POPULATION AGEING IN IRELAND

Projections 2002-2021

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FOREWORD

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SUMMARY

The total population is projected to rise to between a low of 4.57 million (A1) and a high of 4.91 million (A4) by 2021. The percentage of older males will rise from 9.7 percent in 2002 to between 13.9 percent (A4) and 14.1 percent (A1) in 2021. The percentage of older females will rise from 12.5 percent in 2002 to between 15.8 percent (A4) and 16.4 percent (A1) in 2021.

The absolute number of older males (i.e. aged 65 or more) was 189,555 in 2002 and in 2021, the corresponding figure will be between 322,651 (A1) and 339,505 (A4), which is equivalent to an increase of between 70.2 and 79.1 percent on existing numbers. The absolute number of older females was 246,846 in 2002 and in 2021, the corresponding figure will be between 375,835 (A1) and 389,101 (A4), which is equivalent to a smaller percentage increase than for males, of between 52.3 and 57.6 percent.

A large proportion of these projected increases will be in the 'young' older people category (i.e. people aged 65-74). However, there will still be a substantial increase in the absolute numbers of 'old' older people (i.e. people aged 75 years and over). For example, with regard to males aged 75 years and over, the absolute numbers will rise from 72,146 recorded for 2002 to between 114,528 (A1) and 120,399 (A4) in 2021, which is equivalent to an increase of between 58.7 and 66.9 percent. Similarly, absolute numbers females aged 75 years and over will rise from 118,252 as recorded in 2002, to between 158,761 (A1) and 164,014 (A4) in 2021, which is equivalent to an increase of between 34.3 and 38.7 percent.

Geographical Distribution

Apart from Dun Laoghaire-Rathdown and Waterford County, the counties with the highest projected percentages of older people for both sexes are in the western half of the country, while most of the counties in the eastern half have lower estimated percentages. However, absolute numbers are important in this context and Dublin city and county will be home to an estimated 23.8 per cent of all males aged 65 or over and 25.7 per cent of females.

Marital Status

The projections predict a shift towards married and separated people over the age of 65 years and a shift away from single and widowed people in this age group. Single men aged 65 to 74 represented almost 1 in 5 men in this age group in 2002. By 2021 this will have fallen to 1 in 8. In 2021 single men aged 75 years and over will represent less than 1 in 6 men of this age compared to more than 1 in 5 in 2002. In geographical terms the areas projected to experience

the largest growth in the numbers of single older people are South Dublin, Kildare, Fingal, Wicklow and Meath.

The decline in single females (especially those aged 75 years and over) will be more marked as it will be a fall to only 1 in 10 women of that age in 2021 compared to 1 in 6 recorded in 2002.

It is projected that the number of 'younger older people' will increase by 180,000 by 2021. Of these, 112,000 will be married. The married 'older older people' aged 75 years and over will also show a significant growth in numbers with older married males increasing by 68 per cent and females by 58 per cent between 2002 and 2021. Among the 'young older people' the proportion 'ever married' is projected to increase from 62 percent in 2002 to 71 percent in 2021 with a corresponding increase from 33 percent to 43 percent among the 'old older people'.

However, in 2002, 8 per cent of men and over 10 per cent of women aged 45 to 54 were recorded as separated or divorced. It is projected that 1 in 10 men and women aged between 65 and 74 will be separated or divorced in 2021.

Living Alone

It is projected that the number of older people living alone will increase substantially between 2002 and 2021 in line with the growth in the overall number of older people. By 2021 there will be 211,000 older people living alone, representing just over 30 percent of all those aged 65 and over. There will be a significant increase in the number of those aged 70 and over living alone by 2021 with a doubling of the 2002 figures for both males and females. Although the eastern region will still have a relatively low proportion of older people living alone, Dublin, Meath and Kildare will gain an additional 24,000 households with an older person living alone. In the southeast, Wexford, Waterford and Waterford City will gain an additional 7,000 such households with Galway City gaining almost 2,000.

For males, the counties of the northwest will continue to have the highest proportion of older people living alone. For females, the cities of Dublin, Cork and Limerick will have the highest proportions living alone.

In 2002, over 1 in 3 of the older people living alone were single but by 2021 this will have fallen to less than 1 in 4. Despite the projected shift in the marital status composition of the older population from single to married by 2021, there will be close to 100,000 additional

older people living alone by that time. In 2021, 35 percent (compared to 33 percent in 2002) of older people living alone will be aged 65 to 69, with 65 percent (compared to 67 percent in 2002) aged 70 or over.

CHAPTER ONE

Introduction to the Study

In 1995, a set of population projections was produced for the National Council for the Elderly by Peter Connell. This Report compares those projected populations with the actual populations, as enumerated in the 1996 and 2002 censuses, to identify if there are any lessons that could be incorporated in future population projections. It also assesses whether other refinements are required.

Changes in the total population of an area are a function of only three factors: births, deaths and net migration (i.e., the difference between the total number of people moving into the area and the number moving out). To predict future population changes, it is necessary to make assumptions about future trends in each of these factors. The accuracy of the predictions will obviously depend upon the accuracy of the assumptions made.

Some assumptions can be made with greater confidence than others. Birth rates, for example, tend to change gradually and therefore can be predicted with reasonable accuracy over the short-term. They are more difficult to predict over the long-term because they tend to reflect changes in things such as societal attitudes and the state of the economy which are themselves difficult, if not impossible, to predict. Future changes in the birth rate will probably be gradual, but whether the long-term trend towards lower birth rates will continue or be reversed is unknown.

Changes in the death rate in the developed world have tended to be very slow and incremental following the 'conquest' of most major infectious diseases.[1] The emergence of 'new' infectious diseases, such as Ebola, AIDS and SARS, coupled with a disturbing growth in drug resistance by many of the older infectious diseases, has raised concerns that we in developed countries may have become complacent about the threat posed by infectious diseases which could leave us vulnerable to a devastating pandemic similar to the Justinian plague in the 6th century and the Black Death in the 14th century, each of which may have reduced the European population by about one third. However, if we disregard these pessimistic

[1] It is still a matter of debate whether deaths from infectious diseases declined because of medical and scientific advances or because people were better equipped to survive them as a result of improvements in living conditions.

prognoses, future changes in the death rate are likely to be slow and incremental, although whether improvements will continue at a similar pace, slow down, or possibly speed up as more becomes known about the human genome, is more difficult to predict.

The most volatile factor, and therefore the most difficult to predict, is net migration. Ireland was traditionally a net 'exporter' of people, but migration flows can fluctuate rapidly and have on occasions, such as the late 1970s and late 1990s, gone into 'reverse'. Migration is largely driven by economic factors – if there are economic opportunities people tend to stay, but if there is little prospect of employment or affordable accommodation people tend to leave. Dramatic changes in economic circumstances can occur almost overnight, provoking an almost equally rapid response in net migration rates. Explaining the Celtic Tiger phenomenon retrospectively has proven difficult enough; accurately predicting what is likely to happen in the future is probably impossible.

Migration differs from births and deaths in other respects. Births and deaths are irreversible events which occur only once, but migration is reversible. People who felt forced to leave in the past may decide to return home. Likewise, some of the people who moved to Ireland in the late 1990s could at some point in the future decide to return to their original homes or possibly decide to move elsewhere in the European Union should better prospects present themselves. The uncertainties associated with both types of move make predictions about future migration trends even more problematic.

The assumptions made regarding births, deaths and migration are not of equal importance when projecting populations, especially in our situation where the focus is primarily on the older population. A change in the birth rate will not have a direct impact upon the number of older people for a another six or seven decades. It would, however, have an impact on the number of people available to care for older people in only two or three decades. It could even have implications for the time available to carers by creating competing demands for care and resources almost immediately, although an evaluation of such implications lies outside the scope of the present study.

Assumptions regarding changes in the death rate are of more obvious relevance. Quite small increases in overall life expectancy (i.e., life expectancy at birth) may disguise significant improvements in the survival rates for older people because of the way in which life expectancy is calculated from life tables. This in turn may result in substantial increases in the absolute numbers of older people. It is therefore necessary to analyse the changes, and possibly make different assumptions, for each age group separately.

Assumptions about both immigration and emigration will have a major bearing on the projections. There are several points to be made in this regard. First, net migration may exert a more significant impact upon population change than natural increase (i.e., the excess of births over deaths). Net emigration resulted in population decline in Ireland for over a century after the Famine, despite a high birth rate. Conversely, net immigration was a more important cause of the population increase between 1996 and 2002 than the excess of births over deaths.

Second, net migration flows can change quickly. The period 1996 to 2002, as noted, was a period of population increase due to both natural increase and net immigration. However, the period 1986 to 1991, only a few years earlier, was a period of net population decline because net emigration exceeded the natural increase. The volatility of migration flows makes population projections hazardous.

Third, migration flows vary by age. The traditional pattern was for people to emigrate in their late teens and twenties. This, however, was partly offset by a net immigration of returned emigrants in older age groups (i.e., middle-aged and elderly). This flow, especially amongst the middle-aged, was more pronounced in times of economic prosperity, such as the late 1970s and late 1990s. The late 1990s also saw the arrival of a large number of new immigrants (as opposed to returned emigrants), but these were mostly in the younger age groups (i.e., twenties and thirties, plus their children). It seems reasonable to assume that most of the volatility in net migration flows referred to above occurs amongst the younger age groups. Thus, while projections of the entire population may be susceptible to major errors, there are grounds for believing that projections of the older population, which is the primary focus of the present study, may be more reliable.

Finally, migration flows have a differential spatial impact within Ireland. In periods of net emigration some counties will experience a greater loss of population than others, whilst the effects of net immigration are also spatially uneven. The picture is further complicated by internal migration (i.e., movements from one county to another within Ireland), which can result in net population growth in some areas and net decline in other areas. Even in periods of net emigration, the major cities, most notably Dublin, normally experienced net population growth because the loss of population due to emigration was offset by 'in' movements from other parts of the country. It is clearly insufficient to assume for the purposes of making population projections that the impact of migration flows is geographically even, but developing realistic assumptions about the differential impact of future migration flows is

clearly problematic when one cannot predict with any confidence whether the net flows at national level will be inward or outward.

While the emphasis in the present exercise is on projecting the number of people aged 65 or more and 80 or more, a broader aim is to provide information which might be used to assess the broader implications of an increase in the number of older people. To this end an assessment is made as to how many older people are likely to be living alone. Traditionally older people living alone were either widowed or single (i.e., never married). However, the situation is changing due to increasing numbers of people who are either separated or divorced, increasing numbers of single parent families, and increasing numbers of single people in stable relationships – i.e., 'single' status is becoming a less reliable indictor of the likelihood of living alone. The likelihood of people being widowed will be influenced by gender differences in life expectancy – if life expectancy for females increases at a faster rate than for males, then more older women are likely to survive their partners and they will also be left living alone for a longer period. Trends in the difference in age between partners at marriage will also influence the likelihood of women (traditionally the younger partner) being widowed for an extended period of time. Finally, if present trends in house prices continue, younger people may find it increasingly difficult to move out of the family home, resulting in new types of household formation in which older widowed parents no longer live alone, but live with their children (and their partners). Predicting future trends in the number of older people living alone clearly involves making a lot of assumptions (as well as some speculation).

Future trends in dependency ratios are also of relevance as they provide an indication (albeit a very crude indication) of the ability of society to support a growing older population. However, whereas assumptions regarding the factors affecting the number of older people (i.e., death rates and the movement of older people) can be made with some confidence, assumptions regarding the factors affecting the number of people in the economically active age groups (i.e., birth rates and the movement of younger people) are more problematic. Errors in the dependency ratio are therefore more likely to be caused by under- or over-estimates of the number of people in the economically active age groups.

There are clearly a lot of unknowns requiring assumptions to be made when compiling population projections. However, as already noted, some factors are more important than others. The most important factors in projecting future populations include:

- fertility rates by age and marital status

- marriage rates by age and sex
- migration rates by age and sex
- death rates/survivorship by age and sex.

Chapter Two compares the projections made in 1995 with the populations recorded in the 1996 and 2002 censuses. Key questions to be addressed include:

- the relative importance of each of the factors (i.e., how sensitive are the projections to inaccuracies in the assumptions relating to each of the factors)
- the importance of geographical variations in each of the factors (i.e., would the assumption that there are no geographical variations in a factor cause serious errors in the projection)
- the accuracy of the assumptions made with regard to these factors in the 1995 projections and whether these assumptions can be improved upon for future projections.

CHAPTER TWO

An Evaluation of the 1995 Projections for 1996 and 2002

2.1 Actual and Projected Populations

Population projections carried out for the Council in 1995 generated projections for 1996, 2001, 2006 and 2011. These projections were calculated at county level and were disaggregated by gender, age and marital status. Projections were also generated for numbers of older people living alone. Data from the 1991 census formed the baseline for the projections. The data referred to below as 2002 projections have been calculated as a straight line interpolation of the 2001 and 2006 projections.

Tables 2.1 to 2.4 compare the actual and projected populations for 1996 and 2002. For 1996 this shows a margin of error of just under 1 per cent. By 2002 the actual and projected populations had diverged by over 7 per cent.

Table 2.1: Difference between actual and projected, 1996

	Males	Females	Total
Aged 0-14	5,677	5,197	10,874
Aged 15-64	9,719	16,701	26,420
Aged 65 and over	-13	-1,257	-1,270
Total	15,383	20,641	36,024

Table 2.2: Percentage difference between actual and projected, 1996

	Males	Females	Total
Aged 0-14	1.29%	1.24%	1.27%
Aged 15-64	0.82%	1.43%	1.12%
Aged 65 and over	-0.01%	-0.53%	-0.31%
Total	0.85%	1.13%	0.99%

Table 2.3: Difference between actual and projected, 2002

	Males	Females	Total
Aged 0-14	24,074	25,611	49,685
Aged 15-64	117,010	125,777	242,787

Aged 65 and over	122	-3,850	-3,728
Total	141,206	147,538	288,744

Table 2.4: Percentage difference between actual and projected, 2002

	Males	**Females**	**Total**
Aged 0-14	5.68%	6.35%	6.00%
Aged 15-64	8.78%	9.52%	9.15%
Aged 65 and over	0.06%	-1.56%	-0.86%
Total	7.26%	7.49%	7.37%

For both projections the level of divergence between actual and projected population varies across the broad age groups: under 15, 15 to 64 years and 65 years and over. For 1996 there were 1.27 per cent more under 15s than projected and 1.12 per cent more in the 15 to 64 age category. On the other hand the number of those aged 65 and over was within 0.31 per cent of the numbers projected. For 2002 the numbers of those aged 0 to 14 was 6 per cent higher than projected and the numbers aged 15 to 64 was over 9 per cent higher than projected. The projections proved much more accurate when forecasting numbers in the older age groups with a margin of error of less than 1 per cent.

To explain the divergence between this projected and actual population in 1996 and 2002 we need to revisit the assumptions made in 1995 relating to external migration, births and death.

2.2 External Migration

The projected 1996 population was based on an assumption of net external migration of 8,000 per annum (i.e., emigration of 40,000 over the five year period). This broadly reflected trends in the early 1990s. In fact between 1991 and 1996 there was net 'in-migration' of 7,300. This net difference of 47,300 largely accounts for the divergence between the projected and actual populations of 36,000. Almost all of this difference of about 11,000 between projected and actual populations for 1996, not attributable to migration, is accounted for by the younger and older age groups as shown in Table 2.5. This is accounted for by fewer births and slightly more deaths of those 65 and over than anticipated.

Table 2.5: Difference not attributable to migration, 1996

	Males	Females	Persons
Aged 0-14	-4,623	-4,603	-9,226
65 and over	-1,013	-1,157	-2,170

The projected 2002 population was based on an assumption of net external migration of 15,000 per annum (i.e., emigration of 90,000 over the six year period). In fact there was net 'in-migration' of 144,000 during this period, giving a total difference of 234,000. As in the period 1991-96 the difference between assumed and actual migration (234,000) accounts for much of the difference between the projected and actual population (288,744). In contrast to the period 1991-1996, in 1996-2002 there were more births than anticipated. On the other hand, as in 1991-1996, there were slightly more deaths among those 65 and over than anticipated.

Table 2.6: Difference Not Attributable To Migration, 2002

	Males	Females	Persons
Aged 0-14	4,974	6,011	10,985
65 and over	1,322	-3,050	-1,728

2.3 Births

Table 2.5 shows that, excluding migration, there were 9,226 fewer in the under 15 age category in 1996 than projected. This reflects the assumptions made in the projection for 1996 regarding the number of births in the period 1991-1996. This, in turn, reflects the fact that the marriage rate for females aged 25 or more fell more steeply in the period than anticipated (Table 2.7). These rates are crucial in projecting births as fertility rates for married women are substantially higher than those for single women, particularly in the 25 to 29 and 30 to 34 age categories.

