

Aspects of the Intercommunity Population Balance in Northern Ireland

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THE population of Northern Ireland is probably unique in that it is composed of two groups of people each of which can be characterized as a "minority". Conventional wisdom has it that at present there is a dominant Protestant majority wishing to maintain political links with Great Britain, and a Catholic minority desirous of closer links with, if not absorption by, the Irish Republic. The seeming paradox of two minorities is explained, on the one hand, by the existence of the current Catholic minority; and, on the other, by a Protestant group, in the majority at present, fearing that in time it will become a minority. As the recent Commission on Disturbances in Northern Ireland said ". . . among Protestants there are deep-rooted suspicions and fears of political and economic domination by a future Catholic majority in the population".¹ This fear is partly caused by the knowledge that the average size of Catholic families is significantly larger than average non-Catholic families. Out of this situation has sprung rumour and counter-rumour concerning the precise current population balance between the two communities.²

The current proportions of Protestants and Catholics in the population of Northern Ireland and possible changes in them through time are thus inevitably of considerable political significance. It is not only the actual proportions that are important, but also what people believe them to be. In addition, it could be argued that political attitudes (and actions) are significantly affected by what people think will happen in the future to the distribution by religious adherence of the Northern Ireland population.

The aims of this paper are fivefold, First, to set out the changes that have taken place in the proportion of Catholics and non-Catholics during the last 100 years.

1. Cameron Commission, *Disturbances in Northern Ireland*. H.M.S.O., 1969, p. 55.

2. Throughout this paper we use the word Catholic in preference to the longer "Roman Catholic". The "non-Catholic" population includes all other religious denominations, and those professing no religious affiliation.

Second, to establish what people think are the current proportions of Catholics and Protestants in the population. Third, to try to establish what these proportions actually are. Fourth, to determine what people believe the future proportions in the population will be; and, finally, to state what the proportions would be, given certain specific sets of conditions.

An Evolutionary View of the Intercommunity Population Balance in Northern Ireland

According to census data, the proportion of Catholics of all ages in the population of Northern Ireland declined from 40.9 per cent in 1861 to 33.5 per cent in 1937, since when there has been a slight trend upwards, the proportion reaching 34.9 per cent by 1961. It is interesting to note, however, that the percentage of Catholics in the population over the age of twenty, i.e., an approximation to the proportion of the population of voting age, declined continuously between 1861 and 1961. Yet this picture for the country as a whole hides a degree of regional variation (Table I). In the west of Northern Ireland, in counties Armagh, Tyrone, Fermanagh and Londonderry, the proportion of Catholics in the total population has remained remarkably stable over the past 100 years. Comparative stability is also indicated for counties Antrim and Down. Great changes, on the other hand, have occurred in the County Boroughs of Belfast and Londonderry. Thus we find the proportion of Catholics in Belfast falling by 10 per cent between 1861 and 1937, only to increase by three per cent between 1937 and 1961. The post-war Catholic surge has been even greater in Londonderry, where a four per cent rise occurred between 1951 and 1961 alone.

The variations shown in Table I can theoretically be attributed to the operation, either singly or in combination, of intercommunity differentials in fertility, mortality and migration. Although the details must await further research, we are in a position to make some general points by way of explanation. First, intercommunity variations in mortality historically have not been of sufficient signifi-

TABLE I: *County Variations in the Percentage of Catholics in Northern Ireland—1861 to 1961*

Year	Province	County Antrim	County Armagh	County Down	County Fermanagh	County Londonderry	County Tyrone	Belfast C.B.	Londonderry C.B.
1861	40.9	24.3	48.8	32.5	56.5	43.7	56.5	33.9	56.5
1871	39.3	23.1	47.5	31.7	55.9	42.7	55.6	31.9	54.7
1881	38.0	22.2	46.4	30.9	55.8	42.1	55.5	28.8	55.1
1891	36.3	21.3	46.1	29.8	55.4	41.6	54.6	26.3	55.2
1901	34.8	20.6	45.2	31.3	55.3	41.4	54.7	24.3	55.2
1911	34.4	20.5	45.3	31.6	56.2	41.5	55.4	24.1	56.4
1926	33.5	20.1	45.4	30.4	56.0	41.6	55.5	23.0	59.9
1937	33.5	20.2	45.5	30.6	55.3	42.1	55.3	23.8	61.3
1951	34.4	22.1	46.4	30.2	55.6	43.0	55.4	25.9	63.1
1961	34.9	24.4	47.3	28.6	53.2	42.6	54.8	27.5	67.1

Sources: Census of Ireland 1861-1911; Censuses of Northern Ireland 1926-61.

cance to account for the longitudinal variations in the proportion of Catholics to non-Catholics portrayed in Table 1.³ On the other hand, the fertility differential is great. It is reflected in the larger size of Catholic, as compared with non-Catholic, families; and it is well documented in the 1961 Fertility Report for Northern Ireland⁴ for women whose marriages were contracted before 1936. Unfortunately, this report tells us nothing of the current situation; but the fact that the census of 1961 recorded 43.8 per cent of the population under one year as Catholic, compared with only 33.7 per cent of females of reproductive age, confirms the existence of a large current religious differential in fertility.

The evidence thus suggests that the fertility differential is of long standing. In the *ceteris paribus* situation, therefore, the proportion of Catholics in the population of the six-county area as a whole, and in each county, should have increased consistently during each intercensal period since 1861. The considerable decline in the proportion of Catholics between 1861 and 1926, and the slow, subsequent rise, therefore suggest strong religious differentials in rates of emigration from the area operative over the past 100 years.⁵ In addition, complex differentials in internal mobility are indicated by the stable intercommunity population ratios in the western counties, and by the falling proportion Catholic in Co. Down, and the fluctuating proportion in Co. Antrim, and in Belfast and Londonderry County Boroughs. The ability of the western counties, over a large number of years, almost exactly to counterbalance the intercommunity fertility differential by a reversed emigration differential, has been a remarkable coincidence.

*Current Intercommunity Population Balance: community differentials in fertility and migration*⁶

A task of some importance in the context of the current intercommunity population balance in Northern Ireland is the formulation of a precise quantitative statement of the differentials between Catholic and non-Catholic fertility and net emigration operative over the past few years. Although the deficiencies in data make this a task somewhat speculative in nature, the authors have been able to estimate the mean fertility and emigration differentials existing between 1966 and 1966.

The fertility differential can best be demonstrated by its effect on reproduction. For instance, over the period 1961 to 1966, the mean gross reproduction rates were calculated as being 2.2 and 1.4 for the Catholic and non-Catholic population

3. For example, D. P. Barritt and C. F. Carter, *The Northern Ireland Problem*, 1962, p. 107.

4. Government of Northern Ireland, *Census of Population 1961 Fertility Report*. H.M.S.O., 1965.

5. The differential in net emigration by religious denomination was discussed for the periods 1937 to 1951 and 1951 to 1961 by Barritt and Carter, *op. cit.*, pp. 107-8.

