A Comparison of Immigration Growth and Fertility Growth as Alternative Solutions to Australia's Ageing Population Problem.

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Abstract

The combined effects of the post World War Two 'baby boomers' approaching retirement age and a decreasing fertility rate is predicted to cause Australia's worker ratio to increase from 2011. This raises the policy issue of how future tax revenue can be generated to finance the increase in social expenditure necessary to support the increasing number of dependents. This paper explores fertility growth and immigration growth as alternative policy options to increase the size of the future labour force. In addition to exploring the impacts on employment of these alternative policies, the impact on various other economic variables is investigated.

The increase in skilled immigration under recent immigration policy changes is found to improve employment outcomes for recently arrived new-immigrants relative to those who arrived prior to the policy changes. A logit analysis of the second Longitudinal Survey of Immigration to Australia data reveals that the probability of employment for less-skilled immigrants is significantly related to post-secondary education, Australian qualifications and English language skills. The future employment rate of new immigrants is predicted to increase as less-skilled immigrants who invest in education post-arrival enter the labour force.

Forecasts generated using the Murphy Model (MM2) for various demographic scenarios reveal that gradually increasing immigration levels from 2010 produces a more favourable worker ratio than alternative scenarios. Economic forecasts at 2011 indicate that, in addition to increasing the worker ratio, gradually increasing immigration impacts positively on other economic indicators. Gradually increasing immigration increases labour productivity, is non-inflationary, increases per capita consumption, reduces the income gap, and increases income for the pre-immigration population. Unemployment is marginally increased in the medium-term, as is the ratio of the current account deficit to GDP. However, as productivity and GDP increase over time, unemployment and the ratio of the current account deficit to GDP are expected to decrease.

Introduction

The post world war two baby boom, followed by a decreasing fertility rate has led to an increase in the proportion of over 65 year olds in the Australian population. It is predicted, under current mortality, fertility and immigration assumptions, that in the 40 years from 2011 to 2051 the dependency ratio per 100 will increase by over 20. That is for every 100 individuals between ages 15 and 65 (the usual working ages) there will be an increase in the number of individuals outside the usual working ages of 21.7. This anticipated change in population structure raises the issue of how the increasing number of dependents is to be financially supported. As the number of dependents increases, the tax revenue required to finance increasing social expenditure will also need to increase.

The purpose of this paper is to explore two policy alternatives for dealing with this ageing population issue; immigration growth and fertility growth. It is hypothesised that immigration growth will be more efficient than fertility in stabilising the worker ratio (the proportion of the population in the labour force relative to the proportion not in the labour force). A policy to encourage fertility growth would be costly in terms of the financial incentives that would need to be offered and the initial increase in the dependency ratio. Immigration growth is hypothesised to produce more immediate results and be less costly to implement. However, it is necessary to investigate the impacts of immigration and fertility growth (both in the short-run and the long-run) on the labour force and other economic indicators, in order to determine which of these policy options is preferable.

In chapter 2 the likely impact of Australian immigration on various economic indicators is discussed. In particular output and income, income distribution, inflation, unemployment and balance of payments are identified as economic indicators against which policy alternatives should be judged, in addition to labour force outcomes. Disaggregating the results into the pre- and post-immigration population is also recommended.

Chapter 3 focuses on recent empirical work and models employed to test the impact of immigration on the economy. Immigrants entering under previous immigration policy were found to have no significant impact on the unemployment rate, inflation or the current account (when measured in terms of direct effects). Increasing the skill level of immigrants has been shown to improve living standards and labour productivity. Immigrants entering under current policy, which focuses on skilled migration, produce greater economic benefits than those who entered previously. Previous research does not compare the economic impact of increasing immigration with fertility growth. Consequently, as a relevant input into the current policy debate, this paper improves on previous research.

The Longitudinal Survey of Immigration to Australia (LSIA) was conducted by the Department of Immigration, Multicultural and Indigenous Affairs to collect data on the early settlement experiences of new immigrants to Australia. Two cohorts of immigrants were surveyed, the first (LSIA1) being immigrants who arrived in the two

year period from September 1993 to August 1995. The second cohort (LSIA2) included immigrants who arrived in the one-year period from September 1999 to August 2000. LSIA2 data is analysed in chapter 4, to assess the labour force experience of new-migrants 18 months after arrival.

Examination of LSIA2 data reveals that new-immigrants aged over 15 achieve an employment rate only 0.3 per cent lower than the national average 18 months after arrival. Amongst primary applicants the employment rate 18 months after arrival is 3.2 percentage points higher than the national average, an improvement of 8.8 percentage points over LSIA1 primary applicants. This evidence supports the expectation that the current composition of new-immigrants will produce greater economic benefits than past immigration.

A logit analysis of the LSIA2 data reveals that Australian qualifications and English language ability greatly improve the probability of employment for less skilled immigrants. As less-skilled migrants invest in these forms of human capital post-arrival, their labour force outcomes are predicted to improve as a consequence. Therefore, in the long run employment rates are expected to be greater for new-immigrants than the national average, even before the worker ratio is predicted to decline. The greater than national average skill level of new-immigrants will also yield greater labour force productivity for increasing the labour force by immigration rather than fertility.

In chapter 5 the demographic module of the Murphy Model (MM2) is used to generate demographic forecasts based on various migration and fertility assumptions. These forecasts support the hypothesis that increasing immigration will stabilise the worker ratio earlier and at a higher level than increasing fertility, so long as the increase in immigration levels occur gradually over time. The demographic scenarios are imported into main module of MM2 to predict their initial impact on the economic indicators identified in chapter 2. The main module only produces annual economic forecasts up to 2011, but this is sufficient to assess whether there are any costs associated with increasing immigration relative to fertility.

Overall the results strongly support increasing immigration rather than increasing fertility to address the economic impact of Australia's ageing population.

Chapter 1

Current issues in Australian population economics

1.1 Exploring the economic consequences of the demographic changes facing Australia

Australia's population is aging, as a consequence of the post World War Two baby boom and recently declining fertility rates. As the number of retirees grows relative to the number of individuals entering the labour force the issue arises of how the increasing proportion of dependents are to be supported. This chapter explores predictions about Australia's demographic future and two possible policy options for addressing the declining worker ratio.

1.1.1 Changes in Australia's demography post World War Two

Australia's total fertility rate (TFR) peaked at 3.6 in 1961. The result of this post World War Two "baby boom" combined with a TFR that has now fallen below replacement level is a progressive aging of the population. In 1901 35.1% of Australians were less than 15 years of age whilst the proportion aged over 65 was 4%. In 1999 the proportion of under 15 year olds had fallen to 20.7% whereas the proportion of over 65 year olds had risen to 12.2%. [Hugo G. (2001), "Centenary Article – A century of population change in Australia" *Year Book Australia, 2001* , AusStats, pp. 7-8 & 22.]

The Australian Bureau of Statistics has produced national population projections for each year in the period 2002 to 2101. Three alternative population scenarios were produced based on different assumptions for fertility, mortality and migration, with age

structure of migrants based on the average structure for 2001-02. The assumptions of the three scenarios are summarised in the table below:

Table 1.1 Population Projections

	Assumptions				Population as at 30June	
	Total fertility rate (a)	Net overseas migration (b)	Life expectancy at birth (years) ©		2051	2101
	Babies per woman	Persons	Males	Females	million	million
Series A	1.8	125,000	92.2	95.0	31.4	37.7
Series B	1.6	100,000	84.2	87.7	26.4	26.4
Series C	1.4	70,000	84.2	87.7	23.0	18.9
(a) from 2011						
(b) from 2005-06						
(c) from 2050-51						

[Source: AusStats: 3222.0 Population Projections Australia, Explanatory Notes, www.abs.gov.au]

The age structure of the population has been projected for each year under each series. The actual population of Australia on 13 September 2003 (time 14:56:48) was 19,944,291, which according to the Australian Bureau of Statistics is consistent with series B population projections. [AusStats: Population Clock, www.abs.gov.au]. Consequently series B projections are used for the remainder of this section.

The following table summarises series B projections at five-year intervals up to 2051. The data is disaggregated into three age cohorts; 0-14 years, 15-64 years and 65 years and over. This gives a clear illustration of the increasing proportion of elderly in the Australian population under the abovementioned assumptions.

Table 1.2 Projected age structure of Australian population at end June 2006-2051

	2006	2011	2016	2021	2026	2031	2036	2041	2046	2051
total (millions)	20.53	21.52	22.46	23.37	24.20	24.92	25.48	25.89	26.19	26.42
Aged 0-14 (millions)	3.94	3.84	3.76	3.75	3.79	3.83	3.81	3.77	3.73	3.71
% 0-14	19%	18%	17%	16%	16%	15%	15%	15%	14%	14%
Aged 15-64 (millions)	13.86	14.53	14.91	15.17	15.28	15.35	15.42	15.49	15.58	15.56
% 15-64	67%	68%	66%	65%	63%	62%	61%	60%	59%	59%
Aged 65+ (millions)	2.73	3.16	3.80	4.44	5.13	5.74	6.25	6.63	6.89	7.16
% 65+	13%	15%	17%	19%	21%	23%	25%	26%	26%	27%

[Source: AusStats: 3222.0 Population Projections Australia, 2002-2101, www.abs.gov.au]

1.1.2 Australia's increasing dependency ratio / declining worker ratio

So we find a clear decline in the proportion of people about to enter the workforce, with an increase in the proportion of retirees. This presents the economic problem of how the increasing numbers of elderly are to be supported, both financially and otherwise. Clearly as the proportion of retirees escalates relative to new entrants to the workforce there is likely to be insufficient tax revenue at current rates to support the welfare needs of the older population. Furthermore as the demand for facilities such as nursing homes, home aids and other aged care needs increases, the labour required to provide those services is decreasing.

Using the figures from table 1.2 projected dependency ratios can be calculated, where the dependency ratio is measured as the ratio of the population aged 0 to 14 and 65 and over, to the population aged 15 to 65.

Table 1.3 Projected dependency ratios at end June 2006-2051

	2006	2011	2016	2021	2026	2031	2036	2041	2046	2051
Dependency ratio (per 100)	48.2	48.1	50.7	54.0	58.4	62.3	65.3	67.2	68.1	69.8

Table 1.3 indicates the increase in the dependency ratio from 2011 to 2051, under the series B projection assumptions. In the 40 years from 2011 to 2051 the dependency ratio per 100 will increase by over 20. That is for every 100 individuals between ages 15 and 65 (the usual working ages) there will be an increase in the number of individuals outside the usual working ages of 21.7. This is a clear indicator that policy options for coping with this situation be considered now, so that by 2011 appropriate measures can be implemented to manage or dampen this change.

Before investigating two possible policy alternatives, immigration growth and fertility growth, I will consider a more accurate indicator of the economic impact of the above demographic projections, the worker ratio. The worker ratio is the population of individuals in the labour force, relative to the population not in the labour force. The Australian Bureau of Statistics has produced labour force projections for each year up to 30 June 2016 [ABS Labour Force Projections, 6260.0, 1999-2016, www.abs.gov.au].

These projections are combined with population projections for 2002 to 2016 to produce table 1.4 below.[1]

Table 1.4 Labour force and worker ratio projections at end June 2002-2016

	2002	2003	2004	2005	2006	2007	2008
Population Total (millions)	19.66	19.89	20.11	20.33	20.53	20.74	20.94
Labour force (millions)	9.92	10.05	10.17	10.29	10.41	10.51	10.61
Not in labour force (millions)	9.75	9.84	9.94	10.03	10.12	10.23	10.33
Projected worker ratio	1.02	1.02	1.02	1.03	1.03	1.03	1.03
Inverse of worker ratio (per 100)	98.31	97.97	97.68	97.47	97.27	97.34	97.35

	2009	2010	2011	2012	2013	2014	2015	2016
Population Total (millions)	21.14	21.33	21.52	21.71	21.90	22.09	22.28	22.46
Labour force (millions)	10.71	10.80	10.89	10.97	11.04	11.11	11.17	11.24
Not in labour force (millions)	10.43	10.53	10.64	10.75	10.86	10.99	11.10	11.22
Projected worker ratio	1.03	1.03	1.02	1.02	1.02	1.01	1.01	1.00
Inverse of worker ratio (per 100)	97.42	97.46	97.70	98.03	98.42	98.91	99.36	99.86

The worker ratio is predicted to decline from 2010. As the population continues to age over time the worker ratio will continue to deteriorate, in the absence of policy intervention. The demographic forecasts in chapter 5 predict that, with current fertility and immigration assumptions, the worker ratio will fall to 0.809 by 2064.

[1] The projections are based on historic trends in labour force participation rates

1.2 Identifying an optimal population structure

It has been emphasised above that an irregular population structure has produced the economic problem of a declining worker ratio. Rather than concentrating on optimum population size, identifying an optimal population structure is relevant for addressing the worker ratio issue.

Young and Day identify an optimal population structure as having the following characteristics:

- Continuing low age specific mortality rates
- A gradual attainment of the population target
- A regular age / sex structure

[Christabel Young and Lincoln Day (1995), "Australia's demographic future: determinants of our population", Ch. 2 in, *Population 2040 Australia's Choice,* Australian Academy of Science, Canberra, p. 36.]

The resultant population will be stationary once the population target is reached. The regularity of the age/sex structure will result in a constant worker ratio. Shocks to social expenditure can be avoided because the proportion of individuals requiring particular services (such as education, age pensions, health care) will remain stable. Fertility and immigration are the alternatives for reaching this stationary population structure that will be explored in this paper.

John Greedy compared aggregate social expenditure as a percentage of GDP for various immigration scenarios ranging from 40,000 to 170,000 immigrants per annum, holding other factors influencing social expenditure constant. He found that the ratio of social expenditure to GDP falls as immigration increases. In Greedy's analysis he assumed constant productivity growth and per capita costs in each social expenditure category to be constant. Consequently the reduction in social expenditure to GDP is due to immigration's effect on the age structure of the population and the resulting worker ratio. [Greedy (1999), *Population ageing and the Growth of Social Expenditure,* Melbourne Institute Working Paper Series, Working Paper No. 7/99, pp. 18-19.]

Fertility growth is expected to be less effective in increasing the worker ratio because of the increase in the number of dependent children it would also produce. Initially the worker ratio would actually decline. Consequently we can expect a greater increase in social expenditure from fertility growth than from increased immigration, requiring a larger or more productive workforce than that required under the alternative scenario of increasing migration.

If productivity is increasing over time this will reduce the size of the worker ratio required to maintain a stable rate of social expenditure. The relative skill levels of new-immigrants and other Australians in the workforce will also have productivity effects. The analysis in chapter 5 considers both productivity and labour force growth effects of various migration and fertility scenarios.

1.3 Fertility growth versus immigration growth as possible solutions for achieving an optimal population structure

A solution proposed by the Australian government is that the population should be encouraged to bear more children, blaming the breakdown of the traditional family as one cause of the declining fertility rate, which had fallen to 1.7 in 2002. According to Liberal politician Malcom Turnbull, "In light of the threat to our society from the decline in fertility and the increase in family breakdown, we should be identifying policies which actively promote 'united caring families' and the social values they represent." At the same time as bearing more children Turnbull wants to encourage women to "participate to their fullest in the workforce". [Michelle Gratten, "Turnbull's solution: marry and multiply", Sydney Morning Herald, July 15, 2002, p. 1 & 6.]

Even if families could be encouraged to be more caring, have more children yet still participate fully in the workforce, the effects of such a policy would not be felt for at least 15 to 20 years. Until this time the increase in dependent children will be a drain on the economy additional to the increasing proportion of retirees to workers. Moreover a solution which depends on the population conforming to the will of the government rather than their own individual preferences would be extremely difficult to implement.

Furthermore, the result of such a policy may be that only poorer families choose to have more children in order to reap the financial rewards offered by the government to encourage fertility growth. The size of such incentives would need to be sufficiently high to offset the cost of childcare and the opportunity cost of time out of work in order

to be of any financial benefit to families, even in the short term. In the long term, by offering incentives to increase fertility in Australia, the government may in fact be adding to the income gap by generating a continual spiral of education sacrificed by the poor in order to bear more children. Lappe and Shurman indicate that many studies have concluded that an inverse relationship exists between women's education and fertility. It is the poor and less educated who typically have more children in an attempt to cope with their economic weakness. [Lappe and Shurman, *Taking Population Seriously,* The Institute for Food and Development Policy, CA, USA, 1998,1990, pp. 25-30].

In contrast, wealthier, more educated families are already more empowered to choose how many they wish to have because they can afford childcare if they choose to both bear children and continue to work. However, the opportunity cost of even a short period of parental leave is greater for wealthier families. Consequently to avoid widening the income gap, incentives offered to increase fertility would need to be means tested. This would be costly both administratively and in terms of cost of the incentive payments.

A more immediate and less costly policy to implement would be to stabilise the population structure through immigration. Australia turns away thousands of potential immigrants every year and yet these people may be the solution to our pending economic crisis. There may also be global environmental benefits from spreading the world's population over a greater area, rather than adding to it. The net economic

impact on the nations from which individuals are emigrating is unclear. This would need to be considered in addition to global environmental benefits and is suggested as an area for future research.

Chapter Two

Comparing migrants with the Australian born population

2.1 Identifying a series of economic indicators to analyse the impact of immigration relative to fertility growth on the Australian Economy

In order to explore the question of whether immigration or fertility growth is the preferred method for achieving an optimal population structure it is helpful to examine the impact of migrants versus the native born population on particular economic indicators. The increase in social expenditure arising from the increasing number of retirees in the population will need to be financed out of tax revenue. A larger worker ratio and a more productive workforce will require a lower average tax rate per capita to finance public expenditure on the dependent population. Thus, labour force experience of migrants relative to the native born population, in terms of the proportion of the population employed and the productivity of labour, is a key determinant of whether an increase in one or the other is preferable. The labour force experience of new immigrants is analysed in detail in chapter 4.

However, population growth does not only affect the economy through the supply of labour. Population growth affects the economy through both supply and demand effects, which may impact on economic growth, income distribution, inflation and the balance of payments. The impact on all of these variables of changes in migration compared with fertility should therefore be considered in comparing the net benefits of these alternative population growth scenarios. In some cases natural population growth may produce the same effects as migration growth. It is therefore insufficient to

examine these variables with respect to migration alone, but to examine the impact of changes in migration relative to in changes in the native born population. The timing of such effects is also of crucial importance and is discussed in section 2.2.

Chapter 3 reviews previous empirical evidence and economic models that have been employed to test the impact of past immigration on the Australian economy, looking at the results and also the shortfalls of these models**.** In chapter 5 the Murphy Model is employed to compare the impact of immigration growth with fertility growth on both the worker ratio and other economic indicators. The specific indicators on which this chapter focuses are outlined below.

2.1.1Output and Income

An increase in population via immigration will cause the economy to expand because it will increase both demand and supply. Whether this translates into an increase in per capita output depends, on whether the rate of expansion of output exceeds the rate of population growth. [M. Woden, "The Economic Impact of Immigration", Ch. 3 in Bureau of Immigration and Population Research, *Australian Immigration a Survey of the Issues*, AGPS, Canberra, 1994, p. 111.] If the productivity of immigrants in the labour force exceeds that of the pre-immigration labour force then the expansion of output will be greater as a consequence. Output expansion would need to exceed the growth rate of the total population to be welfare improving.

Woden [1994, pp. 124 –125.] suggests that regardless of skill factors, migrants are likely to be more motivated than the native born population, in part because the decision to migrate indicates a high degree of motivation and furthermore because job security is likely to be more important to immigrants as they have more difficulty finding work quickly. Obviously whether this motivation translates into greater expansion of output depends on migrants actually being employed, which is discussed further on.

Even if per capita output declines as a result of immigration, this does not necessarily indicate a decline in welfare either for the pre-immigration population or for the immigrants themselves. In order to correctly interpret the output and income effects of immigration it is necessary to disaggregate the results to evaluate whether the per capita income of the pre-immigration population has improved. It is possible that the per capita income for the immigrants may be significantly lower than for the population as a whole. It does not necessarily follow that this indicates a welfare decline for immigrants. Indeed, the decision to migrate suggests that voluntary immigrants[2] experience an improved welfare level in Australia relative to their country of origin.

If new-immigrants in the labour force are more skilled than the pre-immigration population then GDP and average income growth may overstate the benefits to the pre-migration population. Parmenter and Peter concur that the average income of the pre-immigration population is the appropriate variable by which to determine the long-term

[2] The effects on forced migrants are less obvious, but where migration is from the developing world to Australia it is likely that the welfare affect on those migrants will also be positive.

economic effects of immigration. [Parmenter and Peter (1990), *Two papers on the Economics of Immigration,* Institute of Applied Economic and Social Research, Parkville, Vic, p. 12.]

Withers [cited in Woden 1994, p. 122.] found that since 1877 per capita GDP growth consistently understates welfare improvements for the pre-immigration population, whilst the income of immigrants is consistently more than double that of their country of origin. These findings support the need to disaggregate results into pre- and post-immigration populations in order to assess the welfare effects of immigration.

If per capita output for the pre-migration population increases this may be due to economies of scale and/or productivity effects. Scale effects would also be felt via 'natural' labour force growth, however productivity effects occur due to differences in human capital between migrant and native born workers and the degree to which this spills over onto the pre-migration workforce. It is therefore necessary to identify externalities due to productivity to determine whether migrants outperform natives in terms of output growth and per capita income.

The short-term effect of fertility growth on output is a decline in per capita income (as women leave employment or go on maternity leave). Even with policies targeted at returning women to work, it is likely that at least one parent will be in part time work post child-birth, thus reducing per capita income until the new generation enters the workforce. In the long term the productivity issues discussed above will determine whether migration outperforms fertility growth is terms of output effects.

Econtech (the producers of the Murphy Model) suggest that in assessing the impact on living standards, output should be disaggregated in to consumption, investment and net exports. If consumption per capita increases then this indicates an increase in average living standards. [Econtech Pty Ltd (Feb. 2001), *The Economic Impact of 2000/01 Migration Program Changes,* Prepared for the Department of Immigration and Indigenous Affairs, Canberra, p. 12.] In chapter 5 the results of alternative demographic scenarios based on different migration and fertility assumptions are disaggregated into pre and post taxation income for the new-immigrant workforce and the pre-immigration workforce. In addition the impact on per capita consumption levels, which are a function of disposable income, are also considered.

2.1.2 Income Distribution

It is not sufficient to disaggregate income effects into pre-migration and new immigrant populations alone. Whilst this indicates aggregate benefits to these groups it does not indicate the effect on the income gap. Whether migrants perform differently to the Australian born population in terms of distributional effects of population growth depends on the capital/labour ratio.

The entry of immigrants with lower capital than the host country average[3] reduces the capital labour ratio. According to classical economic theory this will increase the earnings of the wealthier end of the pre-immigration population. This is because a

[3] This average will incorporate Australian born and previous migrants. It is still possible however to determine the contribution of new migrants in terms of their deviation from this average.

relative fall in capital increases the return on investment. The effect on the lower income end of the pre -immigration population is a decrease in earnings due to the increased demand for unskilled jobs putting downward pressure on wages. [Simon, J.L. (1999), *The Economic Consequences of Immigration",* 2nd Edition, University of Michigan Press, p. 270.] The combination of these effects increases the income gap in the host country.