Table 2.7: Difference between assumed and actual married females, 1996

	Assumed Females Married (per 1000)	Actual Females Married (per 1000)
15-19 years	3	3
20-24 years	12	65
25-29 years	545	413
30-34 years	788	726

35-39 years	859	835
40-44 years	883	866
45-49 years	879	871

Table 2.6 shows that in 2002, excluding migration, there were almost 11,000 more in the under 15 age category than projected. This reflects two trends affecting births not anticipated in the projections. The first relates to migration. Because there was significant in-migration of those aged 15 to 45, as opposed to the net emigration predicted, there were 110,000 (10.7 per cent) more women in the country in these child-bearing age groups than projected. Secondly, the assumptions made regarding fertility rates projected that the total fertility rate[2] (TFR) would remain below 1.90. In the late 1990s, the TFR stabilised above this level and rose to 1.98 by 2002.

2.4 Life Expectancy

The assumptions made regarding life expectancy projected that the improvements made in the period 1986-1991 (based on the 1985-1987 and 1990-1992 Life Tables) would continue through 1991-2002. It appears that this did not occur. For example, between 1985-1987 and 1990-1992, the life expectancy for those aged 70 increased from 9.7 to 10.4 years. By 1995-1997 this had increased by only a further 0.2 years. While detailed Life Tables based on the 2002 census have not been published, it would appear that the assumptions made regarding the period 1996-2002 were over-optimistic. Tables .2.8 to 2.11 may suggest that life expectancy for the over 75s in particular has failed to improve in line with the assumptions made back in 1995. This statement must be qualified somewhat as the migration assumption for those 65 and over made in 1995 was simply applied to the 65 to 69 age group, rather than distributed over all four older age groups.

Table 2.8: Difference between actual and projected older population, 1996

	Males	**Females**
Aged 65-69	-255	-486
Aged 70-74	410	-36
Aged 75-79	-205	-1,248
Aged 80+	37	513

[2] The total fertility rate is an estimate of the number of children that an average woman would have if current age-specific fertility rates remained constant during her reproductive years.

Table 2.9: Percentage difference between actual and projected older population, 1996

	Males	Females
Aged 65-69	-0.4%	-0.7%
Aged 70-74	0.8%	-0.1%
Aged 75-79	-0.6%	-2.6%
Aged 80+	0.1%	0.9%

Table 2.10: Difference between actual and projected older population, 2002

	Males	Females
Aged 65-69	1,365	315
Aged 70-74	587	-448
Aged 75-79	-285	-1,030
Aged 80+	-1,545	-2,688

Table 2.11: Percentage difference between actual and projected older population, 2002

	Males	Females
Aged 65-69	2.09%	0.46%
Aged 70-74	1.13%	-0.74%
Aged 75-79	-0.76%	-1.96%
Aged 80+	-4.44%	-4.08%

2.5 Marital Status Projections

The 1995 projections prepared for the Council disaggregated the population by marital status. The following were the key assumptions underlying these projections:

- proportion of females married
- proportion of females widowed
- ratio of married males to married females
- proportion of widowed males
- single males and females are calculated as residuals.

Tables 2.12 to 2.15 summarise the difference between actual and projected populations by marital status for 1996 and 2002.

Table 2.12: Difference between actual and projected older population by marital status, 1996

Marital Status	0-14 years	15-65 years	65+ years
Females married	0	-19418	6117
Females widowed	0	7912	-3729
Females single	5197	28208	-3646
Males married	0	-17179	6141
Males widowed	0	656	-1449
Males single	5677	26241	-4705

Table 2.13: Percentage difference between actual and projected older population by marital status, 1996

Marital Status	0-14 years	15-65 years	65+ years
Females married	0.0%	-3.0%	7.6%
Females widowed	0.0%	23.2%	-3.3%
Females single	1.2%	5.8%	-8.5%
Males married	0.0%	-2.9%	5.7%
Males widowed	0.0%	6.8%	-5.3%
Males single	1.3%	4.6%	-11.4%

Table 2.14: Difference between actual and projected older population by marital status, 2002

Marital Status	0-14 years	15-65 years	65+ years
Females married	0	-16297	15169
Females widowed	0	3913	-8054
Females single	25611	138161	-10965
Males married	0	-7499	18727
Males widowed	0	506	-2320
Males single	24074	124003	-16286

Table 2.15: Percentage difference between actual and projected older population by marital status, 2002

Marital Status	0-14 years	15-65 years	65+ years
Females married	0.0%	-2.3%	16.4%
Females widowed	0.0%	12.0%	-6.9%
Females single	6.3%	23.9%	-28.8%
Males married	0.0%	-1.1%	15.2%
Males widowed	0.0%	4.9%	-8.5%
Males single	5.7%	18.8%	-42.4%

The most significant differences for both 1996 and 2002 reflect the much lower marriage rate of both males and females in the 15 to 65 age group and the under-estimation of the numbers married in the older age groups. The discussion below focuses on the 2002 projections as the divergence between actual and projected numbers for 2002 merely amplify those for 1996.

2.5.1 Proportion married

Table 2.16 outlines the assumption made in 1995 regarding the proportion of females married in 2002 and the actual outcome. This shows that the marriage rate for women aged 20 to 35 was very much lower than anticipated. The higher number of married women in the 55 to 74 age groups reflects the failure of the assumptions made in 1995 adequately to take account of rising marriage rates in the 1960s which, by 2002, are feeding through to higher proportions of married females in the 65 to 69 and 70 to 74 age groups. As Table 2.17 shows, there has been an historic trend of higher proportions of married females amongst the over 65.

Table 2.16: Projected and actual number of women married (per 1,000), 2002

	Projected	Actual
15-19 years	3	3
20-24 years	116	4
25-29 years	539	268
30-34 years	786	602
35-39 years	858	777
40-44 years	884	840
45-49 years	884	857
50-54 years	849	854
55-59 years	773	818
60-64 years	620	742
65-69 years	554	609
70-74 years	394	444
75-79 years	302	290
Aged 80+	144	132

Table 2.17: Historic trend in percentage of females married

Age	1981	1986	1991	1996	2002 (actual)	2002 (assumption)
65-69 years	44.3%	45.3%	48.4%	53.6%	60.9%	55.4%
70-74 years	31.0%	32.9%	35.0%	39.1%	44.4%	39.4%
75-79 years	20.1%	20.4%	23.5%	25.7%	29.0%	30.2%
Aged 80+	9.8%	8.7%	10.5%	13.2%	13.2%	14.4%

The divergence between the actual and projected number of married females is mirrored in the case of married males. This is because the number of married males in each cohort was calculated as a ratio of married females. The projected and actual ratios are shown in Table 2.18.

Table 2.18: Ratio of males to females married, 2002

	Projected	Actual
15-19 years	0.4110	0.4154
20-24 years	0.4250	0.4278
25-29 years	0.6550	0.6317
30-34 years	0.8450	0.8361
35-39 years	0.9190	0.9101
40-44 years	0.9360	0.9419
45-49 years	0.9980	0.9688
50-54 years	1.0130	0.9916
55-59 years	1.0590	1.0374
60-64 years	1.0930	1.0862
65-69 years	1.1050	1.1744
70-74 years	1.3430	1.3121
75-79 years	1.4740	1.5008
Aged 80+	2.0930	1.9134

This ratio proved reasonably accurate (within a margin of 5 per cent) with the exception of one age cohort. The number of married men relative to married women in the 65 to 69 age group was 7 per cent higher than anticipated, resulting in 4,500 more married men than projected.

2.5.2 Proportion widowed

Table 2.19a shows that the assumptions made regarding proportions of females widowed proved reasonably accurate with the widest divergence in the 60 to 64 and 65 to 69 age groups. The divergence between the assumed and actual rates resulted in an over-estimation of 5,789 widows aged between 65 and 74 (out of a total of 128,726 women) and an underestimation of 2,139 widows aged 80 and over (out of a total of 65,814 women). The level of error in relation to males is similar, although the absolute numbers involved are much lower as there are fewer widowers than widows. The projections for 2002 for widowers over 65 over-estimated the number of widowers by 2,320 out of a total male population over 65 of

just under 190,000. The 1995 assumption was based on historic trends of proportions widowed. A more appropriate approach would be to take into account the actual marital status of the base population – 2002 in the case of our projections. This would involve taking the proportions married in a given age group and projecting the proportion of these likely to be widowed by the time of the following census.

Table 2.19a: Projected and actual proportion of females widowed, 2002

	Projected widows (per 1,000)	Actual widows (per 1,000)
60-64 years	197	156
65-69 years	318	269
70-74 years	452	410
75-79 years	561	546
Aged 80+	648	680

Table 2.19b: Projected and actual proportion of males widowed, 2002

	Projected widowers (per 1,000)	Actual widowers (per 1,000)
60-64 years	40	45
65-69 years	86	71
70-74 years	129	110
75-79 years	184	171
Aged 80+	300	303

In the projections both single males and females are calculated as a residual and are, therefore, dependent upon the accuracy of the assumptions described above. As this tends to reflect inaccuracies in assumptions made about widows and marrieds, it seems preferable to calculate rates of single men and women independently of those assumptions regarding marital status.

2.5.3 Overview

In general, the 1995 projections underestimated the numbers of married in the older age groups, and overestimated the numbers of widowed and single. Positive numbers in Tables 2.19a and 2.19b represent an underestimation, while negative numbers signify an

overestimation. A re-evaluation of the historic trends in the proportions married in these age groups was therefore conducted for the new projections reported in Chapters 3 and 4.

Table 2.20a: Difference between actual and projected population by marital status, 2002

	65-69 years	70-74 years	75-79 years	80+ years	Total
Married males	7243	3085	-958	-3684	5685
Married females	3903	2825	-937	-1219	4572
Widowed males	-765	-874	-263	-264	-2167
Widowed females	-3204	-2703	-1356	367	-6895
Single males	-5112	-1623	936	2403	-3396
Single females	-384	-569	1263	-1836	-1527

Table 2.20b: Percentage difference between actual and projected population by marital status 2002

	65-69 years	70-74 years	75-79 years	80+ years	Total
Married males	14.8%	8.8%	-4.2%	-21.2%	4.6%
Married females	9.4%	10.5%	-6.2%	-14.0%	5.0%
Widowed males	-16.5%	-15.3%	-4.1%	-1.5%	-7.9%
Widowed females	-17.5%	-10.9%	-4.7%	0.8%	-5.9%
Single males	-43.1%	-15.0%	11.4%	31.8%	-8.8%
Single females	-4.6%	-6.5%	14.6%	-14.9%	-4.0%

2.6 Regional Projections

This section examines the extent to which the errors reported in the previous section vary geographically.

2.6.1 1996 Projections

Table 2.21: Regional variations in projections, 1996

Area	Actual -projected	Percentage difference
Carlow	153	0.4%
Dublin C.B.	10,100	2.1%
Dun Laoghaire	-7,034	-3.7%
Dublin Co.	-5,254	-1.4%
Kildare	3,250	2.4%
Kilkenny	4	0.0%

Laois	466	0.9%
Longford	789	2.6%
Louth	-39	0.0%
Meath	846	0.8%
Offaly	584	1.0%
Westmeath	1,878	2.9%
Wexford	958	0.9%
Wicklow	911	0.9%
Clare	2,015	2.1%
Cork C.B.	1,424	1.1%
Cork Co.	1,307	0.4%
Kerry	4,184	3.3%
Limerick C.B.	2,391	4.6%
Limerick Co.	-376	-0.3%
Tipperary N.R.	1,092	1.9%
Tipperary S.R.	1,143	1.5%
Waterford C.B.	-120	-0.3%
Waterford Co.	319	0.6%
Galway C.B.	84	0.1%
Galway Co.	3,540	2.7%
Leitrim	1,243	4.9%
Mayo	4,216	3.7%
Roscommon	1,971	3.7%
Sligo	1,476	2.6%
Cavan	827	1.5%
Donegal	1,679	1.3%
Monaghan	-3	0.0%

Table 2.21 shows the difference between the projected and actual population for 1996 at county level. Most of the significant variations centre on the country's main cities. Counties in the west that had experienced significant out-migration in 1986-1991, and upon which the internal migration assumption in the model for 1991-1996 was at least partly based, lost less of their population than projected. Counties Leitrim, Mayo, Roscommon and Sligo stand out in this regard.

2.6.2 2002 Projections

Table 2.22 shows the difference between the projected and actual population for 2002 at county level. Many of the differences reflect the dramatic changes in settlement patterns that took place in the late 1990s with counties within a 50 mile radius of Dublin gaining very significant populations as commuters followed lower house prices. The internal migration assumption used to project the 2002 population reflected the very different circumstances of the late 1980s. The conclusion to be drawn here is that the projection model needs to incorporate a more sophisticated way of projecting internal flows of population within the state.

Table 2.22: Regional variations in projections, 2002

Area	Difference between actual and projected	Percentage difference
Carlow	4,447	9.7%
Dublin C.B.	36,254	7.3%
Dun Laoghaire	-18,098	-9.4%
Dublin Co.	12,330	2.8%
Kildare	22,846	13.9%
Kilkenny	4,037	5.0%
Laois	6,892	11.7%
Longford	3,287	10.6%
Louth	9,167	9.0%
Meath	22,465	16.8%
Offaly	5,968	9.4%
Westmeath	11,759	16.4%
Wexford	12,767	10.9%
Wicklow	8,660	7.6%
Clare	10,962	10.6%
Cork C.B.	326	0.3%
Cork Co.	24,843	7.6%
Kerry	11,574	8.7%
Limerick C.B.	8,044	14.9%
Limerick Co.	4,779	3.9%
Tipperary N.R.	5,881	9.6%
Tipperary S.R.	6,506	8.2%

Waterford C.B.	-565	-1.3%
Waterford Co.	5,112	9.0%
Galway C.B.	1,378	2.1%
Galway Co.	18,325	12.8%
Leitrim	4,058	15.7%
Mayo	15,352	13.1%
Roscommon	6,645	12.4%
Sligo	4,905	8.4%
Cavan	5,848	10.3%
Donegal	10,108	7.3%
Monaghan	1,881	3.6%

2.6.3 Older Age Groups

Tables 2.23 and 2.24 show that, in general, the projections for older age groups are more accurate than for the population at large. Most of the projections fall within 3 per cent of the actual population in 2002. However, some counties such as Kildare and some counties in the west exhibit wider variations. An examination of variation in death rates or particular circumstances relating to internal migration is required.

Table 2.23: Difference between actual and projected population by county, 2002

Area	65-69 years	70-74 years	75-79 years	80+ years
Carlow	-42	22	-49	-36
Dublin C.B.	-101	-24	-675	-1089
Dun Laoghaire	-290	-47	-234	-471
Dublin Co.	-441	-223	-69	-202
Kildare	138	-34	11	218
Kilkenny	11	-47	-50	-148
Laois	88	44	-31	-59
Longford	13	-48	50	39
Louth	69	-78	-97	-40
Meath	14	-82	-136	24
Offaly	124	-78	-27	-39
Westmeath	114	45	79	49
Wexford	421	235	47	-131
Wicklow	-81	-162	-81	-131

Clare	148	5	47	-43
Cork C.B.	96	95	64	-91
Cork Co.	126	150	-46	-367
Kerry	521	457	223	-202
Limerick C.B.	93	34	46	-60
Limerick Co.	-56	-19	108	-100
Tipperary N.R.	69	41	31	-60
Tipperary S.R.	129	-81	-77	-80
Waterford C.B.	34	67	62	88
Waterford Co.	103	85	88	-152
Galway C.B.	-63	-44	-21	20
Galway Co.	137	14	-217	-240
Leitrim	-7	-6	-5	-61
Mayo	197	41	-108	-289
Roscommon	45	39	-31	-148
Sligo	9	-103	-76	-182
Cavan	95	-107	-30	6
Donegal	44	-67	-98	-164
Monaghan	-78	17	-10	-93

Table 2.24: Percentage difference between actual and projected population by county, 2002

Area	**65-69 years**	**70-74 years**	**75-79 years**	**80+ years**
Carlow	-2.9%	1.7%	-5.0%	-3.4%
Dublin C.B.	-0.5%	-0.1%	-5.1%	-7.6%
Dun Laoghaire	-3.9%	-0.7%	-5.0%	-8.7%
Dublin Co.	-4.4%	-3.2%	-1.4%	-4.2%
Kildare	3.9%	-1.3%	0.5%	8.7%
Kilkenny	0.4%	-2.0%	-2.5%	-6.8%
Laois	4.4%	2.5%	-2.2%	-4.0%
Longford	1.1%	-4.8%	5.2%	3.6%
Louth	2.2%	-3.0%	-4.3%	-1.7%
Meath	0.4%	-2.8%	-5.8%	0.9%
Offaly	5.4%	-4.2%	-1.7%	-2.4%
Westmeath	4.8%	2.2%	4.6%	2.8%

Wexford	9.4%	6.6%	1.7%	-4.6%
Wicklow	-2.3%	-5.7%	-3.5%	-4.9%
Clare	4.0%	0.2%	1.9%	-1.4%
Cork C.B.	1.9%	2.3%	2.0%	-2.8%
Cork Co.	1.2%	1.7%	-0.6%	-4.4%
Kerry	9.7%	9.8%	5.9%	-4.6%
Limerick C.B.	4.5%	2.0%	3.6%	-4.9%
Limerick Co.	-1.4%	-0.6%	3.9%	-3.4%
Tipperary N.R.	2.9%	1.9%	1.7%	-3.2%
Tipperary S.R.	4.4%	-3.2%	-3.5%	-3.4%
Waterford C.B.	2.0%	5.2%	6.2%	8.3%
Waterford Co.	4.7%	4.7%	5.8%	-10.0%
Galway C.B.	-3.7%	-3.2%	-2.0%	1.6%
Galway Co.	2.6%	0.3%	-5.8%	-5.0%
Leitrim	-0.6%	-0.6%	-0.6%	-5.6%
Mayo	4.1%	1.0%	-3.0%	-6.3%
Roscommon	1.9%	1.8%	-1.8%	-7.0%
Sligo	0.4%	-5.4%	-4.6%	-9.3%
Cavan	4.3%	-5.6%	-1.8%	0.3%
Donegal	0.9%	-1.6%	-2.7%	-3.6%
Monaghan	-4.2%	1.0%	-0.7%	-5.9%

2.6.4 Health Board Projections

Tables 2.25 to 2.30 outline the projected and actual numbers in the older age cohorts by marital status disaggregated by health board. In comparing actual and projected outcomes at this level the numbers in some categories are quite small, so interpreting actual and percentage differences should be done with caution. The same patterns are evident across the regions with the projections underestimating the numbers of married in the older age groups and a corresponding over-estimation of the number of singles. These projections also show an over-estimation of the number of marrieds aged 80 and over with a significant under-estimation of the number of single males, albeit the numbers are quite small.

