WORKING PAPER 470

Internal Migration in the United Kingdom: Characteristics and Trends

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Abstract

Census transition and NHSCR movement dates are used to identify changes in levels of aggregate migration. Age-specific migration rates are analysed using model migration schedules and the stability of the functional effect of distance on movement between 18 metropolitan and non-metropolitan regions in the UK is examined using spatial interaction models.

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1. Introduction

1.1 Structure of the paper

The objective of this paper is to outline the characteristics of internal migration in the UK to enable comparisons to be made with migration in the Netherlands. In order to facilitate comparison, the paper has been organised into three parts. The first part illustrates changes that have occurred in the overall levels of migration recorded by censuses since 1961, and the levels of movement evident from National Health Service patient re-registration data since 1975. In the second part, age differentials in migrant transition data are examined and model migration schedules constructed for national rates at district, county and regional level. Finally, in part three, spatial patterns of net and gross moves are summarised using a system of 18 metropolitan and non-metropolitan regions, and spatial interaction models are used to indicate variations in the frictional effect of distance on movement.

Unfortunately research in Britain does not benefit to the same extent as research in the Netherlands from the availability of data on migration. Single year data used in this paper, which comes from two primary sources, is reviewed in the following section.

1.2 One year transition and movement data

In the absence of a registration system of the type used in the Netherlands, the two primary sources of data on migration within the UK are the Census of Population and the patient re-registration statistics available from the National Health Service Central Register (NHSCR). The characteristics and limitations of census 'migrant' or 'transition' data and NHSCR 'transfer' or 'movement' data have been reported by several researchers (Rees, 1977; Ogilvy, 1980; Devis, 1984; Stillwell, 1985). The published census data which is used in this paper refers to those persons who were in existence one year prior to the census, who migrated at least once during the period to a

different place of usual residence and who survived the period there. Transition statistics exclude certain subgroups of migrants such as those aged less than one on census date. Comparison of migration during the one year periods prior to the censuses in 1971 and 1981 is facilitated by the existence of special tabulations for 1971 census data for Great Britain as constituted following local government reorganisation in 1974 in England and Wales and in 1975 in Scotland (OPCS, 1978).

The NHSCR is a register of patient transfers between Family Practitioner Committee Areas (FPCAs) in England and Wales. Transfers occur when a patient registers with a new doctor in an FPCA other than the one in which the patient was previously registered. The FPCA system for England and Wales consists of 16 London boroughs, 35 districts making up the pre-abolition provincial metropolitan counties, and 47 non-metropolitan counties. Since 1975, OPCS has taken a 10% sample of re-registrations and, every three months produces two computer summaries of transfers taking place during the previous 12 months. One of the summaries contains total numbers of transfers between each FPCA and all other FPCAs in England and Wales, together with transfers between these FPCAs and three other regions; Scotland, Northern Ireland and the Isle of Man. The five FPCAs which comprise the former county of Middlesex are combined in the summary, thus giving a matrix of moves between 97 zones in the UK, which can be aggregated to produce inter-county or inter-region matrices. The other computer summary contains the numbers of moves into and out of each of the 97 zones in the UK, disaggregated by sex (person, male, female, not-stated) and by age group (0-4, 5-9, ... 70-74, 75+, not-stated). The proportion of transfers where sex and/or age is not-stated is relatively small. During the 12 month period ending September, 1981 for example, 1.7% of transfers were not distinguished by sex and 0.2% had no age specification.

OPCS estimate an average time lag of about three months between movement and re-registration, and it is therefore assumed that transfers recorded between one September and the next are appropriate for mid-year to mid-year analysis. NHSCR data used in this paper has been obtained from computer summaries for eight mid-year to mid-year periods, commencing in 1975-76 and ending in 1982-83. Comparative analysis of census and NHSCR data for the year prior to the census in 1981 (Thomson, 1984; Devis and Mills, 1986) indicates that NHSCR moves exceed census transitions by about 28%, and this difference is explained by the inclusion in the re-registration statistics of student transfers, multiple and return moves, and moves involving infants aged less than one..

2. Aggregate migration levels

2.1 Inter-censal change in national migration 1961-81

It is difficult to establish precisely how the level and the rate of migration occurring within this country has changed over the last 25 years for two main reasons. Firstly, the absence of continuous data until the 1970s has placed reliance on the results of censuses which have been conducted only intermittently. Secondly, the inconsistency of administrative boundary definition over time at regional, county and district level, has meant that time series comparison without adjustment can only be undertaken at the national level. However, the significant feature which does emerge from comparing national migration in Britain between the four censuses taken between 1961 and 1981 is the dramatic shift from an increase in the level and rate of migration during the 1960s to a substantial decline over the following decade.

The number of migrants with known origin area of residence who moved within England increased by 16% between 1961 and 1971 (Table 1) to exceed 4.9 million persons in the year prior to the 1971 census. The migration rate, defined as the number of migrants divided by the resident population on census night and expressed per 1,000 persons, increased by 9.6% from 97.8 in 1960-61 to 107.2 in 1970-71. In Wales, the rate of

Preceding census	Migrants within England		Wales		Scotland	
	Total (000s)	Rate per 1,000 residents	Total (000s)	Rate per 1,000 residents	Total (000s)	Rate per 1,000 residents
1960-61	4256.9	97.8	187.3	70.9	479.5	92.8
1965-66	4477.9	99.3	193.0	72.7	487.5	93.1
1970-71	4933.3	107.2	204.4	75.0	546.0	104.5
1980-81	3990.4	86.0	175.9	63.2	436.1	84.8
Change 60-61/ 70-71	+676.5	+9.4	+17.0	+4.1	+66.5	+11.7
(%)	(+15.9)	(+9.6)	(+9.1)	(+5.8)	(+13.9)	(+12.6)
Change 70-71/ 80-81	-942.9	-21.2	-28.5	-11.8	-109.9	-19.7
(%)	(-19.1)	(-19.8)	(-13.9)	(-15.7)	(-20.1)	(-18.9)

Notes: (1) Figures exclude migrants whose origin was not stated.

(2) 1965-66 figures have been multiplied by an underenumeration coefficient of 1.0142143 (Rees and Wilson, 1977).

(3) Rate defined as:

$$\left[\frac{\text{Number of migrants in one year prior to census}}{\text{Resident population at census}}\right] 1{,}000$$

Sources: GRO (1966); GRO, Edinburgh (1966);
GRO (1968); GRO, Edinburgh (1968);
OPCS, London and GRO, Edinburgh (1974a);
OPCS (1974); GRO, Edinburgh (1974);
OPCS, RGS (1983a, 1983b)

Table 1 Migrants within England, Wales and Scotland in the one year prior to each census since 1961

migration was significantly lower than in England and increased by only 5.8% between these two periods, whereas the rate for Scotland, despite being slightly lower than the rate for England, increased by 12.6% from its 1960-61 level. Furthermore, Ogilvy (1979) has shown, using 1961 census data recalculated on the basis of 1971 boundaries, that rates of migration between standard regions in England and Wales increased by 25% from 11.9 to 14.9 per 1,000 in comparison with intra-regional rates which rose from 85.9 to 92.1 per 1,000 between 1961 and 1971.

The levels and rates presented in Table 1 for 1965-66, obtained from the 1966 10% sample census and adjusted for underenumeration, suggest that mobility increased more significantly in the second half of the decade than in the first half. However, this increase appears to have been relatively short-lived because migration levels for 1980-81, in contrast to those for 1970-71, show substantial declines of 19.1%, 13.9% and 20.1% in England, Wales and Scotland respectively, with rates of migration falling by 21.2, 11.8 and 19.7 persons per 1,000 in each case. OPCS have reconstituted migration data from the 1971 census so that it relates to post-reorganisation local authority areas in Great Britain, and this enables comparisons between 1970-71 and 1980-81 to be undertaken with more disaggregated information.

2.2 Male and female migration at the national scale

In Great Britain as a whole, the level of internal migration declined by 19.2% from over 5.8 million persons in 1970-71 to approximately 4.7 million in 1980-81. The majority of migrants (50.5%) in both these periods was female, although migration rates were lower for females than for males. However, the national levels of migration presented in Table 2 indicate that more males than females moved between regions, and between counties in 1970-71, and between regions, counties and districts in 1980-81. In both periods, rates of inter- and intra-zonal migration were higher for males than females

Type of migration of those aged one and over	Male/Female	Migrants within Great Britain in the one year prior to the census				% change 1971-81	
		1971		1981			
		Total (000s)	Rate per 100 residents	Total (000s)	Rate per 100 residents	Total	Rate per 100 residents
Total Internal	M	2906.3	11.09	2351.4	9.14	-19.1	-17.6
	F	2963.3	10.67	2393.5	8.81	-19.2	-17.4
Inter-district	M	1239.1	4.73	923.6	3.59	-25.5	-24.1
	F	1246.8	4.49	901.3	3.32	-27.7	-26.1
Inter-county	M	774.8	2.96	605.4	2.36	-21.9	-20.3
	F	767.1	2.76	579.9	2.13	-24.4	-22.8
Inter-region	M	426.5	1.63	316.6	1.23	-25.8	-24.5
	F	408.8	1.47	294.5	1.08	-28.0	-26.5
Intra-district	M	1667.2	6.37	1427.8	5.56	-14.4	-12.7
	F	1716.5	6.18	1492.2	5.49	-13.1	-11.2
Intra-county	M	2131.4	8.14	1746.1	6.79	-18.1	-16.6
	F	2196.2	7.91	1813.7	6.68	-17.4	-15.5
Intra-region	M	2479.8	9.47	2034.8	7.92	-17.9	-16.4
	F	2554.5	9.20	2099.0	7.73	-17.8	-16.0

Sources: OPCS (1978); OPCS, London and GRO, Edinburgh (1974b); OPCS, RGS (1983a, 1983b).

Table 2 Migrants within Great Britain in the single year prior to the 1971 and 1981 censuses at district, county and regional scales

at all three spatial scales. In 1970-71, 14.2% of internal migration involved movement between regions, 26.3% involved movement between counties and 42.4% involved movement between districts in Great Britain. By 1980-81, inter-regional movement accounted for only 12.9% of all migration, inter-county migration fell to 25% and inter-district migration also declined to 38.5% of total migration. These changes over the decade reflect the fact that levels and rates of inter-zonal migration at all three scales for males and for females have declined more rapidly than levels and rates of intra-zonal migration. The largest decline is associated with females migrating between regions, whereas the smallest decline is that for females migrating within districts. At each spatial scale, declines in inter-zonal migration of males are exceeded by those of females, whereas intra-zonal migration declines are higher for males than for females at each scale.

The problem with making comparisons between two time periods that are a decade apart is that no details of shorter term fluctuations in levels of migration are available and consequently analysis of trends in migration based on census data is of only limited value. This shortcoming emphasises the advantage of the NHSCR movement data which, despite its limitations, is available on a continuous basis and can be used to examine time series trends.