If investment increases in response to the higher rate of return, the capital labour ratio will increase. If capital increases sufficiently to return the economy to its pre-immigration capital labour ratio then in the long run the income gap will be unchanged.

Where immigrants increase the average level of capital the opposite scenario will ensue. Thus it is also important that we investigate the various types of capital that immigrants may bring to Australia, focusing not only on physical capital but also on human capital and the degree to which this is embodied in skilled and unskilled labour. The degree to which foreign investment is stimulated by a larger overseas born population will also affect the changes in the capital labour ratio produced by immigration.

2.1.3 Inflation

If the capacity of the economy is already fully or close to fully utilized, then an increase in demand that is not at least matched by an increase in production will result in inflation. If, however, the additional supply of resources from immigrants, such as

labour, capital, technical knowledge and entrepreneurial skills, are at least sufficient to cover the increased demand generated by immigrants then price stability will ensue. Junankar and Pope [(1990), ***Immigration, Wages and Price Stability,*** **Australian Government Publishing Service, Canberra]** estimated a model using quarterly data from 1960 quarter 3 to 1989 quarter 2 and (controlling for two oil price shocks and two periods of incomes policies) found no significant impact of immigration on inflation for that period. This model is discussed in more detail in chapter 3.

Australia's current migration quotas emphasise skilled migration. It is therefore likely that, to the extent that migrants transfer those skills via employment, there will continue to be no inflationary impact of migration. This is due to the extra productivity generated by a more skilled labour force.

2.1.4 Unemployment

When assessing the welfare effects of immigration it is necessary to examine not only per capita output changes for the pre-immigration population, but also changes in the rate of unemployment. If per capita output increases but so does the unemployment rate then clearly the benefits of immigration are not impacting on the entire population. One way of determining whether this is the case is to disaggregate changes in the rate of unemployment into the pre-migration and new-immigrant population. For example, if it is found that in aggregate the unemployment rate is increased, but that the unemployment rate is higher than average for the immigrant population, then we may find that the rate of unemployment is in fact lower for the pre-immigration population.

Once again the experiences of the immigrant population should be compared with that of the country of origin rather than with Australian data.

Pookong Kee assessed the economic attainments of 1st, 2nd and 3rd generation immigrants to Australia using 1986 census data. Kee found that Australians overall who were participating in the labour force faced an unemployment rate of 9.2%. Immigrants in the labour force faced an unemployment rate of 10.4% for the first generation, 10% for the second generation and 8.7% for the third generation. Breaking this down further revealed that recently arrived immigrants with a high proportion of refugees experienced the highest unemployment rates among the immigrant population ranging from 26.6% for Lebanese to 41.5% and 44.1% for immigrants from Vietnam and Cambodia. Whilst some groups showed an improvement in the second generation, for most migrants the unemployment rate did not converge to national levels until the third generation. At the time of this study, however, many groups had a high proportion of their second generation in the under 19 age group. The Cambodian and Vietnamese population, who suffered the worst unemployment levels in the immigrant generation, had 81.3% and 75.2% of their Australian born children in the under 5 age group at the time of the 1986 census. [Pookong Kee, *Socio-economic Attainments of Immigrants and Later-generation Australians,* AGPS, Canberra, 1992, pp. 8-9.]

Various models have been employed by Warren (1982), Withers and Pope (1985) Chapmen et al (1985) and Withers and Pope (1989) to assess the impact of immigration on unemployment. All of these studies find that immigration does not

increase the rate of unemployment and there is some indication (from Withers and Pope's 1989 model) that there is a negative relationship between immigration and the unemployment rate. [Cited in Woden , 1994, pp. 145-146.] Taken in conjunction with Kees' findings above, this indicates that the demand effects of immigration growth are sufficient to stimulate employment growth for the pre-migration population.

Whether or not natural population growth produces an increase or decrease in the rate of unemployment (in the long run) is difficult to predict. In the short term the official unemployment rate is likely to decrease as women leave the labour force to raise children. However the dependency ratio increases putting more pressure on social expenditure. In the long run, assuming the attributes of the new generation are comparable with the existing work force then the trend unemployment rate is likely to remain unchanged.

If the employment rate for migrants is shown to have improved due to recent changes in visa category quotas, then it is likely that immigration growth will reduce the rate of unemployment to a greater degree than shown in earlier studies. This indicates an obvious benefit of immigration growth over fertility growth because, by identifying which cohorts of migrants perform better than others, policy makers can then decide which types of immigrants to encourage when addressing particular economic goals.

2.1.5 Balance of Payments

In 1998 tourism was responsible for 15.1 percent of Australia's export earnings [Hugo G., "Centenary Article – A century of population change in Australia" *Year Book Australia, 2001* , AusStats, p16]. If increased migration is pursued as a means of population growth the tourism industry is likely to expand as new Australians are visited by their families and friends from overseas. Migrants returning to their previous country for holidays would offset this to some degree. Net unrequited transfers overseas are also likely to increase and dampen some of the positive balance of payments effects of immigration.

Accepting more migrants from Asian countries will also improve Australia's relationship with this part of the world, on which it is highly dependent for export income from the sale of food and natural resources. As more of Australia's labour force is comprised of people with connections overseas, we can expect a heightened international profile and increased demand for Australian exports as a consequence. This may be dampened by an increasing demand for imports as migrants purchase goods from their country of origin that are not available in Australia. If net exports remain unchanged, but trade flows increase, this represents a welfare gain both nationally and internationally as consumers face a larger choice set.

Australia can also expect an increase in foreign investment as more Australians are foreign born and may finance investment projects by borrowing overseas. The degree

to which increased lending to other countries may offset this depends on both average capital levels and national savings. If new migrants have lower than average capital and if average savings are unchanged then we can expect net capital inflows. Whilst this will add to the country's current account deficit (absorbing some of the increased export revenue) the benefits of new foreign investment will be reflected in output and employment growth.

2.2 Human Capital investment: immigrants versus native-born population

Human capital can be evaluated in terms of three phases. Initially there is an investment stage from birth through education to seeking employment. This phase is (usually) followed by a productive phase of employment and finally there is the retirement phase. Working age adults who migrate to Australia and gain employment are a cost saving over native-born human capital because the initial investment phase of 15 years or more is eliminated. [Chris Richardson, "Migration Myths and Realities", Address to DIMIA Staff, Dec '02, Access Economics, www.imi.gov.au/research/publications/richardson.pdf] Even if a migrant family has children, the savings in terms of the parents' investment phase being financed by their country of origin renders the family unit less costly than one where all members are Australian born.

Once an individual enters their productive phase, however, we need to compare the contributions of migrants versus native-born individuals to the economy. It was suggested in the previous section that immigration does not increase inflation or

unemployment and is probably welfare improving. For fertility to produce greater economic benefits than migration, it would therefore be necessary for Australian born individuals to outperform migrants during the productive phase by an amount greater than the savings produced by migrants in the investment stage.

J. L. Simon investigates the human capital effects of migrants in the USA in terms of 'human capital externalities'. Simon suggests that a person's output depends not only on his own skills but also on the skills of those they work with. Migrants from poorer countries are less informally skilled in areas such as computers than those from wealthier countries (for the same level of formal education). Consequently until these informal skills are learned such migrants represent a 'lower quality of capital' than native-born workers. Once these skills are learned, however, migrants outperform natives. Furthermore there are positive externalities gained from working with someone from a different culture because of the new ideas they contribute. The size of the initial negative effect is dependent on the proportion of new migrants to natives in a given workplace. Simon finds that if this proportion is small then the positive 'new ideas' effect is dominant. [Simon, J.L. (1999), p. 8.]

Furthermore because migration increases aggregate output, this induces increased investment in plant and equipment, which presents an opportunity for adoption of new technology. [Woden, 1994, pp. 132-133.] Technological innovation in the form of new ideas and up-to-date equipment will shift the production frontier outward increasing the returns to both capital and labour.

If labour force growth creates opportunities for technological expansion then fertility increase would also increase the return to capital and labour in the long-run. However, an increase in the labour force from fertility growth would not occur for at least 15 years, and in the short term there is likely to be a negative effect as the labour force declines due to an increase in parental leave.[4] Labour productivity would need to be sufficiently high to offset the increasing dependency of women and children for fertility growth to produce aggregate productivity gains. Furthermore the new ideas effect would render the technological advancement due to immigration greater than that due to population growth via increased fertility even in the long run.

Cobb-Clark, Connoly and Worswick suggest that Australian policy makers should consider transferability of skills when deciding the basis on which immigrants should be accepted. [(March 2002), *Education and Job Search among Immigrant Families,* http://econrsss.anu.edu.au/~dcclark/index.html, p. 2.] The Department of Immigration increased skills based immigration quotas from 37.3 percent in 1996-97 to a planned 57.5 percent in 2001-02. Such applicants are required to satisfy a points test requiring a high level of skill, strong employment history and good English language ability. [Department of Immigration And Multicultural Affairs (2001), *Population Flows Immigration Aspects*, http://dimia.gov.au/statistics/publications/popflows2001/popflows2001.htm, Chapter 5, "Migrants and the Labour Market", p. 61] Yet Cobb-Clark et al. indicate the need to

[4] This decline in the labour force for reproductive purposes would be difficult to accurately measure because many parents would be on official maternity/paternity leave for 12 months and consequently still be recorded as employed.

determine the extent to which these skills are transferred. If skilled immigrants are unable to transfer their skills and if "unskilled immigrants" undertake rapid investment in developing their own skills post migration then the gap between "skilled" and "unskilled" migrants closes. [Cobb-Clark, Connoly and Worswick, March 2002, p. 2.]

Evidence of the economic success of less skilled immigrants in the Australian community is found in Strahan and Williams' (1988) study of small businesses between 1973 and 1985. The success of immigrant small businesses outweighed that of Australian born with 53.4% immigrant firms surviving the first 3 years of business, compared to 46.6% for Australian born. This was despite less formal training and a smaller start up scale. [Woden, 1994, p. 133.] This suggests that immigrants may possess greater entrepreneurial ability than native-born Australians, which offsets any lack of formal training pre migration. Further research is necessary to determine the proportion of new-migrants establishing small businesses and their current success rates to determine whether this has a significant impact on the economy.

The Department of Immigration has recognized that the Australian labour market prefers Australian qualifications to many overseas qualifications. Consequently in July 2001 new onshore categories for immigration were introduced waiving the work experience requirement for applicants with Australian qualifications who apply within 6 months of completing their studies. [Department of Immigration And Multicultural Affairs (2001), "Skill Migration", p18] This preference for Australian qualifications supports the need to determine whether our preference for qualified and experienced

migrants is too heavily weighted, given that subsequent human capital investment in Australia may be more transferable to the labour market.

The Longitudinal Survey of Immigration to Australia provides the basis for such a study because it interviews the spouse as well as the primary applicant of migrant families entering Australia under various visa categories. Whilst the application to migrate is assessed on the criteria of the primary applicant alone, the survey allows us to compare the post migration experience of the applicant and spouse. If the spouse is shown to acquire Australian qualifications post arrival, or if the primary applicant is unable to transfer their skills acquired overseas, then we may find that there is a far smaller difference in productivity between skilled and unskilled immigrants than is suggested by current policy. The results can also be disaggregated into visa category for a richer analysis.

Chapter 3

Reviewing previous empirical research

3.1 Published results from the first wave of data from the Longitudinal Survey of Immigration to Australia (LSIA)

The LSIA was conducted to collect data on the early settlement experiences of new immigrants to Australia. Two cohorts of immigrants were surveyed, the first (LSIA1) being immigrants who arrived in the two year period from September 1993 to August 1995. The second cohort (LSIA2) included immigrants who arrived in the one-year period from September 1999 to August 2000. Results from LSIA1 were used by the Department of Immigration to review migration policies. As a result policy changes were introduced in 1996, such as extending the waiting period from 6 months to 2 years for which immigrants could be eligible to receive most social security benefits. Consequently LSIA2 results reflect more accurately the experiences of new immigrants, because it assesses immigrants who arrived after the new policy was established. [Department of Immigration and Multicultural and Indigenous Affairs (DIMIA) (26/09/2002) "LSIA User Documentation", Section II: Overview of the Survey, p. 14.] Chapter 4 of this paper analyses LSIA2 results. For the purpose of comparison, published results of LSIA1 data are discussed below.

For LSIA1 a sample of 5192 visaed primary applicants over age 15 and their accompanying spouse (including fiancé or de facto partner) who arrived as offshore visaed immigrants, were interviewed three times over the first three years post arrival. The survey excluded New Zealand citizens; immigrants granted a visa while resident in

Australia; immigrants granted special eligibility visas (such as former Australian citizens); and immigrants with no identifiable country of birth.[5] The survey sample of 5192 primary applicants represents 7 per cent of the remaining immigrant population who arrived between September 1993 and August 1995. The first interview was conducted five or six months after arrival, the second interview one year later and the third interview another two years later. These interviews are identified as wave 1, wave 2 and wave 3 respectively. Wave specific estimation weights are applied to the data in order to account for biases between the sample and total population of immigrants who arrived between September 1993 and August 1995. Weights were constructed based on visa group, country of birth, sex, English language proficiency and state or territory of residence. Wave 2 and 3 estimation weights also account for sample attrition[6], and the total population remaining onshore. [DIMIA (26/09/2002) "LSIA User Documentation", Sections II, V and VI]

The table below summarises labour force participation rates and unemployment by visa category for LSIA1 primary applicants.

[5] For LSIA1 and 2 the proportion of offshore-visaed primary applicant immigrants aged under 15 on arrival is less than four per cent of the total. For LSIA 2 the other exclusions amount to less than one per cent of the total. It is not explained in the documentation what this percentage is for LSIA1.
[6] In LSIA1the percentage interviewed in all 3 waves was 70%.; 11% were unable to track,; 4% refused; 6% overseas temporarily; 5% overseas permanently ; and 2% other (death, illness etc). In LISA2 85% were interviewed in both waves; 5% unable to track; 3% refused; 3% overseas permanently; 2% overseas temporarily; and 2% other. [DIMIA (26/09/2002) "LSIA User Documentation", Appendix D, p2]

Table 3.1 Labour force participation and unemployment rates for LSIA1 primary applicants

	Preferential Family	Concessional Family	Business / Employer Nominated	Independent	Humanitarian	Total
Participation Rate						
Wave 1	48	80	85	90	43	58
Wave 2	54	86	94	93	56	65
Wave 3	58	90	95	93	66	69
Unemployment Rate						
Wave 1	36	37	2	26	84	37
Wave 2	19	18	3	9	49	19
Wave 3	16	9	2	4	33	14

[After VandenHeuvel and Wooden (Nov. 1999), *New Settlers Have Their Say – How Immigrants Fare Over the Early Years of Settlement,* Commonwealth of Australia, Canberra, Table 2.1, p. 25.]

It is clear from the above results that migrants who enter under the skilled and points tested categories (concessional family, business and independent) outperform the unskilled family and humanitarian categories in terms of labour force participation and unemployment. The Humanitarian category shows the greatest improvement over time with an unemployment rate of 84 per cent in wave 1 falling to 33 per cent in wave 3. Whilst labour force participation was lowest for humanitarian entrants in wave 1, by wave three this rate had increased to 66 per cent whilst the preferential family labour force participation rate only increased to 58 per cent. Despite an unemployment rate of 26 percent in wave 1, by wave 3 the skilled independent category is only two percentage points behind the business skills / employer nominated category for both its

labour force participation rate and its unemployment rate. Similarly the concessional family (points tested) category catches up with the other skilled categories over time, although participation and unemployment rates remain less favourable for this group than the other skilled categories.

The wave 3 results are disaggregated further to show the relationship between gender, qualifications and English speaking skills, summarised in the tables below:

Table 3.2 Primary applicants: labour force participation rates at wave 3

	Preferential Family	Concessional Family	Business / Employer Nominated	Independent	Humanitarian	Total
Gender						
Male	77	93	97	95	78	84
Female	46	84	84	87	46	51
Qualifications						
Degree or higher	66	90	98	91	72	80
Other post-secondary	68	91	94	95	74	77
No post-secondary	44	85	78	*	58	48
Spoken English						
Good	64	91	97	93	78	75
Poor	42	82	79	88	54	49

* Sample too small for reliable estimation

[After VandenHeuvel and Wooden (Nov. 1999), Table 2.2, p. 27.]

Table 3.3 Primary applicants: unemployment rates at wave 3

	Preferential Family	Concessional Family	Business / Employer Nominated	Independent	Humanitarian	Total
Gender						
Male	15	8	2	5	33	14
Female	16	9	*	*	31	15
Qualifications						
Degree or higher	6	8	*	4	38	8
Other post-secondary	11	8	*	3	21	10
No post-secondary	31	*	*	*	41	32
Spoken English						
Good	9	7	*	3	23	8
Poor	43	18	*	*	48	41

* Sample too small for reliable estimation

[After VandenHeuvel and Wooden (Nov. 1999), Table 2.3, p. 27.]

Labour force participation is significantly higher for male than female applicants, with the difference in participation between the sexes being greatest for the preferential family and humanitarian visa categories. The national participation rate for males in 1997 was 73.4 and for females 53.8 [Year Book Australia (2002), section 6.5 "Civilian Population Aged 15 and Over, Labour Force Status, Annual Average" **http://www.abs.gov.au/Ausstats/abs**, pp. 4-5]. Amongst the primary applicants in LSIA1, 3 years after arrival, only female preferential family and humanitarian immigrants had participation rates below the national averages for males and females.

There is no obvious difference between the unemployment rate for males and females within any of the visa categories, although only males in the skilled categories

performed better than the national average, of 8.6 per cent for males and 8.0 per cent for females. [Year Book Australia (2002), section 6.5, pp. 4-5.]

Post secondary qualifications and English speaking skills impact positively on both the labour force participation rate and unemployment rate for all visa categories. For the Humanitarian and Concessional (points tested) family categories, the unemployment rate is more than doubled for those with poor spoken English. For the preferential Family category English-speaking skills have the greatest impact, with an unemployment rate almost five times higher for those with poor spoken English. The skill level of migrants not only improves the likelihood of being in the labour force and gaining employment but also, if new migrants in are more skilled than the existing population, will have a positive impact on labour force productivity.

All of the results indicate that labour force participation increases over time of residence whilst unemployment decreases. Skilled visa categories perform better than unskilled categories in terms rates of labour force participation and unemployment over all waves. For all categories English speaking ability and post secondary education improve outcomes. This indicates that if immigrants invest in education and improve English language skills post arrival; the gap between categories is likely to become smaller. The degree to which employers prefer Australian qualifications will close the gap even further. This is examined in chapter 4 where the LSIA2 data is analysed and the impact of Australian over foreign qualifications is compared.

3.2 Previous models employed to test the impact of immigration on the economy

Junanker and Pope investigate the impact of immigration on wage and price inflation in the Australian economy. They construct a three-equation model to analyse the impact of migration on the unemployment rate, wage inflation and price inflation. The inclusion of the unemployment rate allows indirect inflationary effects of migration to be incorporated into the model, because changes in unemployment effect wage inflation (via a Philips curve relationship) and this follows through to affect price inflation. The authors are critical of most previous models for failing to include this relationship. The equations of their model are as follows:

Wage inflation: $w = f(UR, p_e, M, \ldots) + e_1$

Price inflation: $p = g(w, prod, imp, M, \ldots) + e_2$

Unemployment rate: $UR = h(W/P, cap, M, \ldots) + e_2$

Where p_e are price expectations; M is a vector of migration variables (permanent and long term arrivals and departures and rates with respect to total population); prod is a productivity growth index; imp is an index of import price inflation; W/P is the real wage rate; cap is a capacity utilisation variable[7], and e_n are the error terms. [Junankar and Pope (1990), p. 18.]

In addition to the abovementioned variables, lagged and dummy variables are included in the equations. In particular dummy variables are included for each of the oil price shocks and for the two periods of income policies (1975 q2 to 1981q2 and the Accord from 1983q2), seasonal dummies and time trend variables were also included. The data

[7] Cap = RGDP/RGDPHAT*100, where RGDP is real GDP and RGDPHAT is derived by regressing log RGDP on an intercept and time trend variable [Junankar & Pope (1989), p59]

used in the estimation was from 1960 q3 to 1989 q2 and the model was estimated using the Datafit (Microfit) program. [Junankar and Pope (1990), p. 22.]

Results for price inflation should be interpreted with caution as standard errors are biased and estimates inefficient due to serial correlation. Consequently the authors examine the signs and magnitude of the coefficients and conclude that arrivals have a negative impact on price inflation, whilst departures have a positive impact. This implies that the supply effects of migration outweigh the demand effects. When they impose zero restrictions on the coefficients, however, the restrictions cannot be rejected. In other words the results suggest that there is no significant impact of migration on price inflation. [Junankar and Pope (1990), p. 26.]

The results from the wage inflation equation are more reliable. Once again the sign of the coefficients for migration variables suggest that arrivals have a negative impact on wage inflation whilst departures have a positive impact. However, the coefficients were not very significant and when zero restrictions are imposed on the migration coefficients they cannot be rejected. Consequently the results support the hypothesis that migration does not have a significant effect on wage inflation. [Junankar and Pope (1990), p. 26.]

For the unemployment equation, the sign of the migration coefficients suggest that arrivals positively affect unemployment whilst departures have a negative effect. However, the coefficients of the migration variables were not very significant and once

again when a zero restriction is imposed on the coefficients the restriction cannot be rejected. Consequently the results suggest no significant impact of migration on unemployment. [Junankar and Pope (1990), p. 26.]

The authors indicate that these results are consistent with some of the simpler models previously employed, despite different estimation methods and time periods. They conclude that migration has no significant impact on unemployment or wage and price inflation. [Junankar and Pope (1990), p. 27.]

Junanker and Pope, together with Kapuscinski and Mudd, also test the balance of payments effects of Australian migration. They begin with the following set of equations (a simplified version of a previous model by Goldstein and Khan, 1985):

Import demand:	Md = Md (Y, Pm, P)	(3.1)
Import supply:	Ms = Ms (Pm*, P*)	(3.2)
Equilibrium condition for imports:	Md = Ms	(3.3)
Export demand:	Xd = Xd (Y*e, Px, P*e)	(3.4)
Export supply:	Xs = Xs (Px, P)	(3.5)
Equilibrium condition for exports:	Pm = Px*e	(3.6)
Definition:	Pm = Px*e	(3.7)
Definition:	Pm*= Px/e	(3.8)

Where M and X represent imports and exports respectively and their subscripts d and s indicate demand and supply respectively; Y is GDP; P denotes prices with subscripts m and x representing import or export prices respectively; e is the exchange rate and *

indicates world values. The definitions 3.7 and 3.8 explain that import prices in one country equal export prices of the other country converted to domestic prices by the exchange rate (assuming no tariffs or subsidies). [Junanker, Pope, Kapuscinski and Mudd (1994), *Immigration and Australia's External Account Balances,* Australian Government Publishing Service, Canberra, p. 22.]