At health board level the following differences between actual and projected numbers illustrate some areas that require further investigation:

- the number of married males over 75 in the Western Health Board (WHB) area is much less than projected
- the number of widowed males in the Eastern Regional Health Authority (ERHA) and North Western Health Board (NWHB) areas is lower than projected
- the number of married females over 75 in the Western Health Board (WHB) and North Western Health Board (NWHB) areas is less than projected.

Table 2.25a: Difference between actual and projected married males by health board, 2002

	65-69 years	70-74 years	75-79 years	80+ years	Total
ERHA	1655	1190	68	-625	2288
Midlands HB	441	-76	-132	6	239
Mid Western HB	716	241	-51	-406	501
North Eastern HB	519	103	-174	-330	119
North Western HB	506	188	-220	-386	89
Southern HB	1419	615	-56	-590	1387
South Eastern HB	1044	600	88	-429	1303
Western HB	943	223	-483	-925	-242
State	7243	3085	-958	-3684	5685

Table 2.25b: Percentage difference between actual and projected married males by health board, 2002

	65-69 years	70-74 years	75-79 years	80+ years	Total
ERHA	10.2%	10.3%	1.0%	-13.1%	5.8%
Midlands HB	15.6%	-3.9%	-9.2%	0.6%	3.3%
Mid Western HB	16.3%	7.6%	-2.4%	-27.6%	4.5%
North Eastern HB	13.0%	3.7%	-9.1%	-21.9%	1.2%
North Western HB	17.5%	8.6%	-15.1%	-29.7%	1.1%
Southern HB	18.3%	10.9%	-1.5%	-22.6%	7.1%
South Eastern HB	18.1%	14.2%	3.2%	-23.0%	8.9%
Western HB	19.1%	6.0%	-19.4%	-42.9%	-1.8%
State	14.8%	8.8%	-4.2%	-21.2%	4.6%

Table 2.26a: Difference between actual and projected widowed males by health board, 2002

	65-69 years	70-74 years	75-79 years	80+ years	Total
ERHA	-451	-425	-86	-183	-1145
Midlands HB	10	-21	24	-22	-9
Mid Western HB	-31	-49	-20	-35	-134
North Eastern HB	-3	-66	-49	1	-116
North Western HB	-80	-94	-65	-27	-266
Southern HB	-125	-115	-30	-72	-342
South Eastern HB	-100	-76	4	12	-159
Western HB	14	-29	-41	62	6
State	-765	-874	-263	-264	-2167

Table 2.26b: Percentage difference between actual and projected widowed males by health board, 2002

	65-69 years	70-74 years	75-79 years	80+ years	Total
ERHA	-28.2%	-21.9%	-4.1%	-5.9%	-13.1%
Midlands HB	3.4%	-6.1%	5.9%	-3.7%	-0.6%
Mid Western HB	-7.1%	-9.3%	-3.4%	-3.6%	-5.4%
North Eastern HB	-0.8%	-15.4%	-9.9%	0.1%	-5.4%
North Western HB	-30.3%	-29.4%	-15.6%	-3.3%	-14.6%
Southern HB	-16.9%	-12.6%	-3.0%	-4.3%	-7.9%
South Eastern HB	-19.7%	-11.2%	0.5%	1.0%	-5.0%
Western HB	3.1%	-5.2%	-6.8%	4.9%	0.2%
State	-16.5%	-15.3%	-4.1%	-1.5%	-7.9%

Table 2.27a: Difference between actual and projected single males by health board, 2002

	65-69 years	70-74 years	75-79 years	80+ years	Total
ERHA	-1326	-678	-190	427	-1766
Midlands HB	-281	154	227	-18	82
Mid Western HB	-553	-91	151	280	-212
North Eastern HB	-346	-135	94	245	-142
North Western HB	-446	-229	188	308	-179
Southern HB	-836	-163	232	416	-350
South Eastern HB	-590	-367	-42	246	-753
Western HB	-735	-115	275	499	-76
State	-5112	-1623	936	2403	-3396

Table 2.27b: Percentage difference between actual and projected single males by health board, 2002

	65-69 years	70-74 years	75-79 years	80+ years	Total
ERHA	-53.6%	-32.8%	-13.5%	31.7%	-24.2%
Midlands HB	-33.3%	18.0%	33.5%	-3.2%	2.8%
Mid Western HB	-47.2%	-8.2%	18.0%	37.4%	-5.5%
North Eastern HB	-31.8%	-13.0%	11.5%	32.7%	-3.8%
North Western HB	-41.8%	-22.8%	22.8%	39.2%	-4.9%
Southern HB	-41.8%	-9.3%	17.4%	34.7%	-5.6%
South Eastern HB	-42.2%	-28.4%	-4.3%	28.8%	-16.6%
Western HB	-40.6%	-6.6%	21.4%	38.5%	-1.2%
State	-43.1%	-15.0%	11.4%	31.8%	-8.8%

Table 2.28a: Difference between actual and projected married females by health board, 2002

	65-69 years	70-74 years	75-79 years	80+ years	Total
ERHA	971	892	-110	-126	1627
Midlands HB	332	131	-68	7	402
Mid Western HB	426	298	-52	6	677
North Eastern HB	273	143	-8	-86	322
North Western HB	164	143	-110	-279	-84
Southern HB	705	613	-215	-212	891
South Eastern HB	692	400	36	-159	968
Western HB	340	206	-408	-370	-232
State	3903	2825	-937	-1219	4572

Table 2.28b: Percentage difference between actual and projected married females by health board, 2002

	65-69 years	70-74 years	75-79 years	80+ years	Total
ERHA	6.8%	9.6%	-2.2%	-4.3%	5.2%
Midlands HB	14.0%	9.1%	-8.0%	1.5%	7.9%
Mid Western HB	11.6%	12.5%	-3.9%	0.7%	8.2%
North Eastern HB	8.3%	6.9%	-0.6%	-12.1%	4.4%
North Western HB	6.8%	8.8%	-11.0%	-45.5%	-1.5%
Southern HB	10.7%	14.3%	-9.2%	-16.0%	6.1%

South Eastern HB	14.3%	13.4%	2.1%	-18.2%	9.3%
Western HB	8.3%	7.3%	-26.2%	-38.1%	-2.5%
State	9.4%	10.5%	-6.2%	-14.0%	5.0%

Table 2.29a: Difference between actual and projected widowed females by health board, 2002

	65-69 years	70-74 years	75-79 years	80+ years	Total
ERHA	-1484	-1241	-1081	-655	-4460
Midlands HB	-123	-162	-21	95	-211
Mid Western HB	-292	-288	58	91	-432
North Eastern HB	-308	-211	-240	128	-631
North Western HB	-123	-141	-91	74	-281
Southern HB	-307	-229	73	207	-256
South Eastern HB	-305	-227	-83	116	-499
Western HB	-263	-203	29	311	-126
State	-3204	-2703	-1356	367	-6895

Table 2.29b: Percentage difference between actual and projected widowed females by health board, 2002

	65-69 years	70-74 years	75-79 years	80+ years	Total
ERHA	-26.0%	-16.0%	-12.7%	-4.9%	-12.7%
Midlands HB	-10.3%	-10.1%	-1.1%	3.6%	-2.9%
Mid Western HB	-17.6%	-13.1%	2.1%	2.3%	-4.1%
North Eastern HB	-19.9%	-9.7%	-9.6%	3.2%	-6.2%
North Western HB	-10.7%	-9.4%	-4.9%	2.3%	-3.6%
Southern HB	-10.3%	-5.8%	1.6%	2.9%	-1.4%
South Eastern HB	-14.0%	-7.9%	-2.6%	2.4%	-3.8%
Western HB	-13.6%	-7.3%	0.9%	5.4%	-0.9%
State	-17.5%	-10.9%	-4.7%	0.8%	-5.9%

Table 2.30a: Difference between actual and projected single females by health board, 2002

	65-69 years	70-74 years	75-79 years	80+ years	Total
ERHA	-141	-228	352	-513	-530
Midlands HB	-41	-63	40	-77	-141

Mid Western HB	-12	-49	145	-200	-115
North Eastern HB	-35	-84	102	-62	-78
North Western HB	25	-44	118	-95	4
Southern HB	-113	-20	238	-410	-305
South Eastern HB	-85	-50	18	-246	-363
Western HB	18	-32	249	-233	2
State	-384	-569	1263	-1836	-1527

Table 2.30b: Percentage difference between actual and projected single females by health board, 2002

	65-69 years	**70-74 years**	**75-79 years**	**80+ years**	**Total**
ERHA	-4.3%	-6.8%	11.4%	-12.0%	-3.8%
Midlands HB	-9.8%	-14.1%	8.2%	-11.4%	-7.0%
Mid Western HB	-1.8%	-6.9%	19.2%	-19.5%	-3.6%
North Eastern HB	-6.1%	-13.4%	14.9%	-6.1%	-2.7%
North Western HB	5.0%	-8.0%	21.8%	-11.2%	0.2%
Southern HB	-9.1%	-1.4%	18.2%	-21.4%	-5.2%
South Eastern HB	-10.1%	-5.5%	2.0%	-19.3%	-9.3%
Western HB	2.3%	-3.9%	29.1%	-17.9%	0.0%
State	-4.6%	-6.5%	14.6%	-14.9%	-4.0%

2.7 Geographical Variations in Births and Deaths

Tables 2.1 to 2.6 underline the fact that migration is a major determinant of population numbers. The tables in the previous section highlight the fact that migration flows vary geographically and that a more sophisticated method is required to model internal flows. It was assumed in the 1995 projections that the fertility rates and survivorship rates were the same for all areas. This assumption is obviously false, but the issue is whether the geographical variations in fertility and survivorship are sufficiently large to make a significant difference to the population projections. This issue is addressed in this section.

2.7.1 Fertility

Examination of the total fertility rate over a 22 year period suggests quite wide variations, ranging from an average of 13 per cent above the national average to about 8 per cent below (with Dublin an outlier at 19 per cent below the national average). However, the total fertility rate does not take account of variations in demographic structure. Given that Dublin (and

most of the other counties with low fertility rates) has a predominantly young population this, rather than differences in fertility, may explain most of the variations. Likewise, the total fertility rate takes no account of the marital status of women in the child-bearing age groups. Variations in the percentages of married women may account for the geographical variations in total fertility.

As an experiment, fertility rates were calculated at both national and county levels for women divided by age group and marital status using data on the births and the numbers of women in each category in 1996. These rates were then used to predict the numbers of births expected in each county in each of the years 1997 to 2001. The predicted numbers were then compared with the actual numbers. The predicted numbers were less accurate using the national fertility rates than those using the county specific rates, but the additional error was much smaller than the error caused by the unanticipated increase in fertility rates in the late 1990s. Thus, while it might be possible to predict the numbers of births more accurately using county specific rates, it was felt the improvements would have little bearing upon the final projected numbers. Given that the emphasis in this study is upon the numbers in the older age groups, it was concluded that an assumption of nationally uniform fertility rates for each marital status category would suffice for its purposes.

2.7.2 Mortality

Standardised mortality ratios (i.e., measures of mortality that take account of differences in the age compositions of the population) tend to vary from about 20 per cent below the national average for some counties to more than 20 per cent above the national average for others. There are a lot of variations in the geography of mortality from one year to the next. Nevertheless, there is a long-term tendency for certain counties to be above average and others to be below, so it would seem feasible to make assumptions about county variations in mortality for use in projections. The differences in standardised mortality rates are sufficiently large to suggest that this may be beneficial.

2.8 Numbers Living Alone

Projected numbers of those over 65 living alone formed part of the 1995 report. Their number continues to increase, from 96,500 in 1991 to 107,000 in 1996 and to 114,000 in 2002. This rate of increase is somewhat lower than that projected in 1995 when 113,000 was projected for 1996, while 128,000 was projected for 2002. In the 1995 projections, the number of older people living alone was generated by projecting the numbers of single and widowed, and applying a ratio to this total. This ratio, which rose, for example, from 0.38 to 0.45 for men

aged 70 and over between 1986 and 1991, reflects the propensity of those who are single or widowed to live alone.

In total there were 37,500 fewer single and widowed persons in 2002 than projected. This accounts for a large part of the over-estimation of the numbers living alone. Table 2.31 shows the projected and actual numbers of those living alone in 2002.

Table 2.31: Projected and actual numbers of older people living alone, 2002

	65 to 69	70 and over
Males actual	10845	27169
Males projected	15374	28458
Actual – projected	-4529	-1289
Females actual	14580	61232
Females projected	16256	68793
Actual – projected	-1676	-7561

The propensity of single and widowed persons over 65 to live alone continues to increase in line with historic trends. For example, the ratio of single and widowed men of 70 or over living alone to all single and widowed men of 70 or over stood at 0.38 in 1986. This rose to 0.45 in 1991 and stands at 0.55 in 2002. Rates of change have varied for men and women, as well as for those aged 65 to 69 as against those aged 70 and over. Analysis of these trends in the period 1986-2002 will form the basis of generating future projections.

An additional factor impacting on future numbers of older people living alone is the increasing numbers of separated persons. The projections generated in 1995 used the category 'ever married' as corresponding to 'married'. This involved aggregating married, separated and divorced, and treating them as married for the purposes of the projections. In 2002, separated and divorced persons represented 8.7 per cent of those aged between 40 and 59. As these enter the older age groups they are likely to inflate the numbers of older people living alone and their status will need to be accommodated in the model.

2.9 Conclusions

The major conclusions arising from this review include the following.

1. Migration is not only a major determinant of future population numbers (both directly and indirectly due to its impact on future births), but it is also the factor that is most difficult

to predict. Given the uncertainties associated with predicting future net migration, several projections assuming different migration scenarios are reported in the following chapters.

2. Apart from the difficulties associated with predicting future net migration at national level, it is also important to take account of its differential geographical impact. This issue is explored in more detail in the following chapters in order to gauge whether the assumptions relating to differential migration can be further enhanced.
3. Death rates (and hence survival rates) vary geographically. These variations are incorporated in the new projections.
4. Evidence elsewhere suggests that survivorship rates may vary by marital status – i.e., death rates appear to be higher for single people than for married people. However, there does not appear to be any data on mortality by marital status for Ireland, so it is not possible to incorporate variations in mortality data by marital status in the projections.
5. Fertility rates vary geographically. However, given that the emphasis is on projecting the numbers of people in the older age groups, and given that estimates of the geographical variability in fertility could be problematic, it was decided to assume fertility was geographically uniform after adjusting for age and marital status.
6. Assumptions relating to future trends in proportions of the population who are single, married and widowed, particularly for older age groups, need to be based on an analysis of the baseline population rather than on historic trends in the propensity to be single, married or widowed.
7. For the purposes of projecting numbers living alone there is a need to disaggregate those 'ever married' into those 'still married' and those 'separated or divorced' as the latter group are more likely to live alone and will constitute a growing proportion of the population in future years.