2.3 Annual internal movement, mid-1975 to mid-1983

The initial analysis of time series trends in migration based on NHSCR transfer data was that undertaken by Ogilvy (1979) who, using a two year moving average of transfers in order to counter the annual periodicity in the data and to reduce uncertainty created by local government reorganisation, demonstrates that the reversal in the trend is likely to have occurred in 1973, and that the decline continued throughout the decade. Figure 1 illustrates annual movement levels based on NHSCR data from the mid-year after reorganisation to the year ending mid-1983 for three systems of interest. Moves between counties in England and Wales fell by

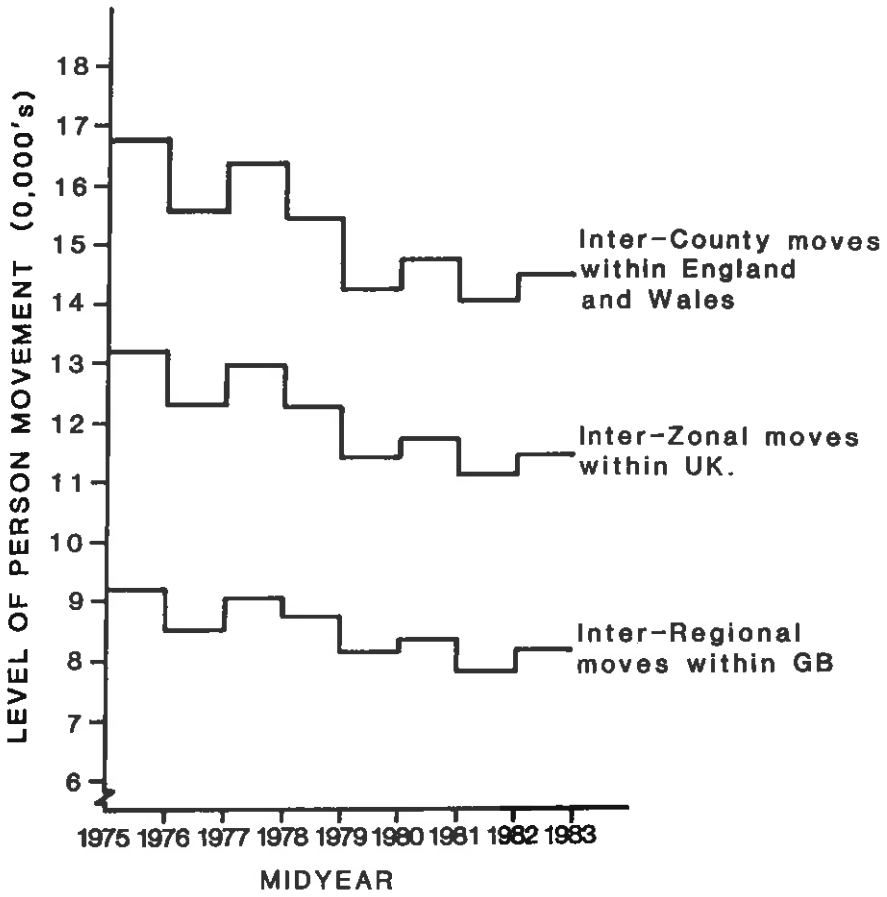


Figure 1 Levels of movement based on NHSCR patient re-registration data for single years from mid-1975 to mid-1982

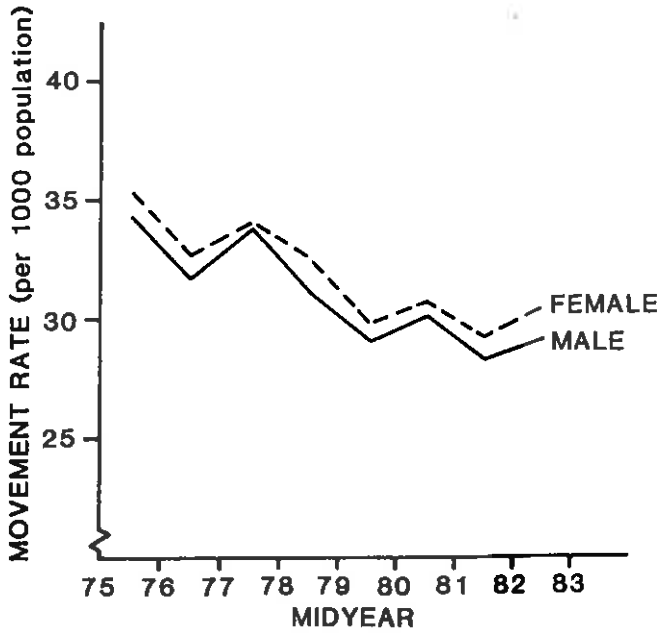


Figure 2 Rates of movement by sex based on NHSCR transfer data for Great Britain, 1975-76 to 1982-83

13.4% from over 1,673 thousand in 1975-76 to nearly 1,449 thousand in 1982-83 and the level of inter-regional movement in Britain dropped by 11.2% from 921 thousand to almost 818 thousand. Similarly, transfers between the system of 18 zones consisting of metropolitan counties in England, their region remainders and other regions in the UK, also declined by over 13%. In seeking explanation for the decline in the national level of mobility in this country, Ogilvy (1979) dismisses change in population structure and government policy, and argues that reduced mobility since 1973 is likely to be due to the effects of recession and its effects on employment opportunities, incomes and housing. Whilst the overall trend of decline in movement levels appears to continue into the 1980s, the volume of movement does experience fluctuation from year to year with appreciable declines between 1975-76 and 1976-77, 1977-78 and 1979-80 and between 1980-81 and 1981-82. The level of movement increased in 1977-78 in comparison with its preceding year, and again between 1981-82 and 1982-83. This last increase, of 4% at the inter-regional scale, has in fact been followed by a second successive rise of about 2% during 1983-84 (OPCS, 1985).

Rates of movement as distinct from numbers of moves confirm that the trends illustrated in Figure 1 are not simply accounted for by fluctuations in the populations at risk. The inter-regional movement rate, for example, dropped from 16.8 per thousand in 1975-76 to a low of 14.3 per thousand in 1981-82 before picking up to the 1979-80 level of 14.9 per thousand in 1982-83. In 1973, sex disaggregated data on movement totals into or out of individual FPCAs became available for the first time. When the totals are aggregated for all FPCAs in England and Wales together with the single Scotland zone, and used to compute rates based on the average of the mid-year populations at the beginning and end of each 12 month period (Figure 2), males appear to have lower rates than females throughout the time series, including mid 1980-81 when census results suggest higher rates for males than females at both county and district levels (Table 2).

The next step is to explore the relationship between national migration and age over time and although some age-disaggregated data is available from the NHSCR, the next sections of the paper focus on age differentials in migration using data for single years of age from the last two censuses.

3. National age-specific migration

3.1 Age differentials and model schedules

Migration researchers in different countries are unanimous in their emphasis on age as a selective influence on migration behaviour. Important theoretical developments have been made in the field of migration rate schedule modelling by Rogers, Raquillet and Castro (1978) and Rogers and Castro (1981), whose methodology has been adopted in more recent research in Britain (Bates and Bracken, 1982; Bracken and Bates, 1983) and in the Netherlands (Drewe, 1985). In this approach, the functional relationship between migration and age is described by a series of four components, the first of which involves a decline in the rate of migration of children up to their mid-teens. The second component is characterised by an increase in migration following school-leaving age, reaching a peak in the early twenties and declining steadily thereafter. The third component is associated with higher migration rates for those in the post-labour force ages and is usually attributable to retirement migration. Finally, there is the constant component which reflects the underlying propensity to migrate at all ages. The 'full' model schedule defined by Rogers and Castro (1981) comprises the sum of these four components referred to respectively as the negative exponential pre-labour force curve, the left-skewed double exponential curve of the labour force ages, the bell-shaped double exponential curve of the post-labour force ages and the constant component; and the mathematical function describing the relationship can be expressed as:

$$M(x) = a_1 \exp(-\alpha_1 x) + a_2 \exp\{-\alpha_2(x-\mu_2) - \exp[-\lambda_2(x-\mu_2)]\} + a_3 \exp\{-\alpha_3(x-\mu_3) - \exp[-\lambda_3(x-\mu_3)]\} + c \quad (1)$$

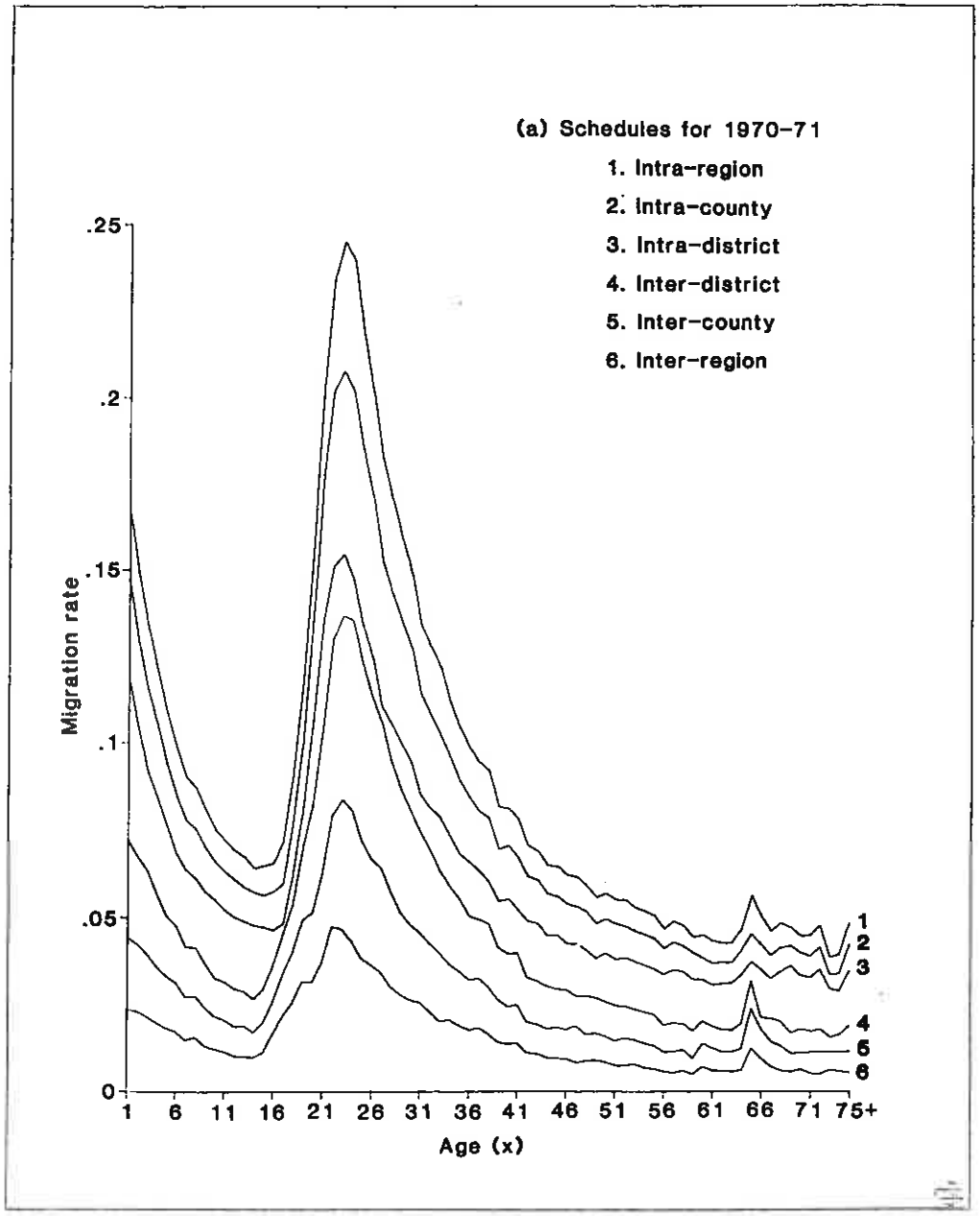
where x is an age group label, where α_1, α_2, μ_2, λ_2, α_3, μ_3 and λ_3 are parameters defining the profile of the schedule, and where a_1, a_2, a_3 and c are parameters defining the level of the schedule.

In the following section, single year of age migration rates are examined at a variety of spatial scales as a preliminary to the fitting of model schedules using the package developed by Rogers and Planck (1983).

3.2 One year age group migration rates by sex

Comparable data is available at the national level on male and female migration within and between districts, counties and regions in Great Britain in the years prior to the censuses in 1971 and 1981 (OPCS, 1978, 1983a). The data is disaggregated by single year of age from age one to age 74, and there is an additional age group of those aged 75 and over. In the absence of published estimates of national age-specific populations one year before each census, end-of-period usually-resident populations have been used to calculate admission rates for migrants aged x on census night. The rates schedules depicted in Figures 3 and 4 have been plotted using the Gimms graphics package (Waugh and McCalden, 1983) and illustrate some interesting and significant variations between different sexes, scales and time periods.

The most noticeable difference between both sets of male and female schedules is the existence, in the former, of a pronounced retirement component, peaking at age 65 at each spatial scale. The female schedules do not exhibit this characteristic to the same extent although there is a slight suggestion of a peak at age 60. Rates of intra-zonal migration of women in the post-labour force ages at each of the scales in 1980-81 appear to experience, if anything, a marginal rise with increasing age, and this characteristic is strengthened by the values of rates for the 75+ age group which are significantly higher than the rates of women who migrate in their 50s, 60s and early 70s. However, the general absence of a discernible post-labour force component in the rate schedules of females suggests that a reduced, seven parameter model is more suitable for females than the 11 parameter model defined in equation (1).