The export supply equation is modified to include trend level domestic output, which is itself a function of various exogenous factors (Z below) and immigration. Combining the above equations leads to the following estimable equations for exports and imports:

$$\log X = \lambda_0 + \lambda_1 \log P_w + \lambda_2 \log Y_w + \lambda_3 \log P + \lambda_4 \log Z + \lambda_5 \log (\text{immigration}) + u \quad (4.5)$$

$$\log M = \beta_0 + \beta_1 \log Y + \beta_2 \log P_m + \beta_3 P + \beta_4 (\text{immigration}) + v \quad (4.6)$$

where subscript w is now used to indicate a world, as opposed to domestic, variable; Z indicates other exogenous variables, including lagged values of Y. Immigration is also split into arrivals and departures (permanent and long term).

Finally an equation is estimated for the current account balance:

$$CAB = \delta_0 + \delta_1 TOT + \delta_2 ER + \delta_3 GDP + \delta_4 (\text{immigration}) + \varepsilon \quad (4.7)$$

Where TOT is the terms of trade; ER is the exchange rate; GDP is domestic GDP (same as Y).

u, v and ε are the error terms for equations 4.5,4.6 and 4.7 respectively.

[Junanker, Pope, Kapuscinski and Mudd (1994), pp. 25-26.]

Similarly to Junanker and Pope's model of unemployment and inflation, discussed previously, this model is superior to most previous models of the economic impact of immigration because it focuses on permanent and long-term arrivals and departures, as opposed to net migration including short-term migration. The demographic module of the MM2 model used in Chapter 5 of this paper also focuses on permanent and long-term migration and arrivals and departures. Short-term migration is dominated by tourism and is likely to have very different economic effects from long-term and permanent migration, which are the focus of the immigration debate.

The equations were estimated using ordinary least squares estimation, with quarterly and annual data from 1952 to 1988. The results for annual and quarterly estimations summarised in the tables below which shows the signs of the long run multipliers:

Table 3.4 Annual data, results of the impact of migration on the current account

	Exports	Imports	CAB
Arrivals	-	0	0
Departures	0	-	+
Net migration	-	+	0

[After Junanker, Pope, Kapuscinski and Mudd (1994), table 4.17, p. 39.]

Table 3.5 Quarterly data, results of the impact of migration on the current account

	Exports	Imports	CAB
Arrivals	0	0	0
Departures	+	-	+
Net migration	-	+	-

[After Junanker, Pope, Kapuscinski and Mudd (1994), table 4.18, p. 39.]

Given that this paper is interested in the effects of increasing immigration we are most concerned with the results for arrivals. Annual data indicate that arrivals decrease exports, and both sets of data suggest that there is no impact of arrivals on imports or the current account balance.

One problem with the estimation method used, however, is that it only models direct effects of migration. As the authors themselves indicate, indirect effects of immigration may affect exports, imports and the current account balance. Immigrants that are more skilled than the average population may increase exports via increased productivity. Increased contacts overseas may also boost exports, as would increases in tourism and other short-term migration (such as for education) from friends and family of immigrants. Increased investment may boost imports in the short run and exports in the long run, and changes in aggregate demand and aggregate supply caused by immigration would impact on the current account. [Junanker, Pope, Kapuscinski and Mudd (1994), table 4.17, p. 25.]

The MM2 model used later in this paper allows for the impact of skills changes on productivity. The population scenarios in MM2's demographic module impact on housing and business investment, via the population growth rate. Similarly, migration in MM2 affects labour force participation and the size of the labour force, aged pensions and family allowance payments. All of these effects feed into other areas of the model, and ultimately the balance of payments. Consequently MM2 will improve

on the above results because it models many of the indirect effects of immigration as well as direct effects.

William Foster used the Access Economics Murphy Model (a predecessor of MM2) to model the effects of various immigration scenarios on the economy. Because a similar method is used to construct demographic scenarios in chapter 5 of this paper, a detailed exposition of Foster's work is given here.

The scenarios differ in terms of magnitude and skill level of immigration. A1, B1 and C1 vary the skill composition of immigrants, with A1 being the most skilled and C1 the least. B2 and C2 reduce the magnitude of immigration, leaving the proportion of skilled immigrants the same as B1 and C1 respectively. C3 reduces the magnitude of immigration even further, leaving the skill composition the same as C1 and C2. The scenarios are summarised in table 3.6 below:

Table 3.6 Summary of alternative demographic scenarios

('000s persons p.a.)	A1	B1	B2	C1	C2	C3
Family	47.0	42.5	34.0	53.3	42.7	32.0
Skilled	41.0	42.5	34.0	26.7	21.3	16.0
Humanitarian	12.0	15.0	12.0	20.0	16.0	12.0
	100.0	100.0	80.0	100.0	80.0	60.0
Special eligibility	0.5	0.5	0.5	0.5	0.5	0.5
Unvisaed	11.0	11.0	11.0	11.0	11.0	11.0
Permanent arrivals	111.5	111.5	91.5	115.5	91.5	71.5
Permanent emigration						
Early 90s	30.0	30.0	30.0	30.0	30.0	30.0
Later 90s	30.0	30.0	27.5	30.0	27.5	25.0
Net permanent arrivals						
Early 1990s	81.5	81.5	61.5	81.5	61.5	41.5
Later 1990s	81.5	81.5	64.0	81.5	64.0	46.5
Long-term arrivals	115.0	115.0	115.0	115.0	115.0	115.0
Long-term departures	105.0	105.0	105.0	105.0	105.0	105.0
Category jumpers	11.0	11.0	11.0	11.0	11.0	11.0
Net migration gain						
Early 1990s	102.5	102.5	82.5	102.5	82.5	62.5
Late 1990s	102.5	102.5	85.0	102.5	85.0	67.5

[After Foster (1992), *Macroeconomic Effects of Change in the Size and Composition of Australia's Migrant Intake,* Australian Government Publishing Service, Table 2.1, p. 8.]

The above scenarios are implemented from 1992-93 onwards. The corresponding skills indices for each scenario were derived from occupation and earnings data for 1984-85 to 1989-90, which generates base indices for each migration group. These are then weighted according to relative numbers in each migration group. Finally the aggregate population skill index is derived for each period using the index for each scenario

together with the skill base for Australian born (set at 63.8 in the model and also estimated over the late 1980s). A net funds transfers index is also derived for each scenario using the relative size of each migrant group. The base skills indices and funds transfer indices for each migration category are summarised in table 3.7.

Table 3.7

Migration Group	Base Skills Index	Net Funds Transfer Index
Permanent arrivals		
Family	61.0	0.33
Skilled	73.5	1.50
Humanitarian	54.9	0.00
Special eligibility, unvisaed	62.3	1.00
Permanent departures	65.6	1.10
Long-term arrivals	70.9	0.00
Long-term departures	71.0	0.00
Category jumpers	54.9	0.00

Source: Parameters of AEM demographic module (June 1992) [After Foster (1992), p. 13, table 3.1]

Table 3.8 shows the derived skill index and funds index for each demographic scenario.

Table 3.8

	A1	B1	B2	C1	C2	C3
Skills index						
Early 1990s	64.29	64.3	64.03	62.07	61.81	61.4
Later 1990s	64.29	64.3	64.08	62.07	61.93	61.71
Funds index						
Early 1990s	0.54	0.55	0.50	0.35	0.30	0.21
Late 1990s	0.54	0.55	0.51	0.35	0.32	0.28

[After Foster (1992), p. 14, table 3.2]

Finally the aggregate demographic scenarios were derived, which are summarised in table 3.9 below:

Table 3.9

	A1	B1	B2	C1	C2	C3
Population (millions)						
1993-94	17.92	17.92	17.89	17.92	17.89	17.86
1999-2000	19.28	19.28	19.13	19.28	19.13	18.98
Age distribution %						
1993-94						
Up to 4 years	7.22	7.22	7.22	7.22	7.21	7.21
5 to 14 years	14.33	14.33	14.32	14.33	14.32	14.32
15 to 64 years	66.80	66.80	66.80	66.80	66.80	66.80
65 years or more	11.65	11.65	11.66	11.65	11.67	11.68
1999-2000						
Up to 4 years	6.79	6.79	6.76	6.79	6.77	6.75
5 to 14 years	13.95	13.96	13.93	13.94	13.91	13.88
15 to 64 years	67.21	67.21	67.21	67.20	67.19	67.19
65 years or more	12.05	12.04	12.10	12.07	12.13	12.19
Participation rate (%)						
1993-94	63.87	63.87	63.86	63.85	63.85	63.85
1999-2000	64.26	64.27	64.26	64.20	64.21	64.21
Aggregate skill index						
1993-94	63.81	63.81	63.80	63.79	63.78	63.78
1999-2000	63.83	63.83	63.82	63.73	63.73	63.72
Net unrequited fund						
(% GDP)						
1993-94	0.6435	0.6522	0.4720	0.4194	0.2858	0.1522
1999-2000	0.6435	0.6522	0.5038	0.4194	0.3175	0.2158

[After Foster (1992), p.15, table 3.3]

These demographic results were then fed into the main model. The most notable difference in main model results occurs between scenarios A1 and C3. The results in terms of the percentage point differences are summarised below for the longer term (1999-2000) and split into magnitude and composition effects (Foster used the

intermediate scenario C1 to disaggregate these effects). The results are given in table 3.10.

Table 3.10

	Units	Total	Composition: Proportion of skilled migrants reduced from 41% to 26%	Magnitude: Reduction in net migration of 40,000 per annum
Population	Millions			
Total		-1.6	-	-1.6
15-64 years		-1.6	-	-1.6
GDP components	$b1984-85			
Private consumption		-1.5	-0.5	-1.0
Private dwelling investment		-3.9	-0.8	-3.1
Private business fixed investment		-0.7	-0.1	-0.6
Gross national expenditure		-1.6	-0.4	-1.2
Exports		-0.3	0.2	-0.5
Imports		-2.6	-0.8	-1.8
GDP		-1.0	-0.1	-0.9
Employment	Millions	-1.2	-0.1	-1.1
Foreign debt	$b	-1.1	0.9	-2.0
Living standards	$'000 1984-85			
Consumption/ head		0.1	-0.4	0.5
GDP/head		0.5	-0.1	0.6

[After: Foster (1992), p15, table 4.5, p. 28.]

Table 3.1 shows that a decline in both the number and skill level of immigrants (moving from scenario A1 to C3) produces negative economic affects overall. However, although reducing the skill level of immigrants is shown to reduce living

standards, reducing the size of the intake actually improves living standards in the above example. The current composition of net migration has a higher skill level than in Foster's scenario A1. This outweighs any negative magnitude effects, as is demonstrated in Chapter 5. Foster warns that the differences between the scenarios are marginal and cautions against using immigration policy for short term macroeconomic stabilisation. [Foster (1992), p. 31.]

A more recent paper by Econtech Pty Ltd analyses the effects of recent immigration policy changes on the economy using the Murphy Model (MM2). They find that due to the greater skill level of the current composition of immigrants, living standards measured by per capita consumption levels are improved under current immigration policy. This is due to the higher skill levels, stronger English language skills, younger age and greater levels of wealth of new immigrants. The new intake has little effect on aggregate unemployment rates. [Econtech Pty Ltd (Feb. 2001)]

3.3 Additional contribution of this paper

The use of recent data allows policy changes to the composition of migrant intake to be reflected. This is likely to produce different results from previous studies due to the difference in human capital between migrants. The analysis of LSIA2 data in chapter 4 will reveal whether the higher level of human capital embodied in new immigrants is being transferred to the labour force. It will also show whether subsequent human capital investment is being undertaken by immigrants post-arrival and whether this is likely to improve labour force outcomes.

As Foster showed there are marginal benefits from a more skilled intake. Despite Foster's caution about using migration for short-term macroeconomic stabilisation, the concern of this paper is how to reduce the negative consequences of an aging population. The huge differences in labour force participation for increasing migration rather than fertility, which are shown in chapter 5, indicate that migration can in fact be a useful long-term policy tool.

Disaggregating the Murphy Model Results will illustrate whether migrants produce externalities that benefit the pre-immigration population in addition to the benefit of reducing the dependency ratio. Furthermore by using fertility growth as a comparison, this analysis is richer than others because it determines which source of population growth is optimal, rather than merely the impact of migration with fertility held constant.

Chapter 4

Using LSIA2 data to identify differences between cohorts of migrants and their labour force outcomes in the short run

The second cohort of the Longitudinal Survey of Immigration to Australia (LSIA2) data relates to a sample of 3124 primary applicants who arrived in Australia between September 1999 and August 2000. This represents approximately ten per cent of the total in-scope[8] primary applicants who arrived during that year. The second wave of the survey relates to the second (of two) interviews of both the primary applicant and spouse (when available), which took place 18 months after arrival[9]. This wave is analysed to determine the short run labour force outcomes of both primary applicants and migrating unit spouses. Investment in education is also investigated to determine whether the skill gap between migrants closes after migrating.

As discussed in Chapter 3, because the immigrants surveyed in LSIA2 arrived after new immigration policy was established, LSIA2 results more accurately reflect the experiences of new immigrants than LSIA1. Policy changes included increasing the waiting time for most social security benefits from six months to two years post arrival.[10] Also the points tested concessional family category was replaced by the Skilled-Australian Sponsored category with a greater emphasis placed on skills in the selection criteria. The quota of skilled immigration increased from 29.1 per cent in 1993-94 and 39.7 percent in 1994-95 to 51.5 per cent in 1995-96.

[8] Those immigrants not included in the sample (i.e. out of scope) are New Zealand Citizens, immigrants granted a visa while in Australia, immigrants who had special eligibility visas (eg former Australian citizens), and immigrants with no identifiable country of birth.
[9] The interviews took place over the course of a year beginning in March 2001
[10] Excluding Humanitarian category immigrants.

This focus on skilled migration has continued and since 1 July 1999 greater emphasis is placed on targeting migrants who have skills for which there is a shortage in the Australian labour market. Furthermore Australian qualifications and work experience, multi-lingual ability (including English) and spouse skills are accounted for under the new policy. [Department of Immigration and Multicultural and Indigenous Affairs (DIMIA) (Dec 2000) *Population Flows Immigration Aspects*, pp. 16-17.] Consequently the LSIA2 results are more consistent with the current intake than LSIA1, although some migrants who entered in 1999-2000 would have had visas issued under the previous policy. It is likely, therefore, that if policy changes improve the labour force outcomes for migrants, new migrants will show some improvement over the LSIA2 results, as they will all be entering under the new criteria.

4.1 Tabulating the LSIA wave 2 results in order to compare labour force outcomes and post-arrival education investment of migrants

The LSIA2 data are weighted to the total population remaining onshore using the relevant weighting cell supplied with the data. This enables the data to reflect the estimated population remaining in Australia at the time of the wave 2 interviews. The tables below summarise the labour force outcomes for primary applicants and migrating unit spouses 18 months after arrival.

Table 4.1

LSIA 2 Wave 2 Estimates for Population Remaining Onshore (Persons)

Labour force status of Primary Applicants	Family	Skilled-points tested - sponsored	Skilled Other	Skilled - Points Tested - Independent	Humanitarian	Total
Employed	8659	2498	1400	6361	435	19354
Unemployed	1277	150	0	481	330	2237
In labour force	9936	2648	1400	6842	765	21591
Not in labour force	6280	406	253	687	1616	9242
Total	16216	3054	1654	7528	2381	30833

Labour force status of Migrating Unit Spouses	Family	Skilled-points tested - sponsored	Skilled Other	Skilled - Points Tested - Independent	Humanitarian	Total
Employed	97	1264	564	2347	138	4410
Unemployed	4	111	4	147	110	375
In labour force	101	1374	568	2493	248	4785
Not in labour force	492	390	686	1799	1061	4427
Total	593	1765	1254	4292	1309	9212

Total labour force status by visa category	Family	Skilled-points tested - sponsored	Skilled Other	Skilled - Points Tested - Independent	Humanitarian	Total
Employed	8756	3762	1965	8708	573	23764
Unemployed	1281	260	4	627	440	2612
In labour force	10037	4023	1968	9335	1013	26376
Not in labour force	6773	796	939	2485	2676	13669
Total	16810	4819	2907	11820	3689	40045

Table 4.2

Total Australian Labour Force 2000-01 [Source: ABS Labour Force Australia (6203.0)]	Persons
Employed (000s)	9129.9
Unemployed (000s)	625.5
In labour force (000s)	9755.4
Not in labour force (000s)	5562.0
Total persons 15+ (000s)	15317.4

Table 4.3

LSIA 2 Wave 2 Estimates for Population Remaining Onshore (%)

Labour force status of Primary Applicants	Family	Skilled-points tested - sponsored	Skilled	Other	Skilled - Points Tested - Independent	Humanitarian	Total
Employed/total	53.4%	81.8%	84.7%		84.5%	18.3%	62.8%
Unemployed/total	7.9%	4.9%	0.0%		6.4%	13.9%	7.3%
Labour force	61.3%	86.7%	84.7%		90.9%	32.1%	70.0%
Not in labour force	38.7%	13.3%	15.3%		9.1%	67.9%	30.0%
Unemployed/L force	12.9%	5.7%	0.0%		7.0%	43.1%	10.4%
Labour force status of Migrating Unit Spouses	Family	Skilled-points tested - sponsored	Skilled	Other	Skilled - Points Tested - Independent	Humanitarian	Total
Employed/total	16.3%	71.6%	45.0%		54.7%	10.6%	47.9%
Unemployed/total	0.6%	6.3%	0.3%		3.4%	8.4%	4.1%
Labour force	17.0%	77.9%	45.3%		58.1%	19.0%	51.9%
Not in labour force	83.0%	22.1%	54.7%		41.9%	48.1%	48.1%
Unemployed/L force	3.8%	8.0%	0.6%		5.9%	7.8%	7.8%
Total labour force status by visa category	Family	Skilled-points tested - sponsored	Skilled	Other	Skilled - Points Tested - Independent	Humanitarian	Total
Employed/total	52.1%	78.1%	67.6%		73.7%	15.5%	59.3%
Unemployed	7.6%	5.4%	0.1%		5.3%	11.9%	6.5%
Labour force	59.7%	83.5%	67.7%		79.0%	27.5%	65.9%
Not in labour force	40.3%	16.5%	32.3%		21.0%	72.5%	34.1%
Unemployed/L force	12.76%	6.47%	0.18%		6.72%	43.43%	9.90%

Table 4.4

Total Australian Labour Force 2000-01 (%) Source ABS Labour Force Australia (6203.0)	Rate
Employed/Total	59.6%
Unemployed/Total	4.1%
In labour force	63.7%
Not in labour force	36.3%
Unemployed/L force	6.4%

Discussion of tables 4.1 to 4.4

National unemployment for 2000/01 was 6.4 per cent with a labour force participation rate of 63.7 per cent. [Year Book Australia (2002), section 6.5 "Civilian Population Aged 15 and Over, Labour Force Status, Annual Average" **http://www.abs.gov.au/Ausstats/abs**] Table 4.3 illustrates that amongst primary applicants, 18 months after arrival, labour force participation exceeds the national average for all of the skilled visa categories, with the family category being only 2.4 percentage points below the national average. Labour force participation for the humanitarian category was substantially lower, being only 32.1 percent.

The "skilled other" category incorporates business skilled and employer sponsored migration and it is consistent with expectations that there would be a zero unemployment rate for primary applicants in this category. Primary applicants in the skilled points tested sponsored category (points tested and with an Australian sponsor) have an unemployment rate of 5.7 per cent which is lower than the national average, whilst the independent points tested category has slightly higher unemployment at 7 per cent. This category, however, has the highest labour force participation rate, which results in 84.5 per cent of primary applicants under this category being employed, compared to the national average of 59.6 per cent (9,129,900 / 15,317,400) [Year Book Australia 2002, section 6.5].

It is consistent with our expectations that migrants under the skilled categories are able to transfer their human capital to the Australian workforce, evidenced by their success

in gaining employment 18 months after arrival. The family stream is not points tested at all and applicants are selected purely on the basis of their family relationship with their sponsor. Consequently it is anticipated that there would be a greater lag in such migrants finding employment than for the skilled categories.

Migrating unit spouses fare less well than primary applicants in both labour force participation and unemployment, for all visa categories. The only category that outperformed the national average in terms of labour force participation and the total proportion in employment was the skilled-points tested-sponsored (i.e. family sponsored) stream, with labour force participation of 77.9 per cent and total employment 71.6 per cent. The other two skilled categories performed better than the family and humanitarian streams, having lower labour force participation rates than the national average but also lower unemployment rates. However these do not sufficiently offset each other to result in higher employment than the national average of 59.6 per cent.

In aggregate new immigrants have a labour force participation rate of 65.9 per cent, being 2.2 percentage points higher than the national average of 63.7 per cent. Thus, despite an unemployment rate of 9.9 per cent, the aggregate employment rate for new immigrants is only 0.3 percentage points below the national average. As new immigrants become more settled in Australian life and as less skilled migrants improve their human capital through education, these results are expected to improve further

over time. In this context, it is relevant to examine the post arrival education investment of new immigrants, which is explored in section 4.2.

Before proceeding to an analysis of post migration human capital investment, the labour force outcomes for primary applicants in LSIA2 wave two, are compared with the results for LSIA1 wave 2 from chapter 3. Because there have been improvements in labour force participation and unemployment rates nationally, the results for new immigrants are compared relative to national averages at the time of the LSIA1 and LSIA2 wave two surveys respectively. The results are summarised in tables 4.5 and 4.6 below:

Table 4.5 Primary applicants LSIA1 wave 2 labour force outcomes compared with national average for 1995-97 [ABS Labour Force Australia (6203.0)]

	Preferential Family	Concessional Family	Business/ Employer Nominated	Skilled Independent	Humanitarian	Total
Participation Rate LSIA1	54	86	94	93	56	65
Participation Rate Australian 1995-96 & 1996-97 average	63.5	63.5	63.5	63.5	63.5	63.5
Difference	**-9.5**	**22.5**	**30.5**	**29.5**	**-7.5**	**1.5**
Unemployment Rate LSIA1	19	18	3	9	49	19
Unemployment Rate Australian 1995-96 & 1996-97 average	8.2	8.2	8.2	8.2	8.2	8.2
Difference	**10.8**	**9.8**	**-5.2**	**0.8**	**40.8**	**10.8**
Employment Rate LSIA1	43.7	70.5	91.2	84.6	28.6	52.7
Employment Rate Australian 1995-96 & 1996-97 average	58.3	58.3	58.3	58.3	58.3	58.3
Difference	**-14.6**	**12.2**	**32.9**	**26.3**	**-29.7**	**-5.6**

Table 4.6 Primary applicants LSIA2 wave 2 labour force outcomes compared with national average for 2000-01 [ABS Labour Force Australia (6203.0)]

	Preferential Family	Skilled-Australian Sponsored	Skilled Other (Business/ Employer Nominated)	Skilled Independent	Humanitarian	Total
Participation Rate LSIA2	61.3	86.7	84.7	90.9	32.1	70.0
Participation Rate Australian 2000-01	63.7	63.7	63.7	63.7	63.7	63.7
Difference	**-2.4**	**23.0**	**21.0**	**27.2**	**-31.6**	**6.3**
Unemployment Rate LSIA2	12.9	5.7	0.0	7.0	43.1	10.4
Unemployment Rate Australian 2000-01	6.4	6.4	6.4	6.4	6.4	6.4
Difference	**6.5**	**-0.7**	**-6.4**	**0.6**	**36.7**	**4.0**
Employment Rate LSIA2	53.4	81.8	84.7	84.5	18.3	62.8
Employment Rate Australian 2000-01	59.6	59.6	59.6	59.6	59.6	59.6
Difference	**-6.2**	**22.2**	**25.1**	**24.9**	**-41.3**	**3.2**

A comparison of tables 4.5 and 4.6 reveals that for primary applicants labour force participation rates and unemployment rates have improved relative to the national average for immigrants 18 months after arrival. For 1995-1997 the labour force participation rate for primary applicants who had been in Australia for 18 months is 1.5 percentage points higher than the national average. In 2000-2001 the labour force participation rate for primary applicants who had been in Australia for 18 months is 6.3 percentage points higher than the national average, an improvement of 4.8 percentage points. For LSIA1 wave 2 primary applicants the unemployment rate is 10.8 percentage points above than the national average. The unemployment rate for primary applicants in LSIA2 is less favourable than the national average, being 3.2 percentage points higher. However it has improved by 6.8 percentage points relative to LSIA1.

