

**STUDIES ON MEDICAL AND POPULATION SUBJECTS
NO.58**

Population density, change and concentration in Great Britain 1971, 1981 and 1991

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Population density, change and concentration in Great Britain 1971, 1981 and 1991

1 Introduction

The purpose of this study is to describe how the local areas in which people live in Britain have changed over the last two decades in the most simple way – through their population density. This has been done for a number of reasons. Firstly, basic changes in the distribution of the population are of interest to researchers ranging from those who study the spread of diseases to those who speculate about future property prices. Secondly, this study provides a simple illustration of how characteristics of the population can be compared over time and across many small areas in Britain using new mapping and statistical techniques. Thirdly, the study introduces a derived dataset which makes local change over time analysis possible by combining data from the 1971, 1981 and 1991 Censuses of Population for the same large set of small areas.

This study builds on the work on population density and concentration by John Craig which followed the publications of the 1961, 1971 and 1981 Censuses of Population (Craig 1975, 1980, 1988). In the main, the approach developed by Craig is continued, but new methods are also introduced where they are thought to be appropriate. Here the population of all of Great Britain is considered, and enumeration district data from the 1971 and 1991 Censuses have been combined with ward level data from the 1981 Census, so that the changing population densities of people living in over ten thousand frozen areas can be compared.

Following three decades of computerisation, Census analysis in Britain has become a very complex and often confusing topic. Readers are referred to the 1991 Census definitions volume (OPCS 1992) for a full explanation of terms such as *visitor*, *resident*, *imputed* and *enumeration district*. Here the aim has been to use all these terms consistently and they are italicised at the point in the text where they are defined. However, when trying to compare counts of the population across three Censuses with data generated by two sections of the government statistical service (OPCS and GRO Scotland), it is sometimes necessary to generalize.

2 Sources and methods

All the data used in this study were supplied by the Office of Population Censuses and Surveys (OPCS). The methods used ranged from the exploitation of Geographical Information Systems, to define and cross-check the areas for comparison, to the use of traditional demographic measures combined with new visualization

techniques, to describe the changes which have occurred. The population data and the geographic information used in this study are © crown copyright.

2.1 Data sources

The Census data used for each enumeration district in 1971 were the count of people who were resident at the address of enumeration (or were resident in a communal establishment, Census cell number 37 and 39) and the grid reference of the enumeration district. From the 1981 Census the count of all ‘present and absent’ residents (excluding wholly absent households) for each English and Welsh ward and each Scottish part-postcode sector was extracted along with the digital boundaries of these places and their areas in hectares. These areas are termed 1981 Census Wards in this study. From the 1991 Census the count of all persons usually resident or imputed to be resident was extracted for each enumeration district and Scottish output area, along with the grid references of each of these areas and the grid references and population counts of the unit postcodes covered by each area.

The three counts of the population described above were chosen because they each best approximate to the number of people who usually lived in each area at each time. These three counts omit the same proportion of people thought to be living in Great Britain at the time of the Censuses. Thus their comparison shows changes over time which are similar in magnitude to those which are measured from the mid-year population estimates which are available only for standard administrative areas (Rees, 1993). A changing definition of the population has been adopted in this study because it appears to produce trends which are consistent with the district level trends indicated by the official mid-year estimates (which are based on a constant definition of the population). For more general purposes of comparing census data between 1971 and 1991 these population definitions may not be appropriate.

Table 1 shows how, at each Census, the definitions of the population chosen included 97.4 per cent of the number of people who were thought to be in Britain on Census night. It is very fortunate that this proportion happened to remain constant. What in fact occurred is that at each Census the OPCS devised more sophisticated methods of enumerating the population, while the population simultaneously became more difficult to enumerate. The net effect of these changes was that roughly the same proportion of people were enumerated or imputed as residents in 1991, as were simply found to be present (and resident where they were present) in 1971 or were ‘present or absent’ residents in 1981. In Britain the proportion of people who are visitors (i.e.

Table 1 People in Britain on Census Night 1971, 1981 and 1991

	1971 (000's)		1981 (000's)		1991 (000's)	
Residents						
Resident present in private households at enumeration	51658	95.7%	52077	94.7%	51533	91.5%
Absent residents (part of household present)			684	1.2%	974	1.7%
Absent residents enumerated (wholly absent households)					680	1.2%
Absent residents imputed (wholly absent households)					869†	1.5%
Present residents of Communal establishments	909	1.7%	797	1.4%	833	1.5%
Usual Residents (enumerated and imputed)	52567	97.4%	53527	97.4%	54889	97.4%
Visitors						
Visitors resident in the United Kingdom	1257	2.3%	(1222)	(2.2%)	(1535)§	(2.7%)
Visitors resident outside the United Kingdom	155	0.3%	190	0.3%	255	0.5%
Wholly absent households in 1981 (not in the SAS)			1005*	1.8%		
Total Population Present (enumerated and imputed)	53979	100.0%	54752	99.6%	55144	97.9%
Underenumeration						
Accounted for by validation survey			215	0.4%	299	0.5%
Not accounted for by validation survey			26	0.0%	899	1.6%
Total Population						
Estimated number of people who were in Britain, or were usually resident in Britain, on Census night	53979	100.0%	54993	100.0%	56342≠	100.0%

Source: OPCS 1992 (National Monitor (CEN91CM56), Champion 1995, and the 1971 and 1981 SAS.

Notes

* 1,005,000 residents from wholly absent households were not recorded in the 1981 Small Area Statistics.

† Imputed residents will include some households who were out of the country on Census night.

§ 249,000 visitors were not included in the 1991 enumeration district Small Area Statistics.

≠ When visitors from abroad are subtracted from this figure and timing effects are included it equals the Final and Revised 1991 Mid-Year Estimate of the Population of Great Britain 56342 - 255 + 113 = 56200.

spending Census night at an address which is not their usual residence, including international visitors) has risen from 2.6 per cent to 3.2 per cent over twenty years, again making the population more difficult to enumerate.

It should be noted that there is a very important difference between the 2.6 per cent of the population that are ignored by this definition in 1971 and the 2.6 per cent of the population in 1991 who researchers are forced to ignore (see Table 1). The former were almost all enumerated visitors, whereas 80 per cent of the latter are people whom the Census failed to enumerate (the other 20 per cent being visitors from abroad who were enumerated). Because of these discrepancies this study is only concerned with the population densities of usual residents. Usual Residents are defined here as all those residents who were enumerated or imputed in a ward in which they stated they were resident at each Census. Figure 1 provides some evidence that the experiences of residents closely follow the changes which have occurred to the whole population. It shows the relationship between the 1971-91 population change rate calculated from the Census and that indicated by the mid-year estimates at the county level.

There is very little variation around the central axis in Figure 1 suggesting that changes in these Census 'usual resident' population definitions closely approximate to the mid year estimate changes. There is, however, a systematic bias where the metropolitan counties (excluding London) appear to have lost more population when the Census measures are used, while more rural counties such as Cambridgeshire, Cornwall and the Island Areas of Scotland (a 'county equivalent area') appear to have grown faster according to the Census measures.

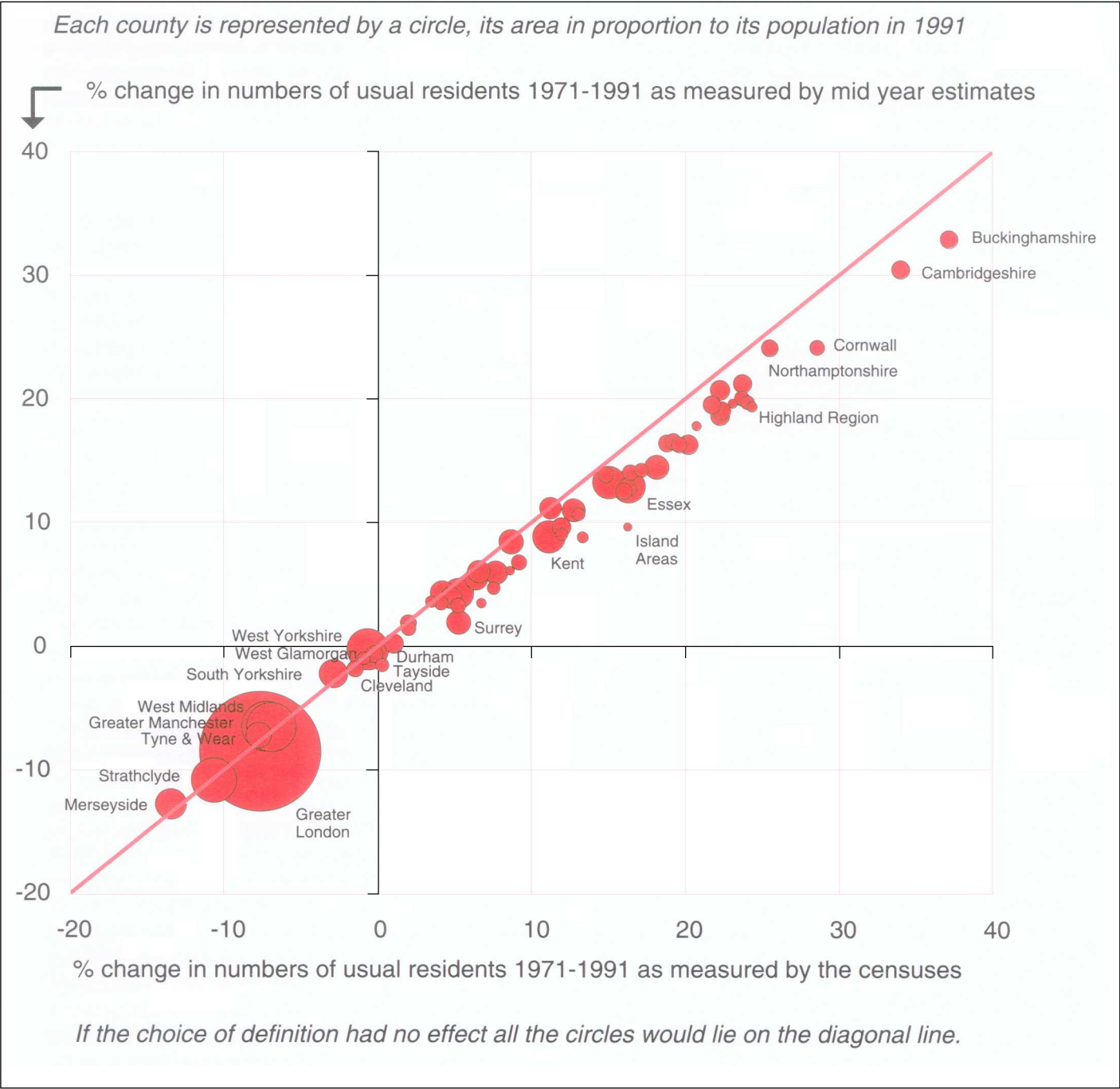
There is evidence (Simpson and Dorling, 1994; Simpson *et al*, 1994, 1995), which Figure 1 supports, that as areal units get smaller the influence of differential undercount becomes more important. So the biases are likely to be greater at the level of wards, and it is changing ward populations which are of interest in this study.

Nevertheless, at the time of writing, the Census provides the only nationwide estimates of ward populations, and the changing definition of population adopted here does capture a constant proportion of the population thought to be living or usually resident in Britain at each Census point. It is reasonable to assume, however, that the decline of urban areas and the rise of rural regions may be somewhat overemphasised in this study because of the differential effects of undercounting at the ward level (see Section 6 for further details).

2.2 Areal and temporal units

The choice of which areas and time periods to use in a study such as this can affect the results as much as the choice of population definition. As Figure 2, maps *a* and *b*, demonstrate, it is possible to show a very different pattern of population density in Great Britain at the regional level by simply re-aggregating counties to a different set of regions from the standard ten. The pattern of population density shown at the large regional level depends more on how regional boundaries are drawn than on where most people are. Also, the choice of which years to measure change between can have a strong influence on the impression of the changes which is gained. This problem of timing is compounded across space because different places grow at different rates in different years, depending upon the age structure of their

Figure 1 The influence of population definition on 1971-1991 change by county



population and the migration to and from those places. The decennial timing of the census limits the options for which time periods to study changes over. However, annual changes in population estimates are explored in Section 5.

This study departs from previous practice by choosing to use a consistent set of basic areal units which do not change between Censuses and for which data from each of the last three censuses can be made available. This has the advantage that the areas of these places do not change so boundary changes should have no influence on the measures of population density reported here. The disadvantage of this approach is that a set of statistics for these unchanging areas was not readily available but had to be derived, and in some cases approximated.

The basic areal units chosen for this study were 1981 Census wards because these areas held administrative significance at the midpoint of the study period, and because they were the smallest areas for which digital boundaries were available for research at the time of writing. In Scotland the areas to which Census wards refer are Part-Postcode Sectors which were adopted here because the same areas have been used in both the 1981 and 1991 Censuses. Most wards in use today are identical to those which were used to report statistics from the 1981 Census, and many wards have had unchanged boundaries since 1971.

1981 Census wards have three advantages over the main alternative of grid squares as area units (CRU/OPCS/GROS 1980). Firstly, exact population counts are available for all of the wards in 1981 and most of them in 1991. Secondly, wards contain similar numbers of people across space and time (although they exhibit a bimodal urban/rural population distribution). Most one kilometre grid squares in Britain contain very few people and those same sparsely populated squares have usually experienced dramatic changes in population levels which are not representative of the experiences of most people. Thirdly, wards have important functions other than being census output areas. More and more wards have been contested at local elections; statistics on local housing, employment and medical matters are becoming more numerous for wards; and, even estate agents have started using their boundaries to delimit areas of varying affluence. As the parish becomes less important in civic life and many housing areas become increasingly mixed-tenure, wards are growing in local significance. Thus, while wards may not represent the ideal areal unit for studying local change (embodying concepts of community, village and estate which could, perhaps, be defined using migration flows) there are good practical reasons for using wards for this study.

For England and Wales the areas of wards were supplied with the Small Area Statistics in 1981, whilst the areas of the 1981 Scottish Part Postcode Sectors can be calculated from their digital boundaries. It is not practical, however, to tabulate figures for each of the 10,444 1981 Census wards in Britain, although they can be mapped.

For tabulation and summary purposes much larger areal units are required. This study follows the convention of reporting figures for the administrative areas of local authority districts, boroughs, counties (including the former metropolitan counties) and the Scottish regions. This is done because these areas are often most familiar and, like wards, have a political importance. Following the convention of previous reports, figures are also reported here for eleven categories of districts termed District Types (Webber and Craig, 1978). To negate the influence of boundary changes, the 1981 boundaries of all these areas are used throughout this study.

Linking the censuses spatially so that a frozen set of boundaries can be employed is not a trivial task. The standard Small Area Statistics from the 1971 and 1991 Censuses are not available for the areas of 1981 Census wards. In both cases it is necessary to assign each enumeration district to the 1981 Census ward which would have best contained it, and then to sum the counts for these enumeration districts to produce estimates of the 1971 and 1991 populations for the 1981 Census geography.

The procedure used for the 1971 data was relatively simple because the quality of the grid-references assigned to 1971 enumeration districts was very high. Each enumeration district was assigned to its closest 1981 enumeration district and thus to the 1981 Census Ward which contained that enumeration district. Where the enumeration districts had not changed during the decade this process would be error free, and where the changes in enumeration district location were minor there should also be little incorrect allocation of enumeration districts. However, where a 1971 enumeration district is crossed by a 1981 ward boundary it is impossible to allocate the population perfectly from published information. In most cases the enumeration district will have been assigned to the ward in which most of its population would have lived, had those boundaries been in force in 1971.

Allocating 1991 enumeration districts to 1981 wards was a much more difficult process because the initial quality of grid-referencing was worse than in 1971. Fortunately, the quality of computer software has improved greatly in recent years and so it was possible to triple-check the locations and allocations of enumeration districts on the basis of the locations of unit postcodes which were assigned to each enumeration district, and from information about enumeration districts which had not been altered since 1981 as well as from other sources. For Scotland a solution had already been provided by the census authorities there, in that all but ten 1991 output areas in Scotland nested perfectly into 1981 enumeration districts.

Tests of the quality of the links which have been made to the 1981 Census showed that 99.9 per cent of 1991 enumeration districts have been allocated correctly (Atkins *et al* 1993). Any error associated with this link is insignificant when compared with the problems of undercount and the changes in the population definition

over time. For the 1991 count the resident population figure was taken from the header record in the Small Area Statistics file and so is not affected by ‘blurring’ or by the suppression of information about enumeration districts with very small populations. ‘*Blurring*’ and *suppression* are methods of maintaining confidentiality by either perturbing the Census data in various ways or by amalgamating data in particular circumstances. These processes are described in Appendix A.

2.3 Measures of Population Density

Having discussed the influence of the choices of population definition, areal units and timing, the last factor to consider is the measure of population density which is to be calculated. Population density has been of great interest ever since the first British censuses were taken because, at that time, many people thought that the population was expanding so quickly that there would not be enough land for them to live on, or enough food for them to eat (Dale and Marsh 1993: 11).

Nowadays population density is of most interest to researchers in the social sciences as a means of defining and distinguishing between urban and rural areas. This is increasingly thought of as an important cleavage between people living in Britain (Dorling 1995). There is much more to an area being recognised as ‘rural’ than for it simply to have a low level of population density, but population density is the most important factor in determining this status. As the political agenda has changed from the shortage of land to the living standards of people, interest moves to the population density at which most people are living, rather than the density at which most of the land is occupied. These are not at all the same things.

‘The average population density of an area, as conventionally calculated, is an *area weighted* mean of the densities of any and every way in which the original area may be spatially subdivided.’ (Craig 1988: 3). To calculate area weighted population density the population of a place is simply divided by its land area. Thus the area weighted population density of Britain in 1991 was 2.38 persons per hectare, 238 persons per square kilometre or one person for every 4,200 square metres of land.

Craig has long argued for a more sophisticated measure of population density which is *population weighted*, rather than area weighted, to reflect interest in the densities at which people live (Craig 1985). This measure is called population weighted population density and measures the density at which the *average person* in an area lives. To calculate this measure of density a set of basic areal units have to be selected for which area weighted population densities can be calculated. The population weighted (geometric mean) average of these ratios is then taken to produce population weighted population density. Here 1981 Census Wards are used as the basic areal units. The population weighted population density of Britain in 1991 was 13.21 persons per hectare. Thus most people live at over five times the conventional

population density at which the ‘average’ piece of land in Britain is occupied.

Figure 2 illustrates how different the population density of an area is when measured in this different way. The figure uses an unconventional shading scheme to highlight how geographical patterns can be changed by adopting varying statistical assumptions. In maps *c* and *d*, the same two variants of county aggregations to ten regions are used as in maps *a* and *b*. Now, however, the regions are shaded by the population weighted population density of these regions with wards being used as the basic areal units. By Standard Regions the South East is now denser than the North West and the inner core of the alternative regions is also no longer the densest part of Britain. Densities are very sensitive to the way in which they are calculated as well as to the areas for which they are calculated.

