AN ANALYSISOF RECENT DEMOGRAPHIC TRENDS WITH POPULATION PROJECTIONS FOR THE YEARS 1981 AND 1986

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INTRODUCTION

This paper sets out to describe recent important demographic changes and, further, incorporates these changes in assumptions used in the compilation of a set of population projections for the years 1981 and 1986. Indeed it is these very changes, which in some areas are quite fundamental and unique for this country, that provided the incentive to present this paper.

The first part of the paper, the analysis of trends, is sub-divided into five parts dealing with total population, migration, nuptiality, fertility and mortality. In this analysis the concentration is mainly (but not solely) on the period 1971/76 not only because this is the most recent period but because it encompasses some of the most significant changes in demographic trends in recent times. In some areas, of course, (e.g. marriages) it is necessary to examine the situation in earlier periods in order to explain adequately the origins of the pattern of events in the years since 1971.

The main interest in the population projections contained in this paper lies in the fact that the various assumptions formulated as part of this exercise are based on the most recent information available and on the trends derivable therefrom. In this respect the author concedes that he is in an advantageous position in relation to other existing projections, such as those produced by Professor Brendan Walsh in his paper for the NESC(l). Howevei, the demographic scene is currently undergoing rapid change in this

(1) "Population and Employment Projections; 1981-86", 1975, Dublin: National Economic and Social Council, February.

country at present and some of the constituent elements are particularly volatile; it is probable that before long the projections presented here tonight will need to be revised again in order to take account of a constantly changing situation.

While not everyone may agree with the various hypotheses and methods used in the paper it is hoped that this presentation will provide a constructive contribution to the current debate on the important issues involved, which have far reaching and serious implications for the future of this country when considered in social and economic terms.

The basic data used in the various analyses in this paper were obtained mainly from the 1971 and previous Censuses, the ongoing Vital Statistics series and, in some instances, from the 1975 Labour Force Survey. The latter was a sample inquiry covering some 31,000 households and institutions designed primarily to obtain information on the labour force. However, certain basic demographic questions were asked of all persons in the selected households and this provided a basis for compiling population estimates under broad headings.

Before proceeding to discuss the main subject matter of the paper, it might be helpful to review this country's position in the context of the present international demographic scene. Irish demographic statistics have historically been characterised by a number of features which are well known, such as heavy losses through emigration, a high average age at marriage and high fertility. These factors are illustrated for more recent years in Appendix 1, for each member state of the EEC. Although the differences between this country and other European states, as measured in demographic terms, have gradually been diminishing over the years, the- pattern of social behaviour here is still quite different. Mainly as a result of the elimination of emigration and owing to the high birth rate still prevailing the annual average population growth in Ireland is now one of the highest in Europe. Indeed in some European countries the population is stagnant or declining. Because of its concern about this, the Council of Europe organised last year a seminar on the implications of a stationary or declining population in Europe.

RECENT DEMOGRAPHIC TRENDS

Total Population

The demographic history of this country since the beginning of the last century, winch has been characterised by consistent and at times massive falls in population due to emigration, is well known and has been extensively documented and analysed. In the second half of the last century, Ireland suffered an enormous population decline, from 6,529,000 in 1841 to 3,222,000 in 1901, in the first half of this century the fall continued, almost without interruption, but at a slower rate — by 1961 the total population had fallen to its lowest level of 2,818,000. However, after 1961, with the onset of greatly increased industrial and general economic growth (stimulated by the First Programme for Economic Expansion) the Irish population began to show consistent increases. The 1966 Census recorded a population of 2,884.000, some 66,000 higher than the 1961 level and the next Census in 1971 yielded a total population of 2.978,000, representing a further increase of 94,000.

At this time a further watershed in the Irish demographic scene was reached when, for the first time in well over a century, the tide of emigration was turned. Since 1972 the annual estimates of net migration have indicated small but consistent net inflows. This in turn has generated an increased rate of population growth - in April 1976 it is estimated that the total population of this country stood at 3,162,000. This represented an increase of 184,000 on the 1971 total, an increase of 6.2 per cent, as against a growth rate of 3.3 per cent in the previous intercensal period.

TABLE 1: TOTAL POPULATION AT EACH CENSUS OF POPULATION SINCE 1901 AND ESTIMATED POPULATION FOR INTERCENSAL YEARS 1962-76.

Year	Population	Year	Population	Year	Population
			('000)		
1901	3,222	1962	2,830	1970	2,950
1911	3,140	1963	2,850	1971	2,978
1926	2,972	1964	2,864	1972	3,014
1936	2,968	1965	2,876	1973	3,051
1946	2,955	1966	2,884	1974	3,089
1951	2,961	1967	2,900	1975	3,127
1956	2,898	1968	2,913	1976	3,162
1961	2,818	1969	2,926		

The changes in the population in different age groups in some recent years are illustrated in Appendix 2, which shows an age classification of the population for 1966, 1971 and as estimated for 1976. This table shows that, of the total increase in population of 278,000 between 1966 and 1976, some 240,000 were in the under 30 year age group while a further 21,000 were in the 65 years and over age group. There was a very substantial increase over this period for the age group 20 to 29 years, the numbers increasing from 335,000 in 1966 to 444,000 ten years later, an increase of 33 per cent. The population in the age group 40-59 years declined over this period; this was mainly a result of the large volume of emigration in the late 1950s which left, at that time, a greatly reduced population aged 20-39 years remaining in the country. As this age cohort grows older these decreases will move gradually up the age scale.

It is clearly of considerable interest to analyse these population changes in some depth, particularly the changes in recent years. This is done in the succeeding sections of this paper, which deals, in turn, with the four elements that influence population change, namely - migration, nuptiality, fertility and mortality.

Migration

As indicated previously, heavy losses through emigration have been a feature of Irish demography for wel) over a century. Total net emigration between 1871 and 1901 was 1¼ million and in the first half of this century from 1901 to 1946 the corresponding total net emigration was just over one million. Table 2 below shows the pattern of migration by age groups for each five year period since 1946. The overall figure for the period 1971/76 is an estimate based on net passenger movement data. In recent intercensal periods these estimates have proved to be a reasonable indicator of net migration when compared with the final Census results in each case. These annual estimates of net migration are, of course, the least reliable constituent in the compilation of the annual population estimate and it was, therefore, reassuring in 1975 to find that the independent population estimate obtained from the 1975 Labour Force Survey almost coincided with the existing estimate after conceptual and definitional differences had been taken into account.

TABLE 2: NET MIGRATION BY AGE GROUP IN EACH FIVE-YEAR PERIOD SINCE 1946.

Age group at end of period	1946-51	1951-56	1956-61	1961-66	1966-71	1971-76
	('000)					
0 - 14	- 4	- 19	- 7	+ 10	+ 12	+ 26
15 - 19	- 20	- 28	- 42	- 29	- 17	-
20 - 24	- 47	- 61	- 73	- 48	- 43	- 25
25 - 29	- 30	- 31	- 33	- 8	- 12	- 12
30 - 39	- 14	- 29	- 23	+ 5	+ 6	+ 10
40 - 64	- 11	- 27	- 37	- 11	- 7	+ 6
65 +	+ 10	+ 6	+ 6	+ 2	+ 7	+ 6
Total	- 117	- 189	- 209	- 79	- 54	+ 11

Note: + = immigration

The bulk of net emigration from this country has, of course, always been concentrated in the 15-29 year age group. In the period of highest net emigration in recent times, 1956/61, 148,000 out of a total net loss of 209,000 persons were in this age group. An interesting feature of the recent changes in net migration is that this long standing pattern is undergoing some change. While even in 1971/76 it was estimated that there was still substantial net emigration of persons aged 20 to 29 years (some 37,000) the net outflow had virtually ceased for persons aged between 15 and 19 years while there is now substantial net immigration of children aged 14 years or less. Table 2 also shows evidence of increased inflows of older persons.

Many reasons have been put forward to explain the change in migration patterns in recent years. There is little doubt that the economic situation in this country relative to that in other countries (particularly Britain) does influence migratory trends and it is likely that the enhanced job opportunities resulting here from the sustained economic growth in the 1960s and in the first few years of this decade attracted home sizeable numbers of former emigrants, many of them with young children. Recent evidence from the Department of Education school enrolment figures, and also from the 1975 Labour Force Survey, has tended to confirm that there is now an increasing pattern of net immigration in the 5 to 14 year age group in particular.

As indicated previously, there is still a substantial amount of net emigration of persons in their twenties. Indeed it can be said that even if the overall net inflow were to grow even bigger, it is very likely that this situation would prevail. It is likely that there is involved here an element of voluntary emigration of young people looking for opportunities to broaden their experience and these may, in future, form part of the return flow at older ages.

Nuptiality

Total marriages in this country have risen from 15,300 in 1961 to 16,800 in 1966 and then to a level of about 23,000 in the years 1973-74. In 1975 this number fell to 21,300. The implications of this fall for the population projections will be discussed in the second part of this paper. In Table 3, marriages in each of the years 1961, 1966 and 1971-75 are classified by age group of bride.