CHAPTER THREE

Population Projections: 2002-2021

3.1 Introduction

The projections reported here are based upon an extrapolation of recent demographic trends subject to various assumptions regarding the major components. These assumptions are discussed in Section 3.2.

The procedure adopted falls into two basic stages:

1. estimates of the total population, disaggregated by age, sex and county of residence, were made for each anticipated census year (i.e., 2006, 2011, 2016 and 2021) by adding estimates of the number of births, subtracting estimates of the number of deaths, and then adding the estimated number of net migrants to the population at the end of the previous intercensal period. (Net migration is defined here as the total number of people moving into an area minus the total number moving out. A positive number indicates a population increase whereas a negative number indicates a population decrease.)
2. the total population for each time period was then further disaggregated by marital status and whether they live alone, based upon an extrapolation of recent trends with regard to these factors.

The predicted numbers of births and deaths are reasonably stable under different assumptions, but the number of people moving in and out of the country, and also between different counties within the country, is much less predictable. Four separate projections were therefore made of total population, based upon different assumptions relating to net migration. These assumptions (labelled A1, A2, A3 and A4) are explained in Section 3.2.3.2. However, disaggregation by marital status and living alone is reported here only for the population projected under assumption A1.

3.2 Assumptions

The projections require assumptions to be made with regard to five major components: births; deaths; net migration; marital status; and living alone. The assumptions made are discussed in the following subsections.

3.2.1 Fertility And Births

The most widely recognised measure of fertility is the 'total period fertility rate' (TPFR). This is defined as the average number of children born to a cohort of women who experienced, throughout their childbearing years, the fertility rates of the calendar year in question. Irish fertility rates have declined significantly over the past four decades, reaching their lowest point in the mid-nineties. In 1964, the TPFR stood at 4.07, falling to 2.50 in 1985 and to 1.85 in 1985. Since then it has recovered to just below 2.0, which is well above the rate in most European countries (1.72 United Kingdom, 1.75 France, 1.62 Netherlands). The Central Statistics Office (CSO) in its 1999 population projections put forward three different scenarios regarding Irish fertility. The first sees the TPFR increasing from its 1998 level of 1.94 to reach 2.0 in 2001 and remain constant thereafter. The second and third assumptions project that the TPFR falls from its 1998 level. The CSO expert group considered the first assumption to be too optimistic, but in the interim the TPFR has in fact recovered and in 2002 stood at 1.98. Fahey argues that patterns of Irish fertility may be closer to countries such as Australia, New Zealand and the US rather than Europe and, on that basis, suggests that Irish TPFRs may stay above European levels into the future.[3] Our assumptions, outlined below, are largely consistent with this view and suggest that Irish TPFRs will remain close to 2.0 in the medium-term. However, the 2002 census showed a dramatic fall in the proportion of married women in the 25 to 29 and 30 to 34 age cohorts which will inevitably feed through to lower fertility. This is because, although births outside marriage have risen sharply through the 1990s, the fertility rate of married women remains much higher than for those who are single. The following are the assumptions made regarding trends in Irish TPFRs over the next 20 years.

Table 3.1: Assumption on total period fertility rate (TPFR), 2006-2021

	2002	2006	2011	2016	2021
TPFR	1.98	1.95	1.85	1.80	1.80

3.2.2 Deaths

Having added births, the second step is to subtract losses to each cohort due to deaths. To do this, a cohort survival rate, expressing the number of expected survivors as a percentage of the number of people in the cohort at the beginning of an intercensal period, was calculated for each intercensal period for each age cohort in each county. This requires assumptions to be

[3] Fahey, T., 'Trends in Irish fertility rates in comparative perspective', *The Economic and Social Review*, vol. 32, no. 2, July 2001, pp. 153-180.

made regarding how survival rates are likely to change over time, and also how they are likely to vary between counties.

3.2.2.1 Temporal Changes in Survival Rates

Cohort survival rates were calculated at national level for each five-year cohort in 1996. Similar calculations were made for five-year cohorts in 1981, 1986 and 1991 to identify recent trends. It became obvious that different assumptions would be required for different age groups.

Improvements were observed in the survival rates for the 0 to 4 age group in the 1980s, but male survival rates improved only slightly subsequently, while female rates actually disimproved slightly. Most deaths in this age group are infants. Ireland's neonatal mortality rates have fallen substantially over recent decades, and are now on a par or better than most developed countries. The post-neonatal rates also dropped to extremely low rates by the mid-1990s. There is no reason to suspect that further improvements will be readily forthcoming, so the survival rates for the 0 to 4 age group are assumed to remain static over the next two decades.

There was virtually no change over the past twenty years for either males or females aged 5 to 39. There may in fact be a slight disimprovement for both males and females in the period since 1996, but, given that the changes are so small and there is no obvious reason to believe that this may represent the beginnings of a long-term trend, the rates for all groups between 5 and 40 are assumed to remain static.

Improvements were observed for the 40 to 44 age group in the 1980s, but would seem to have petered out by the 1990s. Indeed the survival rate for males disimproved slightly in the late 1990s, but, in the absence of any reason to believe this may be the beginning of a long-term trend, it is assumed that the rate for this age group will also remain static.

The number of deaths below the age of 45 is relatively small. Any errors in the assumption of no change in the death rates for both males and females in these age groups is likely to have minimal impact upon future projections, especially when the emphasis is on the numbers of older people. Changes in the age-specific rates for people aged 45 or over are more substantial and of more direct relevance.

There was a continuous improvement in the survival rates for all ages over 44 for both males and females over the past two decades. The rate of improvement has been slowing down in the 45 to 49 and 50 to 54 age groups, has remained reasonably constant in the 55 to 59 age group, and has accelerated in the 60 to 64 and 65 to 69 age groups. It has both accelerated and decelerated in most of the older age groups in a less consistent manner. There are indications of a possible slowing down in the 75 to 79, 80 to 84 and 85+ age groups for both sexes in the late 1990s following a substantial improvement in the early 1990s.

Comparative international studies of temporal trends in life expectancy provide no evidence of a life expectancy 'ceiling' i.e., a maximum life expectancy beyond which no further progress is possible. They also provide no indications that the improvements in life expectancy are slowing down as they approach this hypothetical ceiling. Given that life expectancy in Ireland is lower than for most developed countries, there would seem to be grounds for assuming that improvements will continue.

Given that the rate of progress has been slowing down in the 45 to 49 and 50 to 54 age groups, it is assumed that there will be further improvements over the next five years, but at only half the rate of the past five years. Beyond that, it is assumed that the survival rates will remain static. For each of the other age groups, the rate of improvement for the next five years is assumed to be a weighted mean of the rates of improvements in the previous twenty years.[4] It is also assumed that these rates of improvement will continue to 2021.

Under these assumptions, life expectancy at birth would increase from 73.0 to approximately 76.3 for males, and from 78.5 to 81.5 for females.[5] Increases of this magnitude do not appear implausible given historic trends and life expectancies currently prevailing in other countries.

3.2.2.2 Geographical Variations In Survival Rates

There is a long-term tendency for death rates to be higher in some areas relative to others. However, this tendency is disguised by fluctuations from year to year (e.g., areas which generally tend to have more deaths than average may experience fewer deaths than average for one or more years before returning to above average mortality). These fluctuations make it difficult to detect long-term trends, either towards an improvement or disimprovement. Nevertheless, despite these fluctuations, it is felt that these geographical variations in

[4] The previous three incremental changes are weighted 1:2:3. While the weights are arbitrary, they give more weight to the more recent changes.

[5] These life expectancy calculations are approximate and are intended only as an indicative guide.

mortality were sufficiently large to merit recognition in the projection models in the form of a geographic scaling factor for each county to be applied to the national rates.

The situation is further complicated by variations between different age groups i.e., an area may experience above average mortality in some age groups at the same time as below average mortality in other age groups. Because the geographical variations are different for each age group, it was decided that a single scaling factor for each county to be applied to all age-specific rates was inappropriate. It was therefore decided to calculate different scaling factors for each age group for each county.

The number of deaths in the younger age groups is relatively small, making it very difficult to establish a reliable scaling factor for each county. Also, given that the number of deaths is so small, adjustments for geographical variations would make very little difference. It was therefore decided to estimate geographical scaling factors only for age groups above 50. Less than 10 per cent of all deaths occur under the age of 50.

Five year cohort survival rates were calculated for each county for each of the periods 1981-1985, 1986-1990, 1991-1995 and 1996-2000. For each period, the cohort survival rate for each cohort was divided by the national cohort survival rate. A ratio of, say, 1:1000 would indicate that the cohort survival rate in a particular county was 10 per cent above the national average. These ratios may be used to calculate age-specific geographic scaling factors on the assumption that past spatial variations in age-specific rates provide an indication of future geographical variations in each cohort. However, given that some of the variations in the values of the ratios for different time periods may reflect long-term secular trends rather than stochastic fluctuations, it was decided to weight the ratios using the formula:

$$GSF = (1 \times R_{81} + 2 \times R_{86} + 3 \times R_{91} + 4 \times R_{96}) / 10$$

where GSF is the geographical scaling factor for a particular cohort in a particular county, and R_y is the ratio of the cohort survival rate to the national average for that cohort and county in the five-year period beginning in year y.

The geographical scaling factors for the 85+ cohort were found to be extremely variable and were inconsistent with those for other age groups. It is therefore felt that the geographical scaling factor for this cohort should be assumed to be 1.0 (i.e., the same as the national rate everywhere).

3.2.3 Net Migration

Having allowed for deaths, the final step in the estimation of the total population at the end of each intercensal period is to add the number of net migrants (i.e., the number of people moving into each area minus the number moving out). As before, these numbers are estimated for males and females separately in each county for each age cohort.

Given that we are working at a county level, rather than at national level, it is necessary to make a distinction between internal migration (i.e., moves from one county to another) and external migration (i.e., moves in or out of the country). It is also necessary to make assumptions about how each type of migration will vary over time.

3.2.3.1 Internal Net Migration

The census question asking respondents where they resided twelve months previously enables internal migration flows to be established for the twelve-month period before each census. However, comparison of the 1996 and 2002 censuses reveals quite dramatic shifts in the pattern of internal migration between 1996 and 2002. The pattern in 1996 was similar to previous years but 2002 was characterised by a decline in the popularity of cities as a destination. Given that it is not known whether 2002 will typify future patterns, or whether it is a temporary aberration associated with the Celtic Tiger, it was decided to split the difference and average the two patterns.

The total number of moves in the twelve months before each census was reasonably similar. It is therefore assumed that the means for the two censuses provide a reasonable indication of the number of internal moves in an average year (44,443 males and 49,167 females). It is assumed, in the absence of any obvious reasons to assume otherwise, that these numbers will neither increase nor decrease in the period up to 2021. This assumption will obviously introduce errors if internal migration either increases or declines significantly, but the impact upon the net migration in each area may be relatively small because a change in the number of moves into an area will to some extent be counter-balanced by a change in the number of moves out of that area.

It should also be noted that errors in the assumptions regarding internal migration will have no influence upon the total populations projected at national level – the sum total of internal net migration at national level is, by definition, always zero. Errors in the estimates of internal migration may, however, affect the projected geographical distribution of the population.

3.2.3.2 External Net Migration

External net migration is more difficult to estimate because external out-migration (i.e., the total number of people leaving the country) is unknown and therefore has to be estimated indirectly.

Total net migration between censuses may be estimated as the increase in total population minus births plus deaths. This is equal to the sum of internal net migration plus external net migration. External net migration may therefore be estimated as total net migration (i.e., the increase in population minus births plus deaths) minus internal net migration. The estimates of external net migration will obviously depend upon the assumptions made relating to the extent of internal net migration. The annual rate on internal net migration, as noted above, was assumed to be the average of that recorded in the twelve months before the 1996 and 2002 censuses. If internal net migration for a cohort in a county is overestimated, then external net migration will be underestimated by the same amount. However, total national internal net migration is zero, consequently the estimate of external net migration at national level should be unaffected by the assumptions regarding internal migration levels.

External in-migration (i.e., the number of people moving into the country) may be estimated for each county by age and sex using information available from the census on moves in the previous twelve months. External out-migration may then be estimated as the difference between external in-migration and external net migration. If external net migration in a county is underestimated for the reasons suggested above, then external out-migration for that county will be overestimated.

External net migration levels are extremely volatile and may change dramatically within a few years in response to changes in the economy and other factors. For example, if the economy is strong, then fewer people will emigrate and more people will immigrate, therefore external net migration will be high. If the economy is weak, then net migration will decline. Indeed, for most of the history of the State, with the exception of the 1970s and 1990s, net migration was negative (i.e., out-migration exceeded in-migration).

It is not envisaged that we will return to negative net migration, but net migration levels are highly unpredictable. It was therefore decided to run four projections based on different assumptions of net migration levels. These are labelled A1, A2, A3 and A4. The A1 assumption follows the M1 assumption adopted by the CSO for projections based on the 1996

census.[6] The other three assumptions assume increasing rates of net migration. The assumptions are summarised in Table 3.2. (To put these assumptions in context, net migration averaged about 25,000 per annum between 1996 and 2002, but it was estimated by the CSO as 32,800 in 1991 and 41,300 in 2002).[7]

Table 3.2: Assumptions regarding annual net external migration numbers

Assumption	2002-2006	2006-2011	2011-2016	2016-2021
A1	15,000	10,000	5,000	5,000
A2	20,000	15,000	15,000	10,000
A3	25,000	17,500	17,500	10,000
A4	25,000	25,000	25,000	25,000

It was initially envisaged that the estimates of external net migration could be used to calculate percentages, which in turn could be applied to calculate the individual cell values for any given figure assumed for total external net migration. However, net migration is negative for some age groups (i.e., the net flow is outward). This means that, if one assumed that the net inflow was to double, the net outflow in these age groups would also double. This is counterintuitive. It was decided to use separate estimates of external in-migration and external out-migration, each of which could be scaled up or down as required.

The ratio of in-migration to out-migration for the period 1996-2002 was estimated as approximately 5:3. This ratio was assumed to remain constant while scaling the estimates of external in-migration and external out-migration up or down so that their differences produced the external net migration required by the assumptions A1 to A4. However, there is no reason why this ratio should remain constant. An increase in external net migration could result from either an increase in external in-migration or a decrease in external net migration, either of which would result in a change in the ratio. Given that external in-migration and external out-migration display different geographical distributions, any departures from the assumed ratio will result in errors in the projected geographical effects of net external migration.

3.2.4 Marital Status

[6] Central Statistics Office (2001) *Regional Population Projections, 2001-2031*. Central Statistics Office, Dublin.

[7] Central Statistics Office (2003) *Population And Migration Estimates, April 2003 (With Revisions To April 1997 To April 2002)*. Central Statistics Office, Dublin.

Projecting future populations disaggregated by marital status involves making assumptions regarding marriage rates, widowhood and marital separation. Assumptions on marriage rates are used to generate numbers of 'ever married'; assumptions on separation are used to generate numbers of separated people which are then subtracted from the numbers 'ever married' to generate the numbers actually married in each age cohort.

3.2.4.1 Marriage Rates

Projecting future trends in marriage rates by each cohort from 15 to 19 to the oldest age cohort, those aged 85 and over, involves making two separate sets of assumptions. The first focuses on the propensity of those aged 18 to 40 to change their marital status from single to married. Given that marriage rates for those over 40 are low, the second focuses on the propensity of those married to become widowed in each age cohort.

Since 1986 there has been a very dramatic fall in the proportion of those married in all age cohorts up to 30 to 35 as is shown in Table 3.3. This is the result of the combination of two trends – later average age of marriage and declining popularity of marriage. For example, the average age of grooms rose from 28.6 in 1990 to 30.2 in 1996, while the figure for brides rose from 26.6 to 28.4. The growing propensity to avoid marriage is reflected in the fact that in 1991 only 12.8 per cent of females in the 35 to 39 age cohort were single, but this rose to 21.6 per cent in 2002. The corresponding figures for males were 19.1 per cent and 28.1 per cent respectively.

Table 4.3: Percentage females married, 1986-2002

Age group	1986	1991	1996	2002
15-19 years	0.9%	0.4%	0.3%	0.3%
20-24 years	22.3%	13.7%	6.5%	4.0%
25-29 years	64.6%	56.5%	41.3%	26.8%
30-34 years	82.6%	79.6%	72.6%	60.2%
35-39 years	87.8%	86.3%	83.5%	77.7%
40-44 years	87.8%	88.2%	86.6%	84.0%
45-49 years	84.4%	86.7%	87.1%	85.7%
50-54 years	78.2%	82.0%	84.4%	85.4%
55-59 years	68.9%	73.7%	78.1%	81.8%
60-64 years	57.9%	62.0%	67.6%	74.2%
65-69 years		48.4%	53.6%	60.9%
70-74 years		35.0%	39.1%	44.4%
75-79 years		23.5%	25.7%	29.0%

Aged 80 +		10.5%	13.2%	13.2%

CSO-published data on vital statistics suggests that there has been a recovery in the overall marriage rate which has risen from 4.3 per thousand in 1997 to 5.1 per thousand in 2002. Given that the proportions married in the 25 to 39 age cohorts as reported in the 2002 census are at quite a low level, our projections are based on the assumption that these rates will decline only slightly up to 2021.