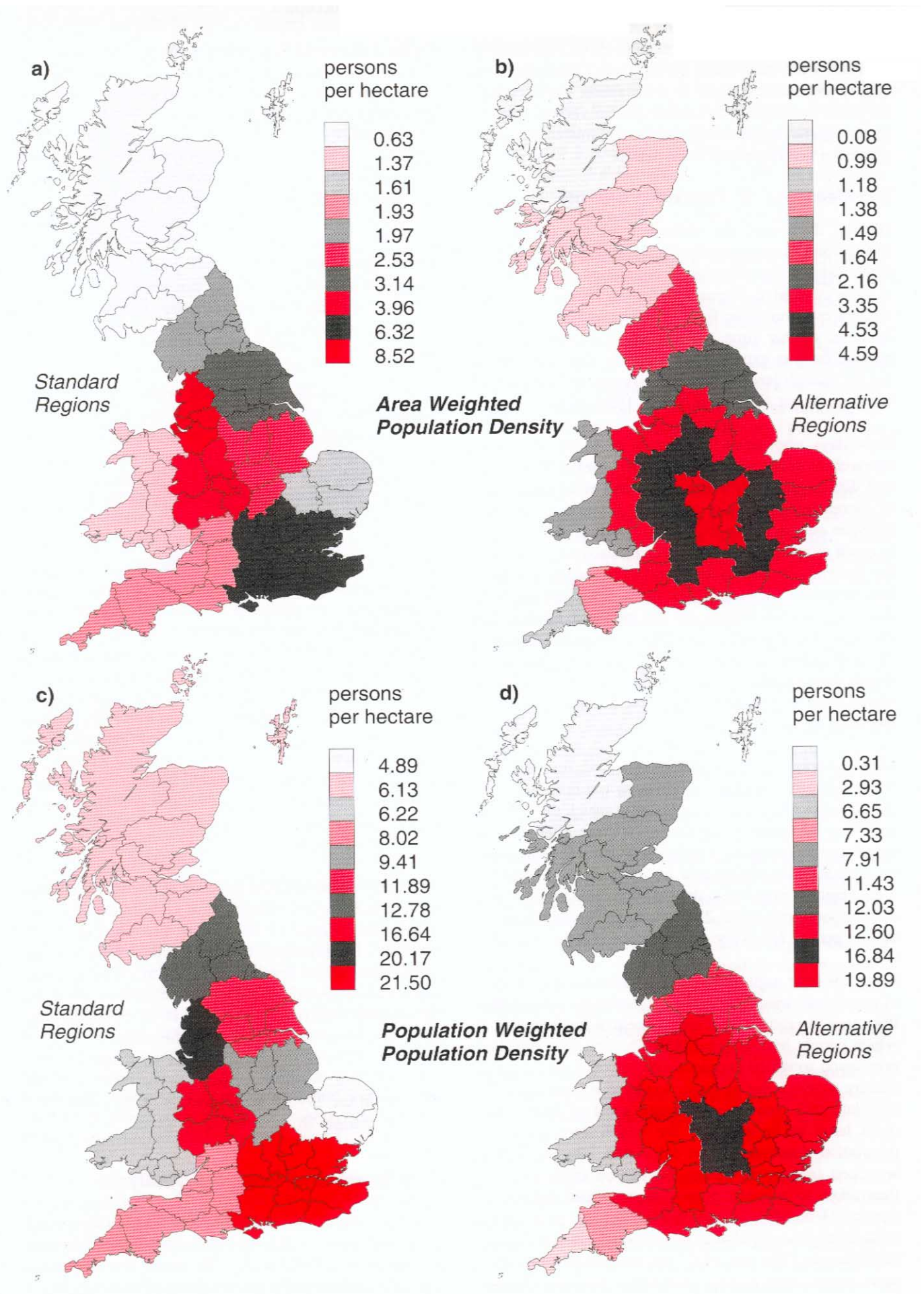
In 1971 the population weighted population density of Britain, based upon 1981 Census wards, was 14.96 persons per hectare compared to an area weighted density of 2.28 persons per hectare. There are at least three ways in which one can express the simple change at this national level from the 1971 situation to the 1991 situation described above. In *absolute* terms in 1991 there was one more person in Britain for every ten hectares as compared to 1971. Most people in Britain, however, are living in wards which have fallen in population density by more than one person per hectare. In *relative* terms the area weighted population density of Britain has risen by 4 per cent while the population weighted population density has fallen by 12 per cent. From the point of view of land, Britain has become more densely populated, but from the perspective of people it is now much less densely populated. One way to understand these changes is to follow the *change in the ratio of population weighted to area weighted* population density. Nationally this ratio has fallen from 6.6:1 to 5.6:1 over this period. Britain’s population has thus become spread more evenly between wards even as it has risen in size.

All three of these different methods of measuring change are used in this study where each is appropriate. A fourth measure of ‘change in change’ is also used on some occasions. Having three Censuses linked for the same set of units means that it is possible to obtain a crude measure of acceleration or deceleration for these changes. The simple measure used here is to calculate the proportion of the total change over the period 1971-1991 that is attributable to change which occurred between 1981 and 1991. Where the change in the 1980s reverses the trend in the 1970s, the proportion of the sum of the absolute changes in each decade is given.

3 National and Regional Analysis

This section of the study provides an overview of changing population density and the degree of population concentration in Britain. First, the national averages are given, then the country is divided into several large sets

Figure 2 Population density and the aggregation and measurement problems (persons per hectare 1991)



of regions which each contain many millions of people. Standard regions are not used, as they are arbitrary administrative aggregations of areas which can easily distort the various measures of population density and change. Instead, regions are created from the amalgamation of wards on a consistent basis according to their population densities. Changes in the region of highest densities can be compared with the changes in the population of the region with the lowest densities in the knowledge that both of these regions have been defined using a single set of criteria. There is, however, more than one way of defining regions consistently by density. The three alternative methods used here are described in the next three sections below.

3.1 Constant Area Analysis

In 1971 in Britain the most concentrated 50 per cent of residents lived in wards which made up only 2.5 per cent of the country's total land area. In 1981 45 per cent of the residents of Britain lived in these same wards and by 1991 only 43 per cent of all residents in Britain lived there. In terms of conventional densities the population of Britain has become less concentrated over the last twenty years but the majority of the people still spend most of their lives on a tiny fraction of the land. This recent deconcentration of residents has not occurred evenly over space and time. It is the regional variation in these changes which is the subject of this section of the study.

To study this deconcentration, the wards of Britain have been divided into ten groups which each contained 5.26 million residents in 1971. These areas contain the least densely concentrated 10 per cent of the population through to the most densely concentrated 10 per cent. By examining each of these 1971 'Decile Areas' of Britain over time a simple picture of the changes that have occurred over the last twenty years can be drawn. A map of a four-fold grouping of these Decile Areas is shown in Figure 3. The lowest density group of wards, which contain 10 per cent of residents, dominate the map as they occupy more than 80 per cent of the land area. Because the projection used for this map is an equal area projection, an area weighted view of the distribution of density is given. Figure 4a shows an equal population cartogram of these same wards which gives a population weighted perspective on the densities at which people live. The cartogram highlights the densities which most people experience. A key to the boundaries of counties and Scottish regions is provided as Figure 4b (see Dorling 1994 for an explanation of this method of mapping).

Table 2 lists the number of wards, the land area and the changing populations in each of the Decile Areas. Over the last two decades the biggest decrease in population has occurred in the most dense Decile Area (Decile 10 in Table 2), which has seen a net loss of over a million people. The biggest increase has been seen by the second to least dense set of wards (Decile 2) where almost a million and a half more people live as compared to twenty

years ago. The changes in the 1980s have all been in the same direction as those which occurred in the 1970s but they have slowed down to roughly half the rate of change, as the table shows. The most dramatic slow down has been seen in the most dense Decile Area, with the rate of decline reduced ten fold from 18.4 per cent in 1971-81 to only 1.8 per cent in 1981-91. By the 1980s strongest evidence for deconcentration was found in the second-to-most dense group of wards, Decile 9, but even here the 4 per cent decline for the 1980s was less than half the 1970s rate.

It is important to remember that the the magnitude of these changes depends very much on the areal units which have been chosen in this study. Figure 5 shows that the inequality between the distributions of people and land area changes, depending on whether counties, districts or wards are used to group people. Looking at the least populated areas, by ward, 20 per cent of the residents live on 90 per cent of the land, by district almost 40 per cent of the residents live on 90 per cent of the land, and by county more than 50 per cent of residents live on 90 per cent of the land. The areal unit which is chosen to represent an individual's environment determines how evenly that environment is seen to have been shared out amongst all individuals.

As people move into lower density areas they make these places more dense, and as they leave high density areas these places become less congested. Figure 6 illustrates the nature and extent of these processes by plotting the changes in population density for each Decile Area which have resulted from such changes in populations, both in absolute and in relative terms. This figure is based on the statistics given in Table 3 which show both the area weighted and the population weighted densities of each Decile Area at each census date. The pattern of change is very regular across the Decile Areas and shows how the different definitions of population density matter most when relative changes are considered.

At one extreme the average density that most people live at (population weighted population density), in what were the most sparsely populated areas in 1971 (with no ward having more than 1.12 people per hectare), rose by 23 per cent in the 1970s and then by 14 per cent in the 1980s. Overall this was the largest twenty year increase, with population weighted average densities now being 39 per cent higher than they were in 1971 (and area weighted densities being 25 per cent higher). Many of these wards would no longer qualify to be in this group if the upper density limit were maintained. This Decile Area experienced the largest relative rise in its population weighted population density during the 1980s. In absolute terms, however, that rise only represented an extra 0.07 people arriving per hectare of land.

At the other extreme the absolute change has been most dramatic. In population weighted terms 19 fewer people per hectare lived in the most dense Decile Area in 1981 as compared to 1971; during the 1980s, however, there was little change to the population weighted population

Figure 3 Ward population density by land area

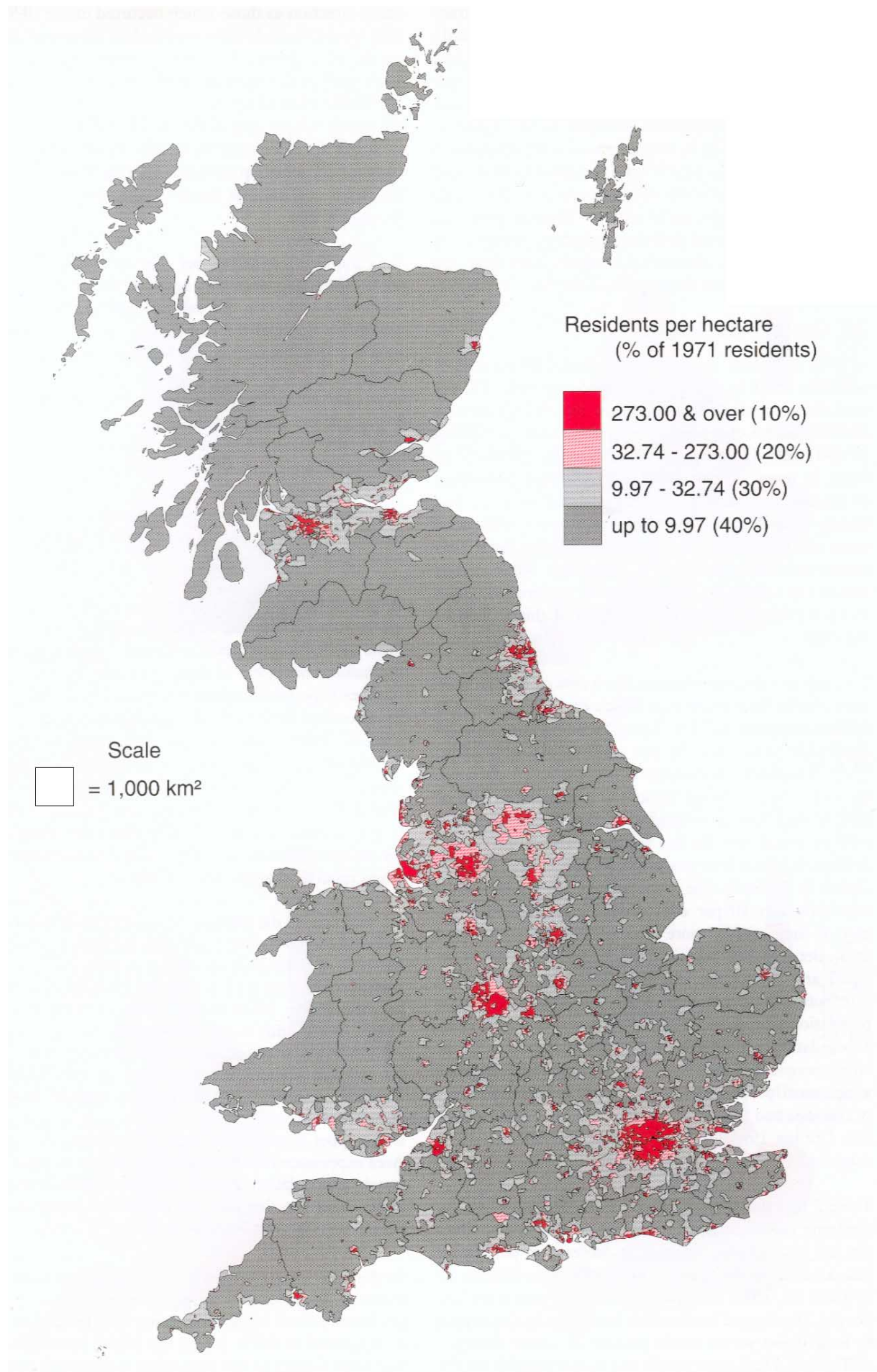


Table 2 Population and Area in Britain by Decile Area 1971, 1981 and 1991

Decile Area and definition (1971 ward population density range in persons per hectare in brackets)	Land Area %	Usual Residents			Population Change			Usual Residents*			Land Area Hectares range in (000's)
		1971	1981	1991	71-81	81-91	1980s†	1971	1981	1991	
		%	%	%	%	%	%	(000's)	(000's)	(000's)	
Britain (0.00-273.00)	100.0%	100.0%	100.0%	100.0%	1.9%	2.5%	56.9%	52567.4	53556.9	54888.8	23014.7
Decile											
1 (0.00-1.12)	80.5%	10.0%	11.2%	12.0%	14.6%	9.4%	39.0%	5253.2	6020.3	6583.6	18522.9
2 (1.13-4.27)	10.6%	10.0%	11.5%	12.2%	17.4%	8.7%	33.3%	5259.3	6174.1	6710.0	2441.6
3 (4.28-9.96)	3.5%	10.0%	11.2%	11.6%	13.8%	6.1%	30.7%	5254.8	5979.2	6344.1	795.9
4 (9.97-16.13)	1.8%	10.0%	10.8%	11.0%	9.6%	4.8%	33.3%	5258.9	5762.4	6037.3	409.7
5 (16.14-24.14)	1.2%	10.0%	10.2%	10.2%	4.3%	2.0%	32.1%	5255.4	5481.7	5593.1	267.6
6 (24.15-32.73)	0.8%	10.0%	9.8%	9.5%	-0.5%	-0.1%	18.6%	5258.5	5231.1	5224.9	186.0
7 (32.74-41.74)	0.6%	10.0%	9.4%	9.0%	-4.2%	-2.2%	34.5%	5249.3	5029.6	4919.0	142.1
8 (41.75-53.02)	0.5%	10.0%	9.1%	8.7%	-7.0%	-2.8%	28.5%	5249.5	4884.7	4749.3	111.9
9 (53.03-73.96)	0.4%	10.0%	8.8%	8.2%	-10.8%	-4.0%	26.9%	5261.6	4694.9	4508.8	86.0
10 (73.97-273.00)	0.2%	10.0%	8.0%	7.7%	-18.4%	-1.8%	8.8%	5258.8	4293.5	4217.9	51.1

Source: The 1971, 1981 and 1991 Small Area Statistics, and areas for Scottish part postcode sectors calculated.

Notes

* The populations of each Decile Area do not sum exactly to the total population of Britain as people living aboard a ship could not be assigned to a Decile Area because, by definition, they are not living at any particular density upon the land. This excludes 8100 usual residents in 1971, 5321 usual residents in 1981 and 820 usual residents in 1991 from the Decile Area Categories.

† This column gives the 1980s change as a proportion of the total of the absolute changes of both the 1970s and the 1980s - providing a measure of the importance of the 1980s over the two decades. Thus if there was -5% change in the 1970s and +10% change in the 1980s, the 1980s will have accounted for 66.6% of the overall change.

density of this area. The decline of the population living in what were the most dense parts of Britain halted. Where the line is drawn between which parts of Britain are still becoming less densely populated and which parts are becoming more densely populated depends again on the definition of population density adopted, as Table 3 shows. Decile 6 (wards with densities between 24.15 and 32.73 persons per hectare in 1971) lost population over both decades but simultaneously experienced increases in population weighted population density.

3.2 Constant Density Analysis

The analysis above has held constant the Decile Areas

so that it is possible to see how these different parts of Britain have changed over the last twenty years. It is possible, however, that this method of analysis could misrepresent dramatic changes if, for instance, many of the wards which were least dense in 1971 were no longer the least dense wards in 1991. To check for this, another way of analysing changes in density is to hold density categories constant over time and to allocate wards to the groups according to their density at each census point, thus allowing the ward composition of each group to change. Here the number of people living at the same population densities are compared at each Census date.

Table 3 Population Density in Britain by Decile Area 1971, 1981 and 1991

Decile Area and definition (1971 ward population density range in persons per hectare in brackets)	Area Weighted			Population Weighted			Area Weighted			Population Weighted		
	Population Density			Population Density*			Density Change			Density Change		
	1971 pph	1981 pph	1991 pph	1971 pph	1981 pph	1991 pph	71-81 %	81-91 %	1980s† %	71-81 %	81-91 %	1980s† %
Britain (0.00-273.00)	2.28	2.33	2.38	14.96	13.48	13.21	1.88%	2.49%	56.92%	-9.93%	-2.03%	16.99%
Decile												
1 (0.00-1.12)	0.28	0.33	0.36	0.43	0.53	0.60	14.60%	9.36%	39.05%	23.17%	13.64%	37.06%
2 (1.13-4.27)	2.15	2.53	2.75	2.32	2.88	3.23	17.39%	8.68%	33.29%	24.13%	12.05%	33.32%
3 (4.28-9.96)	6.60	7.51	7.97	6.82	8.03	8.72	13.79%	6.10%	30.68%	17.78%	8.65%	32.73%
4 (9.97-16.13)	12.84	14.07	14.74	12.96	14.52	15.45	9.58%	4.77%	33.25%	12.03%	6.38%	34.65%
5 (16.14-24.14)	19.64	20.49	20.90	19.78	21.02	21.69	4.31%	2.03%	32.06%	6.26%	3.18%	33.68%
6 (24.15-32.73)	28.27	28.13	28.09	28.38	28.59	28.72	-0.52%	-0.12%	18.64%	0.75%	0.44%	36.86%
7 (32.74-41.74)	36.94	35.39	34.61	37.03	35.77	35.14	-4.18%	-2.20%	34.46%	-3.40%	-1.78%	34.28%
8 (41.75-53.02)	46.90	43.64	42.43	47.02	44.04	43.04	-6.95%	-2.77%	28.50%	-6.34%	-2.27%	26.40%
9 (53.03-73.96)	61.19	54.60	52.44	61.46	55.15	53.35	-10.77%	-3.96%	26.90%	-10.27%	-3.25%	24.07%
10 (73.97-273.00)	102.87	83.99	82.51	106.53	87.38	86.65	-18.36%	-1.76%	8.75%	-17.98%	-0.84%	4.46%

Source: The 1971, 1981 and 1991 Small Area Statistics, and areas for Scottish part postcode sectors calculated.

Notes

* The population weighted population density of each Decile Area is calculated as the geometric mean of the population densities of each ward in that area with each ward weighted by its population.

† See note †, Table 2.

