OFFICE OF POPULATION CENSUSES AND SURVEYS

Inter-regional migration since 1971

an appraisal of data from the National Health Service Central Register and Labour Force Surveys

Audrey Ogilvy PhD

Building Research Establishment
Department of the Environment

Occasional Paper 16

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The views presented here are the author's and do not necessarily represent those of OPCS or the Department of the Environment

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INTER-REGIONAL MIGRATION SINCE 1971: AN APPRAISAL OF DATA FROM THE NATIONAL HEALTH SERVICE CENTRAL REGISTER AND LABOUR FORCE SURVEYS

INTRODUCTION

A problem which confronts all who are concerned with population movements in this country is the lack of information about present day migration. It is a problem for research workers and planning authorities who must rely on current knowledge as a basis for forecasts and future plans. The most detailed and reliable source of data on migration in Great Britain is the national Census of Population. However, figures for the 1971 Census refer to the situation nearly nine years ago. Although a time interval of this kind is not extensive when viewed in the general context of urban change, confidence in figures for earlier years is diminished if one believes that changes have taken place in the intervening period. Since 1971 the country's economic situation has altered substantially and this may well have affected migration.

A further three or four years will elapse before the results of the 1981 Census become available. Even then the Census will provide a reference point for one year alone which will not, in itself, show the directions of current change. In order to obtain information on migration during the period between censuses, as well as to trace trends in the pattern, one must turn to alternative data sources.

The urgency of this issue became evident in the course of a migration study being carried out at the Building Research Establishment (BRE). It was decided to appraise sources that might be used to update the BRE work and to assist planning authorities in understanding the present situation. This paper deals with two of the available sources of migration data: the National Health Service Central Register (NHSCR) and Labour Force Surveys (LFS).

The first part of the paper describes the migration figures that are derived from the NHSCR; it then examines NHSCR figures for the 1971 period to establish whether these provide a picture of inter-regional movement which corresponds to that recorded in the Census. The second section turns to the Labour Force Surveys and compares the migration figures from the earliest LFS with the Census and then with early NHSCR figures. In the third section of the paper, data for later years from each of the two sources are compared to see whether they provide consistent information about more recent migration flows.

The analysis shows a generally high degree of consistency in the results and, where there is inconsistency, identifies some factors responsible. The two sources provide useful data on migration. However, the figures from both sources must be used and interpreted with care to allow for sampling errors and differences in recording methods and definitions.

1. THE NATIONAL HEALTH SERVICE CENTRAL REGISTER (NHSCR)

This source is of particular interest because it provides quarterly information on movements and it is used by OPCS as one of the inputs for establishing the migration component in official sub-national population estimates.

The NHSCR exists to help in maintaining doctors' lists of their patients and to transfer personal medical records between health authorities. It acts as a central record of patients who transfer from a doctor practising in the area administered by one Family Practitioner Committee (FPC) to another doctor in a different FPC area. The Family Practitioner Committee areas correspond to counties and to metropolitan districts. The Register provides information on the origin and destination of transfers and, since April 1975, it has recorded the sex and age-groups of the patients who transfer.

1.1 Limitations of the NHSCR as an index of migration

There are problems to note when interpreting the data. For example, the NHSCR does not record migrants who do not register with a doctor. Some migrants who move only a short distance may not change their doctor even though their moves have crossed a county boundary; some of these changes of address may be picked up on the Register but others will pass unrecorded. Other migrants whose moves take them further afield may delay registering for a long time or may never register from their new addresses. The probability of registering with a new doctor, and of registering early, is greater for certain sub-groups of the population. Although these groups include both extremes of the age-scale (the elderly and the chronically sick as well as families with young children), young adults without families are likely to be under-represented on the Register. This is a serious potential omission for this group has a high propensity to migrate.

The time delay between moving and recording a change of doctor is a problem for which some allowance can be made. OPCS estimate that the average lag between move and registration is about three months and that rather over 90 per cent of migrants register within a year of their moves. Given this assumption, one can take account of the time lag by assuming that registrations recorded in a certain period refer to moves made on average three months earlier.

The quality of the Registers kept by the Family Practitioner Committees varies. In general, those maintained by authorities in rural areas are of higher quality than those in urban areas. There was some disturbance to the figures in April 1974 when the Register had to be re-organised to correspond to the new FPC areas instead of the previous Executive Councils.

Such problems inherent in the Register and the possibility of bias in the figures should not be forgotten; the NHSCR is not a perfect source. Yet, for those interested in migration, neither is it a perfect world when the country lacks population registers such as those which monitor migration in many countries in Europe. In this situation the NHSCR appears as one of the best potential sources of migration data. It provides a time series dating from the early 1970s and it is constantly updated. The Register provides information at regional, county and metropolitan district level. The sampling fraction is a large one; at first the figures were based on 100 per cent coverage; in April 1975 sampling on a 10 per cent basis was introduced and recording was extended to include the sex and age-groups of the migrants.

1.2 Comparison with the 1971 Census: number of inter-regional transfers

The NHSCR's usefulness as a measure of migration can be tested by comparing its data for the 1971 period with the Census figures for one year migrants. Moves recorded in the Census were those which took place in the 12 months preceding Census day in April 1971. The nearest NHSCR equivalent is the first 12 month period for which statistics have been extracted, that is transfers registered between 1 April 1971 and 31 March 1972. Assuming an average time delay of three months, these moves would have taken place during the calendar year 1971; thus the time periods used by Census and NHSCR overlap by three months.

The figures are shown in Table 1. The regions are those defined as standard regions at the time of the 1971 Census. The analysis has been restricted to movement between the eight English regions and Wales.

Table 1 Inter-regional migrants or transfers in England and Wales recorded by the 1971 Census and the NHSCR 1971-2

1971 Census	
Migrants between regions	728,460
Resident population aged 1 or over	47,980,540
Migrants per 1,000 population	15.2
1971-2 NHSCR	
Transfers between regions	883,710
Resident population, all ages	48,754,815
Transfers per 1,000 population	18.1

One should not expect NHSCR and Census figures to be identical. Apart from the problems mentioned already, three other differences should be noted. First, the NHSCR includes transfers made by children under one year of age who are registered with a doctor at birth. The Census migration tables exclude this group who, by definition, had no address 12 months earlier. This age-group reflects the migration behaviour of young adults who have a high propensity to migrate. When figures for migrants and transfers are expressed as a proportion of population (as in Table 1), the inclusion of children aged under one in NHSCR figures can be allowed for by taking population of all ages as a basis while calculating the Census figure on population aged one and over. Even so, the migration rate per 1,000 population recorded by the NHSCR is almost 20 per cent higher than that shown in the Census.

The second difference between the two data sources is that the NHSCR includes some student movement. Some, but not all, students register with a doctor at their place of education; the policy of the universities varies as to whether registration is encouraged.

