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COMPONENTS OF ELDERLY POPULATION CHANGE

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ABSTRACT

The paper develops simple methods for analyzing the components of change inherent in a multiregional population projection and applies those methods to the study of elderly population change in 20 United Kingdom regions. The pattern of current component change through mortality and migration (internal and external) is shown to be closely related to geographical location and urbanization class of the regions across all elderly age groups. The pattern of future "natural increase" of the elderly is shown to be closely related to past fertility and past migration history of the regions.

1. THE PROBLEM

Recently, the tools of multiregional population analysis have been used to study the migration behaviour and projected numbers of the elderly in a number of countries (for example, in the Multinational Comparative Study of Migration of the Elderly organized by Andrei Rogers). Relatively little attention has been given to analyzing the results of such multiregional projections (with the notable exceptions of Rogers, 1986 and Liaw, 1986). Here some some simple techniques are used to illuminate the projections of the elderly population for a set of regions over a medium term horizon.

Regional projections of the elderly consist of population stocks broken down into appropriate ages at successive points in time. Each regional elderly cohort (or group of people born in the same set of years) ages over a time interval and loses members through death, through out-migration to other parts of the same nation, and through emigration to other parts of the world. Each regional cohort gains members from other regions and other countries. Migration can result in gains to the regioal cohort or loss; mortality represents, however, purely losses which eventually lead to the complete attrition of the cohort.

These gains and losses to each regional cohort can be viewed as composed of two parts: the national change on the one hand and on the other the regional shift or departure of the region from the national norm. In this paper the techniques of shift-share analysis are partially adapted to describe the extent to which regional populations depart from national expectations.

Of course, the elderly population as a whole does not disappear. New recruits are provided in successive time intervals by persons attaining an elderly age, defined operationally in this paper to be age 60. The fluctuation over time in new recruits to the elderly population attaining their 60th birthdays will reflect both the fertility history of the regional population 60 years earlier and the processes of migration and differential mortality between birth and age 60. These fluctuations can be examined in relation to national trends, although a full decomposition into birth and subsequent components of change is not attempted here. It would require full knowledge of regional population accounts back to 1916!

The second section of the paper outlines the methods used for analysis of individual period-cohorts of the elderly population. These methods are then used to examine in section three the components of elderly population change across seven elderly period-cohorts for 20 United Kingdom regions (Figure 1) in a recent five year period (1976-81).

The fourth section of the paper develops indices of change for the whole elderly population (aged 60 and over) and specifies the notion of

"natural increase" for the elderly population. The next section, the fifth, then examines the likely fluctuations in this variable cohort size over the next 45 years across the 20 regions in relation to national trends.

The overall purpose of the paper is to measure for a set of regional elderly populations the contribution that past population history (as represented by the numbers attaining their 60th birthdays), mortality variation amongst regions (known to be quite marked in the UK compared with other developed countries - see Termote, 1986), and migration flows (known to have distinctive features - see Rees and Warnes, 1986a, 1986b) make to the future size of regional elderly populations.

2. A COMPONENTS FRAMEWORK FOR THE PERIOD-COHORT PERSPECTIVE

2.1 Gross and net components of population change

Adopting a projection viewpoint we work with the period-cohort framework (the stippled areas in Figure 3) for the observation of demographic events. The following variables are defined.

P_a^i = population of region i at the start of the time interval in period-cohort a (persons who are aged x to x+n at time t and are, given survival, aged x+n to x+2n at time t+T, where n is the age interval and is equal to the time interval, T).

D_a^i = deaths in region i to the period-cohort a in the time interval.

M_a^{ij} = (internal) migrations from region i to region j by persons in period-cohort a.

E_a^i = emigrations from region i to other countries by persons in period-cohort a.

I_a^i = immigrations to region i from other countries by persons in period-cohort a.

$P_a^{.i}$ = population of region i at the end of the time interval in period-cohort a.

Initial and final populations in period-cohort a are linked by the following accounting identity

$$P^{.i}_{a} = P^{i.}_{a} - D^{i}_{a} - \sum_{j \neq i} M^{ij}_{a} - E^{i}_{a} + \sum_{i \neq j} M^{ji}_{a} + I^{i}_{a} \qquad (1)$$

These components of change can be simplified into net internal migration

$$N^{i}_{a}(I) = \sum_{j \neq i} M^{ji}_{a} - \sum_{i \neq j} M^{ij}_{a} \qquad (2)$$

and net external migration

$$N^{i}_{a}(E) = I^{i}_{a} - E^{i}_{a} \qquad (3)$$

or total net migration

$$N^{i}_{a} = N^{i}_{a}(I) + N^{i}_{a}(E) \qquad (4)$$

so that the accounting identity reads

$$P^{.i}_{a} = P^{i.}_{a} - D^{i}_{a} + N^{i}_{a}(I) + N^{i}_{a}(E) \qquad (5)$$

or in simpler terms

$$P^{.i}_{a} = P^{i.}_{a} - D^{i}_{a} + N^{i}_{a} \qquad (6)$$

2.2 National components and regional shifts

Parallel to these regional relations we can define the equivalent national variables

$$P^{N.}_{a} = \sum_{i} P^{i}_{a} \qquad (7)$$

$$D_a^N = \sum_i D_{ia} \tag{8}$$

$$M_a^N = \sum_{i \neq j} \sum_{j \neq i} M_{ija} = \sum_{j \neq i} \sum_{i \neq j} M_{jia} \tag{9}$$

$$E_a^N = \sum_i E_{ia} \tag{10}$$

$$I_a^N = \sum_i .I_a \tag{11}$$

Adopting the average population as the population at risk

$$P_a^i = (P_a^{i.} + P_a^{.i}) / 2 \tag{12}$$

$$P_a^N = \sum_i P_{ia} \tag{13}$$

We can define the national rates for each component to be

$$d_a^N = D_a^N / P_a^N \tag{14}$$

$$m_a^N = M_a^N / P_a^N \tag{15}$$

$$e_a^N = E_a^N / P_a^N \tag{16}$$

$$i_a^N = I_a^N / P_a^N \tag{17}.$$

Each regional component can be decomposed into a national portion and a regional shift:

$$D_a^i = d_a^N P_a^i + D_a^i (R) \quad (18)$$

$$M_a^{i.} = m_a^N P_a^i + M_a^{i\,OUT} (R) \quad (19)$$

$$E_a^i = e_a^N P_a^i + E_a^i (R) \quad (20)$$

$$I_a^i = i_a^N P_a^i + I_a^i (R) \quad (21)$$

$$M_a^{.i} = m_a^N P_a^i + M_a^{i\,IN} (R) \quad (22)$$

The national parts consist of the regional population at risk multiplied by the national rate for the event concerned. The national part is that change for the component expected if the region reproduced national rates of change. Regional shifts represent the change peculiar to the region itself and are computed as residuals rearranging equations (18) through (22) thus

$$D_a^i (R) = D_a^i - d_a^N P_a^i \quad (23)$$

$$M_a^{i\,OUT} = M_a^{i.} - m_a^N P_a^i \quad (24)$$

$$E_a^i (R) = E_a^i - e_a^N P_a^i \quad (25)$$

$$I_a^i (R) = I_a^i - i_a^i P_a^i \quad (26)$$

$$M_a^{i\,IN} = M_a^{.i} - m_a^N P_a^i \quad (27)$$

Another way of expressing these shifts is as differences between the

national and regional rates

$$D_a^i = (d_a^i - d_a^N) P_a^i \quad (28)$$

$$M_a^{i\,OUT}(R) = (m_a^{i\cdot} - m_a^N) P_a^i \quad (29)$$

$$E_a^i(R) = (e_a^i - e_a^N) P_a^i \quad (30)$$

$$I_a^i(R) = (i_a^i - i_a^N) P_a^i \quad (31)$$

$$M_a^{i\,IN}(R) = (m_a^{\cdot i} - m_a^N) P_a^i \quad (32)$$

where d_a^i, $m_a^{i\cdot}$, e_a^i, i_a^i and $m_a^{\cdot i}$ are defined in the same way as the national rates in equations (14) to (17), substituting label i for label N.