Figure 4a Population density on a ward cartogram

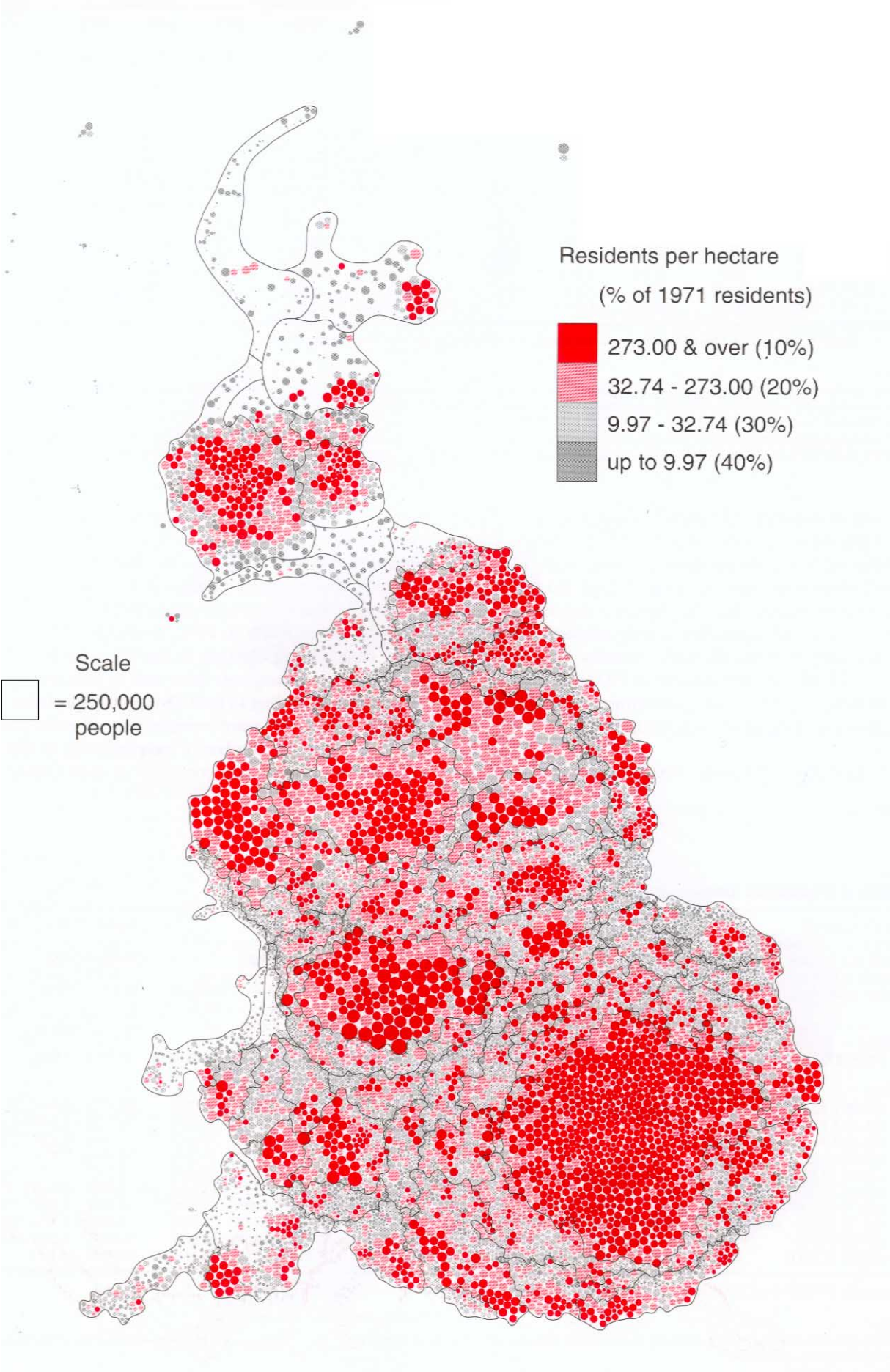


Figure 4b County boundaries on a ward cartogram

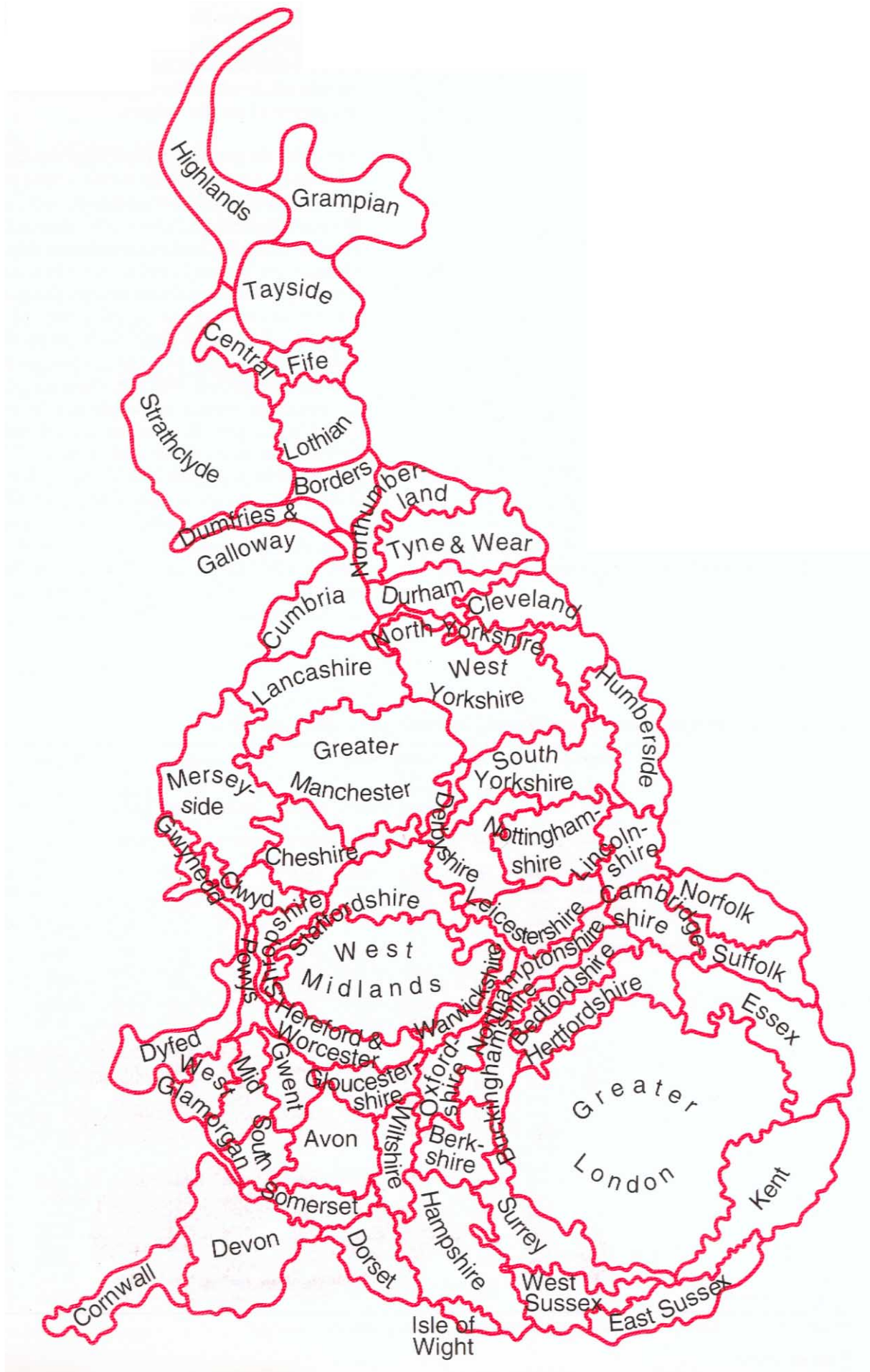


Figure 5 Gini curves of population and area in 1991

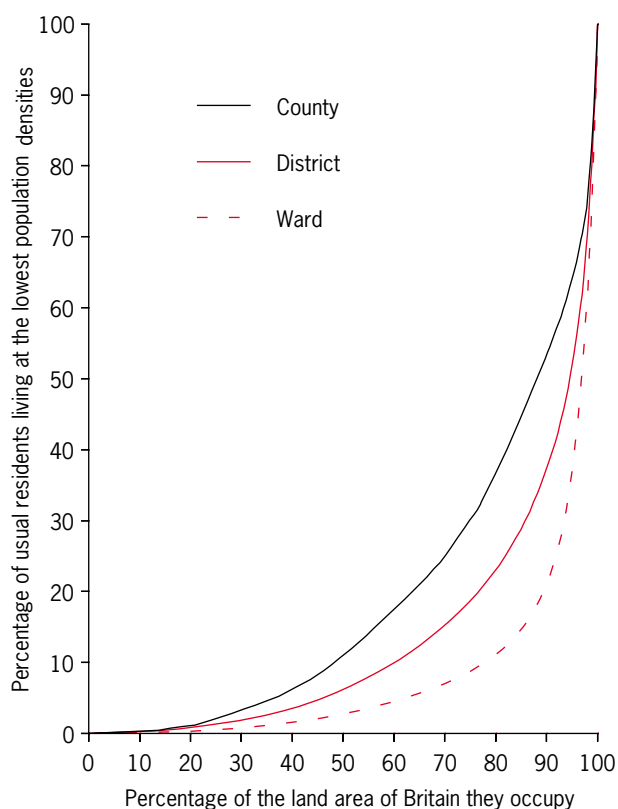


Table 4 uses the same density categories as were chosen in the last study of population density (Craig 1988, Appendix table 1). Now, however, all the wards of Britain are included and areas approximating to an unchanging set of wards are used for each Census so the figures presented here will differ slightly from those which were last presented on this subject.

Nationally the increase in population was larger over the 1980s than in the 1970s but within almost every density category the change has been less dramatic in the 1980s. The most interesting changes have come at both ends of the scale where the least dense and most dense categories of wards are the only ones to see a turn-around in the trajectory of their population change. From the table it is possible to calculate that in 1971 only 12 per cent of people lived in 'Dense Rural' to 'Virtually Uninhabited' wards (with densities of up to 1.5 persons per hectare), and this proportion has not changed over time. A decreasing proportion of people live in wards which would be categorised as urban (on the basis of Craig 1988), falling from 49 per cent to 46 per cent and to 45 per cent of the population in 1991. The difference between these proportions gives the total of people who are living in industrial rural or suburban wards. This middle density group of wards included 39 per cent then 42 per cent and, in 1991, 43 per cent of the population who have spread to cover 14 per cent, 15 per cent and then 16 per cent of the land area of Britain at this density.

Table 4 Population and Area by Ward Density in Britain 1971, 1981 and 1991

Density Area		1981 Census Wards			Area (hectares)			Usual residents			Population change		
Description (persons per hectare)		1971 no.	1981 no.	1991 no.	1971 (000's)	1981 (000's)	1991 (000's)	1971 (000's)	1981 (000's)	1991 (000's)	71-81 %	81-91 %	1980s* %
0 plus	<i>Britain</i>	10444	10444	10444	23015	23015	23015	52559	53552	54888	1.9%	2.5%	56.9%
0 - 0.02	<i>Virtually uninhabited</i>	85	86	198	1784	1644	1661	17	15	15	-9.6%	2.2%	18.8%
0.02 - 0.1	<i>Very sparse</i>	230	280	201	4325	4202	3998	254	247	241	-2.7%	-2.7%	50.1%
0.1 - 0.2	<i>Sparse rural</i>	314	296	260	2949	2804	2617	439	416	392	-5.2%	-5.9%	53.0%
0 - 0.2		629	662	659	9059	8650	8275	710	678	648	-4.4%	-4.5%	50.7%
0.2 - 0.3		436	378	326	2474	2326	2314	619	582	577	-5.9%	-0.9%	12.7%
0.3 - 0.5		783	706	680	3419	3356	3287	1326	1312	1290	-1.0%	-1.7%	62.5%
0.5 - 1		1087	1046	1054	3234	3404	3620	2243	2371	2537	5.7%	7.0%	54.9%
1 - 1.5		503	505	522	1042	1164	1237	1259	1414	1504	12.3%	6.4%	34.1%
0.2 - 1.5	<i>Dense rural</i>	2809	2635	2582	10169	10250	10458	5446	5679	5908	4.3%	4.0%	48.5%
1.5 - 2.5		629	616	602	1008	1077	1105	1959	2083	2138	6.3%	2.6%	29.3%
2.5 - 5		825	829	813	910	1035	1076	3234	3658	3768	13.1%	3.0%	18.7%
5 - 10		948	923	928	615	658	713	4423	4740	5060	7.2%	6.7%	48.4%
10 - 15		720	726	724	346	365	375	4263	4524	4638	6.1%	2.5%	29.1%
15 - 25		1026	1113	1150	351	406	426	6732	7816	8242	16.1%	5.4%	25.2%
1.5 - 25	<i>Industrial rural and suburban</i>	4148	4207	4217	3230	3542	3696	20611	22821	23844	10.7%	4.5%	29.5%
25 - 40		1128	1290	1366	283	319	346	8984	10088	10958	12.3%	8.6%	41.2%
40 - 50		541	629	653	111	124	123	4958	5531	5493	11.6%	-0.7%	5.7%
50 - 75		692	669	614	114	98	86	6771	5735	5078	-15.3%	-11.5%	42.8%
75 - 100		232	196	197	28	21	20	2408	1741	1700	-27.7%	-2.4%	7.9%
25 - 100	<i>Urban</i>	2593	2784	2830	537	561	576	23120	23096	23228	-0.1%	0.6%	84.7%
100 - 150		192	136	135	17	9	9	1978	1117	1093	-43.5%	-2.1%	4.6%
150 plus		73	20	21	4	1	1	694	159	166	-77.1%	4.6%	5.6%
100 plus	<i>Dense urban</i>	265	156	156	21	10	10	2672	1276	1260	-52.2%	-1.3%	2.4%

Source: The 1971, 1981 and 1991 Small Area Statistics, and areas for Scottish part postcode sectors calculated.

* See note †, Table 2.

Figure 6 Change in population density by decile areas in Britain 1971-81, 1981-91

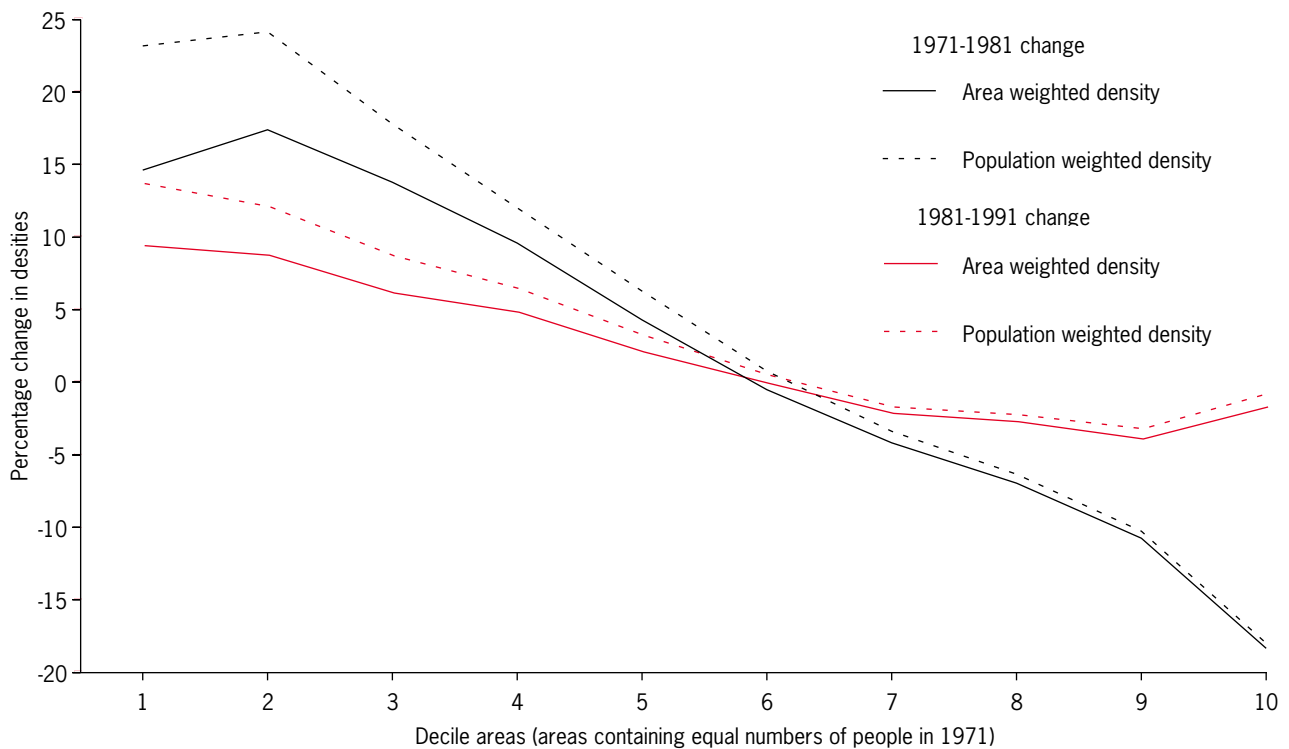
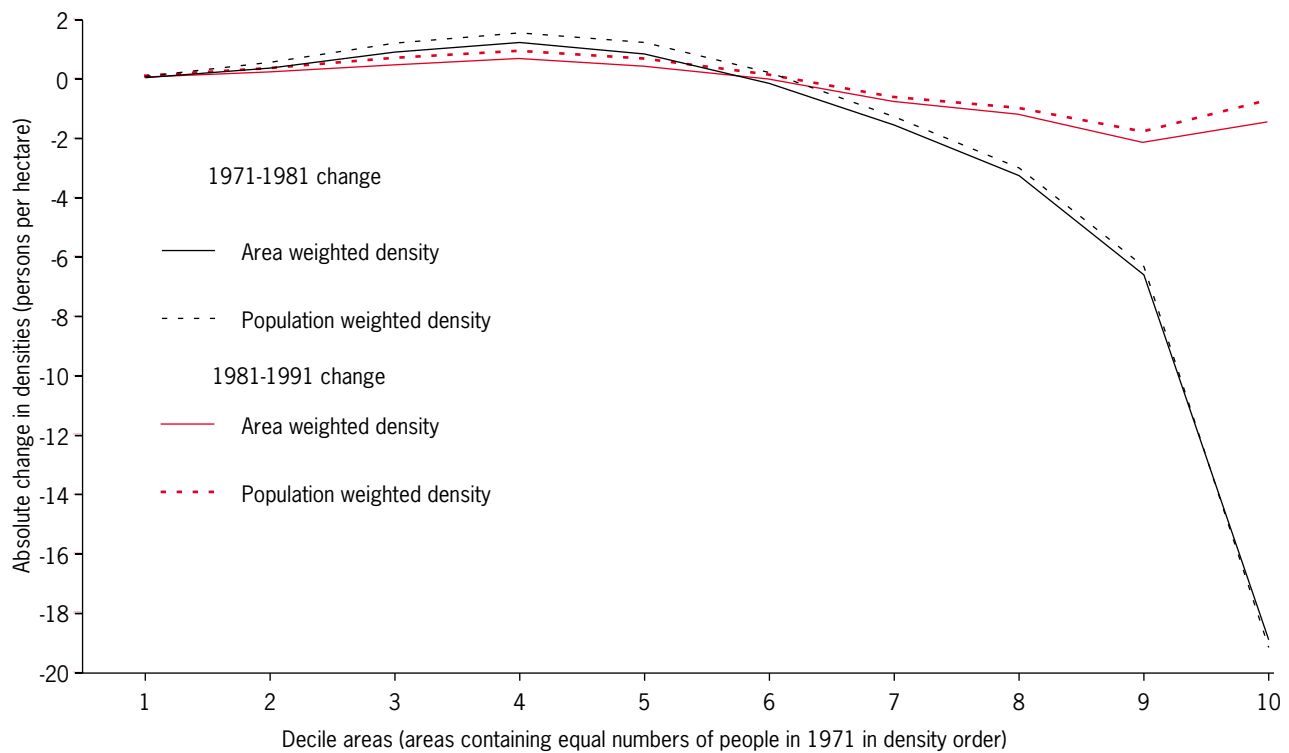


Figure 7 Population change by ward population density in Britain 1971-81, 1981-91

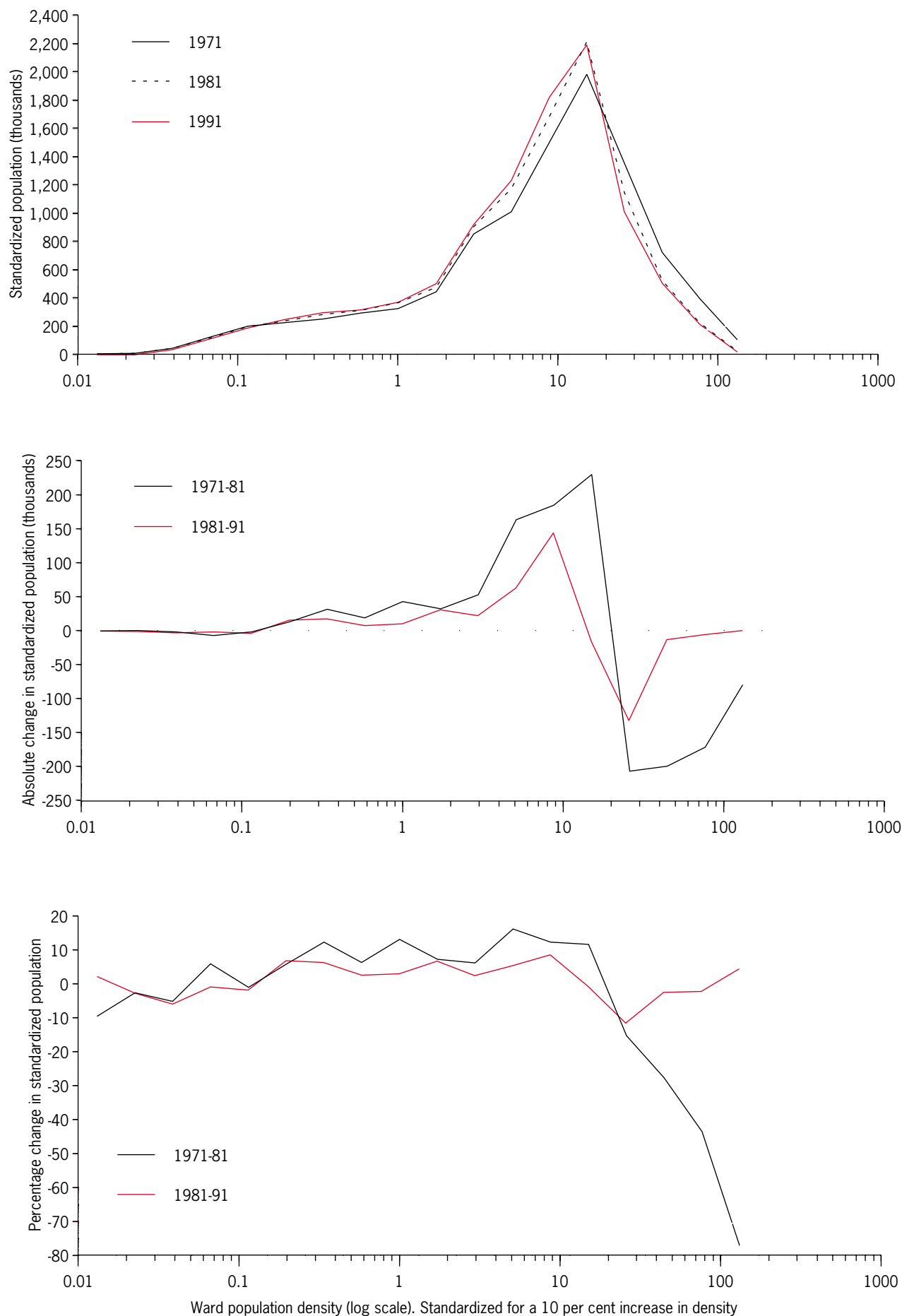


Figure 7 shows the distribution of the population by ward density and how this has changed. The figure is derived from Table 4, with each population category count being standardized by dividing it by the per cent increase in densities which it represents (following Craig, 1988, but now including Scotland). In all three years the peak density is between 40 and 50 people per hectare, although that peak flattened slightly (by -0.7 per cent) in the 1980s. In general, however, the 1991 distribution of the population is very similar to that found in 1981. In absolute terms, wards with population densities below 40 people per hectare accounted for a larger increase in people in the 1970s. In the 1980s similar increases were restricted to wards with population densities below 25 people per hectare and even in these kinds of wards the absolute net increase fell by over 60 per cent. Even more significant has been the slow-down in the population decline in those urban areas which, in the 1980s, lost only a fifth of the number of people they lost in the 1970s, with the most dense areas seeing a population increase in the 1990s. This turn-around is even more dramatic when measured in relative terms as the final graph in Figure 7 shows. A 77 per cent fall in the population living in wards classified to be in the most dense category across the 1970s has been converted to a 5 per cent rise in the size of this group in the 1980s.