Overall the employment rate for primary applicants 18 months after arrival has improved from being 5.6 per cent below the national average to 3.2 per cent above the national average. This indicates that the current program mix is likely to produce greater economic benefits to Australia than previous immigration. However, when the results are disaggregated into visa category, only the Preferential Family and Skilled Australian Sponsored (previously Concessional Family) categories have actually improved. Skilled Other (Business and Employer Nominated) and Skilled Independent entrants actually show poorer labour force participation rates than previously, although these are still substantially higher than the national average. The unemployment rates for these categories has improved relative to LSIA1 and results in only a marginal

decrease in the employment rate of .01 percentage points for skilled independent visaed immigrants.

The employment rate for the skilled other category has reduced by 6.5 percentage points in LSIA2 relative to LSIA1 but is still the most favourable relative to the national average. Consequently the recent increase in the skilled migration quota is still expected to benefit the economy, with all skilled-visaed immigrants having employment rates more than 22 percentage points above the national average of 59.6 per cent in 2000-01. LSIA2 Humanitarian category immigrants, however, have an employment rate of 41.3 percent age points below the national average, a worsening of 11.6 points relative to LSIA1 results. However there is some improvement in the unemployment rate for this category. Whilst humanitarian immigrants do not arrive for economic reasons, their reduced employment performance indicates a need to address the causes and consider policy options for addressing the employment needs of this group.

4.2 Post arrival education investment of LSIA2 immigrants after 18 months

The LSIA2 wave 2 survey included two types of questions which can be used to determine post arrival education of immigrants. Question O.3 asks which of a series of categories best describes the person's current main activity in Australia. The choices are wage or salary earner; conducting own business (with other employees and without employees); other employed; unemployed and looking for work (full time and part time); student; home duties; retired; aged pensioner; other pensioner; and other. The

choice 'student' does not specify what type of study (such as English, secondary level or post secondary education). Applicants who are studying but consider another pursuit to be their main activity would not select 'student' for this question. Consequently the answers to question O.3 under-represent the total number of immigrants studying. Questions N.1 to N.12 relate to education other than learning English. The answers are then used to determine whether immigrants have completed or are currently undertaking any post-secondary education since arriving in Australia.[11] The data for these questions indicate total numbers of migrants studying, and in this respect are superior to data for question O.3, however because only post-secondary study is included, the results understate total human capital investment. The tables below summarise the results for both sets of questions, with answers to O.3 disaggregated into those working and not working.[12]

[11] The questions include secondary level education however the database only records post-secondary education.
[12] * indicates sample size to small to report, in accordance with DIMIA guidelines.

Table 4.7 Education investment 18 months after arrival (persons)

Primary applicants who describe their current main activity 'studying'	Family	Skilled-points tested - sponsored	Skilled	Other	Skilled - Points Tested - Independent	Humanitarian	Total
Student and working	156	*	*		*	*	252
Student and not working	1120	104	50		238	736	2248
Migrating unit spouses who describe their current main activity 'studying'	Family	Skilled-points tested - sponsored	Skilled	Other	Skilled - Points Tested - Independent	Humanitarian	Total
Student and working	0	*	*		*	*	35
Student and not working	*	*	64		379	318	805
Primary applicants post-secondary study since arrival	Family	Skilled-points tested - sponsored	Skilled	Other	Skilled - Points Tested - Independent	Humanitarian	Total
Currently studying	1464	728	79		1786	239	4297
Completed course	1583	379	76		947	152	3137
Migrant unit spouse post-secondary study since arrival	Family	Skilled-points tested - sponsored	Skilled	Other	Skilled - Points Tested - Independent	Humanitarian	Total
Currently studying	*	117	75		1026	94	1340
Completed course	*	238	67		588	24	924

Table 4.8 Education investment 18 months after arrival (percentage)

Primary applicants describing current main activity 'studying'	Family	Skilled-points tested - sponsored	Skilled	Other	Skilled - Points Tested - Independent	Humanitarian	Total
Student and working	1.0%	*	*		*	*	0.8%
Student and not working	6.9%	3.4%	3.0%		3.2%	30.9%	7.3%
Migrating unit spouses describing current main activity 'studying'	Family	Skilled-points tested - sponsored	Skilled	Other	Skilled - Points Tested - Independent	Humanitarian	Total
Student and working	0.0%	*	*		*	*	0.4%
Student and not working	*	*	5.1%		8.8%	24.3%	8.7%
Primary applicants post-secondary study since arrival	Family	Skilled-points tested - sponsored	Skilled	Other	Skilled - Points Tested - Independent	Humanitarian	Total
Currently studying	9.0%	23.8%	4.8%		23.7%	10.0%	13.9%
Completed course	9.8%	12.4%	4.6%		12.6%	6.4%	10.2%
Migrant unit spouse post-secondary study since arrival	Family	Skilled-points tested - sponsored	Skilled	Other	Skilled - Points Tested - Independent	Humanitarian	Total
Currently studying	*	7.1%	6.0%		31.4%	7.2%	14.5%
Completed course	*	15.6%	5.6%		13.7%	1.8%	10.0%

Discussion of tables 4.7 and 4.8

Immigrants who entered on family and humanitarian visas are more likely to be undertaking secondary level study than skilled migrants, particularly if they have migrated from poorer countries with less educational opportunities. The focus of the database on post-secondary education therefore does not allow us to fully establish the level of human capital investment for these groups and the results should be interpreted accordingly.

6.9 per cent of family stream primary applicants who were not employed declared their main activity studying and 9.0 per cent are currently undertaking post-secondary study whilst 9.8 have already completed a post-secondary level course. This demonstrates that human capital investment for less skilled immigrants is taking place post arrival. A more striking result is in the humanitarian visa stream. Humanitarian visas are issued to individuals under threat of persecution in their country of origin. Consequently they are expected to be disadvantaged compared with other migrant streams because they are unlikely to have experienced the same levels of education and work experience. Furthermore the trauma experienced by this group prior to migration may make integrating into a new culture much more difficult. However, despite high unemployment and low labour force participation rates of 43.1 per cent and 32.1 per cent respectively, 30.9 per cent of humanitarian stream primary applicants who were not employed reported their current main activity as studying. 24.3 per cent of humanitarian category spouses also report their main activity as studying. This accounts for a large proportion of humanitarian visaed migrants who are not in the labour force, indicating that the employment gap between this category and other immigrants is likely to reduce over time as newly acquired skills are transferred to the labour market.

When the figures for 'main activity student' are compared with totals for post-secondary level education, it is clear that more family and skilled migrants are studying than those who declared student as their main activity. In the humanitarian category, however, less post-secondary study is reported suggesting that many of those who declared their main activity as 'student' are studying English or secondary level

education. Given that this is a necessary investment before further education is likely to be possible, it would be interesting to observe the results of LSIA2 wave 3 when it occurs, in order to establish whether a greater proportion of humanitarian entrants pursue post-secondary study in the future.

The results from LSIA1 wave 3 (table 3.2) indicate that good English language ability increases the probability of being in the labour force by 24 and 22 percentage points for humanitarian and family category immigrants respectively. Unemployment rates for humanitarian and family visaed immigrants were also more favourable for those with good English language ability being 25 and 34 percentage points higher than for those with poor spoken English (table 3.3). In part 4.2 of this paper the impact of English language skills on the probability of employment is explored for LSIA2 immigrants.

Comparing the results for post secondary study between visa groups, primary applicants in the 'skilled other' category are less likely to invest in post-secondary study after arrival than any other categories. Given that this group also has a zero unemployment rate it is clear that their skills are already fully transferable to the Australian market. Skilled Australian-sponsored and skilled independent migrants are the most likely to invest in post-secondary education after arrival, which may indicate less transferability of existing skills for these groups. For family and humanitarian categories, primary applicants are more likely to invest in post secondary education than migrating unit spouses. For all of the skilled categories a greater proportion of migrating unit spouses report having completed a post-secondary course since arrival,

and in the skilled other and skilled independent categories, spouses are also more likely to be currently studying.

Results for spouses in the family category cannot be relied upon because the size of the sample reporting post-secondary study is too low. However this is sufficient to indicate that spouses in the family category are the least likely to invest in post-secondary education. The reasons for this are not obvious because spouses in all other categories are investing in education. Further investigation is necessary to understand this result, which may be due to a greater proportion of older people entering under the family category.

As predicted by Cobb-Clark et al. (2002), overall in the skilled visa categories a greater proportion of spouses are studying post arrival than primary applicants, thereby reducing the gap in human capital between more and less skilled migrants. This varies considerably between visa categories, with the highest proportion of post-secondary study occurring for spouses in the skilled independent category. Furthermore, the probability of investing in post-secondary education is highest for entrants on skilled Australian-sponsored and skilled independent visas, be they primary applicants or their spouses. Consequently, the recent policy change towards higher visa quotas under the skill stream categories to over 50 per cent since 1997-98, from previous levels ranging from 29 to 42 percent between 1991-92 and 1996-97, is likely to produce more benefits to the economy.

It is likely that the investment in education of less-skilled migrants (both spouses and unskilled visa streams) will result in increased employment for these groups, given the preference of employers for Australian qualifications. It is clear, however, that both primary applicants and their spouses who enter under the skilled other (business skilled and employer nominated), skilled independent sponsored and skilled points tested sponsored (Australian sponsored) are the most successful in terms of immediate labour force performance and likelihood of future employment due to current human capital investment.

4.3 A logistic regression analysis of LSIA2 second wave data

In this section econometric testing is employed to undertake a more detailed analysis of employment outcomes for migrants, allowing factors other than visa type to be considered.

4.3.1 Explaining the statistical method

The dependent variable in the analysis is whether or not an immigrant is employed 18 months after arrival. Because the dependent variable is binomial (yes/no) rather than continuous, ordinary least squares regression is inappropriate. Instead a logistic analysis is undertaken. This involves transforming the dependent variable into a continuous variable by dividing the proportion of yes answers by the total sample population. A logit transformation is then applied to ensure that the data is bounded between zero and one. The dependent variable then becomes logit E = log(E/(1-E)), where E is the number employed divided by the total sample, this is known as the log odds ratio. Shazam is used to run the regression, and automatically applies the above transformation when the logit command is used.

The relevant explanatory variables included in the final model for primary applicants are listed in table 4.9.

Table 4.9 Description of explanatory variables

VISA1	Visa category 1: Family
VISA2	Visa category 2: Skilled Australian Sponsored
VISA3	Visa Category 3: Skilled Other (business skills /employer nominated)
VISA5	Visa Category 5: Humanitarian
PMWORK	Employed at any time in the year prior to migrating
STUDYING	Current main activity studying
SIMCULT	Similar culture: previous region of residence Northern America; Southern, Northern, North-West and Western Europe, Australia and territories, or New Zealand[13]
ENGLGOOD	Speaks English well
MALE	Male
MARMALE	Married and male
MARRIED	Married
CAT1MALE	Visa category 1 and male
CAT2MALE	Visa category 2 and male
CAT3MALE	Visa category 3 and male
CAT5MALE	Visa category 5 and male
UNDER46	Aged under 46
QUALAUST	Highest formal qualification prior to migrating obtained in Australia[14]
CAT1QAUS	Visa category 1 and qualified in Australia prior to migrating
CAT2QAUS	Visa category 2 and qualified in Australia prior to migrating
PMUNEMP	Unemployed at any time in the year prior to migrating
CAT1BDEG	Visa category 1 with bachelor degree
CAT2BDEG	Visa category 2 with bachelor degree
CAT3BDEG	Visa category 3 with bachelor degree
CAT5BDEG	Visa category 5 with bachelor degree
CAT1PG	Visa category 1 with post graduate qualification
CAT2PG	Visa category 2 with post graduate qualification
CAT3PG	Visa category 3 with post graduate qualification
CAT1HD	Visa category 1 with higher degree
CAT3HD	Visa category 3 with higher degree
BDEGREE	Bachelor degree
POSTGRAD	Post graduate qualification
HIDEGREE	Higher degree
CONSTANT	Intercept

(note when visa1, visa2, visa3 and visa 5 = 0 the results relate to visa 4, skilled-independent)

[13] See appendix to section 4 for a detailed explanation of this variable. Country of residence need not be country of citizenship or country of birth.

[14] The database does not include a variable for highest formal qualification overall obtained in Australia. The university level education variables reflect level of education at 18 months post arrival. DIMIA warn that the separate variables of the level of qualifications obtained pre-immigration are unreliable and consequently it was not possible to disaggregate the highest formal qualification variables to determine those which were obtained in Australia post arrival.

4.3.2 Results: Primary applicants and factors determining employment outcomes 18 months after arrival

Table 4.10 Estimated coefficients and t-values

		ASYMPTOTIC	
VARIABLE	ESTIMATED	STANDARD	T-RATIO
NAME	COEFFICIENT	ERROR	
VISA1	-1.82470	0.10053	-18.1510
VISA2	-0.88303	0.11500	-7.6746
VISA3	-1.03510	0.18400	-5.6289
VISA5	-3.63200	0.15800	-23.0570
PMWORK	1.39620	0.03710	37.6450
STUDYING	-0.56410	0.04290	-13.1360
SIMCULT	0.87456	0.04270	20.4890
ENGLGOOD	0.71830	0.03940	18.2400
MALE	0.23311	0.09260	2.5181
MARMALE	0.51994	0.08140	6.3849
MARRIED	-1.32050	0.05810	-22.7320
CAT1MALE	0.20100	0.08100	2.4824
CAT2MALE	0.39497	0.12600	3.1439
CAT3MALE	0.76737	0.18800	4.0855
CAT5MALE	0.56444	0.15648	3.6070
UNDER46	0.98827	0.04640	21.2880
QUALAUST	-0.15192	0.09300	-1.6339
CAT1QAUS	1.49620	0.16603	9.0112
CAT2QAUS	3.91430	0.81170	4.8224
PMUNEMP	0.52759	0.05600	9.4212
CAT1BDEG	1.18240	0.11548	10.2390
CAT2BDEG	0.51008	0.14231	3.5843
CAT3BDEG	1.31550	0.21981	5.9850
CAT5BDEG	0.43199	0.21559	2.0037
CAT1PG	0.24373	0.15675	1.5549
CAT2PG	0.99028	0.25002	3.9608
CAT3PG	2.69360	0.58408	4.6116
CAT1HD	1.77830	0.12928	13.7560
CAT3HD	1.44580	0.23800	6.0766
BDEGREE	-0.80895	0.10522	-7.6884
POSTGRAD	-0.79930	0.12108	-6.6016
HIDEGREE	-1.24780	0.08770	-14.2320
CONSTANT	0.19024	0.11849	1.6054

The number of observations in the unweighted sample, n = 2649

For a 1% significance level, $\alpha = 0.01$

Critical t-values: $\alpha = 0.01$ $t_{n-k,\alpha/2} = t_{2617,\ 0.005} = 2.576$

$\alpha = 0.02$ $t_{n-k,\alpha/2} = t_{2617,\ 0.01} = 2.326$

$\alpha = 0.05$ $t_{n-k,\alpha/2} = t_{2617,\ 0.025} = 1.960$

The results above indicate that the variables QUALAUST, CAT1PG and the constant term are all insignificant at the 10 per cent level. These were left in the regression because there apparent insignificance is due to multicolinearity. QUALAUST and CAT1PG are correlated with the variable SIMCULT, when SIMCULT is omitted from the regression QUALAUST and CAT1PG are both significant at the 1 per cent level. Consequently these variables are left in the regression. Other variables that were insignificant at the 5 per cent level or higher in earlier attempts were omitted from the model. CAT5BDEG is significant at the 5 percent level and all other variables included in the final model are significant at the 1 per cent level.

Likelihood ratio test:

LIKELIHOOD RATIO TEST = 12226.9 WITH 32 D.F.

The likelihood ratio test is a test of the null hypothesis that all slope coefficients are zero.[15] The above result is highly significant at the 1 per cent level. Therefore the null hypothesis that all slope coefficients are zero is rejected.

[15] Approximate critical values for this test can be obtained from the chi-squared distribution.

Test for heteroscedasticity:

Davidson and MacKinnon's test for heteroscedasticity in the Logit and Probit models was applied to the model. [Davidson and MacKinnon, "Convenient Specification Tests for Logit and Probit Models", Journal of Econometrics, Vol 25, 1984, pp. 241-262.] This yielded a p-value of 0.19780; therefore the null hypothesis of no heteroscedasticity cannot be rejected, even at the 19 per cent significance level.

Interpretation of the results:

The coefficients can be interpreted as follows:

The negative coefficient for visa categories 1, 2, 3 and 5 indicates that relative to visa category 4 and with everything else held constant, the log of odds of employment 18 months after arrival is reduced, with visa category 5 (humanitarian) being the least successful. Having good spoken English skills increases the log of odds of employment for all categories (because of the positive coefficient of ENGLGOOD). Multiplicative dummy variables, such as CAT1QAUS indicate a different outcome for particular combinations of characteristics. Using the CAT1QAUS example, having Australian qualifications improves employment outcomes for a category 1 (family) migrant more so than it does for a category 3 migrant (skilled other: business skilled and employer nominated). This is because of the positive coefficient for CAT1QAUS, whereas the variable CAT3QAUS was irrelevant and not included in the model. It is factors such as these that make this analysis more informative than the tabulated results presented previously. Clearly, though, this is a complicated way of interpreting the results.

In order to get a more meaningful interpretation of the above results, probabilities of employment for migrants with particular characteristics are predicted. The probabilities for different combinations of characteristics can then be compared to determine the marginal effect of a particular characteristic on the probability of being employed 18 months after arrival, for each visa category. Initially a benchmark individual is constructed. Next particular characteristics are varied and the differences in the probability of being employed are observed.

Initial assumptions: The benchmark immigrant is defined as male, unmarried, aged under 46, worked in the year prior to migrating, does not have a degree or higher qualification, migrated from a country culturally similar to Australia, speaks English well and was not unemployed at any time in the year prior to migrating.

The probability of employment 18 months after arrival is compared for each visa group with the above characteristics. The resulting probabilities are tabulated below.

Table 4.11 Benchmark as described above	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Probability of employment	0.9414173	0.9804029	0.9842164	0.9878793	0.7913465

These results can be compared with the first line of table 4.3 (see below) which showed the employment outcomes for all LSIA2 primary applicants 18 months after arrival.

Extract from table 4.3	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Employed/total	53.4%	81.8%	84.7%	84.5%	18.3%

The results show that when similar characteristics are imposed the gap between all categories with regard to likelihood of employment becomes smaller. The majority of skill stream visas are issued to migrants aged 45 and under. For family and humanitarian categories there is a larger proportion in older age groups. Consequently it is useful to determine how age affects employment outcomes. Part of the gap in employment outcomes in table 4.3 may be due to the age of immigrants. In order to test this, the assumptions of the benchmark individual are changed by defining the individual as aged over 45. The results are tabulated below.

Table 4.12 **Age over 45**	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Probability of employment	0.8567652	0.9490353	0.9586956	0.9680892	0.5853543

It is clear from table 4.12 that older immigrants are less likely to be employed for all visa categories. The difference is greatest for humanitarian category entrants, reducing the likelihood of employment by more than 20 percentage points relative to the benchmark case. The difference is least for the skilled categories.

Another factor that influences employment outcomes is gender. Therefore the original benchmark case is returned to, but the individual is defined as female. The probabilities for each visa group are then generated.

Table 4.13 **Age under 46** **Sex female**	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Probability of employment	0.9123630	0.9638933	0.9582094	0.9847459	0.6307676

Being female reduces the probability of employment by less than 4 percentage points for family, less than 2 percentage points for skilled-sponsored and less than 3 percentage points for skilled other categories. Being female reduces the probability of employment for the skilled independent category by only 0.3 percentage points. For humanitarian category entrants, however, being female reduces the probability of employment by 16 percentage points. This suggests that gender roles may be significantly different for humanitarian visaed migrants than those of other categories, with women more likely to undertake domestic duties than enter the paid labour force.

It is also useful to examine how marriage affects employment outcomes for primary applicant.

Table 4.14 Married	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Probability of employment	0.8782910	0.9573842	0.9655195	0.9734042	0.6300566

Being married reduces the probability of employment for all visa categories. For all of the skilled categories marriage reduces the probability of employment by less than 2.5 percentage points. For family entrants the reduction is six percentage points, whilst for the humanitarian category marriage reduces the probability of employment by 16 percentage points. This may be due to migrants in the humanitarian category having a greater number of dependents, thereby making them less likely to find employment that suits their domestic situation. Further research is necessary to investigate the domestic

situation of immigrants from different visa categories and it's impact on labour force outcomes.

The results for variations in formal educational attainment are now investigated. These results will have significant implications for the possibility of family and humanitarian migrants improving their employment outcomes over time as they invest in tertiary education.

Beginning again with the benchmark case, the highest level of formal education is assumed to be a bachelor degree and the probability of employment is generated for each visa category.

Table 4.15 Bachelor degree	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Probability of employment	0.9589228	0.9737559	0.9904296	0.9731873	0.7223409

Table 4.15 shows that relative to the benchmark case, having a bachelor degree increases the likelihood of a family and skilled-other category migrant gaining employment, relative to all other levels of education. However, it marginally lowers the probability for the other skilled categories, and lowers the probability by almost 7 percentage points for humanitarian category entrants. The marginal reduction for two of the skilled categories may indicate that very highly skilled immigrants are fussier regarding accepting employment. There may also be an issue of over-qualification, although the results are still very high. In the case of humanitarian category entrants,

they may have more difficulty having their degree recognised by Australian employers because of the country where it was obtained.