For the older age groups the proportion married is calculated as a residual, obtained by subtracting the proportion widowed plus the proportion single from the total population. This assumption has been cross-checked for consistency by examining the declining proportion married through the older age groups as the proportion widowed increases. For example, the assumption that 67.1 per cent of females in the 65 to 69 age group will be married in 2006 is consistent with the fact that 74.2 per cent of females in the 60 to 64 age group were married in 2002. This means that the assumptions will accurately reflect the high marriage rates of the 1960s and 1970s as they feed through to higher proportions of married older people in 2006 and in subsequent years.

3.2.4.2 Separation Rates

The 2002 census showed a large increase in the numbers recorded as separated or divorced, rising from 78,000 in 1996 to 134,000 in 2002. In 2002 about 10 per cent of all females and just under 8 per cent of males aged between 40 and 54 were recorded as separated or divorced. As rising rates of marriage breakdown are a relatively new phenomenon in Ireland it is difficult to anticipate future trends. Our projections are based on an assumption that the trends evident in the period 1996 to 2002 will continue to 2011. This will see the proportion of females separated aged 45 to 50 rise to 17.1 per cent while the figure for males will be 13.4 per cent. Thereafter it is assumed that the rise in proportions separated in these age groups will taper off as the rates approach levels of separation currently experienced in the US and the UK. Apart from the phenomenon of higher rates of separation for those in the middle-aged cohorts, the assumptions also reflect the trend whereby the proportion of those separated in the older age groups will also rise as this middle-aged population ages. For example, it is assumed that 9 per cent of males and 10 per cent of females aged 65 to 69 will be recorded as separated in 2021 compared to 4 per cent and 3 per cent respectively in 2002.

If future trends in marriage breakdown are difficult to predict then future trends in re-marriage are even more problematical. In 2002 the numbers married following the dissolution of a

previous marriage represented less than 7 per cent of the numbers separated. While the number re-marrying is likely to rise following the legalisation of divorce, this is not reflected in these assumptions other than in the period after 2011 when the rise in the proportions separated is assumed to level off.

3.2.4.3 Widows

The proportion of the population widowed is a function of the proportion who were ever married and mortality. Our assumptions are based on an analysis of the ratio of widowed persons in age group *n* to the number of married persons in age group *n-1* in the previous census. This takes account of the fact that the proportion of widowed may rise, despite improvements in life expectancy, if it corresponds with an increase in the proportion married. For example, in 1991, 56 per cent of females aged 75 to 79 were widowed. This is projected to rise to almost 60 per cent in 2021 reflecting higher marriage rates among the older age groups at that time. For those under 40 the proportions widowed, which for both sexes and all age cohorts is less than 7 per thousand, is held constant throughout the period.

3.2.4.4 Single

The assumptions relating to the proportions who are single fall into two parts. For those aged under 40 the proportion is calculated as a residual whereby the proportion married plus the proportion widowed (a figure of less than 1 per thousand) is subtracted from the total population in each age cohort. For those aged 40 and over as each age cohort ages, the proportion who are single remains relatively constant as there are few marriages. For example, in 1991 of those males aged 65 to 69, 249 per thousand were single. Five years later in 1996 those males were now aged 70 to 74 and 238 per thousand were single. The difference is just 4 per cent and could be accounted for by migration and slight variations in the death rates by marital status (and the very small number of men in their late sixties marrying). Using this approach, and starting with the 2002 census, it is possible to project forward the proportions single for each 5 year age cohort over 40. Table 3.4 shows how the assumption for single males in 2006 is generated with the 'difference' column reflecting trends in 1996-2002. For example, the decline of 17 per thousand in the number of single males in the 50 to 54 age cohort in 2006 compared to the 45 to 49 cohort in 2002 is the same rate of decline in single males in those age cohorts in 1996-2002.

Table 3.4: Number of single males per 1,000, 1996 and 2002

Age	Numbers of single males per thousand

	2002	Difference	2006
40-44 years	196		
45-49 years	163	-44	153
50-54 years	154	-17	146
55-59 years	145	-18	136
60-64 years	158	-6	139
65-69 years	182	3	161
70-74 years	210	9	191
75-79 years	219	-10	200
80-84 years	220	-15	204
Aged 85+	212	-29	191

3.2.4.5 Geographical Variations In Marital Status

The assumptions regarding future changes in proportions married, widowed, single and separated described above are at the level of the State. However, in projecting future populations at county and county borough (i.e. city) level by marital status, geographical variations in marital status as evident in the 2002 census are taken into account. For example, the number of married females at the county level in 2006 are calculated as follows:

$$M2006_{i=1,34}^{j=4,8} = P2006_{i=1,34}^{j=4,8} * (M2002_{i=1,34}^{j=4,8} / P2002_{i=1,33}^{j=4,8}) * m2006_{i=35} * (M2002_{i=35}^{j=4,8} / P2002_{i=35}^{j+4,8})$$

where

- M2006 is the number of married females in 2006
- P2006 is the population of all females in 2006
- M2002 is the number of married females in 2002
- P2002 is the population of all females in 2002
- m2006 is the assumption on the proportion of females married in 2006
- i=1,34 are the 34 geographic areas; i=35 state total
- j=4,8 are the 5 age cohorts, 15 to 19 up to 35 to 39.

3.2.5 Living Alone

Previous projections of the numbers of older persons living alone carried out in 1995 for the Council used the changing propensity of those single and widowed to live in single person households to generate the results. Historically, there is a relationship between the numbers of widowed and single older people, and the numbers of older persons living alone. A similar

approach is adopted in these projections with the one difference that separated persons are included along with those widowed and single. The projections are disaggregated by sex and by two age groups – those aged 65 to 69 and those aged 70 and over.

Over the past fifteen years, both the absolute numbers of those over 65 and their propensity to live alone has increased. In 1991, of the 403,000 aged 65 and over, 96,000 (24 per cent) lived alone. In 2002, 114,000 (26 per cent) out of 436,000 lived alone. The modest change in the proportion of older people living alone masks some more striking changes relating to marital status. For example, in 1986, women over 70 living alone represented 34 per cent of single and widowed women over 70. By 2002 this had increased to 47 per cent. The corresponding figures for males were 38 per cent and 57 per cent. Based on trends in the late 1980s, the projections generated for the Council in 1995 over-estimated the rate at which these percentages were increasing. The propensity of the single and widowed in older age groups to live alone continued to increase during the 1990s but at a slower rate. For the purposes of the current projections it is assumed that the propensity of single, widowed and separated older people to live alone will continue to increase at the rate experienced in the period 1991 to 2002.

Geographic variations in patterns of living alone are accommodated in the assumptions using a similar method to that being used to reflect geographic variations in marital status described above.

$$LA2006_{i=1,34} = (PS2006_{i=1,34} + PW2006_{i=1,34} + PSP2006_{i=1,34}) * R2002_{i=1,35} * R2006_{i=35} * / R2002_{i=35}$$

where

- LA2006 is the number living alone
- PS2006 is the population single in 2006
- PW2006 is the population widowed in 2006
- PSP2006 is the population separated in 2006
- R2002 is the ratio of single, widowed and separated to those living alone in 2002
- R2006 is the ratio of single, widowed and separated to those living alone in 2006
- i=1,34 are the 34 geographic areas; i=35 is state total.

CHAPTER FOUR

Discussion of Projection Results

The following sub-sections summarise some of the major findings arising from the projections.

4.1 Total Population

Table 4.1 shows the populations projected for each census year until 2021.

Table 4.1: Projected national populations, 2006-2021

		2006	2011	2016	2021
Total	**A1**	4,093,740	4,290,153	4,441,002	4,569,854
	A2	4,114,845	4,339,188	4,544,518	4,701,365
	A3	4,135,950	4,374,896	4,594,138	4,750,639
	A4	4,135,950	4,414,880	4,675,912	4,913,637
Males	**A1**	2,037,121	2,138,564	2,216,948	2,283,734
	A2	2,047,569	2,162,687	2,267,534	2,347,086
	A3	2,058,017	2,180,214	2,291,556	2,370,355
	A4	2,058,017	2,200,004	2,331,693	2,449,815
Females	**A1**	2,056,619	2,151,589	2,224,054	2,286,120
	A2	2,067,276	2,176,501	2,276,984	2,354,279
	A3	2,077,933	2,194,682	2,302,582	2,380,283
	A4	2,077,933	2,214,876	2,344,220	2,463,822

The total population projected ranges from a low of 4.57 million (A1) to a high of 4.91 million (A4). However, the A4 projection was included simply to provide an indication of the possible upper limits if Celtic Tiger conditions prevailed until 2021. This is probably unlikely.

Our lowest estimate corresponds almost exactly with the highest of six estimates produced by the CSO based on the 1996 census figures. Our lowest and their highest estimates used the same migration assumptions. However, the CSO used either lower net migration and/or lower fertility assumptions in their other projections. The CSO projections underestimated the population recorded in the 2002 census by between 40,000 and 80,000, so we feel that our

higher estimates are probably more realistic given the changed circumstances arising from the Celtic Tiger.

4.2 Age Composition

Table 4.2 shows the percentages of the population in selected age groups in 2002 and the percentages projected under each of the assumptions for 2021.

Table 5.2: Projected percentages in selected age groups, 2021

Males				Females			
	0-14 years	**15-64 years**	**Aged 65+**		**0-14 years**	**15-64 years**	**Aged 65+**
2002	21.8	68.5	9.7	**2002**	20.5	67.0	12.5
2021 A1	19.6	66.3	14.1	**2021 A1**	18.1	66.4	16.4
2021 A2	19.6	66.3	14.0	**2021 A2**	18.3	65.5	16.2
2021 A3	19.6	66.4	14.0	**2021 A3**	18.4	65.5	16.1
2021 A4	19.7	66.4	13.9	**2021 A4**	18.7	65.5	15.8

The percentage of older males (i.e., males aged 65 as a percentage of total males or more) is projected to rise from 9.7 per cent in 2002 to between 13.9 per cent (A4) and 14.1 per cent (A1). Migration assumptions do not make a big difference, but the percentage of older people declines slightly with increases in net migration (which would be expected to bring in more younger people).

The percentage of older females is projected to rise from 12.5 per cent in 2002 to between 15.8 per cent (A4) and 16.4 per cent (A1). There is a wider spread of values than for males, suggesting that the female percentages are more dependent upon net migration rates.

While the extent of the increase is dependent upon the choice of assumption about net migration, all the projections predict a substantial increase in the percentage of older people, in the order of about 4.0 per cent for males and 3.5 per cent for females. While the number of children under the age of 15 is projected to decline by about 2.0 per cent for both males and females, the percentage in the economically active age groups (i.e. 15 to 64) will also decline by about 2.0 per cent for males and 1.5 per cent for females. The dependency ratio will therefore increase quite substantially.

The increase in the percentage of older people must be seen in the context of an absolute increase in total population. Table 4.3 shows the absolute numbers of people projected in each of the age groups considered above.

Table 4.3: Projected numbers in selected age groups, 2021

	Males				Females		
	0-14 years	**15-64 years**	**Aged 65+**		**0-14 years**	**15-64 years**	**Aged 65+**
2002	424,044	1,332,965	189,155	**2002**	403,384	1,320,809	246,846
2021 A1	447,187	1,513,896	322,651	**2021 A1**	414,566	1,495,719	375,835
2021 A2	460,758	1,557,166	329,162	**2021 A2**	431,755	1,541,577	380,948
2021 A3	464,443	1,574,022	331,891	**2021 A3**	437,290	1,559,918	383,075
2021 A4	483,395	1,626,915	339,505	**2021 A4**	459,773	1,614,948	389,101

The absolute number of older males is projected to increase from 189,555 in 2002 to between 322,651 (A1) and 339,505 (A4). This represents an increase of between 70.2 and 79.1 per cent on existing numbers.

The absolute number of older females is projected to increase from 246,846 in 2002 to between 375,835 (A1) and 389,101 (A4). This is a smaller percentage increase than for males, but still represents an increase of between 52.2 and 57.6 per cent.

While such large increases indicate the need for a major investment in services, it should perhaps be noted that the projections suggest that a large proportion of these increases will be in the 'young' elderly (i.e., people aged 65 to 74). Table 4.4 shows the projected percentages of those aged 65 or over who will be less than or more than 75. It will be noted that the percentages aged less than 75 will increase for both males and females as the post-war baby boomers move into the retirement age groups.

Table 4.4: Percentages of 'young' and 'old' older people, 2021

	Males		Females	
	65-74 years	**Aged 75+**	**65-74 years**	**Aged 75+**
2002	61.9%	38.1%	52.1%	47.9%
2021 A1	64.5%	35.5%	57.8%	42.2%
2021 A2	64.6%	35.4%	57.8%	42.2%

2021 A3	64.6%	35.4%	57.9%	42.1%
2021 A4	64.5%	35.5%	57.8%	42.2%

Nevertheless, although the older population will on average become younger, there will still be a substantial increase in the absolute numbers of 'old' older people. Table 4.5 shows the absolute numbers of 'young' and 'old' older people under each of the four assumptions. The number of males aged 75 or over is projected to increase from 72,146 to between 114,528 (A1) and 120,399 (A4), an increase of between 58.7 and 66.9 per cent, while the number of females aged 75 or over is projected to increase from 118,252 to between 158,761 (A1) and 164,014 (A4), an increase of between 34.3 and 38.7 per cent.

Table 4.5: Numbers of 'young' and 'old' older people, 2021

	Males		**Females**	
	65-74 years	**Aged 75+**	**65-74 years**	**Aged 75+**
2002	117,009	72,146	128,594	118,252
2021 A1	208,123	114,528	217,074	158,761
2021 A2	212,495	116,667	220,286	160,662
2021 A3	214,373	117,518	221,649	161,426
2021 A4	219,106	120,399	225,087	164,014

4.3 Geographical Distribution

Projections are more normally made at either national or regional level. The projections reported here attempt to project the populations for each county. It must be recognised, however, that this entails making assumptions with regard to the origins and destinations of both internal and external migration based upon the patterns in the twelve months before the 1996 and 2002 censuses. These patterns may be influenced at a local level by particular time-specific events (e.g., a new housing development, or a major expansion of local employment opportunities) which may not form the basis of a continued long-term trend (or may even be reversed). Cities currently experiencing rapid growth may run out of space for development, in which case further growth may be transferred to neighbouring areas. For these reasons, and others, projections of future geographical trends need to be treated with a high degree of caution. The maps shown here are based on the A1 assumption regarding net migration, but the trends under the other assumptions are generally somewhat similar.

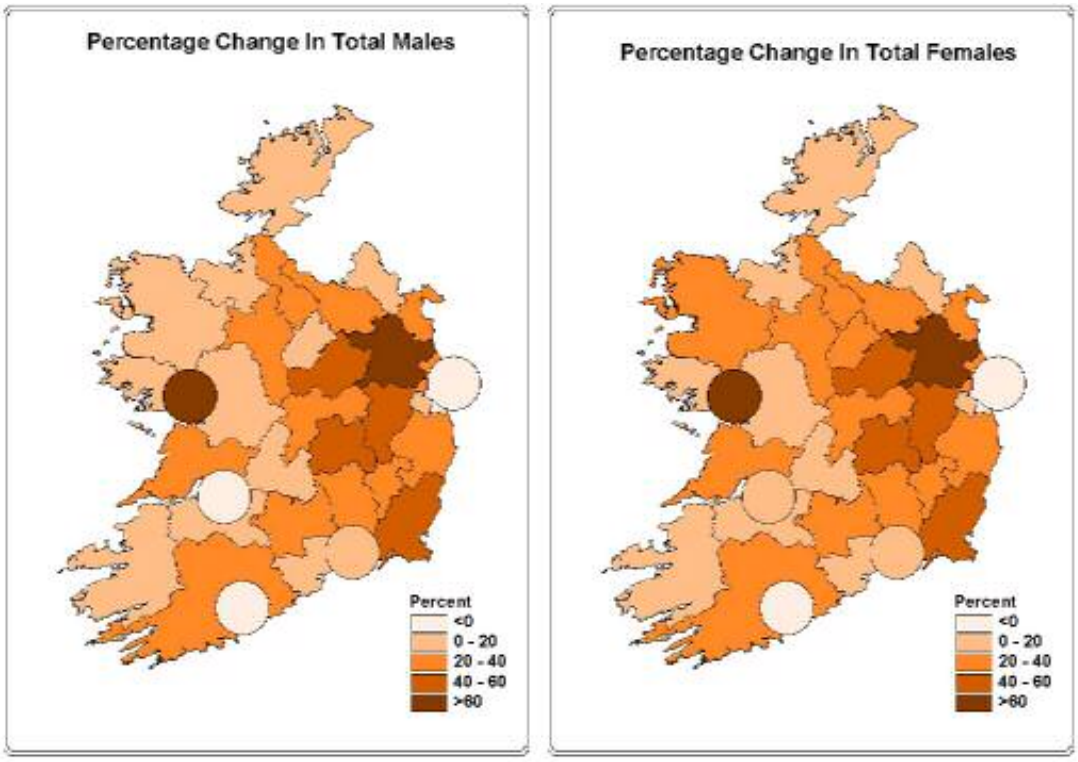
4.3.1 Total Population

Figure 4.1 shows the projected changes in total population under the A1 assumption. The populations of Dublin C.B., Dun Laoghaire and Cork C.B. are projected to decline in absolute numbers, but the populations of Fingal, South Dublin, Waterford C.B. and Galway C.B. are projected to increase. However, some of the projected trends need to treated with caution. The rapid increase projected for Fingal is probably too heavily dependent upon the recent expansion of Blanchardstown as the third of Dublin's three new cities. This rate of growth is unlikely to be sustained. The rapid growth of Galway, if it continues, would most probably overspill into the surrounding county. The populations of Waterford C.B. and Limerick C.B. are likely to remain much the same as at present for similar reasons, unless these cities experience an extension of their boundaries.