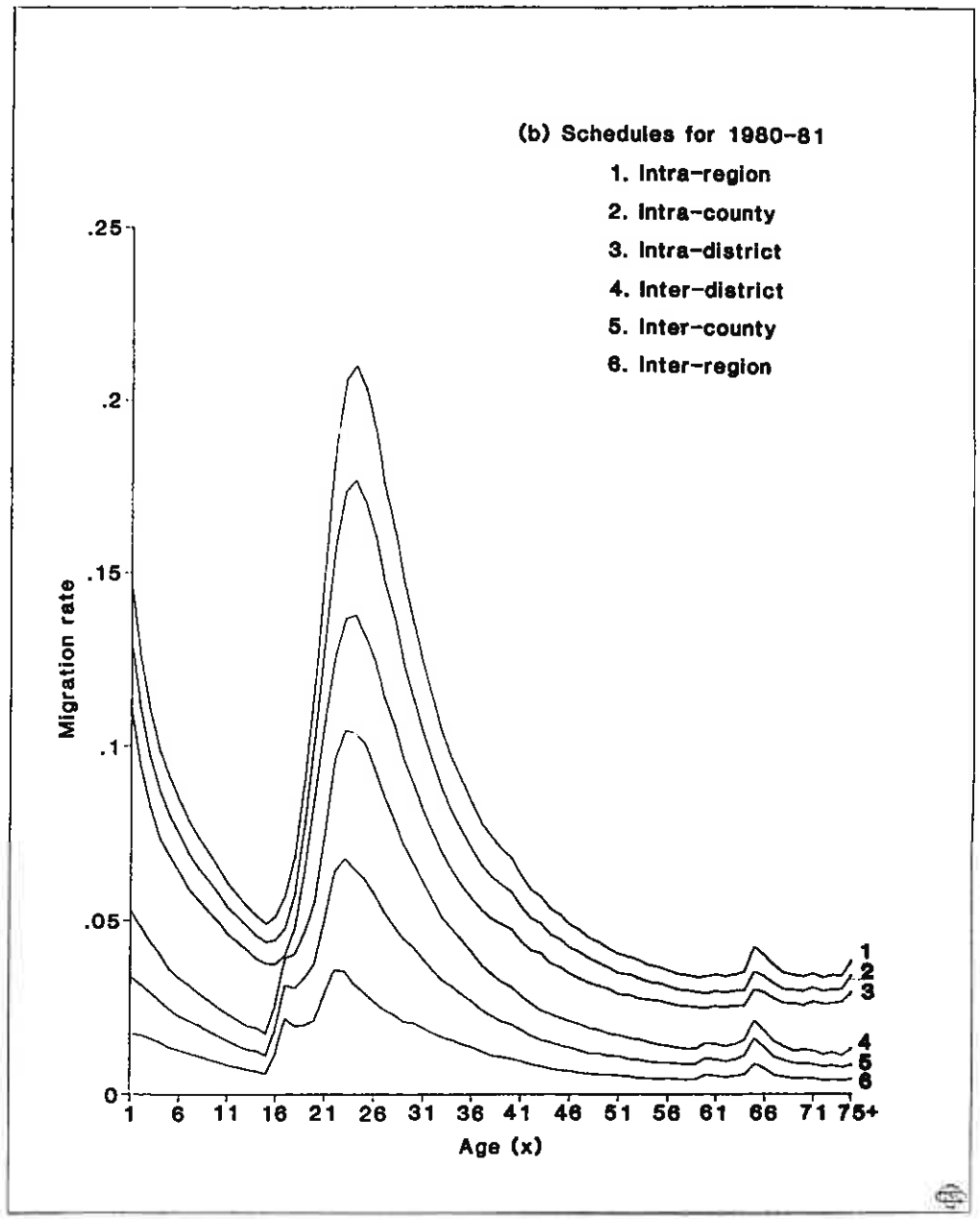


Figure 3 Migration rates schedules, males, 1970-71 and 1980-81

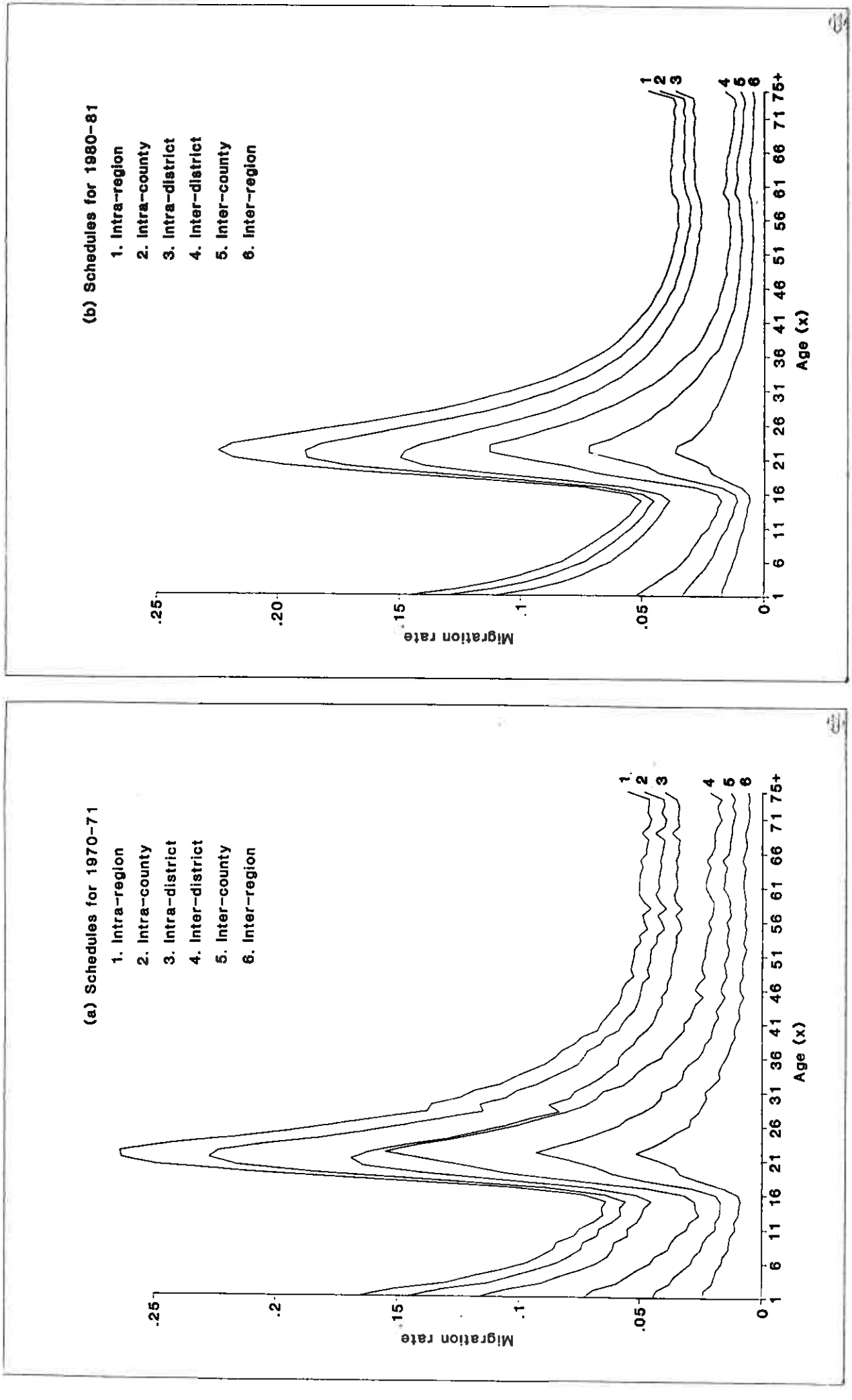


Figure 4 Migration rates schedules, females, 1970-71 and 1980-81

Another interesting variation is the shape of the upward curve of the labour force component for males migrating between zones in 1980-81. The slope is kinked at the inter-regional scale in particular so that migration rates rise for male teenagers aged 16 and 17, remain at about the same level for those aged 18 to 20 and then rise again to a peak at age 22. This punctuation of the smooth ascent is also observed in the male rates for inter-county migration, and, to a much lesser extent, in the rates of migration between districts in 1980-81. It is an anomaly which has emerged since 1970-71 and which might be due to employment-related factors. Since inter-regional migration tends to be longer distance, job-based migration, it might be argued that migration rates increase as school-leavers seek and secure their first jobs, remain stable for two to three years as they become settled in some form of temporary or permanent employment, but then increase again as they move to jobs elsewhere.

More precise comparisons can be made between male and female migration at each scale and between the two periods from an examination of the parameters of model schedules fitted to rates which have been normalised to allow for the difference in the volume of migration occurring in each case. Standardisation is achieved by dividing each age-specific rate by the gross-migraproduction rate (GMR), the sum of the age-specific rates, which acts as a scaling factor and reduces the rates so that they sum to one. The GMRs presented in Table 3 have been computed for the 74 single year age groups and confirm that the declines in migration between zones has been more substantial than the falls in migration rates within zones (Table 2). Males have higher inter-zonal GMRs than females but their rates have dropped marginally less.

3.3 Comparison of estimated model schedules for Great Britain

Model migration schedules have been fitted to each of the data sets for males and females. The male schedules are based on the selection of an 11 parameter model whereas the female schedules have been generated using the seven parameter version. The

Type of migration	Gross migra-production rates					
	Males			Females		
	70-71	80-81	Change Index 1970-71=1	70-71	80-81	Change Index 1970-71=1
Inter-district	3.37	2.54	0.753	3.33	2.44	0.733
Inter-county	2.12	1.67	0.788	2.05	1.57	0.766
Inter-region	1.16	0.87	0.750	1.10	0.80	0.727
Intra-district	4.56	3.95	0.800	4.56	4.00	0.877
Intra-county	5.82	4.83	0.830	5.83	4.85	0.832
Intra-region	6.77	5.62	0.830	6.79	5.62	0.828

Table 3 Gross migra-production rates for male and female inter- and intra-zonal migration in Great Britain

model schedules smooth out the irregularities apparent in the observed data and Figure 5 illustrates the differences between the profiles for males and females migrating between regions, counties and districts in 1980-81. The goodness-of-fit statistic, E, is an index representing the mean of the absolute differences between the observed and estimated values, expressed as a percentage of the observed mean. The model fits, which are reasonably good in general, are marginally better for males than females at the inter-region scale and vice versa at the inter-county and inter-district levels. Comparison of the profiles for inter-zonal migration indicates that the onset of the labour force component tends to be later for females than males, yet the labour force peak is earlier and considerably higher for females. Rates of ascent and descent of this component are therefore steeper for females than males and this is confirmed by the α_2 and λ_2 parameters (Table 4). However, the mean age of the labour force component, μ_2, turns out to be lower by almost a year for men than women at the regional scale, and higher for males at the other two scales. The rate of descent of the pre-labour force curve, α_1, is marginally steeper for females than males and the constant component, c, is higher for females at each spatial scale.

Parameter ratios can also be calculated to identify differences between schedules. S_{12} measures the relative levels of the pre-labour force and labour force curves, indicating that in 1980-81, child migration is more important in male than female migration. The so-called parental shift regularity, β_{12}, which measures the relative descent rates of the pre-labour force and labour force curves, indicates that with values close to unity, the slopes decline in parallel. The most noticeable difference occurs at the regional scale where the curve is steeper for boys than their fathers and less steep for girls than their mothers. The asymmetry of the labour force component, σ_2, can be measured as the ratio of the upward to the downward curves and is higher for men than women at the inter-regional scale but lower at the other two scales. The labour force component is most asymmetric for men migrating between regions and least asymmetric for men migrating between districts.