The only other turn-around to be seen in Table 4 has been for people living in the 40 to 50 persons per hectare urban/suburban category (which is now falling in population), and in the virtually uninhabited areas which have converted a 10 per cent fall in population to a 2 per cent rise, over the two decades. The changes in both of these types of places have become increasingly important in very recent years with the former wards perhaps categorising places which are now losing population most quickly while the latter are typical of those rural areas which are growing the fastest - but this is to pre-empt the analysis of year-on-year change in Section 5 of this study.

In general the findings of this analysis by constant density classes are consistent with the changes found when the areas used for study are held constant. The 1980s have seen a continuation of the changes which were already occurring in the 1970s – deconcentration (Champion 1989). However, the rate of deconcentration in Britain has slowed dramatically. In general, all but the least dense rural areas were becoming more dense and urban areas were becoming less concentrated. At the extremes of the density scale there has been a dramatic revival in the numbers of people living at both the highest and the lowest densities in Britain. Wards which fall into only three groupings of densities in Britain are now growing in population: these are the most dense inner city areas, industrial rural and suburban areas, and the virtually uninhabited areas. Most typical rural and most typical urban areas are declining in population. It should be remembered that it is possible that ‘virtually uninhabited’

areas have seen a revival because wards have lost people and have been re-classified into this group. It is having a static set of ward boundaries which allows places to be re-classified in this way, as changes in density have to be due to changes in population, not area.

3.3 Regional Density Change

Constant area and constant density analyses of changes between Censuses in Britain tell a similar story. Here the former approach is adopted again to look in more detail at which wards are becoming more or less dense and thus which parts of Britain are becoming more or less concentrated.

Within each broad density based category of wards there is a great deal of variation around the average changes which have occurred over time and have been reported here. For instance not all wards in the least dense Decile Area have seen their populations increase. To adequately explain this variation in population changes (within areas of a similar density) a great many factors would have to be taken into account, not least the age structure of the population in each ward, the patterns of house-building and the movement of jobs over time. Each Decile Area could be split along north/south lines, for example, to see how these two parts of each Area have fared. However some Decile Areas are over-represented in the south while others are allocated most of their wards from the north of Britain. A more systematic approach to dividing each area in two is on the basis of their wards’ proximities to centres of population. Are people moving in greater numbers to the more remote parts of each Decile Area, or to the parts where they can live at a low density but within relatively easy access to the centres of population which contain most jobs and services?

Proximity to centres of population is traditionally measured as Population Potential. The Population Potential of a ward is the weighted sum of the populations of all the other wards in Britain each divided by their distance from that ward. Figure 8 presents a map of population potential by ward which shows how smooth is this distribution compared with population density. The map highlights how a belt of wards from Liverpool to London is home to the 60 per cent of the people who live at a potential of more than 442 residents per metre. This is the industrial and urban heartland of Britain, and the area containing most of the jobs, shops, theatres, buses, hospitals and schools in the country.

Table 5 looks for evidence to suggest whether the relative population potential of each ward is a factor which can account for some of the differences to be found in population changes within Decile Areas. The Table shows the changes which have occurred to population numbers and hence to conventional density when each Decile Area is split into two equal population sized areas according to the population potential of the wards within it. These ‘Demi-decile Areas’ all contained one twentieth of the population of Britain in 1971.

Figure 8 Population potential by ward in Britain 1991

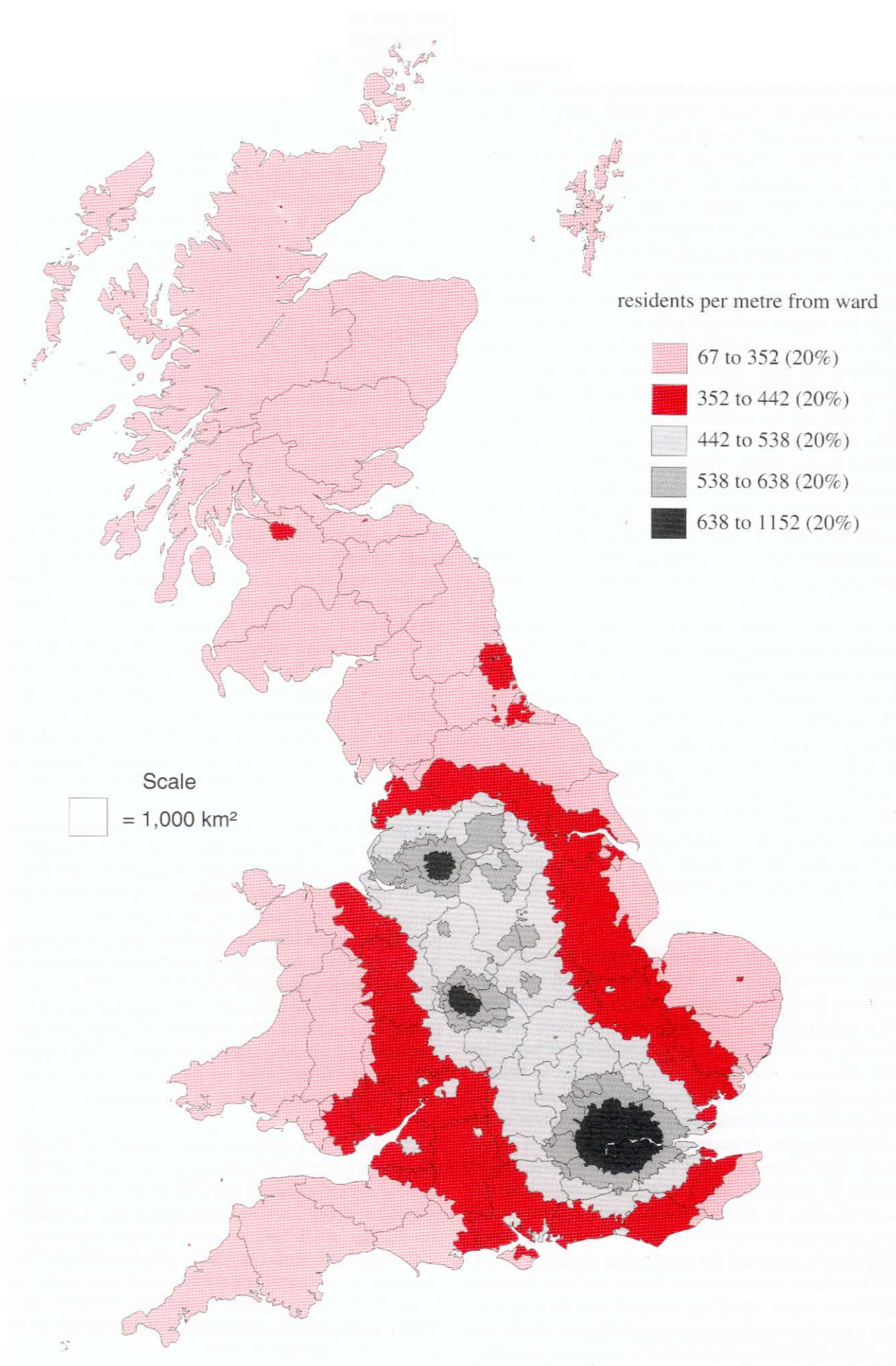


Table 5 Population Change in Britain by Decile Area and Population Potential 1971, 1981 and 1991

Decile Area and definition (1971 ward population density range in persons per hectare in brackets)	Low Population Potential*						High Population Potential*					
	Usual Residents			Population Change			Usual Residents			Population Change		
	1971 (000's)	1981 (000's)	1991 (000's)	71-81 %	81-91 %	1980s† %	1971 (000's)	1981 (000's)	1991 (000's)	71-81 %	81-91 %	1980s† %
Britain (0.00-273.00)	26234	26626	27270	1.5%	2.4%	61.8%	26326	26925	27618	2.3%	2.6%	53.0%
Decile												
1 (0.00-1.12)	2628	2941	3210	11.9%	9.2%	43.5%	2625	3080	3374	17.3%	9.5%	35.5%
2 (1.13-4.27)	2629	3073	3336	16.9%	8.6%	33.7%	2630	3102	3374	17.9%	8.8%	32.9%
3 (4.28-9.96)	2625	2962	3145	12.8%	6.2%	32.5%	2630	3017	3199	14.7%	6.0%	29.0%
4 (9.97-16.13)	2621	2871	3038	9.5%	5.8%	37.9%	2638	2892	2999	9.6%	3.7%	27.9%
5 (16.14-24.14)	2622	2780	2883	6.0%	3.7%	38.0%	2633	2701	2710	2.6%	0.3%	11.0%
6 (24.15-32.73)	2627	2644	2674	0.7%	1.1%	62.7%	2631	2587	2551	-1.7%	-1.4%	44.7%
7 (32.74-41.74)	2622	2523	2479	-3.8%	-1.7%	31.5%	2627	2507	2440	-4.6%	-2.7%	36.7%
8 (41.75-53.02)	2617	2423	2354	-7.4%	-2.9%	27.9%	2632	2461	2396	-6.5%	-2.7%	29.2%
9 (53.03-73.96)	2622	2299	2167	-12.3%	-5.8%	31.9%	2640	2396	2342	-9.2%	-2.2%	19.5%
10 (73.97-273.00)	2620	2111	1985	-19.4%	-5.9%	23.4%	2639	2183	2233	-17.3%	2.3%	11.7%

Source: The 1971, 1981 and 1991 Small Area Statistics, and areas for Scottish part postcode sectors calculated.

Note

* The wards in each Decile Area have been split into two equal groups according to their population potential. Each of the twenty groups of wards contained approximately 2.62 million people in 1971.

† See note †, Table 2.

Table 5 shows that in the 1970s the first four least dense Decile Areas all saw their strongest growth in those parts of their territory with the highest population potentials. So it is true that people were moving to 'rural areas', but they preferred rural areas which were less far away from urban centres. The next three Decile Areas (5 to 7) saw stronger growth (or weaker decline) in their low population potential sectors. People from the cities were moving to the more remote suburbs or small towns which fell into these Areas. The three most dense Decile Areas saw the slower declines over the 1970s in their high population potential wards. If, in aggregate, people left these urban areas, they were more likely to leave those parts further from the heart of Britain's urban system, no longer leaving the very centres of cities.

During the 1980s only the least dense two Decile Areas saw most of their growth in high population potential wards. The next five Decile Areas experienced greater

growth (or slower declines) in their lower population potential sectors. People were moving to the parts of these areas which were furthest away from population centres. The densest three Decile Areas saw a continuation of the trend of the 1970s with the centres of the densest parts of Britain losing less people than the edges of these territories. The high population potential half of the most dense Decile Area actually experienced population growth in the 1980s. To be precise this, as the analysis below demonstrates, was occurring in the heart of London.

Because the sizes of the split Decile Areas remain constant, the relative conventional density changes have been identical to the relative changes in total populations.

This is not the case for population weighted population densities. Table 6 shows the changes in population weighted population density in each half of each Decile

Table 6 Population Density Change in Britain by Decile Area and Population Potential 1971, 1981 and 1991

Decile Area and definition (1971 ward population density range in persons per hectare in brackets)	Population Density Change						Population Weighted Population Density					
	Low Pop. Potential*			High Pop. Potential			Low Pop. Potential			High Pop. Potential		
	71-81 %	81-91 %	1980s† %	71-81 %	81-91 %	1980s† %	1971 pph	1981 pph	1991 pph	1971 pph	1981 pph	1991 pph
Decile												
1 (0.00-1.12)	15%	12%	43%	30%	16%	34%	0	0	0	1	1	1
2 (1.13-4.27)	24%	11%	31%	24%	13%	35%	2	3	3	2	3	3
3 (4.28-9.96)	16%	8%	33%	20%	9%	32%	7	8	8	7	8	9
4 (9.97-16.13)	12%	8%	39%	12%	5%	29%	13	15	16	13	14	15
5 (16.14-24.14)	8%	5%	38%	4%	1%	23%	20	21	22	20	21	21
6 (24.15-32.73)	2%	2%	44%	-1%	-1%	55%	28	29	29	29	28	28
7 (32.74-41.74)	-3%	-1%	29%	-4%	-2%	38%	37	36	35	37	36	35
8 (41.75-53.02)	-7%	-2%	27%	-6%	-2%	26%	47	44	43	47	44	43
9 (53.03-73.96)	-12%	-5%	30%	-9%	-2%	16%	62	54	52	61	56	55
10 (73.97-273.00)	-19%	-5%	22%	-17%	2%	12%	94	76	72	120	100	102

Source: The 1971, 1981 and 1991 Small Area Statistics, and areas for Scottish part postcode sectors calculated.

Notes

* The wards in each Decile Area have been split into two equal-population groups according to their population potential. Each of the twenty groups of wards contained approximately 2.62 million people in 1971.

† See note †, Table 2.

Table 7 Population by District Type in Britain 1901-1991

District Type Group (by 1981 Census boundaries)	Population present						MYE*	PRep†	MYE	PRep	MYE
	1911	1921	1931	1951	1961	1971	1971	1981	1981	1991	1991
Britain	36993	40830	42767	44794	48852	51284	54388	54285	54814	53917	56200
Inner London Boroughs	4897	5000	4972	4896	3682	3493	3060	2498	2550	2350	2627
Outer London Boroughs	1609	2160	2415	3214	4515	4500	4470	4215	4255	4028	4263
Principal Metropolitan Cities	4412	4762	5117	5376	5454	5368	4892	4251	4324	3882	4138
Other Metropolitan Districts	5846	6629	6883	7190	7784	8269	8827	8645	8702	8269	8591
Large Non-metropolitan Cities	3050	3335	3462	3640	3775	3840	3833	3594	3675	3454	3667
Small Non-metropolitan Cities	1315	1429	1484	1553	1714	1806	1896	1834	1923	1835	1978
Districts with Industrial Areas	4672	5460	5827	5908	6348	6707	7213	7411	7443	7354	7566
Districts with New Towns	1031	1169	1245	1289	1517	1904	2325	2653	2683	2787	2879
Resorts Port and Retirement Districts	1597	1814	2090	2196	2635	2839	3184	3350	3368	3508	3626
Urban and Mixed Urban/Rural Districts	3880	4291	4487	4865	6398	7498	9196	9802	9841	10070	10364
Remoter Mainly Rural Districts	4683	4781	4784	4667	5032	5061	5493	6031	6051	6379	6501
District type group (by 1981 Census boundaries)	Mid year estimate of usual residents (1970s series)										
	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Britain	54388	54558	54693	54708	54702	54693	54666	54655	54712	54797	54814
Inner London Boroughs	3060	2991	2930	2871	2816	2755	2705	2658	2618	2587	2550
Outer London Boroughs	4470	4452	4432	4393	4363	4334	4307	4288	4270	4263	4255
Principal Metropolitan Cities	4892	4813	4748	4684	4618	4560	4500	4441	4394	4357	4323
Other Metropolitan Districts	8827	8834	8830	8833	8825	8805	8786	8758	8737	8721	8702
Large Non-metropolitan Cities	3833	3825	3809	3800	3782	3758	3739	3709	3692	3677	3674
Small Non-metropolitan Cities	1896	1896	1897	1895	1896	1894	1888	1884	1882	1883	1885
Districts with Industrial Areas	7213	7268	7324	7364	7376	7386	7391	7399	7417	7440	7440
Districts with New Towns	2325	2361	2405	2441	2475	2508	2546	2584	2622	2653	2675
Resorts Port and Retirement Districts	3184	3227	3256	3266	3282	3298	3309	3323	3341	3358	3369
Urban and Mixed Urban/Rural Districts	9196	9314	9399	9439	9493	9561	9613	9682	9761	9838	9889
Remoter Mainly Rural Districts	5493	5576	5662	5723	5776	5832	5882	5927	5977	6019	6051
District Type Group (by 1991 Census boundaries)	Mid year estimate of usual residents (1980s series)										
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Britain	54814	54779	54831	54956	55127	55283	55433	55581	55769	55972	56200
Inner London Boroughs	2550	2524	2523	2531	2543	2550	2557	2546	2564	2596	2627
Outer London Boroughs	4255	4248	4242	4241	4248	4253	4244	4224	4235	4256	4263
Principal Metropolitan Cities	4324	4294	4267	4247	4226	4204	4179	4149	4134	4131	4138
Other Metropolitan Districts	8702	8670	8647	8614	8593	8568	8558	8553	8575	8581	8591
Large Non-metropolitan Cities	3675	3667	3667	3664	3661	3657	3647	3631	3632	3647	3667
Small Non-metropolitan Cities	1923	1929	1934	1925	1923	1933	1935	1942	1952	1961	1978
Districts with Industrial Areas	7443	7431	7427	7424	7429	7437	7442	7469	7520	7550	7566
Districts with New Towns	2683	2703	2720	2737	2758	2775	2804	2830	2852	2869	2879
Resorts Port and Retirement Districts	3368	3379	3394	3429	3471	3508	3550	3588	3606	3608	3626
Urban and Mixed Urban/Rural Districts	9841	9865	9907	9998	10082	10149	10205	10258	10264	10311	10364
Remoter Mainly Rural Districts	6051	6071	6102	6146	6193	6248	6314	6391	6436	6461	6501

Source: The 1971, 1981 and 1991 Small Area Statistics, and calculated from Mounsey, 1982.

Notes

* Mid-Year Estimates of the population are often higher than the counts of the population present.