These results can now be compared with those for immigrants whose highest formal level of education is a post-graduate qualification. The probability of employment for each category with a post-graduate qualification, and all other characteristics as per the benchmark case, are given in table 4.16.

Table 4.16 Post graduate qualification	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Probability of employment	0.9021531	0.9837545	0.9975934	0.9734379	0.6303606

The results for the skilled categories are marginally higher for having a post-graduate qualification. For family and humanitarian visaed entrants a post-graduate qualification reduces the probability of employment by more than 5 and 8 percentage points respectively relative to having a bachelor degree as the highest formal qualification. Only for the skilled Australian-sponsored and skilled other primary applicant does a post-graduate qualification improve the probability of employment relative to the benchmark. This suggests that over-qualification may
be a problem for highly qualified immigrants who do not match specific skill shortages to which the skilled visas are targeted.

In order to establish whether having Australian qualifications prior to arrival influences employment outcomes, the benchmark individual is now assumed to have a bachelor

degree as a highest formal qualification, and that the highest formal qualification prior to arrival was obtained in Australia.

Table 4.17 Australian bachelor degree	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Probability of employment	0.9889543	0.9993744	0.9888769	0.9689249	Not applicable[16]

Given that a bachelor degree takes at least 3 years to complete, it is reasonable to assume that this case captures Australian bachelor degrees obtained prior to arrival. Having an Australian bachelor degree as opposed to a foreign bachelor degree improves the probability of employment for the family and skilled Australian-sponsored entrants, whilst marginally decreasing the probability for the other two skilled categories. This difference may be due to differences in the country where degrees were obtained. A Cambridge degree, for example, may be more highly regarded than an Australian degree. It is sufficient to note, however, that for an under 46 year old male entrant under the family visa scheme (with all the characteristics of the benchmark case in table 4.11) having an Australian bachelor degree increases the probability of being employed 18 months after arrival by four percentage points and closes the gap between family and skilled immigrants.

A more detailed analysis of formal educational attainment is recommended for future research. In this analysis all levels of education below bachelor degree are grouped

[16] No humanitarian category immigrants had an Australian qualification; therefore this should not be estimated with the model because it is outside the range of the data.

together.[17] Disaggregation of education levels below university level would give a richer understanding of the impact of education on employment and the benefits of post-arrival educational investment for various visa groups.

As a penultimate comparison we return to the benchmark case but assume that the individual has poor spoken English skills. The results are tabulated below.

Table 4.18 English not good	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Probability of employment	0.8868181	0.9606184	0.9681568	0.9754538	0.6490255

Poor spoken English reduces the likelihood of employment for all categories. For the humanitarian category the probability of employment is reduced by 14 percentage points relative to the benchmark case and for the family category it is reduced by 5 percentage points. Table 4.8 in the previous section indicated that the main activity for 30.9 per cent of Humanitarian visaed primary applicants 18 months after arrival is studying. If English skills are improved as a result, this should result in a substantial increase in employment for these immigrants, given the effect of English speaking skills on employment outcomes demonstrated above.

Finally the effect on employment of coming from a dissimilar cultural background is generated. All other characteristics remain as per the benchmark case.

[17] Recorded as not having a bachelor degree, higher degree or post graduate qualification.

Table 4.19 Cultural dissimilarity	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Probability of employment	0.8701610	0.9542624	0.9629705	0.9714209	0.6126577

Again we find that a handicap, cultural dissimilarity in this case, affects skilled immigrants less than other visa categories, with humanitarian category entrants faring the worst. Coming from a dissimilar culture reduces the likelihood of employment by 7 percentage points for family and 17 percentage points for humanitarian visaed entrants respectively. For skilled immigrants the probability of employment is reduced by less than 3 percentage points. In addition to reflecting cultural differences that may be overcome after new immigrants adapt to life in Australia, this variable may also reflect racism on the part of Australian employers. A more detailed analysis of the influence of pre-migration country of residence is required to investigate this possibility.

Migrants in the skilled streams are expected to continue to outperform other categories in terms of employment outcomes, because they have particular advantages, such as being younger and more experienced. However, all of the results above this indicate that investment in education, both language skills and post-secondary education significantly improves the chances of being employed for less skilled migrants. Further improvement in employment outcomes are expected as immigrants settle in and become more accustomed to Australian culture, particularly for the more disadvantaged groups. Consequently under current immigration policy we can expect a greater employment rate for migrants than the Australian born population over time, given that

in aggregate the difference in the employment rate for immigrants 18 months after arrival is only 0.03 per cent lower than the national average (see tables 4.3 and 4.4). Migrants in the skilled streams are expected to continue to outperform other categories in terms of employment outcomes, because they have particular advantages, such as being younger and more experienced.

4.3.3 Employment outcomes for migrating unit spouses[18] 18 months after arrival

A separate logit regression was run for LSIA2 wave 2 migrating unit spouse data.

Table 4.20 Description of explanatory variables

VISA2	Visa category 2: Skilled Australian Sponsored
VISA3	Visa Category 3: Skilled Other (business skills and employer nominated)
VISA5	Visa Category 5: Humanitarian
PMWORK	Employed at any time in the year prior to migrating
STUDYING	Current main activity studying
ENGLGOOD	Speaks English well
MARRIED	Married (some 'spouses' were no longer married 18 months post arrival)
MALE	Male
MARMALE	Married and male
CAT1MALE	Visa category 1(family) and male
CAT5MALE	Visa category 5 and male
QUALAUST	Highest formal qualification prior to migrating obtained in Australia
CAT3BDEG	Visa category 3 with bachelor degree
CAT5BDEG	Visa category 5 with bachelor degree
CAT2HD	Visa category 1 with higher degree
CAT5HD	Visa category 3 with higher degree
BDEGREE	Bachelor degree
HIDEGREE	Higher degree
UNDER46	Aged under 46
CONSTANT	Intercept
(note when visa1, visa2, visa3 and visa 5 = 0 the results relate to visa 4, skilled-independent)	

[18] Spouse and migrating unit spouse are used interchangeably in this section and refers to a spouse accompanying a primary applicant on the same visa

4.3.4 Results: Migrating unit spouses and factors determining employment outcomes 18 months after arrival

Table 4.21 Estimated coefficients and t-values

		ASYMPTOTIC	
VARIABLE	ESTIMATED	STANDARD	T-RATIO
NAME	COEFFICIENT	ERROR	
VISA2	0.53527	0.07440	7.1965
VISA3	0.48267	0.08880	5.4334
VISA5	-0.50812	0.13481	-3.7692
PMWORK	1.44480	0.06710	21.5300
STUDYING	-0.51941	0.07800	-6.6599
ENGLGOOD	1.62140	0.08930	18.1600
MARRIED	-0.20247	0.15335	-1.3204
MALE	-0.65842	0.24326	-2.7067
MARMALE	2.26950	0.25382	8.9414
CAT1MALE	-0.70048	0.23959	-2.9237
CAT5MALE	-1.08070	0.22354	-4.8343
QUALAUST	1.62890	0.31128	5.2329
CAT3BDEG	-0.89619	0.16577	-5.4062
CAT5BDEG	-2.29590	0.72377	-3.1721
CAT2HD	-0.87460	0.23254	-3.7610
CAT5HD	-1.58380	0.54083	-2.9284
BDEGREE	0.46128	0.06970	6.6228
HIDEGREE	0.93637	0.10855	8.6264
UNDER46	0.18838	0.08140	2.3135
CONSTANT	-2.96760	0.19286	-15.388

The number of observations in the unweighted sample, n = 889

For a 1% significance level, $\alpha = 0.01$

Critical t-values: $\alpha = 0.01$ $t_{n-k,\alpha/2} = t_{869,\ 0.005} = 2.576$

$\alpha = 0.02$ $t_{n-k,\alpha/2} = t_{869,\ 0.01} = 2.326$

$\alpha = 0.05$ $t_{n-k,\alpha/2} = t_{869,\ 0.025} = 1.960$

The results above indicate that the variable MARRIED is insignificant at the 10 per cent level. This variable was left in the regression because its apparent insignificance is due to multicollinearity with MARMALE. When MARMALE is omitted from the regression MARRIED becomes significant at the 1 per cent level. VISA1 was omitted from the regression, as it was highly insignificant. Despite some collinearity with CAT1MALE, VISA1 remained insignificant at the 5 per cent level when this variable was omitted from the model, indicating that for female spouses there is no significant difference in the probability of employment between family and skilled independent entrants. Other variables that were insignificant at the 5 per cent level or higher in earlier attempts were omitted from the model. UNDER46 is significant at the 5 per cent level. All other variables included in the final model are significant at the 1 per cent level.

Likelihood ratio test:

LIKELIHOOD RATIO TEST = 3744.30 WITH 19 D.F.

The likelihood ratio test is a test of the null hypothesis that all slope coefficients are zero. The above result is highly significant at the 1 per cent level. Therefore the null hypothesis that all slope coefficients are zero is rejected.

Test for heteroscedasticity:

Davidson and MacKinnon's test for heteroscedasticity in the Logit and Probit models was applied to the model [Davidson and MacKinnon, "Convenient Specification Tests for Logit and Probit Models", Journal of Econometrics, Vol 25, 1984, pp. 241-262.]

This yielded a p-value of 0.37009; therefore the null hypothesis of no heteroscedasticity cannot be rejected, even at the 37 per cent significance level.

Interpretation of the results:

Probabilities of employment are predicted for migrating unit spouses with particular characteristics. The probabilities for different combinations of characteristics are then compared to determine the marginal effect of a particular characteristic on the probability of being employed 18 months after arrival, for each visa category. Initially a benchmark individual is constructed. Next particular characteristics are varied and the differences in the probability of being employed are observed.

Initial assumptions: The benchmark individual is assumed to be female, married, under 46, worked in the year prior to migrating, does not have a degree or higher qualification, and speaks English well. In the primary applicant analysis we also assumed a similar cultural background and no unemployment in the year prior to arrival, however in the spouse model these variables were irrelevant and excluded from the regression. This implies that cultural difference and recent unemployment does not significantly affect employment outcomes at 18 months for migrating unit spouses. In the primary applicant analysis the benchmark individual was assumed to be male and unmarried. Because the majority of migrating unit spouses are female (72 per cent) and still married 18 months after arrival the benchmark spouse is assumed to be female and married.

The probability of employment 18 months after arrival is compared for each visa group with the above benchmark characteristics. The resulting probabilities are reported in table 4.22.

Table 4.22 Benchmark as described above	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Probability of employment	0.5211133	0.6501669	0.6381115	0.5211133	0.3956520

These results can be compared with table 4.3 (see below) which showed the employment outcomes for all LSIA2 migrating unit spouses 18 months after arrival.

Extract from table 4.3	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Employed/total	16.3%	71.6%	45.0%	54.7%	10.6%

As was the case for primary applicants, the results show that when similar characteristics are imposed the gap between likelihood of employment becomes smaller. Spouses of persons immigrating on humanitarian category visas still fare worse than other categories. Spouses migrating with family and skilled independent entrants show the same result but are more than 10 per cent less likely to be employed than those of the two other skilled categories. To see how much the age of immigrants affects employment outcomes, the age of the benchmark individual is now changed to over 45. The results are tabulated below.

Table 4.23 **Age over 45**	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Probability of employment	0.4740529	0.6062051	0.5935818	0.4740529	0.3516031

Table 4.23 shows that older immigrants are less likely to be employed than younger immigrants, for all visa categories. The difference is least for humanitarian category entrants, reducing the likelihood of employment by less than 2 percentage points relative to the benchmark scenario. This is in contrast to the primary applicant case (see table 4.12) where being aged over 45 reduced the probability of employment for humanitarian visaed entrants by more than 20 percentage points relative to the benchmark case. The result is probably less dramatic for humanitarian category spouses because of their low likelihood of employment overall. As the likelihood of being employed moves closer to zero an additional handicap is expected to have a smaller effect. For skilled category spouses being older reduces the probability of employment by less than 5 percentage points and for the family category less than 4 percentage points.

Now we compare the difference in employment outcomes for male spouses relative to females. Therefore we will return to the original benchmark case but define the individual as male for all categories. The probabilities for each visa group are then generated.

Table 4.24 Age under 46 Sex male	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Probability of employment	0.7300880	0.9029834	0.8982772	0.8449530	0.5266690

Table 4.24 shows that being male greatly improves the chance of a migrating unit spouse being employed for all categories. The result is smallest for humanitarian category spouses, improving the probability of employment by 13 percentage points relative to the benchmark case. The family category shows an improvement of 20 percentage points, whilst the chance of employment increases by more than 25 percentage points for all of the skilled categories. This is consistent with the usual division of labour within couples. Female partners are more likely to perform household duties than male partners, who are more likely to be employed outside of the home. An interesting exercise for future research would be to determine whether the traditional female role of 'housework' is more common amongst migrants than the Australian born and, if so, to what degree the impact of skilled migration on productivity growth offsets the greater dependency of migrant spouses.

Returning to the benchmark case, we now assume that immigrants have a bachelor degree. The results are tabulated below:

Table 4.25 Bachelor degree	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Probability of employment	0.6331569	0.7466933	0.5330198	0.6331569	0.09464444

The most striking result here is that for Humanitarian category spouses, having a bachelor degree reduces the probability of being employed to less than one percent, relative to the benchmark case. Once again this may reflect a lack of recognition of qualifications from certain countries by Australian employers. 7.2 percent of humanitarian visaed spouses surveyed reported currently studying a post-secondary level course, whilst a further 1.8 per cent had completed such a course post arrival. 24.5 percent reported their current main activity as studying (see table 4.8). These results are consistent with the possibility that qualified migrating unit spouses in the humanitarian category may be upgrading their qualifications to Australian standards post arrival. When the third wave of LSIA2 data is released it should be examined to see whether those immigrants studying or recently completing courses 18 months post arrival, have subsequently transferred these skills to the labour market.

For family, skilled sponsored and skilled independent migrating unit spouses, having a bachelor degree improves employment outcomes by 11, 9 and 11 percentage points respectively. In the skilled other category, however, a bachelor degree reduces the probability of employment by 10 percentage points. 'Skilled other' visas include business skills, employer sponsored and 'distinguished talent' migrants. These visas are issued to primary applicants who have specific talents that are desirable for Australia (such as entrepreneurial skills) or fill particular positions for which there are no suitable applicants in the Australian market. It is possible that spouses under this category are also highly skilled and those with a tertiary qualification may be more selective in what employment they will accept. Also primary applicants under this category are likely to

earn higher salaries than other immigrants and can therefore support their spouse financially, allowing qualified spouses in this category to take more time in selecting a suitable job. Once again it will be useful to compare the outcomes when wave 3 data become available.

The results from above are modified by assuming that the qualification is from Australia and the results compared. A result is not reported for the humanitarian category because none of the migrating unit spouses in this category reported having an Australian qualification. Consequently this is outside of the range of the model.

Table 4.26 Australian bachelor degree	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Probability of employment	0.8979541	0.9376121	0.8533579	0.8979541	Not applicable

Comparing table 4.26 with 4.25 shows that the probability of being employed 18 months after arrival is much greater for migrating unit spouses with Australian as opposed to foreign degrees. Australian qualifications improve the probability of employment by 19 percentage points for skilled sponsored category spouses, 26 percentage points for the family and skilled independent categories and 32 percentage points for spouses in the 'skilled other' visa category. In the discussion of table 4.25 it was suggested that the poor result for spouses in the skilled other category with a foreign bachelor degree may be the result of being fussier in accepting employment. Having an Australian qualification seems to reverse this result; this suggests that

migrants with Australian qualifications may receive more job offers such that even those with higher career aspirations are likely to find employment faster.

Finally the affect of English language skills on employment outcomes is examined. Returning again to the benchmark scenario, the individual is assumed to have poor spoken English skills and the probability of employment is generated. The results are recorded below.

Table 4.27 Poor spoken English	VISA1 Family	VISA2 Skilled-sponsored	VISA3 Skilled other	VISA4 Skilled independent	VISA5 Humanitarian
Probability of employment	0.1769854	0.2686196	0.2584130	0.1769854	0.1145560

Poor spoken English reduces the likelihood of employment to between 28 and 38 percentage points, relative to the benchmark case. An examination of the weighted raw data indicates that 33.8 per cent of family category, 93.2 per cent of skilled sponsored, 78.6 per cent of skilled other, 92.5 per cent of skilled independent and 34.6 per cent of humanitarian entrant spouses have good spoken English ability. In conjunction with the results of table 4.26 this reveals that the lack of good English speaking skills amongst family and humanitarian category spouses is a large contributor to their relatively low levels of employment relative to migrating unit spouses on skilled visas. It also helps to explain the poorer employment outcome for spouses of skilled other entrants relative to the other skilled categories.

Overall the results for spouse data are consistent with the expectation that if less skilled immigrants improve their English ability and invest in education the gap between skilled and unskilled migrants, in terms of employment outcomes, will reduce over time. Table 4.8 revealed that only a negligible proportion of family entrant spouses are studying post arrival, although these figures may underestimate secondary level education, if it is not the main activity being undertaken. In aggregate 14.5 per cent of spouses are currently studying at a post-secondary level and 10 per cent have completed a post secondary course since arrival.

4.4 General discussion of the LSIA2 results.

For increasing the annual level of immigration to be a feasible solution to Australia's anticipated declining worker ratio it is necessary for new-immigrants to improve the rate of employment over time relative to current predictions. In the long-run immigration growth is only a preferable solution to fertility growth if new immigrants can increase the worker ratio and/or productivity to a greater degree than can be achieved by increasing the labour force by fertility growth.

Section 4.1 illustrated that under current immigration policy new immigrants aged over 15 have an employment rate only 0.3 percentage points below the national average 18 months after arrival. Skilled-visaed primary applicants have an employment rate of more than 22 percentage points higher than the national average. Amongst spouses only those migrating on skilled Australian-sponsored visas had a higher employment rate than the national average 18 months after arrival. However, 14 per cent of migrating

unit spouses report studying at a post secondary level and 10 percent report having completed a post secondary course 18 moths after arrival, with only spouses in the family category not undertaking post secondary education. Amongst primary applicant the results are similar, with post secondary education investment occurring in all categories including family.

Section 4.2 reveals that for less-skilled migrants, including spouses of primary applicants in the skilled categories, and family visaed primary applicants[19], having an Australian qualification significantly improves employment outcomes. As less skilled immigrants who are currently studying in Australia complete their studies, these migrants are expected to be more successful in gaining employment over time.

Good spoken English improves employment outcomes for all immigrants. As language skills improve with length of residence the employment rates for all migrant categories are expected to improve as a consequence.

Although skilled immigrants are likely to continue to outperform less- skilled immigrants in terms of gaining employment, there is sufficient evidence to expect that the gap between skilled an less-skilled migrants will improve over time. Given that only 18 months after arrival new-immigrants have an employment rate only 0.3 percentage points below the national average, in the long run new-immigrants are expected to have a greater employment rate than average. Consequently, in terms of

[19] This was not testable for the humanitarian category because none of those in the sample revealed Australian qualifications.

supplying needed labour to prevent the worker ratio from falling, increasing immigration is expected to perform better than national population growth, both immediately and in the longer term. Furthermore, if the degree of human capital embodied in skilled migrants is above that of the average population then productivity is also expected to improve under increased immigration. This is explored in the following chapter, in addition to the effects of migration and fertility on other economic variables.

Chapter 5

Results from the Murphy Model (MM2)

The previous chapter looked at empirical evidence of the short-run employment experience of immigrants to Australia with a particular focus on disaggregating the data into various categories (qualifications, age, visa category etc). It was found that new-immigrants experience an employment rate close to the national average only 18 months after arrival and in the long-term are expected to improve the average employment rate as less-skilled immigrants acquire Australian qualifications and improved English language skills. In this chapter the Murphy Model (MM2) is employed to compare the short and long term economic effects of different demographic scenarios. The scenarios are generated using the demographic module of MM2 for varying assumptions of fertility rates and annual immigration levels (with the current category mix). The scenarios are first compared in terms of their success in achieving a regular age structure and the size of the worker ratio. The demographic scenarios are then imported into the main module of MM2 in order to compare their effects on the various economic indicators discussed in chapter 2.

In looking at immigration's effect on the various economic indicators the aggregate impact and also the per capita impact on the *pre-immigration* population is analysed. This method assumes that the immigrants themselves are better off than pre migration based on their choice to migrate.[20] Comparing this result with the overall per capita

[20] Even if this not always the case the economic effect of migration on the immigrants should be compared with their country of origin, not the previous conditions in Australia. The effect of migration on Australians is more properly assessed when looking at the pre-migration population and how it is affected by the change.

income change with fertility growth will allow the external effects from migration to be measured. It is shown further on that new immigrants have a higher average skill level than the existing population. MM2 does not model the new ideas effect from migrant workers. However, skill impacts on productivity such that some of the benefits return as migrant wages whilst an additional return goes to the industry and flows through to the rest of the population accordingly. Because new entrants to the native born working population are assumed to have the same characteristics as the existing native-born workforce (having been trained in the same institutions etc) there is no need to disaggregate natural labour force growth.

5.1 Demographic results

The assumptions of the eight demographic scenarios generated are summarised below:

1. Base scenario using ABS Series B assumptions for age specific fertility rates, net overseas migration and interstate migration. Fertility reduces to 1.6 by 2011 and migration decreases from a level of 133,684 in 2002 to a level of 100,000 from 2006, of which 90,000 represents permanent arrivals. This scenario does not exactly match ABS predictions because mortality assumptions cannot be varied in MM2 and the historical population levels are slightly different. The differences between the projections are reported in the appendix for comparisons sake. Series B predictions are consistent with the current population (see chapter 1, p3), therefore this scenario represents a forecast of

the Australian population with no change to current policy. Scenario 1 acts as a benchmark against which other scenarios can be compared.

2. This scenario is constructed to analyse the impact of fertility rates increasing but remaining slightly below replacement level, with migration remaining at current policy levels. Migration remains as per Series B assumptions with fertility gradually increasing to 2.015 by 2011 (close to replacement level, replacement level being 2.1 – accounting for mortality assumptions)

3. This scenario allows the impact of a large initial increase in net migration levels to be examined, with fertility rates unchanged from series B predictions. Net overseas migration is assumed to increase gradually to 150000 by 2010 (of which 140,000 is permanent immigration). It remains at this annual level for the rest of the projection period (i.e. to 2064).

4. In this scenario fertility increases gradually to replacement level, 2.1, by 2008. Net overseas migration is reduced to zero from 2003. This is achieved by setting arrival levels equal to departures, according to 2003 series B departure levels.

5. As a comparison with scenario 3, under this scenario migration increases more gradually over time. Fertility remains as per series B so that the differences between scenarios 1, 3 and 5 are only due to differences in migration policy assumptions. In this scenario migration increases from series B levels by 5,000

per annum from 2010 and then by 10,000 per annum from 2020 for the remainder of the projection period.