TABLE 3: MARRIAGES, 1961, 1966 AND 1971>1975, CLASSIFIED BY AGE GROUP OF BRIDE.

Age Group	Year of marriage						
	1961	1966	1971	1972	1973	1974	1975
Under 20	1,173	1,765	2,624	3,055	2,995	3,070	2,982
20--24	6,113	7,920	11,450	11,322	11,701	11,913	10,935
25-- 29	4,305	4,099	5,086	5,085	5,268	5,290	4,867
30--34	1,924	1,558	1,435	1,424	1,439	1,331	1,330
35-- 39	893	730	656	597	595	509	492
40--44	361	368	316	312	308	277	246
45-- 49	195	134	164	207	176	162	159
50 +	161	152	213	183	205	186	201
Not stated	204	123	70	117	129	95	68
Total	15,329	16,849	22,014	22,302	22,816	22,833	21,280

It can be seen from this table that marriages where the bride was aged 20-24 years have risen from 6,100 in 1961 to between 11,000 and 12,000 in the years 1971-74. As in the case of the other important relevant age groups, there was some reduction in 1975. At ages over 30 yea'is the number of marriages has reduced steadily since 1961. This changing pattern of age at marriage has resulted in a reduction in the high average age at marriage which prevailed in 1961, which is illustrated in Appendix 1.

The most basic indicator of trends in this area is the crude marriage rate (total marriages per 1,000 population). This has increased from 5.4 in 1961 to 7.4 in 1971 and 1972, 7.5 in 1973 and 7.4 in 1974, falling to 6.8 in 1975. This rate is, however, influenced by the age structure of the population.

Changes in marriage patterns can also be illustrated in terms of the proportion of single females in each age group. These are shown in Table 4 for the Census years 1961, 1966 and 1971 and as estimated for 1976.

TABLE 4: PROPORTION OF SINGLE FEMALES IN EACH FIVE-YEAR AGE GROUP, 1961-76.

Age Group	3 961	1966	1971	1Q76 (estimated)	1975 (estimated from Labour Force survey)
15 — 19	.989	.984	.979	.973	.97
20 – 24	.782	.748	.689	.672	.67
25 – 29	.451	.378	.312	.268	.25
30 – 34	.296	.241	.194	.145	.15
35 – 39	.235	.212	.171	.136	.12
40 – 44	.220	.195	.178	.144	.13
45 – 49	.221	.204	.182	.165	.14

The decreases since 1961 in the proportion of single women in these age groups has, of course, meant a considerable increase in the number of married women which has important implications for the number of births. In the 20-24 year age group, the number of married women rose from 16,900 in 1961 to 22,800 in 1966 and to 32,700 in 1971. The corresponding figures for the same years in the 25-29 year age group are 40,000, 46,100 and 58,500. The total number of married women in the child-bearing ages, 15 to 49 years, was 335,400 in 1971 as compared with 301,100 ten years earlier.

The proportions single in 1976 were estimated using the data on marriages by single year of age of bride for each of the years 1971-75. In calculating these proportions, single for each age group, the total marriages in a particular cohort were added to the 1971 married population and the results compared with the survivors in 1976 from that cohort to obtain the proportion single. For those age groups where there was net immigration, this was ignored, which implies the arbitrary assumption that the proportion single in the gross flows both outwards and inwards were the same as in the non-migrating population. The proportions single in the 1971 female population and in the population of females who moved into Ireland in the preceding year as given by the 1971 Census of Population are shown in Table 5. This gives some support, in respect of immigrants in the 30-44 age group, for this assumption.

TABLE 5: PERCENTAGE OF SINGLE FEMALES, 1971.

Age group	Total population	One year immigrants, 1970-1971
15—19	97.9	85.3
20 — 24	68.9	54.7
25 — 29	31.2	30.8
30 — 34	19.4	19.7
35 — 39	17.1	17.0
40 — 44	17.8	23.6

In age groups where there was net emigration, allowance was made for emigrants after marriage and for emigration from those already married in 1971, the latter at a lower rate than from those single in 1971. The 20-24 age group is the most important in this regard and as this is still an age group of heavy net emigration, the lower proportion single among immigrants as shown by Table 5 has only a slight effect on the overall proportion single.

The 1976 rates obtained as described above are a little higher than the extrapolated 1971-75 trend would give. However, the independent estimates from the 1975 Labour Force Survey, (making allowance for sampling accuracy), shown in the final column of this table, agree fairly closely with the 1976 rates. There was in fact a fall in the number of marraiges in all of the important relevant age groups in 1975 as can be seen from Table 3 so these rates do not necessarily conflict. Marriages in the first half of 1976 were again down on the corresponding period in the previous five years.

The use of the proportions single estimated in this fashion enabled the number of married women in each age group in 1976 to be calculated, assuming the proportion of widows in each age group to have remained constant at the 1971 level. The trends shown above in the proportions single have important implications for the projections which are discussed in the second part of this paper.

Fertility

The total number of annual births in this country has remained fairly static in recent years at approximately 68,000. Prior to this, birth numbers showed a significant increase in the early 1960s, from 59,800 in 1961 to 64,100 in 1964, followed by a period of decline until 1968 when the number of births fell back to 61,000. During the next four years birth numbers again began to rise and reached their present level of about 68,000 in 1972. However, despite these fluctuations, if one relates these figures to the changes in the numbers of married women during this time it can, in fact, be shown that there has been a consistent decline in "fertility" throughout this period. Before examining the situation further it is perhaps desirable to elaborate at this stage on what we mean by "fertility", as there are a number of different ways in which this concept can be measured. Whereas total numbers of births are discussed above, the remainder of this section of the paper deals only with legitimate births, which currently account for 97 per cent of all births.

A method frequently used to analyse fertility trends involves "age specific fertility rates". This method involves compiling, for different age groups in the child-bearing span from 15 to 49 years, the ratios of the numbers of annual births to the numbers of married women in the related age groups. Regular and detailed information on births is available from the Vital Statistics data and, for Census years, information on the numbers of married women in different age groups can be obtained. The following table shows age specific fertility rates for the Census years 1961, 1966 and 1971 and estimated rates for 1976. The 1976 rates have been calculated by dividing the annual average number of births over the period 1971/76 by the estimated average numbers of married women (in the appropriate age groups) in the same period. The resulting annual average decline for the 1971/76 period thus obtained was then applied to the 1971 age specific fertility rates for each successive year to give the 1976 rates. Actual 1976 rates could not be calculated as data on births for the whole year are not yet available.

TABLE 6: AGE SPECIFIC LEGITIMATE FERTILITY RATES, 1961-76.

Age group of mother	1951	1966	1971	1976	England and Wales, 1971
15 — 19	612.6	639.2	681.6	654.3	468.5
20 - 24	478.0	484.5	459.3	408.3	245.2
25 — 29	392.3	369.6	350.5	307.5	173.0
30 - 34	298.6	280.9	249.1	195.7	82.0
35 — 39	202.4	186.0	160.7	122.6	34.1
40 — 44	77.1	70.7	58.7	45.6	8.4
45 — 49	5.8	5.8	4.3	3.3	0.6

It can be seen from this Table that for married women in the age group over 25 years there has been a consistent and substantial decline in fertility over the entire period concerned. This decline, in fact, becomes successively greater if one progresses upwards through the age groups; for women between 25 and 29 years, fertility, as measured according to the criteria involved here, decreased by 22 per cent over this 15 year span, but for women aged between 35 and 39 it went down by nearly 40 per cent. For women aged between 20 and 24 there was a marginal increase in fertility between 1961 and 1966, but a substantial and rapid decline thereafter.

A notable feature of the trends evident here is that, in the age groups where consistent decreases occurred over the entire period, these have tended to be very much more rapid in the final five years between 1971 and 1976. For example, for women aged between 25 and 29 years, the decreases over the three five year spans involved were 6 per cent, 5 per cent and 12 per cent respectively.

Despite the rapid declines evident here, the 1976 rates are still well above those in England and Wales, as can be seen from the comparative figures shown in the final column of the above table.

It is difficult to obtain an overall or composite view of fertility trends from the foregoing values as rates for different age groups can simultaneously move in opposite directions and, of course, different weights or relative considerations have to be given to the various age groups as very different numbers of married women are involved. It is, therefore, of interest to try to compile an overall measure or index of fertility which gives proper consideration to these factors. Such an index can be obtained by applying age specific fertility rates for any one year to the numbers of married women in different age groups in other years, so as to yield expected numbers of births, and then comparing these totals with the actual numbers of births recorded in the other years involved. Such an index is shown in Table 7, taking the year 1966 as a base. The actual numbers of births in each of the years 1961 to 1975 have been expressed as a percentage of the expected numbers obtained by applying the above method.

TABLE 7: INDEX OF LEGITIMATE FERTILITY, 1961-75.