The ratio of regional to national rates when multiplied by 100 gives us sets of standardized rates

standardized rates = 100 (regional rate / national rate) (33)

in which the national mean is 100, rates above 100 indicates greater than average rates and less than 100 indicates less than average.

The shifts for the gross components can be reduced to net shifts

$$P_a^{\cdot i} = P_a^{i\cdot} - (d_a^N P_a^i + D_a^i(R))$$

$$+ [(m_a^N P_a^i + M_a^i(R)) - (m_a^N P_a^i + M_a^{i\,OUT}(R))]$$

$$+ [(i_a^N P_a^i + i_a^i(R)) - (e_a^N P_a^i + E_a^i(R)] \quad (34).$$

The net shift for the internal migration component reduces to the observed net internal migration. Each of these three net shifts can be expressed as a percentage of the total absolute value of the net shifts to yield an assessment of the contribution of mortality differentials, internal migration flows or external migration differentials to the observed departure of regional population change from the national norm.

Parenthetically, we may note that the structural shift identified in shift-share analysis is absent in this procedure because the "sectoral" dimension (age) is retained. However, the structural concept can be introduced when the elderly as a whole are considered.

2.3 An illustration

Tables 1 through 7 set out the illustrative arithmetic of the components analysis described above for 20 UK regions (see Figure 1 for the key to the region abbreviations). These components derive from sets of multiregional movement accounts described in Rees (1986).

Picking out one region as an example, one can see that the population of 60-64 year olds in Greater Manchester (GM) in 1981 is the result of a reduction of the 55-59 population there in 1976 of 153,500 by 12,326 deaths, 469 emigrations and 6,395 out-migrations to other parts of the UK, partially compensated for by the addition of 253 immigrations from abroad and 3,840 internal migrations from other British regions (Table 1).

Table 2 shows that the population reduction of 15,097 in this period-cohort in Greater Manchester is made up of 12,326 deaths, a net external migration loss of 216, a net internal migration loss of 2,555 and therefore a net overall loss due to migration of 2,771.

Table 3 expresses both the gross and net components of change as annual equivalent rates per 1000 average population in the time interval (1976-81). Greater Manchester's death rate is 16.89 per 1000 in the 55-59 to 60-64 period-cohort and the internal migration rate is just over half this level at 8.76 per 1000. The internal in-migration rate is lower at 5.26 per 1000 and the external and net migration rates much smaller.

The standardized rates of Table 4 place Greater Manchester in relation to the nation. The rate of population decline is 36.7 per cent greater than that of the UK; the death rate is 13.9 per cent higher; all the migration rates are lower than the national norms but, because the in-migration rates are lower than the out-migration rates, migration loss contributes 22.8 per cent to the standardized population change rate.

The pattern of population change expected if each region exactly mirrored the nation is set out in Table 5. By assumption all internal

migration flows balance. In Greater Manchester's case there are many fewer deaths (10,826) under these utopian conditions than we actually observe (15,097).

Subtraction of the expected components in Table 5 from the observed components of Tables 1 and 2 yields the regional shifts (or departures from the national norm) of Table 6. Greater Manchester has 1,500 more deaths, 320 less emigrations, 319 less immigrations, 1611 less internal out-migrations and 4,166 less internal in-migrations than it would have if it reproduced national demographic behaviour. The net shift of internal migration is a loss of 2,555, but a tiny positive shift in external migration is recorded (although a glance at Table 2 shows that the region loses through external migration but slightly less strongly than the nation).

The percentage contributions of the net shifts to an absolute value sum of those shifts are set out in Table 7. Some 63% of the depression of Greater Manchester's population below that of the nation is due to internal migration and 37% to higher mortality.

3. SHIFTS IN COMPONENTS ACROSS THE ELDERLY AGES

3.1 A classification of shifts in the components of change

In a previous analysis (Rees and Warnes, 1986a, Table 19; Rees and Warnes, 1986b, Figure 11), a simple classification of the pattern of elderly population change was developed based on the direction of shift (positive or negative) for the deaths, net internal and net external migration components. Eight types of change were distinguished in relation to the national norm (Table 8). The classification represents, in part, a gradation from most favoured region (in demographic terms) to least. For example, type A regions experience fewer deaths than the nation, gain through internal migration and show positive shifts in external migration (and often gains). For the period-cohort 55-59 to 60-64 in 1976-81 Tabble 9 shows the regions belonging to each type of shift combination.

To what extent is this picture of population change, based on the youngest elderly period-cohort, established in earlier papers, characteristic of other elderly period-cohorts in which most members will have retired? Table 10 sets the population shift types into which each region's population falls for seven elderly period-cohorts. The classification of the first column has already been reported in Table 9. There is a fair measure of agreement across the age groups in the pattern of population shift. Eight of the 20 regions retain the same classification across all age groups, and five more show only one deviation from a common pattern. There are thus seven regions which show

variation in population shift type across the age groups.

The East Anglian population moves from positive to negative shifts for net external migration from age 79-74 (in 1976), although the numbers involved are very small. The East Midlands population experiences a worse than national average risk of mortality for age groups 70-74 to 80-84 (in 1976), although the standardized mortality rates are only 1 per cent or so above the national average. The Welsh population exhibits a transition from net internal migration gains and positive external shift to net internal losses and negative external shift as more aged populations are considered. Around retirement the region is attractive to migrants but not beyond age 70. The North West Remainder's population shows variation in the internal migration component - gains from ages 55-59 to 60-64 (in 1976), losses from 65-69 to 75-79, and then gains again in the 80-84 and 85+ age groups. A somewhat similar pattern occurs for the North Remainder's population but along with a pattern of negative external migration shift. For Northern Ireland the deaths and internal migration shifts remain constantly negative but the relatively small external component varies between positive and negative. Finally, Central Clydeside shows positive external migration shifts in the 60-64 and 65-69 age groups (in 1976): the balance of external migration remains negative, however, in both these age groups.

Overall, the changes that take place are confined to one component, and a majority involve the rather small and least reliably estimated external migration flows. The pattern of Table 9 (and Figure 11 of Rees and Warnes, 1986b) is not greatly altered when we use all the elderly ages. The West Midlands Remainder moves to type E, the North Remainder to type H, but otherwise there is agreement.

To generalize, the pattern of mortality shift is one of a regional gradient from South and East regions (favoured) to North and West regions (unfavoured). The pattern of internal migration is one of a metropolitan (unfavoured) to non-metropolitan (favoured) gradient. The pattern of external migration is one of positive shifts for non-metropolitan regions and for the mid-northern metroplitan counties which have been important destinations for overseas immigration in the past.

3.2 The size of shifts in the components of change

The classificatory analysis disguises somewhat the systematic change in the absolute size of changes as the population ages, and the change in the relative contribution of the different components of change. The older cohorts are much smaller than the younger, and much more subject to the influence of mortality. Figure 2 illustrates these age effects for Greater London and the South West. The internal migration gains and losses are dominant in the first three age groups and are relatively

unimportant after age 75. Mortality shifts rise to the 70-74 to 75-79 period-cohort as mortality rates rise faster than the populations at risk diminish but thereafter the shift diminish as the population reduces rapidly. External migration shifts contribute only marginally and only in the first three period-cohorts.

The relative contribution of the deaths shift to the absolute value of the deaths and net migration shifts added together is listed in Table 11. The sign indicates whether regional deaths are less than the national norm (negative) or more than it (positive). After age 70-74 the contribution of the deaths shift dominates but in the first three age groups the situation is very variable. In the "deepest north", in Central Clydeside, Scotland Remainder, Northern Ireland, Tyne and Wear and North Remainder, the greatest contribution (more than 50%) to greater than average population attrition comes from the regions' poor mortality performance. For most other non-metropolitan regions migration gains play the biggest role in redducing population losses below the national average. In Greater London and Birmingham the migration loss component is dominant, and in the Outer Metropolitan Area the deaths shift predominates. The picture varies in the other regions over the first three age groups.