6. The significance of the religious differential in the demography of Northern Ireland and the Irish Republic in the post-war period has been discussed by Brendan Walsh, *Religion and Demographic Behaviour in Ireland*. Dublin: Economic and Social Research Institute, Paper No. 55, 1970.

respectively.⁷ The respective female intrinsic rates of natural increase were calculated as 25 and 11 per thousand population, which indicate a potential Catholic growth-rate more than twice that of the non-Catholic after population age distributions have been smoothed to take into account different intercommunity demographic histories. Since the differential between the gross reproduction rates is somewhat smaller than this, we may conclude that the present population age structures of the two communities mask the true fertility differentials.

The net outflow of population from Northern Ireland during the intercensal period, 1961 to 1966, was 37.7 thousand (1966 Census of Northern Ireland), at least half of whom were Catholic. These aggregate figures, however, disguise the highly significant age and sex selectiveness of the migration process, which, in conjunction with the religious differential, are worthy of further comment (Table 2).⁸ For both communities, the rate of male population loss from the 25-29 years, and all younger, age groups is significantly higher than the rate of outflow from the corresponding female population. The reverse holds for the population older than 29. Secondly, for cohorts losing population, the net emigration rate amongst Catholics is at least twice as high as the non-Catholic rate, among both males and females. Thirdly, a fairly strong net immigration rate is suggested amongst males of the 60-64 and older age groups in 1966, the rate of inflow being greater amongst the non-Catholic population. In the case of females, a net inflow is restricted to the cohort aged 60-64 in 1966.

7. The gross reproduction rates were calculated from: (i) the mean annual number of female live births over the period 1961 to 1966; (ii) estimates of the mean Catholic and non-Catholic female populations of child bearing age over the same period; (iii) an assumed distribution of births according to mothers' age. The proportion of Catholic births in the total number of births over the period was assumed to be constant at 43.8 per cent, i.e., the ratio of Catholic children under the age of one to the total female population under that age in 1961. (Data sources—Registrar General's Annual Reports 1961-1966, Census of N.I., 1961 and 1966).

8. The component method was utilized in the calculation of the age and sex differential in net migration.

We are given the population in 1961 decomposed into five-year age groups by sex, and the same population after five years similarly differentiated. Each age-group after five years is made up of the survivors from the same population five years earlier. Population losses can only occur through death and net emigration, therefore, provided the number of deaths to a particular five year cohort over the period are known, the net emigration or immigration component of that cohort can then be estimated. Deaths to five year cohorts were accordingly summed over the period 1961-1966, and change due to migration in the population over the age of 5 in 1966 was calculated. The migration figure for the 0-4 age group in 1966, i.e., the population born over the intercensal period, was taken as the difference between the net migration figure for the total population, i.e., the 37.5 thousand, and the value as calculated for the population aged 5 and over in 1966. Adjustments were made to equate five year age-groups estimated at the end of five years with the five and a half year intercensal period.

Religious denomination was not enumerated in 1966. However, its availability for 1951 and 1961 enabled the direct calculation of the religious differential in net migration by age and sex over that period. The differentials so obtained were then applied to the 1961-66 migration data to obtain estimates of religious selectiveness in net migration over the last intercensal period.

TABLE 2: *Estimated net migration rates for the period 1961 to 1966 (Five Year Rates per thousand of the initial population)*

Age group in 1966	All Males	All Females	Catholic Males	Catholic Females	Non- Catholic Males	Non- Catholic Females
0-4	-7	-5	-11	-4	-7	-3
5-9	-5	-3	-8	-5	-3	-2
10-14	-7	-5	-12	-8	-4	-3
15-19	-73	-45	-124	-73	-43	-27
20-24	-133	-109	-209	-174	-91	-71
25-29	-64	-46	-92	-73	-50	-31
30-34	-11	-20	-16	-34	-8	-13
35-39	-2	-10	-3	-19	-2	-6
40-44	-10	-21	-17	-40	-7	-12
45-49	-5	-8	-8	-16	-3	-5
50-54	-10	-13	-20	-26	-7	-8
55-59	-6	-8	-11	-17	-5	-4
60-64	+5	+21	+7	+39	+5	+15
65-69	+17	-7	+5	-24	+23	-1
70-74	+5	-9	+5	-16	+5	-6
75-79	+6	-5	+8	-8	+5	-4
0-79	-26	-22	-46	-39	-17	-13

Estimated Intercommunity Population Balance in 1971

A precise statement of the current intercommunity population balance will have to await the results of the 1971 census. However, having identified the Catholic and non-Catholic fertility and emigration differentials operative between 1961 and 1966, we can make a reasonable estimate of the likely situation at the beginning of 1971. Five sets of assumptions have been adopted regarding fertility and emigration behaviour since 1966. The resultant population figures are given in Table 3. Four of the five estimates show the expected proportion of Catholics to be between 36.0 and 36.1 per cent of the total population, or just over 1 per cent more than in 1961. The remaining forecast, in which the full fertility differential between the two communities is allowed to come into play (by assuming no emigration) shows a correspondingly higher proportion of Catholics in 1971. Concerning the population over the age of 20, the values given by four of the projections again broadly correspond, indicating a 0.6-0.8 per cent rise in the proportion of Catholics in that age group. The forecast ignoring emigration again gives higher values for the Catholic population. Concerning the school population (approximated by the 5-14 age group), greater variability between the results is apparent, and an increase of between 0.8 and 1.1 per cent in the proportion of

Catholics is suggested.⁹ The greatest surge in the proportion of Catholics occurs in the 15-39 age group, a 2 per cent gain being expected. These gains, however, are partly offset by the continuing decline in the percentage of Catholics aged 65 and over.