Thirdly, the NHSCR includes multiple and return moves; thus a person who moved and re-registered twice during the 12 month period will count as two moves, a person who re-registered three times as three, and so on. The Census, on the other hand, excludes multiple moves; by asking for address one year ago, it counts a multiple mover as one move only. A return migrant, who left and returned to the same address within one year, will not be counted by the Census as a migrant at all.

It seems reasonable to regard multiple movement as the major explanation of the difference; studies have shown that a considerable part of migration is due to repeated moves made by a small section of the population. The General Household Survey gives some indication of multiple movement; in each of the six surveys carried out between 1971 and 1976, some 21-24 per cent of the sample of household heads reported that they had moved once in the past five years, 5-7 per cent had moved twice, 3 per cent three times, 1 per cent four times and 1 per cent five or more times. (See, for example, *The General Household Survey 1976*, OPCS Social Survey Division, HMSO, 1978.) Part of the highly mobile group comprises young, childless adults, some of whose short-stay moves are likely to pass unrecorded by the NHSCR. But also included are the equally mobile young families who tend to register with a doctor very soon after moving. In addition temporary moves made for health reasons will raise NHSCR figures relative to those in the Census. It would not take many multiple and return moves to explain the difference observed between NHSCR and Census figures.

1.3 Numbers of migrants and transfers to and from each region

As one would expect from the relatively high counts yielded by NHSCR transfers, the two figures for gross transfers to and from each region are about one fifth higher than corresponding figures from the Census. Nevertheless, the overall association between the two data sources is close, giving a correlation coefficient for gross flows of $r = 0.997$. (This result is highly significant at the 0.1 per cent level with Student's $t = 53.350$.) The figures are plotted in the upper graph in Figure 1. The regression line of Census migrants on NHSCR transfers is shown, with control limits placed at 1.96 times the standard error of the estimate. The regression coefficient is 0.820; thus for every 1,000 transfers registered by the NHSCR, the best estimate of one year migrants recorded by the Census is 820, with 95 per cent certainty that the figure lies between 751 and 889.

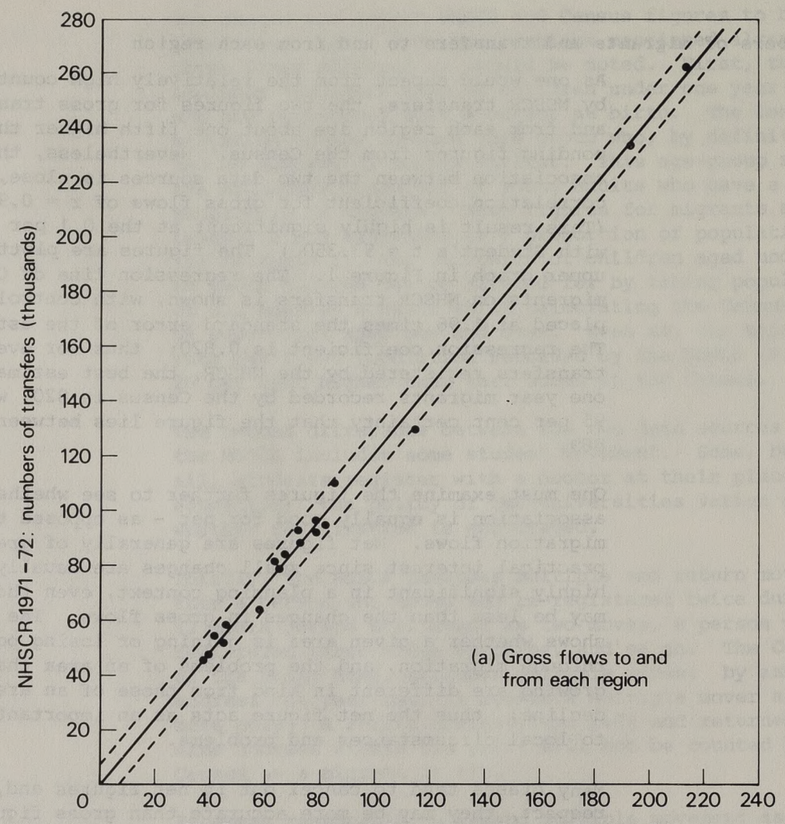
One must examine the figures further to see whether the association is equally good for net - as opposed to gross - migration flows. Net figures are generally of greater practical interest since small changes are usually seen as highly significant in a planning context, even though they may be less than the changes in gross flows. The net figure shows whether a given area is gaining or losing population through migration, and the problems of an area that is growing are different in kind from those of an area in decline; thus the net figure acts as an important index to local circumstances and problems.

Many biases tend to cancel out in net figures and, in this respect, they may be more accurate than gross figures. On the other hand, the net figure is calculated as the difference between the two figures for inward and outward movement; since each of these component estimates has a range of error due to sampling, it follows that the net figure itself is subject to a greater range of error. In fact, the figures for net migration flows from NHSCR and the Census, plotted on the lower half of Figure 1, are not as closely related as those for gross flows. The association is still strong, however; $r = 0.972$, highly significant at the 0.1 per cent level with $t = 10.911$. The regression coefficient in this case is 0.866.

1.4 Rates of movement or transfer between regions

A further test of consistency between Census and NHSCR results is to calculate the rates of movement or transfer to and from each region. These rates are given in Table 2 in which the regions are listed in rank order of net change (the final column).

Figure 1 Inter–regional moves: 1971 Census and NHSCR 1971–2



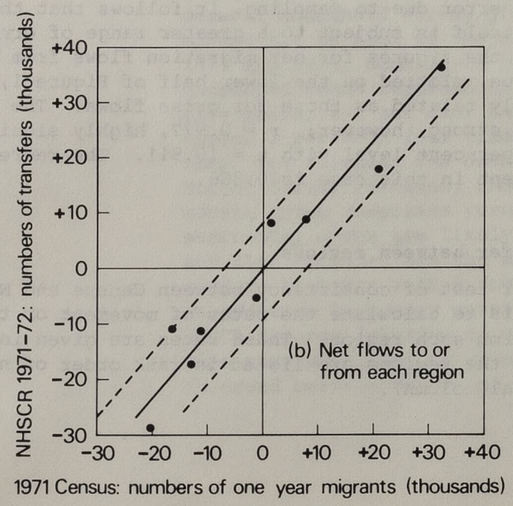


Table 2 Rates of inter-regional migration or transfer recorded by the 1971 Census and the NHSCR 1971-2

(a) 1971 Census: migrants in one year preceding the Census

Regions (1971 boundaries)	Migrants per 1,000 population aged 1 and over		
	Into region from rest of England and Wales	Out of region to rest of England and Wales	Net migrants
Yorks and Humberside	13.4	16.8	- 3.4
West Midlands	13.4	15.7	- 2.3
North West	10.8	12.8	- 2.0
South East	11.4	12.6	- 1.2
North	13.9	14.3	- 0.4
Wales	15.2	14.7	+ 0.5
East Midlands	22.1	19.7	+ 2.4
South West	31.1	22.3	+ 8.8
East Anglia	35.9	23.3	+ 12.6