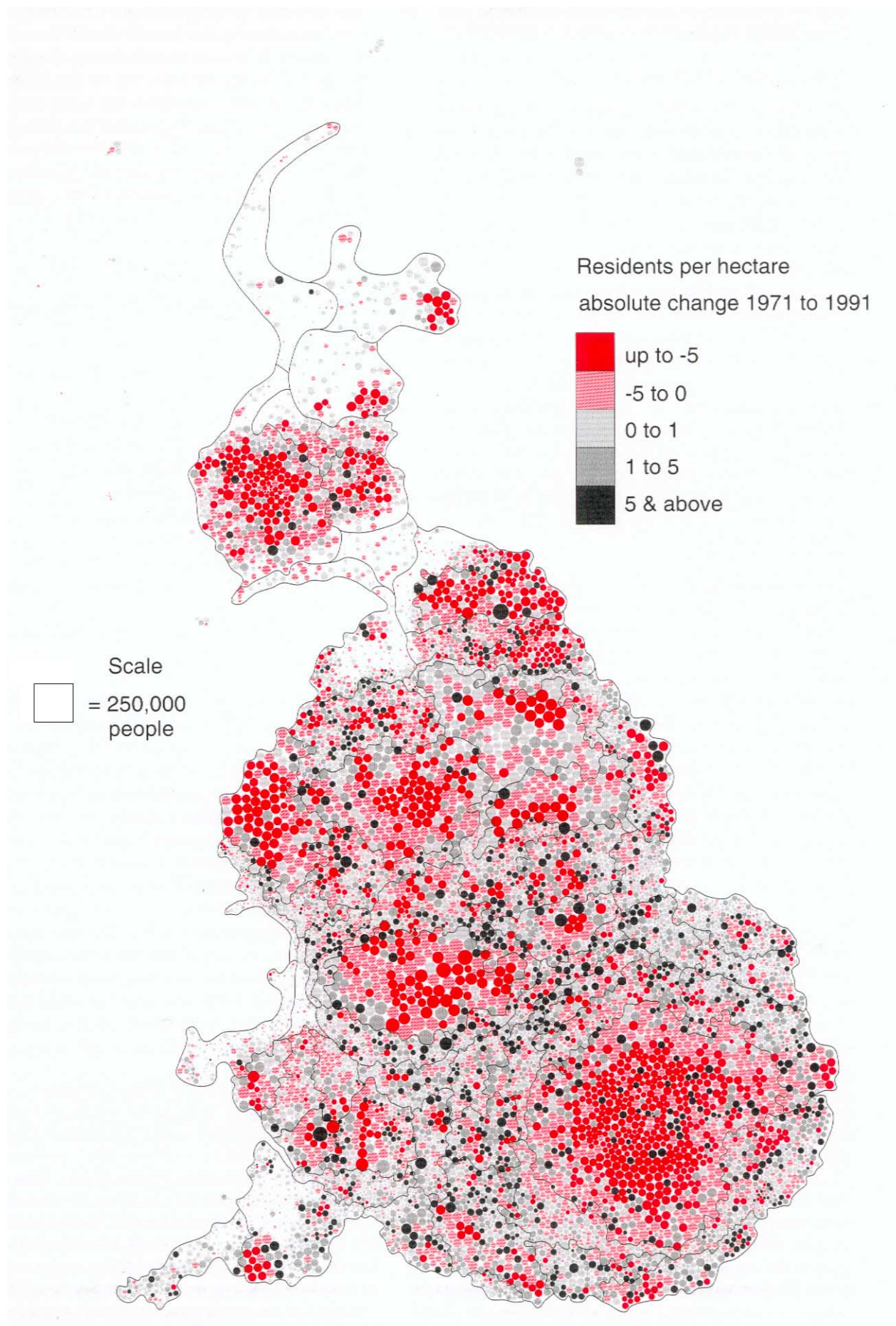
† To provide a consistent series the population present counts from the 1981 and 1991 Census are included. PRep stands for Preliminary Census Report, from which these figures are taken.

Area. The pattern is very similar, but now the least dense three decile areas saw most concentration in their high population potential areas during in the 1980s. That decade's change had most influence in Decile Area 6 which saw a bigger fall in population weighted population density in high population potential areas in the 1980s than it did in the 1970s. This is the only case where the changes that occurred in the 1970s were less important than those of the 1980s. The only population weighted population density to have moved outside the 1971 definitional range is that for the low population potential parts of the most dense decile where the average density is now 72.3 persons per hectare, this would no longer be enough to qualify these wards to be classed as Decile Area 10, were a constant density categorisation being used.

4 County and District Analysis

Counties (Regions in Scotland) and Districts are the local administrative areas of Britain best known to most people. In moving below the regional and national scales these might be the obvious areas within which to look for different patterns across different places. These types of areas are not defined using any consistent criteria but they do have actual administrative functions, at least until the Local Government Boundary Commission has finished its deliberations. More importantly, the aggregation problem described in Section 2.2 becomes less severe as the number of areas being considered increases. Nevertheless it is important to remember that districts like the City of London and County equivalents

Figure 9 Population density change on a ward cartogram



like the Island Areas of Scotland contain very few people and so will tend to exhibit more unusual changes as fewer people need to move to achieve significant change.

4.1 *Densities of Local Areas*

The absolute 1971-1991 change in the densities of all of Britain's 1981 Census wards is shown in Figure 9. This cartogram should be compared to Figure 4a and the key given in Figure 4b. It is evident that many of the highest density wards have lost the most people. All the metropolitan counties contain large groups of wards which have experienced losses of over five residents per hectare, but they also contain wards which have experienced population growth. Cities ranging from Aberdeen to Exeter can be identified within their respective counties as areas which have lost many people over the decades. The pattern of density increases is not so clear, as what are in the main being highlighted here are hundreds of house building projects. Buckinghamshire, Northamptonshire and Warwickshire contain more than their fair share of wards which have gained over five people per hectare. The degree of variation in this map needs to be born in mind through the analysis of the patterns seen for larger areas which is discussed below.

This section of the study is concerned with the changing population densities of the 459 districts and the 64 counties and Scottish Regions of Britain listed in Appendix B, which serves to update Table 7 of Craig's 1988 study. This Appendix lists the conventional area weighted density and the population weighted density of each local authority, for each Census year (1971, 1981 and 1991), calculated on the basis of the frozen set of 10,444 1981 Census wards described in Appendix A. The changes in these densities are also given along with the absolute and relative differences in 1991 between the population weighted and the area weighted densities. These last statistics provide an indication of how concentrated the population is within each district. Finally, a sensitivity measure is given which shows by how much the density changes reported in 1991 depend upon the definition of the population used - by comparing the difference between the changes from 1981 which would be calculated if the 'population present' total were used instead of the 'usual residents' total of each area. This should give a very rough indicator of how sensitive an area's estimates are to influences which are correlated to this measure (such as population undercount). Inner London Boroughs have average discrepancies of greater than 9 per cent, whereas rates of less than 3 per cent are usual for the country as a whole.

The 1970s changes reported in this table differ slightly from those given previously by Craig for two reasons: Firstly, a 'frozen' set of wards is used to calculate population weighted population density. Secondly, the districts of Scotland are included which particularly effects the District Type calculations. Thirdly, and more importantly, an estimate of the usual resident population is used here rather than of the population present (see

Section 2.1). In general the effect of this choice is minor but in a few places, such as Cambridge, a present population density decrease in the 1970s contrasts with a slight rise in usual resident's density. Similarly, Oxford has experienced a stronger rise in the 1970s when the densities of usual residents are compared. This rise continued into the 1980s because the 1981 boundary of Oxford city is being used in all these comparisons. If the more recent, extended, boundary of Oxford were adopted for 1991, the population density of that city would have appeared to have dropped in the 1980s. This is not what the people of Oxford experienced. That is why frozen boundaries have been used in this study.

The main features which can be gleaned from the listing in Appendix B are:

- (a) In 1991 conventional densities for local authority districts ranged from 0.02 persons per hectare in Sutherland to 115 persons per hectare in Kensington and Chelsea. These were also the least and most dense districts in 1971, but while the density of Sutherland has not altered significantly, the density of Kensington and Chelsea has fallen by 27 persons per hectare. Population weighted densities are always higher than conventional densities. The population weighted densities for these two areas in 1991 were 0.04 and 122 persons per hectare respectively, which were also the highest and lowest across this range of areas.
- (b) The biggest difference between area and population weighted densities is to be found for the country of Scotland, where the conventional density is 0.63 persons per hectare, but in which people usually live in wards with a population weighted density of 6.13 persons per hectare - almost ten times more dense. In inner city and compact city boroughs there is little difference between conventional and population weighted densities. There is little relative difference, for example, between the two figures given above for Kensington and Chelsea. The only place for which there has, for any of the last three censuses, been no difference (to two decimal places) was for Skye and Lochalsh in 1981. This was due partly to how people are allocated to postcode sectors in that part of Britain.
- (c) Outside Scotland the largest difference in densities for counties is to be found for Northumberland and Cumbria with ratios of 7.7:1 and 6.0:1 respectively. These are areas with the most uneven divisions between their urban and rural populations; they are also the two counties which border Scotland. Carlisle, Colwyn, Lancaster, Allerdale, Tynedale, Aberconwy, and Harrogate are the only districts in England and Wales which exhibited ratios of over 4:1 in 1991. In 1981 Scarborough, Berwick-upon-Tweed, Alnwick, Copeland, Darlington, Crewe and Nantwich, Wear Valley, Shrewsbury and Atcham, North Bedfordshire, Kettering, Basingstoke and Deane, and Dinefwr also

fell into this category as did Rugby, Chester, Preseli Pembrokeshire, Cleethorpes, Waveney, East Yorkshire, Taunton Deane, and Shepway in 1971. Over time the category has shrunk and gained no new members. In all these districts, increases in population have served to even out the population densities among their constituent wards.

- (d) In 1991 the largest absolute differences between the two density measures were of over 20 persons per hectare in Westminster and the City of London (which have large parks and wards with very low night-time populations respectively), the next highest were Darlington, and Hartlepool (which are both compact cities with administrative boundaries that extend into the rural area). In 1971 there were more absolute differences of over 20 persons per hectare between the two measures of population density. Most striking was again Westminster, but Edinburgh City, Hartlepool, and Burnley also used to be in this category. Within these districts the population is also now more evenly spread.
- (e) During the 1980s area weighted densities fell most in two districts which lost more than four people per hectare: Glasgow City and Liverpool. Five districts gained more than four people per hectare: Tower Hamlets, Kensington and Chelsea, City of Westminster, Islington, and Camden. If, however, it is changes in the densities at which people live that are of interest, then the ranking is very different. Five districts lost more than four population weighted persons per hectare: Glasgow City, Liverpool, Clydebank, Newham, and Middlesbrough. Only two of these would be included in the top six for losses by conventional density measures. By population weighted population density measures the top five absolute gains are still shared by the same five districts which were listed above.
- (f) Conversely, the relative changes in population density by district during the 1980s show less consistency over which districts have risen in population density, depending on the measure which is chosen. Five districts saw falls of over 10 per cent in their conventional densities: Glasgow City, Knowsley, Clydebank, City of London and Liverpool. This list is not dissimilar to that for the ranking on absolute losses described above. Four districts saw increases of over 20 per cent in their conventional densities during the 1980s: Milton Keynes, Kincardine and Deeside, Gordon, and Wokingham. These represent the most extreme of a totally different set of places to those which saw the greatest absolute gains. By population weighted population density seven districts, two counties and one country saw falls of 10 per cent in their population densities: Clydebank, Inverclyde, Inverness, Glasgow City, Carlisle, Middlesbrough, Stirling, Strathclyde, Tayside, and

Scotland. Nineteen districts saw rises of over 20 per cent in their population weighted densities during the 1980s: Kincardine and Deeside, Gordon, South Hams, Wokingham, Milton Keynes, Vale of White Horse, Sedgemoor, North Dorset, Lewes, West Oxfordshire, Radnorshire (which was previously Radnor), Horsham, East Hampshire, Mendip, East Lindsey, North Shropshire, Mid Suffolk, Skye and Lochalsh, and South Northamptonshire.

- (g) In general the 1980s saw a continuation of the trends of the 1970s. There were, however, a number of major exceptions. Five districts saw a rise in densities in the 1970s converted into a fall in density during the 1980s with a difference of over 10 per cent in the rates of change: City of London, Shetland, Strathkelvin, Crawley, and Western Isles. Fourteen districts saw the reverse, with a fall in densities in the 1970s turning to a rise of a similar magnitude in the 1980s: Kensington and Chelsea, Tower Hamlets, City of Westminster, Islington, Hammersmith and Fulham, Southwark, Camden, Lambeth, Hackney, Wandsworth, Lewisham, Etrick and Lauderdale, Newham, and Bournemouth. Measured by population weighted density, four very different districts saw rises in the 1970s converted into falls in the 1980s by a difference of over 20 per cent: Basingstoke and Deane, Cumbernauld and Kilsyth, Durham, and Brecknock. Eight districts saw the reverse by this measure: Kensington and Chelsea, Tower Hamlets, Hammersmith and Fulham, Thamesdown, Islington, Camden, City of Westminster, and Hackney.

The measure of population density used, the type of change considered, the years for comparison chosen, the definition and quality of the enumeration of the population, and the geography of the areas chosen clearly all affect the pictures of population density change in Britain which emerge from this study.

4.2 Densities for District Types

Studying density changes at the district level quickly results in long lists and tables of places being produced which appear to be collections of quite similar areas as the last discussion showed. One method of summarising the changes which have occurred is to compare the fortunes of a typology of districts. A typology by which all 459 districts are grouped into 11 types has been accepted by many researchers and was used in the last study of population density and concentration (Webber and Craig 1976, Craig 1988: 10). Here use of that same typology is continued, but Scottish districts are also included. The results for these *District Types* and for England, Wales and Scotland are given in Appendix B along with the individual district and county data. The population weighted densities for these Districts Types are still based on ward level counts of the population within all their amalgamated districts.

In 1991 the conventional densities of these areas ranged from 78 persons per hectare across Inner London Boroughs to 0.5 persons per hectare in Remoter Mainly Rural Districts. The differences in population weighted population density were very similar, ranging from 88 persons per hectare to 1.8 respectively. By measures of conventional density, the first five District Types with densities in double figures are clearly differentiated from the last six which all have densities of less than 4 persons per hectare. The progression is much smoother when measured by population weighted population density, which more clearly shows the differences between these types of district, and shows why eleven (rather than two) categories of districts are required.

During the 1970s all the city District Types (1 to 6) were becoming less densely populated in the conventional sense, while the districts of the other types were in aggregate growing and thus becoming more densely populated. Districts with new Towns were growing fastest. All the 1970s population weighted density changes for usual residents were lower than the conventional changes which suggests that the population was becoming more evenly spread within each and every District Type. People were leaving some of the most dense parts of cities (which were not necessarily those parts with the highest population potentials) while other people were moving to the least dense parts of more rural areas.

During the 1980s this pattern changed. The Inner London Boroughs and the Small Non-metropolitan Cities saw their conventional population densities increase while the Remoter Mainly Rural Districts experienced the greatest increases overall. The change in population weighted population density was larger than the conventional density change in two types of district: Outer London Boroughs and Remoter Mainly Rural Districts. In both of these sets of places the population was becoming more concentrated in fewer wards over the 1980s.

In Britain as a whole conventional densities have increased with the rise in population in the ten years prior to each Census. Population weighted densities have decreased at each point in time as the population becomes more evenly spread across the land. The same pattern has occurred in England and Wales, but in Scotland the conventional density has fallen slightly across each decade while the population weighted density has fallen much faster. The result has been that in 1971 most people in Scotland lived in wards at a higher population density than did most people in Wales, yet by 1991 the opposite had become true.

The inclusion of Scottish districts in this study means that very different results are produced for District Types than would have been produced had only English and Welsh districts been included. The ratio of weighted to conventional density is a measure of the inequality in 1991 of ward densities across each District Type. The more urban areas have the most even distribution, except for small non-metropolitan cities which actually show the greatest contrast. This contrast is almost ten times

greater than that previously reported for these districts, as only English and Welsh areas were included in studies following the 1981 Census (Craig, 1988: 11). Thus, this difference is entirely due to the inclusion of those Scottish districts which are classified as Small Non-metropolitan Cities and contain a marked urban-rural divide within them. The next biggest difference is to be found in Resort Ports and Retirement Districts and then in Remoter Mainly Rural Districts. In these places most residents are living at densities which are almost four times higher than the conventional population densities there.

4.3 District Density Variation

It is very difficult to gain an impression of the distribution of densities and concentration changes through tables of figures or from lists of the most extreme areas. Descriptions of what has happened to a small typology of districts are easier to grasp but their relevance relies on the relevance of the typology, and variations in trends within these groups of places are lost. One method of displaying both the variation between districts and a summary of the overall pattern is to map the changes at district level across the country. For every district to be visible at a reasonable scale, and to give the appropriate emphasis to each district, an equal population cartogram of districts is used here (described further in Dorling 1994). This form of projection has the added advantage that several of these district maps can fit onto one page and hence are easier to compare. These graphics have the disadvantage of not providing a familiar image of Britain. An index map to this projection is given in Figure 10 and a key to the indexes is provided as Figure 11.

Four aspects of the 1991 distribution of population density across the 459 districts are shown in Figure 12. Map *a* shows the distribution of (ward) population weighted population densities by district. London Boroughs clearly dominate the image while districts within which most people live in wards with fewer than 5 people per hectare, are generally very small in terms of their total population. Map *b* uses the same scale as map *a*, but shows the conventional density distribution. The pattern is very similar but now twice as much of the map (and hence twice as many people) are allocated to districts with average densities below 5 persons per hectare. It is easy to see that Glasgow city, for instance, is the only Scottish district to contain more than 20 people per hectare by this measure.

The way in which these two measures differ is shown more precisely in the bottom two maps of this figure. Map *c* shows how, in many dense urban areas, there is very little difference between the two measures in relative terms. Map *d* shows how the measures differ little in absolute terms in rural areas. Edinburgh and Sheffield are two of the largest districts for which the measures do differ considerably, even in absolute terms. The most uneven distributions of populations in Britain are those in the districts shaded red. A cluster around Cumbria stands out clearly, here most people are living in relatively few wards.

Figure 10 Index to districts on the population cartogram

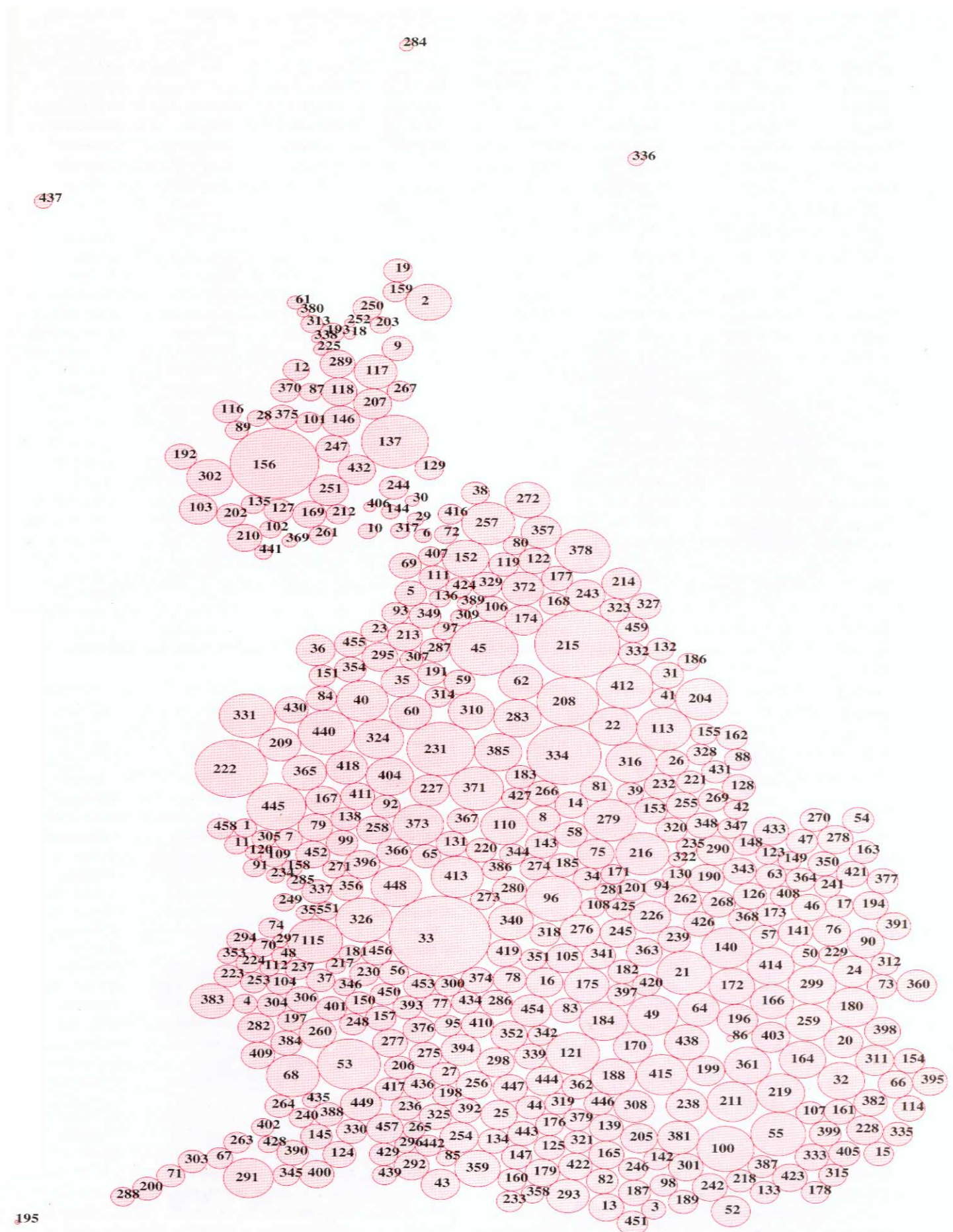
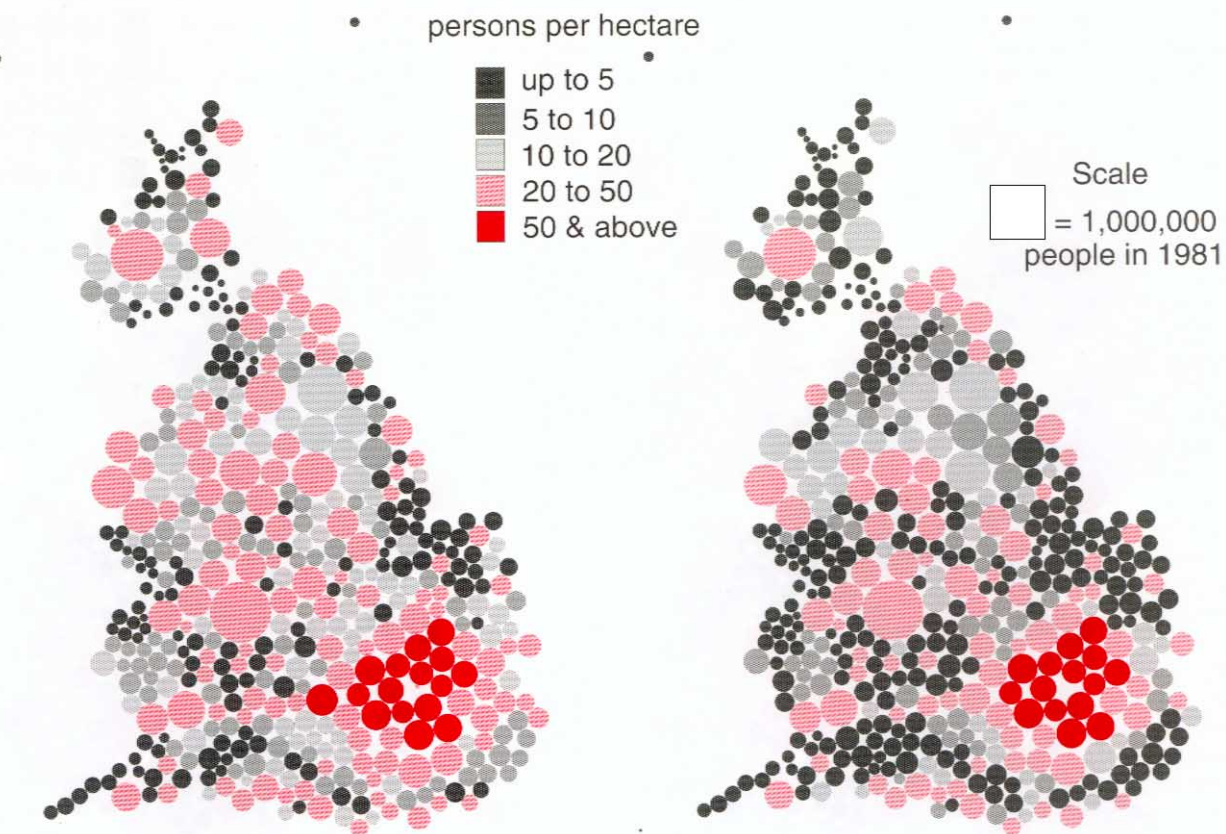