TABLE 3: *The percentage of Catholics in the population of Northern Ireland in 1961, and estimates of this percentage for 1971*

Age Group	Derived from 1961 N.I. census			1971—A			1971—B			1971—C		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-14	42.3	42.7	42.5	43.9	43.9	43.9	43.6	43.6	43.6	43.3	43.4	43.3
15-39	33.5	34.5	34.0	36.5	37.6	37.1	34.9	36.3	35.6	35.5	36.7	36.1
40-64	29.9	29.8	29.9	31.0	31.1	31.0	30.8	31.1	31.0	30.9	31.1	31.0
65+	31.0	29.0	29.9	29.2	29.2	29.2	29.0	29.0	29.0	29.1	29.1	29.1
0-100	35.0	34.8	34.9	36.7	36.6	36.6	36.0	36.0	36.0	36.1	36.1	36.1
20-100	31.1	31.1	31.1	32.2	32.5	32.4	31.5	31.9	31.7	31.7	32.1	31.9
5-14	41.5	42.1	41.8	44.0	44.0	44.0	43.5	43.6	43.6	43.6	43.7	43.6
	1971—D			1971—E								
0-14	43.5	43.6	43.6	43.8	43.9	43.9						
15-39	35.4	36.7	36.0	34.8	36.2	35.5						
40-64	30.9	31.1	31.0	30.8	31.1	30.9						
65+	29.0	29.1	29.0	29.0	29.0	29.0						
0-100	36.1	36.1	36.1	36.0	36.0	36.0						
20-100	31.6	32.1	31.9	31.4	31.9	31.7						
5-14	43.6	43.7	43.6	43.5	43.6	43.6						

1971—A Assuming continuation of the 1961 to 1966 fertility and mortality rates. Migration excluded.

1971—B Assuming continuation of the 1961 to 1966 fertility, mortality and migration rates.

1971—C Non-Catholic fertility, mortality and migration rates unchanged: Catholic fertility and emigration falling.

1971—D Assuming falling rates of Catholic and non-Catholic emigration and fertility.

1971—E Catholic fertility mortality and migration rates unchanged: Non-Catholic fertility and emigration rates declining.

Current Beliefs

Popular beliefs as to population proportions by religious adherence (early 1970) have been established for limited segments of the population only. A questionnaire was administered separately to three groups of students attending Queen's University, and Stranmillis and St Mary's Training Colleges in Belfast.¹⁰ The limitation to student respondents was necessary because of the difficulties involved in obtaining the necessary data from a random sample of the total population.

9. We use the term "school population" in the sense of "the population of school age" and not in the sense of the "population actually attending school". The available statistical information suggests that there is a considerable difference between the latter two populations as to religious affiliation. For instance, the Ministry of Education statistics recorded 46.6 per cent of the population attending primary school in 1961 as being Catholic. The 1961 census enumerated 52.9 per cent of the population of primary school age as being Catholic.

10. Students attending Stranmillis Training College are almost entirely Protestant, while those in St. Mary's Training College are almost entirely Catholic. Only students whose homes are in Northern Ireland were included in the University sample.

CORRIGENDUM

Economic & Social Review Vol. 1, No. 4, July, 1970.

Last sentence of Footnote 9, p. 460 should read as follows:

The 1961 Census enumerated 42.9 per cent of the population of primary school age as being Catholic.

As to the current population proportions two questions are relevant. These, and the tabulated results, are set out below (Tables 4 and 5).

TABLE 4: "What percentage of the total population of Northern Ireland is Roman Catholic?"

	<i>Queen's University</i>	<i>Stranmillis Training College</i>	<i>St. Mary's Training College</i>
Mean Percentage believed Catholic	36.2	40.2	40.2
Median Percentage believed Catholic	35	40	40
N=	103	83	52

TABLE 5: "What percentage of the school children in Northern Ireland is Roman Catholic?"

	<i>Queen's University</i>	<i>Stranmillis Training College</i>	<i>St. Mary's Training College</i>
Mean Percentage believed Catholic	45.2	46.0	51.2
Median Percentage believed Catholic	45	50	50
N=	103	83	52

Thus the proportion of the population of Northern Ireland believed to be Catholic (early 1970) lies between thirty-six and forty per cent, while the corresponding estimate for the school population lies between forty-five and fifty-one per cent. In the former case the estimate suggested by the University students is significantly smaller (at the 0.01 level) than that suggested by the Training College students. In the case of school children, St Mary's College students suggested a proportion Catholic that was significantly in excess of those offered by the other two samples.

The discrepancy between the proportion of Catholics in the total population of the Province as estimated by the authors for 1971, and the mean and median values suggested by our three groups, is not great. The results obtained from the University group, and the calculated values for 1971, are virtually identical. Both training college groups, on the other hand, suggested a slightly larger Catholic proportion than we estimated. The difference between the estimated and the suggested proportion of Catholics in the population of school age is somewhat greater, all three student groups overestimating the proportion of Catholics in this age group. Moreover, since we included children only up to compulsory school leaving age in our calculation, our estimates of the proportion of Catholics amongst those of school age are themselves likely to be overstatements. In view of this, the discrepancy between the estimated proportion and that suggested by students at St Mary's training college is possibly as great as 10 per cent.

The Future Evolution of the Inter-community Population Balance

Estimates of the likely future evolution of the inter-community population balance must be based on the separate projection of the Catholic and non-Catholic populations, rather than by extrapolation of past trends in the ratio of Catholics to non-Catholics. The fluctuations that have occurred since 1861 in this ratio provide evidence that the relative values of the inter-community fertility and emigration differentials, especially of the latter, have changed dramatically, and are likely to do so in the future. The magnitudes of fertility and emigration have similarly fluctuated. For these reasons we have made a number of different projections based on various sets of assumptions as to the future behaviour of Catholic and non-Catholic fertility and emigration rates. The exercise is not concerned primarily with population numbers, but is an attempt to assess the likelihood that the Catholic population will outnumber the non-Catholic population at some time in the future, and the time when this might be likely to happen. Additionally, while being interested in the aggregate intercommunity population balance, we are also concerned with the balance between the sexes, and variations by major age groups. In the light of the present strong association between religious denomination and political sympathy, likely changes in the intercommunity balance of the population of voting age are of particular significance.

Obviously there is an infinite number of combinations of fertility and emigration rates on which such work may be based. We have restricted ourselves to eight projections; and in so doing hope to have covered the most likely eventualities.¹¹ The projections are based on the application of various schedules of fertility, mortality and emigration rates to given initial populations. The important factor of marriage has not been considered directly; but variations in average age and incidence of marriage can be incorporated in the projection models through their effects on fertility. It has been assumed that there are no significant intercommunity mortality differentials.¹² It has further been assumed that future improvements in mortality are likely to be insignificant, compared with changes in fertility and migration rates. For these reasons, mortality is held constant, and identical for both communities, at the 1961-1966 mean level throughout the projections.

The various assumptions concerning fertility and emigration on which we have calculated future intercommunity population balances are as follows:

Projection 1: Catholic and non-Catholic fertility and mortality rates constant at the 1961-1966 level. In this projection it is assumed that there is no migration.

Projection 2: Catholic and non-Catholic fertility, mortality and net emigration rates, constant at the 1961-1966 level.

11. Shifts in the intercommunity population balance resulting from religious "conversion" are assumed to be negligible and are ignored.