(b) NHSCR: transfers registered during the year 1.4.71 - 31.3.72

Regions (1971 boundaries)	Transfers per 1,000 population		
	Into region from rest of England and Wales	Out of region to rest of England and Wales	Net transfers
North West	13.8	16.3	- 2.5
Yorks and Humberside	16.9	19.1	- 2.2
West Midlands	16.5	18.7	- 2.2
North	15.7	17.5	- 1.7
South East	13.6	15.2	- 1.6
East Midlands	26.1	23.4	+ 2.8
Wales	20.3	17.3	+ 3.0
South West	34.9	25.2	+ 9.8
East Anglia	38.4	27.6	+ 10.8

Although the NHSCR indicates in each region higher rates of both inward and outward movement than does the Census, there are only minor differences in the two sets of rank orders and there are no discrepancies between the lists in respect of direction of net flow. This is illustrated in Figure 4 where the net rates of change shown by Census and NHSCR are plotted together (see the left-hand scale on the diagram).

These results encourage confidence in the value of NHSCR figures as a measure of migration. They provide a picture of inter-regional movements which, in general, correlates closely with that recorded in the Census. Of course, the results are not identical; this would be unreasonable to expect in view of the differences in method and definition that underlie the figures; the 1971 Census migration tables, themselves, are derived from a 10 per cent sample of the population and are liable to sampling error. For this reason, the figures need careful interpretation, particularly when using NHSCR figures for later years in which there is no census information to act as a check on accuracy. It is useful, therefore, to examine another data source for supporting evidence of any trends. The Labour Force Survey is particularly suitable for this purpose because it yields inter-regional migration figures and provides a time series based on a two year interval.

2. THE LABOUR FORCE SURVEY (LFS)

Labour Force Surveys are carried out in England and Wales by OPCS for the Department of Employment and to EEC requirements. In Scotland the General Register Office and in Northern Ireland the Department of Finance undertake the surveys. The LFS provides national information on employment and unemployment, and on the size and structure of the labour force, comparable with the results of surveys conducted in other European countries. The first LFS in the United Kingdom was carried out in 1973; a biennial programme was established, with further surveys following in 1975, 1977 and 1979.

2.1 Survey method

The surveys are based on interviews with a sample of households. In England and Wales approximately 100,000 households are selected, representing about 0.5 per cent of the population. Information about each household is obtained from an interview with one adult member.

Interest in the LFS from the migration angle derives from a question which asks if household members were living at the same address one year previously and, if not, where they were living. This is a direct parallel with the census question concerning address one year ago.

However, while the census results can be used for a detailed geographical analysis of migration, using units as small as local authority areas, the LFS is not designed for this purpose. Its principal objective is to obtain a general view of the national population and for reasons of economy it uses area sampling, with a multi-stage stratified cluster design. The sampling frame used in the first survey differed from that used in subsequent ones. The change in method is the most likely explanation of the differences that this paper finds in the accuracy of the migration results and, therefore, it is worth outlining the two sampling frames.

The 1973 survey used a three-stage sample, based on the 2,000 census districts and the 100,000 enumeration districts used for the 1971 Census. At the first stage about 1,000 census districts were selected; second, within each of these census districts, five enumeration districts were chosen; and finally a systematic sample of one in eight addresses was drawn from a list of inhabited properties produced by visual inspection. This method, particularly through its initial selection of approximately half the 2,000 census districts, yielded a sample of areas well dispersed geographically. The method was not used again because of field problems and costs.

In 1975 a two-stage design was introduced. At the first stage 150 local authority districts were selected with probabilities proportional to population size; as a result of this method some districts were selected more than once. Second, within each of the chosen districts, a sample of 600 residential properties was drawn from the valuation or rating lists (1,200 in the five districts selected twice, and 1,800 in the one district selected three times). Local authority districts had been redefined and enlarged the year before, reducing the number of districts in England and Wales to 402. The initial sampling of 143 of these produced a sample with a higher degree of clustering than the one drawn for the first survey. A modified version of this two-stage frame was used again for the third survey in 1977. The method is described more fully in 'Labour Force Survey' by the LFS Group in OPCS, *Population Trends 7*, Spring 1977, HMSO, pp 15-17.

The degree of clustering gives results which are satisfactory for analysis at the national scale and for some regional analyses. The article in *Population Trends* mentioned above, states that: 'Because the LFS has included questions about residence and occupation one year before the interview, it can yield figures of inter-regional movement and occupational mobility'. However, the variable of geographical movement is particularly susceptible to clustering effects; for example, in districts situated on a regional boundary there will be a higher incidence of moves crossing that boundary than in districts further away. The results for each region will be influenced by the location of the districts selected, this effect being greatest in the smallest regions. The regions of England and Wales differ widely in population size and number of local authority districts. Thus the LFS migration results for regions must be interpreted with care, bearing in mind the greater degree of clustering in the later surveys.

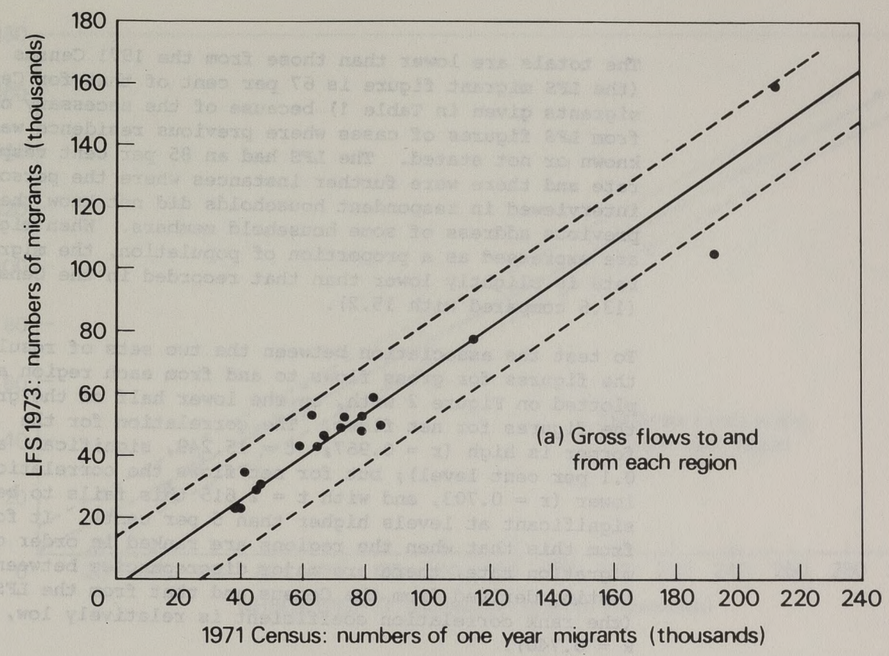
2.2 Comparison of the first LFS with the 1971 Census