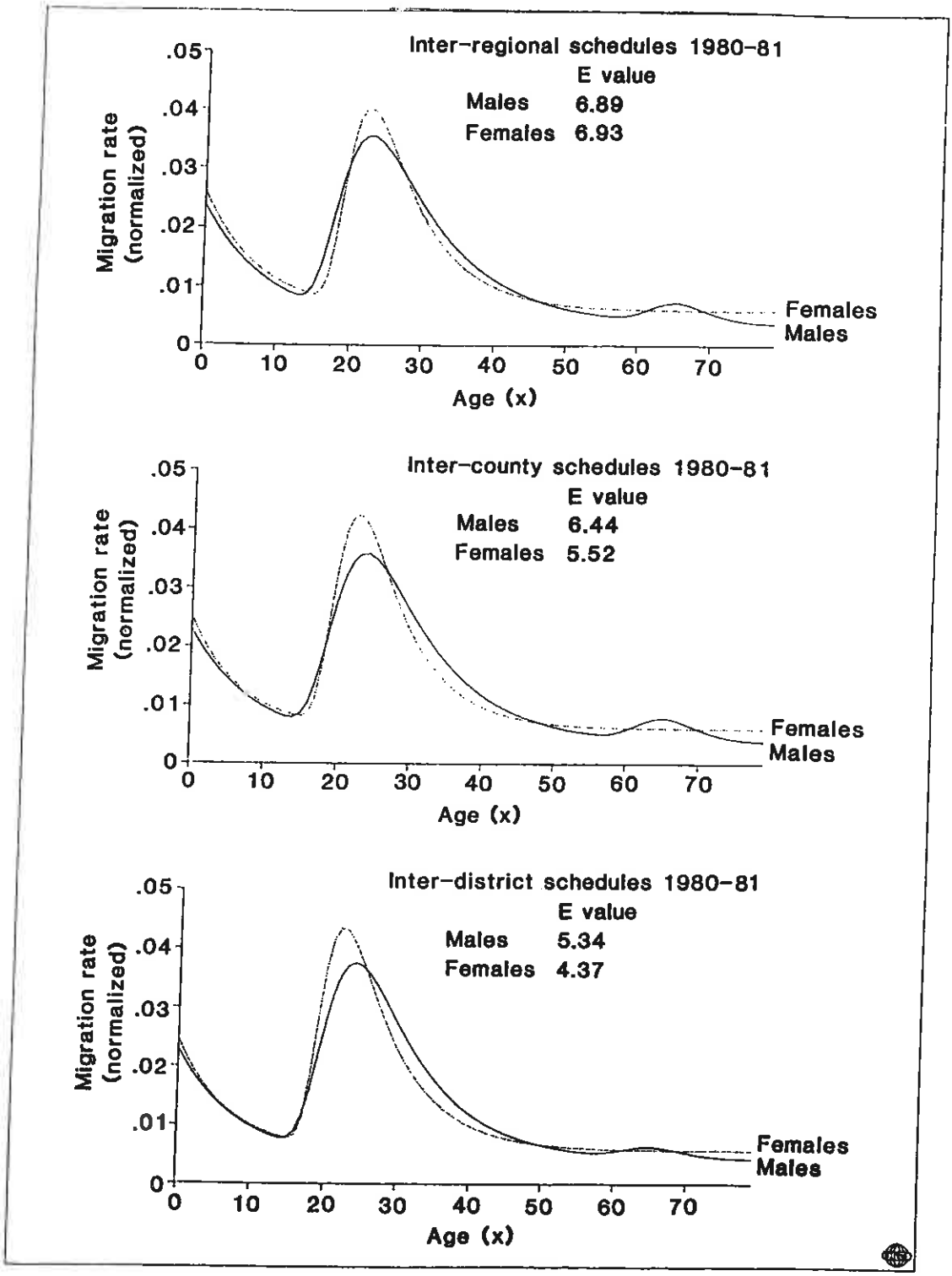


Figure 5 National model schedules for male and female inter-region, inter-county and inter-district migration, 1980-81

Model parameter	1980-81 Model Schedules					
	Inter-region		Inter-county		Inter-district	
	Male	Female	Male	Female	Male	Female
a_1	0.0216	0.0214	0.0203	0.0206	0.0198	0.0204
α_1	0.1063	0.1324	0.1148	0.1489	0.1211	0.1493
a_2	0.0592	0.0662	0.0665	0.0755	0.0705	0.0747
μ_2	19.3232	20.2042	20.8256	20.5343	21.4047	20.2181
α_2	0.0962	0.1395	0.1091	0.1518	0.1176	0.1435
λ_2	0.3223	0.4367	0.2770	0.4040	0.2853	0.4318
a_3	0.0001	--	0.0001	--	0.0001	--
μ_3	81.1234	--	81.7765	--	80.2840	--
α_3	0.6106	--	0.5910	--	0.5808	--
λ_3	0.1107	--	0.1061	--	0.1114	--
c	0.0032	0.0059	0.0036	0.0059	0.0042	0.0056
Parameter ratio						
$\delta_{12}=a_1/a_2$	0.3644	0.3237	0.3050	0.2734	0.2806	0.2727
$\beta_{12}=\alpha_1/\alpha_2$	1.1054	0.9487	1.0524	0.9809	1.0293	1.0408
$\sigma_2=\lambda_2/\alpha_2$	3.3513	3.1302	2.5380	2.6619	2.4257	3.0098

a_1 = level, α_1 = rate of descent } of pre-labour force component

a_2 = level, μ_2 = mean age, α_2 = rate of descent, λ_2 = rate of ascent } of labour force component

a_3 = level, μ_3 = mean age, α_3 = rate of descent, λ_3 = rate of ascent } of post-labour force component

c = constant component

Table 4 Parameters defining model schedules for national inter-zonal migration, 1980-81, males and females

Have the model migration schedules changed over time? Unfortunately the lack of annual single year of age migration data in Great Britain prohibits us from undertaking an analysis of temporal stability similar to that conducted by Drewe (1985) based on annual migration rates between Dutch communes. However, model schedules constructed for 1970-71 migration can be compared with those for 1980-81 migration between zones (Figure 6) or within zones (Figure 7). Small differences between the schedules can be detected for males and females at each spatial scale, but the feature which is common to most pairs of schedules is that the labour force peak in 1980-81 is higher and later than it was in 1970-71. This is confirmed by changes in selected parameter values between the two periods (Table 5). The mean age of labour force migration, μ_2, has increased in all cases apart from males moving between regions. The rate of descent of the labour force curve, α_2, has steepened whereas the rate of ascent, λ_2, has declined, producing a more symmetric labour force component as indicated by lower values of σ_2. The inter-regional schedules for males are an exception since the μ_2 parameter appears to decline and the λ_3 parameter to increase fractionally between 1970-71 and 1980-81. Figure 6 illustrates that the labour force curves for males at this scale are very similar in both periods whereas that the peak for females is later but not higher in 1980-81.

A post-labour force component is more evident for males at the inter-zonal scales but the model schedules suggest that whereas this has become a less important component of migration between counties and regions it has become a more important component of inter-district mobility. The curves for male intra-zonal migrants at each scale in the post-labour force ages are lower in 1980-81 than in 1970-71 and this characteristic is common to all pairs of female schedules apart from at the inter-region scale, where the constant component, c, has actually increased (Table 5).

The comparison of age differentials in migration between these two periods which are a decade apart is of only limited use in establishing trends over time. Annual re-registration data is again useful in this respect although age group disaggregation is much less refined.

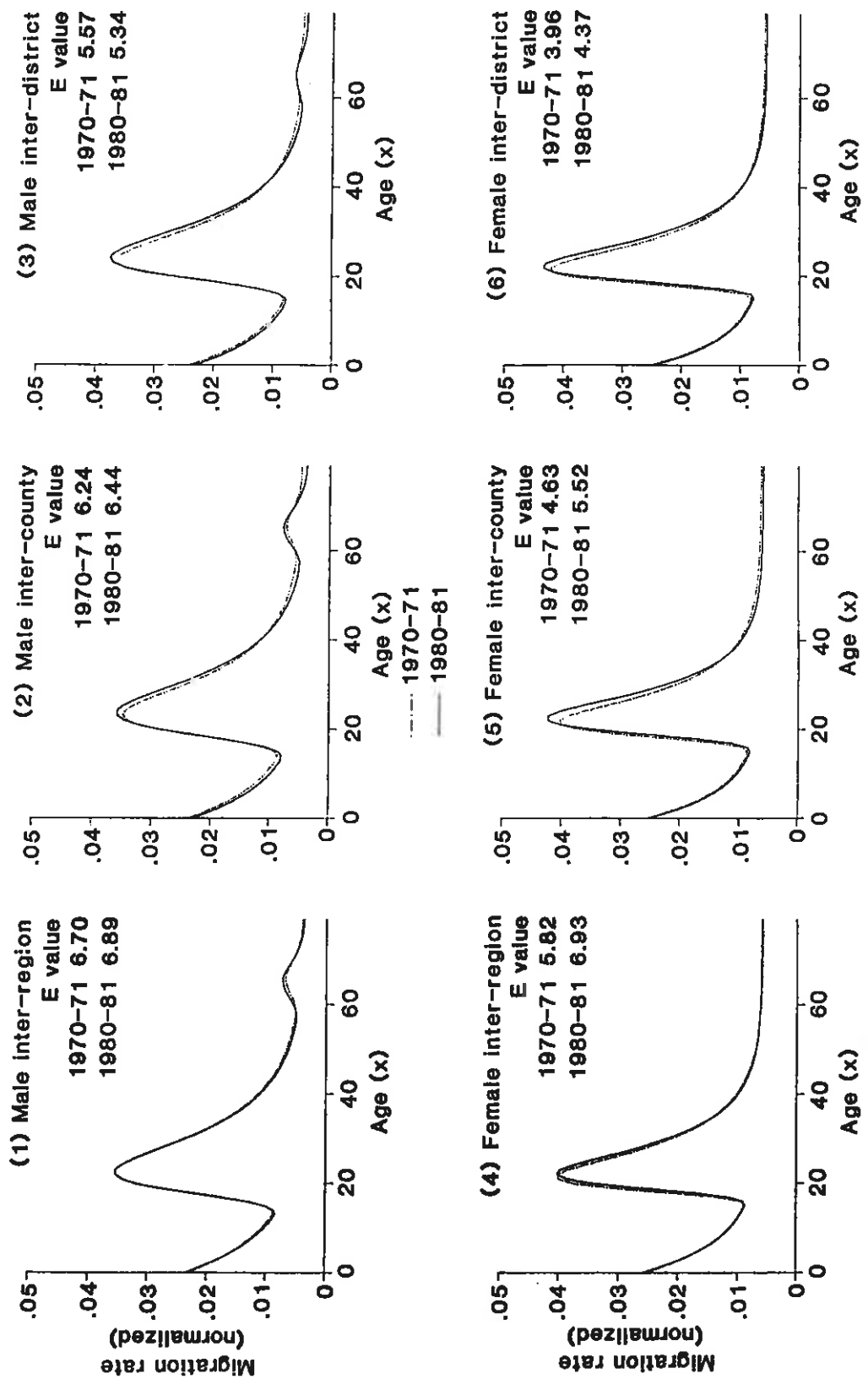


Figure 6 Model schedules for inter-zonal migration, males and females, 1970-71 and 1980-81