Year	Index	Year	Index	Year'	Index
1961	105.3	1966	100	1971	91.6
1962	106.7	1967	95.2	1972	89.5
1963	107.3	1968	91.8	1973	86.4
1964	106.7	1969	91.7	1974	83.4
1965	103.9	1970	90.4	1975	78.2

The value of the index declined from 105.3 in 1961 to 78.2 in 1975, an overall decrease of over 25 per cent. There was an initial consistent decline in fertility from 1963 to 1968 at which stage there was a levelling-off until 1971. Since then the decline has continued at a fate similar to that experienced in the mid-1960s; in terms of the index, current indications are that overall fertility is falling by about 4 per cent per year on average.

It can be argued, however, that trends in fertility, as measured by the methods outlined above, can be influenced not only by the age structure of the population of married women but also by a varying pattern of duration of marriage. The availability of classifications for married women according to age and duration of marriage in the 1961 and 1971 Censuses makes it possible to compile for those two years an index similar to the one described above, but taking duration of marriage into account as an additional factor. Using this additional information, the 1971 age specific fertility rates for different age and duration categories were applied to corresponding groups of married women in the 1961 Census totals and the resultant expected number of 1961 births compared with the actual number. The fall in fertility as measured in this way was 12 per cent, compared with a decrease of 13 per cent shown by the index in Table 7. It is clear, therefore, that the varying pattern of marriage duration is not seriously distorting the index, even over relatively long periods of time.

However, if different durations of marriage are considered, different rates of decline are evident. Fertility rates, specific for duration, were compared for 1961 and 1971. Within each duration group, the effect of different age structures in the two years was removed. The resulting decline over the ten year period was only 1 per cent for marriages of less than 5 years duration but rose to 15 per cent for the 5 - 9 years duration group, 23 per cent for marriages of duration 10-14 years and to 31 per cent for the duration group 15-19 years.

The most basic indicator of fertility is the crude birth rate i.e. total births per 1,000 population. This is, however, influenced both by the age structure of the population and by the proportion of married females in the population. This rate increased in Ireland between 1961 and 1971, despite the reduction in fertility described above, because of the changing structure of the population. It will be seen later, when dealing with the results of the population projections, that the crude birth rate is projected to remain at a high level for some time despite a projection of continued falls in fertility.

Mortality

Changes in mortality rates in recent years have not been spectacular. However, there are some interesting aspects which are worthy of comment. The changes in survivorship rates for five-year age groups in the 1961-66 and 1966-71 periods are set out in Appendix 3(b). These are expressed in terms of the increase (or decrease) in the number of persons surviving five years per 100,000 in each age group at the start of each period.

This Appendix table shows that between 1966 and 1971 the survivorship rate for males declined in all except the 30-39 and 80 years and over age groups whereas there were improvements in the rate between 1961 and 1966 for all except the 15-19 and 55-74 groups. This is in line with the situation in a number of other European countries. A recent United Nations review[(2)] of post-war demographic trends in Europe and of the outlook until the year 2000 stated that, for the first time in Europe's modern demographic history, at least as recorded during peace time, a potential for increased mortality may be developing for major sectors in some populations. Mortality among middle-aged or older males may be beginning to rise or fluctuate in a number of countries. Similar tendencies may be in store for older females as well, judging from some trend developments, but the signs so far are inconclusive. Were they to persist and multiply as for males these would be the first significant reversal of mortality trends in Europe in over a century. For females in Ireland, this table also shows that survivorship rates for the 10-24 and 60-64 age groups declined between 1966 and 1971, whereas there were improvements in all age groups between 1961 and 1966. In almost all other age groups the rate of improvement was less than in the previous five-year period. Exceptions to this were the 40-44, 55-59 and 65-74 age groups. Changes in these rates in the older age groups may to some extent be due to minor inaccuracies in statement of age at death or at the Census of Population.

This change in mortality patterns in recent years is illustrated for various countries in Table 8, where life expectancy figures for males and females at ages 0, 30 and 65 around 1950, 1960 and 1970 are shown.

(2) Economic Survey of Europe in 1974 — Part II (New York, 1975).

TABLE 8: EXPECTATION OF LIFE FOR MALES AND FEMALES AT AGE 0, 30 AND 65 AROUND 1950, 1960 AND 1970 IN CERTAIN COUNTRIES.

Country		Age 0			Age 30			Age 65		
		1950	1960	1970	1950	1960	1970	1950	1960	1970
Ireland	M	64.5	68.1	68.8	40.2	41.7	41.5	12.1	12.6	12.4
	F	67.0	71.9	73.5	42.2	44.7	45.6	13.3	14.4	15.0
Federal Republic of Germany	M	64.6	66.9	67.4	41.3	41.1	41.0	12.8	12.4	12.1
	F	68.5	72.4	73.8	43.9	45.5	46.3	13.7	14.6	15.2
Netherlands	M	70.6	71.5	70.7	44.3	44.2	43.2	14.1	14.2	13.6
	F	72.9	75.3	76.5	45.7	47.3	48.1	14.7	15.7	16.5
Belgium	M	62.0	67.2	67.8	39.3	40.9	40.9	12.3	12.4	12.1
	F	67.3	73.0	74.2	43.2	45.9	46.4	13.9	14.8	15.3
Denmark	M	69.8	70.4	70.7	43.6	43.4	43.3	13.9	13.7	13.7
	F	72.6	74.4	75.9	45.3	46.5	47.7	14.6	15.3	16.7
Austria	M	61.9	65.6	66.3	39.7	40.5	40.2	12.0	12.2	11.7
	F	67.0	72.0	73.5	43.4	45.6	46.1	13.6	14.8	15.2
Hungary	M	58.8	65.2	66.3	39.6	40.9	40.8	12.6	12.0	12.1
	F	63.2	69.6	72.1	42.7	44.2	45.6	13.9	13.6	14.8

Sources:- Demographic statistics of the countries of the Community, 1960-74, *Eurostat,* August, 1976.

Economic Survey of Europe in 1974, Part II - Post-war demographic trends in Europe and the outlook until the year 2000. *(United Nations,* New York, 1975).

For each country shown in this Table, life expectancy for males aged 30 declined or stayed the same between 1960 and 1970 while, at the same time, female life expectancy continued to improve, although at a slower rate than between 1950 and 1960. The increases in the earlier period are, of course, due to some extent to improvements in living conditions following the end of the immediate post-war era. The figures for life expectancy at age 65 follow almost exactly the same pattern.

Most countries continue to show some improvement in life expectancy at age 0 for both males and females, but the rate of increases between 1960 and 1970 is again less than in the preceding decade. In this case also the situation for females was better than for males, with the difference in life expectancies between the sexes increasing in Ireland from 3.8 in 1960 to 4.7 in 1970. This was also the experience in other countries with the difference being as high as 6.4 in Belgium and Germany and 7.2 in Austria.

PROJECTIONS FOR 1981 AND 1986

Methodology

The population projections were prepared using a relatively simple cohort survival method. Emphasis has been placed on incorporating the latest available data on the various subjects which have been discussed in the first part of this paper rather than on developing a refined sophisticated model.

I will describe the methodology in broad terms first of all and then describe the assumptions made under the various headings: mortality, migration, etc.

The projections were prepared in five year steps. The influence of births, deaths and migration on the population at the start of the period had to be considered. When considering births, both marriages and fertility had to be taken into account. The combined effect of each of these was used to produce the projected population at five year intervals.

The starting point for the 1981 and 1986 projections was the 1976 population classified by sex and age group and also by marital status for females in the 15 to 49 age group. The numbers of survivors in each quinquennial age group in 1981 were then calculated by applying the relevant survivorship rates to the 1976 population. The assumed net migration for each age group over the 1976-81 interval was then added to or subtracted from the total survivors to give the 1981 population in each age group.

The use of the number of marriages over each five year period was not an integral part of the method but the number of married women was needed in order that the number of births could be calculated. The proportion of single females in each five-year age group between 15 and 49 was projected first of all. Using this, and assuming the same proportion of widows in each age group as in 1971, the proportion, and therefore the number, of married women in each age group in 1981 was calculated. Taking this together with the corresponding number of married women in 1976 the average number of married women in each age group over the 1976-81 period was calculated.

On the basis of the fertility assumptions made, average annual age, specific legitimate fertility rates for the 1976-81 period were calculated and applied to the average number of married women to give the average annual number of legitimate births for the period and hence, the total legitimate births during the five years. Similarly, illegitimate age specific fertility rates were assumed and applied to the average number of single females over the period to give total illegitimate births. Total births were then divided between males and females in the ratio 1.058 to 1, which was the ratio for the 1971-76 period.

The appropriate survivorship rates were then applied to these to *give* the total number of surviving males and females in the 0 - 4 age group in 1981, and the assumed number of migrants was then added or subtracted as in the case of the other age groups.

This process was then repeated for 1986 using the derived 1981 population as a starting point. In this case two migration assumptions were used so that the calculation of births had to be done separately for each of these. The method used was first tested by using it to prepare a 1976 "projection" for which most of the data were already available. Slight amendments to the resulting 1976 population were made, where necessary, to ensure compatability with the actual situation.