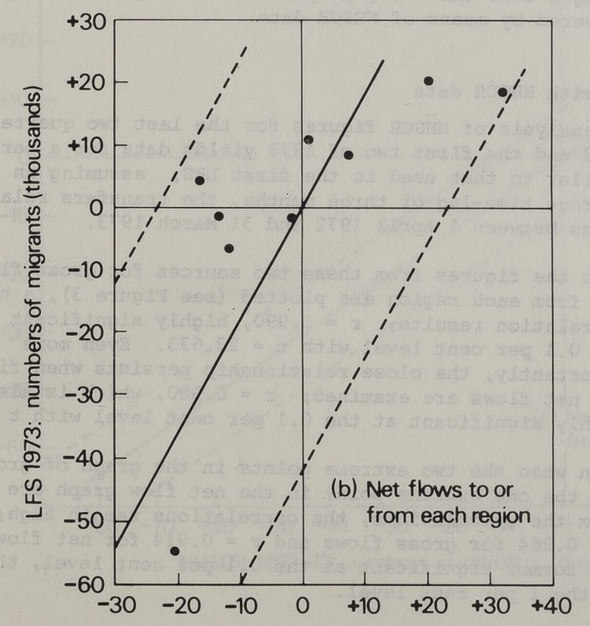
The results of the earliest LFS were compared initially with those from the Census to test the extent of agreement between the two. The first LFS was conducted two years after the Census and this posed a problem; if discrepancies were observed between results, should these be attributed to differences in the methods employed by the two sources or to changes in migration behaviour between the two time-periods? The question becomes important because the comparison shows considerable differences.

The 1973 LFS recorded the following results for migration between the eight regions of England, and Wales:

Migrants between regions	489,256
Respondent population	35,850,984
Migrants per 1,000 population	13.6

Figure 2 Inter–regional moves: 1971 Census and LFS 1973





The totals are lower than those from the 1971 Census (the LFS migrant figure is 67 per cent of that for Census migrants given in Table 1) because of the necessary omission from LFS figures of cases where previous residence was not known or not stated. The LFS had an 85 per cent response rate and there were further instances where the person interviewed in respondent households did not know the previous address of some household members. When migrants are expressed as a proportion of population, the migration rate is slightly lower than that recorded in the Census (13.6 compared with 15.2).

To test the association between the two sets of results, the figures for gross flows to and from each region are plotted on Figure 2 with, on the lower half of the graph, the figures for net flows. The correlation for the former is high ($r = 0.967$; $t = 15.249$, significant at the 0.1 per cent level); but for net flows the correlation is lower ($r = 0.703$, and with $t = 2.615$ this fails to be significant at levels higher than 5 per cent). It follows from this that when the regions are ranked in order of net migration rate, there are major discrepancies between the listing derived from the Census and that from the LFS (the rank correlation coefficient is relatively low, $R = 0.740$).

This raises the question mentioned already: do these discrepancies arise from differences in method or from changes over the two year period? This question can be answered by means of NHSCR data.

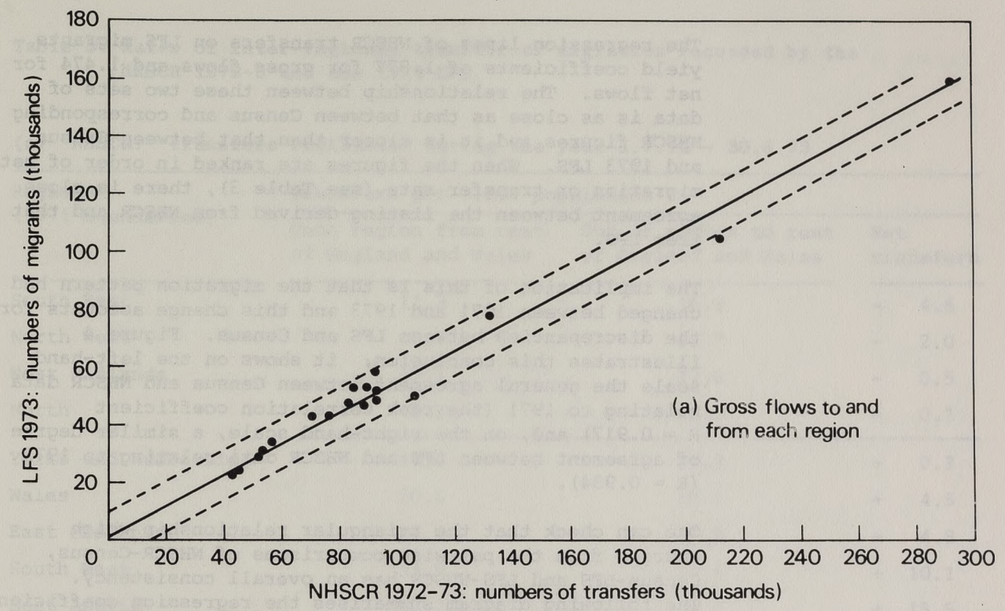
2.3 The 1973 LFS compared with NHSCR data

An analysis of NHSCR figures for the last two quarters of 1972 and the first two of 1973 yields data for a period similar to that used in the first LFS; assuming an average time-lag of three months, the transfers relate to moves between 1 April 1972 and 31 March 1973.

When the figures from these two sources for gross flows to and from each region are plotted (see Figure 3), a high correlation results; $r = 0.990$, highly significant at the 0.1 per cent level with $t = 28.633$. Even more importantly, the close relationship persists when figures for net flows are examined; $r = 0.980$, which is also highly significant at the 0.1 per cent level with $t = 13.146$.

Even when the two extreme points in the graph of gross flows and the one extreme point in the net flow graph are excluded from the calculations, the correlations remain high; $r = 0.964$ for gross flows and $r = 0.914$ for net flows, the former significant at the 0.1 per cent level, the latter at the 1 per cent level.

Figure 3 Inter–regional moves: NHSCR 1972–3 and LFS 1973



The regression lines of NHSCR transfers on LFS migrants yield coefficients of 1.877 for gross flows and 1.474 for net flows. The relationship between these two sets of data is as close as that between Census and corresponding NHSCR figures and it is closer than that between Census and 1973 LFS. When the figures are ranked in order of net migration or transfer rate (see Table 3), there is close agreement between the listing derived from NHSCR and that from LFS.

The implication of this is that the migration pattern had changed between 1971 and 1973 and this change accounts for the discrepancies between LFS and Census. Figure 4 illustrates this conclusion; it shows on the left-hand scale the general agreement between Census and NHSCR data relating to 1971 (the rank correlation coefficient $R = 0.917$) and, on the right-hand scale, a similar degree of agreement between LFS and NHSCR data relating to 1973 ($R = 0.934$).