4. A COMPONENTS FRAMEWORK FOR THE PERIOD-AGE PERSPECTIVE

The analysis described in the previous two sections involves semi-closed populations that do not replace themselves, but merely exchange populations among themselves. Elderly cohorts disappear quite quickly over time. An alternative perspective is to use an open system in which the elderly population is replaced by new recruits. The new recruits are persons attaining the starting age assigned to the elderly population. These new recruits are the elderly equivalent of new infants in the population as a whole.

Here, the starting age is defined as a person's 60th birthday and attention is focussed on the elderly population as a whole across future years. In Figure 3 is shown the age-time plan used. The components of change for ages 60 and over are estimated by addition of the six oldest period-cohorts and half of the 55-59 to 60-64 period-cohort:

$$P^{i.}_{60+} = \sum_{a=2}^{7} P^{i.}_{a} \qquad (34)$$

$$D^{i}_{60+} = \left(D^{i}_{1} \right) /2 + \sum_{a=2}^{7} D^{i}_{a} \qquad (35)$$

$$M^{i\,OUT}_{60+} = \left(M^{i\,OUT}_{1} \right) /2 + \sum_{a=2}^{7} M^{i\,OUT}_{a} \qquad (36)$$

$$E^{i}_{60+} = \left(E^{i}_{1} \right) /2 + \sum_{a=2}^{7} E^{i}_{a} \qquad (37)$$

$$B^{i}_{60+} = \left(P^{i.}_{1} + P^{.i}_{1} \right) /2 \qquad (38)$$

$$M^{i\,IN}_{60+} = \left(M^{i\,IN}_{60+} \right) /2 + \sum_{a=2}^{7} M^{i\,IN}_{a} \qquad (39)$$

$$I^{i}_{60+} = \left(I^{i}_{1} \right) /2 + \sum_{a=2}^{7} I^{i}_{a} \qquad (40)$$

$$P^{.i}_{60+} = \sum_{a=1}^{7} P^{.i}_{a} \qquad (41)$$

where a = 1 refers to the 55-59 to 60-64 period-cohort, a = 2 refers to the 60-64 to 65-69 period cohort and so on to a = 7, which refers to the 85+ to 90+ period-cohort. Table 12 sets these aggregate figures, adding a 60th birthdays column to those which appeared in Table 1. Note that for the Greater Manchester population the number of such new entrants exceeds the losses due to deaths but not those due to deaths and migration combined. Table 13 contains the net components of change for the population aged 60 and over. The new additional column is labelled "natural increase" and is computed thus

$$F^{i}_{60+} = B^{i}_{60+} - D^{i}_{60+} \qquad (42).$$

Over the 1976-81 period the surplus of new entrants over deaths was some 220 thousand for the United Kingdom as a whole. In only two regions was this surplus negative, and in only four regions were the natural surpluses exceeded by migration losses. Table 15 computes the annual equivalent rates per 1000 for both gross and net components.

It is necessary not to take the term "natural increase" too literally. The number of persons attaining their 60th birthdays in a region depends both on the number born there and the subsequent history of all regional cohorts. As mentioned in section 1 the task of linking the elderly back

to their birth regions is not attempted in this paper. What it is possible to do, however, is to peer into the future through a projection exercise. This makes possible the assessment of the influence of past population history, as represented by the regional distribution of 60 year olds in 5 year periods from 1976-81 to 2026-31, on fluctuations in the regional elderly populations. These fluctuations, due in the main to temporal variation in the size of birth cohorts in the past, have a profound impact on the national aged population (see Rees and Warnes, 1986b, section 7.1). In section 5 the regional impacts are described, focussing on the balance of 60th birthdays and deaths. Since the projections used assume constant mortality and migration rates over the period of the projections, the patterns of such change replicate those described for the base period, 1976-81, in section 3.

5. THE BALANCE OF 60TH BIRTHDAYS AND ELDERLY DEATHS TO 2031

The "natural increase" rates or NIRs (named thus for the sake of convenience) for the 20 UK regions and the nation are graphed from 1976 to 2031 in Figure 4. The national pattern follows quite closely that of the projected population of 60-64 year olds (Rees and Warnes, 1986a, Figure 6) - the deaths part of the "natural increase" calculation follows a much smoother trend as it involves the whole elderly population. Figure 3 enables us to match those fluctuations with earlier fertility phases. The fall from 1976-81 to 1991-96 matches the fertility drop from 1916-21 to 1931-36; low NIR levels in 1996-2001 match continuing low birth numbers in 1936-41; rising NIRs in 2001-06 and 2006-11 correspond with the increasing births of the later Second World War years and the post-war baby boom (particularly 1947); the fall in 2011-16 reflects the trough for births in the early 1950's; the rise to 2012-26 and high level in 2026-31 represents the sustained fertility rise of the late 1950's and high fertility of the 1960's (only in 1971 did the total fertility rate drop back to replacement).

The graphs for the regions have been arranged in groups corresponding roughly to the component shift groups identified in section 3, since the possibility exists of links between migration flow patterns and "natural increase" patterns. Here several links are suggested in interpreting regional departures from the national trends, although ideally all need further careful verification. There are also clearly links to past regional fertility history. The discussion focusses on the most extreme patterns of NIR fluctuation.

Northern Ireland. In 1976-81 the Northern Ireland elderly NIR is close to the UK figure, but it successively departs from it as time goes on, reflecting the arrival at their 60th birthdays of larger and larger

cohorts. In the last 15 years of the projection period Northern Ireland elderly NIRs are double those for the UK as a whole.

Outer Metropolitan Area. This region exhibits NIRs well above the national norm but they tend to converge over time towards those of the UK. Here the explanation is not that regional fertility was higher than that of the nation but rather lies in the history of migration to the region. Persons attaining their 60th birthdays in the region in 1976-2001 were in their 20s and 30s in the period 1926-71 which saw massive expansion of suburbs, new towns, commuter settlements and industrial satellites in this peri-metropolitan belt wwhich drew in large numbers of in-migrants. This bulge of in-migrants become the elderly of the region in the rest of the century and sustain the "natural increase" of the belt. The convergence of Outer Metropolitan and national NIRs in the 2001-2031 period reflects the lesser growth rate in the region in the 1970's and the migration pattern of the 1976-91 base period.

Outer South East. Until 2001 this region experiences negative NIRs. The number of deaths occurring in the region to persons 60 and over exceeds the numbers attaining age 60 in the region. This situation is fairly general in 1986-2001 but not in 1976-86. The excess of deaths probably reflects the considerable migration, after age 60, into the region making the 60+ population much larger than an "ageing in situ" of the population attaining age 60 would sustain.

Central Clydeside. Up to the end of the century, Central Clydeside's NIRs do not depart from the national trend by much, but after 2001 they all substantially below the UK average. Persons attaining age 60 in 2001-2031 will have been in their 20s and 30s in the 1961-2001 period, during which sustained out-migration from Greater Glasgow has occurred and is likely to occur. In part, this reflects suburbanization moving beyond the boundary of Central Clydeside, but also results from the process of abandonment of a devastated urban economy.

These remarks apply also, although in lesser measure, to Tyne and Wear, Merseyside and Greater Manchester, but not to the West Midlands metropolitan county where a history of higher past fertility and an attractiveness to migrants persisting into the 1950s plays a role in keeping the region's NIRs above those of the UK.

Greater London. The national capital exhibits higher NIRs than the nation throughout the projection period. Here the factor at work is probably the massive retirement migration stream out of the metropolis after age 60 which reduces the size of the elderly population well below that which an "ageing in situ" of those attaining their 60th birthdays would sustain.