The distribution of projected increases for the other counties look reasonably plausible, although the increases projected for Westmeath, Laois and Wexford may be on the high side. Limerick County might also be expected to grow at a faster rate if it receives overspill from Limerick C.B. The high rates of decline projected for Dun Laoghaire and Cork C.B. are probably exaggerated as vacated housing will eventually attract replacement population.

With the exception of Galway C.B., most of the counties with the highest rates of projected population increase are in Leinster. In some instances the percentage increase is high because the starting population is comparatively low. Nevertheless, the predominant impression is of a spread of population growth radiating out of Dublin. Dublin itself may experience a small decline in population as people suburbanise, but this decline is likely to remain small as there will always be a demand for a central location.

Figure 4.1: Projected changes in total population, 2002-2021



4.3.2 Elderly Persons

The projected increase in the older population was documented in Section 4.2. This section looks at the anticipated geographical distribution of the older population.

Figure 4.2 shows the percentage of the population expected to be aged 65 or over in 2021 under the A1 assumption. The maps are generally similar for males and females, although a higher percentage of older females than males is projected for Dublin. Apart from Dun Laoghaire-Rathdown and Waterford County, the counties with the highest projected percentages of older people for both sexes are in the western half of the country, while most of the counties in the eastern half have lower percentages.

Figure 4.2 does not necessarily mean that there will be a greater need for services catering for older people in the west. It is important to bear in mind the absolute numbers as well as the percentages.

Table 4.6 shows the numbers of people aged 65 or over projected for each county under assumption A1. It also shows these numbers as a percentage of total persons aged 65 or over of that sex in the State. This may provide a better indication of the need for services. It will be noted, for example, that despite having low percentages of older people in Figure 4.2, Dublin

City and County will be home to an estimated 23.9 per cent of all males aged 65 or over and 25.7 per cent of females.

Figure 4.2: Percentage of projected population aged 65 or more, 2021

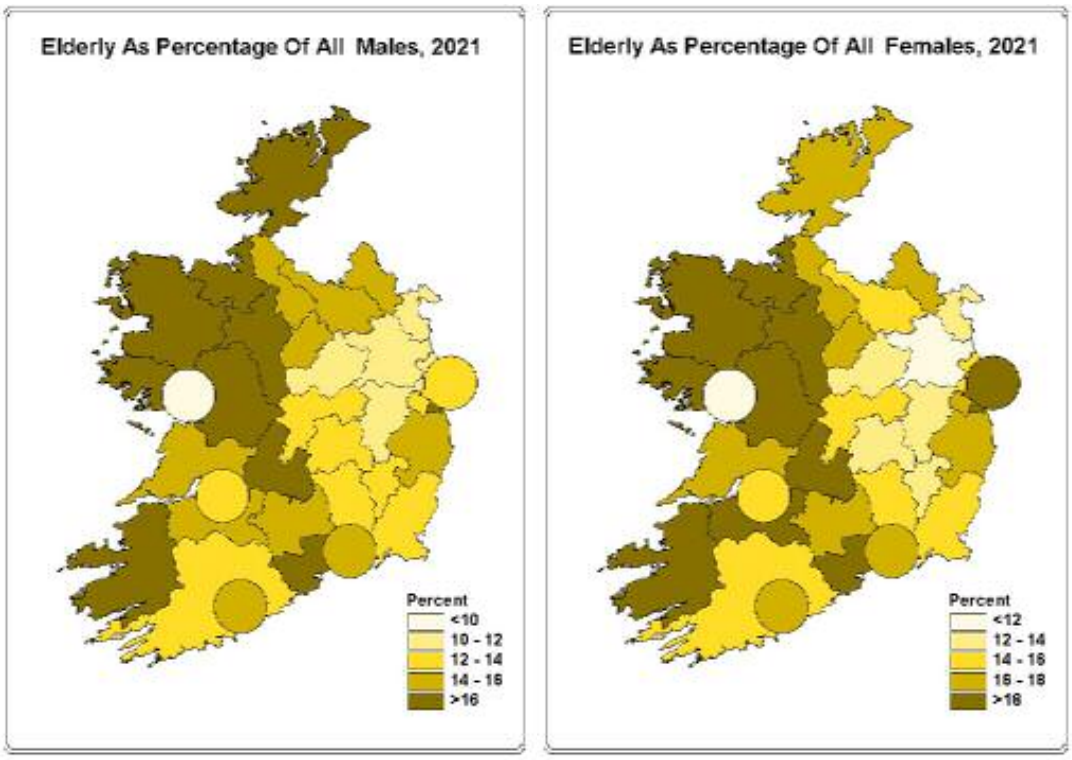


Table 4.6: Projected numbers of people aged 65 or over by county, 2021

	Males		Females	
	Number	**Percentage**	**Number**	**Percentage**
Carlow	3,728	1.2%	3,800	1.0%
Dublin C.B.	29,176	9.0%	38,284	10.2%
Dun Laoghaire	14,901	4.6%	17,804	4.8%
Fingal	14,932	4.6%	18,258	4.8%
South Dublin	17,985	5.6%	22,260	5.8%
Kildare	12,600	3.9%	14,169	3.8%
Kilkenny	7,286	2.3%	7,930	2.1%
Laois	5,333	1.7%	5,663	1.5%
Longford	2,769	0.9%	3,195	0.9%
Louth	7,797	2.4%	9,342	2.5%
Meath	12,028	3.7%	13,496	3.5%
Offaly	5,323	1.6%	6,150	1.6%
Westmeath	6,000	1.9%	7,037	1.9%

Wexford	11,209	3.5%	12,522	3.3%
Wicklow	10,020	3.1%	11,558	3.1%
Clare	9,769	3.0%	11,112	3.0%
Cork C.B.	8,583	2.7%	11,261	3.0%
Cork Co.	28,075	8.7%	32,066	8.5%
Kerry	13,108	4.1%	15,397	4.1%
Limerick C.B.	3,623	1.1%	4,555	1.2%
Limerick Co.	10,020	3.1%	11,584	3.1%
Tipperary N.R.	5,207	1.6%	6,155	1.6%
Tipperary S.R.	7,274	2.3%	8,343	2.2%
Waterford CB.	3,457	1.1%	4,389	1.1%
Waterford Co.	5,465	1.7%	5,951	1.6%
Galway C.B.	4,809	1.5%	5,891	1.5%
Galway Co.	13,993	4.3%	14,534	3.9%
Leitrim	2,676	0.8%	2,920	0.8%
Mayo	11,838	3.7%	13,149	3.5%
Roscommon	5,706	1.8%	6,275	1.7%
Sligo	5,012	1.6%	6,071	1.6%
Cavan	5,521	1.7%	5,535	1.5%
Donegal	12,946	4.0%	14,057	3.8%
Monaghan	4,482	1.4%	5,120	1.4%
Total	322,651	100.0%	375,835	100.0%

4.4 Marital Status

As described in Section 4.2, under migration assumption A1 the number of older people is projected to increase by 70.6 per cent (males) and 52.3 per cent (females) between 2002 and 2021. Disaggregated by marital status, the composition of this larger older population will show a number of significant changes with a shift towards married and separated and, in general, a shift away from single and widowed. The broader changes are shown in Figure 4.3 with the more detailed trends summarised in Table 4.7.

Figure 4.3: Percentage change in males and females by marital status, 2002-2021

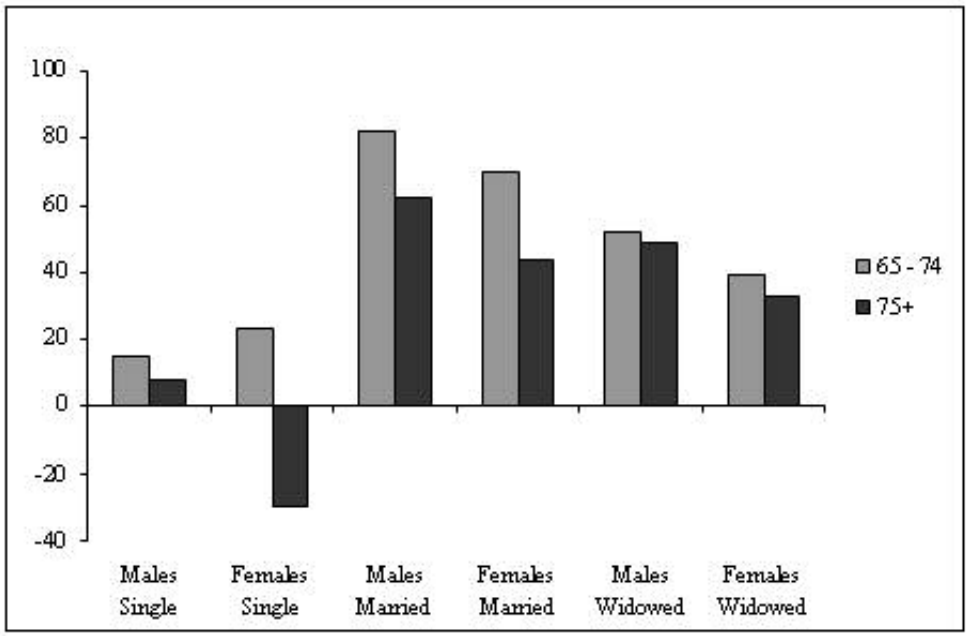


Table 4.7: Changing composition of older age groups by marital status, 2002-2021

Males	**Single**		**Married**		**Widowed**		**Separated**	
	65 -74 years	**Aged 75+**	**65 -74 years**	**Aged 75+**	**65 -74 years**	**Aged 75+**	**65 -74 years**	**Aged 75+**
2002	19.4%	21.8%	68.5%	53.4%	8.8%	23.5%	3.2%	1.3%
2006	17.2%	19.7%	69.3%	54.2%	8.7%	24.1%	4.8%	1.9%
2011	14.7%	19.4%	70.4%	52.8%	8.6%	24.8%	6.2%	3.0%
2016	13.4%	17.5%	70.3%	54.1%	8.3%	23.9%	8.0%	4.5%
2021	12.6%	15.4%	70.1%	56.7%	7.5%	22.0%	9.8%	5.9%
Females	**Single**		**Married**		**Widowed**		**Separated**	
	65 -74 years	**Aged 75+**	**65 -74 years**	**Aged 75+**	**65 -74 years**	**Aged 75+**	**65 -74 years**	**Aged 75+**
2002	13.3%	17.7%	50.6%	19.5%	33.5%	62.1%	2.6%	0.7%
2006	10.2%	15.2%	54.3%	21.7%	31.0%	61.8%	4.5%	1.3%
2011	8.9%	13.2%	54.2%	18.8%	30.2%	65.8%	6.7%	2.2%
2016	8.7%	11.1%	53.5%	21.7%	28.7%	63.3%	9.1%	3.9%
2021	9.7%	9.5%	51.0%	23.0%	27.7%	61.6%	11.6%	6.0%

Those who are single will represent a smaller proportion of the older population in 2021 than at present. Single men aged 65 to 74 represented almost one in five men in this age group in 2002. By 2021 this will have fallen to one in eight. The projections indicate that the absolute number of single men of 75 and over will increase by about 1,900 but they will represent less

than one in six men of this age compared to more than one in five in 2002. The decline in single females will be more marked as it will be a fall in both absolute numbers and in the proportion they represent. The change is most marked in the older age group with the number of single women of 75 and over projected to fall from 21,000 to 15,000 in 2021, at which point they will represent only one in ten women of that age compared to one in six at present.

Table 4.7 shows that both married men and women will represent a larger proportion of the older population in 2021, although the increase is countered somewhat by the growing proportion who are separated. In Section 4.2 'young' older people aged 65 to 74 were identified as one of the fastest growing age groups in the population with their numbers growing by 180,000 by 2021. Of these, it is projected that 112,000 will be married. The 'older' older population aged 75 and over who are married will also show significant growth in numbers with males increasing by 62 per cent and females by 44 per cent.

By 2021 the relatively high separation rates of those in their late forties and early fifties evident in the 2002 census will have fed through to much higher rates of separation in older age groups than is currently the case. In 2002, 8 per cent of men and over 10 per cent of women aged 45 to 54 were recorded as separated or divorced. Assuming that current rates of marital breakdown continue up to 2011 with a levelling off after that point, it is likely that one in ten men and women aged between 65 and 74 will be separated or divorced in 2021. The rates are projected to be much lower for the 'older; older population as by 2021 the higher rates of marital separation currently experienced by those in middle-age will not yet have fed through to those over 75.

Table 4.8: Population and percentage of single males aged 65 to 74 and 75+, 2002 and 2021

	Population Single Males				Change 2002-2021		Percentage Single Males			
	2002		2021				2002		2021	
	65-74 years	Aged 75+	65-74 years	Aged 75+	65-74 years	Aged 75+	65-74 years	Aged 75+	65-74 years	Aged 75+
Carlow	278	214	332	233	54	19	20.2%	26.3%	13.2%	19.1%
Dublin C.B.	2475	1397	1840	1278	-635	-119	15.7%	15.1%	10.4%	11.2%
Dun Laoghaire	488	296	473	381	-15	85	8.0%	8.6%	5.3%	6.4%
Fingal	328	211	468	468	320	257	9.8%	13.3%	6.5%	9.5%
South Dublin	317	214	557	502	240	288	7.0%	11.0%	4.6%	8.4%