6. To compare slightly higher net increases in migration than above, in this scenario migration increases by 10,000 per annum from 2010 for the remainder of the projection period. Fertility remains at series B rates.

7. This scenario combines the fertility assumptions of scenario 4 with the migration assumptions of scenario 6. This enables the combined effects of migration growth and fertility growth to be examined. Fertility increases gradually to replacement level, 2.1, by 2008 with migration increasing by 10k per annum from 2010.

8. This final scenario assumes that fertility rates increase to 3.0 by 2011, with migration levels as per series B. This allows the impact of an aggressive fertility growth policy to be examined, with fertility increasing beyond replacement level.

Changes in the worker ratio over time for each demographic scenario are summarised in the charts below:

Chart 5.1: Scenario 1

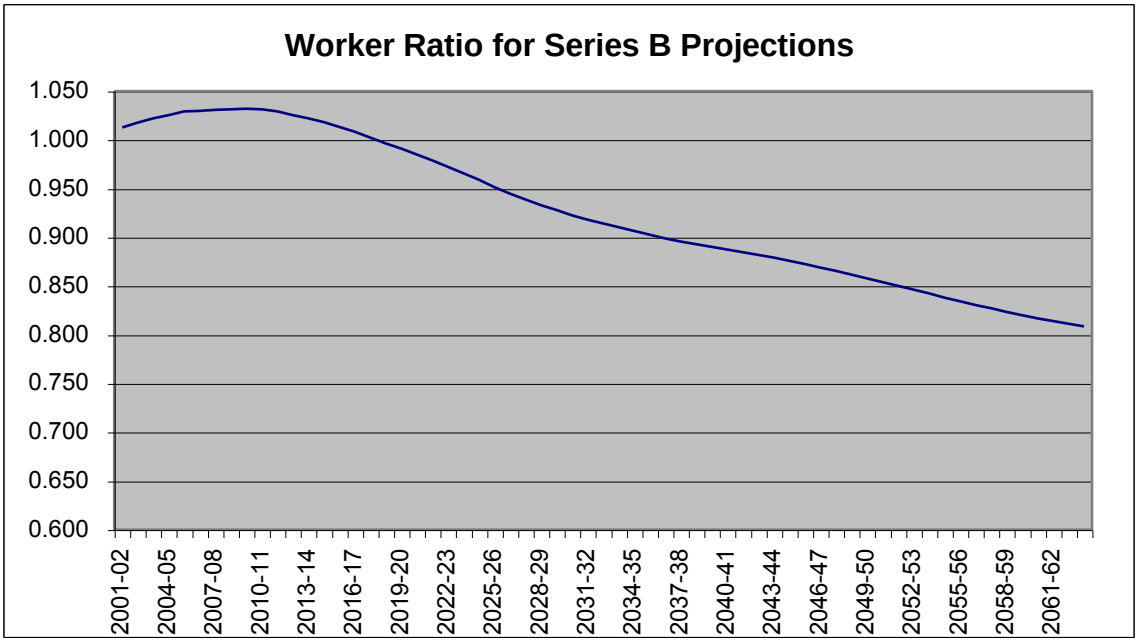


Chart 5.2: Scenario 2

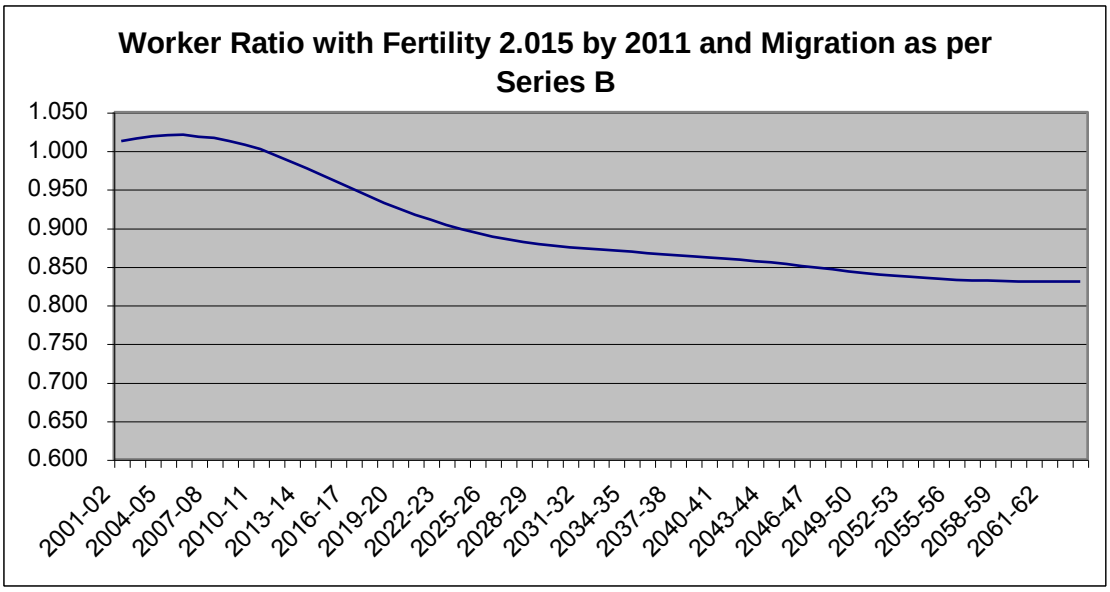


Chart 5.3: Scenario 3

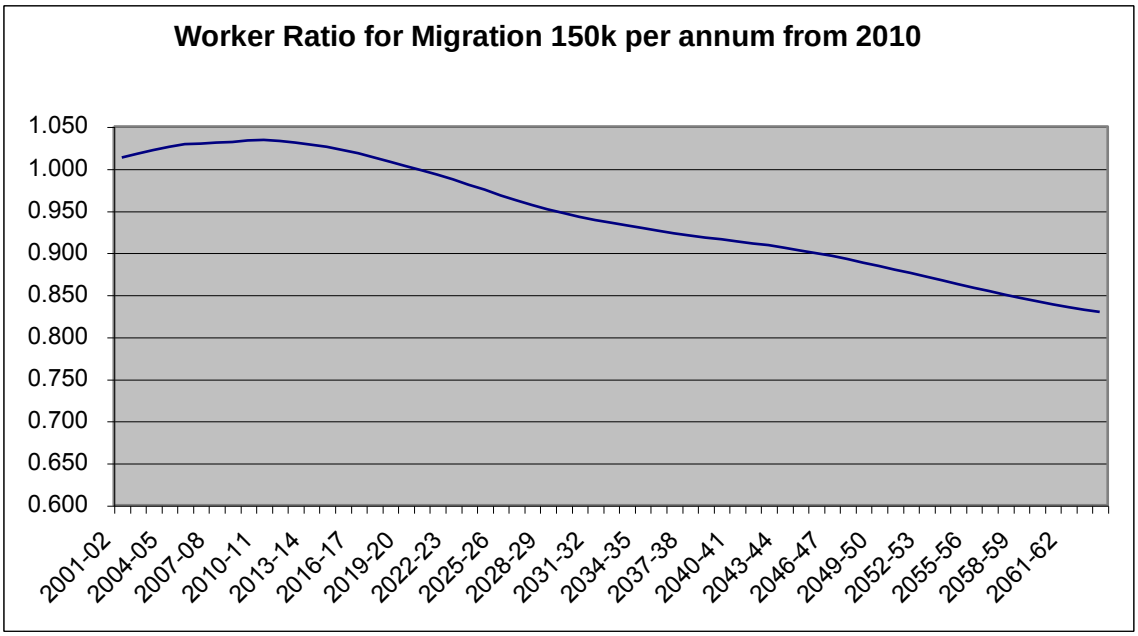


Chart 5.4: Scenario 4

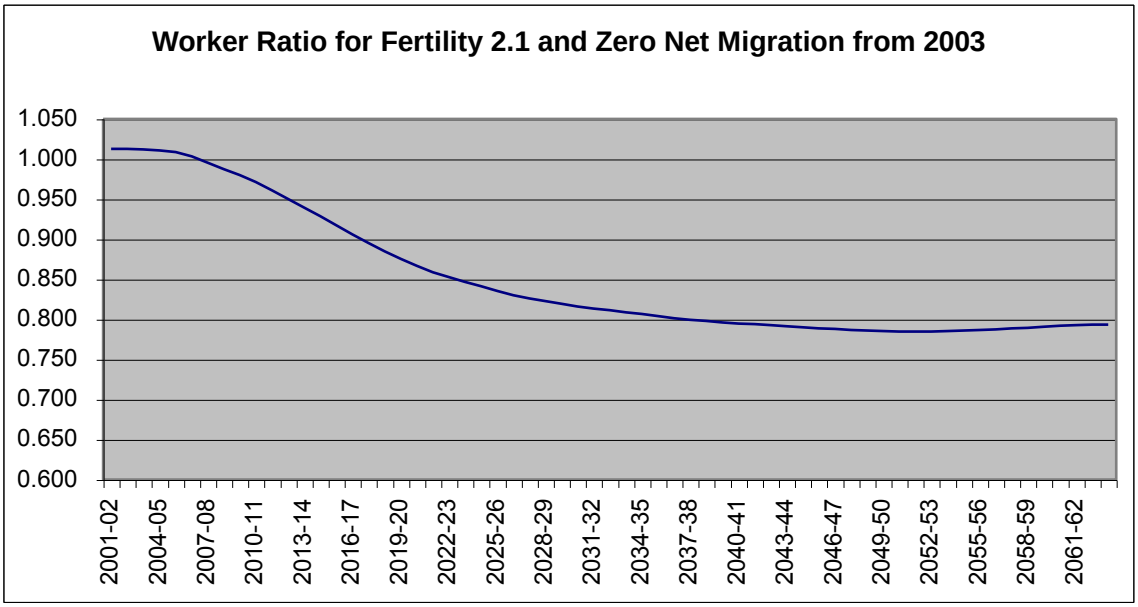


Chart 5.5: Scenario 5

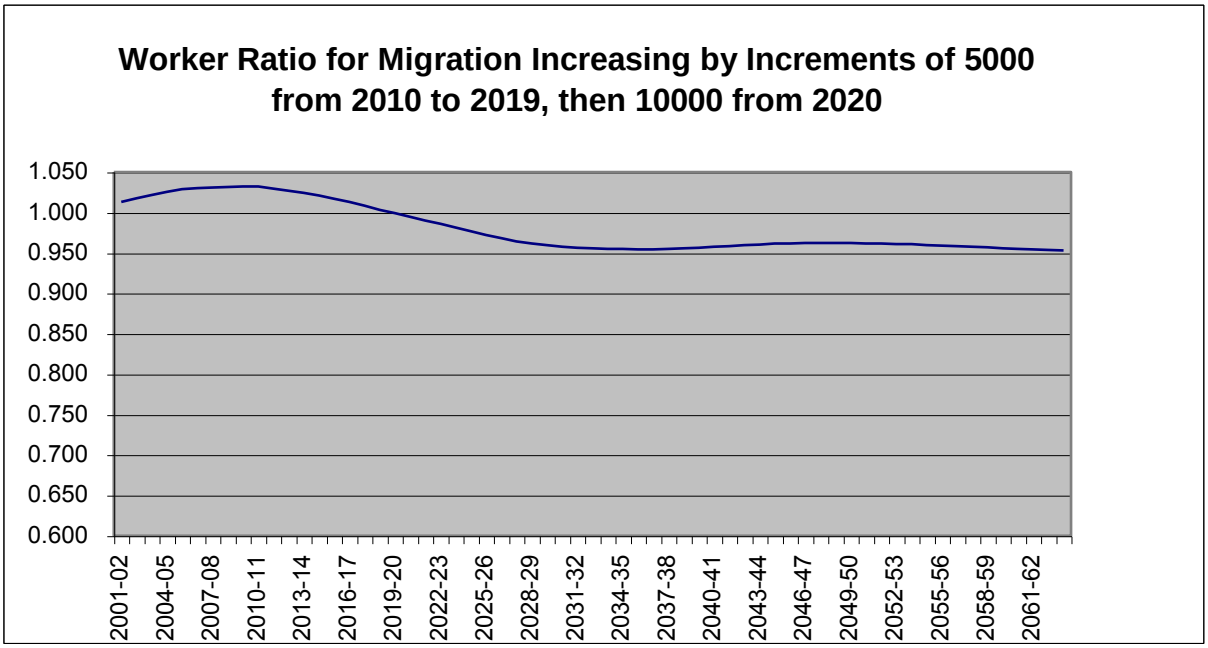


Chart 5.6: Scenario 6

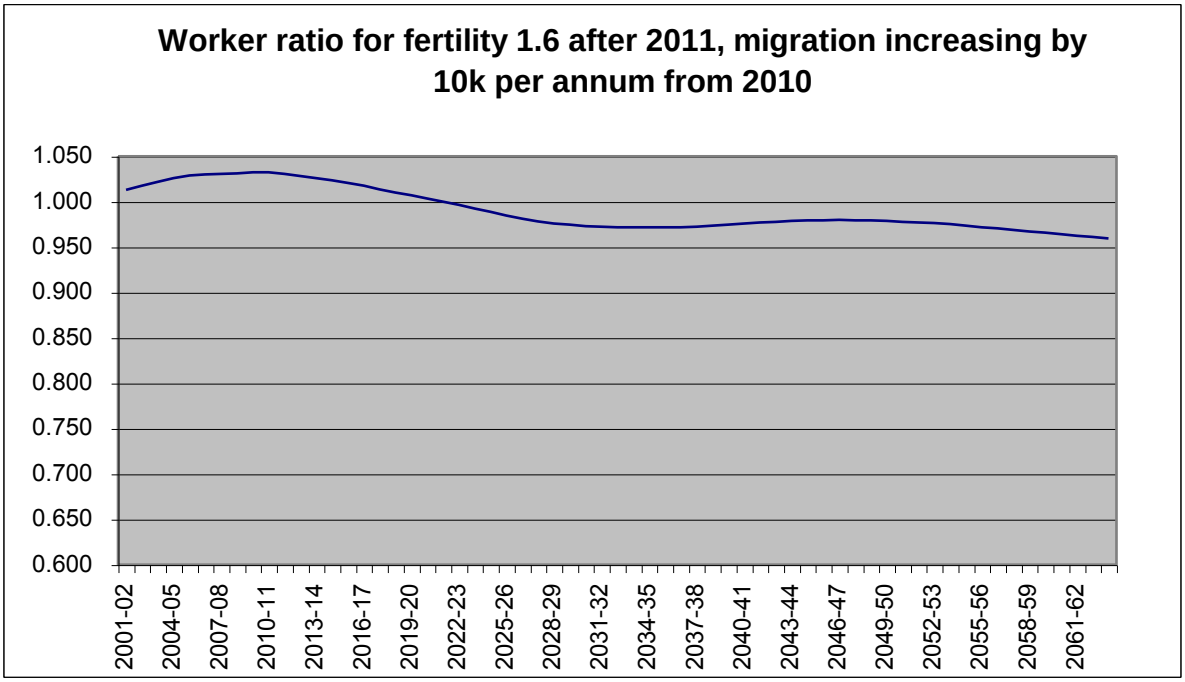


Chart 5.7: Scenario 7

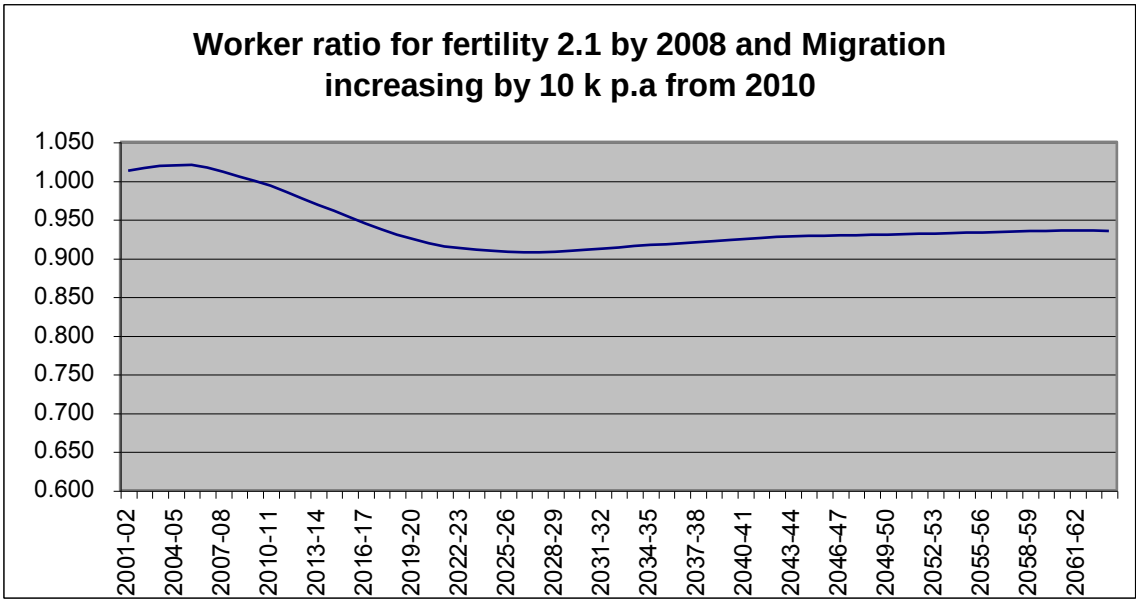
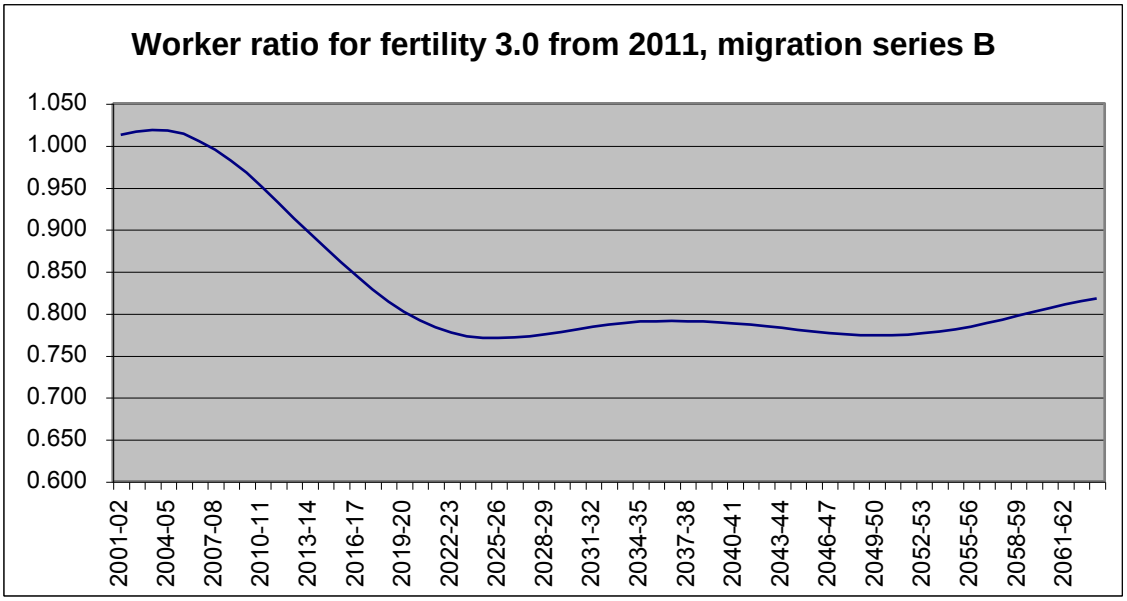


Chart 5.8: Scenario 8



Scenario 1 closely represents Australia's demographic future without policy intervention. Under this scenario the worker ratio is predicted to decline after 2010 for the remainder of the projection period. The worker ratio is predicted to fall to .809 by 2064.

Increasing fertility and leaving migration constant (scenario 2) offers little improvement over the benchmark case. Similarly, chart 3 shows that large increases in migration result in a constant declining worker ratio, only slightly higher than the benchmark and close to replacement fertility scenarios.

Scenario 4 with fertility growth to replacement level and zero net migration from 2003 shows worse results than all of the other cases for the projection period, with the worker ratio declining more rapidly and falling to below .80 by 2043. By 2064 the worker ratio has not risen above .80 although there is some increase relative to the previous decline. This indicates that fertility growth without migration may improve the worker ratio some years after 2064 but the price is a lage reduction in the worker ratio for more than half of a century. The costs of a fertility growth policy, in terms of the incentives the government would need to offer, combined with a very low worker ratio is likely to outweigh any possible long term benefits from this scenario relative to the other cases.

Scenario 8, with high fertility rates and migration as per series B, shows an even worse result than scenario 4 for the majority of the projection period, only indicating a slight improvement in the long run with the worker ratio reaching .818 by 2064.

Charts 5.5and 5.6 illustrate that increasing migration levels gradually over time produces the best results in terms of stabilising the worker ratio. Under scenario 6 the worker ratio does not fall below .96 at any time during the projection period 2001-02 to 2063-64. Until 2057 the worker ratio was consistently above .97, being the best result for all six scenarios. The small decline in the worker ratio at the end of the projection period indicates that slightly higher migration levels may be required to keep the worker ratio constant after 2057. The result for scenario 5 is similar with a slightly lower worker ratio but consistently above .95 and a slighter decline in the last years of the projection period. There is also more stability in the worker ratio under scenario 5, indicating that it may produce better results beyond 2064.

Chart 5.7 illustrates the predicted worker ratio for a combination of replacement level fertility and increasing migration over time. This scenario produces a steeper initial decline in the worker ratio relative to scenario 6. After 2029 the worker ratio begins to increase reaching .936 by 2061. By 2064 the worker ratio declines again slightly to .935. For the projection period a combination of fertility increasing to replacement level and migration increasing over time does not produce a higher worker ratio than increasing migration over time and leaving fertility at 1.6.

The above evidence suggests that scenarios 5,6 and 7 offer the best solution for stabilising the worker ratio relative to the other scenarios. Gradual increases in migration are required to achieve these results. Natural population growth is expected to decrease over time so it is clear that an adequate response in terms of migration is to increase immigration levels over time. Combining increasing migration and increasing fertility may eliminate the need for higher increases in migration after 2050. However the slight decrease in the worker ratio for this scenario between 2061 and 2064, suggests that some increase in migration will be required after 2061 to prevent the worker ratio declining after the projection period.