6. CONCLUSIONS

The interpretation and explanation of the short and medium term future size of and fluctuations in regional elderly populations are thus complex tasks involving subtle interactions between past population history and current population dynamics. Past concern with long run multiregional population outcomes (e.g. Liaw 1986) has perhaps been at the expense of examining short and medium run futures. In this paper some simple methods have been outlined and employed to unravel projections of regional populations by investigating in detail the underlying components of change.

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COMPONENTS OF CHANGE FOR THE ELDERLY POPULATION OF THE UK

Period = 1 Years = 1976-1981
Age transition = 55-59 to 60-64

TABLE 1. Gross components of change: observed

Zone	Initial popn.	Deaths	Emigr.	Immigr.	Total int.out migr.	Total int.in migr.	Final
NI	74600	6049	224	93	1143	636	68113
CC	100100	9196	554	290	7097	7224	89777
SR	180600	14759	720	770	4059	5808	167640
TW	69400	5987	238	79	2698	1310	62456
NR	107600	9048	369	206	4079	4508	99018
SY	77100	5914	170	108	2254	1734	70604
WY	117600	9016	332	198	4442	3104	107112
YH	84000	5801	267	322	3565	5139	79828
EM	207300	14443	597	428	7722	9530	194496
EA	97700	5772	512	441	4800	10334	97385
OS	249400	15311	1548	1376	17987	25683	241613
OM	286200	17404	2268	1442	26365	26891	268496
GL	422800	27155	4917	2766	33880	12764	372378
SW	247000	15475	1060	1166	12128	21534	241037
WC	158500	12205	448	251	8087	3472	141483
WR	130200	9182	385	613	7020	9190	123416
GM	153500	12326	469	253	6395	3840	138403
ME	87400	7302	315	159	4491	2578	79029
NW	130900	9856	505	517	7170	9224	122110
WA	163600	12646	494	309	4972	7267	153154
UK	3145900	224837	16592	11877	166270	166270	2916548

Key to UK regions in tables

NI	=	Northern Ireland	OS	=	Outer South East
CC	=	Central Clydeside	OM	=	Outer Metropolitan Area
SR	=	Scottish Remainder	GL	=	Greater London
TW	=	Tyne and Wear	SW	=	South West
NR	=	North Remainder	WC	=	West Midlands metro county
SY	=	South Yorkshire	WR	=	West Midlands Remainder
WY	=	West Yorkshire	GM	=	Greater Manchester
YH	=	Yorkshire & Humberside Rem	ME	=	Merseyside
EM	=	East Midlands	NW	=	North West
EA	=	East Anglia	WA	=	Wales

COMPONENTS OF CHANGE FOR THE FAMILY POPULATION OF THE UK

Period = 1 Years = 1976-1981
Age transition = 55-59 to 60-64

TABLE 2. Net components of change observed

Zone	Average Popn.	Popn. change	Deaths (Neg.)	Extern. Migr.	Net Intern. Migr.	Total Migr.
NT	71457	-6697	-6049	-131	-507	-638
TC	94939	-10373	-9186	-264	-673	-1137
SP	174120	-12960	-14759	50	1749	1799
TW	65926	-6944	-5987	-159	-798	-957
NS	103409	-9792	-9048	-165	429	266
SY	73852	-6490	-5914	-62	-520	-582
NY	112356	-10488	-9016	-134	-1338	-1472
YH	81914	-4172	-5801	55	1574	1629
EM	200608	-12804	-14443	-169	1808	1639
EA	97543	-315	-5772	-71	5528	5457
JS	245507	-7797	-15311	-172	7696	7524
DM	277346	-17704	-17404	-520	520	-300
GL	397599	-50472	-27155	-2151	-21116	-23267
SW	244019	-5943	-15475	106	9406	9512
WC	149902	-17017	-12205	-197	-4615	-4812
WP	126808	-6734	-9182	228	2170	2398
WM	145952	-15097	-12326	-216	-2555	-2771
NE	82715	-9371	-7302	-156	-1915	-2069
NW	126505	-8790	-9856	12	1054	1066
NA	158377	-10446	-12646	-95	2295	2200
UK	3031224	-229352	-224837	-4515	0	-4515

COMPONENTS OF CHANGE FOR THE FLOPLY POPULATION OF THE UK

Period = 1 Years = 1976-1981
Age transition = 55-59 to 60-64

TABLE 3. Rates of change

Zone	Popn. Change	Death	Emigr.	Immig	Intern Out-Migr.	Intern In-Migr.	Net Extern Migr.	Net Intern Migr.
NT	-19.72	16.93	0.65	0.76	3.20	1.78	-.37	-1.42
CC	-21.75	19.35	1.17	0.61	6.52	4.69	-.56	-1.84
SR	-14.99	14.95	0.83	0.88	4.46	6.47	0.06	2.01
TV	-21.07	19.16	0.72	0.24	7.91	5.49	-.48	-2.42
NP	-16.98	17.50	0.71	0.40	7.89	8.72	-.32	0.83
SY	-17.59	16.02	0.46	0.29	6.10	4.70	-.17	-1.41
WY	-19.67	16.05	0.59	0.35	7.91	5.55	-.24	-2.36
YH	-10.19	14.16	0.65	0.79	8.70	12.55	0.13	3.84
EM	-13.75	14.38	0.59	0.43	7.69	9.49	-.17	1.80
EA	-.65	11.95	1.05	0.90	9.95	21.19	-.15	11.33
OS	-6.34	12.47	1.26	1.12	14.65	20.92	-.14	6.27
OM	-13.77	13.55	1.64	1.04	12.01	12.39	-.60	0.38
GL	-25.36	13.66	2.47	1.39	17.04	6.42	-1.08	-10.62
SW	-4.89	12.68	0.87	0.96	8.94	17.65	0.09	7.71
WC	-22.69	16.27	0.60	0.33	10.73	4.63	-.26	-6.15
WP	-10.70	14.46	0.61	0.97	11.07	14.49	0.36	3.42
GM	-20.69	16.99	0.64	0.35	8.76	5.26	-.30	-3.50
ME	-22.66	17.66	0.76	0.38	10.86	6.23	-.38	-4.63
NW	-13.90	15.58	0.90	0.82	11.34	13.00	0.02	1.67
WA	-13.19	15.97	0.62	0.50	6.28	9.18	-.12	2.90
UK	-15.13	14.95	1.08	0.76	10.97	10.97	-.30	0.00

ANALYSIS OF CHANGE FOR THE [illegible] POPULATION OF THE U

Period = 1 Years = 1976-1981
Age transition = 55-59 to 60-64

TABLE 4. Standardized rates of change (OF = 100)

one	Popn. Change	Death	Emigr.	Immig	Intern Out-migr.	Intern In-migr.
H	123.7	114.1	59.0	33.2	29.2	16.2
C	143.7	130.4	107.9	78.0	59.5	42.7
P	99.4	114.3	74.5	112.9	42.5	60.3
W	139.2	132.4	66.9	30.6	72.1	50.1
B	112.2	116.0	64.0	50.6	71.9	79.5
V	116.3	108.0	42.6	37.3	55.6	42.6
Y	123.4	108.2	54.6	45.0	72.1	50.4
H	67.3	95.5	60.3	190.3	79.3	114.4
M	84.2	96.9	55.0	54.4	70.1	96.5
A	4.3	79.3	97.1	115.4	89.9	193.1
S	41.9	84.1	116.6	143.0	133.6	190.7
M	84.4	94.6	151.2	132.7	173.3	176.8
L	167.6	92.1	228.7	177.6	155.4	58.5
N	53.3	95.5	80.3	122.0	90.6	160.9
C	140.9	109.7	55.9	42.7	98.3	42.2
P	70.7	97.6	56.1	123.4	100.9	132.1
M	136.7	113.9	59.4	44.2	79.9	46.0
E	149.7	119.0	70.4	49.1	99.0	56.8
W	91.9	105.0	73.8	104.3	103.3	118.5
A	87.2	107.6	57.7	64.3	57.2	85.7
K	100.0	100.0	100.0	100.0	100.0	100.0