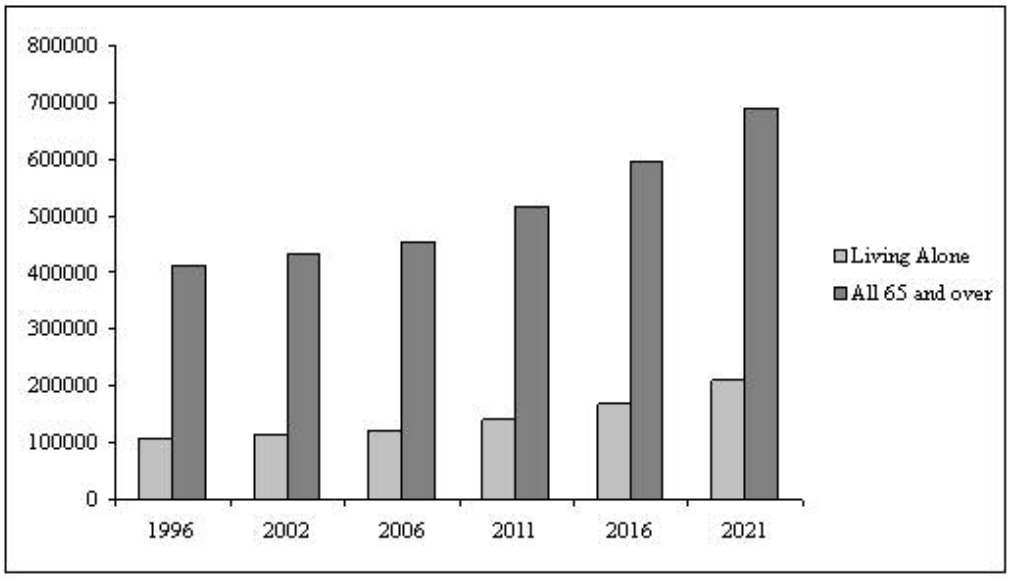
Kildare	479	316	906	486	427	170	15.7%	18.1%	10.3%	12.8%
Kilkenny	566	433	689	470	123	37	22.5%	24.8%	14.7%	18.1%
Laois	456	330	551	371	95	41	24.2%	27.5%	15.9%	19.9%
Longford	320	214	355	180	35	-34	29.2%	26.5%	19.3%	19.2%
Louth	476	338	586	382	110	44	17.2%	20.3%	11.3%	14.6%
Meath	559	425	936	619	377	194	17.8%	21.2%	11.7%	15.4%
Offaly	457	353	515	345	58	-8	22.3%	26.5%	14.5%	19.4%
Westmeath	463	351	588	367	125	16	22.2%	25.9%	14.6%	18.7%
Wexford	651	393	786	521	135	128	16.6%	18.1%	10.9%	13.0%
Wicklow	457	324	651	437	194	113	15.0%	17.6%	9.9%	12.7%
Clare	782	572	958	666	176	94	23.3%	26.1%	15.3%	19.0%
Cork C.B.	567	320	472	334	-95	14	13.2%	14.5%	8.7%	10.6%
Cork Co.	2036	1346	2560	1596	524	250	21.2%	22.6%	13.9%	16.4%
Kerry	1140	868	1268	914	128	46	23.2%	26.4%	15.2%	19.1%
Limerick C.B.	238	129	212	137	-26	8	13.8%	14.5%	9.1%	10.7%
Limerick Co.	767	517	959	577	192	60	21.9%	23.9%	14.4%	17.3%
Tipperary N.R.	497	374	513	322	16	-52	22.6%	25.4%	14.8%	18.5%
Tipperary S.R.	627	395	713	425	86	30	23.0%	22.7%	15.1%	16.6%
Waterford C.B.	194	113	198	161	4	48	14.3%	15.7%	9.5%	11.8%
Waterford Co.	373	291	433	340	60	49	19.0%	23.6%	12.4%	17.1%
Galway C.B.	211	140	286	241	75	101	14.7%	17.9%	9.7%	13.0%
Galway Co.	1425	1032	1682	1073	257	41	28.8%	28.8%	18.9%	21.1%
Leitrim	370	276	359	242	-11	-34	32.2%	34.1%	21.1%	24.7%
Mayo	1253	933	1370	925	117	-8	27.7%	29.4%	18.2%	21.5%
Roscommon	658	477	681	466	23	-11	28.8%	30.3%	18.9%	22.2%
Sligo	499	321	541	286	42	-35	25.1%	22.7%	16.5%	16.5%
Cavan	622	469	691	442	69	-27	29.5%	31.1%	19.4%	22.6%
Donegal	1199	1014	1367	1093	168	79	26.1%	30.0%	17.2%	21.9%
Monaghan	470	338	522	328	52	-10	27.3%	28.9%	17.9%	20.9%

Table 4.8 shows the impact of the decline in the proportion of older single men at county level between 2002 and 2021. Counties in the north-west including Leitrim, Roscommon, Mayo, Donegal, Cavan and Monaghan, where up to one in three men over 65 were single in 2002, will experience the sharpest declines in the percentage single by 2021.

4.5 Living Alone

The numbers of those aged 65 and over living alone increased from 107,000 to 114,000 between 1996 and 2002, representing a small decline in the percentage of older living alone, from 25.8 per cent to 24.5 per cent. Our projections suggest that although the number of older people living alone will increase substantially between 2002 and 2021, the increase will be largely in line with the growth in the overall number of older people. By 2021 it is projected that there will be 210,000 older people living alone, representing just over 30 per cent of all those aged 65 and over.

Figure 4.4: Population 65 and over and those living alone, 1996-2021



Up to 2011 the growing propensity of those single, widowed and separated to live alone will be largely cancelled out by the rising proportion of older people who are married. As described in Section 2.5, the propensity to live alone is calculated as the ratio between the numbers living alone and the total number of single, widowed and separated in that age category. Table 4.9 shows the projected changes in this ratio with the increase between 2002 and 2021 accounting for an additional 25,000 older people living alone by the end of the period.

Table 4.9: Ratio of numbers living alone to aggregate number of single, widowed and separated, 1996-2002

	Males	Females

	65-69 years	Aged 70+	65-69 years	Aged 70+
1996	0.57	0.50	0.48	0.44
2002	0.57	0.53	0.50	0.47
2006	0.59	0.56	0.53	0.50
2011	0.62	0.59	0.56	0.53
2016	0.65	0.63	0.59	0.56
2021	0.67	0.66	0.61	0.59

Table 4.10 shows that a significant rise in the number of those aged 70 and over living alone is projected by 2021 with a doubling in the number of both males and females.

Table 4.10: Numbers of Males and females aged 70 and over living alone, 1996-2021

	Males	Females
1996	25,300	55,800
2002	27,200	61,200
2006	29,500	63,200
2011	34,500	73,250
2016	41,500	86,300
2021	52,200	109,700

4.5.1 Geographical Variations In Living Alone

Table 4.11 indicates marked regional differences in the growth in numbers of those 65 and over living alone between 2002 and 2021.

Table 4.11: Change in numbers of those living alone aged 65 and over, 2002-2021

	2002		2021		Change			
	Males	Females	Males	Females	Males	Females	Total	Percentage Change
Dublin County	1418	4150	5529	14714	4111	10564	14675	264%
Kildare	799	1620	2494	4919	1695	3299	4994	206%
Meath	887	1838	2438	4566	1551	2728	4279	157%
Wicklow	873	1903	2310	4540	1437	2637	4074	147%
Galway Co. Borough	335	916	958	2097	623	1181	1804	144%
Wexford	1124	2202	2516	4696	1392	2494	3886	117%
Cork County	3051	5982	6214	11701	3163	5719	8882	98%
Limerick County	1201	2058	2298	4123	1097	2065	3163	97%

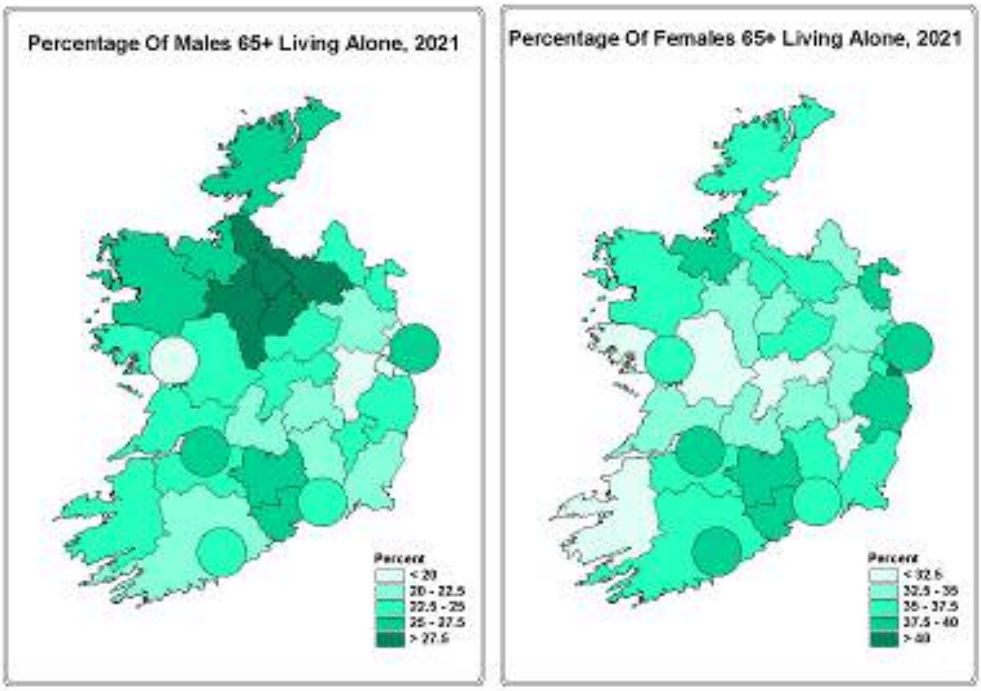
Waterford County	681	1199	1380	2316	699	1117	1816	97%
Kilkenny	829	1468	1629	2865	800	1397	2197	96%
Waterford Co. Borough	370	889	794	1637	424	748	1172	93%
Clare	1262	1946	2442	3730	1180	1784	2963	92%
Tipperary, S.R.	1009	1742	1877	3291	868	1549	2417	88%
Westmeath	715	1427	1369	2612	654	1185	1839	86%
Louth	881	2025	1833	3541	952	1516	2468	85%
Laoighis	598	1087	1112	1904	514	817	1331	79%
Kerry	1802	2808	3224	5003	1422	2195	3616	78%
Carlow	446	728	888	1175	442	447	889	76%
Galway County	1941	2636	3301	4666	1360	2030	3389	74%
Sligo	802	1328	1326	2375	524	1047	1571	74%
Donegal	1852	2960	3288	5046	1436	2086	3523	73%
Dún Laoghaire-Rathdown	1262	4683	2839	7307	1577	2624	4200	71%
Offaly	725	1193	1246	1994	521	801	1322	69%
Mayo	1924	2879	3179	4693	1255	1814	3069	64%
Roscommon	1002	1364	1598	2163	596	799	1395	59%
Cavan	987	1321	1595	2049	608	728	1337	58%
Limerick Co. Borough	489	1237	910	1757	421	520	940	54%
Longford	525	726	856	1069	331	343	674	54%
Tipperary, N.R.	725	1377	1125	2107	400	730	1129	54%
Monaghan	676	1181	1093	1687	417	506	923	50%
Cork Co. Borough	1157	3096	1991	4371	834	1275	2110	50%
Leitrim	566	746	792	1089	226	343	569	43%
Dublin Co. Borough	5100	13097	7732	14726	2632	1629	4261	23%

In general, those counties that currently have relatively low numbers of older people living alone will experience the most significant growth. On the other hand, counties in the northwest and north midlands, such as Leitrim, Longford, Roscommon and Cavan, that currently have relatively high proportions of older people living alone, will experience the lowest increases. These trends will result in a narrowing of the differences between counties in terms of the proportion of their populations consisting of older people living alone. Although the eastern region will still have a relatively low proportion of older people living alone, counties Dublin, Meath and Kildare will gain an additional 25,000 households occupied solely by an older person. In the southeast, Wexford, Waterford and Waterford City will gain an additional 7,000 such households with Galway City gaining almost 2,000.

In terms of percentages of older people living alone, Figure 4.5 shows current regional patterns will persist. For males, the counties of the northwest will continue to have the highest

proportion of older people living alone. For females, the geographic pattern is more complex with the cities of Dublin, Cork and Limerick having the highest proportions living alone.

Figure 4.5: Percentage of males and females aged 65 and over living alone, 2021



CHAPTER FIVE

Comparisons with Other Projections

5.1 Other Projections

A few other projections covering the period to 2021 or beyond have been made in recent years. These have different objectives, make different assumptions and have different starting points, consequently the projected populations are different to those reported here. Nevertheless, it is useful to examine the extent to which the various projections are in agreement. The following sections, therefore, compare our projections with those made in by the CSO in 2001[8] and those made by Jonathan Blackwell and Associates on behalf of the National Spatial Strategy.[9]

5.1.1 Total Population

The CSO considered six scenarios, based upon combinations of two alternative assumptions regarding net migration and three different assumptions with regards to total fertility. The net migration assumptions, referred to as M1 and M2, were:

- M1– net immigration continuing but diminishing
  +20,000 per annum in 1996-2001
  +15,000 per annum in 2001-2006
  +10,000 per annum in 2006-2011
- M2 – net immigration followed by net emigration
  +15,000 per annum in 1996-2001
  +5,000 per annum in 2001-2006
  zero net migration in 2006-2011

The total fertility rate assumptions, referred to as F1, F2 and F3 were:

- F1 – total fertility rate (TFR) to increase from its 1998 level to 2.0 by 2001 and remain constant thereafter
- F2 – TFR to remain constant at its 1998 level to 2001, decrease to 1.75 by 2011 and remain constant thereafter

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[8] Central Statistics Office (2001) *Regional Population Projections, 2002-2031*. Central Statistics Office, Dublin and Cork.

[9] Jonathan Blackwell and Associates (2001) *Population, Labourforce And Housing Demand Projections*. Final Report to National Spatial Strategy.

- F3 – TFR to remain constant at its 1998 level to 2001, decrease to 1.5 by 2011 and remain constant thereafter.

The Blackwell report focuses upon four projections, although they also provide results for a further eight models in an appendix. Two of the four reported projections referred to as Current Trends Scenario 1 and Current Trends Scenario 2 are similar to CSO M1F1 and M2F1 projections respectively. The other two models, referred to as Economic Growth Scenario 1 and Economic Growth Scenario 2 assume economic growth. Economic Growth Scenario 1 assumes that international in-migration flows will be driven by job creation and that agricultural employment will decline at 2 per cent per annum, while Economic Growth Scenario 2 is similar but assumes that a portion of the projected basic employment in Dublin is redirected elsewhere.

Table 5.1 shows the total populations projected for the State in 2021 (or, in the case of Blackwell and Associates, for 2020). It will be noted that our lowest projected population (A1) is almost identical to the CSO's highest projected population (M1F1). The A1 projection uses the same net migration assumptions as the CSO's M1F1 projection, but our model assumes a slightly lower total fertility rate. The main reason the two projections forecast virtually the same population for 2021, despite the differences in fertility, is that our model started from the actual 2002 population which was higher than had been projected by the CSO starting from the 1996 population. The actual 2002 population was underestimated by each of the CSO projections and also by both the Blackwell Current Trend models, consequently the end populations projected by each of these models needs to be adjusted upwards. Given that the Blackwell models estimate populations for 2000 and 2005, rather than 2002, it is difficult to be precise, but the Blackwell Economic Growth models would appear to have come close to predicting the 2002 population.

Table 5.1: Projected populations, 2020/2021

Model	**Population 2020/2021 (1,000s)**
Connell and Pringle A1 2021	4,570
Connell and Pringle A2 2021	4,701
Connell and Pringle A3 2021	4,751
Connell and Pringle A4 2021	4,914
CSO M1F1 2021	4,563
CSO M1F2 2021	4,436

CSO M1F3 2021	4,315
CSO M2F1 2021	4,272
CSO M2F2 2021	4,152
CSO M2F3 2021	4,040
Blackwell Current Trends 1 2020	4,509
Blackwell Current Trends 2 2020	4,391
Blackwell Economic Growth 1 2020	5,016
Blackwell Economic Growth 2 2020	5,009

Our other three projections (A2, A3 and A4), based on assumptions of more sustained rates of high net migration, result in higher estimates of the population in 2021 than the A1 projection. However, it should be noted that even the A4 model, which assumes the highest levels of net migration, estimates a lower population in 2021 than either of the Blackwell Economic Growth models.

The populations projected for 2021 by the different models range from just over 4 million to just over 5 million. It is impossible to predict with any confidence which set of assumptions will eventually prove to be the most realistic. Our A1 model predicts strong growth in the short-term, with more modest growth subsequently. This seems a plausible scenario, and it also produces a population estimate of just over 4.5 million for 2021, which is more or less half-way between the two extremes of the other models. However, while this would be regarded by the authors as the preferred model, none of the other scenarios are beyond the realms of possibility, so it is necessary to accept that all the projections are associated with a high degree of uncertainty.

5.1.2 Age Composition

The CSO provides estimates of the population in five age bands, but only for the M1F2 model. The Blackwell report does not provide estimates of population numbers, but it does provide figures on projected young and old dependency rates for the two Current Trend models. It is possible to calculate population numbers from these rates given the total population. The Blackwell report also notes that similar trends were observed for the two Economic Growth models.

Table 5.2: Projected populations by age, 2020/2021

Model	0-14 years	15-64 years	Aged 65+
Connell and Pringle A1 2021	18.9%	65.9%	15.3%
Connell and Pringle A2 2021	19.0%	65.9%	15.1%
Connell and Pringle A3 2021	19.0%	66.0%	15.0%
Connell and Pringle A4 2021	19.2%	66.0%	14.8%
CSO M1F2 2021	19.0%	65.8%	15.2%
Blackwell Current Trends 1 2020	20.8%	64.9%	14.3%
Blackwell Current Trends 2 2020	19.1%	65.8%	15.1%

Table 5.2 shows the percentage of the projected populations in 2020/2021 in each of three age bands for these projections as calculated from the information available in the reports. The percentages for all the models are generally very similar. All of the models predict a substantial increase in the percentage of people aged over 65 from 11.1 per cent in 2002 to around 15 per cent in 2021. The number of people aged less than 15 will decline only slightly (from 21.1 per cent in 2002 to around 19 per cent in 2021), which means that there will also be a reduction in the percentage aged 15 to 64, and hence an increase in dependency ratios, especially the old age dependency ratio.