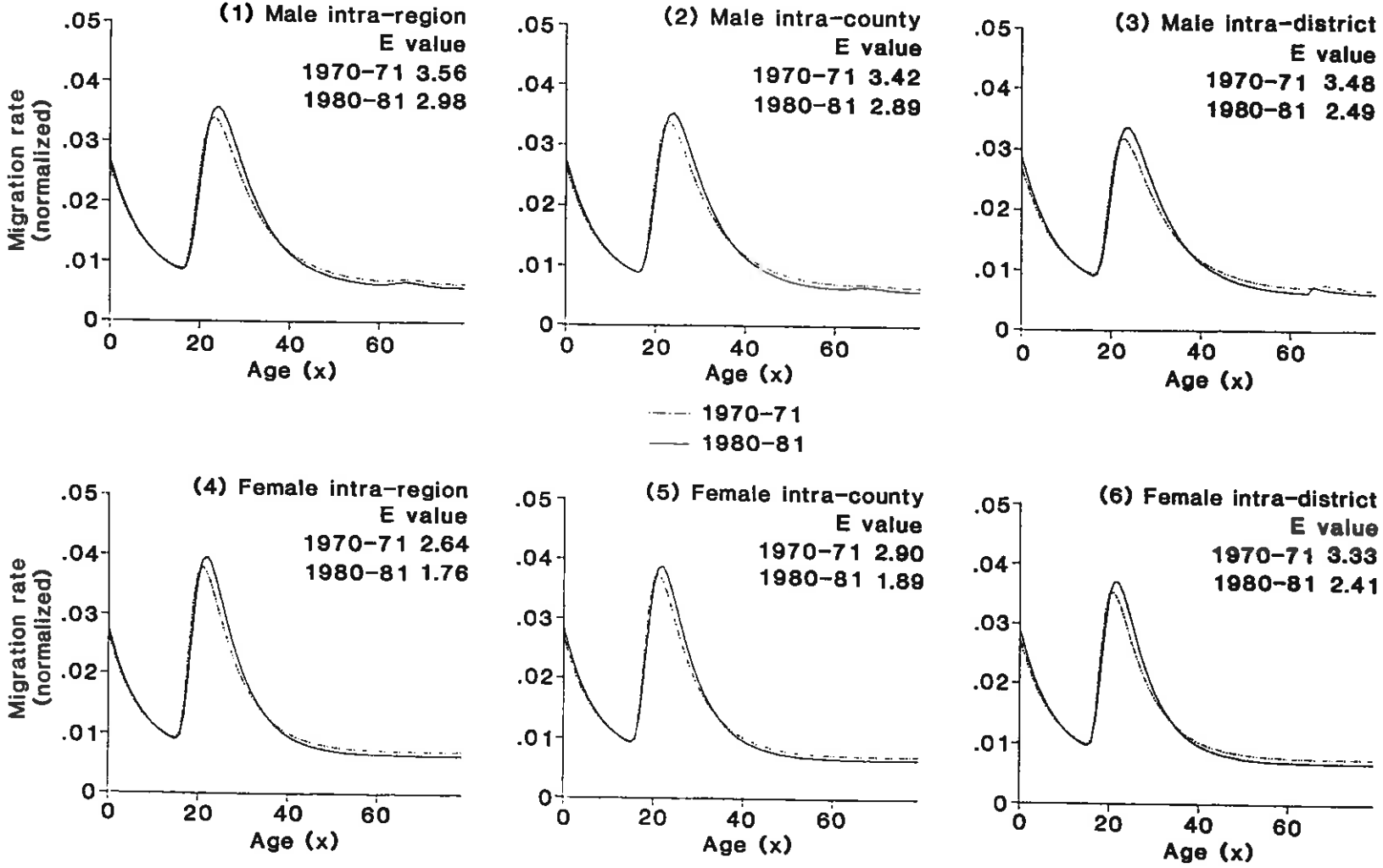


Figure 7 Model schedules for intra-zonal migration, males and females, 1970-71 and 1980-81

Parameter	Sex	1980-81 value/1970-71 value					
		Inter-			Intra-		
		Region	County	District	Region	County	District
μ_2	Male	0.989	1.024	1.036	1.047	1.048	1.046
	Female	1.047	1.052	1.040	1.048	1.045	1.046
α_2	Male	1.039	1.008	1.045	1.117	1.125	1.121
	Female	1.126	1.103	1.044	1.102	1.105	1.112
λ_2	Male	1.004	0.900	0.840	0.815	0.789	0.799
	Female	0.839	0.852	0.896	0.789	0.779	0.749
σ_2	Male	1.043	0.893	0.804	0.730	0.701	0.713
	Female	0.745	0.772	0.858	0.716	0.705	0.674
c	Male	0.839	0.789	0.862	0.909	0.909	0.894
	Female	1.042	0.944	0.955	0.913	0.923	0.910

Table 5 Changes in selected parameters defining model schedules, 1970-71 and 1980-81

3.4 Age-disaggregated moves in the UK

Age-specific NHSCR transfer data can be used to identify national trends in annual movement between 1975 and 1983. In this case, national movement refers to total transfers in the UK between FPCAs in England and Wales and between these spatial units and the three regions of Scotland, Northern Ireland and the Isle of Man. Movements at this scale are clearly dominated by those persons in the broad age group 15-29 (Figure 8). However, the most significant decline in relative terms between 1975-76 and 1982-83 is that of 27% experienced by the 0-14 age group. Total movements of those aged 45-64 declined by 19%, while movements of those aged 15-29 and 65+ dropped by 14% and 8% respectively over the period. Although there was little difference in the absolute numbers of persons aged 30-44 moving in 1975-76 and 1982-83, the volume did fluctuate from year to year and Figure 9 illustrates that the percentage of total moves made by those in this range has steadily increased while the percentage of migrants in the 0-14 age range has persistently declined.

More detailed analysis of shares of movement can be undertaken using male and female movement totals disaggregated into five year age groups. The graphs illustrated in Figure 10 indicate how the percentage shares of total male and female transfers made by people in different age groups have changed between 1975-76 and 1982-83. Transfers involving persons whose sex category was 'not-stated' have been allocated between males and females in proportion to 'stated' totals. The graphs show a variety of trends. In each of the first three age groups where the proportion of male moves was higher than females moves, the shares of total movement declined. The decline was most significant in the 5-9 age group and least significant in the 10-14 age group. The proportion of very young movers, aged 0-4, only declined until 1980-81. In marked contrast to the 0-14 age group trends, the shares of male and female moves in the next two age groups have grown. Female shares are about 3% greater than male shares in the 15-19 age group and about 5% in the 20-24 age group. Although there is an upward trend in the statistics for

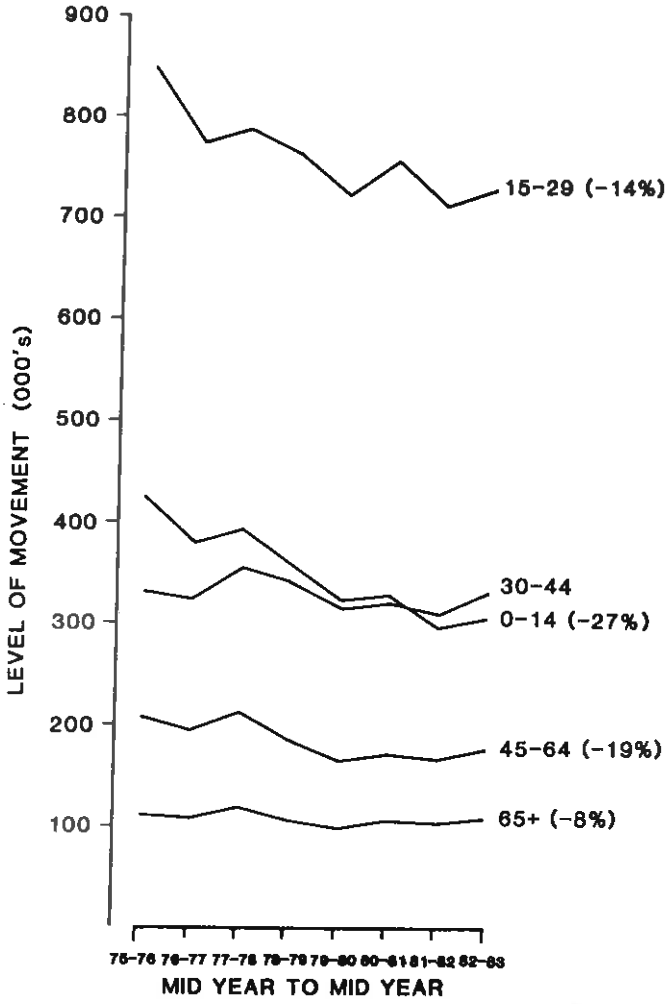


Figure 8 Levels of movement by broad age group for single years from mid-1975 to mid-1982

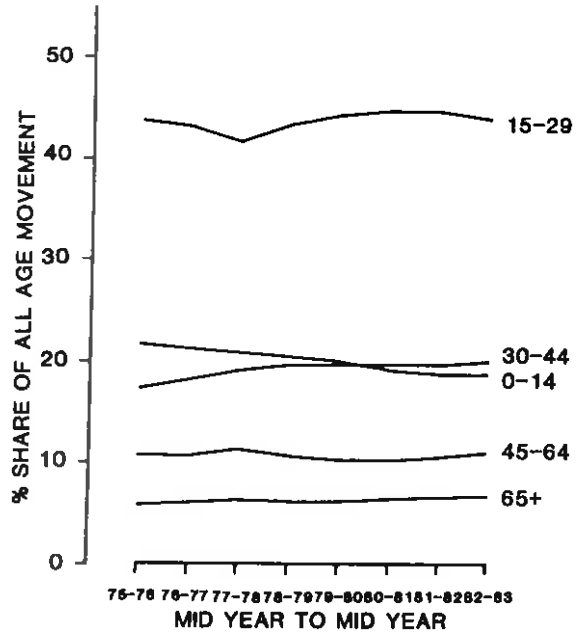


Figure 9 Broad age group % shares of all age movement for single years from mid-1975 to mid-1982

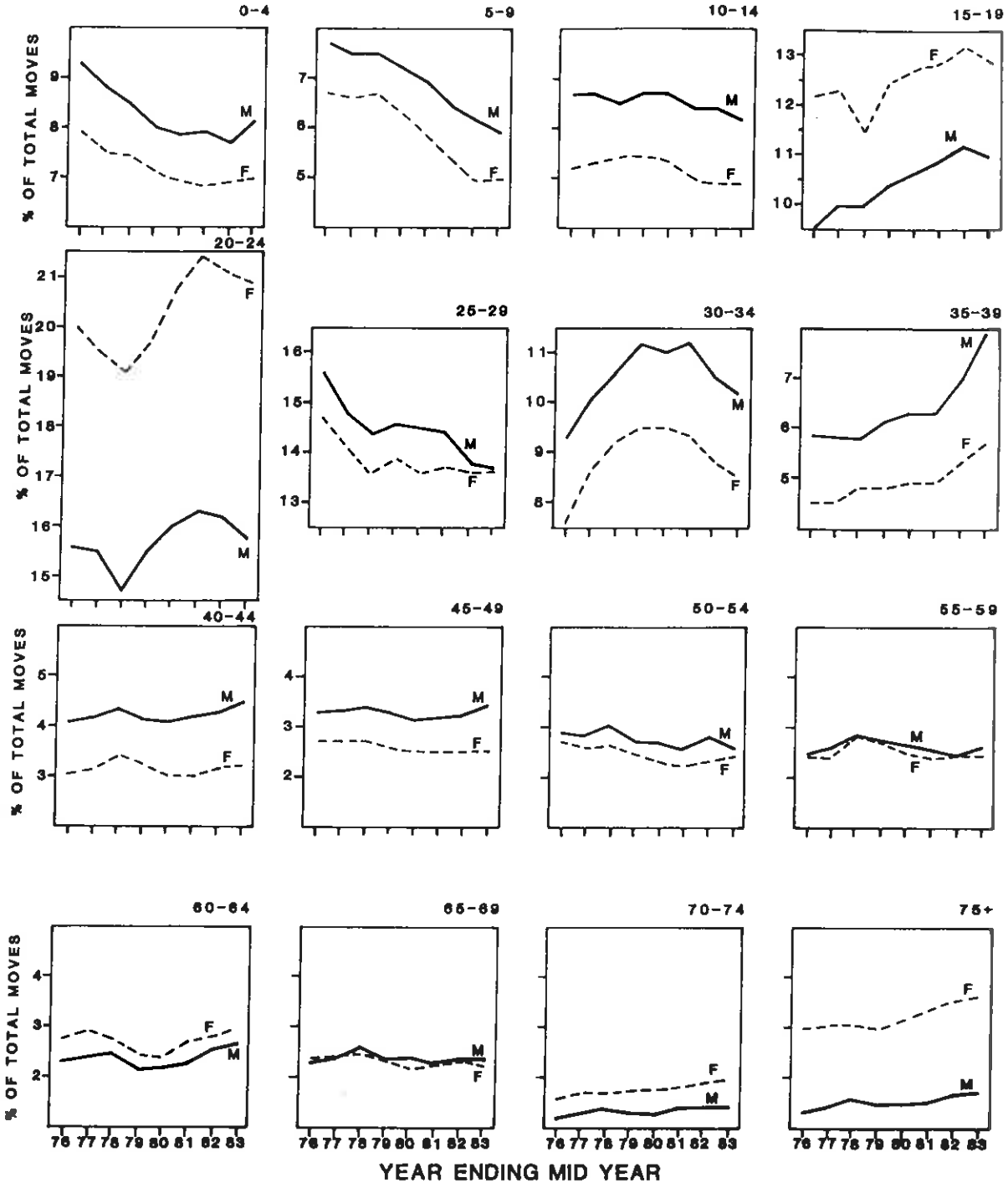


Figure 10 % shares of male and female movement by five year age group for single years from mid-1975 to mid-1982

both age groups, increases in shares only occurred in the middle years of the period. The pattern of change for those aged 25-29 reverts back to that of decline. This is not entirely unexpected since the age group is likely to contain many of the parents of children in the first two age groups. The proportions of moves involving men or women aged 30-34 increased until 1978-79 but dropped in parallel over the second half of the period, whereas the 35-39 age group increased its shares of both male and female migration throughout the period. The numbers of moves made by people in five year age groups over the age of 40 are lower and changes in the age group proportions are less significant. The male proportion is higher than the female proportion in the age groups up to 55-59, about the same in the 65-69 age group, and lower in the 60-64, 70-74 and 75+ groups. Women over the age of 75 constitute a considerably higher share of total movement than do men of similar age, and since 1978-79, the trend has been for this share to increase.