COMPONENTS OF CHANGE FOR THE FLOATING POPULATION OF THE UK

Period = 1 Years = 1976-1981
Age transition = 55-59 to 60-64

TABLE 5. Expected components of change

Zone	Popn. Change	Death	Emigr.	Immig	Intern Out-Migr.	Intern In-Migr.	Net Extern Migr.	Net Intern Migr.
NT	-5407	5300	386	290	3920	3920	-196	0
CC	-7195	7042	513	372	5206	5206	-141	0
SR	-13174	12915	942	682	9551	9551	-259	0
TW	-4998	4890	357	258	3616	3616	-99	0
NP	-7824	7670	559	405	5672	5672	-154	0
SY	-5598	5478	399	289	4051	4051	-110	0
WY	-8501	8334	606	440	6163	6163	-167	0
YH	-6198	6076	443	321	4493	4493	-122	0
EM	-15201	14901	1086	787	11020	11020	-299	0
EA	-7380	7235	527	382	5350	5350	-145	0
OS	-19576	19210	1398	962	13467	13467	-366	0
OM	-20985	20572	1500	1087	15213	15213	-413	0
GI	-30083	29491	2150	1558	21809	21809	-592	0
SW	-18465	18190	1320	956	13395	13395	-363	0
WC	-11349	11125	811	588	8227	8227	-223	0
WP	-9595	9406	686	497	6950	6950	-189	0
GM	-11043	10826	789	572	8006	8006	-217	0
MF	-6258	6135	447	324	4537	4537	-123	0
NW	-9572	9383	684	496	6939	6939	-188	0
WA	-11983	11747	856	621	8687	8687	-236	0
UK	-229352	224837	16392	11877	166270	166270	-4515	0

COMPONENTS OF CHANGE FOR THE CIVILIAN POPULATION OF THE UK

Period = 1 Years = 1977-1981
Age transition = 55-59 to 60-64

Table 6. Shifts in components of change

Zone	Popn. Change	Death	Emigr.	Immig	Intern Out-Migr.	Intern In-Migr.	Net Extern Migr.	Net Intern Migr.
I	-1280	749	-162	-197	-2777	-3284	-35	-507
C	-3140	2144	41	-92	-2411	-2984	-133	-573
D	214	1344	-222	98	-5492	-3743	309	1749
W	-1956	1027	-119	-179	-1006	-1806	-61	-798
D	-958	1578	-190	-199	-1593	-1164	-9	429
V	-908	436	-229	-191	-1797	-2317	48	-520
Y	-1997	692	-276	-242	-1721	-3059	33	-1338
H	2026	-275	-176	1	-928	646	177	1574
M	2397	-458	-489	-359	-3698	-1490	130	1808
A	7065	-1443	-15	59	-544	4934	74	5528
S	10789	-2809	220	414	4520	12216	194	7696
M	3291	-7168	768	355	11152	11678	-413	526
L	-20339	-2336	2767	1208	12071	-9045	-1559	-21116
W	12500	-2625	-260	210	-1257	9149	469	9406
C	-5668	1090	-363	-337	-140	-4755	26	-4615
E	2611	-224	-301	116	64	2234	417	2170
M	-4054	1500	-320	-319	-1611	-4166	1	-2555
F	-3113	1147	-132	-165	-46	-1959	-33	-1913
W	792	473	-179	21	231	1285	200	1054
A	1537	899	-362	-222	-3715	-1420	141	2295
K	0	0	0	0	0	0	0	0

COMPONENTS OF CHANGE FOR THE ELDERLY POPULATION OF THE UK

Period = 1 Years = 1976-1991
Age transition = 55-59 to 60-64

TABLE 7. Percentage contributions of shifts

Zone	Abs.Val. Shifts	Deaths	Net Extern. Migr.	Net Intern. Migr.
NT	1490	52.5	-1.9	-59.4
CC	3140	62.3	-5.9	-37.9
SD	3982	41.2	7.9	44.5
TW	1956	54.1	-5.1	-40.9
ND	1810	75.9	-.5	23.4
SY	1094	47.4	4.8	-51.9
WY	2053	53.2	1.5	-45.2
YH	2026	-13.4	9.1	77.7
EM	2397	-19.1	5.4	75.4
EA	7045	-29.2	1.1	79.2
OS	10789	-24.9	1.6	71.3
OM	4107	-77.1	-10.1	13.2
GL	25010	-9.3	-6.2	-84.4
SW	12500	-21.0	3.2	75.2
WC	5721	12.2	0.5	-87.7
WD	2611	-8.0	14.3	77.2
GM	4057	57.9	0.0	-57.0
ME	3113	57.5	-1.1	-61.5
NW	1727	27.4	11.6	61.0
WA	3334	24.9	4.2	69.9
UK	0	24.9	-4.0	0.0

TABLE 8. Types of regional population shifts

Type	Deaths	Internal migrations	External Migrations
A	Fewer	Gain	More
B	Fewer	Gain	Fewer
C	Fewer	Loss	More
D	Fewer	Loss	Fewer
E	More	Gain	More
F	More	Gain	Fewer
G	More	Loss	More
H	More	Loss	Fewer

TABLE 9. The 20 UK regions classified by population shift type and geographical class for ages 55-59 and 60-64, 1976-81

Type	North and West		South and East	
	Metro	Non-metro	Metro	Non-metro
A		Yorks & Humb Rem W. Midlands Rem		Outer South East South West East Anglia East Midlands
B			Outer Metro Area	
C				
D			Greater London	
E		North West Rem Scotland Rem Wales		
F		North Rem		
G	W. Midlands MC West Yorkshire South Yorkshire Greater Manchester			
H	Merseyside Tyne & Wear Central Clyside	Northern Ireland		

Note: the country is divided approximately on the line of the Severn-Wash into North and West and South and East

TABLE 10. Population shift type for 20 Uk regions for 7 period-cohorts (ages)

Region	Period-cohort (age group in 1976 - age group in 1981) 55-59 to 60-64	60-64 to 65-69	65-69 to 70-74	70-74 to 75-77	75-79 to 80-84	80-84 to 85-89	85+ to 90+
NON-METROPOLITAN REGIONS							
South and East							
Outer South East	A	A	A	A	A	A	A
South West	A	A	A	A	A	A	A
East Anglia	A	A	A	B	B	B	B
East Midlands	A	A	A	E	E	E	A
W. Midlands Rem	A	E	E	E	E	E	E
North and West							
Yorks & Humb Rem	A	A	A	E	A	A	A
Wales	E	E	E	F	H	H	H
Scotland Rem	E	E	E	E	E	E	A
North West Rem	E	E	G	G	G	E	E
North Rem	F	E	H	H	H	H	F
Northern Ireland	H	G	G	G	H	H	G
METROPOLITAN REGIONS							
South and East							
Outer Metro Area	B	B	B	B	B	F	B
Greater London	D	D	D	D	D	D	D
W. Midlands mc	G	G	G	G	G	G	G
North and West							
W. Yorkshire	G	G	G	G	G	G	G
S. Yorkshire	G	G	G	G	G	G	G
G. Manchester	G	H	G	G	G	G	G
Merseyside	H	H	H	H	H	H	H
Tyne & Wear	H	H	H	H	H	H	H
Central Clydeside	H	G	G	H	H	H	H

Notes: See Table 8 for definitions of the population shift types A-H

TABLE 11. Percentage contribution of the deaths shift to the absolute value of shifts in three components