I will now describe the assumptions made under the separate headings:

Mortality

Survivorship rates for quinquennial age groups, based on the 1970-72 Life Table, are given in Appendix 3(a), and recent trends in this area have been discussed in the earlier part of the paper. These 1971 rates, when applied to the 1971 population in each age group, gave rise to a total number of deaths in the 1971-76 period which was very close to the actual number occurring in that period. For this reason and because of the relatively small changes in the rates between 1966 and 1971, these 1971 rates were used for both the 1976-81 and 1981-86 periods. In fact, the use of these rates understated male deaths over the five years between 1971 and 1976 by 500 and overstated female deaths by 450. These slight differences are another indication that the female mortality situation continues to improve whereas the situation for males shows no recent improvement. In a more detailed projection, some provision would have to be made for further changes in this area.

Migration

For the 1976-1981 period, one assumption only has been made. This is for nil net migration over the five years. The annual estimates of net migration have been of this order in each of the last five years and there is no current indication of any radical change. The assumed distribution by age group is shown in Table 9 below together with that of the two assumptions made for 1981-86. The 1976-81 distribution is based on the 1971-76 experience. The reasons suggested in the earlier part of the paper for the age structure of the 1971-76 migration flow should continue to influence the 1976-81 structure.

TABLE 9: ASSUMED **NET MIGRATION BY AGE GROUP, 1976-81 AND 1981-86.**

Age group at end of period	1976-81	1981-86	
		1	2
0—14	+25	+ 22	+ 17
15— 19	-	-	- 5
20 — 24	- 30	- 26	-35
25— 29	- 15	- 14	-20
30— 39	+ 8	+ 6	+ 6
40— 64	+ 6	+ 6	+ 6
65+	+ 6	+ 6	+ 6
Total	-	-	- 25

In the case of assumption 1 for 1981-86, also of nil net migration, the age distribution is again very similar to that estimated for 1971-76. Some slight modification of the totals for both emigration and immigration in the relevant age groups has been incorporated. By 1986 the pool of emigrants abroad from which the inward flow originates would not be as great as it is at present because many of those now abroad aged 35 and over are persons who formed part of the heavy emigration of the late fifties.

If this inflow decreases and the supply of jobs in new industries reaches a level similar to that of the early seventies, there would also be more opportunities at home which would slacken the outward movement at the younger ages.

The second assumption involves a resumption of overall net emigration at a rate of 5,000 persons per annum. This assumption incorporates increased emigration in the 15-29 year age group, the traditional age range for emigration, and less immigration of children and their parents. If net emigration does resume, it could be at a time when economic conditions abroad, particularly in Britain, might be more favourable than in Ireland. There would then be less incentive for former emigrants to return and more incentive for persons in the younger age groups to emigrate.

In the case of each of these migration assumptions, the totals involved were equally divided between males and females.

Nuptiality

As I have explained when describing the methodology, the figure projected was the proportion of single females in each age group. In the first part of this paper the method by which these proportions were obtained for 1976 was described. The proportions single in 1981 and 1986 were calculated as follows. On the basis of the proportions single in each age group in 1966, 1971 and 1976, rates of marriage per 1,000 single over the intervals 1966-71 and 1971-76 were calculated. These were assumed to increase linearly over the two following five-year intervals and, on this basis, proportions single in 1981 and 1986 were derived. This was the only assumption made on nuptiality. The resulting proportions, together with those estimated for 1976, are given in Table 10, together with the England and Wales 1971 rates for comparison purposes.

TABLE 10: PROPORTION OF SINGLE FEMALES IN EACH FIVE-YEAR AGE GROUP, 1976-86.

Age group	1976	1981	1986	England and Wales 1971
15– 19	.973	.967	.961	.920
20 – 24	.672	.662	.648	.413
25 – 29	.268	.242	.218	.187
30 – 34	.145	.110	.087	.078
35 – 39	.136	.100	.075	.069
40 – 44	.144	.114	.084	.073
45 – 49	.165	.134	.106	.077

The percentage single in a given year can be higher for an older age group than for a younger one since different cohorts are being considered. The rates of marriage which were extrapolated to give the proportions shown above were for different cohorts at the same age. As described above, they are based upon the 1966-71 and 1971-76 trends. The fall in marriages which occurred in 1975 is therefore incorporated in these projections to a limited extent only, so if it continues in all age groups for some years, then the assumption made would have to be changed. However, some of this fall may be due to postponement of marriage in a period of recession. Thus a larger than assumed proportion single at, say, age 20-24 years in a particular cohort would be balanced at a later stage for that cohort. The next, cohort may not experience postponement of marriage in this fashion and so the proportion single aged 20-24 could be of the size assumed, irrespective of the behaviour of the preceding cohort.

Fertility

As in the first part of the paper, this section deals, except where otherwise stated, with legitimate fertility. The method of obtaining annual average age-specific fertility rates for the period 1971-76 has already been described. The rate of decline over this period implied by these rates was continued up to 1981 for each age group. It was felt that the 1971-76 decline showed the effect of major fertility declines in more urbanised regions which had not yet been experienced throughout the country as a whole and that, therefore, the decline should be assumed to continue for some time yet. At older ages it may also be the result of families being completed at an earlier age as a result of earlier ages at marriage. As we have seen, when referring to Table 7, fertility declines between 1961 and 1971 in marriages of longer duration were more pronounced than in those of short duration.

In this context it is of interest to analyse the varying declines in fertility in different types of area. Fertility rates for, 1971 and 1975 for two regions of the country are compared in Table 11. The figures show a substantially smaller rate of decline in the mainly rural area considered (covering the West, Mid-West and North-West Planning Regions). Estimates of the numbers of married women in each age group in the Regions in 1975 obtained from the Labour Force Survey facilitated this comparison.

TABLE 11: AGE-SPECIFIC LEGITIMATE FERTILITY RATES, 1971 AND 1975, IN TWO REGIONS.

Age of mother	Last Region			West, Mid-West and North-West Regions		
	1971	1975	Percentage decline	1971	1975	Percentage decline
20 — 24	451.4	372.0	17.6	474.2	426.0	10.2
25 — 29	330.1	273.6	17.1	377.3	326.6	13.4
30 — 34	226.6	191.1	15.7	279.5	231.0	17.4
35 — 39	136.9	101.6	25.8	192.7	142.8	25.9
40 — 44	50.7	36.0	29.0	68.0	56.0	17.6

Thus, in the age groups with the highest rates, the percentage decline was more pronounced in the more urbanised area, even though the 1971 rates in that area were already substantially lower than in the more rural area. In the 30-39 year group, the rates of decline were about equal while, in the 40-44 year group, the East region again experienced a more severe decline. It was felt, therefore, that the 1971-76 rate of decline could be assumed to continue up to 1981 if the West and similar regions were to approach the levels of more urbanised regions such as the East.

However, in considering the fertility assumption to be made for the 1981-86 period, it had to be borne in mind that fertility declines of the magnitude shown for 1971-1976 could not be expected to continue indefinitely. Thus I have made the very arbitrary assumption of halving the rate of decline between 1981-1986. Assumptions on this topic for more than a few years can be particularly hazardous. For example, in his paper for the National Economic and Social Council, Professor Walsh projected births on a number of fertility and nuptiality assumptions. His lowest projection of births, combining low nuptiality with low fertility, was for 68.7 thousand per annum for the 1971-76 period — the actual average over this period was 68.2 thousand. Thus, the actual number of births has fallen below the lowest level projected just a few years previously.

The 1981 and 1986 age specific fertility rates resulting from this assumption are shown in Table 12, together with those estimated for 1976.

TABLE 12: AGE SPECIFIC FERTILITY RATES, 1976-86.

Age group of mother	1976	1981	1986
15 — 19	654.3	628.0	615.5
20 — 24	408.3	362.9	342.1
25 — 29	307.5	269.8	252.9
30 — 34	195.7	153.7	136.0
35 — 39	122.6	93.5	81.7
40 — 44	45.6	35.4	31.2
45 — 49	3.3	2.6	2.3

These assumed fertility rates, taken in conjunction with the nuptiality assumption discussed earlier, would result in the fertility index shown in Table 7 falling to 65.2 in 1981 and to 60.1 in the case of assumption 1 for 1986 and 59.9 in the case of assumption 2.

The increase in illegitimate fertility in 1971-76 was assumed to continue over the period covered by the projection. As a result, the illegitimacy rate (illegitimate births as a percentage of all births) was projected to rise from 3.2 in 1971-76 to 4.5 in 1976-81 and 6.1 in 1981-86.

RESULTS

The projections show a rise in total population from the estimated 1976 level of 3,162 thousand to 3,333 thousand in 1981 and to between 3,486 thousand and 3,514 thousand in 1986, depending on the migration assumption chosen. The detailed projections are shown in Appendix 4.