The results presented in this section of the paper have indicated that, in the context of declining levels and rates of migration since the early 1970s, there have been interesting changes in the age and sex structure of aggregate flows. There have also been changes in the spatial patterns and mean distances of migration which are considered in the next section.

4. Spatial characteristics of inter-area movement

4.1 Net and gross movement levels

One of the most prominent features of the redistribution of the population through migration within the country has been the pattern of net losses sustained in metropolitan areas and net gains incurred by non-metropolitan areas. The phenomenon described in the literature as counter-urbanisation (Fielding, 1982) is reflected in the migration statistics obtained from both the census and the NHSCR. Transition data at the regional level in 1971 and 1981 shows that, with the exception of the South East, all regions in Great Britain containing a metropolitan

county had negative balances whereas all remaining regions had positive net balances (Brant, 1984). Changes in regional net movement between 1971 and 1979 (Ogilvy, 1982) confirm this pattern in general terms and indicate the important role of the South East region, whose dramatic drop in transfer numbers has affected several other regions. Within the South East there are marked differences between the net out-migration experienced by Greater London and the net in-migration associated with the Outer Metropolitan Area and the Outer South East. Comparison between transfers in 1975-77 and 1980-82 at the county and district level (Devis, 1984) indicates that net losses in most districts in metropolitan areas, particularly in Greater London, have continued to diminish.

It is convenient to summarise trends in the spatial pattern of migration in the UK by adopting the system of metropolitan counties, region remainders and regions without metropolitan counties defined in Rees and Stillwell (1984). However, since the NHSCR zone set does not distinguish between Central Clydeside and the remainder of Scotland or between the Outer Metropolitan Area and the Outer South East, the number of spatial units is reduced from 20 to 18 (Figure 11). Net migration totals based on transfer data from mid-year 1975-76 to mid-year 1982-83 are presented in Table 6. Apart from a net gain of about 500 persons by South Yorkshire in 1979-80, all the metropolitan counties in England have registered net losses throughout the period. In 1975-76 the pattern of loss was dominated by Greater London whose net out-movement was in excess of 80,000 persons. However, by the end of the period, losses from the capital had declined by 60% to 31,000 in 1982-83. A much less dramatic decline also occurred in the West Midlands but in the other metropolitan counties there has been annual fluctuation around a fairly level trend. In the non-metropolitan regions in England and Wales, only the North, Remainder from 1977-78 and the North West, Remainder in 1982-83 have not experienced net migration gains. The most substantial growth by migration in absolute terms has taken place in the South East, Remainder, the South West and East Anglia, all of which had increasing gains between 1976-77

Spatial unit	Net transfers mid-year to mid-year (000s)							
	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
Metropolitan Counties								
Tyne and Wear	- 3.4	- 4.2	- 6.2	- 6.1	- 4.2	- 4.9	- 3.9	- 3.2
South Yorkshire	- 0.3	- 1.5	- 2.0	- 3.4	0.5	- 0.5	- 2.9	- 3.3
West Yorkshire	- 6.9	- 4.1	- 5.0	- 7.8	- 6.5	- 5.7	- 5.1	- 5.0
Greater London	-80.9	-72.1	-66.6	-64.5	-50.9	-37.6	-32.5	-31.2
West Midlands	-26.7	-24.7	-22.7	-25.2	-19.9	-16.4	-13.5	-16.7
Greater Manchester	-10.8	-11.1	-11.8	-14.1	-11.4	-12.8	-13.3	-10.1
Merseyside	- 6.9	- 8.4	-12.4	-11.9	-11.2	-10.5	-10.6	- 8.1
Non-metropolitan regions								
North, Remainder	5.0	1.6	- 0.9	- 0.6	- 0.4	- 5.3	- 1.7	- 1.2
Yorks & Humbs, Rem.	4.5	5.9	5.2	5.3	1.1	0.8	2.8	2.9
East Midlands	7.3	7.7	6.5	9.5	10.0	7.5	1.7	4.8
East Anglia	18.5	16.2	18.4	19.9	15.5	11.6	12.7	15.7
South East, Rem.	48.8	51.7	56.0	58.0	45.2	44.4	41.2	34.5
South West	31.2	27.2	28.3	29.6	27.7	24.9	21.4	27.6
West Midlands, Rem.	8.8	14.0	13.3	11.5	9.5	4.8	0.5	2.5
North West, Rem.	4.3	7.7	6.3	3.8	4.5	4.0	2.5	- 1.8
Wales	8.8	5.1	5.3	5.5	5.1	1.6	3.4	1.9
N. Ireland	- 5.3	- 4.0	- 4.1	- 3.4	- 3.5	- 3.0	- 2.5	- 2.6
Scotland	4.3	- 6.8	- 7.8	- 6.3	-11.1	- 2.8	- 0.3	- 6.9

Table 6 Net transfers for metropolitan counties and non-metropolitan regions, 1975-76 to 1982-83

Figure 11 The 18 zone system

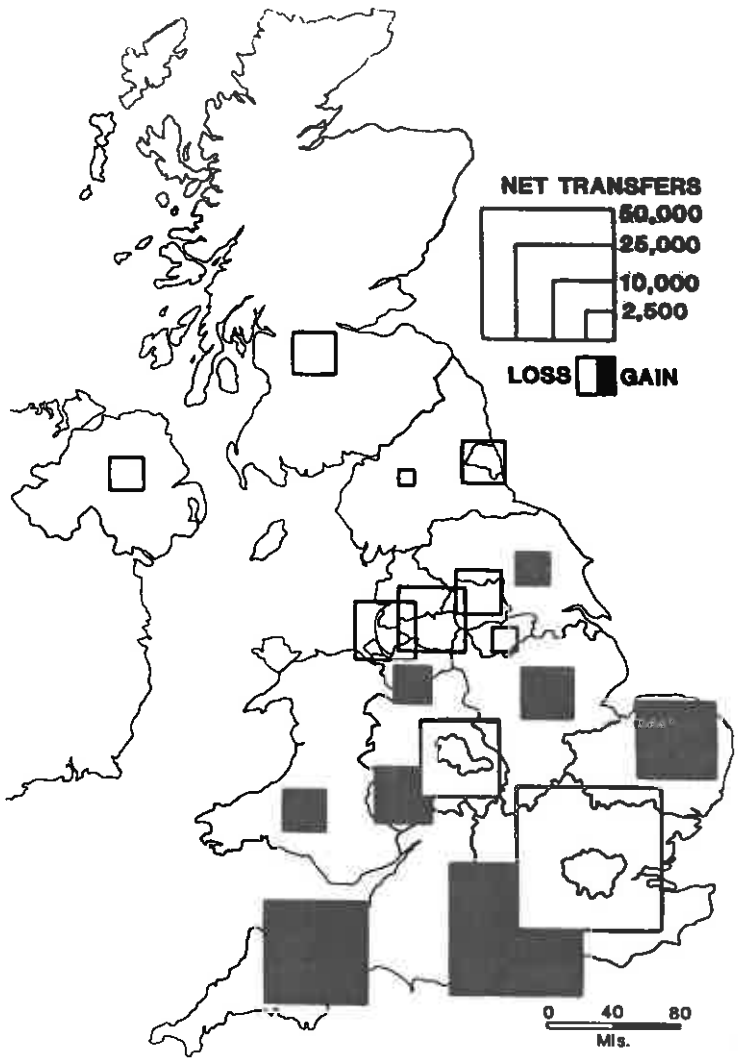


Figure 12 Average annual net transfer balances, 1975-76 to 1982-83

and 1978-79, followed by decreasing gains over the next two to four years. Northern Ireland and Scotland on the other hand have net migration series akin to the group of metropolitan counties in that they have negative balances in almost all years. Scotland of course contains the conurbation of Central Clydeside from which, according to the census, large numbers have departed. Annual net movements from each of the zones have been averaged over the period to produce a summary (Figure 12) of the pattern which emphasises the metropolitan versus non-metropolitan and the North versus South distinctions (Rees and Stillwell, 1984).

To what extent are changes in the net migration balances a function of changes in the levels of either inward or outward movement? The time series schedules of gross out- and in-migration levels for each of the 18 zones (Figure 13) illustrate that the decline in mobility described in Section 2 has been a common feature of both out- and in-migration in all zones. However, the trend in falling in-movement levels has not been paralleled by that of out-movement in every case. In Greater London, and to a lesser extent in the West Midlands Metropolitan County, the decline in out-migration has exceeded the decline in in-migration, whereas in the case of the South East, Remainder and West Midlands, Remainder, the drop in in-movement has been greater than the fall in out-movement. In almost all regions, annual fluctuations in the level of in-and-out movement correspond; although there is no upturn in the level of outward movement from Greater Manchester or from Merseyside in the last 12 month period and this results in a continued downward trend of in-movement to the Remainder of the North West.

4.2 The propensity to move over distance

Spatial analysis can be extended beyond the purely descriptive by using spatial interaction models to investigate the frictional effect of distance on movement between zones (Stillwell, 1978, 1986). Doubly constrained spatial interaction models can be fitted to each of the matrices of inter-zonal transfers to examine changes in distance decay parameters over time. The generalised parameter (β^*) has been calibrated for each flow matrix using the model defined by the equation:

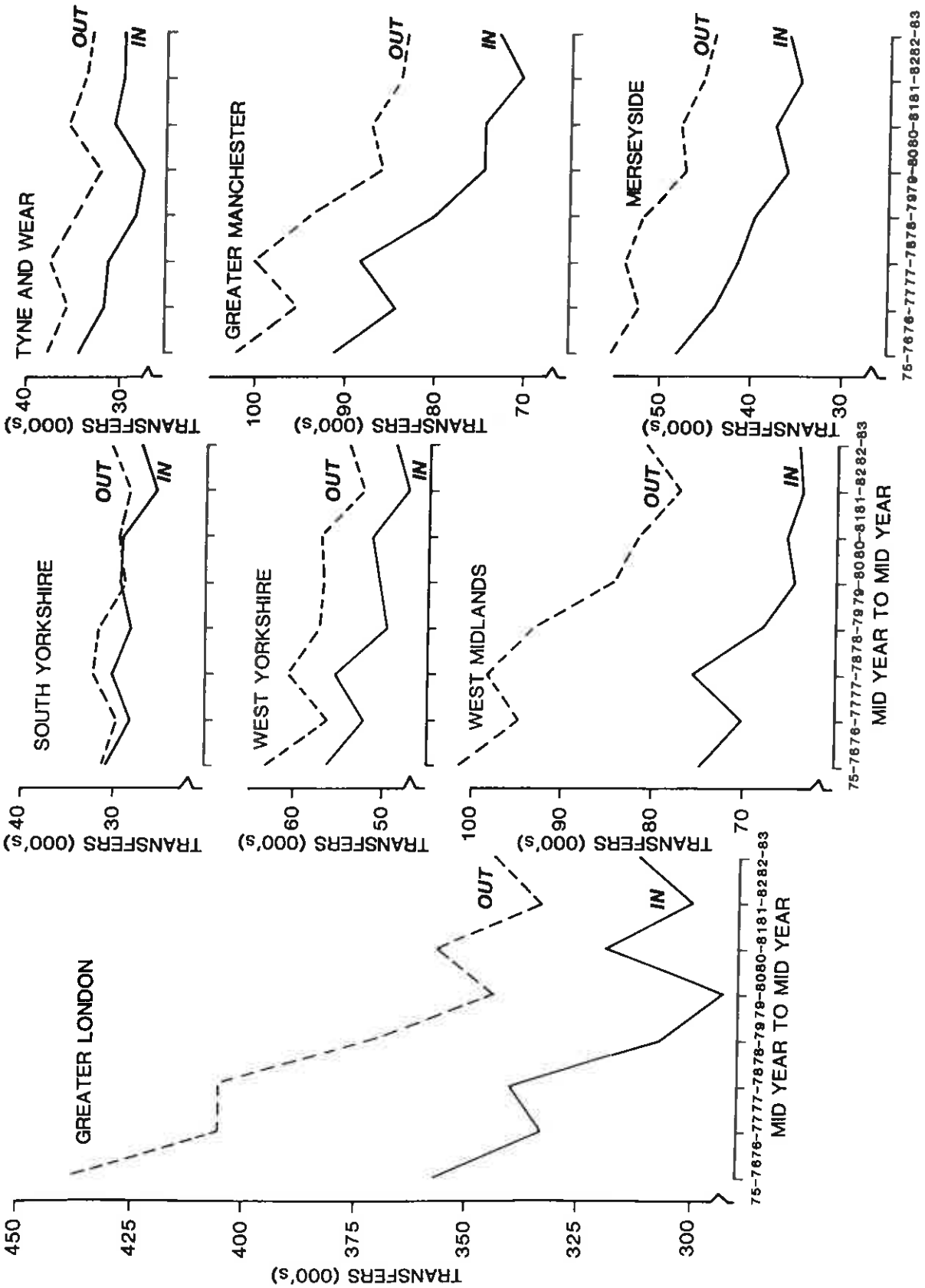


Figure 13 Gross movement levels 1975-76 to 1982-83
(a) Metropolitan counties

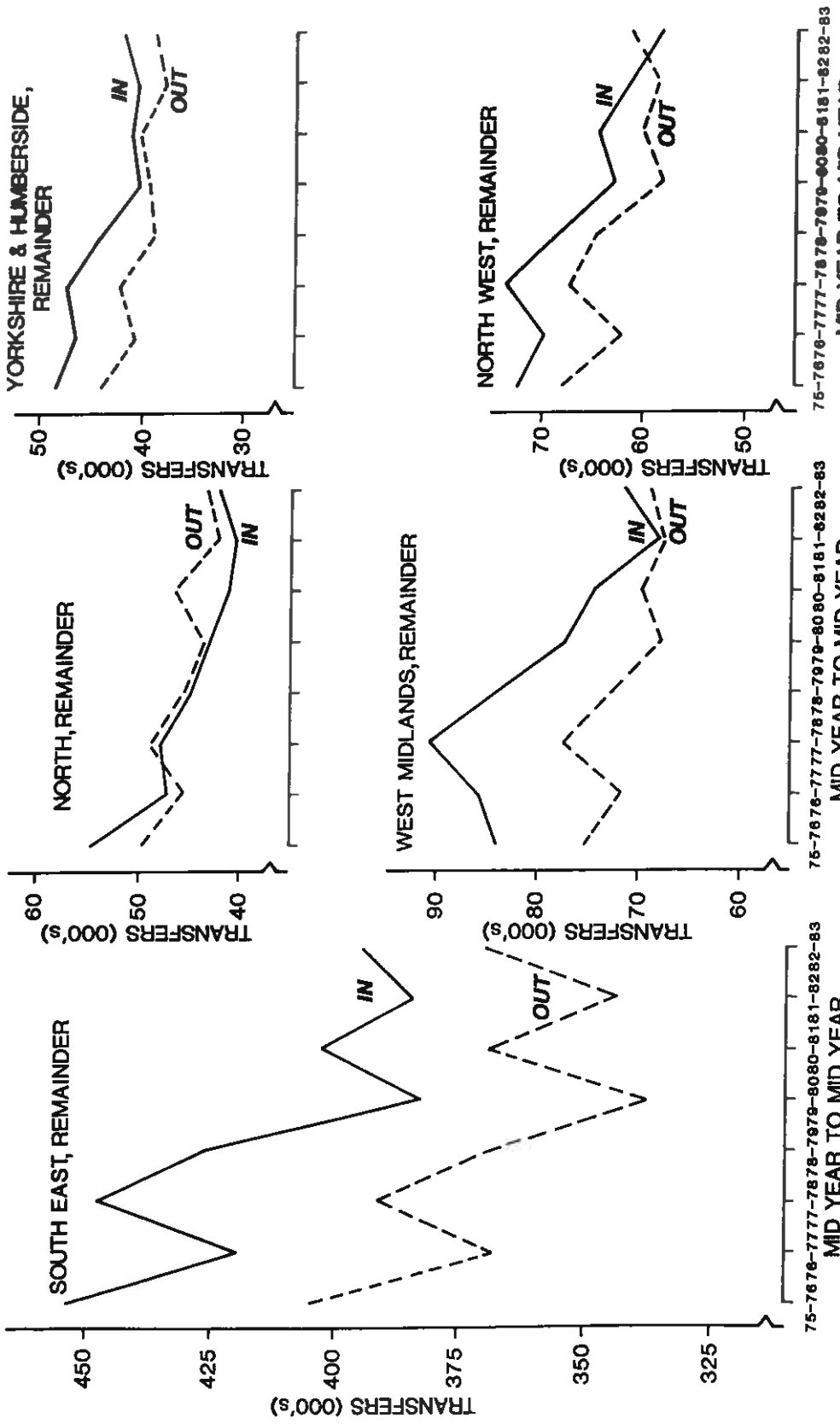


Figure 13 (continued) Gross movement levels 1975-76 to 1982-83
(b) Non-metropolitan region remainders

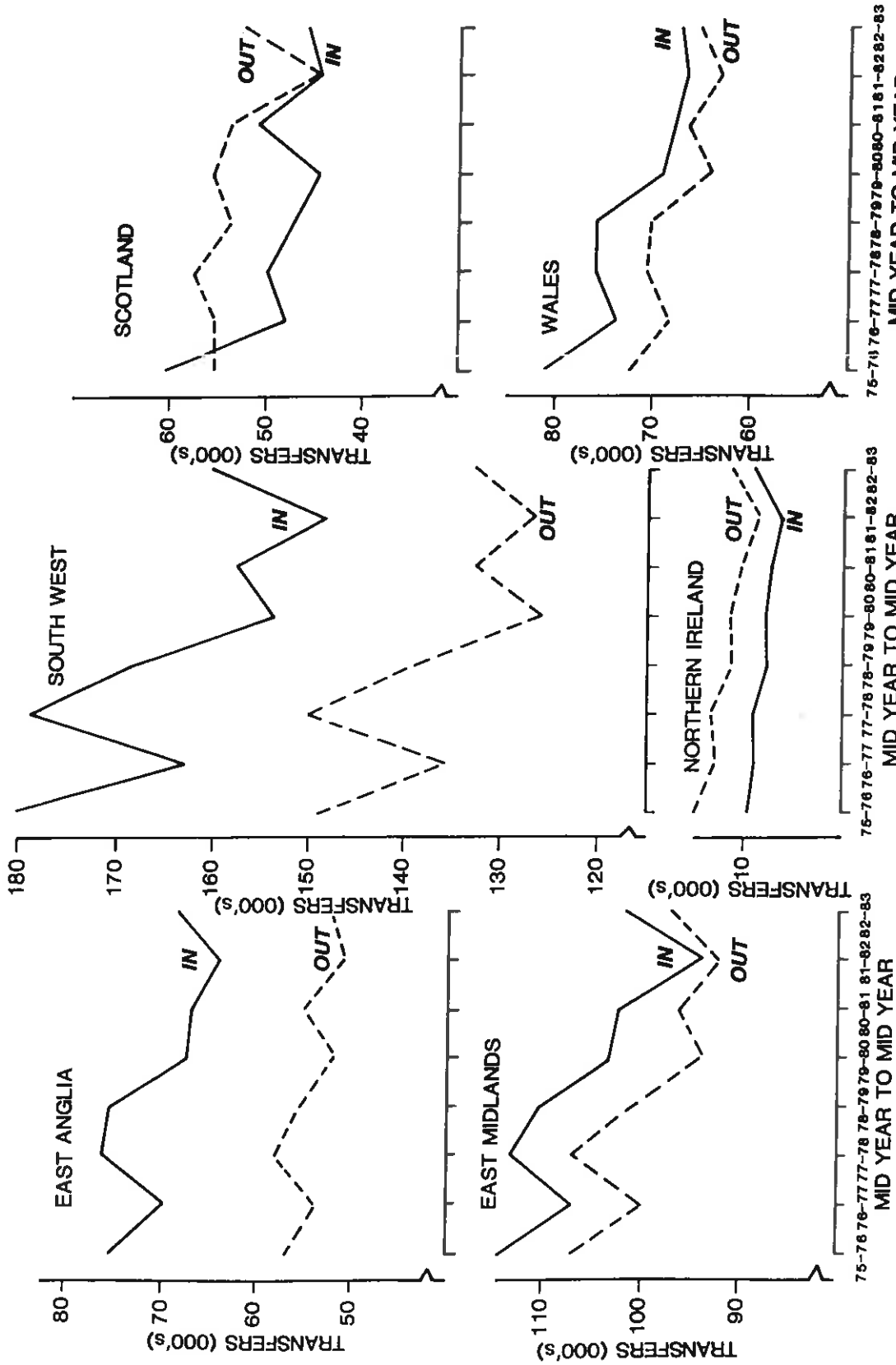


Figure 13 (continued) Gross movement levels 1975-76 to 1982-83
(c) Other regions

$$M_{ij} = A_i \; B_j \; O_i \; D_j \; d_{ij}^{-\beta *}, i \neq j \qquad (2)$$

where

O_i is the total out-movement from zone i,

D_j is the total in-movement to zone j,

$d_{ij}^{-\beta *}$ is the negative power distance decay function in which distance is measured as inter-zonal road mileage, and

$A_i \; B_j$ are balancing factors which ensure that both out- and in-movement constraints are satisfied.

Some changes in the parameter values are evident over the period (Figure 14), but the overall trend suggests decline in the influence of distance on mobility. This is reflected in higher mean distances moved after 1977-78 with the exception of 1981-82.