12. Barritt and Carter, *op. cit.*

Projection 3: Non-Catholic fertility, mortality and net emigration rates constant at the 1961-1966 level; Catholic fertility and mortality rates constant at the 1961-1966 level, but with net emigration rates falling to the non-Catholic value by 1976.

Projection 4: Non-Catholic fertility, mortality and net emigration rates constant at the 1961-1966 level; Catholic fertility and net emigration rates falling to the non-Catholic level by 2001, and 1976, respectively.

Projection 5: Catholic and non-Catholic fertility and mortality rates constant at the 1961-1966 level; Catholic net emigration rate decreasing by one quarter between 1971 and 1981; non-Catholic net emigration rate rising by one quarter between 1971 and 1981.

Projection 6: Catholic net emigration rate falling to the 1961-1966 non-Catholic value by 1976, fertility rate falling to the 1961-1966 non-Catholic level by 2001; Non-Catholic net emigration rate declining by one third to 1976, fertility rate declining by one quarter to 2001.

Projection 7: Catholic fertility, mortality and net emigration rates constant at the 1961-1966 level; Non-Catholic net emigration rate declining by one third to 1976, fertility rate declining by one quarter between 1966 and 2001.

Projection 8: Catholic fertility, mortality and net emigration rates constant at the 1961-1966 level; Non-Catholic fertility and mortality rate constant at the 1961-1966 values, net emigration rate rising by one quarter between 1971 and 1981.

Projections 1 and 2 are to be regarded as bench marks. Projection 1, by excluding emigration, enables the assessment of the population size implications of the full intercommunity fertility differential. The stable age structures of the female populations of the two communities, and their intrinsic rates of natural increase, can also be computed from this projection. Projection 2, by comparison, presents the implications of the current emigration and vital rates, on the assumption that they continue indefinitely into the future. Naturally, this assumption is unrealistic, as events already taking place in Northern Ireland are likely to have a direct bearing on emigration rates and differentials. Similarly changes in fertility cannot be ruled out. For instance, the reforming legislation currently being enacted at Stormont may conceivably dampen the rate of Catholic emigration while leaving the non-Catholic rates unaffected. Projection 3 is designed to take account of this situation on the assumption that fertility remains unchanged. Naturally the actual quantification of the process is difficult; but we have envisaged a rapid reduction in the rate of Catholic emigration to the 1961-66 non-Catholic level, which could be achieved by a relatively small shift in the balance of total movements into and out of the Province.

It cannot be assumed, however, that Catholic fertility will remain unchanged in the face of a greater prosperity accompanying a more equal division of opportunities in Northern Ireland. At the same time, we cannot ignore the possibility

of a relaxation in the attitude of the Catholic Church towards artificial methods of birth control. Accepting this line of argument, we may envisage a slow reduction in Catholic fertility rates over the next decades. Projection 4 is designed to take account of a decline in Catholic emigration, and in fertility, and of their impact upon the future inter-community population balance, assuming no change in non-Catholic rates.

There is, however, evidence to support the view that a section of the non-Catholic population looks on the current reforms with distaste. The demographic consequences of this could be an increase in the rate of non-Catholic emigration from Northern Ireland. This proposition has been amalgamated with declining Catholic emigration in projection 5. Projection 6, on the other hand, takes a more optimistic view of the future and assumes a fall in both Catholic and non-Catholic net emigration rates. A general, although differential, decline in the fertility of the two communities is also built into this projection.

Projection 7 and 8 hold Catholic rates constant at the 1961-1966 level, varying only the non-Catholic situation. These are included mainly for completeness and symmetry. If, however, no dramatic change occurs in the attitude of the Catholic Church to birth control, a continuation of the present high Catholic fertility rate, and the maintenance or even widening the intercommunity fertility differential, are distinct possibilities. The assumptions concerning non-Catholic fertility and emigration are as in projection 5 and 6.

The Projection Model

We are given an initial population in five-year age groups and we wish to compute the population size of the same age groups five years later. Let us denote the initial population in five year age groups as, a_0, a_1, \dots, a_x equivalent to the age groups 0-4, 5-9, $\dots, 5x - (5x + 4)$ and let b_0, b_1, \dots, b_x represent the same age groups after five years. On the assumption of no migration, the relationship between the a 's and the b 's depends solely on the number of persons who survive at the end of five years and can be expressed as,

$$b_1 = a_0 \cdot S_0, b_2 = a_1 \cdot S_1, \dots, b_x = a_{x-1} \cdot S_{x-1} \quad (I)$$

where S_0, S_1, \dots, S_x are five-year survivorship ratios for the age groups initially 0-4, 5-9, $\dots, 5x - (5x + 4)$. The survivorship ratios are easily computed from the stationary population, i.e., the L_x values of an appropriate life table.

Provided we assume that net emigration or immigration is a function of population size, the migration component over the five years can be included in this projection by the modification of the survivorship ratios. Net emigration simply augments population losses due to mortality, while net immigration has the reverse effect. The calculation of net migration probabilities, m_x , and the availability of the probabilities of dying, q_x , from the life table, allows the computation of a stationary population modified for migration, from which we can

obtain the necessary modified survivorship ratios, S_x^1 . The age, sex and religious denomination specific populations of any area can be projected in this manner over as many five-year time intervals as required.

We are still left with the problem of computing the size of the youngest age group, b_0 , at the end of five years. The size of this group is a function of the number of females of reproductive age over the five years of the projection. The standard method of projecting the size of b_0 is to multiply the mean female population between the ages of 15 and 49, decomposed into five-year age groups, by the appropriate age specific fertility rates adjusted for the five years of the projection. The mean female population of a given age group is defined as:

$$\frac{1}{2}(f a_x + f b_x) \quad (2)$$

where $f a_x$ is the initial female population of age group x and $f b_x$ the population of the same age group five years later.

If we denote the age-specific fertility rate of age group x , u_x , the total number of live births to females of reproductive age over the five years of the projection is given by the expression:

$$b_0 = \sum_{x=3}^9 \frac{1}{2} u_x (f a_x + f b_x) \quad (3)$$

Not all live born, however, will survive to form the age group b_0 at the end of five years and the equation must, therefore, be weighted by the survivorship factor, S_b , to take this into account. In addition as discussed above, S_b can be modified to take account of net migration relating to those who form the 0-4 age group at the end of five years, i.e.

$$b_0 = S'_b \sum_{x=3}^9 \frac{1}{2} u_x (f a_x + f b_x) \quad (4)$$

where S'_b is the survivorship ratio modified for net migration.

The projection of new births as set out above is rather inconvenient to work with, since b_0 must be calculated from the mean female population of reproductive age over five years. Keyfitz,¹³ however, has demonstrated that the number of new births can be derived entirely from the initial age groups, the a 's, by modifying the age-specific fertility rates. The whole projection can then be formalised in terms of matrix algebra and performed in one operation.