Table 13 shows the numbers in five broad age groups together with their percentage distribution and the resulting dependency ratio i.e. the ratio of persons aged under 15 and 65 and over to the numbers in the 15 to 64 age group.

TABLE 13: TOTAL POPULATION IN FIVE AGE GROUPS, 1971-86,TOGETHER WITH PERCENTAGE DISTRIBUTION.

Age group	1971		1976		1981		1986			
							1		2	
	('000)	Per cent	(•000)	Per cent	(•000)	per cent	('000)	Per cent	('000)	Per cent
0—14	931	31.3	991	31.4	1,025	30.8	1,063	30.3	1,055	30.3
15 — 29	656	22.0	742	23.5	818	24.5	885	25.2	865	24.8
30 — 44	453	15.2	482	15.2	541	16.2	614	17.5	614	17.6
45 — 64	608	20.4	603	19.1	588	17.6	583	16.6	583	16.7
65+	330	11.1	344	10.9	361	10.8	370	10.5	370	10.6
Total	2,978	100.-	3,162	100.-	3,333	100.-	3,514	100.-	3,486	100.-
Dependency rate	73.4		73.1		71.2		68.9		69.1	

The number of children aged under 15 years is projected to rise from the estimated 1976 level of 991,000 to 1,026,000 in 1981, a rise of 3.5 per cent. Between 1981 and 1986 the number in this age group is projected to rise by a further 2.8 per cent or 3.6 per cent, depending on the migration assumption chosen, to 1,055,000 or 1,063,000. In the 15-29 year age group an increase from 742,000 in 1976 to 818,000 in 1981 (a rise of 10.2 per cent) is projected, with a further increase of either 5.7 per cent or 6.0 per cent between 1981 and 1986 to 865,000 or 885,000. The percentage increases in the 30-44 age group are even greater - 12.2 per cent between 1976 and 1981 and 13.5 per cent in the following five years.

In the 45-64 age group some slight decreases are projected: this is a consequence of the cohorts which were depleted by emigration in the past reaching this age level. The 1976 level of 603,000 is projected to fall to 588,000 in 1981 and 583,000 in 1986. The number of persons aged 65 years and over also shows some increase, from 344,000 in 1976 to 361,000 in 1981 and then to 370,000 in 1986, rises of 4.9 per cent and 2.5 per cent, respectively.

It can be seen, therefore, that the projection implies some improvement in the dependency ratio. This is contributed to by a reduction in the proportion in both the young and old groups. The age group forming a substantially greater proportion of the population is the 15-44 group where, of course, the reduction in emigration has the greatest impact. Such an improvement would be particularly welcome as Ireland has suffered for a long time from the effects of her very high dependency ratio and the resulting heavy demands in areas such as education and health. The corollary is, of course, an increasing demand for jobs to cater for the larger numbers in the active age groups. The 1986 dependency ratio of 69 compares with a rate of 71 in Professor Walsh's high nuptiality/low fertility projection no. 2 which assumed net emigration zero from 1971 to 1986.

The increasing proportion of persons in the 15-44 age group means that, despite the lower levels of feitility which have been assumed, the number of births are projected to continue rising and very little change is shown in the crude birth rate as can be seen in Table 14 where the different vital statistics rates implied by these projections are shown. The younger age structure of the population also results in a decrease in the crude death rate, from 11.0 in 1971-76 to 10.4 - 10.5 in 1981-86. This changing structure, together with the nuptiality assumption made, also results in some increase in the crude marriage rate, from 7.2 in 1971-76 to 7.5 in 1981-86.

TABLE 14: FIVE YEAR VITAL STATISTICS TOTALS (THOUSANDS) AND AVERAGE ANNUAL RATES PER 1,000 POPULATION.

		1966-71	1971-76	1976-81	1981-86	
					1	2
Births	('000)	313	341	345	360	357
	Rate	21.3	22.2	21.2	21.0	20.9
Deaths	('000)	165	168	173	179	179
	Rate	H.2	11.0	10.7	10.4	10.5
Marriages	('000)	96	111	115	129	127
	Rate	6.5	7.2	7.1	7.5	7.5

APPENDIX 1:

CERTAIN DEMOGRAPHIC INDICATORS FOR EEC MEMBER STATES, 1961 AND 1971.

			Ireland	Belgium	Denmark	France	Germany	Italy	Luxembourg	Netherlands	United Kingdom
Net migration per 1,000 average population.		1961	- 5.3(a)	- 0.5	+ 0.6	+ 3.9	+ 6.5	- 3.2	+ 7.6	+ 0.5	+ 1.0
(+ = immigration - = emigration)		1971	- (b)	+ 2.5	+ 0.7	+ 2.8	+ 7.4	- 0.9	+14.8	+ 2.5	- 1.1
Crude birth rate		1961	21.2	17.3	16.6	18.2	18.0	18.4	16.1	21.3	17.9
		1971	22.7	14.6	15.2	17.2	12.7	16.8	12.9	17.2	16.2
Average age at marriage	Males	1961	30.6	25.3	25.7	26.1	25.9	29.2	(c)	26.5	25.6
		1971	27.5	24.5	25.2	24.4	25.5	28.3	26.2	24.8	24.6
	Females	1961	26.9	22.8	22.7	23.5	23.7	25.1	(c)	24.2	23.2
		1971	25.0	22.2	23.0	22.4	22.9	24.5	23.0	22.9	22.6

(a) Year ending 31 March, 1962. (b) Year ending 31 March, 1972. (c) Not available.

Source.- Demographic Statistics of the countries of the Community, 1960-1974. *Eurostat,* August 1976.

APPENDIX 2:

PERSONS, MALES AND FEMALES CLASSIFIED BY AGE GROUP IN 1966, 1971 AND 1976.

Persons

Age	1966	1971	1976 (estimated)
		('000)	
0-14	900	931	991
15-19	259	268	298
20-29	335	388	444
30-39	301	300	333
40-49	330	313	302
50-59	312	314	308
60-64	124	134	143
65 +	323	330	344
Total	2,884	2,978	3,162

Males

		('000)	
0-14	459	476	507
15-19	133	137	152
20-29	170	198	227
30-39	150	152	169
40-49	165	156	152
50-59	160	158	153
60-64	62	68	71
65+	150	151	156
Total	1,449	1,496	1,585

Females

		('000)	
0-14	441	455	484
15-19	126	131	146
20-29	165	190	217
30-39	151	148	164
40-49	165	157	151
50-59	152	156	155
60-64	62	66	72
65 +	173	179	188
Total	1,435	1,482	1,577

APPENDIX 3 (a):

SURVIVORSHIP RATES FOR QUINQUENNIAL AGE GROUPS BASED ON LIFE TABLE NO. 8, 1970-72.

Age group	Males	Females
0 — 4	.996299	.997027
5—9	.997827	.998677
10— 14	.996855	.998176
15— 19	.994656	.997472
20 — 24	.994072	.996997
25 — 29	.994051	.996418
30 — 34	.993113	.995044
35— 39	.987411	.991514
40 — 44	.978035	.985373
45 — 49	.963422	.975263
50 — 54	.941750	.963286
55 — 59	.903650	.940370
60—64	.847150	.908420
65—69	.775706	.856553
70— 74	.677019	.759837
75— 79	.542366	.619660
80 — 84	.389105	.459092
85+	.218236	.266100

These survivorship rates were calculated using the factor

$$\sum_{y=0}^{y=4} L_{x+y+5} \Big/ \sum_{y=0}^{y=4} L_{x+y},$$

i.e. the proportion of persons in the age group (x, x +4) at their last birthday surviving five years. For the age group 85+, the factor used was T_{90}/T_{95}. The Life Table factors used are defined as follows:-

L_x = the population to be expected according to the Life Table aged between x and x + 1 years, assuming that 100,000 births occurred each year.

T_x = the population to be expected according to the Life Table above age x, assuming that 100,000 births occurred each year.

Survivorship rates of .978152 for males and .982246 for females were applied to all births in a five-year interval to give the total aged 0 — 4 at the end of that interval.

APPENDIX 3(b):

INCREASE IN THE NUMBER OF MALES AND FEMALES IN EACH FIVE YEAR AGE GROUP SURVIVING FIVE YEARS PER 100,000 IN THAT AGE GROUP, 1961-66 AND 1966-71.