Zone	55-59 to 60-64	60-64 to 65-69	65-69 to 70-74	70-74 to 75-79	75-79 to 80-84	80-84 to 85-89	85+ to 90+
NON-METROPOLITAN REGIONS							
Outer South East	-26.9	-31.0	-44.9	-63.9	-71.4	-73.8	-87.4
South West	-21.0	-24.6	-41.1	-71.6	-79.1	-79.4	-80.5
East Anglia	-20.7	-21.0	-28.1	-53.1	-59.6	-62.7	-82.3
Wales	26.9	41.5	61.0	84.4	92.5	88.9	93.0
East Midlands	-19.1	-17.4	-11.3	7.7	53.5	57.7	-77.7
Scotland Rem	47.3	60.2	68.4	81.7	89.3	89.7	-81.6
West Midlands Rem	-8.0	8.5	19.5	40.4	51.2	66.8	83.7
N. West Rem	27.4	46.9	96.6	93.3	97.1	98.4	99.2
Yorks & Humb Rem	-13.6	-13.2	-5.3	52.7	-60.5	-78.8	-83.5
North Rem	75.9	75.8	95.8	94.4	95.8	97.0	99.5
METROPOLITAN REGIONS							
Tyne & Wear	56.1	62.8	71.2	83.4	81.8	78.1	90.5
N. Ireland	58.5	72.7	83.2	90.2	83.8	95.2	98.5
S. Yorkshire	43.4	47.4	79.5	82.3	88.8	86.4	87.9
W. Yorkshire	33.2	43.9	59.2	79.0	78.0	60.9	81.9
Merseyside	37.5	46.8	64.6	72.4	70.6	66.3	88.2
C. Clydeside	68.3	74.0	78.3	80.0	79.2	86.3	84.5
G. Manchester	37.0	42.1	61.2	82.8	87.5	86.7	96.3
W. Midlands MC	18.9	19.4	26.9	53.9	65.7	63.4	87.3
Outer Metro Area	-77.1	-75.9	-71.1	-65.3	-69.1	3.9	-69.8
G. London	-9.3	-14.8	-22.9	-45.5	-59.7	-64.1	-78.2

COMPONENTS OF CHANGE FOR THE ELDERLY POPULATION OF THE UK

Period = 1 Years = 1976-1981
Age transition = 60+ (ATP I)

TABLE 12. Gross components of change: population aged 60+

Zone	Initial popn.	Deaths	Int. out-migr.	Emigration	60th birthdays	Int. in-migr.	Immigration	Final popn.
NT	243300	66945	3084	422	71457	1823	217	246346
CC	322000	86989	8635	1094	94939	5677	796	326704
SD	655200	176225	11279	1399	174120	14918	2114	657450
TW	228700	61748	7464	458	65928	5440	165	230563
ND	364700	99043	12746	765	103409	13211	408	369175
SY	250300	65041	6730	345	73952	5372	224	257632
WY	412900	109702	13573	687	112356	9941	412	412647
YH	308300	77829	12288	623	91914	15278	645	314398
EM	712700	181497	24133	1217	200998	30592	916	738270
EA	371000	91039	16550	1154	97543	32176	938	392913
OS	1047100	257953	56877	3223	245507	83433	2979	1060966
OM	909900	227708	83958	4718	277348	87342	3120	966326
GL	1460000	341595	101074	9746	397589	38502	5390	1449067
SW	975100	240459	43120	2517	244019	67119	2438	1002580
WC	498400	124545	22016	812	149997	10738	511	502268
WD	424200	110398	20535	766	126808	27708	1284	448311
GM	521100	139642	18735	916	145952	12255	516	520530
NE	301700	81674	13148	642	82715	8535	356	297542
NW	474000	125678	24048	1139	126505	25304	1047	475991
WA	566100	150746	16458	1141	158377	20984	789	577903
UK	11036100	2911432	516346	33770	3031224	516346	25260	11247382

COMPONENTS OF CHANGE FOR THE ELDERLY POPULATION OF THE UK

Period = 1 Years = 1976-1981
Age transition = 60+ (ATP 1)

TABLE 13. Net components of change: population aged 60+

Zone	Initial popn.	Popn. change	Nat. inc.	Net int. migr.	Net ext. migr.	Net total migr.	Final popn.
NT	243300	3046	4512	-1261	-206	-1466	246346
CC	322000	4704	7950	-2958	-288	-3246	326704
SP	655200	2250	-2105	3640	715	4355	657450
TW	228700	1863	4181	-2024	-294	-2318	230563
NP	364700	4475	4366	466	-357	109	369175
SY	250300	7332	8811	-1358	-121	-1479	257632
WY	412900	-253	3654	-3632	-275	-3907	412647
YH	308300	6098	3086	2990	23	3013	314398
EM	712700	25570	19412	6459	-301	6159	738270
EA	371000	21913	6504	15626	-217	15410	392913
OS	1047100	13866	-12446	26556	-244	26312	1060966
OM	909900	56526	54640	3484	-1598	1886	966326
GL	1460000	-10933	55995	-62572	-4356	-66928	1449067
SW	975100	27480	3560	23999	-79	23920	1002580
WC	488400	13868	25447	-11278	-302	-11579	502268
WP	424200	24111	16420	7173	518	7691	448311
GM	521100	-570	6310	-6480	-400	-6880	520530
MF	301200	-3858	1041	-4613	-286	-4899	297342
NW	474000	1991	827	1256	-92	1164	475991
WA	566100	11803	7631	4526	-354	4172	577903
UK	11036100	211292	219793	0	-8511	-8511	11247382

Period = 1 Years = 1976-1981
Age transition = 60+ (ATP 1)

TABLE 14. Annual rates of change: population aged 60+

Zone	DR	IOMR	EMR	BR	IIMR	IMR	PCR	NIR	NIMR	NEMR	NMR
NT	54.7	2.5	0.3	58.4	1.5	0.2	2.5	3.7	-1.0	-.2	-1.2
CC	53.6	5.3	0.7	58.5	3.5	0.5	2.9	4.9	-1.8	-.2	-2.0
SD	53.7	3.4	0.4	53.1	4.5	0.6	0.7	-.6	1.1	0.2	1.3
TW	53.8	6.5	0.4	57.4	4.7	0.1	1.6	3.6	-1.8	-.3	-2.0
ND	54.0	6.9	0.4	56.4	7.2	0.2	2.4	2.4	0.3	-.2	0.1
SY	51.2	5.3	0.3	58.2	4.2	0.2	5.8	6.9	-1.1	-.1	-1.2
WY	52.7	6.6	0.3	54.4	4.8	0.2	-.1	1.8	-1.8	-.1	-1.9
YU	50.6	7.9	0.4	52.6	9.8	0.4	3.9	2.0	1.9	0.0	1.9
EM	50.0	6.7	0.3	55.4	8.4	0.3	7.0	5.4	1.8	-.1	1.7
EA	47.7	8.7	0.6	51.1	16.8	0.5	11.5	3.4	8.2	-.1	8.1
OS	48.0	10.8	0.6	46.6	15.8	0.6	2.6	-2.4	5.0	-.0	5.0
OM	47.5	17.9	1.0	59.1	18.6	0.7	12.1	11.6	0.7	-.3	0.4
GL	47.0	13.9	1.3	54.7	5.3	0.7	-1.5	7.7	-8.6	-.6	-9.2
SW	48.6	8.7	0.5	49.4	13.6	0.5	5.6	0.7	4.9	-.0	4.8
WC	50.3	8.9	0.3	60.6	4.3	0.2	5.6	10.3	-4.6	-.1	-4.7
WR	50.6	9.4	0.4	58.1	12.7	0.6	11.1	7.5	3.3	0.2	3.5
GM	53.6	7.2	0.4	56.0	4.7	0.2	-.2	2.4	-2.5	-.2	-2.6
MF	54.6	8.8	0.4	55.3	5.7	0.2	-2.6	0.7	-3.1	-.2	-3.3
NW	52.9	10.1	0.5	53.3	10.7	0.4	0.8	0.3	0.5	-.0	0.5
WA	52.7	5.8	0.4	55.4	7.3	0.3	4.1	2.7	1.6	-.1	1.5
UK	50.5	9.3	0.6	54.4	9.3	0.5	3.9	3.9	0.0	-.2	-.2