Demographic results for each of the eight scenarios are summarised in the tables below:

Table 5.1: Scenario 1

	2008	2015	2022	2029	2036	2043	2050	2057	2064
Population (000s)	20871	22171	23430	24597	25594	26413	27122	27777	28395
Proportion aged 0-4	0.059	0.055	0.054	0.053	0.050	0.048	0.048	0.047	0.046
Proportion aged 5-14	0.127	0.117	0.110	0.108	0.106	0.102	0.099	0.097	0.096
Proportion aged 15-64	0.682	0.674	0.657	0.636	0.623	0.615	0.606	0.594	0.582
Proportion aged 65+	0.132	0.154	0.178	0.203	0.221	0.235	0.248	0.262	0.275
Labour Force (000s)	10594	11185	11588	11871	12142	12378	12523	12604	12695
Not in Labour Force (000s)	10277	10986	11841	12726	13452	14035	14599	15173	15700
Worker Ratio	1.031	1.018	0.979	0.933	0.903	0.882	0.858	0.831	0.809

Table 5.2: Scenario 2

	2008	2015	2022	2029	2036	2043	2050	2057	2064
Population (000s)	21017	22735	24452	26103	27668	29212	30781	32364	33976
Proportion aged 0-4	0.065	0.068	0.066	0.063	0.062	0.062	0.062	0.061	0.060
Proportion aged 5-14	0.127	0.125	0.129	0.127	0.123	0.121	0.121	0.122	0.120
Proportion aged 15-64	0.678	0.658	0.635	0.618	0.611	0.605	0.598	0.592	0.590
Proportion aged 65+	0.131	0.150	0.171	0.192	0.204	0.212	0.218	0.225	0.230
Labour Force (000s)	10594	11185	11656	12209	12852	13481	14068	14700	15414
Not in Labour Force (000s)	10423	11550	12796	13894	14816	15731	16712	17665	18563
Worker Ratio	1.016	0.968	0.911	0.879	0.867	0.857	0.842	0.832	0.830

Table 5.3: Scenario 3

	2008	2015	2022	2029	2036	2043	2050	2057	2064
Population (000s)	21128	22833	24529	26147	27601	28889	30071	31195	32263
Proportion aged 0-4	0.059	0.056	0.055	0.054	0.051	0.049	0.049	0.048	0.047
Proportion aged 5-14	0.127	0.116	0.110	0.109	0.107	0.103	0.100	0.098	0.098
Proportion aged 15-64	0.682	0.676	0.661	0.641	0.631	0.625	0.616	0.603	0.591
Proportion aged 65+	0.132	0.152	0.174	0.196	0.211	0.223	0.235	0.250	0.264
Labour Force (000s)	10760	11590	12232	12759	13264	13701	14021	14276	14548
Not in Labour Force (000s)	10368	11243	12297	13388	14337	15188	16051	16919	17715
Worker Ratio	1.038	1.031	0.995	0.953	0.925	0.902	0.874	0.844	0.821

Table 5.4: Scenario 4

	2008	2015	2022	2029	2036	2043	2050	2057	2064
Population (000s)	20398	21337	22154	22847	23428	23957	24451	24925	25436
Proportion aged 0-4	0.067	0.067	0.064	0.062	0.062	0.063	0.063	0.062	0.061
Proportion aged 5-14	0.127	0.128	0.132	0.126	0.122	0.122	0.124	0.124	0.122
Proportion aged 15-64	0.672	0.647	0.619	0.600	0.587	0.579	0.574	0.574	0.575
Proportion aged 65+	0.134	0.158	0.185	0.212	0.229	0.237	0.239	0.241	0.242
Labour Force (000s)	10176	10273	10235	10311	10440	10592	10755	10980	11254
Not in Labour Force (000s)	10222	11064	11919	12536	12988	13365	13696	13945	14182
Worker Ratio	0.995	0.929	0.859	0.823	0.804	0.793	0.785	0.787	0.794

Table 5.5: Scenario 5

	2008	2015	2022	2029	2036	2043	2050	2057	2064
Population (000s)	20871	22280	23952	26073	28645	31703	35340	39637	44632
Proportion aged 0-4	0.059	0.055	0.055	0.054	0.053	0.053	0.053	0.053	0.053
Proportion aged 5-14	0.127	0.116	0.110	0.108	0.107	0.106	0.104	0.104	0.104
Proportion aged 15-64	0.682	0.675	0.660	0.644	0.638	0.639	0.639	0.637	0.634
Proportion aged 65+	0.132	0.153	0.175	0.194	0.201	0.203	0.203	0.206	0.209
Labour Force (000s)	10594	11255	11917	12782	13989	15525	17328	19397	21777
Not in Labour Force (000s)	10277	11025	12035	13291	14656	16178	18012	20240	22855
Worker Ratio	1.031	1.021	0.990	0.962	0.954	0.960	0.962	0.958	0.953

Table 5.6: Scenario 6

	2008	2015	2022	2029	2036	2043	2050	2057	2064
Population (000s)	20871	22388	24414	26964	29999	33538	37672	42482	47999
Proportion aged 0-4	0.059	0.055	0.055	0.055	0.054	0.053	0.053	0.053	0.053
Proportion aged 5-14	0.127	0.116	0.110	0.109	0.108	0.107	0.105	0.105	0.104
Proportion aged 15-64	0.682	0.676	0.663	0.648	0.643	0.644	0.645	0.642	0.637
Proportion aged 65+	0.132	0.153	0.172	0.188	0.194	0.195	0.196	0.200	0.206
Labour Force (000s)	10594	11325	12207	13319	14783	16582	18633	20923	23505
Not in Labour Force (000s)	10277	11063	12207	13645	15216	16956	19038	21560	24494
Worker Ratio	1.031	1.024	1.000	0.976	0.972	0.978	0.979	0.970	0.960

Table 5.7: Scenario 7

	2008	2015	2022	2029	2036	2043	2050	2057	2064
Population (000s)	21070	23110	25708	28906	32767	37406	42890	49260	56589
Proportion aged 0-4	0.067	0.070	0.069	0.068	0.068	0.070	0.070	0.069	0.069
Proportion aged 5-14	0.126	0.127	0.133	0.130	0.128	0.128	0.130	0.130	0.129
Proportion aged 15-64	0.676	0.655	0.634	0.627	0.626	0.627	0.628	0.628	0.628
Proportion aged 65+	0.130	0.148	0.164	0.176	0.178	0.175	0.172	0.173	0.175
Labour Force (000s)	10594	11325	12284	13758	15682	17994	20672	23786	27347
Not in Labour Force (000s)	10476	11785	13424	15148	17084	19411	22218	25473	29242
Worker Ratio	1.011	0.961	0.915	0.908	0.918	0.927	0.930	0.934	0.935

Table 5.8: Scenario 8

	2008	2015	2022	2029	2036	2043	2050	2057	2064
Population (000s)	21244	23923	26709	29522	32617	36309	40562	45175	50287
Proportion aged 0-4	0.075	0.096	0.089	0.085	0.088	0.094	0.096	0.093	0.092
Proportion aged 5-14	0.125	0.137	0.169	0.164	0.157	0.159	0.169	0.173	0.169
Proportion aged 15-64	0.670	0.625	0.586	0.582	0.583	0.576	0.569	0.573	0.584
Proportion aged 65+	0.129	0.143	0.156	0.169	0.173	0.171	0.166	0.161	0.155
Labour Force (000s)	10594	11185	11734	12889	14402	15962	17693	19913	22624
Not in Labour Force (000s)	10650	12737	14976	16632	18215	20346	22869	25262	27663
Worker Ratio	0.995	0.878	0.784	0.775	0.791	0.785	0.774	0.788	0.818

Scenario 6, with migration levels increasing over time, produces the best outcome for the worker ratio to 2064. This scenario results in a total population of 48 million by 2064, with other scenarios ranging from 25 to 57 million. Clearly the benefits arising from scenarios 5, 6 and 7 need to be weighed against the possible cost of a higher total population. The cost of implementing fertility growth policies also needs to be considered when determining the net benefits of scenario 7. These are issues that should be explored in future research.

It should be noted that increasing migration unnecessarily in the years prior to 2010 (i.e. before the worker ratio begins to decline) would lead to a greater rate of decline in

the worker ratio after 2050, as new migrants themselves reach retirement age. This would require an even greater migrant intake after 2050 to reduce further ageing. It is because of this issue that fertility growth and zero migration (scenario 4) despite producing the worst results for the worker ratio for the period of analysis, does produce an increase in the worker ratio after 2050. By 2064, however, scenario 4 still has a worker ratio of only .794 compared with .96 for scenario 6. Increasing fertility to above replacement level and gradually increasing migration levels (scenario 8) produces a similar result.

5.2 Initial economic impact of demographic scenarios

The impacts on selected economic indicators of the various scenarios are now compared using the forecasting module of MM2. It should be noted that increases in fertility do not affect labour force participation in the model. This means that any relative benefits for migration versus fertility will be understated. Furthermore the forecasting module of MM2 only produces annual projections up to 2011. Consequently we can only compare the early years of the various scenarios, before the differences in the worker ratios become obvious. However, if scenarios 5, 6 and 7 are shown to produce overall economic benefits from the onset, the results can be expected to improve exponentially over time due to the increasing differences between the worker ratios over time in these scenarios compared with the alternative scenarios.

Skill indices are calculated for the workforce under each scenario and these are then imported in to the main module along with the demographic forecasts. In MM2 the

average skill level of the population is set to 63.5. A recent paper by Econtech (the producers of MM2) derives skill indices for new migrants and the rest of the population, based on the composition of 2000/01 immigration. Using these figures we can generate skill indices for each of the demographic scenarios. In order that they are consistent with the underlying skill level of 63.5 in the model, the indices taken from the Econtech paper are weighted accordingly.

Table 5.9: Skill indices for 2000/01 migration program

skill index as per Murphy paper table 2.1	maximum skill = 100		
based on 2000/01 migration program			
	skill index	proportion	weighted index
Family	59.1	23.2%	13.71
Skilled Australian Sponsored	65.9	5.6%	3.69
Employer Nominated	71.5	1.7%	1.22
Independent	69.5	20.4%	14.18
Business Skills	84.1	6.2%	5.21
Humanitarian	53.7	9.5%	5.1
Non-program	56.8	33.3%	18.91
Aggregate new migrant skill index			62.02
Australian workforce skill index			57.97

[Source: Econtech Pty Ltd (Feb 2001), "The Economic Impact of 2000/01 Migration Program Changes", prepared for DIMIA, table 2.1, p. 5.]

The indices for the Australian and new immigrant workforce are now weighted to the average skill level of 63.5 in MM2:

Table 5.10: Skill indices for MM2

Australian workforce skill index	63.5
New migrant workforce skill index	68.0

The skill index is derived from the sex and expected occupation indicated by immigrants on their arrival cards, weighted downward to correct for possible optimistic bias. [Econtech (Feb 2001), p. 4.]

The immigrant skill index derived above does not include long-term arrivals and departures, or permanent departures. Foster [(1992), table 3.1, p. 13.] estimated the skill indices for these categories in 1992 as follows:

Table 5.11 (extracted from Chapter 3, Table 3.7)

Permanent departures	65.6
Long-term arrivals	70.9
Long-term departures	71.0

[Source: Parameters of AEM demographic module (June 1992) [After Foster (1992), table 3.1, p.13.]

In demographic scenarios which include migration, long-term arrivals outweigh permanent and long-term departures. The result is that the skill index increases slightly if these categories are included. However, because of the lack of recent information on these migration categories the skill index is only generated using permanent immigration figures. Consequently the aggregate skill index derived for the scenarios including migration underestimates the skill level of migrants. This is reduced over time, however, as permanent migration increases relative to other migration.

For each demographic scenario a benchmark is constructed with zero migration. The proportion of new immigrants in the labour force is generated from the difference in the projected size of the labour force for each year in each scenario. As the proportion of new immigrants in the labour force increases over time, the average skill level of the population increases accordingly. The average skill level for each year is input in to the main module together with the corresponding demographic forecast. Selected macro-economic output for 2010-11 is summarised for each scenario in the table below.

Table 5.12: medium run forecasts 2010-11

		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8
POPULATION	pers. '000	21437	21748	21538	20818	21452	21467	21882	22339
PARTICIPATION RATE	per cent	64.15	64.15	64.17	63.45	64.15	64.15	64.16	64.16
LABOUR SUPPLY	pers. '000	11297	11297	11342	10683	11302	11308	11309	11297
TOTAL EMPLOYMENT (including defence)	pers. '000	10578	10579	10612	10008	10582	10586	10587	10580
EMPLOYMENT (civilian)	pers. '000	10524	10525	10558	9954	10528	10532	10533	10526
UNEMPLOYMENT RATE	per cent	6.393	6.388	6.464	6.357	6.406	6.418	6.409	6.377
AVERAGE EARNINGS	$'000 p.q.	16.12	16.11	16.10	16.20	16.12	16.12	16.11	16.10
RATE OF TAX ON LABOUR INCOME	percentage	20.83	21.22	20.71	23.99	20.80	20.78	21.30	21.96
AVERAGE DISPOSABLE INCOME	$'000 p.q.	12.76023	12.69172	12.76914	12.31470	12.76669	12.77211	12.68204	12.56712
GDP (AVERAGE)	$m 1999-00	919579	919576	923285	867959	920064	920615	920607	919572
GDP PER CIVILIAN EMPLOYED	$'000 1999-00	87.38	87.37	87.45	87.20	87.39	87.41	87.40	87.36
GDP PER CAPITA	$ 1999-00	42896.79	42283.25	42867.73	41692.72	42889.44	42885.11	42071.57	41163.75
BUSINESS CAPITAL STOCK	$m 1999-00	757844	757416	759505	719174	758241	758617	758057	756490
CAPITAL/OUTPUT RATIO	ratio	0.824	0.824	0.823	0.829	0.824	0.824	0.823	0.823
CAPITAL/EMPLOYED LABOUR RATIO	ratio	71.64	71.60	71.57	71.86	71.65	71.66	71.60	71.50
B.O.P.: BAL. ON CURRENT ACCOUNT	% of gdp	-1.668	-1.620	-1.977	-0.890	-1.740	-1.805	-1.746	-1.511
EXPORTS – TOTAL	$m 1999-00	256010	256205	255729	242979	255831	255693	255927	256643
IMPORTS – TOTAL	$m 1999-00	248814	248508	251491	233437	249408	249957	249597	247822
NET EXPORTS	$m 1999-00	7196	7697	4238	9542	6423	5736	6330	8821
NATIONAL INVESTMENT	% of gdp	24.18	24.19	24.57	23.01	24.25	24.32	24.34	24.22
NATIONAL SAVING	% of gdp	22.51	22.57	22.59	22.12	22.51	22.51	22.59	22.71
PRIVATE CONSUMPTION	$m 1999-00	525304	524789	527396	494279	525748	526161	525533	523631
GOV'T CONSUMPTION	$m 1999-00	155896	155896	155896	155896	155896	155896	155896	155896
CONSUMPTION PER CAPITA	$ 1999-00	31777	31299	31725	31231	31775	31772	31141	30418
CONSUMER PRICE INDEX	1989-90=100	176.1	176.1	176.1	174.8	176.1	176.1	176.1	176.1

5.2.1 Interpreting the results

The above table represents the medium run economic impact of scenarios 1 to 8 by 2011. Because the worker ratio is expected to decline from 2011, scenarios 5, 6 and 7 do not introduce increases in migration levels until 2010. Consequently the differences between the scenarios are expected to increase over time. It is only after 2011 that the differences in the worker ratio will be noticeable. The above results can still provide an indication of whether there may be any negative consequences of scenarios 5, 6 and 7, which have already been shown to be the most effective in stabilising the worker ratio.

Output:

Scenarios 3, 5 and 6, in which annual immigration levels are increased, with fertility held constant at series B levels, show an increase in GDP per capita relative to the scenarios with fertility increasing. GDP per civilian employed increases for all scenarios in which immigration levels are increased, including scenario 7, which increases immigration and fertility. This indicates the productivity gain resulting from the higher skill level of the working population due to a higher proportion of new immigrants in the labour force. As the skill level increases over time due to an increasing proportion of new immigrants in the labour force, greater increases in productivity are expected.

GDP can be broken down into net exports, investment and consumption. In order to determine whether the increase in per capita GDP for the increased immigration scenarios reflects an improvement in average living standards, consumption per capita

is calculated. Table 5.12 reveals that consumption per capita is higher for scenarios 3,5 and 6, in which immigration levels are increased with fertility rates unchanged. This is due to the combined effects of higher productivity due to the skill level of migrants, and the lower tax rate for these scenarios relative to those in which fertility rates are increased.

The higher tax rate for the fertility increase scenarios is due to the increase in government expenditure required to finance increasing family assistance payments. It is for this reason that the lowest tax rate observed, of 20.71 per cent, occurs for scenario 3 in which migration levels are highest. This scenario was rejected previously because it does not produce the required increase in the worker ratio after 2011. However, the results for scenario 3 indicate that when immigration is increased over time in scenarios 5 and 6 greater per capita benefits are expected. Also as the number of dependent children increases over time in the scenarios including fertility growth, the tax rates in these scenarios will increase accordingly, reducing per capita consumption. This is without accounting for the cost of incentive payments to induce fertility growth, which would add to the tax burden.

Although scenario 1 (leaving both migration and fertility unchanged) produces similar results to the increasing migration scenarios in 2010-11, the increasing dependency ratio over time will lead to increasing taxation rates for this scenario. The combined effects of productivity growth and lower dependency ratio for increasing immigration, relative to doing nothing or increasing fertility, will increase the relative benefit of

increasing immigration over time. The evidence in terms of living standards and productivity growth supports the case for gradually increasing immigration over time, without increasing the rate of fertility.

Income:

Increasing fertility to replacement level, and reducing net migration to zero (scenario 4) yields the highest gross income per employee. This is due to the lower number of individuals employed, producing a higher capital/labour ratio and increasing the return to labour. However, due to the high level of taxation, disposable income is lower for this scenario than for all the alternative scenarios. As discussed above, as the dependency ratio increases over time, disposable income is expected to reduce further in the absence of immigration increases. Scenario 6 yields the highest level of disposable income in 2010-11. This is expected to improve further over time as productivity increases and the dependency ratio decreases.

Given that new immigrants have a higher skill level than the average Australian it is likely that migrant wages exceed average wages. To determine the impact on the pre-immigration population, average earnings and average disposable income are disaggregated.

In order to disaggregate income into the new immigrant and pre-migration population the ratio of new migrant to pre immigration wages is calculated. Average weekly income for all employed Australians was $656.40 in Feb 2001 and $684.70 in Feb 2002

[ABS Average Weekly Earnings, 6302.0, February 2002, www.abs.gov.au, p. 6.] LSIA 2 data on income from employers and self-employment (own business, partnership or farm) is used to estimate average new migrant incomes between March 2001 and Feb 2002 (the period over which the interviews occurred). The highest income level in the survey is recorded as $2000 or more. Therefore two estimates are generated, one capping the $2000 or more income group at $5000, and another capping it at $3000 for comparison. Because the survey is taken 18 months after arrival, average migrant wages are likely to fall from this estimate over time as skilled migrants form a lower proportion of total migrants employed, once less skilled migrants find employment.

For each scenario the ratio of new-immigrant to pre-migration wages is derived in the following manner:

$$AW = m \times MW + (1-m) \times PMW \quad (1)$$

Where AW = average wage

m = proportion of new immigrants in the labour force

PMW = pre-migration population average wage

Rearranging the equation yields:

$$PMW = (AW - (m \times MW))/(1-m) \quad (2)$$

The series B labour force projections with and without migration (as was used to calculate the skill index) estimates that the proportion of new immigrants in the 2001/02 labour force is .00834.

Average Australian wages for Feb 2001- Feb 2002 = $673.95

Average new-immigrant wages for March 2001 - Feb 2002 = $785.30

(capped at 5000.00)

Alternative average new-immigrant wages for March 2001 – Feb 2002 = $749.51

(capped at $3000)

Equation 2 is now used to estimate the ratio of new migrant to pre-immigration wages.

PMW = (AW – (m x MW))/(1-m)

= (673.95 – (.00834 x 785.30)/(.99166)

= 667.35

Therefore, the ratio of new immigrant to pre-migration wages = 785.30/667.35

= 1.177

Comparing the difference for the higher capped alternative estimate of immigrant wages yields:

PMW = (673.95 – (.00834 x 749.51)/(.99166)

= 667.65

Yielding a ratio of new immigrant to pre-migration wages = 749.51/667.65

= 1.123

I will use the slightly higher ratio 1.177 in the following calculations. The return to immigrants is likely to be overstated, as a consequence.

MW = 1.177 x PMW (3)

Substituting equation 3 into equation 1 yields:

AW = (m x 1.177 x PMW) + (1-m) x PMW (4)

= PMW((m x 1.177) + (1 – m))

Rearranging:

$$PMW = AW / ((1.177 \times m) + (1-m)) \quad (5)$$

Values for the projected proportion of new immigrants in the workforce in 2010-11 are substituted in to equation 5 to determine the wages of the rest of the workforce, excluding the new immigrant workforce. From this the wages for new migrants are also calculated. The results are summarised in table 5.13 below.

Table 5.13 Disaggregation of income

		Average Earnings p.q.			**Tax Rate**	**Average Disposable Income p.q.**	
Scenario	m'	Aggregate	New immigrant workforce	Rest of workforce	%	New immigrant workforce	Rest of workforce
1	0.066	16.12	18.75	15.93	20.83	14.85	12.61
2	0.066	16.11	18.74	15.92	21.22	14.77	12.54
3	0.072	16.10	18.71	15.90	20.71	14.84	12.61
4	N/A	16.20	N/A	16.20	23.99	N/A	12.31
5	0.067	16.12	18.75	15.93	20.80	14.85	12.62
6	0.068	16.12	18.75	15.93	20.78	14.85	12.62
7	0.068	16.11	18.74	15.92	21.30	14.75	12.53
8	0.066	16.10	18.73	15.91	21.96	14.62	12.42

The results show that, despite new-immigrants earning a higher disposable income than the rest of the workforce, there are positive income externalities from increasing migration for the remaining workforce. The highest disposable income for the non-new immigrant workforce occurs under scenarios 5 and 6. This is consistent with the

previous evidence that gradually increasing migration over time produces the best outcome for the economy, relative to policies that include fertility growth.

Fertility growth scenarios 2, 4, 7 and 8 not only have a reduced income (both before and after tax) relative to migration scenarios 5 and 6, but also have larger families. Consequently a relatively lower disposable income is shared amongst a greater number of people, reducing average per capita income as well as income per employee.

The use of average tax rates understates the gains to the pre-immigration population from increasing immigration. Higher income earners face higher marginal tax rates. Consequently the above figures overstate the after-tax income of immigrants, and understate the after-tax income of the rest of the population. In addition the tax revenue supplied by the migrant workforce returns to the whole population in the form of government expenditure.

Distribution of Income

Senarios 4, 5 and 6 all yield a higher capital/labour ratio than the alternative scenarios. This will result in an increase in the rate of return to labour relative to the rate of return to capital. Consequently for these scenarios the income gap between rich and poor closes relative to the alternative scenarios. Scenario 4, in which fertility increases to replacement level and net migration reduces to zero, produces the largest reduction in the income gap. However, this scenario generates the lowest average disposable income and the worst results for the worker ratio over time. Scenarios 5 and 6 marginally

reduce the income gap relative to the other scenarios (excluding zero net migration) and increase disposable income.

Inflation

There is no inflationary impact of scenarios 2,3,5,6 or 7 relative to the benchmark, scenario 1. Scenario 8, with fertility increasing to 3.0, is marginally inflationary. Scenario 4, however, reduces inflation. The reduction in inflation in this scenario is due to reduced demand due to a lower population. As supply adjusts to demand in the long run, inflation is likely to return to its previous level. The important result here is that increasing immigration levels is not inflationary.