The age-specific fertility rates are modified as follows. The standard expression for calculating the number born alive surviving to form the 0-4 age group at the end of five years is:

$$b_0 = \frac{1}{2} \cdot S'_b \cdot u_3 (f a_3 + f a_2 \cdot f S'_2) + u_4 (f a_4 + f a_3 \cdot f S'_3) + \dots + u_9 (f a_9 + f a_8 \cdot f S'_8) \quad (5)$$

13. N. Keyfitz "The intrinsic rate of natural increase and the dominant root of the projection matrix." *Population Studies*, 1965-66. pp. 293-308.

But this can also be written as,

$$b_0 = \frac{1}{2} \cdot S'_b \cdot {}_f a_2 \cdot {}_f S'_2 \cdot u_3 + {}_f a_3 (u_3 + {}_f S'_3 \cdot u_4) + \dots, \\ + {}_f a_8 (u_8 + {}_f S'_8 \cdot u_9) + {}_f a_9 \cdot u_9 \quad (6)$$

and in general as

$$b_0 = \sum_{x=2}^9 a_x U_x \quad (7)$$

where U_x is the modified age-specific fertility rate of age group x derived from the expression $\frac{1}{2} \cdot S'_b (u_x + {}_f S'_x \cdot u_{x+1})$ (8)

The modification of U_x by the sex ratio at birth can provide fertility rates for the separate calculation of the male and female components of b_0 .

The complete projection of any female population in five-year age groups can now be performed in terms of the initial population and can be written in matrix form as:

$${}_f v^1 = {}_f N \cdot {}_f v^0 \text{ and in general as}$$

$${}_f v_i^n = {}_f N_i \cdot {}_f v_i^{n-1}$$

where ${}_f N_i$ is a square matrix containing the modified female age-specific fertility rates and the female survivorship ratios adjusted to take into account net migration.

${}_f v_i^{n-1}$, is a column vector, the elements of which represent the female population in five year age-groups at time $n - 1$.

${}_f v_i^n$, is a column vector the elements of which represent the female population area i in five year age groups at time n .

The male projection is similarly performed, although new male births must be derived from the female population vector, ${}_f V_i$

If it is assumed that rates are constant over time, then the above can be used over as many projection steps as are required by the analysis. Changing emigration and fertility rates can be accommodated in an additional matrix containing the required trend parameters.

The Age Specific Fertility Rates and Adjusted Survivorship Ratios

A problem which presented some difficulty was the apportioning of births between 1961 and 1966 to the age and religious adherence of the mother. The 1961 fertility report demonstrated not only that Catholic families are larger than non-Catholic, but that Catholic parents have a greater tendency to add to their families throughout the whole reproductive period of the female. In consequence, whereas non-Catholic fertility falls off dramatically after the first 10 years of marriage, Catholic fertility shows a much gentler fall. These characteristic

features of Catholic and non-Catholic fertility lead to significant differences in the distribution of births according to mother's age, i.e., the distribution from which we must calculate our age specific fertility rates. An additional factor of relevance here concerns the age of females at marriage. The evidence contained in the fertility report suggests that, on average, Catholic women marry at somewhat higher ages than non-Catholics. Since the authors are not aware of any information to the contrary, it is assumed that this difference remains operative.

Unfortunately, the recording of the mother's age at the registration of a birth is not required by law in Northern Ireland. Unlike most countries in the world, the computation of age-specific fertility rates for the population of Northern Ireland is consequently not a routine procedure. The 1961 fertility report, however, does tabulate births in the year immediately previous to the census data according to the age of mother. Although the data are not complete,¹⁴ the distribution they provide has of necessity formed the basis for the calculation of the age specific rates used in our projections.

The religious differential in the age-specific fertility rates was estimated as follows. First, we assumed that the proportion of Catholic births during the period 1961-1966 was constant at 43.8 per cent of total live births. Second, we estimated the distribution of Catholic births according to mother's age by assuming it to lie mid-way between the distribution as shown by the 1961 Fertility Report for Northern Ireland and that recorded for the population of the Irish Republic in 1961-62 (*U.N. Demographic Yearbook, 1964*). This adjustment was designed to allow for the older average age of Catholic females at marriage, and the slower rate of fertility decline with increasing age of marriage. For various reasons, however, such as the greater availability of social welfare, these features were assumed to be less pronounced among Northern Ireland Catholics than amongst the population of the Irish Republic. Having once obtained the distribution of Catholic births according to mother's age, the estimation of the non-Catholic distribution was straightforward. The estimated age-specific fertility rates thus obtained are given in Table 4.¹⁵ These rates were modified for inclusion in the projection by the procedure outlined above.

The survivorship ratios were calculated from the 1964 abridged life table for Northern Ireland (Registrar General's Annual Report, 1964). Those for the population over the age of 85 were derived from the full life table of 1951. These ratios were adjusted according to the age-specific migration rates presented in Table 2.

14. The data relate to women marrying before the age of 45, plus remarried, widowed and divorced women whose first or only marriages last to age 45. Illegitimate births and births to women remarrying before the age of 45 are thus not recorded. In addition, religious denomination is not recorded.

15. Evidence is available for Belfast (Medical Officer of Health) that, over the period 1958-1968, the age at which the maximum incidence of births has occurred has shifted from the 25-29 to the 20-24 age group. If this trend were restricted to Belfast it would still have an effect on births in the Province as a whole, and allowance has been made for this in the modification of the age-specific fertility rates.

TABLE 4: *Estimated annual age specific fertility rates 1961-66 per thousand female population*

<i>Age Group</i>	<i>Catholic</i>	<i>Other Denominations</i>
15-19	12	15
20-24	122	154
25-29	251	193
30-34	259	136
35-39	200	66
40-44	82	27
45-49	6	3

Results

Although not the prime aim of the analysis, we can obtain various estimates of future absolute population size in Northern Ireland from the eight projections. These figures are of interest, for unlike the forecasts provided by the Government Actuary, the estimated population sizes of each community are also recorded and are given for the years 1986 and 2001 in Tables 5*a* and 5*b*. With the exception of Projection 1, from which we have excluded migration, our projected figures for the total population of the Province at each of these two years are slightly lower than those suggested by the Government Actuary. When broken down by major age-group, our estimates always give a lower population for the 15-39 age-group, but higher figures for the population over the age of 40. The size of the 0-14 age-group is almost always lower by our projections. These discrepancies appear consistent with the adoption of fundamentally different assumptions concerning the age distribution of net migration, the authors assuming a greater concentration of net movement in the young adult age-group than was assumed by the Government Actuary.