Figure 11 Key to districts on the population cartogram

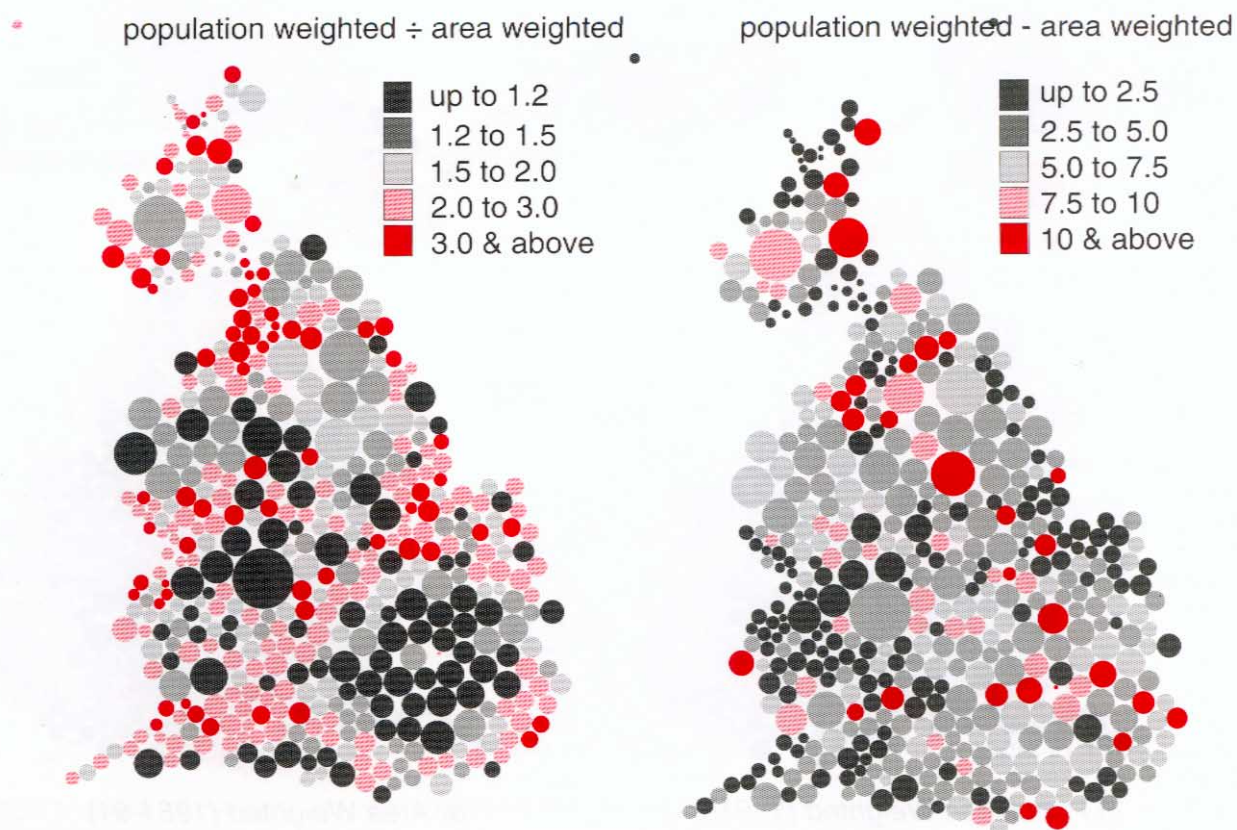
1 Aberconwy	58 Broxtowe	122 Easington	182 Hertsmere	241 Mid Suffolk	295 Preston	352 South	410 Vale of White
2 Aberdeen City	59 Burnley	123 East Cam-	183 High Peak	242 Mid Sussex	296 Purbeck	Oxfordshire	Horse
3 Adur	60 Bury	bridgeshire	184 Hillingdon	243 Middlesbrough	297 Radnor	353 South	411 Vale Royal
4 Port Talbot	61 Caithness	124 East Devon	185 Hinckley and	244 Midlothian	298 Reading	Pembrokeshire	412 Wakefield
(was Afan)	62 Calderdale	125 East Hampshire	Bosworth	245 Milton Keynes	299 Redbridge	354 South Ribble	413 Walsall
5 Allerdale	63 Cambridge	126 East	186 Holderness	246 Mole Valley	300 Redditch	355 South Shropshire	414 Waltham Forest
6 Alnwick	64 Camden	Hertfordshire	187 Horsham	247 Monklads	301 Reigate and	356 South	415 Wandsworth
7 Alyn and Deeside	65 Cannock Chase	127 East Kilbride	188 Hounslow	248 Monmouth	Banstead	Staffordshire	416 Wansbeck
8 Amber Valley	66 Canterbury	128 East Lindsey	189 Hove	249 Montgomery-	302 Renfrew	357 South Tyneside	417 Wansdyke
9 Angus	67 Caradon	129 East Lothian	190 Huntingdonshire	shire	303 Restormel	358 South Wight	418 Warrington
10 Annandale and	68 Cardiff	130 East North-	191 Hyndburn	250 Moray	304 Rhondda	359 Southampton	419 Warwick
Eskdale	69 Carlise	amptonshire	192 Inverclyde	251 Motherwell	305 Rhuddlan	360 Southend-on-	420 Watford
11 Arfon	70 Carmarthen	131 East	193 Inverness	252 Nairn	306 Rhymney Valley	Sea	421 Waveney
12 Argyll and Bute	71 Carrick	Staffordshire	194 Ipswich	253 Neath	307 Ribble Valley	361 Southwark	422 Waverley
13 Arun	72 Castle Morpeth	132 East Yorkshire	195 Isles of Scilly	254 New Forest	308 Richmond Upon	362 Spelthorne	423 Wealden
14 Ashfield	73 Castle Point	133 Eastbourne	196 Islington	255 Newark and	Thames	363 St.Albans	424 Wear Valley
15 Ashford	74 Ceredigion	134 Eastleigh	197 Islwyn	Sherwood	309 Richmondshire	364 St.Edmunds-Bury	425 Wellingborough
16 Aylesbury Vale	75 Charnwood	135 Eastwood	198 Kennet	256 Newbury	310 Rochdale	365 St.Helens	426 Welwyn Hatfield
17 Babergh	76 Chelmsford	136 Eden	199 Kensington	257 Newcastle	311 Rochester	366 Stafford	427 Derbyshire Dales
18 Badenoch and	77 Cheltenham	137 Edinburgh City	and Chelsea	upon Tyne	upon Medway	367 Staffordshire	(was West
Strathspey	78 Cherwell	138 Ellesmere Port	200 Kerrier	258 Newcastle-	312 Rochford	Moorlands	Derbyshire)
19 Banff and Buchan	79 Chester	and Neston	201 Kettering	under-Lyme	313 Ross and	368 Stevenage	428 West Devon
20 Barking and	80 Chester-le-Street	139 Elmbridge	202 Kilmarnock	259 Newham	Cromarty	369 Stewarty	429 West Dorset
Dagenham	81 Chesterfield	140 Enfield	and Loudoun	260 Newport	314 Rossendale	370 Stirling	430 West Lancashire
21 Barnet	82 Chichester	141 Epping Forest	203 Kincardine	261 Nithsdale	315 Rother	371 Stockport	431 West Lindsey
22 Barnsley	83 Chiltern	142 Epsom and Ewell	and Deeside	262 North	316 Rotherham	372 Stockton-on-	432 West Lothian
23 Barrow-in-Furness	84 Chorley	143 Erewash	204 Kingston Upon	Bedfordshire	317 Roxburgh	Tees	433 King's Lynn and
24 Basildon	85 Christchurch	144 Ettrick and	Hull	263 North Cornwall	318 Rugby	373 Stoke-on-Trent	West Norfolk (was
25 Basingstoke	86 City Of London	Lauderdale	205 Kingston Upon	264 North Devon	319 Runnymede	374 Stratford-on-	West Norfolk)
and Deane	87 Clackmannan	145 Exeter	Thames	265 North Dorset	320 Rushcliffe	Avon	434 West Oxfordshire
26 Bassetlaw	88 Cleethropes	146 Falkirk	206 Kingswood	266 North East	321 Rushmoor	375 Strathkelvin	435 West Somerset
27 Bath	89 Clydebank	147 Fareham	207 Kirkcaldy	Derbyshire	322 Rutland	376 Stroud	436 West Wiltshire
28 Bearsden and	90 Colchester	148 Fenland	208 Kirklees	267 North East Fife	323 Ryedale	377 Suffolk Coastal	437 Western Isles
Milngavie	91 Colwyn	149 Forest Heath	209 Knowsley	268 North	324 Salford	378 Sunderland	Islands
29 Berwick-upon-	92 Congleton	150 Forest of Dean	210 Kyle and Carrick	Hertfordshire	325 Salisbury	379 Surrey Heath	438 Westminster,
Tweed	93 Copeland	151 Fylde	211 Lamberth	269 North Kesteven	326 Sandwell	380 Sutherland	City of
30 Berwickshire	94 Corby	152 Gateshead	212 Clydesdale (was	270 North Norfolk	327 Scarborough	381 Sutton	439 Weymouth and
31 East Yorkshire,	95 Cotswold	153 Gedling	Lanark)	271 North Shropshire	328 Scunthrope	382 Swale	Portland
Borough of	96 Coventry	154 Gillingham	213 Lancaster	272 North Tyneside	329 Sedgefield	383 Swansea	440 Wigan
Beverley (was	97 Craven	155 Glanford	214 Langbaugh-On-	273 North	330 Sedgemoor	384 Taff-Ely	441 Wigtown
Beverley)	98 Crawley	156 Glasgow City	Tees	Warwickshire	331 Sefton	385 Tameside	442 East Dorset (was
32 Bexley	99 Crewe and	157 Gloucester	215 Leeds	274 North West	332 Selby	386 Tamworth	Wimborne)
33 Birmingham	Nantwich	158 Gylndwr	216 Leicester	Leicestershire	333 Sevenoaks	387 Tandridge	443 Winchester
34 Blaby	100 Croxson	159 Gordon	217 Leominster	275 North Wiltshire	334 Sheffield	388 Taunton Deane	444 Windsor and
35 Blackburn	101 Cumbernauld	160 Gosport	218 Lewes	276 Northampton	335 Shepway	389 Teesdale	Maidenhead
36 Blackpool	and Kilsyth	161 Gravesham	219 Lewisham	277 Northavon	336 Shetland Islands	390 Teignbridge	445 Wirral
37 Blaenua Gwent	102 Cumncok and	162 Great Grimsby	220 Lichfield	278 Norwich	337 Shrewsbury and	391 Tendring	446 Woking
38 Blyth Valley	Doon Valley	163 Great Yarmouth	221 Lincoln	279 Nottingham	Atcham	392 Test Valley	447 Wokingham
39 Boslover	103 Cunninghame	164 Greenwich	222 Liverpool	280 Nuneaton and	338 Skye and	393 Tewkesbury	448 Wolverhampton
40 Bolton	104 Cynon Balley	165 Guildford	223 Llanelli	Bedworth	Lochalsh	394 Thamesdown	449 Woodspring
41 Boothferry	105 Dacorum	166 Hackney	224 Lliw Valley	281 Oadby and	339 Slough	395 Thanet	450 Worcester
42 Boston	106 Darlington	167 Halton	225 Lochaber	Wigston	340 Solihull	396 The Wrekin	451 Worthing
43 Bournemouth	107 Dartford	168 Hambleton	226 Luton	282 Ogwr	341 South	397 Three Rivers	452 Wrexham Maelor
44 Bracknell Forest	108 Daventry	169 Hamilton	227 Macclesfield	283 Oldham	Bedfordshire	398 Thurrock	453 Wychavon
45 Bradford	109 Delyn	170 Hammersmith	228 Maidstone	284 Orkney Islands	342 South Bucks	399 Tonbridge and	454 Wycombe
46 Braintree	110 Derby	and Fulham	229 Maldon	285 Oswestry	343 South Camb-	Malling	455 Wyre
47 Breckland	111 Derwentside	171 Harborough	230 Malvern Hills	286 Oxford	ridgeshire	400 Torbay	456 Wyre Forest
48 Brecknock	112 Dinefwr	172 Haringey	231 Manchester	287 Pendle	344 South Derbyshire	401 Torfaen	457 South Somerset
49 Brent	113 Doncaster	173 Harlow	232 Mansfield	288 Penwith	345 South Hams	402 Torridge	(was Yeovil)
50 Brentford	114 Dover	174 Harrogate	233 Medina	289 Perth and	346 South	403 Tower Hamlets	458 Ynys Mon – Isle
51 Bridgnorth	115 Dudley	175 Harrow	234 Meirionnydd	Kinross	Herfordshire	404 Trafford	of Anglesey
52 Brighton	116 Dumbarton	176 Hart	235 Melton	290 Peterborough	347 South Holland	405 Tunbridge Wells	459 York
53 Bristol	117 Dundee City	177 Hartlepool	236 Mendip	291 Plymouth	348 South Kesteven	406 Tweeddale	
54 Broadland	118 Dunfermline	178 Hastings	237 Merthyr Tydfil	292 Poole	349 South Lakeland	407 Tynedale	
55 Bromley	119 Durham	179 Havant	238 Merton	293 Portsmouth	350 South Norfolk	408 Uttlesford	
56 Bromsgrove	120 Dwfor	180 Havering	239 Mid Bedfordshire	294 Preseli	351 South North-	409 Vale of	
57 Broxbourne	121 Ealing	181 Hereford	240 Mid Devon	Pembrokeshire	amptonshire	Glamorgan	

Figure 12 Population density and concentration by district 1991



a) Population Weighted

b) Area Weighted



c) Ratio Measure

d) Difference Measure

Figure 13 Change in population density by district 1971, 1981 and 1991

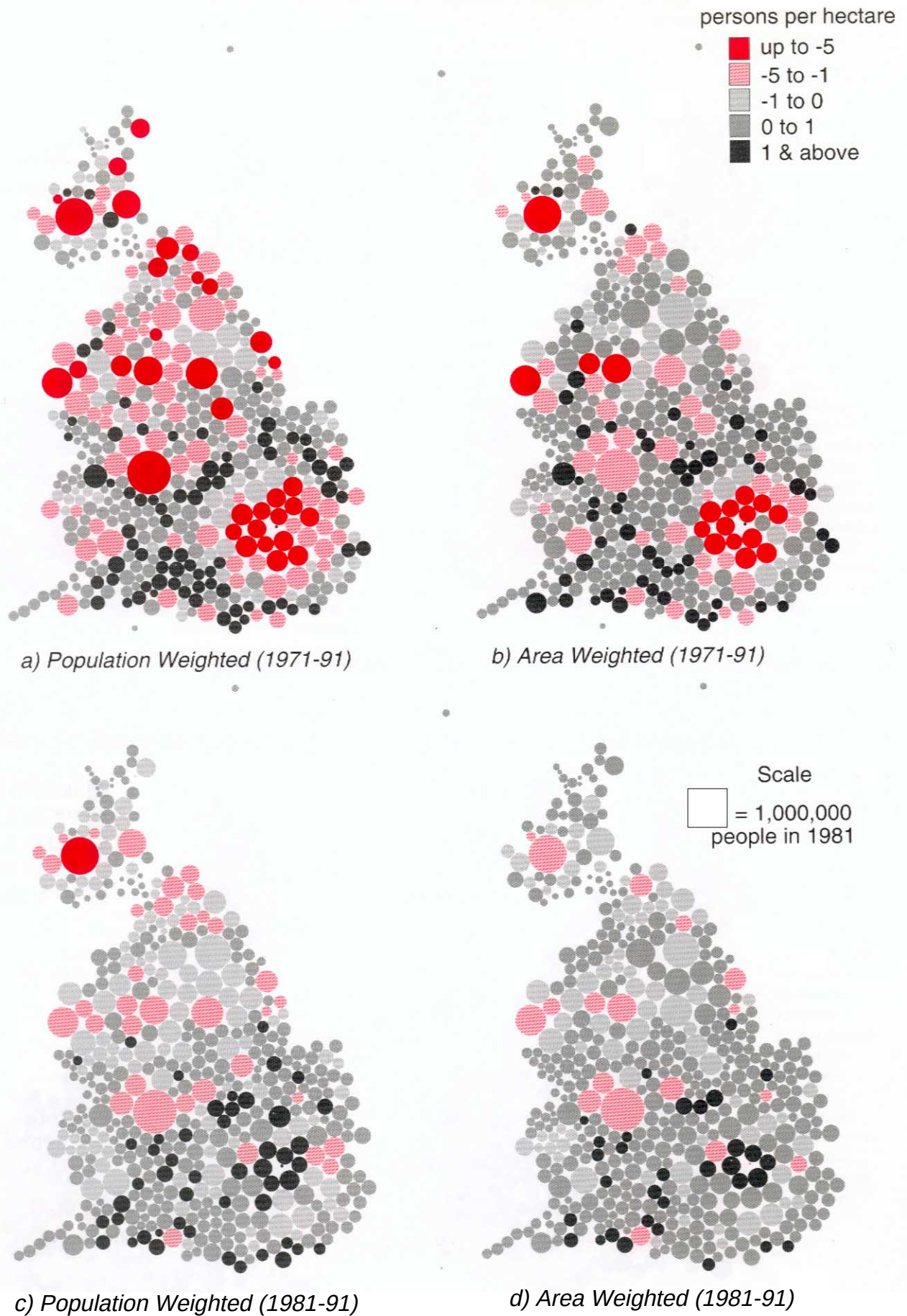
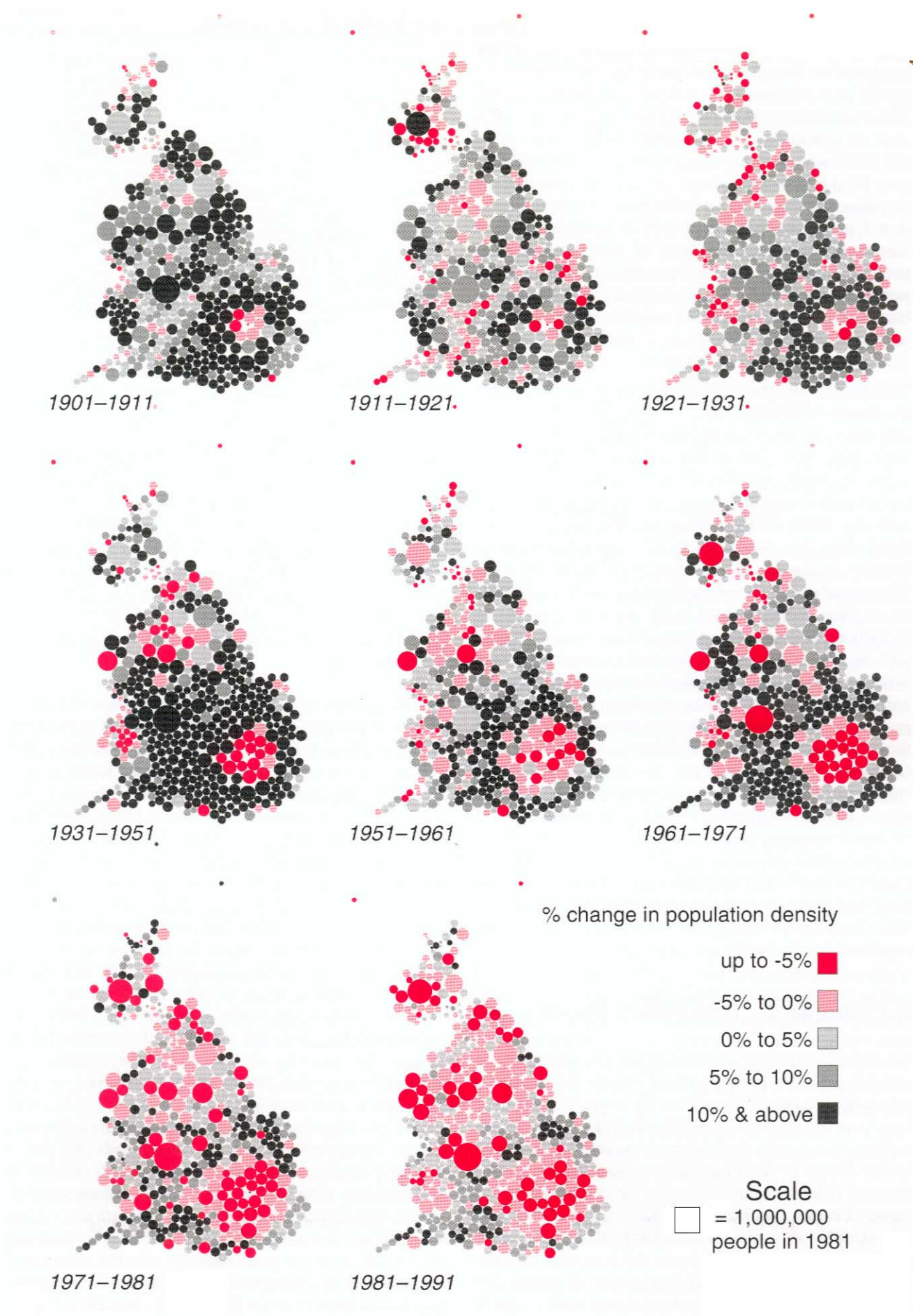