The Blackwell report notes that the CSO estimates that life expectancy at birth will increase to 76.6 for males and 82.6 for females. These figures are very similar to our own tentative estimate for males (76.3), but slightly more optimistic than our estimate for females (81.5).

5.2 Demographic Dependency Ratios

There are a number of different definitions of the demographic dependency ratio. For our purposes it is defined as the ratio of those in the population considered to be dependent (below 15 years of age and 65 years and over), to those considered to be of working age (15 to 64 years). Youth dependency is then defined as the ratio of those below 15 to those aged 15 to 64, while old dependency is the ratio of those aged 65 and over to those aged 15 to 64.

Figure 5.1: Historic and projected trends in Irish dependency ratios

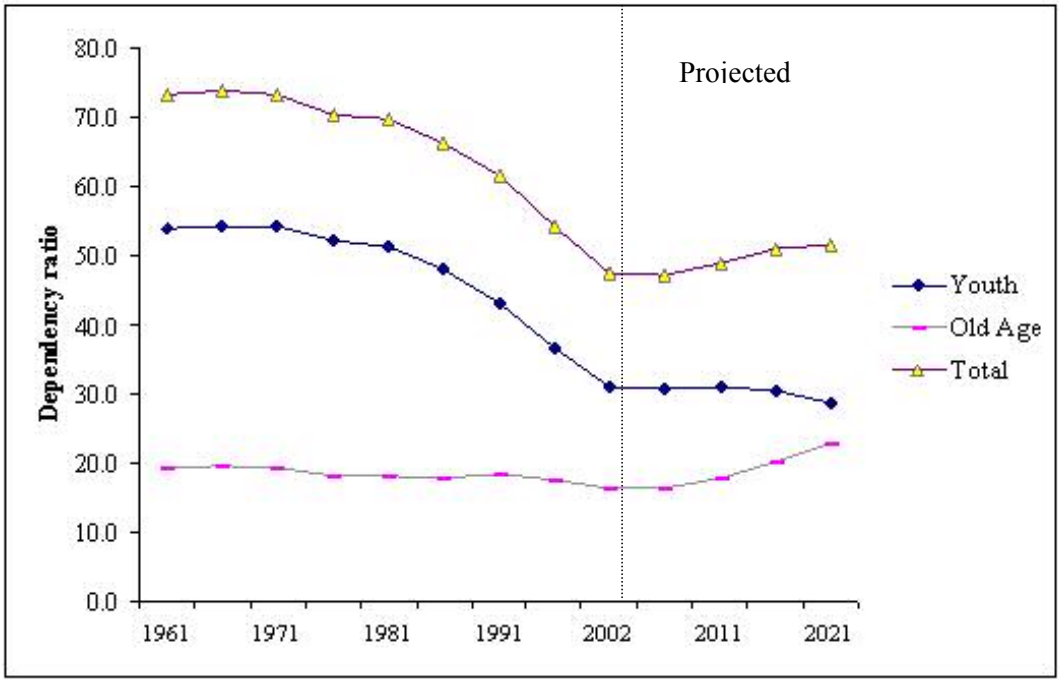


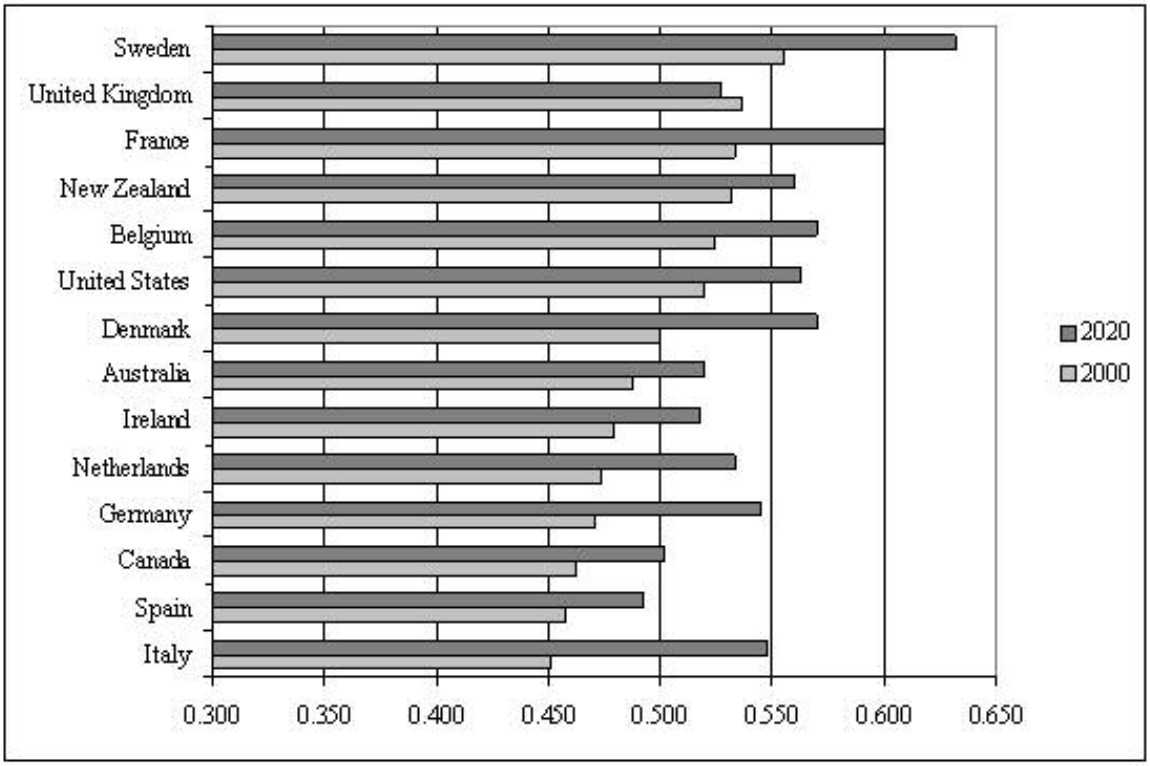
Figure 5.1 shows the historic trend in these ratios together with projected future trends under migration assumption A1.The overall dependency ratio has fallen steeply from 73.4 in 1961 to 47.6 in 2002. Most of this fall is accounted for by declining youth dependency, which fell from 54.0 to 31.2. This reflected a falling birth rate, particularly in the late 1980s and 1990s. Old dependency, on the other hand, has remained relatively stable, falling from 19.4 in 1961 to 16.4 in 2002.

Projections under all four migration assumptions, A1 to A4, predict that there will be a moderate increase in the demographic dependency ratio over the next two decades. Under assumption A1 the ratio will rise from 47.6 in 2002 to 51.8 in 2021 while under assumption A4, which projects the highest level on in-migration of the four assumptions, the ratio reaches 51.6. As Figure 5.1 shows, the increase in the demographic dependency ratio is a function of a small decline in youth dependency (from 31.2 to 28.6) and a larger increase in old age dependency (from 16.4 to 23.2). Most of this increase is concentrated in the years after 2011 when the old dependency ratio rises from 17.9 to 23.2.

In 2002 Ireland's demographic dependency ratio was below the average for developed world countries. Figure 5.2 shows that, based on United Nations (UN) population projections for a group of such countries, this will remain the case up to 2020. In fact the increase of just 4.2 in the Irish dependency ratio is among the lowest of any of the countries in this group. The United Kingdom stands out as something of an anomaly with a small decline in its

dependency ratio, as the increase in its old dependency ratio (4.0) will be slightly less than the fall in its youth dependency ratio (-4.1).

Figure 5.2: Demographic dependency ratios for selected developed countries, 2000 and 2020



Source: UN Population Estimates and Projections 2002 Revision Highlights[10]

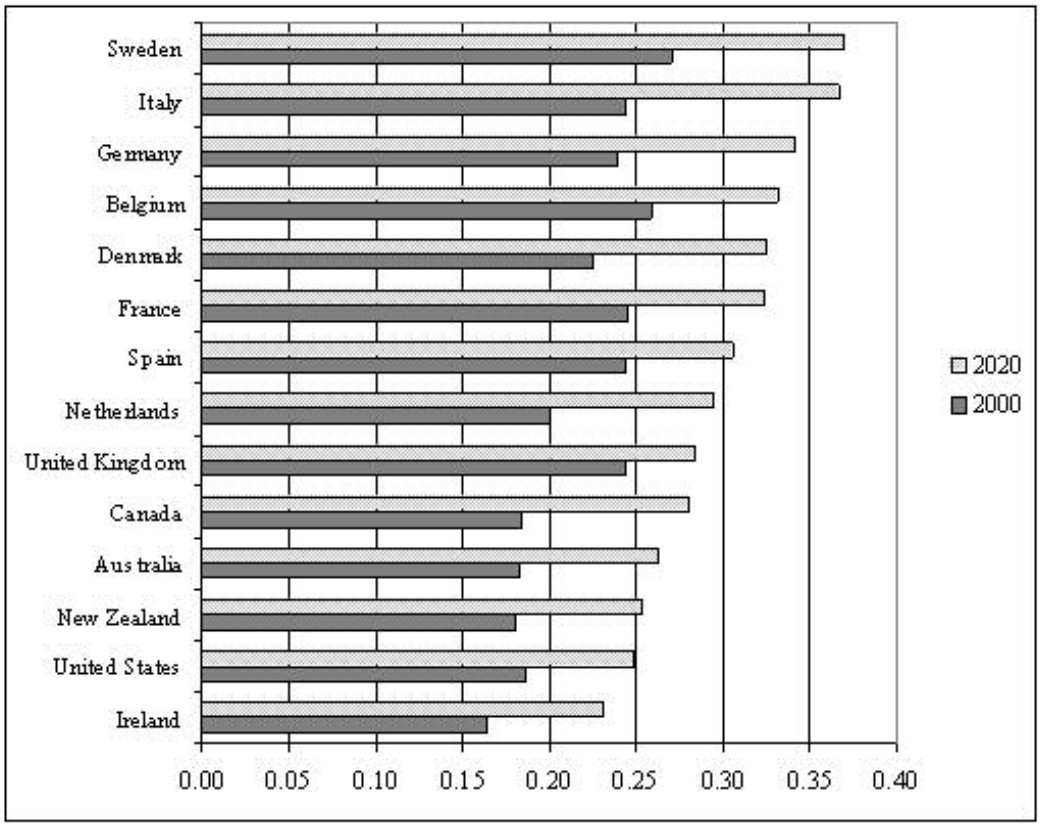
The change in the Irish ratio (based on the 2002 census and the A1 projections in this report) reflects an international trend of declining youth dependency and rising old dependency. Regarding old dependency, the ratio in many European countries in 2000 was close to 20.0 reflecting demographies that have been ageing for several decades. Another group of counties, including Canada, Australia, New Zealand and the United States, have lower ratios than any western European countries but these are still higher than the Irish ratio of 16.4 in 2002. As Figure 5.3 shows, Ireland had a very low old dependency ratio by international standards and this will remain the case in the period up to 2020. However, the anticipated increase in this ratio in the case of Ireland of 7.2, from 16.4 to 23.2, is very much in line with the projected increases in this ratio internationally. The average increase for the 14 countries in Figure 5.3 is 8.0. The net result is that by 2020 Ireland's old dependency will have reached

[10] All references to future Irish dependency ratios are based on the 2021 population projections generated for this report under assumption A1.

a level similar to that of countries such as the United Kingdom, Spain and Italy at present. At the same time, by 2020 a number of European counties such as Belgium, Italy and Sweden will have reached a point where the ratio per 100 of those age 65 and over to those aged 15 to 64 will be 33 or greater.

Ireland's old dependency ratio is set to rise over the next 20 years in line with other developed countries. However, it will still retain and, in some cases enhance, its 'competitive advantage' relative to most countries and continue to have a low old dependency ratio by international standards. In addition, much of the ageing of the Irish population, reflected in a rising old dependency ratio, will take place after 2011 at which point the ratio, at 17.9, will still be below current levels in all developed countries.

Figure 5.3: Old dependency ratios for selected developed countries, 2000 and 2020



Source: UN Population Estimates and Projections 2002 Revision Highlights

5.3 Geographical Distribution

Population estimates are provided by both the CSO and Blackwell and Associates for regional authority (NUTS3) regions. Our models provide population projections for smaller areas (i.e.

counties), but the county estimates can be easily aggregated into regional authority areas (or, for that matter, into several other types of region, such as regional health board areas).

Table 5.3: Percentage of population in each regional authority, 2020/21

Model	Border	Dublin	Mid-East	Midland	Mid-West	South-East	South-West	West
Connell and Pringle A1	11.4%	23.6%	13.1%	6.8%	8.2%	11.9%	14.8%	10.2%
Connell and Pringle A2	11.3%	23.9%	13.2%	6.7%	8.2%	11.7%	14.7%	10.3%
Connell and Pringle A3	11.2%	24.1%	13.2%	6.7%	8.2%	11.7%	14.6%	10.3%
Connell and Pringle A4	11.0%	24.4%	13.4%	6.7%	8.3%	11.5%	14.5%	10.3%
CSO M1F1	9.9%	34.1%	11.0%	4.5%	8.3%	9.3%	13.4%	9.5%
CSO M1F2	9.8%	34.3%	10.9%	4.5%	8.4%	9.3%	13.4%	9.5%
CSO M1F3	9.9%	34.6%	10.0%	4.6%	8.4%	9.4%	13.6%	9.6%
CSO M2F1	10.0%	33.7%	11.1%	4.6%	8.4%	9.4%	13.5%	9.4%
CSO M2F2	9.9%	33.9%	11.1%	4.6%	8.4%	9.4%	13.5%	9.3%
CSO M2F3	9.9%	33.9%	11.1%	4.6%	8.4%	9.4%	13.5%	9.3%
Blackwell Current Trends 1	8.9%	31.8%	12.6%	4.9%	8.4%	10.1%	13.4%	10.2%
Blackwell Current Trends 2	8.9%	31.6%	12.6%	4.8%	8.4%	10.1%	13.4%	10.1v
Blackwell Economic Growth 1	8.9%	33.5%	12.4%	5.3%	7.6%	9.3%	14.2%	8.9%
Blackwell EG2-1	9.8%	28.6%	11.9%	5.9%	8.9%	9.9%	15.5%	9.2%
Blackwell EG2-2	9.4%	32.1%	11.9%	5.4%	8.1%	9.5%	14.6%	8.8v

Table 5.3 shows the percentage of the population estimated by each of the models in each Regional Authority area. It will be noted that there are two variants of the Blackwell Economic Growth scenario. Each assumes that a portion of the basic employment in Dublin and the mid-east regions is redirected to other regions. Option One (EG2-1) assumes that 75 per cent of new basic jobs are redistributed to the other regions in the period 2000-2005, with lower percentages in the following periods. This is an unrealistic figure, but Blackwell and Associates argue that this is what would be required to achieve balanced growth (i.e., to

prevent these regions from growing larger than they already are). Option Two (EG2-2) is similar but assumes a more realistic transfer of basic jobs.

It will be noted that the projected percentage of the total population in each region is very consistent for all the CSO and Blackwell projections, with the exception of the Blackwell EG2-1 option which explores the impact of deliberately redirecting basic employment (and hence population) away from Dublin. Our projections, in contrast, while very similar to one another, provide a quite different picture. Our projections, based upon a continuation of recent trends, forecast Dublin's share of the national population declining from 28.7 per cent in 2002 to around 24 per cent in 2021, whereas the other projections envisage it increasing to well over 30 per cent. Most projections envisage the mid-east region (Kildare, Meath and Wicklow) increasing above its 10.5 per cent share in 2002, but our projections predict a much larger rate of growth than the other projections. Likewise our projections predict a healthier future for the border, midland, south-east and west regions than the other projections, but our projections for the mid-west and south-west regions are more or less in line with most of the other projections.

The fact that our models project only a very modest growth in the share of the national population in the Dublin and mid-east regions, without the wholesale transfer of employment suggested as necessary by Blackwell and Associates, raises fundamental questions for the National Spatial Strategy. It also raises questions as to why our projections should be so different to the other projections. As noted previously, one needs to treat the projections for specific counties, especially the county boroughs, with caution due to the possibility of boundary changes and/or overspill into adjoining areas, but the impact of such errors should be minimal when adjoining areas are aggregated, as in Table 4.3 into larger regions. However, one must be cognisant of the dangers of over-extrapolating from localised short-term trends.

The period 1996-2002 witnessed a reversal of the traditional net flows of population into the larger cities. This reversal is built into our models, whereas the other models, extrapolating without the benefit of the 2002 model, assume a continuation of the traditional flows. It remains to be seen whether the recent changes prove to be short-lived (in which case the CSO and Blackwell models will prove more accurate) or permanent (in which case our models may prove more accurate).[11]

[11] It should be noted that our models do not actually assume a continuation of recent patterns, but are in fact based upon a compromise between traditional and recent patterns.