One can check that the triangular relationship which emerges from the pairwise comparisons of NHSCR-Census, Census-LFS and LFS-NHSCR has an overall consistency. The following diagram summarises the regression coefficients for gross migration flows and illustrates the relationship of the three sources to each other by comparing the source equivalents of 1,000 migrants given by the Census. As a general guide, the relationship can be simplified thus: for every 100 one year migrants counted by the Census, there were approximately 122 medical transfers registered with the NHSCR and about 65 migrants recorded by the LFS. The confidence limits for these figures can be read from Figures 1, 2 and 3. The link between Census and LFS 1973 has the lowest correlation of the three due to the two year time lapse and, accordingly, is shown with a dotted line and the break in estimated figures is shown at that point. Even so, the two estimates arrived at for the LFS are well within the limits of twice the standard error.

(a) using the regression coefficients of x on y

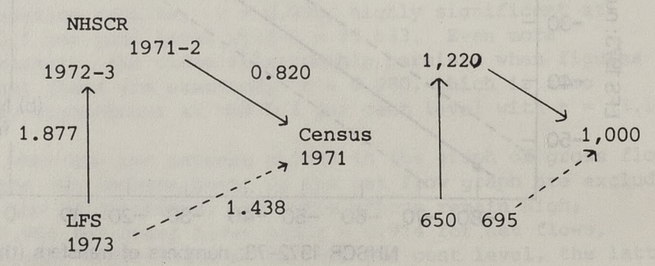


Table 3 Rates of inter-regional transfer or migration recorded by the NHSCR 1972-3 and the 1973 LFS

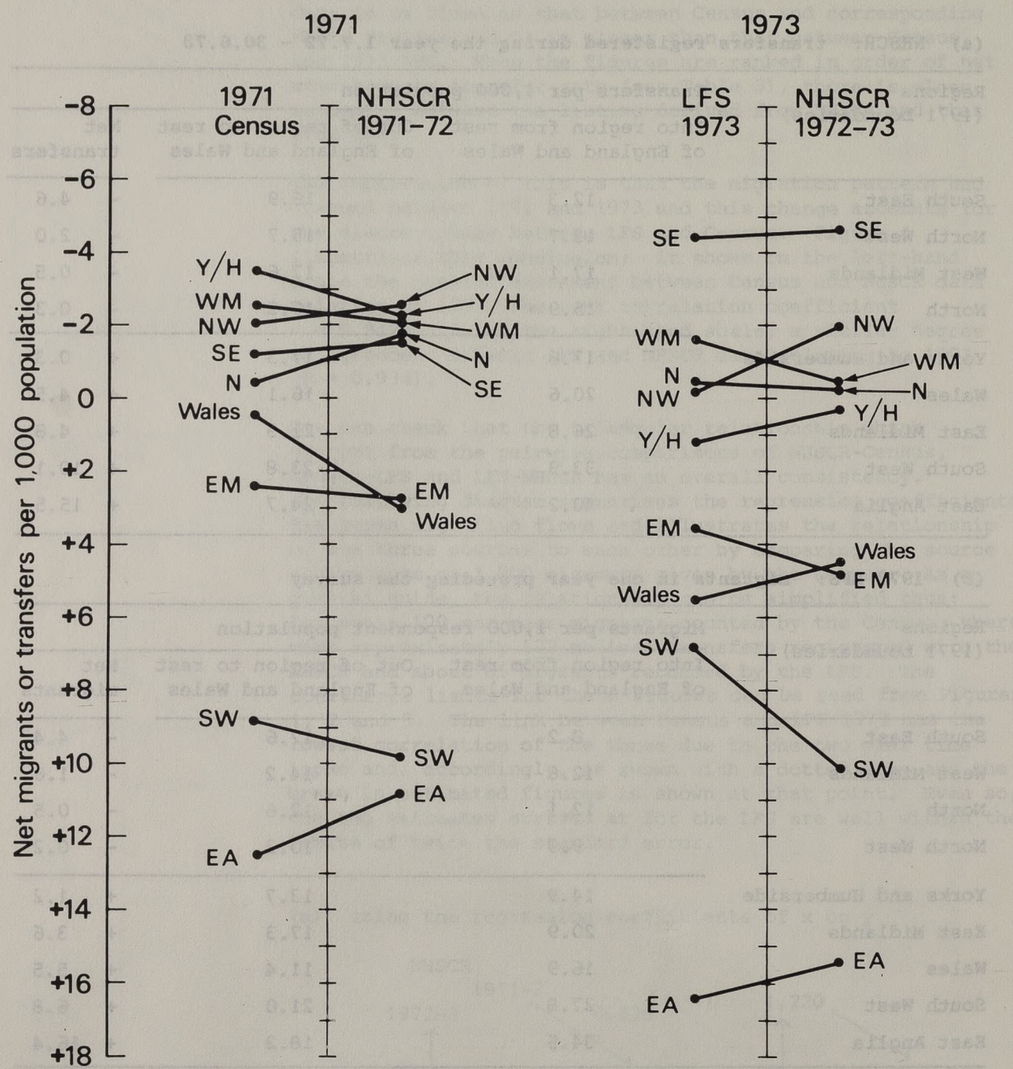
(a) NHSCR: transfers registered during the year 1.7.72 - 30.6.73

Regions (1971 boundaries)	Transfers per 1,000 population		
	Into region from rest of England and Wales	Out of region to rest of England and Wales	Net transfers
South East	12.3	16.9	- 4.6
North West	13.7	15.7	- 2.0
West Midlands	17.1	17.6	- 0.5
North	15.9	16.2	- 0.3
Yorks and Humberside	17.6	17.3	+ 0.3
Wales	20.6	16.1	+ 4.5
East Midlands	26.8	21.9	+ 4.8
South West	33.9	23.8	+ 10.1
East Anglia	40.2	24.7	+ 15.5

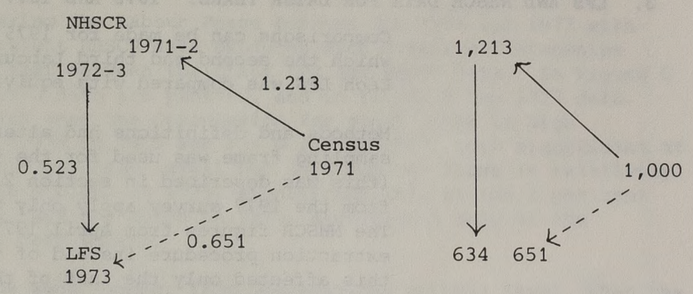
(b) 1973 LFS: migrants in one year preceding the survey

Regions (1971 boundaries)	Migrants per 1,000 respondent population		
	Into region from rest of England and Wales	Out of region to rest of England and Wales	Net migrants
South East	8.2	12.6	- 4.4
West Midlands	12.6	14.2	- 1.6
North	12.1	12.6	- 0.5
North West	9.9	10.2	- 0.2
Yorks and Humberside	14.9	13.7	+ 1.2
East Midlands	20.9	17.3	+ 3.6
Wales	16.9	11.4	+ 5.5
South West	27.8	21.0	+ 6.8
East Anglia	34.5	18.2	+ 16.4

Figure 4 Rates of inter–regional migration or transfer: 1971 and 1973



(b) using the regression coefficients of y on x



2.4 Migration changes between 1971 and 1973

Since the figures have indicated differences between the migration pattern in 1971 and in 1973, it is worth commenting on these before examining the data for later years.