Key to Table 14

DR = death rate
EMR = emigration rate
IIMR = internal in-migration rate
PCR = population change rate
NIMR = net external migration rate
NMR = net overall migration rate
IOMR = internal out-migration rate
BR = 60th birthday rate
IMR = immigration rate
NIR = "natural increase" rate
NEMR = net external migration rate

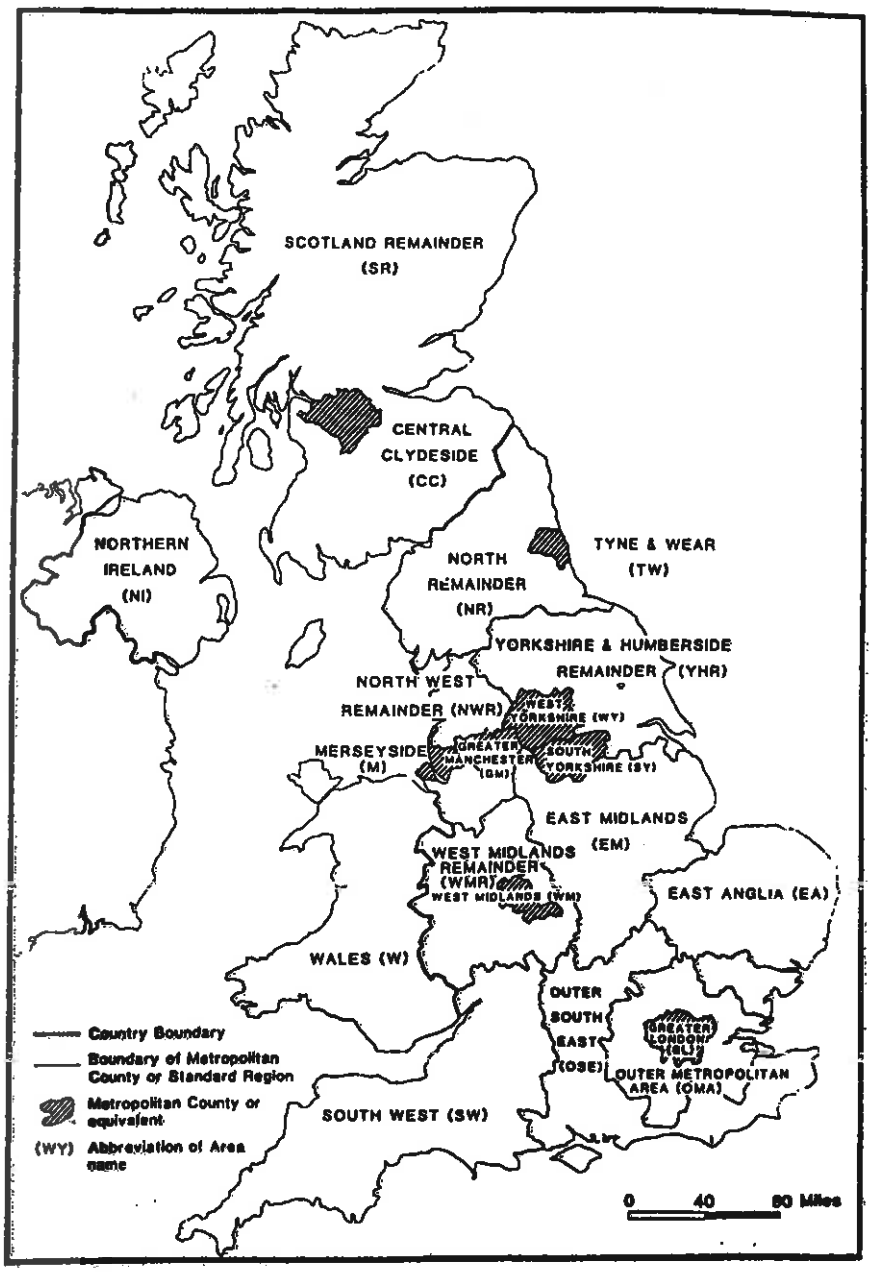

Figure 1 Metropolitan and non-metropolitan zones in the United Kingdom.