Age Group	Males		Females	
	1961-66	1966-71	1961-66	1966-71
0 – 4 years	105.7	- 7.4	89.7	20.4
5 – 9 "	15.6	- 19.5	20.1	10.3
10 – 14 "	1.3	- 44.3	12.8	- 33.7
15 – 19 "	- 20.8	- 77.8	47.0	- 51.6
20 – 24 "	11.7	- 43.9	57.7	- 16.5
25 – 29 "	99.7	- 17.6	100.5	55.2
30 – 34 "	132.1	105.0	234.7	64.8
35 – 39 "	53.8	12.5	156.1	75.5
40 – 44 "	105.5	- 268.3	68.6	71.1
45 – 49 "	67.7	- 188.6	192.2	106.8
50 – 54 "	120.0	- 88.2	299.2	62.7
55 – 59 "	- 357.2	- 20.3	3.2	23.5
60 – 64 "	- 573.8	- 256.6	600.3	- 60.3
65 – 69 "	- 1,207.7	- 27.5	352.9	1,132.8
70 – 74 "	- 493.8	- 1,491.1	538.5	1,459.2
75 – 79 "	1,183.0	- 377.3	1,362.1	957.2
80 – 84 "	1,718.4	1,289.8	1,655.7	1,005.3
85 and over	1,152.9	2,563.1	1,195.3	1,042.9

Note: **(- = fall in number surviving.)**

APPENDIX 4:

POPULATION PROJECTIONS 1971-86 — TOTAL.

Age Group	1971	1976	1981	1986 (1)	1986 (2)
0—4	315.6	338.4	341.8	356.8	352.5
5—9	316.9	326.6	348.3	349.7	347.7
10—14	298.5	326.4	336.0	356.7	354.7
15—19	267.8	297.8	325.6	335.1	330.1
20—24	215.3	241.6	266.6	298.3	289.3
25—29	173.0	202.3	225.6	251.4	245.4
30—34	151.3	176.2	204.3	226.5	226.5
35—39	149.1	156.5	180.1	207.1	207.1
40—44	152.7	149.5	156.8	180.3	180.3
45—49	160.1	152.9	148.8	156.0	156.0
50—54	159.0	156.2	150.3	146.2	146.2
55—59	154.8	151.5	148.8	143.1	143.1
60—64	134.0	142.7	139.7	137.3	137.3
65—69	111.8	120.7	128.3	125.7	125.7
70—74	99.0	94.4	101.6	107.9	107.9
75—79	61.8	71.6	68.1	73.3	73.3
80—84	36.4	36.2	42.0	39.9	39.9
85+	20.9	20.8	20.7	23.3	23.3
Total	2,978.3	3,162.1	3,333.3	3,514.5	3,486.2

Projection (1) for 1986 assumes nil net migration 1981-86 and (2) assumes net emigration of 25,000 over the five year period.

APPENDIX 4(contd.):

POPULATION PROJECTIONS 1971-86 — MALES.,

Age group	/	*9?1	1976	1981	1986 (1)	1986 (2)
0 — 4		161.8	173.6	175.3	183.0	180.8
5 —	9	161.8	167.2	178.5	179.2	178.2
10 — 14		152.1	166.5	171.9	182.6	181.6
15—19		136.8	151.6	166.0	171.3	168.8
20 —	24	110.0	123.5	135.8	152.1	147.6
25 —	29	87.7	103.3	115.3	128.0	125.0
30 —	34	76.8	89.2	104.2	115.6	115.6
35 —	39	75.5	79.3	91.1	105.5	105.5
40 —	44	76.4	75.5	79.3	91.0	91.0
45 —	49	79.5	76.2	74.9	78.6	78.6
50 —	54	80.0	77.1	74.5	73.1	73.1
55 —	59	78.4	75.4	72.6	70.1	70.1
60 — 64		68.1	70.8	68.1	65.6	65.6
65 —	69	54.5	59.2	61.5	59.2	59.2
70 — 74		44.6	43.7	47.4	49.2	49.2
75 —	79	27.8	30.1	29.6	32.1	32.1
80—84		15.7	15.0	16.3	16.0	16.0
85+		8.1	7.8	7.5	8.0	8.0
Total		1,495.8	1,585.1	1^669.7	1,760.2	1,746.0

APPENDIX 4(contd.):

POPULATION PROJECTIONS, 1971-86 — FEMALES,

Age group	1971	1976	1981	1986	
				(1)	(2)
0 — 4	153.8	164.8	166.5	173.8	171.7
5 — 9	155.1	159.4	169.8	170.5	169.5
10 — 14	146.4	159.9	164.1	174.1	173.1
15 — 19	131.0	146.2	159.6	163.8	161.3
20 — 24	105.3	118.1	130.8	146.2	141.7
25 — 29	85.3	99.0	110.3	123.4	120.4
30 — 34	74.5	87.0	100.1	110.9	110.9
35 — 39	73.6	77.2	89.0	101.6	101.6
40 — 44	76.3	74.0	77.5	89.3	89.3
45 — 49	80.6	76.7	73.9	11A	11A
50 — 54	79.0	79.1	75.8	73.1	73.1
55 — 59	76.4	76.1	76.2	73.0	73.0
60 — 64	65.9	71.9	71.6	71.7	71.7
65 — 69	57.3	61.5	66.8	66.5	66.5
70 — 74	54.4	50.7	54.2	58.7	58.7
75 — 79	34.0	41.5	38.5	41.2	41.2
80 — 84	20.7	21.2	25.7	23.9	23.9
85+	12.8	13.0	13.2	15.3	15.3
Total	1,482.5	1,577.0	1,663.6	1,754.3	1,740.2

DISCUSSION

Brendan Walsh: We have heard a very lucid presentation of some fascinating material. It is indeed a pleasure to propose this vote of thanks and to express my appreciation of the quality of the work behind this report.

I would like to divide my remarks into three broad areas: some brief words about the methodology of this study, a discussion of the results presented, and some more general reflections on the state of the art of population projections.

METHODOLOGY

The main point I would like to take up in connection with the author's methodology concerns the choice of migration rates. Given the high level of unemployment in the country at present, and the falling level of real income, *it* is obvious that young entrants to the labour market are constrained in their migration mainly by the adverse circumstances elsewhere in Europe, especially in the traditional destination, Britain. In these circumstances, [believe that it is quite sensible to predict a continuing net outflow in the younger age groups, especially 15-29. I am less happy about the assumption of a continuing inflow at the older ages, especially 35-44. The return flow to Ireland in these age groups over the past five years must have been due in part at least to the depletion of these cohorts by heavy emigration in the 1950s and 1960s. Now, the bulge in our population pyramid is working its way gradually into these age groups. I can illustrate this by considering the growth in the numbers in the interval 35-44 that would occur in the absence of migration. The numbers are as follows:

	1971	1976	1976	1981
Males		actual	without migration	without migration
Aged 35-44 (thousands)	151.9	154.8	150.8	166.9

In the past five years the numbers in this age group would have shrunk by about one thousand in the absence of migration; in the coming five years they will grow by 12 thousand or almost 8 per cent without migration. This will surely affect the opportunities available in Ireland for Irish people in Britain contemplating returning home. I would expect a relative deterioration of the employment prospects of the typical potential return migrant due to this effect, unless there is a very dramatic upswing in the demand for middle-aged workers. On top of this, as the author points out, the stock of recently-emigrated Irish people is now much smaller than it was at the beginning of the 1970s, and it is from this population that most of our return migrants are recruited.

The use of the 1971 Census data on the marital status of the immigrants to" Ireland is a welcome innovation. It is interesting to note the much higher marriage rates among the under 30s in this group. However, the author seems to have used a rather rapid rate of increase in Irish marriage rates, judging by the low proportions remaining single in Table 10. Apart from the present economic difficulties, marriage is at present heavily penalised by our income tax code, and a serious incentive for not marrying has emerged from this quarter in the last few years. Moreover, in many European countries, the fall in fertility has been followed by a remarkable dropping off in the number of marriages.

RESULTS

One must first of all note that the author had access to the results of the EEC labour force survey for 1975, which the public have not yet seen. The delay in publishing a survey financed by the Community in a period when our Census was cancelled is intolerable.

We inevitably treat the projections in the paper as the author's best judgement of what the future course of events will be. In a way this does an injustice to the idea of a "projection", which is merely to present the arithmetical implications of any combination of assumptions. In practice, the actual projections presented are treated as conditional forecasts.

The author projects an annual average rate of population growth of about 1.1 per cent 1976-81 and of 1.0 per cent 1981-86. There is probably less uncertainty about these orders of magnitude than about any other aspect of Ireland's future.

It is, of course, of great interest to compare these figures with those contained in the NESC report on full employment published two years ago. However, it is also partially invalid to make this comparison, because the NESC projections set out to explore the implications of a rather specific set of assumptions regarding the level of migration and labour force participation and did *not* imply that these would actually materialise. However, the figures for total population projected in the two studies are very similar:

	Projected 1986 Total Population (millions)
CSO	3.51—3.49
NESC	3.78-3.51

The range contemplated by CSO is much narrower, which is to be expected, given the ten-year horizon, compared with the 15-year horizon of the NESC study. The NESC projections clearly tended to be on the high side, with their low projection coinciding with the CSO high figure. This of course reflects the faster rate of decline in fertility used in the CSO projections. It is perhaps more relevant to concentrate on the population aged 15 and over, which was the primary concern of the NESC study.