Concerning the estimated population sizes of the two communities, none of the projections indicate a Catholic population majority by the year 2001. Projections 1, 3, 5, 6 and 7, however, show Catholics outnumbering non-Catholics in the population under the age of 15. An additional point of interest is that a comparison of projections 1 and 2 suggests a loss of 455 and 225 thousand persons, from the Catholic and non-Catholic population respectively, between 1966 and 2001 through the direct and indirect (losses of potential births) effects of migration.

The intrinsic rates of female population change associated with our projections provide us with some very useful summary information concerning the ultimate relative strength of Catholics in the population of the Province (Table 6). These rates are derived from the stable populations associated with each of the eight projections, the age structures of which are given in Table 7. It should be noted, however, that the so-called "intrinsic crude death rate" is a true intrinsic death rate only in the case of projection 1. Regarding the other projections, a more

TABLE 5a: The Population of Northern Ireland in 1986 derived from Projections 1-8 (in 000's)

Age Group	Projection 1			Projection 2			Projection 3			Projection 4		
	Catholic	Non-Catholic	Total	Catholic	Non-Catholic	Total	Catholic	Non-Catholic	Total	Catholic	Non-Catholic	Total
0-14	324	319	643	239	283	522	255	283	538	230	283	513
15-39	322	417	739	221	356	577	257	356	613	254	356	610
40-64	152	294	446	128	274	402	132	274	406	132	274	406
65+	65	149	214	64	149	213	64	149	213	64	149	213
20-100	459	764	1,223	352	694	1,046	387	694	1,081	387	694	1,081
0-100	862	1,178	2,040	652	1,062	1,714	709	1,062	1,771	681	1,062	1,743
Age Group	Projection 5			Projection 6			Projection 7			Projection 8		
	Catholic	Non-Catholic	Total	Catholic	Non-Catholic	Total	Catholic	Non-Catholic	Total	Catholic	Non-Catholic	Total
0-14	245	281	526	230	261	491	239	261	500	239	281	520
15-39	231	350	581	254	366	620	221	366	587	221	350	571
40-64	130	274	404	132	276	408	128	276	404	128	274	402
65+	65	148	213	64	150	214	64	150	214	64	148	212
20-100	363	687	1,050	387	708	1,095	352	708	1,060	352	687	1,039
0-100	671	1,052	1,723	681	1,054	1,735	652	1,054	1,706	652	1,052	1,704

Government Actuary Estimate
1985

0-14	521
15-39	624
39-64	396
65+	189
0-100	1,730
20-100	1,053

Source: Digest of Statistics, March, 1969, Table 5, H.M.S.O., Belfast.

TABLE 5b: The Population of Northern Ireland in 2001 derived from Projections 1-8 (in '000's)

Age Group	Projection 1			Projection 2			Projection 3			Projection 4		
	Catholic	Non-Catholic	Total	Catholic	Non-Catholic	Total	Catholic	Non-Catholic	Total	Catholic	Non-Catholic	Total
0-14	458	376	834	291	313	604	351	313	664	264	313	577
15-39	469	498	967	265	395	661	339	395	734	314	395	709
40-64	235	347	581	153	291	444	177	291	468	177	291	468
65+	71	148	218	67	145	212	68	145	213	68	145	213
20-100	652	882	1,535	410	739	1,150	453	739	1,192	480	739	1,219
0-100	1,232	1,368	2,600	777	1,144	1,921	852	1,144	1,996	823	1,144	1,967
Age Group	Projection 5			Projection 6			Projection 7			Projection 8		
	Catholic	Non-Catholic	Total	Catholic	Non-Catholic	Total	Catholic	Non-Catholic	Total	Catholic	Non-Catholic	Total
0-14	316	304	620	264	260	524	291	260	551	291	304	595
15-39	294	380	674	314	391	705	265	391	656	265	380	645
40-64	158	286	444	177	301	478	153	301	454	153	286	439
65+	68	144	212	68	147	215	67	147	214	67	144	211
20-100	440	720	1,160	480	756	1,236	410	756	1,166	410	720	1,130
0-100	836	1,113	1,949	823	1,099	1,922	777	1,099	1,876	777	1,113	1,890
<i>Government Actuary Estimate</i>												
2000												
0-14	651											
15-39	759											
39-64	461											
65+	196											
0-100	2,067											
20-100	1,235											

Source: Digest of Statistics, March, 1969, Table 5, H.M.S.O., Belfast.

correct term would be the intrinsic crude rate of population loss resulting from both mortality and emigration. Correspondingly, the only true intrinsic rate of natural increase relates to projection 1, the others strictly being intrinsic rates of actual population change. Inspection of Table 6 demonstrates conclusively that the Catholic population will eventually exceed the non-Catholic population under

TABLE 6: *Intrinsic Rates of Female Population Change derived from Projections 1-8**

Projection	Catholic females			Non-Catholic females		
	Intrinsic Birth Rate	Intrinsic Death Rate	Intrinsic rate of change	Intrinsic Birth Rate	Intrinsic Death Rate	Intrinsic rate of change
1	30.8	5.8	25.0	19.8	8.6	11.2
2	28.4	15.9	12.5	18.6	12.2	6.4
3	29.2	9.8	19.4	18.6	12.2	6.4
4	18.6	12.2	6.4	18.6	12.2	6.4
5	28.1	12.3	15.8	18.7	13.6	5.1
6	18.6	12.2	6.4	13.4	15.5	-2.1
7	28.4	15.9	12.5	13.4	15.5	-2.1
8	28.4	15.9	12.5	18.7	13.6	5.1

* These rates were calculated from vectors derived from high powers of the various female projection operators, i.e., the matrices f^N , using the technique developed by Keyfitz, *op. cit.*

every set of assumptions adopted here, with the possible exception of those relating to projection 4. In most cases the difference between the Catholic and non-Catholic intrinsic rates of change is considerable, the exact point in time at which the Catholic population overtakes the non-Catholic population being a direct function of this difference.¹⁶

The more detailed evolution of the estimated intercommunity population balances is given in Table 8 and in Figures 1 and 2. From these data we can make the following statements concerning each projection.

Projection 1. Catholics are shown as first exceeding non-Catholics in total population number by about the year 2010. Concerning the population of voting age, however, Catholics are not likely to form the majority until approximately 2020. Yet in 2020 there are still more non-Catholics suggested in the population

16. It is of interest that the implication of a reduction of one quarter in non-Catholic fertility between 1966 and 2001, even though partly offset by a similar reduction in net emigration, is for an eventual fall in the total non-Catholic population in the Province.