A problem which underlies the analysis throughout this paper is that of statistical significance; for example, how much reliance can be placed on the relative ordering of the regions according to a particular data source? While the conventional measures of standard error can be calculated for individual figures, these are not helpful when one compares data drawn from such widely different sources. The problem is not merely one of differences in sampling fraction; the Census migration tables were based on a sample of population, the LFS uses a sample of households, the NHSCR tables derived from an inspection of medical transfers; the variation in sampling fraction is outweighed by more fundamental differences between the three sources in their methodology, recording procedure, definitions, and so on.

There is no simple answer to this problem. The approach used in this paper has been to assess the results in the light not only of the usual tests of significance but also of other evidence such as agreement between data sources and consistency in trends of change over time. However, some range of uncertainty must be taken into account when considering the figures and tables given in this paper, particularly in the case of regions which are relatively small in size.

In the largest region of all - the South East which contains more than 17 million people - there is no doubt about the change shown by these figures. Between 1971 and 1973 there was an increased rate of net outflow from the South East which was reflected in increased rates of movement into the four regions gaining population - the East Midlands, Wales, the South West and East Anglia. Such changes can be followed up in the data for later years.

3. LFS AND NHSCR DATA FOR LATER YEARS: 1975 AND 1977

Comparisons can be made for 1975 and 1977, the years in which the second and third Labour Force Surveys took place. Each LFS was compared with equivalent figures from the NHSCR.

Methods and definitions had altered since 1973. A different sampling frame was used for the two later Labour Force Surveys (this was described in section 2.1) and the migration figures from the 1977 survey apply only to people aged 15 and over. The NHSCR figures from April 1975 were based on a 10 per cent extraction procedure instead of the previous 100 per cent; this affected only the last of the four quarters in 1974-5 for which figures were aggregated to compare with the 1975 LFS, but all of the quarters used in the 1976-7 data.

Also there had been a redefinition of regional boundaries in 1974; the boundaries of four regions had been changed substantially, with a minor change in two others. When the 1971 Census data are retabulated on the basis of post-1974 regions, only in the North and in Yorkshire and Humberside is there a marked difference in terms of net migration flows; the net outflow from Yorkshire and Humberside becomes - 2.7 per 1,000 population (instead of - 3.4), and the net outflow from the North becomes - 2.0 per 1,000 population (instead of - 0.4). The redefinition of regions, therefore, has little effect on the analysis given in this paper.

3.1 Change in inter-regional migration rates

The analysis of the figures for 1975 and 1977 (see Table 4) shows that the rate of inter-regional movement has declined since 1973. The three Labour Force Surveys give migration rates per 1,000 population of 13.6, 11.9 and 10.5. The NHSCR for these three time-periods gives transfer rates per 1,000 population of 18.1, 17.9 and 15.4. This trend is examined further in 'Migration - the influence of economic change', A A Ogilvy, *Futures*, Volume 11 No. 5, October 1979 (IPC Science and Technology Press) pp 383-394.

Table 4 Migrants or transfers between the regions of England and Wales

Labour Force Surveys	1975	1977
Migrants between regions	418,232	384,474
Respondent population	35,179,717	36,736,825
Migrants per 1,000 population	11.9	10.5
NHSCR	1974-5	1976-7
Transfers between regions	881,037	756,320
Resident population	49,158,900	49,142,400
Transfers per 1,000 population	17.9	15.4

3.2 Comparison of LFS and NHSCR figures for regional flows in 1975 and 1977

Comparing the Labour Force Surveys for 1975 and 1977 with equivalent NHSCR data produces much weaker relationships than that between the first LFS and NHSCR data. In Figure 5 the 1975 data are plotted, and in Figure 6 the 1977 data. In each case the correlation for gross flows is high ($r = 0.976$ in 1975 and $r = 0.964$ in 1977, both significant at the 0.1 per cent level) but that for net flows is relatively low ($r = 0.881$ in 1975, significant only at the 1 per cent level, and $r = 0.708$ in 1977, significant only at the 5 per cent level).

As one would expect from correlations at this level, when the regions are ranked in order of net migration rate there are major discrepancies between the listings. These are illustrated in the upper two scales shown on Figure 7; there is less consistency between each pair of data sources than there was between the sources compared for 1971 and 1973 in Figure 4. (The rank correlation coefficients confirm this; $R = 0.634$ for 1975 and 0.734 for 1977, compared with 0.917 for 1971 and 0.934 for 1973.)

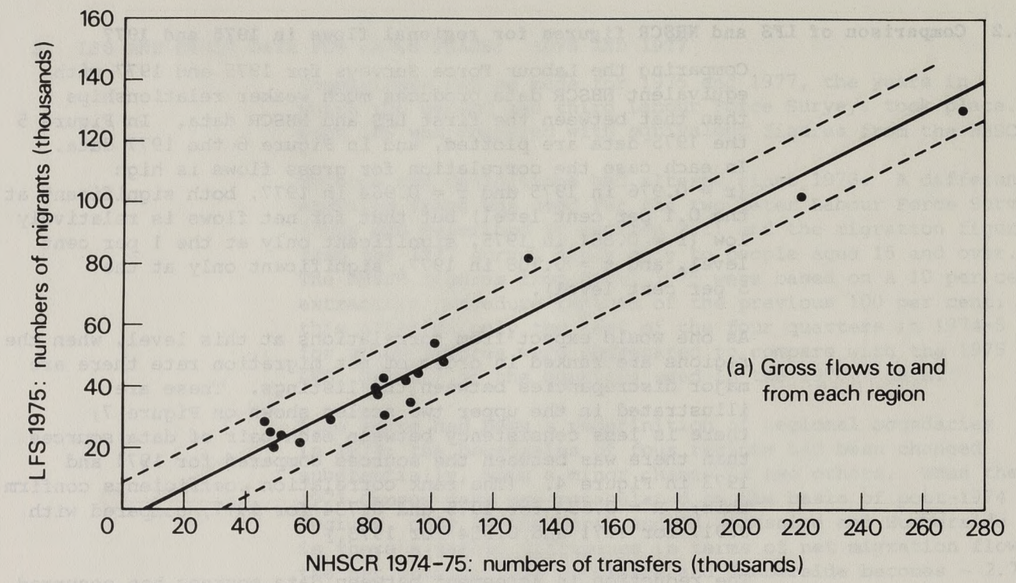
The reduction in agreement between data sources has occurred in years which are relatively remote from the Census yardstick and for which there is a particular need for migration data. The cause can be traced to LFS data which show fluctuations in the relative ordering of regions while the NHSCR results form a more consistent time series. This is probably due to the changed sampling frame used for the second and third LFS which raised the degree of geographical clustering and thereby increased the likelihood of sampling errors in the migration variable.