	Projected Population 1986 aged 15 and over (millions)
CSO	2.43..................2.45
NESC	2.43---————2.49

Thus, as far as the adult population is concerned, the two sets of projections are as close to identical as could occur. This is not to deny that there are considerable discrepancies in individual age groups: NESC projects a much higher figure for the ages 25-34, for example, whereas CSO has larger figures in the 15-24, and 35 and over age groups. These fairly substantial differences arise due to different assumptions concerning the age pattern of migration. The implications of these discrepancies for the labour force and other magnitudes need to be explored.

Considerable interest attaches to the figures in tonight's paper relating to fertility over the last 10 years. The figures in Table 7 show in a very clear manner the pace of the decline in fertility since the early 1960s. One can date (the beginning of this decline as with the introduction of the anovulant pill in Ireland. The publication of Humanae Vitae in 1968 and subsequent publicity over the health hazards from various types of pills seems to lead to a temporary interruption of the decline in fertility. But we can see from tonight's paper that the interruption was no more than temporary. If the annual average rate of decline over the period 1964-68, namely 3.7 per cent, is projected forward for the years 1968-75, we obtain an index of 70.6 compared with the value of 78.2 in the Table. Thus we may conclude that the actual level of fertility is now not more than 10 per cent above what it would have been if the pattern of diffusion of birth control had continued as before 1968.

We should exercise caution, however, in interpreting year to year fluctuations in vital rates, especially fertility rates. The trend in the fertility of successive cohorts of married women is likely to be much smoother than that revealed by the "fictitious cohorts" whose behaviour is summarised by indices such as that in Table 7. One of the problems in the analysis of fertility in Ireland today is that not only is final family size falling, but the timing of births is probably also changing. Undoubtedly, some of the sharp drop in fertility (and marriages) associated with the recession of 1975 represents a postponement rather than a permanent reduction in births or marriages.

VITAL STATISTICS FOR SOME EUROPEAN COUNTRIES, 1971-75.

Country	Total Fertility Rate/ 100 Women		1975 Rates/1,000		
	1971	1975	Birth Rate	Death Rate	Rate of Natural Increase
Belgium	218	176	12,3	12.3	0.0
Denmark	206	193	14.4	10.2	4.2
France	248	190	14.3	10.8	3.5
Germany W.	202	143	9.7	12.1	- 2.4
Ireland	396	353	22.4	11.1	11.3
Italy	236	211	15.2	10.1	5.1
Luxembourg	192	155	11.5	12.7	- 1.2
Netherlands	238	172	13.3	8.5	4.8
United Kingdom:					
England & Wales	240	180	12.2	11.9	0.3
Scotland	246	189	13.1	12.3	0.8
N. Ireland	313	250	17.0	10.7	6.3
Germany, East	213	155	9.7	12.8	- 0.3
Austria	223	186	12.4	12.8	- 0.4
Finland	170	174	14.4	9.6	4.8
Greece	237	233	15.8	8.9	6.9
Norway	249	198	14.2	10.0	4.2
Spain	287	266	18.8	8.4	10.4
Sweden	198	179	12.7	10.8	1.9
Switzerland	203	167	12.4	8.8	3.6
United States of America	230	184	15.0	9.1	5.9

Source: Jean Bourgeois Pichat: "Baisse de la fécondité et descendance finale": *Population:* Nov. - Dec. 1976.

Having commented on the important fall in fertility documented in the paper, one must also call attention to the exceptional position of Ireland in regard to fertility. In this regard I feel that tables such as Tables 6 and 10 and Appendix 1 are somewhat misleading, since they compare Ireland in 1976 with Europe in 1971. The rest of the world has not stood still as Irish fertility declined over the years 1971-76. In round terms, there has been a 25 per cent reduction in fertility in Europe since 1971, significantly higher than that which occurred in Ireland. Thus the Irish level of fertility is far more exceptional than would be understood from a study of Table 6 or Appendix 1. In order to set the record straight on this point, I include with this note a table setting out the fertility rate, the birth and death rates in most European countries in 1975. In Ireland the total fertility rate is 3.5. The next highest is Spain at 2.7. Apart from Italy at 2.1, this rate is below 2 in all othei EEC countries, Scandanavia, Austria, and Switzerland. Turning to birth and death rates, which are sensitive to population age structures, we see that whereas Ireland now has an excess of births over deaths equal to over 1 per cent, both East and West Germany, Austria, Belgium, and Luxembourg now record more deaths than births. This will soon be the case in Britain, Sweden, and before too long, in France and even Italy. I feel, therefore, that the fertility rates used in tonight's paper are perhaps likely to be proved too conservative by events. This was the case with the rates used in the NESC paper. It seems improbable that the total fertility rate that will prevail in Ireland in 1986, as shown in Table 12, which implies a Net Reproduction Rate of about 1.4, should be so much higher than that found almost anywhere in Europe today, where the NRR is already below unity.

Of course, it is possible that the sharp drop in fertility in Europe will prove to be a transitory phenomenon. There will be increasingly frequent expressions of concern about the real and imaginary adverse effects of a stationary or declining population. The problems posed by having over 15 per cent of the population aged 65 and over will get a lot of publicity from now on/ Pension schemes will be under pressure, and rates of social insurance contributions will have to rise steeply. No doubt the retirement age will tend to drift upwards. Ireland will not be concerned with these issues, because the old dependency ratio seems certain to fall here over the next few decades.

However, as is obvious from our population age pyramid, we will face other problems, thrown up by the enormous bulge representing the age groups in which emigration ceased to take a major proportion of each cohort. At present this bulge starts at age 30-34 and reaches its maximum at ages 10-14. There are just over 1 million people in the age group 10-29, compared with only 635 thousand in the next 20-year interval. The individuals in this bulge are going to face congestion and fierce competition throughout their lives: in schools, at the point of entry to the job market, in trying to get promotion, in trying to buy houses. They face higher unemployment rates and lower growth rates of real earnings than their elders now aged 30-50 did. Coping with the problems created by this abnormal population age structure is going to transform Irish society to the core.

GENERAL REMARKS ON POPULATION PROJECTIONS

Let me conclude on a note of dissatisfaction with the widely accepted techniques of population projection, of which to-night's paper is a good example.

Although the techniques used are perfectly general and can be applied to exploring the implications of any set of assumptions, the important question is how to select a relevant set of assumptions. Like it or not, the publication of any set of projections is taken by the public as a set of conditional forecasts. Now in preparing these projections we generally adopt a very simple approach. We make fertility or migration or mortality a function of time. Generally we extrapolate past trends, with a suitable admixture of our judgement about how things will develop. Perhaps we also throw in a comparison with other countries which for some reason we feel may serve as a guide for Ireland.

Not surprisingly, this approach almost always leads to choosing an inappropriate set of assumptions. Let me illustrate this by the experience of population projections in Britain. In 1969, the British CSO projected the population of the UK in the year 2000 at 68.2 million. Each year since then this projection was revised downward in the light of the declining fertility rate, so that now (1976) the population in the year 2000 is put at 58.2 million - a downward revision of 10 million occurring in a projection with a 25-year horizon over the course of seven years. Given that over half the population that will be alive in the year 2000 is already born, we can judge the enormous revisions that have been made to the projected number of births between now and the year 2000: from 34.5 million to 21.5 million. A person seeking enlightenment from population projections regarding the number of maternity hospital beds or school places to provide would have been rather seriously misled by using the figures published in 1968.

There is nothing in the methodology of population projections that gives us the faintest hope of predicting turning points in demographic behaviour. This has tended to vitiate all the advances that have been made in refining the cohort-component technique of projection, not to speak of the enormous gains in productivity from the application of computers to the arithmetic of projections.

How can we hope to progress? I would like to mention two possibilities. One is the recognition that what we are at is a variant of classical statistical time series analysis, but that we are hung up on the crudest of extrapolative models. Statisticians like Cox, Box, and Jenkins have recently made considerable advances in the application of time series analysis to economic and business data. Why not also to demographic data? Personally, I am not convinced that these techniques yield very impressive gains in their new applications, but they have got to be better than mere extrapolation.

Another approach is to try to build a structural model of the demographic behaviour. By this I mean, starting from a coherent theory of demographic behaviour, let us specify the relationships which are *a priori* likely to describe the behaviour of migration, fertility, etc., and test these statistically, and then apply the estimated relationship to the prediction of population, much as large scale econometric models are now in use in almost all countries to predict GNP. The trouble with this approach is that there is little by way of coherent theory about demographic magnitudes. Perhaps migration is an exception, because we have a number of empirically verified relationships that perform fairly well in tracking the fluctuations in Irish migration since the second world war. But even in applying these, a problem arises due to the necessity of knowing the future course of the exogenous variables (e.g., British unemployment) and here we arrive back at our original dilemma.

Rather than ending on such a pessimistic note, I can think of one approach that might have a substantial pay-off for the relatively small investment involved. This is the application of survey techniques to gather some up-to-date information on leading indicators. This might be most useful in connection with fertility. A very simple questionnaire administered to a small sample of women of child-bearing age could shed light on the number of additional children they were likely to have. Experience has shown that there are no problems in administering questionnaires on this type of subject in Ireland. What is needed is a time series on the responses, so that we could perhaps identify changes in family formation patterns ahead of time. This might improve the value of the general projection model in the context of forecasting the future level of population.