Unemployment

The unemployment rate is slightly higher with increasing immigration than without. The largest difference is between scenarios 4 and 6, however this only amounts to .061 percentage points. Results from LSIA1 and LSIA2 indicate that new immigrants experience a higher rate of unemployment than average, although this rate is decreasing over time. LSIA2 showed that new immigrants have an unemployment rate of 9.9 per cent 18 months after arrival, compared with a national unemployment rate of 6.4 percent. Consequently, as discussed in chapter 2, the unemployment rate for the pre-immigration population is actually lower due to increased immigration.

Skilled migrants were shown to have a lower unemployment rate than the national average, suggesting that migrants may be displacing pre-immigration labour in the

skilled sectors of the economy. In July 1999, however, the points test for skilled migrants was restructured to target migrants who have skills which are in shortage in the existing population. [Population Flows Immigration Aspects (2000), DIMIA, pp. 17-20.] In order to determine whether this has eliminated the possibility of job displacement further research is recommended. A suggested way of analysing this is to determine the sectors in which skilled new immigrants are gaining employment and compare this with the history of job vacancies in those sectors.

Because recent policy changes have led to new-immigrants finding employment faster than previously, it is not clear what the long run effects on the pre-immigration labour force will be, in terms of job displacement. The benefits of a higher skilled labour force return to the whole economy, however. The increase in the worker ratio due to higher levels of immigration provide necessary tax revenue to support the dependent population This is due to the employment and higher average skill level of new immigrants. Despite an unemployment rate of 9.9 per cent, LSIA2 results showed that the proportion of new immigrants in employment is only .3 percentage points lower than the national average, and this is expected to improve over time. In the long-run the higher demand generated by increased consumption per capita may result in higher employment rates for both new immigrants and the pre-migration population. Once again, further research is necessary to investigate this.

Balance of Payments

For all of the scenarios involving an increase in immigration, the current account deficit to GDP ratio is increased. This is partly due to a worsening in the trade balance, but to a greater degree reflects the increase in foreign borrowing to finance investment growth. In the long-run as increased immigration raises productivity and increases GDP the size of the current account deficit relative to GDP is expected to decrease. Consequently, any short run expansion of the current account deficit is likely to be outweighed by increased economic benefits in the long- run.

Summary and Conclusion

In chapter 1 the problem of Australia's worker ratio declining from 2011 was discussed. According to the Australian Bureau of Statistics series B projection assumptions, in the 40 years from 2011 to 2051 the dependency ratio per 100 will increase by over 20. That is for every 100 individuals between ages 15 and 65 (the usual working ages) there will be an increase in the number of individuals outside the usual working ages of 21.7.

This has led to debate amongst policy makers regarding how the increasing number of dependents is to be financially supported. The conservative approach is that fertility rates should increase to produce a larger labour force in the future. However, such a policy would be costly to implement and would not produce results by 2011, when the worker ratio will begin its decline. Furthermore increasing fertility would add to the dependency ratio initially.

As an alternative solution to increasing the worker ratio increasing the rate of immigration is suggested. Immigration increases both supply and demand, and impacts on various economic indicators, including the size of the work force.

In chapter 2 the likely impact of migration on the Australian economy was discussed, with reference to some previous research in this area. It is anticipated that immigration would increase output through supply and demand effects, although the per-capita effect depends on whether or not output expands more than the growth rate of the

population. It was also suggested that the impact on the pre-immigration population should be considered when determining whether immigration or fertility growth is the preferred policy response.

Policy makers should also consider whether or not the income gap widens under the alternative solutions. The impact of the fertility and immigration alternatives on income distribution is dependent on the capital/labour ratio. If this ratio decreases then the income gap will widen as the return to capital increases relative to the return to labour. It was suggested, based on previous research, that immigration does not affect the aggregate unemployment rate and decreases the rate of unemployment for the pre-migration population. Inflation is not anticipated as a consequence of immigration, however there is likely to be a net negative impact on the balance of payments.

Chapter 3 focussed on recent empirical work and models employed to test the impact of immigration on the economy. LSIA1 data revealed that under previous immigration policy, primary applicants aged over 15 had an overall employment rate 5.6 percentage points below the national average, 18 months after arrival. Previous models, which tested the impact of Australian immigration on inflation, unemployment and the current account, concluded that immigration had no significant impact on these variables. However, these studies were all undertaken prior to recent policy changes, which increased the proportion of skilled migration relative to other categories and focussed on targeting immigrants who could meet specific skill shortages in the Australian workforce.

Foster's (1992) study of varying the composition and magnitude of net immigration revealed that reducing either the magnitude or skill composition of immigration had overall negative effects on the economy. Foster found, however, that reducing the size of the intake actually improved living standards. The skill content of the current immigration composition is greater than Fosters most skilled scenario and outweighs any negative effects of increasing the magnitude of immigration. A recent study by Econtech (2001) revealed that the current increase in skilled migration has improved labour force participation rates, productivity and per capita consumption relative to the previous policy composition, with little effect on net unemployment.

Chapter 4 used LSIA2 data to analyse the labour force experience of new-migrants 18 months after arrival. LSIA2 immigrants arrived between September 1999 and August 2000. The recent changes to migration policy were introduced in 1999-2000, consequently LSIA2 data provides a more accurate indication of the experience of recent new-immigrants than LSIA1. However, some migrants in LSIA2 would have been issued visas under previous criteria, suggesting that further improvements in labour force outcomes 18 months after arrival are expected. Examination of LSIA2 data revealed that new-immigrants aged over 15 achieve an employment rate only 0.3 per cent lower than the national average 18 months after arrival. Amongst primary applicants the employment rate 18 months after arrival is 3.2 percentage points higher than the national average, an improvement of 8.8 percentage points over LSIA1

primary applicants. This evidence supports the expectation that the current composition of new-immigrants will produce greater economic benefits than past immigration.

A logit analysis was undertaken on LSIA2 wave 2 data to determine the characteristics of new-immigrants affecting their employment outcomes. It was found that Australian qualifications and English language ability greatly improve the probability of employment for less skilled immigrants. Consequently over time, further improvements are anticipated as labour force participation and unemployment rates improve for less-skilled immigrants who acquire skills post-arrival. Although skilled immigrants are likely to continue to outperform less-skilled immigrants in terms of gaining employment, there is sufficient evidence to expect that the gap between skilled and less-skilled migrants will decrease over time. Consequently, in the long run both employment rates and labour productivity are expected to be greater for increasing immigration than increasing fertility.

In chapter 5 MM2 was employed to generate demographic forecasts based on various migration and fertility assumptions. The demographic results support the hypothesis that increasing immigration will stabilise the worker ratio earlier and at a higher level than increasing fertility, so long as the increases in immigration levels occur gradually over time. These scenarios were then fed into the main module of MM2 to predict their impact on the economy by 2010-11. This is only the first year that the worker ratio begins to decline, but the benefits of increasing immigration relative to fertility growth are already apparent.

The scenarios in which migration is increased gradually outperform all other scenarios. Under these scenarios, labour force productivity, income per worker for the pre- and post-migration populations and consumption per capita are increased relative to the scenarios in which fertility is increased or migration is increased too quickly. Only reducing migration to zero produces a greater reduction in the income gap than the migration scenarios, however this scenario generates the lowest average disposable income and the worst results for the worker ratio over time. Increasing migration is also found to be non-inflationary and only marginally increases the aggregate unemployment rate relative to alternative scenarios. The results from LSIA2 in chapter 4, suggest that over time, as immigrants invest in Australian education and improve their English language skills, employment outcomes are likely to improve further.

Further research is necessary to determine the impact of increasing immigrant employment on the existing workforce, however the increase in demand due to higher disposable income levels may increase employment for both the pre- and post-immigration population. Furthermore the tax revenue from immigrant incomes returns to the whole population. In the short-term increasing immigration increases the current account deficit as a percentage of GDP. Given the higher skill level of new-immigrants relative to the rest of the population, the positive results from scenarios 5 and 6, in which immigration levels are gradually increased with the fertility rate remaining at its predicted rate of 1.6, are expected to improve over time. In the long run this is expected to reduce the current account deficit to GDP ratio.

This paper therefore supports the hypothesis that a policy of increasing immigration will benefit the Australian economy and improve living standards for all Australians relative to a policy aimed at increasing fertility.

Concluding Comments and Policy Implications

There are a number of alternatives for dealing with the potential economic downturn to an aging population. In this paper I have examined two alternatives for increasing the worker ratio, both which involve population growth, by increasing either migration or fertility (or a combination of the two). If Australia is unable to support a larger total population, however, other methods need to be explored for increasing the size and productivity of the labour force.

Part of the cause of the increasing proportion of elderly in the population is increased life expectancy. Consequently with better health in old age there is a possibility of labour force participation rates for older cohorts to increase over time. Cultural attitudes towards 'retirement age' need to change for this to occur to a significant degree. A government advertising campaign to introduce a new social norm regarding the potential productivity of the elderly could assist in this cultural transformation. Furthermore, disincentives for employment (such as the high effective marginal tax rate for single parents entering paid employment, around 80 per cent) need to be removed. Increasing female labour force participation may produce greater national benefits than migration or fertility growth, if it can be achieved at a lower cost.

Industry restructuring due to globalisation has made it difficult for certain cohorts of the population to find work. Over 45 year old males, for example, who have been made redundant often leave the labour force because of the poor prospects for finding work that matches their skills. Simultaneously, migrants are often imported specifically to fill skill gaps in the growing sectors of the economy. More targeted skills training could therefore increase the size of or labour force by training the unemployed already in Australia (where there are jobs available). The cost of education would surely be less than the cost of unemployment.

Thus there are some instances where neither immigration nor fertility may be appropriate. Instead more efficient use of the resources already present is recommended. A thorough analysis of the appropriate method for preventing economic deterioration should weigh the costs and benefits of all the alternatives. It is likely that the most efficient method will be some combination of all of these, weighted according to other policy objectives.

Appendix 1

A breakdown of the regions included in the simcult variable, into countries is listed below.

11	Australia (includes External Territories)
1100	Australia (includes External Territories), nfd
1101	Australia
1102	Norfolk Island
1199	Australian External Territories, nec
12	New Zealand
1201	New Zealand
2	North-West Europe
2000	North-West Europe, nfd
21	United Kingdom
2100	United Kingdom, nfd
2101	Channel Islands
2102	England
2103	Isle of Man
2104	Northern Ireland
2105	Scotland
2106	Wales
22	Ireland
2201	Ireland
23	Western Europe
2300	Western Europe, nfd
2301	Austria
2302	Belgium
2303	France
2304	Germany
2305	Liechtenstein
2306	Luxembourg
2307	Monaco
2308	Netherlands
2311	Switzerland
24	Northern Europe
2400	Northern Europe, nfd
2401	Denmark
2402	Faeroe Islands
2403	Finland
2404	Greenland
2405	Iceland
2406	Norway
2407	Sweden

31	Southern Europe
3100	Southern Europe, nfd
3101	Andorra
3102	Gibraltar
3103	Holy See
3104	Italy
3105	Malta
3106	Portugal
3107	San Marino
3108	Spain
81	Northern America
8100	Northern America, nfd
8101	Bermuda
8102	Canada
8103	St Pierre and Miquelon
8104	United States of America

European regions exclude Southeastern and Eastern Europe, which were not considered to have a similar culture to Australia.

Whilst it is acknowledged that cultural similarity is not easily identified, the above regions have a lifestyle that more closely resembles that of Australia than other regions in the database. The high level of significance of the simcult variable suggests that the chosen division is a good approximation of cultural similarity, although a more thorough analysis of the cultural difference between countries may suggest that the simcult variable should be derived on a country by country basis rather than merely focussing on regions.

Appendix 2

Demographic inputs for MM2 forcasts

Scenarios 1, 3, 5 and 6 age specific fertility assumptions:

Age	UNITS	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
		forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast
15to19	b/w/5-years	0.08650	0.08400	0.08150	0.07950	0.07700	0.07500	0.07300	0.07050	0.06850	0.06650
20to24	b/w/5-years	0.2840	0.2765	0.2695	0.2625	0.2555	0.2485	0.2415	0.2350	0.2280	0.2210
25to29	b/w/5-years	0.5080	0.4965	0.4850	0.4740	0.4625	0.4515	0.4405	0.4300	0.4190	0.4080
30to34	b/w/5-years	0.5375	0.5360	0.5340	0.5325	0.5305	0.5290	0.5270	0.5255	0.5235	0.5205
35to39	b/w/5-years	0.2540	0.2605	0.2665	0.2725	0.2785	0.2845	0.2900	0.2955	0.3010	0.3060
40to44	b/w/5-years	0.04800	0.05100	0.05400	0.05700	0.06000	0.06300	0.06550	0.06850	0.07100	0.07350
45to49	b/w/5-years	0.00250	0.00250	0.00300	0.00350	0.00350	0.00400	0.00400	0.00450	0.00500	0.00500
AllAges	b/lifetime	1.721	1.707	1.693	1.682	1.667	1.655	1.641	1.630	1.616	1.601

Fertility assumptions remain at 2010-11 rates for the rest of the projection period (to 2064).
[Based on ABS medium assumptions, 'Assumptions Summary", AusStats: 3222.0 Population Projections, Australia, p7]

Scenario 2 fertility assumptions

Age	UNITS	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
		forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast
15to19	b/w/5-years	0.08800	0.08700	0.08600	0.08500	0.08400	0.08300	0.00820	0.08100	0.08000	0.07850
20to24	b/w/5-years	0.2890	0.2864	0.2810	0.2810	0.2785	0.2755	0.2725	0.2695	0.2665	0.2625
25to29	b/w/5-years	0.5170	0.5200	0.5300	0.5400	0.5500	0.5600	0.5700	0.5800	0.5900	0.6000
30to34	b/w/5-years	0.5470	0.5545	0.5625	0.5705	0.5785	0.5865	0.5945	0.6025	0.6110	0.6180
35to39	b/w/5-years	0.2585	0.2695	0.2806	0.2920	0.3035	0.3155	0.3270	0.3390	0.3515	0.3630
40to44	b/w/5-years	0.04900	0.05300	0.05700	0.06100	0.06550	0.06950	0.07400	0.07850	0.08300	0.08700
45to49	b/w/5-years	0.00250	0.00300	0.00300	0.00350	0.00400	0.00450	0.00500	0.00500	0.00550	0.00600
AllAges	b/lifetime	1.751	1.773	1.800	1.833	1.864	1.895	1.851	1.956	1.987	2.015

Fertility assumptions remain at 2010-11 rates for the rest of the projection period.

Scenario 4 and 7 fertility assumptions:

Age	UNITS	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
		forecast	forecast	forecast	forecast	forecast	forecast	forecast
15to19	b/w/5-years	0.08800	0.08700	0.08700	0.08800	0.08900	0.09000	0.09000
20to24	b/w/5-years	0.2890	0.2864	0.2900	0.2950	0.3000	0.3100	0.3300
25to29	b/w/5-years	0.5170	0.5200	0.5300	0.5400	0.5550	0.5700	0.6100
30to34	b/w/5-years	0.5470	0.5545	0.5625	0.5705	0.5800	0.5900	0.6300
35to39	b/w/5-years	0.2585	0.2695	0.2806	0.2920	0.3035	0.3200	0.3500
40to44	b/w/5-years	0.04900	0.05300	0.05700	0.06100	0.06550	0.07000	0.08500
45to49	b/w/5-years	0.00250	0.00300	0.00300	0.00350	0.00400	0.00450	0.00500
AllAges	b/lifetime	1.751	1.773	1.810	1.850	1.897	1.954	2.100

Fertility assumptions remain at 2007-08 rates for the rest of the projection period.

Scenario 8 fertility assumptions:

Age	UNITS	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
		forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast
15to19	b/w/5-years	0.08800	0.08800	0.09000	0.09500	0.10000	0.10500	0.11000	0.11500	0.12000	0.13000
20to24	b/w/5-years	0.2890	0.2900	0.3000	0.3400	0.3800	0.4200	0.4600	0.4800	0.5200	0.5700
25to29	b/w/5-years	0.5170	0.5200	0.5300	0.5700	0.6100	0.6500	0.6900	0.7300	0.7700	0.8100
30to34	b/w/5-years	0.5470	0.5545	0.5700	0.6100	0.6500	0.6900	0.7300	0.7700	0.8100	0.8500
35to39	b/w/5-years	0.2585	0.2695	0.2900	0.3200	0.3500	0.3800	0.4100	0.4400	0.4700	0.5100
40to44	b/w/5-years	0.04900	0.05300	0.05700	0.06100	0.06400	0.07000	0.07500	0.08000	0.09000	0.12000
45to49	b/w/5-years	0.00250	0.00300	0.00300	0.00350	0.00400	0.00500	0.00600	0.00700	0.00800	0.01000
AllAges	b/lifetime	1.751	1.778	1.840	1.999	2.158	2.320	2.481	2.622	2.788	3.000

Fertility assumptions remain at 2010-11 rates for the rest of the projection period.

Scenarios 1 to 8 net interstate migration assumptions:

STATE	UNITS	2001-02	2002-03	2003-04	2004-05
		forecast	forecast	forecast	forecast
NSW	persons	-23786	-25500	-20500	-16000
VIC	persons	6239	2000	-2000	-6000
QLD	persons	29028	32000	29000	25000
SA	persons	-1854	-2000	-2500	-2500
WA	persons	-4174	-2000	0	2000
TAS	persons	-1691	-2000	-2000	-2000
NT	persons	-2784	-2000	-1500	-500
ACT	persons	-978.0	-500.0	-500.0	0.0
AUS	persons	0.00000	0.00000	0.00000	0.00000

Net interstate migration assumptions remain at 2004-05 levels for the rest of the projection period.
[Based on ABS medium assumptions, 'Assumptions Summary", AusStats: 3222.0 Population Projections, Australia, pp22-23]

Scenarios 1, 2 and 8 net overseas migration assumptions:

DESCRIPTION	UNITS	2001-02	2002-03	2003-04	2004-05	2005-06
		forecast	forecast	forecast	forecast	forecast
permanent arrivals	persons	88900	90000	90000	90000	90000
long-term arrivals	persons	264471	250000	260000	270000	280000
permanent departures	persons	-48241	-40000	-40000	-40000	-40000
long-term departures	persons	-171446	-185000	-200000	-215000	-230000
category jumpers	persons	0.00000	0.00000	0.00000	0.00000	0.00000
net overseas migration	persons	133684	115000	110000	105000	100000

Net overseas migration assumptions remain at 2005-06 levels for the rest of the projection period.
[Based on ABS medium assumptions, 'Assumptions Summary", AusStats: 3222.0 Population Projections, Australia, p20]

Scenario 3 net overseas migration assumptions:

DESCRIPTION	UNITS	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
		forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast
permanent arrivals	persons	88900	90000	90000	90000	90000	90000	90000	90000	140000
long-term arrivals	persons	264471	250000	260000	270000	280000	280000	280000	280000	280000
permanent departures	persons	-48241	-40000	-40000	-40000	-40000	-40000	-40000	-40000	-40000
long-term departures	persons	-171446	-185000	-200000	-215000	-230000	-230000	-230000	-230000	-230000
category jumpers	persons	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
net overseas migration	persons	133684	115000	110000	105000	100000	100000	100000	100000	150000

Net overseas migration assumptions remain at 2009-10 levels for the rest of the projection period.

Scenario 4 net overseas migration assumptions:

DESCRIPTION	UNITS	2001-02	2002-03
		forecast	forecast
permanent arrivals	persons	88900	40000
long-term arrivals	persons	264471	185000
permanent departures	persons	-48241	-40000
long-term departures	persons	-171446	-185000
category jumpers	persons	0.00000	0.00000
net overseas migration	persons	133684	0

Net overseas migration assumptions remain at 2009-10 levels for the rest of the projection period.

Scenario 5 net overseas migration assumptions:

DESCRIPTION	UNITS	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
		forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast
permanent arrivals	persons	88900	90000	90000	90000	90000	90000	90000	90000	95000
long-term arrivals	persons	264471	250000	260000	270000	280000	280000	280000	280000	280000
permanent departures	persons	-48241	-40000	-40000	-40000	-40000	-40000	-40000	-40000	-40000
long-term departures	persons	-171446	-185000	-200000	-215000	-230000	-230000	-230000	-230000	-230000
category jumpers	persons	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
net overseas migration	persons	133684	115000	110000	105000	100000	100000	100000	100000	105000
		2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
		forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast
permanent arrivals	persons	100000	105000	110000	115000	120000	125000	130000	135000	140000
long-term arrivals	persons	280000	280000	280000	280000	280000	280000	280000	280000	280000
permanent departures	persons	-40000	-40000	-40000	-40000	-40000	-40000	-40000	-40000	-40000
long-term departures	persons	-230000	-230000	-230000	-230000	-230000	-230000	-230000	-230000	-230000
category jumpers	persons	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
net overseas migration	persons	110000	115000	120000	125000	130000	135000	140000	145000	150000

After 2018-19, permanent arrivals increase by 10,000 persons per annum for the rest of the projection period.

Scenarios 6 and 7 net overseas migration assumptions:

DESCRIPTION	UNITS	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
		forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast
permanent arrivals	persons	88900	90000	90000	90000	90000	90000	90000	90000	100000
long-term arrivals	persons	264471	250000	260000	270000	280000	280000	280000	280000	280000
permanent departures	persons	-48241	-40000	-40000	-40000	-40000	-40000	-40000	-40000	-40000
long-term departures	persons	-171446	-185000	-200000	-215000	-230000	-230000	-230000	-230000	-230000
category jumpers	persons	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
net overseas migration	persons	133684	115000	110000	105000	100000	100000	100000	100000	110000

From 2009-10, permanent arrivals continue to increase by 10,000 per annum for the rest of the projection period.

Appendix 3

ABS series B population projections at June 2002-2051 and MM2 population predictions for the same fertility and migration assumptions as series B

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
MM2 output																	
total (000s)	19631	19855	20071	20279	20479	20677	20871	21062	21251	21437	21621	21805	21989	22171	22354	22535	22716
ABS projections																	
Population Total (000s)	19663	19891	20112	20326	20533	20737	20938	21136	21332	21524	21714	21903	22091	22278	22464	22649	22831

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
MM2 output																	
total (000s)	22896	23075	23253	23430	23604	23777	23947	24114	24278	24440	24597	24751	24902	25048	25190	25329	25463
ABS projections																	
Population Total (000s)	23012	23192	23368	23542	23713	23880	24043	24202	24356	24504	24647	24784	24915	25040	25159	25272	25378

	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051
MM2 output																
total (000s)	25594	25720	25844	25963	26080	26194	26305	26413	26520	26624	26726	26827	26927	27025	27122	27218
ABS projections																
Population Total (000s)	25478	25572	25660	25742	25820	25892	25960	26024	26084	26141	26194	26245	26292	26338	26381	26422

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