Fluctuations in the LFS results are most noticeable for the smallest regions. The effect can be countered to some extent by grouping the six smallest regions into three pairs. The pairs consist of adjacent regions with broadly similar experience of net migration flow. Yorkshire and Humberside is paired with the North, both being regions of near migration balance. Wales and the South West are paired, both being regions of migration gain, as also are the regions in the third pair, East Anglia and East Midlands. The figures for net migration rates which result from this grouping (see the lower scales in Figure 7) are more consistent with those from the NHSCR. (Using these pairings, the rank correlation coefficients become 0.829 and 0.890 for 1975 and 1977 respectively.)

3.3 Migration changes from 1973 to 1977

As a final check on the consistency of results from the two sources, the figures for net flows in 1973, 1975 and 1977 are brought together (in Table 5) to compare the trends indicated.

Figure 5 Inter–regional moves: NHSCR 1974–5 and LFS 1975



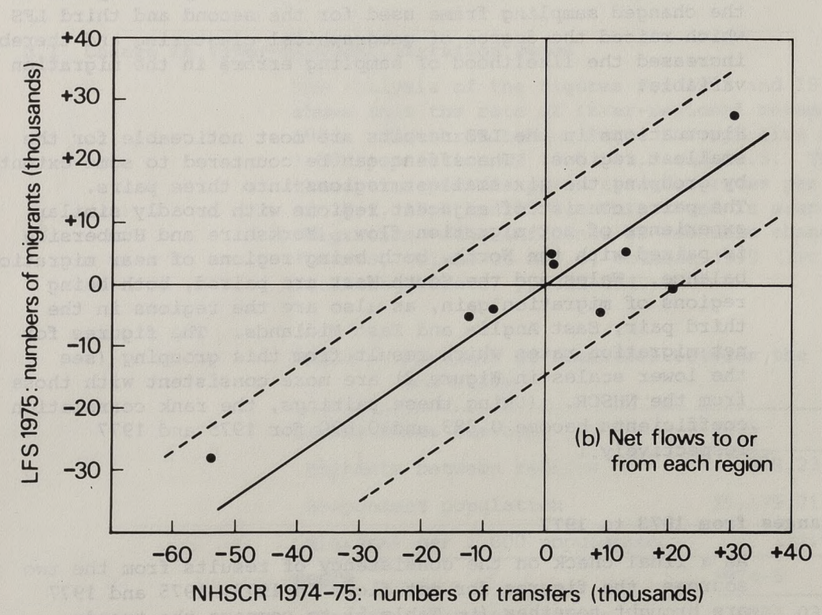
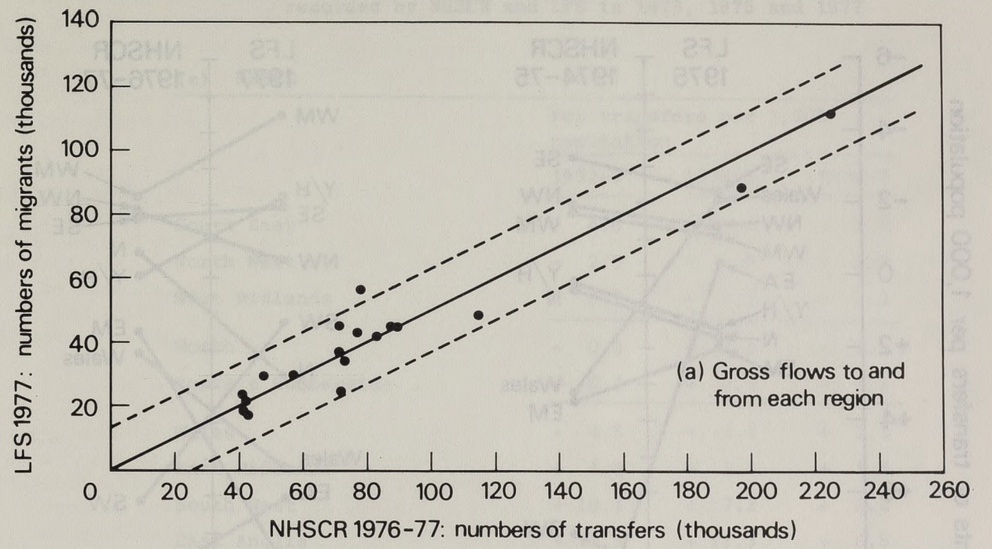