Figure 14 Change in population density by district 1901 to 1991



The changes in densities up to 1991 can also be shown in map form. Figure 13 presents four more maps using both measures of density and two periods of change from 1971 to 1991 and just from 1981 to 1991. All four maps employ the same shading scale so that they are directly comparable. Map *a*, shows the absolute change over twenty years in population weighted population density. The urban to rural shift of the population is made very clear as almost all the large urban districts are shaded red whilst almost all the small rural districts are black or grey. Map *b*, shows the changes in terms of conventional densities. In these terms far fewer districts have lost more than 5 people per hectare. In particular the borough of Tower Hamlets can be seen to have experienced population growth over the period, even though the population weighted population density of the borough, based on its constituent ward population densities, has declined.

The contribution of the changes in the 1980s is shown in the bottom two maps. Map *c*, highlights the fact that only Glasgow has seen absolute falls of over 5 people per hectare during the 1980s in terms of its population weighted population density. Notably the boroughs of Inner London have seen increases in population density over the 1980s as have many smaller districts in the South East. No district north of Lincoln has seen an increase in density greater than 1 person per hectare. The map of change in conventional densities in the 1980s (*d*) is even more subdued, with the vast majority of districts having seen almost insignificant changes of only plus or minus one person per hectare over ten years. Where the population weighted density change less the area weighted density change of a district is positive, the population has been becoming less evenly spread within those districts. Only in Newham, Middlesbrough, Clydebanks, Stockton on Tees, and Glasgow City have significant changes (of 2 per cent or more) in the opposite direction occurred. The populations of these districts have become less concentrated over time. In these five districts the population has tended to leave the most densely populated wards and migrants have tended to settle in less dense areas. Elsewhere in Britain most districts have seen stronger population growth within their more densely populated wards during the course of the 1980s.

5 Changes in Population Density

To end this study the changes of the last twenty years are put into the perspective of nearly a century of population change. This allows an impression of their long term significance to be gauged. In historical terms, is there now a great deal of change occurring, and how is that change in densities different from the changes of the past? After showing the detailed patterns of population density change, the final part of this section shows how it is possible to summarise the national distribution of people through a single statistic: the 'centre of gravity' of the population. One hundred years of population change can then be visualized on a map with a simple

line, showing where the population centre of Britain has moved from and to.

5.1 Density Change by District

The 1971 Census is the oldest 100 per cent Census of Britain for which Small Area Statistics are available in digital form at the Enumeration District level. For the 1961 and earlier Censuses only paper records remain of the population counts and these are for old local authority areas, or for former wards and parishes which usually have very different boundaries to the areas in use today, or they are not in use today in any form. This means that it is not practical to try to estimate the previous populations of 1981 Census wards before 1971 on a national scale, and so only conventional population densities for larger areas can be compared on a consistent basis back into the past.

In the early 1980s a PhD student at Durham University used the printed Census records to provide population estimates for the areas of the then current district boundaries, going back to 1901 (Mounsey 1982). This dataset has been used here, in combination with data from the 1991 Census aggregated from wards to 1981 districts, to allow the changing conventional population densities to be estimated over eight time periods. Figure 14 shows these distributions of change, each drawn upon an equal population area cartogram. No Census was taken in 1941, so it should be remembered that the 1931 to 1951 change being shown here is for a particularly turbulent period which is also twice as long as the other seven periods.

The same shading is used on each cartogram so that the pattern of changes can be compared across all eight maps. The population definition being used here is that of the population who were present on Census night at each date. The preliminary population counts from both the 1981 and 1991 Censuses are used in these maps. The use of the population present counts appears to slightly overemphasise the falls in population density in many metropolitan districts in the 1980s. The sensitivity statistic listed in Appendix B (for every district) measures by how much these changes differ from those based on the usual resident counts used in the previous sections. At the start of this century population growth was strong right across the country. In the first ten years of the century only ten areas (when measured using 1981 local authority boundaries) lost more than 5 per cent of their populations: the City of London, Orkney Islands, the City of Westminster, Merionnydd, Skye and Lochalsh, Hastings, Camden, Angus, Caithness, and Sutherland. These losses amounted to less than one hundred thousand people whereas the country as a whole grew by almost 4 million people in these years (10 per cent). The cities of Newcastle, Birmingham, and Sheffield along with the whole of the Welsh coalfield area were growing faster than this national average and, at the extreme, Southend on Sea doubled its population. It was the most rural areas and most dense urban areas which were losing population fastest in this first decade, broadly the same

areas which have recently seen a turn-around to population growth occurring most quickly.

The next ten years saw national population growth halve to under 5 per cent. Losses of over 5 per cent were now seen across over forty districts. Districts across Yorkshire and Lancaster, in much of Scotland, the South West, East Anglia and in the more remote areas of the Home Counties experienced declining population densities. Apart from industrial successes crowding more people into areas such as in Glasgow, North Tyneside and the Wirral, those Districts which experienced significant population growth during these times include many of the places which now constitute suburbia. The 1920s saw a continuation of these trends with the depression holding population growth at below 5 per cent a decade again. On the map the black ring of suburban expansion around London is clear, as is its emergence elsewhere. Outside central London, however, towns such as Liverpool, Birmingham, and Leeds were still growing by more than the national average during this period.

The fourth map conceals many of the effects of the second world war by showing two decades worth of change in one picture. The rout of the population from the Inner London boroughs is clear, however, as are the losses from the Welsh valleys and from many northern industrial towns, which were previously growing, as well as from ports right around the coast. Outside London the unbroken picture of rapid growth across southern England is dramatic with Birmingham continuing to grow faster than any other major city.

The 1950s saw these trends subside. The ring of southern suburban growth becomes more distinct, now almost encircling London, Birmingham, and Bristol. Manchester and Liverpool continue to lose over 5 per cent of their population a decade while the population decline in London has spread to almost all of its post-1965 boroughs.

The last three decades of this period have seen decreasing levels of activity. During the 1960s over 250 districts fell into the two extreme categories of either losing more than 5 per cent of their populations or of gaining more than 10 per cent more people in that decade. The population declines of large cities took on a new momentum with Birmingham losing people for the first time this century in the 1960s. During the 1970s the number of districts falling into the extreme categories of change fell below 200. The only significant increases in density were generally seen in the rural districts furthest from the large cities but still largely in the south. Many places along the urban rural fringe experienced population declines for the first time since 1901, but a ring of faster growth could still be made out around, but now further from, the capital. The 1980s saw the fastest growth areas shrink even further so that the circle around the capital was broken into a series of clusters of growing districts: around Cambridge, Milton Keynes, Oxford, and Basingstoke. The declines of the metropolitan centres became even more prominent, while in central London

Tower Hamlets recorded an inter-censal increase of above 5 per cent in the enumerated population for the first time this century.

Less than 100 districts fell into the top and bottom categories of change on the map of the 1980s in Figure 14. Nevertheless this does not mean that the last decade was uneventful in terms of changing population densities. Many of the trends of the last one hundred years may have been brought almost to completion by 1991. In rural Britain fast growth has now been restricted to a very narrow band of districts, and planning controls and local lobbying may well restrict further population growth there, as will demographic changes. Most interesting, however, is the possible beginnings of a turn-around in the prospects of some urban areas, notably Inner London but also places such as Warrington near Liverpool, Eastwood near Glasgow, and Redditch near Birmingham which all expanded during the 1980s. The jobs are still in the cities and if people want employment then they often cannot afford to live too far away from these places, whatever their residential preferences. To see where the tide turned during the 1980s, changes over the years rather than the decades will give extra insight.

5.2 Density Change by District Type

To provide more detail about what has occurred in recent years, a year by year study of population density change has been made from 1971 to 1991. Annual population figures are estimates based on calculations which use migration, birth and death figures. For individual districts and individual years these estimates may not be particularly reliable. If, however, the changing fortunes of groups of districts are compared, then a much more robust picture of annual population density change emerges. The groups of districts used here are the eleven types of districts which were described in Section 4.2. Figure 15 shows both the smoothed average annual population density changes which can be estimated from the century's Census figures plus the annual changes in the official mid-year estimate of the population usually resident in each of these District Types. In this section the final mid-year population estimates for 1981 and 1991 are used throughout.

The changes in District Type densities across the century are discussed first. These have been standardized so that they can be compared with annual changes over the last twenty years. Points have also been introduced between the census dates to smooth the lines which are each based on only eight counts. Table 7 gives the population counts for each District Type at each date. The changes in population will be the same as the changes in conventional densities as the areas of these groups of districts do not change over time.

In terms of population density change, the twentieth century in Britain has been a tale of two cities: Inner and Outer London. In almost every decade up to 1961, Outer London has been growing in population by between 1 per cent and 3 per cent per year. In every decade apart

Figure 15 Population density change by district type 1901-1991, 1971-1991

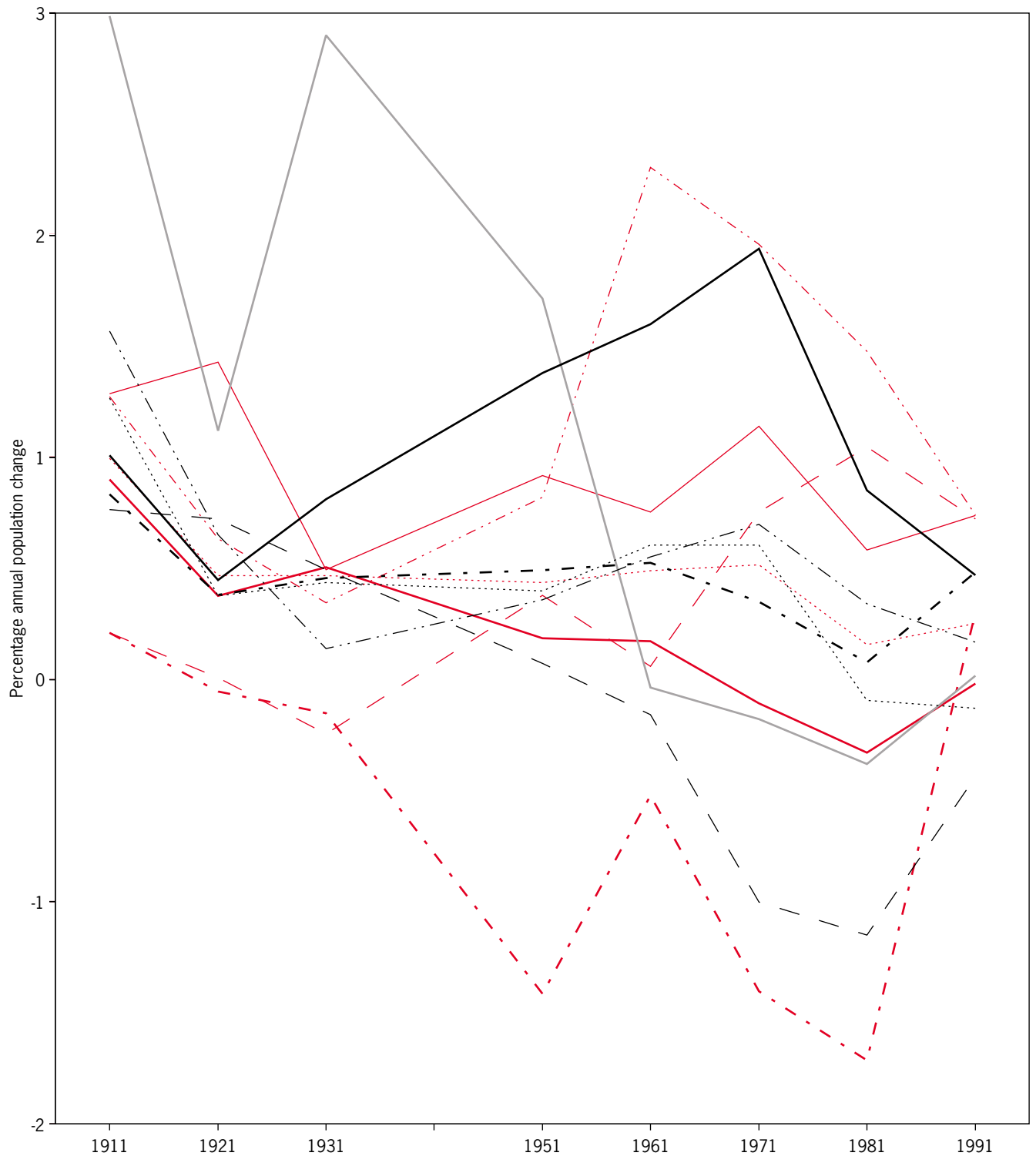
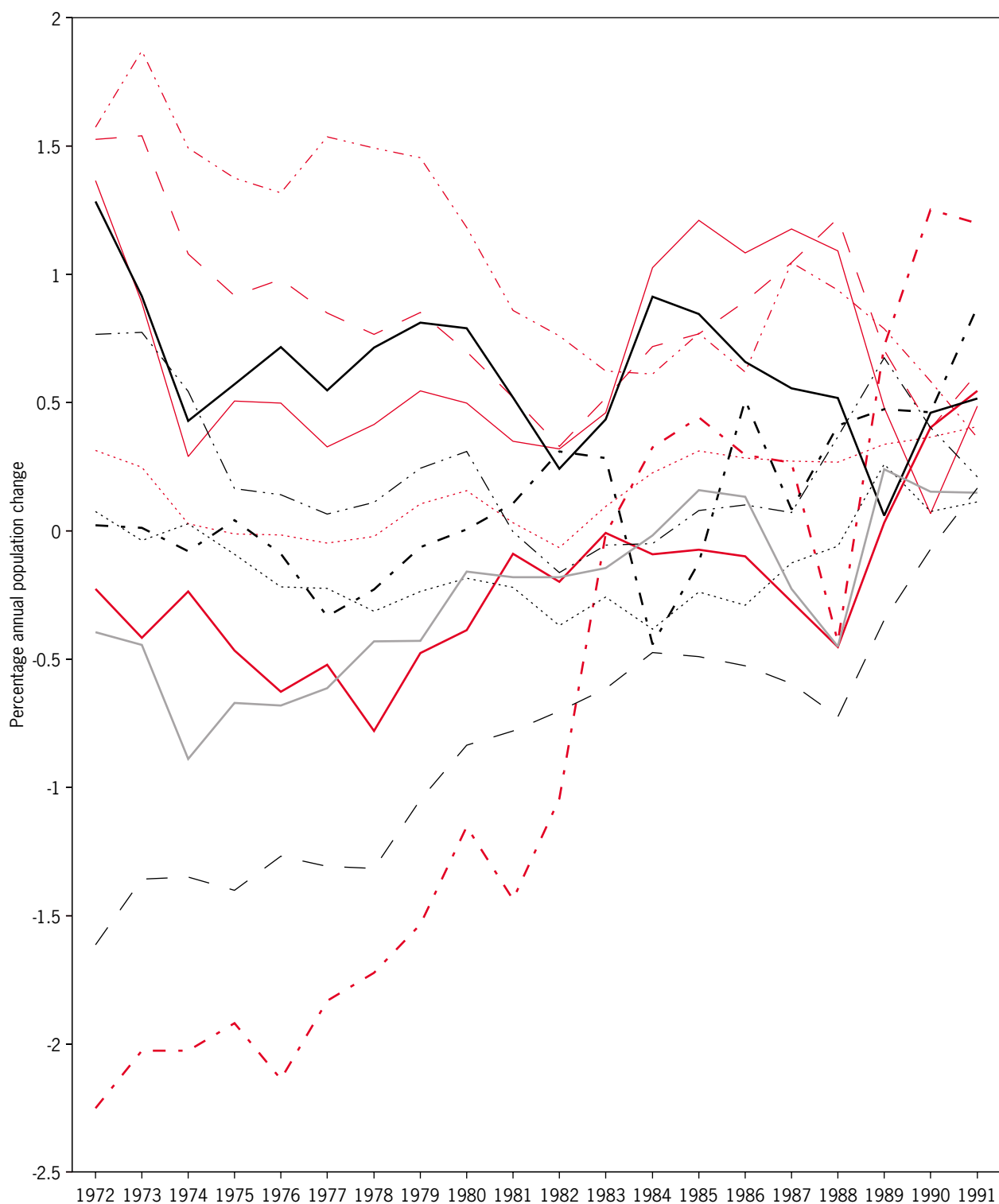
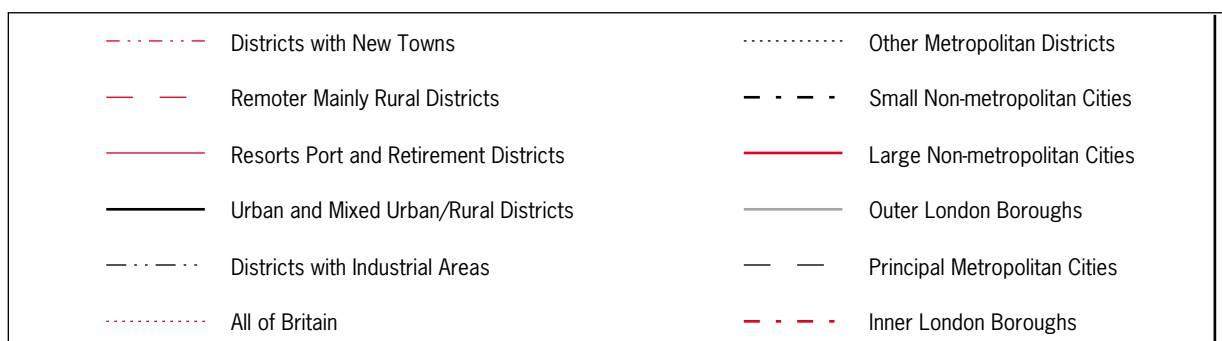


Figure 15 continued



Mid-year to mid-year population change using final series revisions



from the first and the last, Inner London has seen population losses - almost reaching 2 per cent per year by 1981. By the end of the period this situation had reversed dramatically so that now the population of Inner London is increasing its density faster than the nation as a whole is, for the first time this century.