FIG. 1: PROJECTED PERCENTAGE OF ROMAN CATHOLICS IN THE TOTAL POPULATION OF N. IRELAND

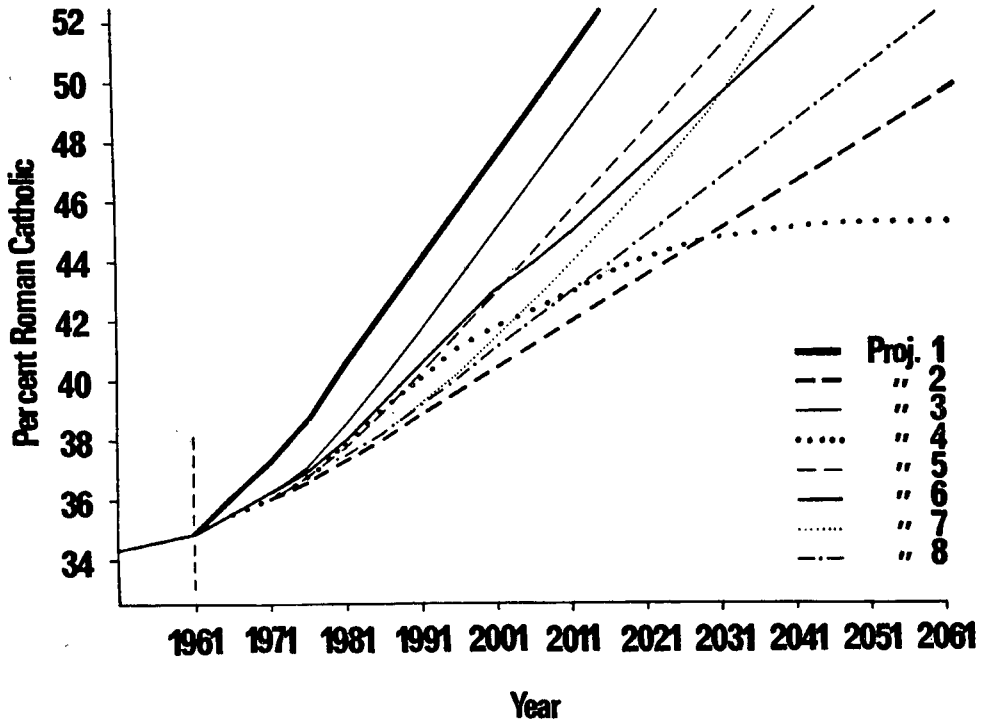


FIG. 2: PROJECTED PERCENTAGE OF ROMAN CATHOLICS IN THE POPULATION OF N. IRELAND AGED 20 AND OVER

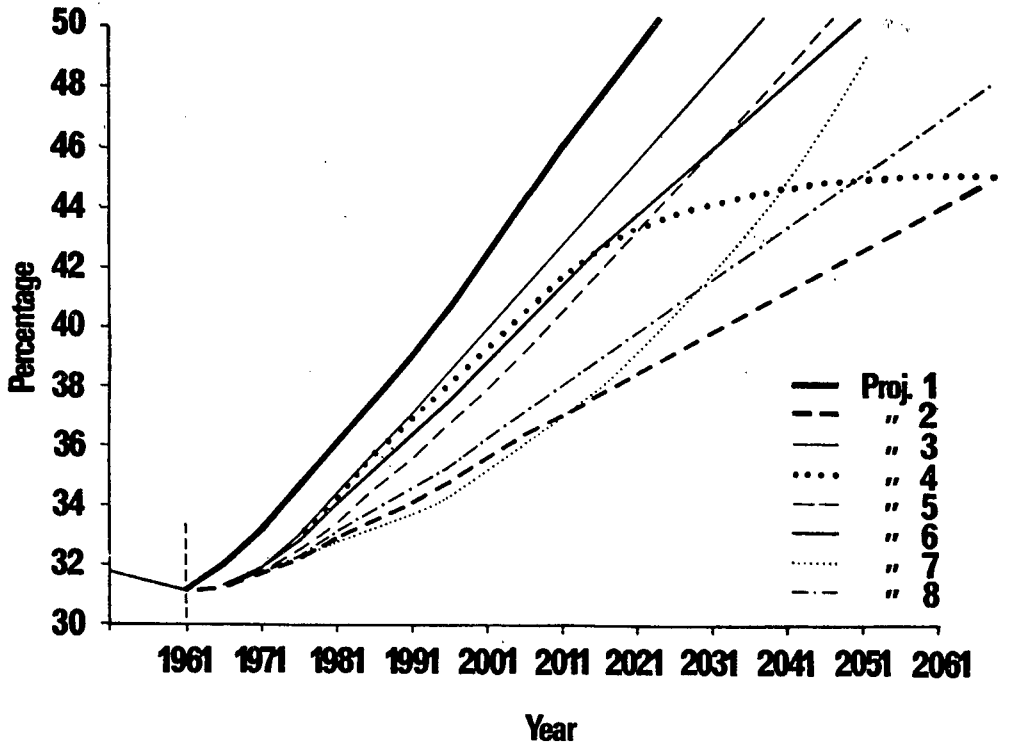


TABLE 7: Stable Age Structures derived from Projections 1-8. Female Population Only

Age Group	Projection 1		Projection 2		Projection 3 ¹	Projection 4 ¹	Projection 5		Projection 6 ²	Projection 7 ³	Projection 8 ¹
	Non-Catholic	Catholic	Non-Catholic	Catholic	Catholic	Catholic	Non-Catholic	Catholic	Non-Catholic	Non-Catholic	
0-4	13.9	9.6	13.1	9.4	13.5	9.4	13.4	9.3	6.7	9.3	
5-9	12.2	9.0	11.9	8.8	11.9	8.8	12.0	8.8	6.6	8.8	
10-14	10.8	8.5	11.1	8.5	10.8	8.5	11.0	8.5	6.6	8.5	
15-19	9.5	8.0	9.7	8.0	9.5	8.0	9.6	8.0	6.6	8.0	
20-24	8.4	7.6	7.5	7.2	8.0	7.2	7.7	7.1	6.3	7.1	
25-29	7.4	7.1	6.5	6.7	7.0	6.7	6.7	6.6	6.3	6.6	
30-34	6.5	6.7	5.9	6.4	6.3	6.4	6.0	6.3	6.2	6.3	
35-39	5.7	6.3	5.4	6.1	5.7	6.1	5.5	6.1	6.2	6.1	
40-44	5.0	5.9	4.8	5.8	5.0	5.8	4.9	5.8	6.2	5.8	
45-49	4.5	5.6	4.4	5.6	4.5	5.6	4.4	5.6	6.2	5.6	
50-54	3.8	5.2	3.9	5.2	4.0	5.2	3.9	5.3	6.1	5.3	
55-59	3.3	4.7	3.5	4.9	3.5	4.9	3.4	4.9	6.0	4.9	
60-64	2.8	4.3	3.4	4.5	3.0	4.5	3.3	4.6	5.7	4.6	
65-69	2.3	3.8	2.9	4.1	2.5	4.1	2.8	4.0	5.4	4.0	
70-74	1.7	3.1	2.4	3.5	2.0	3.5	2.3	3.5	4.8	3.5	
75-79	1.2	2.4	1.8	2.7	1.5	2.7	1.6	2.7	3.8	2.7	
80-84	0.7	1.5	1.2	1.7	0.9	1.7	1.0	1.9	2.7	1.9	
85-89	0.3	0.7	0.6	0.9	0.4	0.9	0.5	1.0	1.6	1.0	
0-14	36.8	27.0	36.2	26.6	36.1	26.6	36.3	26.5	20.0	26.5	
15-39	37.5	35.7	34.9	34.4	36.5	34.4	35.4	34.1	31.7	24.1	
40-64	19.3	25.7	20.1	26.1	20.0	26.1	19.9	26.2	30.2	26.2	
65-89	6.4	11.6	8.8	12.9	7.4	12.9	8.4	13.2	18.2	13.2	
20-89	53.7	65.0	54.2	65.4	54.4	65.4	54.2	65.5	73.4	65.5	