Brendan Herlihy: Seconded the vote of thanks to Mr Keating, and said that as a user of the data provided by the demographers he felt confident that he could speak for all such users in conveying congratulations and thanks to Mr Keating for his paper. It was an historic occasion because it brought to notice the break during 1971/76 with the sad and bad tradition of net emigration going back to the Great Famine. The population was increasing but the way in which the age structure was changing was the most remarkable feature. Illustrating the comparison between 1971 and 1981 as projected, he went on to illustrate the comparison between the 1981 population shape and those for the Netherlands and New Zealand in 1971, the latter being remarkably close to the projected Irish shape. The extent of the expected improvement in the Irish shape over the decade 1971-81 would probably be unparalleled.

Shape, as represented by the percentage distribution of the age groups for each sex, was of key importance in considering the effect of population change on demands for hospital care. The variation in demand by age group was illustrated for general hospitals. Apart from a moderate peak at the baby stage relatively low demand was experienced up to middle age. From about 45 years on there was rapid escalation, more pronounced for men than for women. Added to this increase was a progressive slowing of recovery time with age, giving an enhanced total demand on hospital resources. The figures worked out for 1971/81 were:

Population Increase		Effect on General Hospital Bed Day Demand	
Males	Females	Males	Females
+ 11.6%	+12.2%	+7.7%	+10.3%

It should, of course, be noted that population change was not the only factor involved. Medical advances and changes in the incidence of different disease processes also had an important effect on demand. In view of the importance of the 45+ age group it was notable that this age group was expected to increase very little towards the end of the century although the general population was expected to increase substantially.

In the case of maternity hospital needs a moderate increase of 5,000 in total births for the five years 1976/81 was projected. This would represent an increase in births at 1981 of about 3.6 per cent on 1971. In view of the pace of decline in fertility this was the most difficult area for those making projections and long-range projections could not be made with any confidence.

As regards mental illness the pattern of demand for hospital care was quite different from that for physical illness. The pattern for 1970 was illustrated indicating peak demand for first admissions and total admissions arising at much earlier ages. A calculation of the effect of the projected population change to 1981 showed practically a *pro rata* increase in first admissions for both males and females with a slight reduction from *pro rata* in total admissions. What was of great interest was the projection of continued high marriage rates. This, if borne out, was likely to be a factor of considerable importance in the achievement of the aim of a more community based than hospital based service. Whether it would have a major impact in reducing the incidence of mental illness called for urgent[1] analysis. Attention was drawn to the rapid increase in hospital admissions due to alcoholism. This social problem called for urgent and more drastic intervention.

William J. Hyland: I have no comment to make on the methodology used in the exercise and I am happy to accept the particular assumptions chosen as a reasonable view of future prospects. Accepting for the moment the projections which have been made, my purpose is to consider briefly the implications of the figures, particularly in relation to the demands for educational services. In doing this, I am basing myself mainly on the figures shown in Appendix 4 and to simplify matters I consider hypothesis *(1),* i.e. no new migration, only.

The main point I have to make is that, despite the welcome fall in the (age) dependency rate from 73.1 in 1976 to 68.9 in 1986, this does not imply that demand for educational services will place less pressure on resources than at the present time. Indeed the contrary is likely to be the case. For example, while the age groups 5/9 and 10/14 which cover compulsory education will, taken together, increase by only 8 per cent between 1976 and 1986, the 15-19 age group which covers upper secondary and the beginning of third level education will increase by 12 per cent while the age-group 20-24 which covers the rest of third level education will increase by 22 per cent.

Hence, even if participation rates remain constant it will be the higher and hence the more expensive sectors of education which would be increasing most rapidly. However, it is unlikely that participation rates will remain constant. While participation in the 5-14 age group is virtually 100 per cent and so cannot increase any further, participation in upper secondary is still increasing and the spill-over effect of this on third level education is only recently beginning to show up. Hence, it is reasonable to expect upper secondary (including lower technical) to increase between 15 per cent and 20 per cent in the ten year period and to expect third level education to increase between 25 per cent and 30 per cent, unless restricted by the inability of either the State or private persons to finance this expansion. Given the comparative costs of these sectors, it seems likely that the problem of financing will remain acute.

An expansion of this order, under conditions of financial stringency, could mean that most of the expansion could be concentrated on the faculties which are cheaper in unit cost terms. This could result in levels of graduate unemployment in certain disciplines, which up to now have not been experienced. It might be worth considering whether any mechanism could be evolved between the different agencies concerned which would develop some studies to give some early warnings of this phenomenon.

I appreciate the difficulty for the author in moving beyond a classical demographic model, but I feel that these exercises would be a great deal more useful if they could be expanded into the areas of economic development, particularly in the employment aspect. As we all realise, the credibility of migration assumptions depends critically on the view taken of employment prospects. I trust this exercise could be used as a basis for further development in this direction.

I wish to congratulate Mr Keating on a very clear and useful paper.

W.A. Honohan: remarked that the projections had only an estimated basis instead of a Census. He made a plea for the restoration of the quinquennial Census the introduction of which had been a great post-war break-through in Irish demography.

Referring to the international table of life expectations (Table 8), it was of interest that for males these were higher for Ireland at birth and at age 65 than for the United Kingdom. He wondered if there exists any satisfactory explanation (medical or otherwise) for the fact that, according to the survivorship rates shown in Appendix 3(a), female mortality is lighter throughout than male, even during the child-bearing age groups.

With regard to fertility, the speaker suggested that the traditional measures might be accompanied by others, such as the size of (completed) family and that new techniques (e.g. those based on cohorts) might be introduced. When projecting births it has been customary to study marriage rates and to separate legitimate from illegitimate births. Now that our marriage pattern has become more "normal" perhaps the time has come to take a look at this practice.

While the proportion of persons aged 65 and over had been falling (and according to the projections would continue to do so) their absolute numbers were increasing. At the s,ame time, it was to be noted that the numbers aged between 45 and 65 were still falling, and that for ages 45 and over the projected increase over the period 1971 to 1986 was less than 2 per cent whereas a growth of 18 per cent in total population was envisaged.

Most of the current interest in projections was in the short-term, no doubt because of the immediacy of our manpower problems. But a major message from the paper was that of the possibility of substantial growth of population in the longer term. We are accustomed to thinking that we had a population of over 8 millions about the middle of the last century. This however, related to the whole country, and for the 26 counties the figure in 1841 was *6Vi* millions. The big drop followed in the immediately succeeding two decades - by almost *Wi* million to 1851 and another ^{3}A million to 1861. Such a heavy decline was, of course, not due to "normal" demographic forces but to the quite exceptional effects of the Great Famine. The 1861 population was, in fact, 4.4 million and in the light of Mr Keating's results it seems as if we may look forward with some confidence to a figure of this order again in the next generation or so.

Mr Keating's projections were probably "semi-official". Are we likely ever to have "official" projections, which are found in many other countries? In their absence, is there not some danger of confusion because of the growth in the number of projections which are being made?

J. J. Sexton: I should like to add my congratulations, to those of the other speakers, to Mr Keating for a most interesting and well presented paper. As you know, I am associated myself with the compilation of population statistics and I should like to take this opportunity to say a few words conveying some information about the present activities of the Central Statistics Office in this area, particularly in relation to projections. In addition to the work embodied in Mr Keating's paper, we are also involved in work on a detailed set of projections which will cover the period up to around the year 2000 and will give information for counties and will also cover a wider range of assumptions. In short, this work is similar, in terms of the level of detail, to the work on projections described by Knaggs and Keane in their paper presented to the Society in 1971. The results should be available in about twelve months time and it is likely, on this occasion, that they will be published as an official set of population projections.

The 1975 Labour Force Survey has been mentioned on a number of occasions this evening and I think it is appropriate to say a few further words about this Inquiry. It is, of course, a sample Inquiry, covering over 30,000 households, and since information was collected from all members of the selected households, it is possible to use it to provide population estimates under broad headings. Detailed tabulations, however, are not possible on account of the sampling constraints. There are conceptual differences between this Survey and Censuses of Population; it was carried out on the basis of the "usually resident" population, while as you know the Censuses have always been carried out in this country on the basis of the enumerated or *de facto* population. Also the Labour Force Survey relates to a later period in the year (to around the end of May) and these differences have to be borne in mind in comparing the results of the 1975 Survey with the data from previous Censuses. However, notwithstanding these differences, the Survey does give a ieasonably good indication of demographic changes over the period 1971/75 under broad headings.

A further Labour Force Survey is being taken in April 1977 and we have re-designed and re-structured the sample, mainly with a view to producing more detailed population estimates. Professor Walsh may be interested to know that in this particular Inquiry we are asking a question on fertility (along the same lines as the questions previously asked in Censuses) and this should provide some useful information in enabling us to analyse current trends in this rapidly changing area.