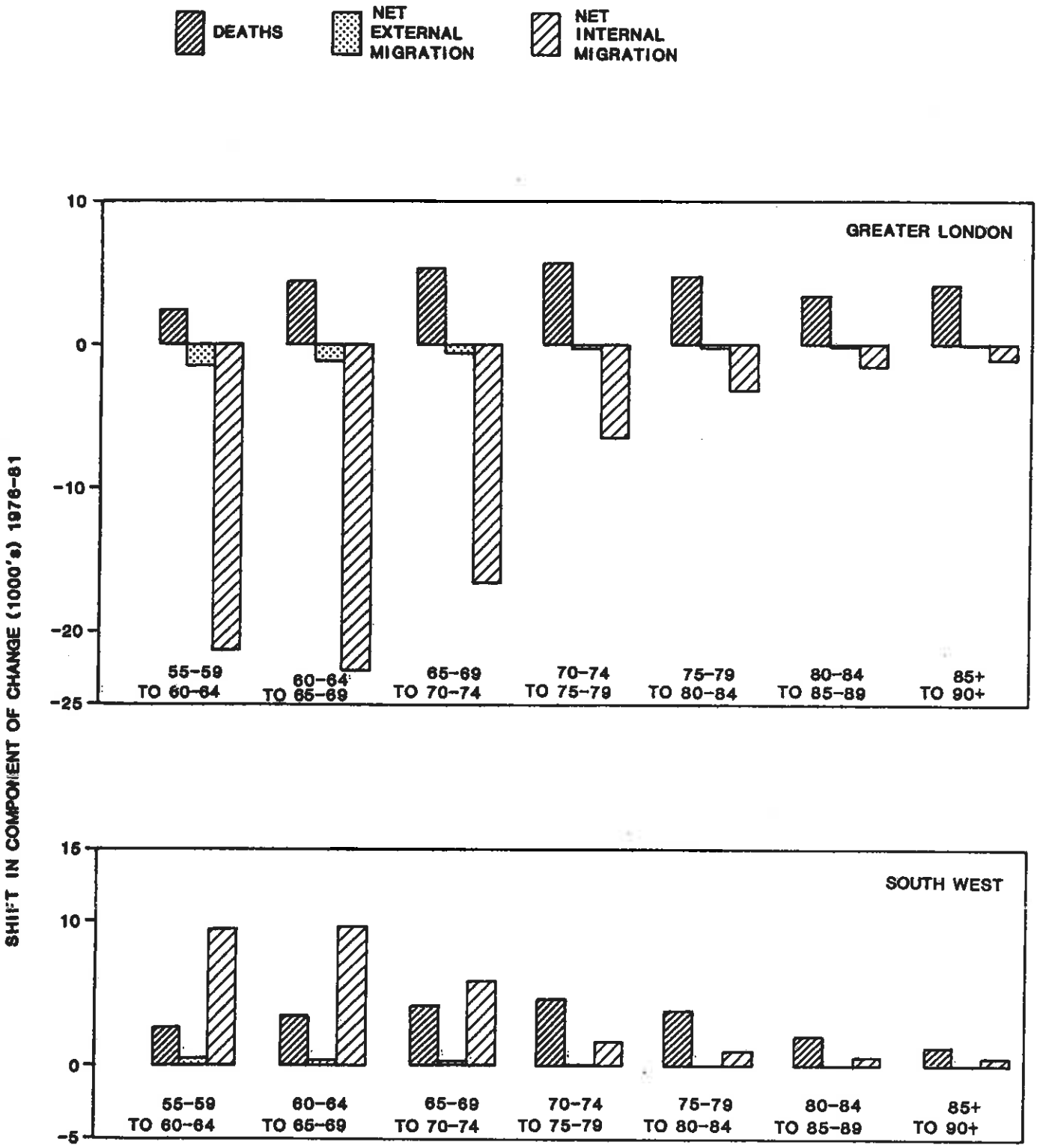

FIGURE 2. SHIFTS IN THE COMPONENTS OF GROWTH BY AGE, 1976-81, SELECTED REGIONS

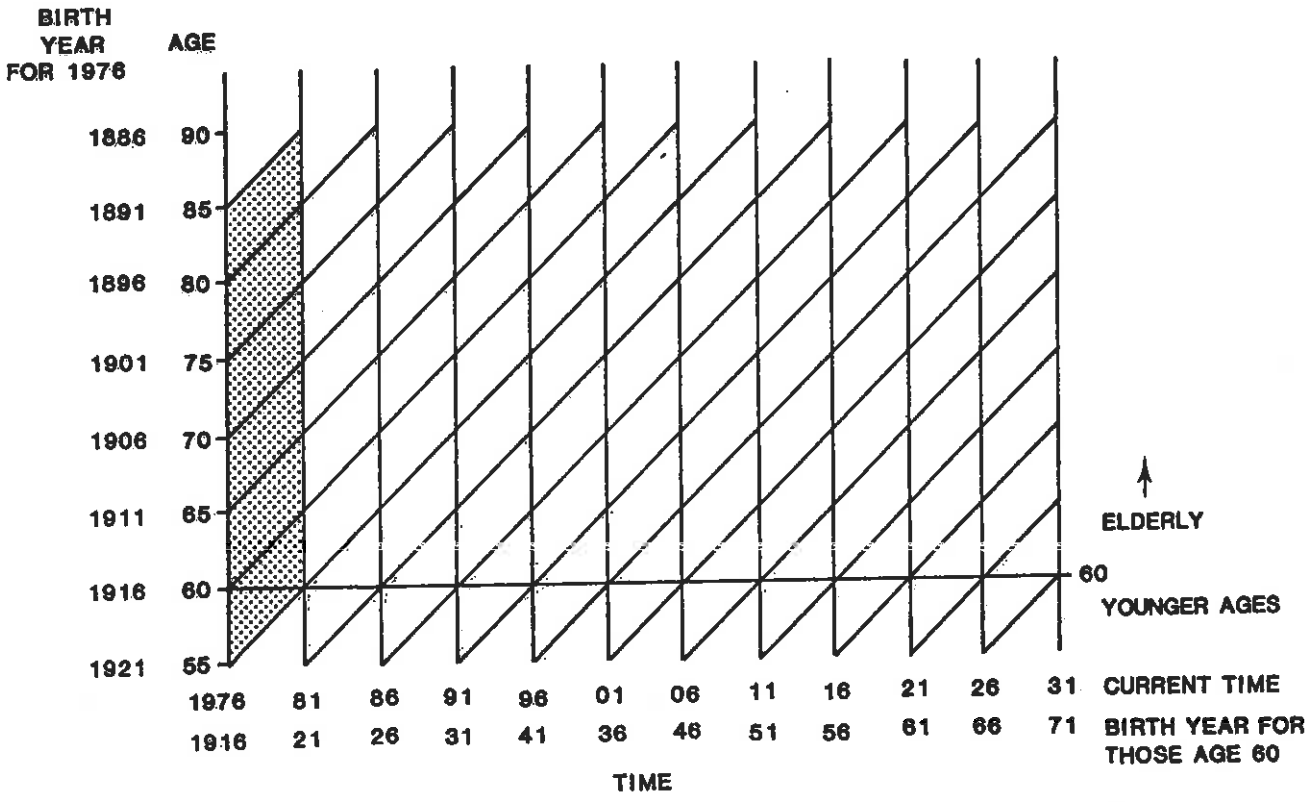

FIGURE.3. THE AGE-TIME PLAN FOR THE UK REGION PROJECTIONS

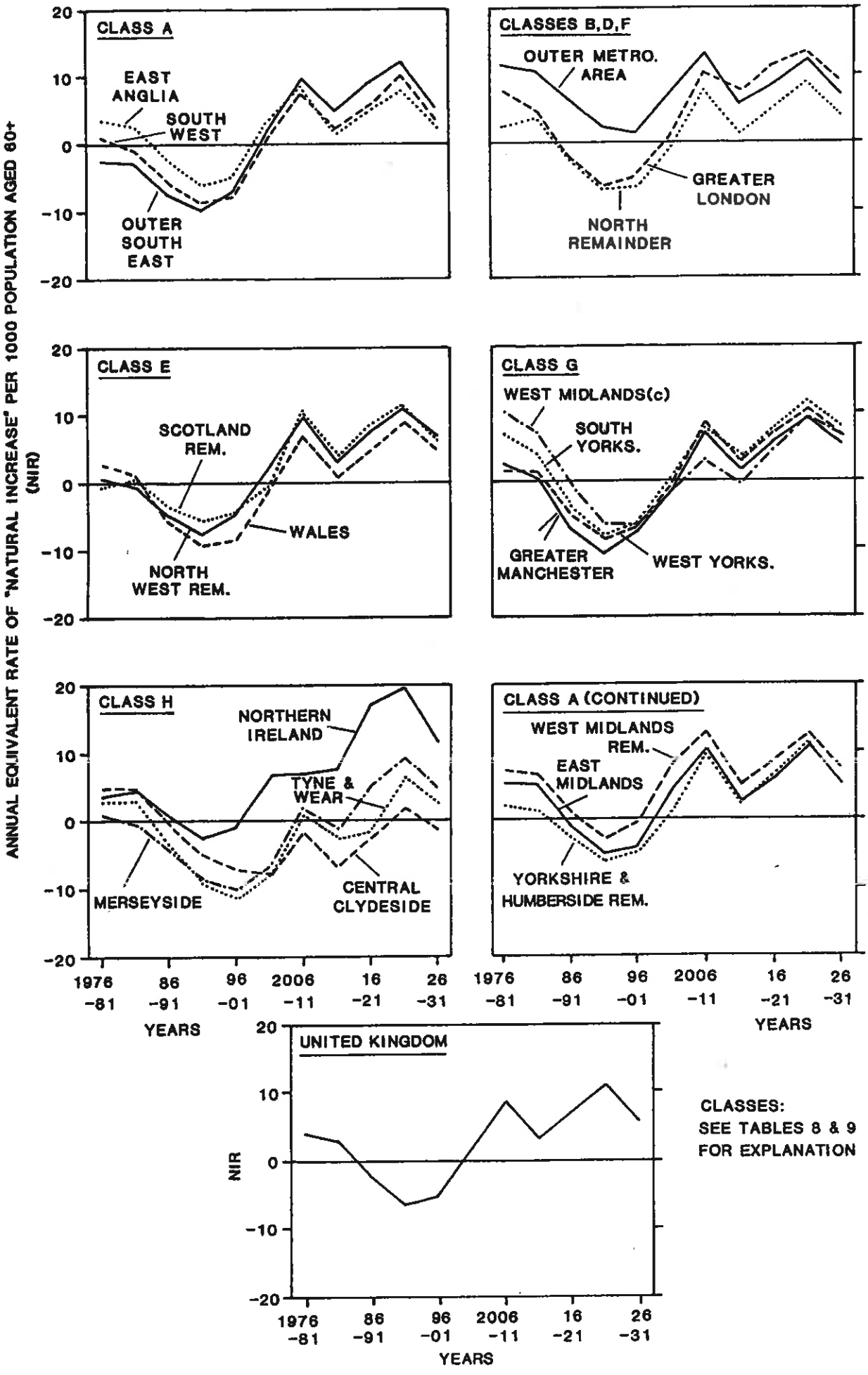

FIGURE 4. "NATURAL INCREASE" RATES, UK REGIONS, 1976-2031