The generalised parameter provides an indication of the influence of distance on all inter-zonal movement occurring within the system. Calibration of zone-specific parameters using the IMP program (Stillwell, 1984) enables spatial variations in decay parameters and mean movement distances to be examined. Origin-specific decay parameters tell us the relative influence of distance on moves out of each zone, whereas destination-specific parameters are associated with in-moves into each j zone. The parameters calibrated on each of the eight annual flow matrices have been averaged and spatial variations in $\overline{\beta}_i$ and $\overline{\beta}_j$ values are illustrated in Figures 15 and 16. Distance appears to exert its greatest influence on transfers out of each metropolitan county and on moves away from region remainders in the Midlands and the North of England. In contrast, persons moving away from Scotland and Northern Ireland are least affected by distance and, due primarily to relative inaccessibility, tend to travel about two and a half times the national average distance of 92 miles. The third category of zones are those in the South of the country; including East Midlands, East Anglia, South East Remainder, South West and Wales, whose parameters are all lower than the national average. In each of these zones and the other region remainders, the destination-specific parameters are higher than the origin-

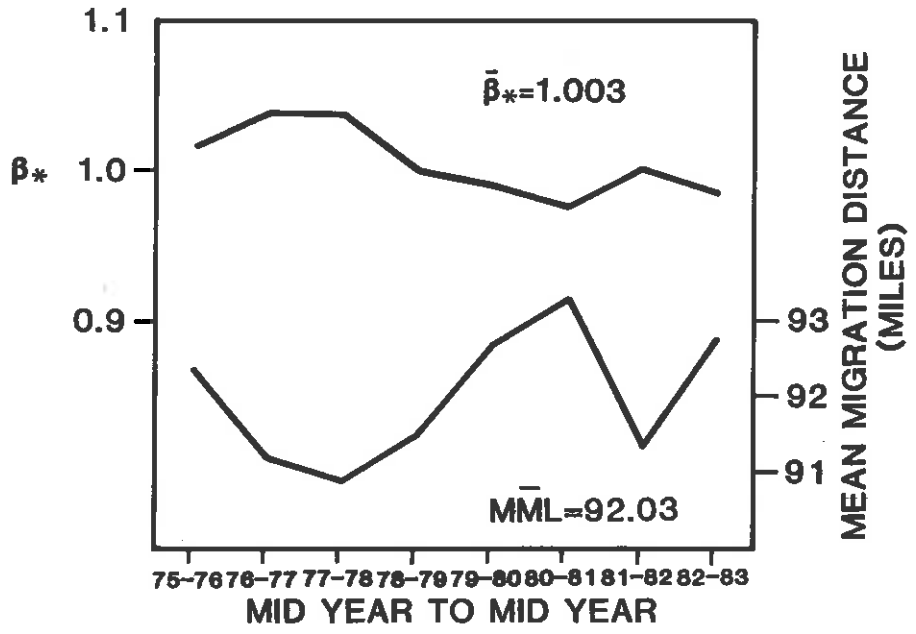


Figure 14 Generalised distance decay parameters and mean movement distances, 1975-76 to 1982-83

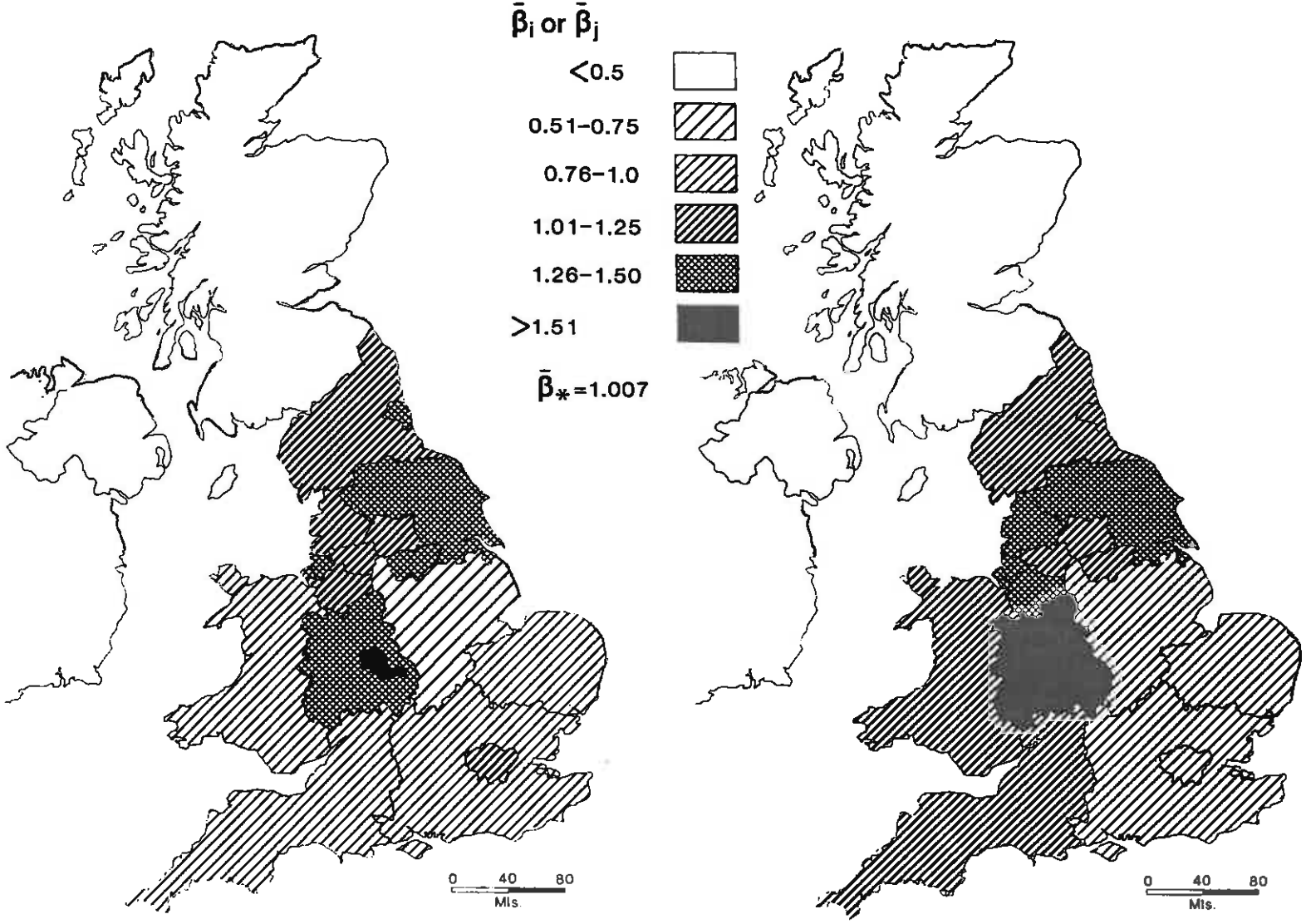


Figure 15 Average origin-specific distance-decay parameters

Figure 16 Average destination-specific distance-decay parameters

specific parameters, whereas in-movement to all metropolitan counties is less influenced by distance than out-movement. Greater London in particular has a much lower $\overline{\beta}_i$ than $\overline{\beta}_j$ value and persons moving to this area travel on average about 102 miles whereas those moving out of London travel an average distance of around 80 miles.

Zone-specific parameters and mean migration distances have remained fairly stable over the period. Values computed for the first and last years of the time series are compared in Figure 17. The β_i values above the UK mean, which are associated with metropolitan counties or their region remainders, have all declined marginally between 1975-76 and 1982-83 except for the West Midlands metropolitan county and its region remainder, whose β_i values have both increased. Below the UK mean, the β_i values have fallen for Wales and East Anglia in line with the national trends, but have risen for the South West, South East Remainder, East Midlands, Northern Ireland and Scotland. All the out-move distances have lengthened apart from those involving the South West, East Anglia, South East Remainder, East Midlands and the West Midlands where out-migration occurred over shorter distances in 1982-83 than in 1976-76. The most significant changes in the propensities to in-migrate over distance are the declines involving the West Midlands and Northern Ireland. The parameter value for Northern Ireland goes negative in 1982-83 for the first time in the period, indicating that the relationship between migration into Northern Ireland and distance has become positive. The province attracts more people as the distance from the origin increases. The zones where the function of distance has a greater effect on in-movement are the East Midlands and Scotland and the metropolitan counties of Tyne and Wear, South Yorkshire and West Yorkshire. The other zones have either the same or higher β_j values in 1982-83 than in 1975-76. A larger number of zones go against the trend as far as mean in-migration distance is concerned. Scotland, Tyne and Wear, North Remainder, Yorkshire and Humberside Remainder, West Yorkshire, South Yorkshire, West Midlands and East Midlands all have lower mean distances at the end of the period than at the beginning.

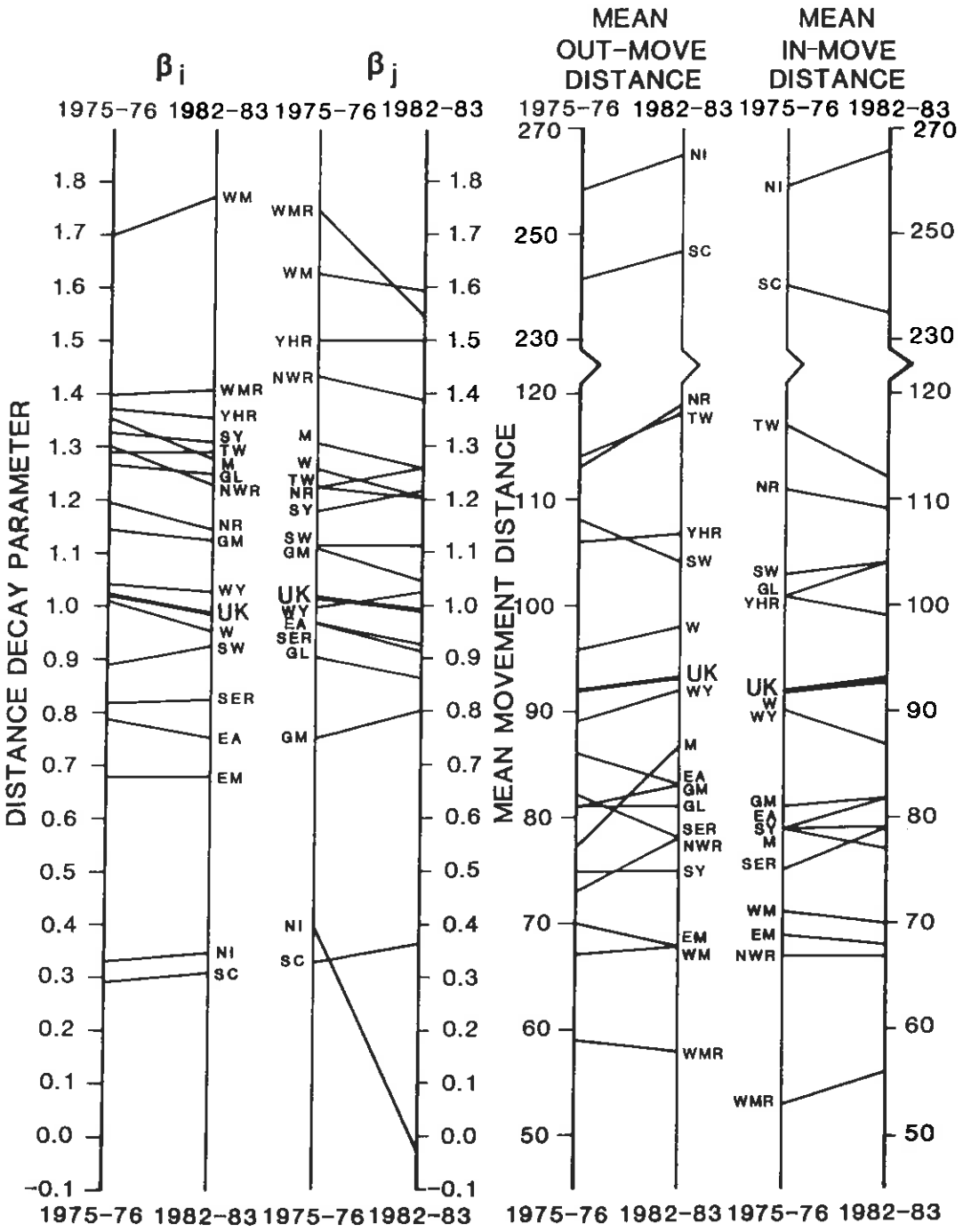


Figure 17 Changes in zone-specific parameters and mean movement distances between 1975-76 and 1982-83

5. Concluding remarks

The results reported in this paper suggest that, whilst there has been a substantial decline in the level of mobility in the UK in the 1970s and early 1980s, the characteristics of migration in terms of its age and sex structure and its spatial pattern have remained relatively stable. This is not to say that there have not been some changes. The comparison of model migration schedules in 1970-71 and 1980-81 reveals a higher and later labour force migration peak for males and females moving between counties and districts as well as within regions, counties and districts. Spatial analysis of NHSCR data for 1975 to 1983 indicates that although gross levels of in- and out-movement have declined in each of the 18 zones identified the fall in out-movement from Greater London, and from the West Midlands to a lesser extent, has been disproportionately large.

One of the research areas which has not yet been fully explored in this country primarily for data reasons, is the systematic analysis of temporal stability in migration flows along the lines of work done in the Netherlands and reported by Baydar (1983) and Willekens and Baydar (1986) in which the migration flows occurring in a system of interest are broken down into separate level, generation and distribution components, and the time dependence of individual components is examined using log linear modelling techniques. Since migration has become the most important component of regional population change, analysis of the dynamics or inertia of migration components is fundamental in the development of models to assist future migration forecasting. This paper has reported some of our initial exploratory research of compositional and spatial changes; the next step is the more systematic examination of the generation and distribution components of NHSCR movement, involving the application of generalised linear models.

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