Figure 6 Inter–regional moves: NHSCR 1976–7 and LFS 1977



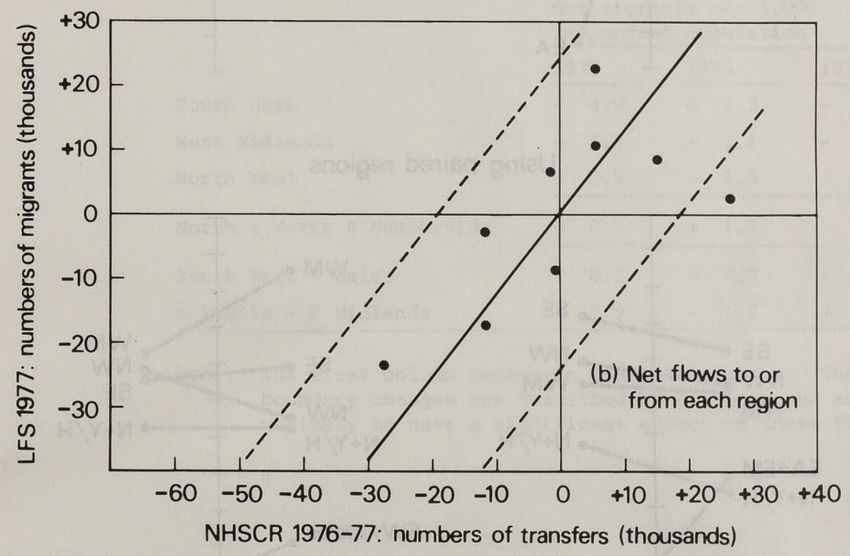


Figure 7 Rates of inter–regional migration or transfer: 1975 and 1977

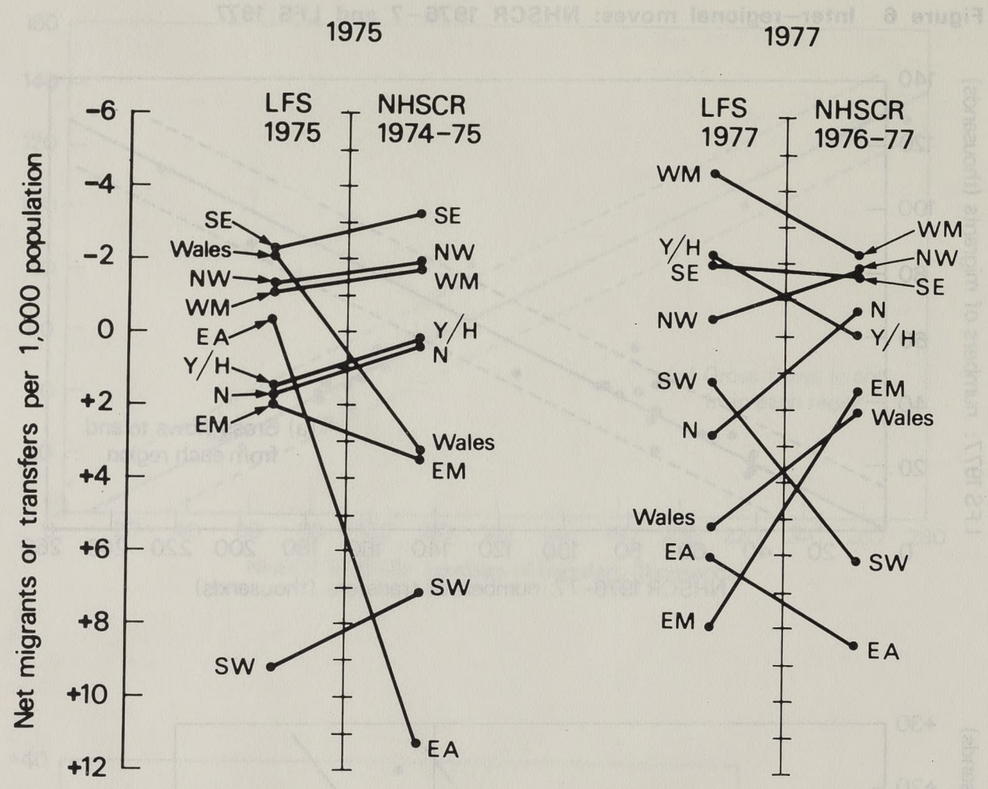


Table 5 Rates of inter-regional transfers or migration recorded by NHSCR and LFS in 1973, 1975 and 1977

(a) NHSCR

	Net transfers per 1,000 population		
	1972-3	1974-5	1976-7
South East	- 4.6	- 3.2	- 1.7
North West	- 2.0	- 1.9	- 1.8
West Midlands	- 0.5	- 1.7	- 2.3
North	- 0.3	+ 0.4	- 0.6
Yorks & Humberside	+ 0.3	+ 0.3	- 0.1
Wales	+ 4.5	+ 3.3	+ 2.1
East Midlands	+ 4.8	+ 3.5	+ 1.5
South West	+ 10.1	+ 7.2	+ 6.2
East Anglia	+ 15.5	+ 11.3	+ 8.5

(b) LFS

	Net migrants per 1,000 respondent population		
	1973	1975	1977
South East	- 4.4	- 2.3	- 1.9
West Midlands	- 1.6	- 1.1	- 4.5
North West	- 0.2	- 1.3	- 0.5
North + Yorks & Humberside	+ 0.5	+ 1.6	- 0.3
South West + Wales	+ 6.3	+ 4.7	+ 2.9
E Anglia + E Midlands	+ 7.9	+ 1.2	+ 7.4

Note: The first column refers to pre-1974 regions. The boundary changes are described in the text and are unlikely to have a significant effect on these figures.

Both sources show that the earlier increase in population movement from the South East (noted in section 2.4) was reversed after 1973; the net outflow from the South East diminished rapidly while there were progressive reductions in the inflows into the four regions gaining population. The LFS result for East Anglia in 1975 yields an irregularity which can be attributed to sampling error.

The general pattern of population movement away from the three most densely populated regions of the country persisted. But while the flow from the South East was diminishing, that from the North West continued at a steadier pace and that from the West Midlands increased. In between the extremes of regions gaining or losing population were the North and Yorkshire and Humberside; these maintained their intermediate position of near balance, in some years making a slight migration gain and in others a slight migration loss.

Although the LFS yields less detail and is subject to greater variation in results because of its sampling methods, it is useful in providing some corroboration of the NHSCR findings. The NHSCR can provide, at best, only an indirect measure of migration flows, and confidence in its reliability is enhanced when a survey which measures migration directly provides supporting evidence.

4. CONCLUSIONS

This paper set out to examine the two data sources and to assess their usefulness as measures of regional migration in the years since the 1971 Census and, by implication, in the years that will elapse before results emerge from the 1981 Census. By a variety of tests, comparing the sources with the Census and with each other, the paper has shown a generally high degree of consistency in the results and has suggested some factors which account for inconsistency.

In spite of their different methodology and definitions, both NHSCR and LFS emerge as useful sources of data on inter-regional migration. Each can make a specific contribution. The NHSCR yields a time series from the early 1970s which provides a consistent picture of relative change in movement for even the smallest regions. Nevertheless, since it is based on medical records, it measures migration only indirectly and includes other categories such as persons making multiple transfers during any 12 month period; thus it registers many more moves than the one year migrants recorded in the Census.

The LFS, on the other hand, is the more useful source for determining absolute levels of migration for comparison with the census. It measures residential movement directly but its limitations arise from its design as a national rather than a regional survey, and as a survey which is not primarily directed towards recording migration. The sampling frame adopted for the second and third surveys seems to have reduced the reliability of migration results at the regional level, and this is likely to continue unless future surveys revert to a less clustered form of area sampling.

As well as making their own specific contributions to the migration analysis, the two sources serve a useful purpose in providing confirmatory evidence of changes in migration behaviour. When any source which is less than a perfect and complete record of migration produces findings that differ from the census and contradict earlier trends, logic demands some confirmation of these. The existence of the trends becomes more certain when a second data source, with a different set of limitations yet independent of the first source, produces supporting evidence.

Nevertheless, the migration data from these two sources must be used and interpreted with care. The figures they provide are not precise counts; each carries a range of possible error due to sampling and recording methods and variations in definition. Neither source can act as a reference volume on migration from which a figure for a specific region in a particular year can be extracted - in the manner in which the census tables are habitually used. Rather, the results must be seen in context and each figure assessed in the light of overall trends.

The variations in the pattern of inter-regional movements between 1971 and 1977 which have emerged from this appraisal are interesting. A few of the main changes have been outlined in this paper. In the next stage of the BRE work these will be examined further in work designed to study the nature of the changes, the explanation for them and their significance in planning terms.

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