- (1) Non-Catholic age structures as for projection 2
- (2) Catholic age structure as for projection 4
- (3) Catholic age structure as for projection 2, Non-Catholic age structure as for projection 6.
- (4) Catholic age structure as for projection 2

TABLE 8: *Estimated Year of Catholic Majority in the Population of Northern Ireland*

Projection	Year Catholics first comprise 50 per cent of total population	Year Catholics first comprise 50 per cent of population over age 20
1	2011	2026
2	2066	2096
3	2016	2031
4	Never	Never
5	2031	2046
6	2036	2056
7	2031	2051
8	2046	2071

over the age of 40. At the opposite extreme, however, Catholics can be expected to form a majority in the population under the age of 15 as early as 1985. It should be noted that this projection is that most favourable from the Catholic point of view, though it is extremely unlikely that the assumptions will be met.

Projection 2. The time at which Catholics form a majority in the total population of the Province, assuming the indefinite continuation of current fertility and emigration rates, is very much delayed compared with projection 1, and does not occur until approximately the year 2060. In the population of voting age, non-Catholics are not outnumbered until the beginning of the 22nd Century. By comparison, Catholics are shown as forming a majority of the population under the age of 15 as early as 2010-15.

Projections 3, 5, 6, 7, 8. These projections can be combined for discussion since they differ only in the time at which they predict a Catholic population majority. The spread in years is rather wide, however, ranging from about 2015 to 2040 in the cases of projections 3 and 8 respectively.

Projection 4. This projection acts somewhat differently from those already discussed, in that at first it shows the Catholic population rapidly closing the size gap. At the passage into the 21st century, however, the rate of convergence slows and the Catholic population settles to constant at 45.5 per cent of the total population of the Province.

As has already been stressed, there is an infinite number of different assumptions concerning fertility and mortality that can be built into an analysis such as that presented here. The results that have come out, however, indicate that Catholics are not likely to form a majority in the population until well into the 21st century. Their attainment of a majority amongst the population of voting age is even further delayed. Yet it must be emphasized that the evolution of the intercommunity population balance as outlined is only as good as the assumptions on which it is based. One must not forget that the data deficiencies have not been

solved entirely satisfactorily. At the same time, events may take a completely different course from that envisaged, thus rendering spurious the population evolution suggested in this paper.

Beliefs as to future population proportions

The student groups were questioned on likely future developments in the proportion of Catholics and Protestants in the population of Northern Ireland. The results of this survey may be fruitfully compared with the authors' projected values.

TABLE 9: "It is said by some people that at a time in the future more than half the total population of Northern Ireland will be Roman Catholic. Do you agree?"

	<i>Queen's University</i>	<i>Stranmillis Training College</i>	<i>St. Mary's Training College</i>
Percentage Answering "Yes"	82.5	92.8	84.6
N=	103	83	52

In this case the percentage "Yes" for Stranmillis Training College is significantly greater than for the University and St Mary's Training College groups (0.01 level). For those that answered affirmatively a further question followed:

TABLE 10: "How many years from the present time do you think it will take for more than half the total population of Northern Ireland to be Roman Catholic?"

	<i>Queen's University</i>	<i>Stranmillis Training College</i>	<i>St. Mary's Training College</i>
Mean Number of Years	26.7	12.5	20.2
Median Number of Years	20	12	20
N=	85	77	44

Thus a very high proportion of the students sampled believe that Catholics will at some date in the future become a majority of the population. This expectation agrees with all our projections with the exception of number 4. When we examine the dates at which the student groups expect this to happen and compare their expectation with our projection results, considerable differences can be seen to exist, however. University students who think that Catholics will become a majority of the population believe, on average, that this will happen in about 27 years time, i.e., around the year 2000. The Training College students, on the other hand, expect it to occur between 13 and 20 years from now (i.e., between 1983 and 1990).

Overall, these figures demonstrate that the rate of change in the inter-community population balance is believed to be much greater than any rate used in our projections. This may be due to misperception of current change rates, or perhaps to fear of an undesired event (Protestant) or to hope for a desired event (Catholic). In addition, however, it is possible that student groups with an average age of 20 years may have short time horizons. To them the end of this century may seem a long time ahead.

Conclusion

Inadequacies in base data, and the inherent difficulties of foreseeing future changes in key demographic rates, make the exercise attempted in this paper a somewhat speculative one. On the other hand, the current importance of the religious intercommunity population balance in Northern Ireland, and its likely continued importance for sometime into the future, justify some attempt at estimating the nature of the balance over time.

The overall demographic trends suggest an *ultimate* Catholic majority in the population in Northern Ireland, and an *ultimate* voting majority of Catholics. However, the attainment of this condition is likely to take a much longer time than the student groups sampled appear to think. The current demographic balance between the two religious groups in Northern Ireland is likely to change only slowly. Perhaps the key lesson to be drawn from this estimate is that Protestant fears of becoming a demographic minority within the next half-century are greatly exaggerated. The corollary of this is that there is no short-run demographic solution to the "Northern Ireland Problem". This must encourage those forces in the community working for inter-group harmony. Perhaps the time will come when the religious intercommunity population balance in Northern Ireland will be politically irrelevant.

Acknowledgements

We would like to acknowledge the computational assistance of Miss J. Orr, and Messrs. T. Ashcroft and G. Bullock. We would also like to thank Miss M. Day and Mr. T. Kirk for their assistance with the student survey.