The other big change which has occurred has been in terms of the fortunes of the four most rural types of district which, by the 1970s and 1980s, had become the fastest growing of all the eleven types. In 1931 Remoter Mainly Rural Districts were losing more people, and hence becoming less densely populated more quickly, than any other type of district. The rise of the New Towns during the 1950s is very clear, as is the deceleration of their density increases ever since. The parts of Britain now losing most people per decade are the Principal Metropolitan Cities.

The annual changes from 1971 to 1991 show more precisely what has occurred in recent years. Inner London boroughs grew at above the national average rate for the first time this century, in the year to June 1984. In the year to June 1988 they dipped below that average again, but suddenly in 1990 they became the fastest growing District Type group in Britain. They remained in this position in 1991 followed by Small Non-metropolitan Cities and then by the Remoter Mainly Rural Districts, which had been the fastest growing of all District Types in 1988. Before then, from 1983 to 1987, Resorts, Ports and Retirement Areas were growing most quickly and before that New Towns had been recording the highest rates of growth. By 1991 New Towns were growing at less than the national average rate of density increase, for the first time since the 1930s. This is a change which is masked when only decennial Census counts are compared. A more significant event was that in 1991, for the first time since the 1950s, the Principal Metropolitan Cities recorded an increase in their overall population density.

It is very difficult to extrapolate from this situation. The last time the picture of density change was so confused was in 1931 after which time both parts of London saw their rate of population change decrease for thirty years while the two most rural District Types experienced sustained rises in their rates of population density increase for the next fifty years. It would have been difficult to have predicted either of these two trends at that time. In any explanation of these changes factors which would need to be taken into account include the changing age and social structure of the population, and the geographical changes in the availability of employment and housing. When jobs are difficult to find and many young people are becoming more mobile (and going to university) it is perhaps not surprising that population densities are increasing in London. Similarly when slightly older people in London have experienced difficulty selling their houses it is probable that they are

staying for longer than is usual while children are growing up. Resorts, Ports and Retirement Districts and New Towns are both experiencing the effects of the ageing of their populations - people are both dying in increasing numbers and arriving in decreasing numbers.

Only one District Type approximates to suburbia: this is the Outer London Boroughs, and here the most interesting change of the very last period is to be seen. The largest drop in the rates of annual density growth occurred in Outer London Boroughs. In the year to June 1990 population density there was growing at 40 per cent *above* the national average. In the year to 1991 it was growing at more than 60 per cent *below* the national average rate. The density increases in these suburbs have now dropped below both all the rural District Types and all the city District Types except for Other Metropolitan Districts, but their rate of population density growth is rising while the Outer London Boroughs are experiencing falling rates of growth. Could this be the beginning of suburban decline in Britain?

Concentrating on the changes in the rates of change over only 12 months is not a particularly reliable method of predicting the future. Once the recession is over, and once jobs become less difficult to find and houses more easy to sell, the trends may well return to the pattern they have held for most of this century. If an urban revival occurs in selected cities then it will be interesting to see which parts of those cities will experience this density growth. Similarly, if not all rural areas are set to grow in future years, there will be much speculation about where growth will occur. Whatever is happening is likely to become evident over the next few years, as situations such as this in the past have rarely remained confused for long. Now is an interesting time to follow the pattern of population change in Britain.

5.3 *The Population Centre of Britain*

One final, more lighthearted way of summarising the changes in the population distribution over time is to calculate how the centre of Britain has moved, based on the 'centre of gravity' of the population of this island. This centre can be calculated for every year for which population counts are available. The movement of the centre provides a neat, albeit crude, summary of how the population of Britain is moving and how fast that movement is occurring. The population centre of Britain is a robust statistic which can be calculated to an accuracy of a few tens of metres which means that the village, street or pub closest to the 'heart of Britain' can be located each year!

To estimate the population centre of Britain a weighted average of the centroids of all 459 districts has been calculated. The centroids are derived from the 1981 ward based boundaries of each district. Each district's eastings and northings are weighted according to the number of

people living in that district at each year. The average of these coordinates produces the population centre of the country. This calculation can be made for every Census date up to 1971 and then for every year up to 1991. These calculations are based on the population present and the mid-year estimate of the population (changing to the very different definition only moves the centre by a couple of hundred metres East in 1971).

Figure 16 maps the movements of the population centre of Britain and Table 8 gives the coordinates at each date and the rates of change in metres moved per year. The population centre has moved steadily southward and slightly to the east over the course of this century, heading, relentlessly, towards London. The centre began, in 1901, at the hamlet of Rodsley in Derbyshire, half way between Derby and Stoke-on-Trent. By 1911 it had crossed the fields of Park Style farm and was located by the village hall of Longford. The ten years from 1911 to 1921 saw the slowest movement of this century but it still continued south through the village, moving, on average, 100 metres a year. The fastest movement occurred in the 1920s as thousands of people moved south in search of work: the population centre crossed over the land of three farms, over the village of Sutton on the Hill, to rest at the fields just north of Hilton. Very little is know about the location of the population centre over the next twenty years and doubtless it will have moved away from London during the war, but smoothed

over the decades the overall southward push continued unabated. The centre moved over Hargate Manor so that by 1951 the heart of Britain lay just to the West of Egginton, a village just north of Burton upon Trent.

During the 1950s the population centre of Britain crossed the old roman road which is now the A38, over a sewage works, over Bladon Castle to settle just to the East of the Winshill suburb of Burton upon Trent. During the 1960s the southward progress continued as the Mining Research Centre on the A50 was bypassed and the population centre of Britain came to settle in the centre of the suburb of Newhall in Swadlincote in 1971. The 1970s experienced almost random movements of the centre of population around Newhall and it was not until just after 1979 that the steady movement south began again in earnest. If annual changes were available for earlier years an interesting correlation between the political leanings of the government of the day and the direction of travel of the heart of Britain might be made.

During the 1980s the population centre moved steadily south through the Church Gresley suburb of Swadlington with the fastest movement being in the year to 1986. The old railway line to Coalville was crossed in 1987, and the mine at Spring Cottage passed. The years following the re-appearance of mass unemployment saw high rates of southward movement just as the 1920s had done earlier (although not quite as fast). By the spring of 1991 the population centre of Britain had come to the village of Overseal on the border of Leicestershire and in the heart of the midlands coalfield. In 90 years it has moved 26 kilometres as the crow flies. If the population of Britain were obliging, and current rates continued, it would hit the south coast at Worthing in the year 2771. Past movements, however, are not necessarily a good guide to future trends!

6 Postscript: Changes Since 1991

The last census was taken some time ago and so this postscript considers what is known about population changes since then. Revised mid-year estimates of district populations in 1991, 1992 and 1993 are the latest figures to be released and so the changes which have taken place in this period are considered here as well as what is now known about the location of residents who were living in Britain but who were not included in the small area statistics of 1991.

Between 1991 and 1993 the population of Britain increased by over a third of a million people. Table 9 shows how this increase was distributed amongst districts according to the eleven-fold typology used earlier. The largest relative increases in population were in Resorts, Ports & Retirement Districts, Urban and Mixed Urban/Rural Districts and Remoter Mainly Rural Districts, as they bounced back from their very low levels of growth

Table 8 The Population Centre of Britain 1901-1991

Date	Eastings	Northings	Movement (metres)	Metres/year
1901	420867	340347		
1911	421467	338220	2210	221
1921	421585	337231	996	100
1931	424572	332514	5583	558
1951	426141	327771	4995	250
1961	427778	324526	3635	363
1971	428798	320912	3755	375
1971	429037	320465		
1972	429039	320156	309	
1973	429021	320074	84	
1974	428886	320198	183	
1975	428830	320169	63	
1976	428803	320198	39	
1977	428783	320138	63	
1978	428868	319970	188	
1979	428953	319783	205	
1980	429079	319496	314	
1981	429168	319223	287	
			1249	125
1981	429167	319230		
1982	429269	318957	291	
1983	429395	318558	418	
1984	429514	318128	447	
1985	429670	317623	529	
1986	429833	317090	557	
1987	429910	316675	422	
1988	429946	316266	410	
1989	429995	316110	164	
1990	430109	315953	194	
1991	430281	315710	298	
			3692	369

Source: Calculated from Mounsey, 1982, and from the official mid-year estimates 1971-1991.

Figure 16 The population centre of Britain 1901 to 1991

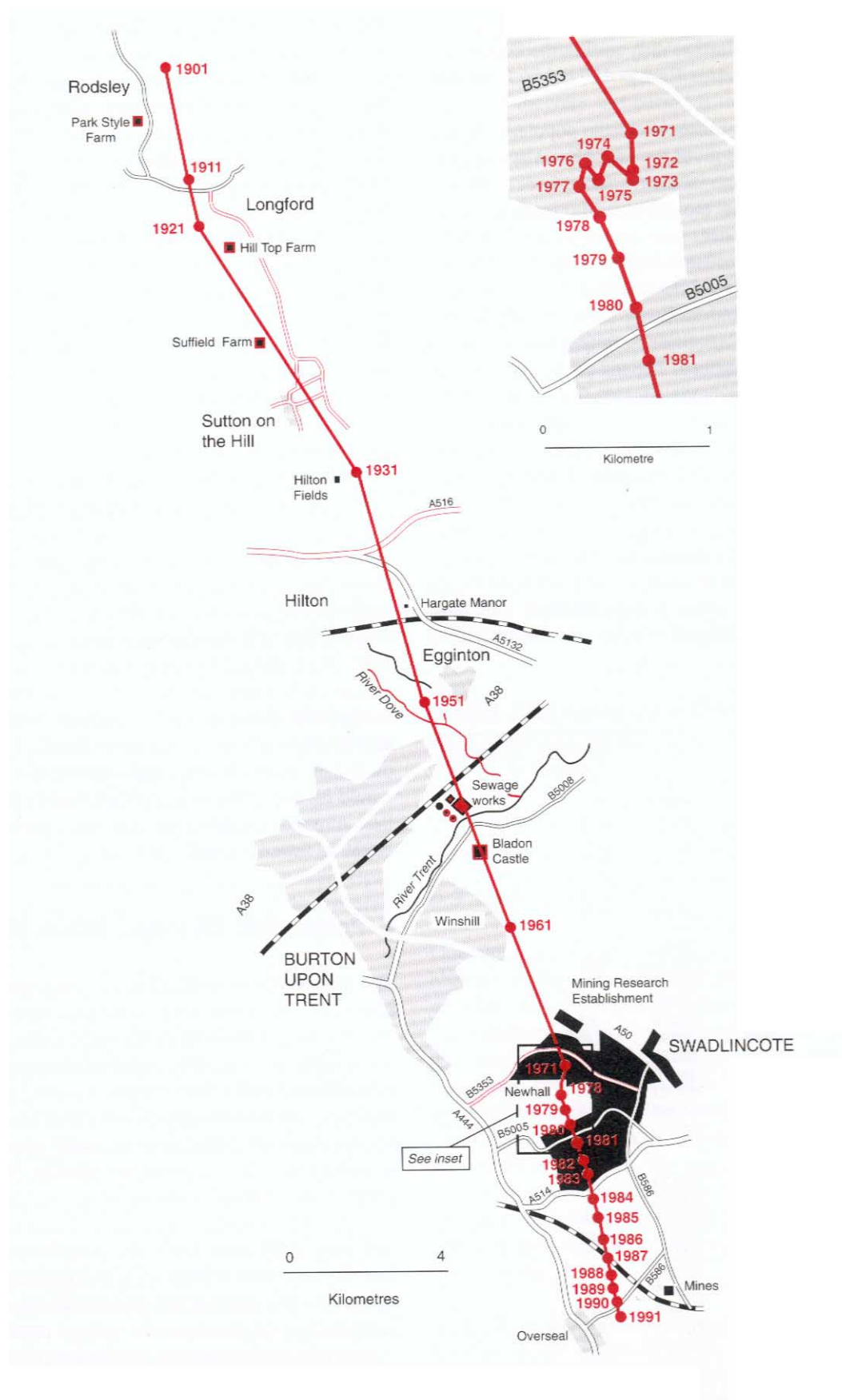


Table 9 Population Change by District Type in Britain 1991-1993

District Type Group (by 1991 Census boundaries)	Mid Year Estimate of Usual Residents (1990s series)								
	Total persons usually resident			% change in residents			% natural change*		
	1991	1992	1993	91-92	92-93	91-93	91-92	92-93	91-93
Britain	56206521	56388087	56559403	0.32	0.30	0.63	0.25	0.21	0.47
Inner London Boroughs	2627396	2635668	2647400	0.31	0.45	0.76	0.69	0.66	1.35
Outer London Boroughs	4262552	4268886	4285601	0.15	0.39	0.54	0.48	0.47	0.95
Principal Metropolitan Cities	4139177	4141490	4144680	0.06	0.08	0.13	0.25	0.19	0.44
Other Metropolitan Districts	8590425	8599021	8610965	0.10	0.14	0.24	0.27	0.22	0.49
Large Non-metropolitan Cities	3668735	3681123	3694303	0.34	0.36	0.70	0.28	0.24	0.52
Small Non-metropolitan Cities	1977996	1987245	1991632	0.47	0.22	0.69	0.28	0.23	0.51
Districts with Industrial Areas	7568502	7587053	7595501	0.25	0.11	0.36	0.30	0.24	0.54
Districts with New Towns	2879863	2881474	2888828	0.06	0.26	0.31	0.50	0.45	0.96
Resorts Port and Retirement Districts	3625565	3644733	3662018	0.53	0.47	1.01	-0.33	-0.35	-0.68
Urban and Mixed Urban/Rural Districts	10363967	10425710	10469607	0.60	0.42	1.02	0.30	0.25	0.55
Remoter Mainly Rural Districts	6502343	6535684	6568868	0.51	0.51	1.02	-0.02	-0.05	-0.06

Source: The 1991, 1992 and 1993 Mid-year estimates

Notes

* Change due to migration and other causes can be calculated by subtracting natural change (births less deaths) from the total change figures given.

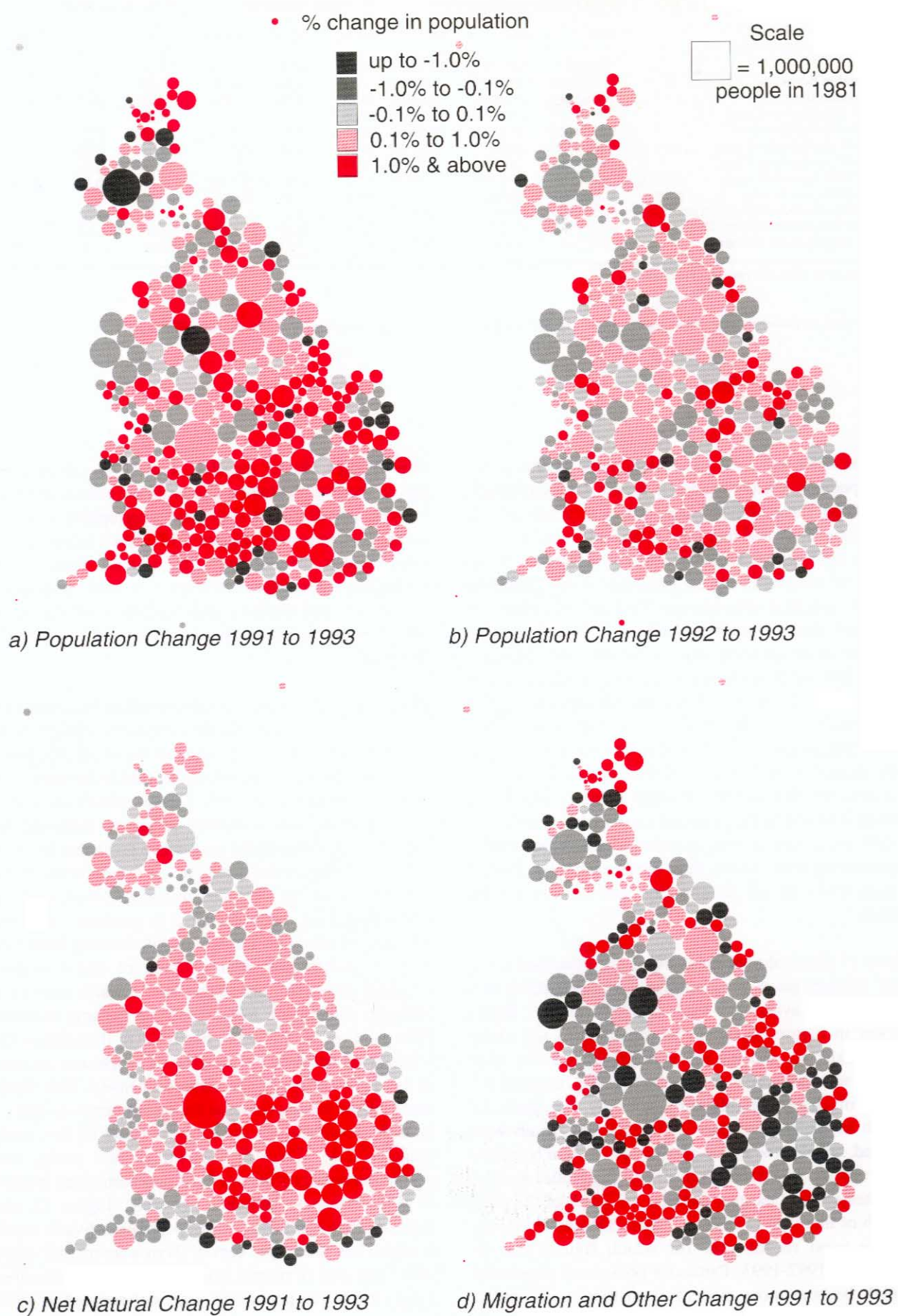
between 1989 and 1991. The beginnings of this trends could, perhaps, already be seen in Figure 15. Interestingly, after these three, Inner London has experienced the strongest growth and this growth has increased over the 1991 to 1993 period, so the revival in the fortunes of this part of the country in population terms in the late 1980s may not have been so temporary. Next, in terms of growth rates, are Small Non-metropolitan cities which also appeared to be growing quickly before 1991, however growth in these places is now slowing. Population growth rates remained lowest in Principal Metropolitan cities. The final three columns of table nine show how much of these changes can be attributed to the surplus of births over deaths in each group of districts. It is this that accounts for the growth of Inner London, while this growth is lowest in the principal (provincial) cities. Two of the three fastest growing groups of districts are actually experiencing more deaths than births each year. Here it is high levels of net in-migration that account for the growth.

Figure 17 shows the recent changes just described at the most disaggregated geographical level for which this information is available – local authority districts. Again the key in Figure 10 should be consulted to see where each district is, and all the cartograms use the same shading scheme to be comparable. Figure 17a shows the pattern of change, highlighting not only the continued growth of many rural parts of central and south west England, but also the strong growth in particular boroughs in the capital. Population falls in principal cities such as Manchester and Glasgow account for much of the slow growth of this type of district. Figure 17b shows change for the most recent year for which figures can be calculated, 1992-1993. Particular pockets of population growth become more evident as districts with similar

growth rates cluster together. Figure 17c shows what part of the overall change in population can be attributed to births and deaths. A very clear geographical pattern is revealed. Conversely Figure 17d shows where people have chosen, in aggregate, to migrate from and to (including international immigration and emigration). Kensington and Chelsea, and Merton stand out as the only London boroughs gaining from net migration in this period.

The population changes just described are based on mid-year estimates which include everybody thought to be living in Britain. However, most of the research reported in this volume has been based on ward level population estimates made by the 1991 Census which are known not to include over a million residents. Although the effect of this undercount on density estimates is not as serious as for other social statistics, it is worth considering here. Ever since the 1991 Census statistics were released, researchers have been working to produce consensus estimates of where the missing population may have been located. During the final revision of this text draft estimates of which English and Welsh wards were most likely to contain the missing people became available (Simpson *et al.* 1995). Figure 18 illustrates the relationship between the location of people not included in the 1991 census and population density. This figure confirms the assumption that the undercount was highest in high density areas made at the start of this study (Section 2.1). Thus the caveat to this study, that population density will have been underestimated in cities in 1991, needs to be taken seriously. Figure 18 also indicates that two thirds of the population live in wards in which less than 2 per cent of them were missed, while only 5 per cent of people live in wards where more than 5 per cent of the population were not counted in 1991.

Figure 17 Population change by district 1991 to 1993



What is most important about these people is not their absolute numbers, but their detailed geographical and social distribution.

One final question which more up to date information can confirm concerns the changing location of the population centre of Britain which was shown in Figure 16. The conversion from the 1980s series of population estimates to the 1990s series altered the position of the centre by only 90 metres, which is reassuring. Table 10 gives the coordinates of the population centre of Britain based on the new series of mid-year estimates. This shows that a very similar pattern of progress emerged in the 1990s as occurred in most of the last two decades. The centre of population has continued to move South-South-

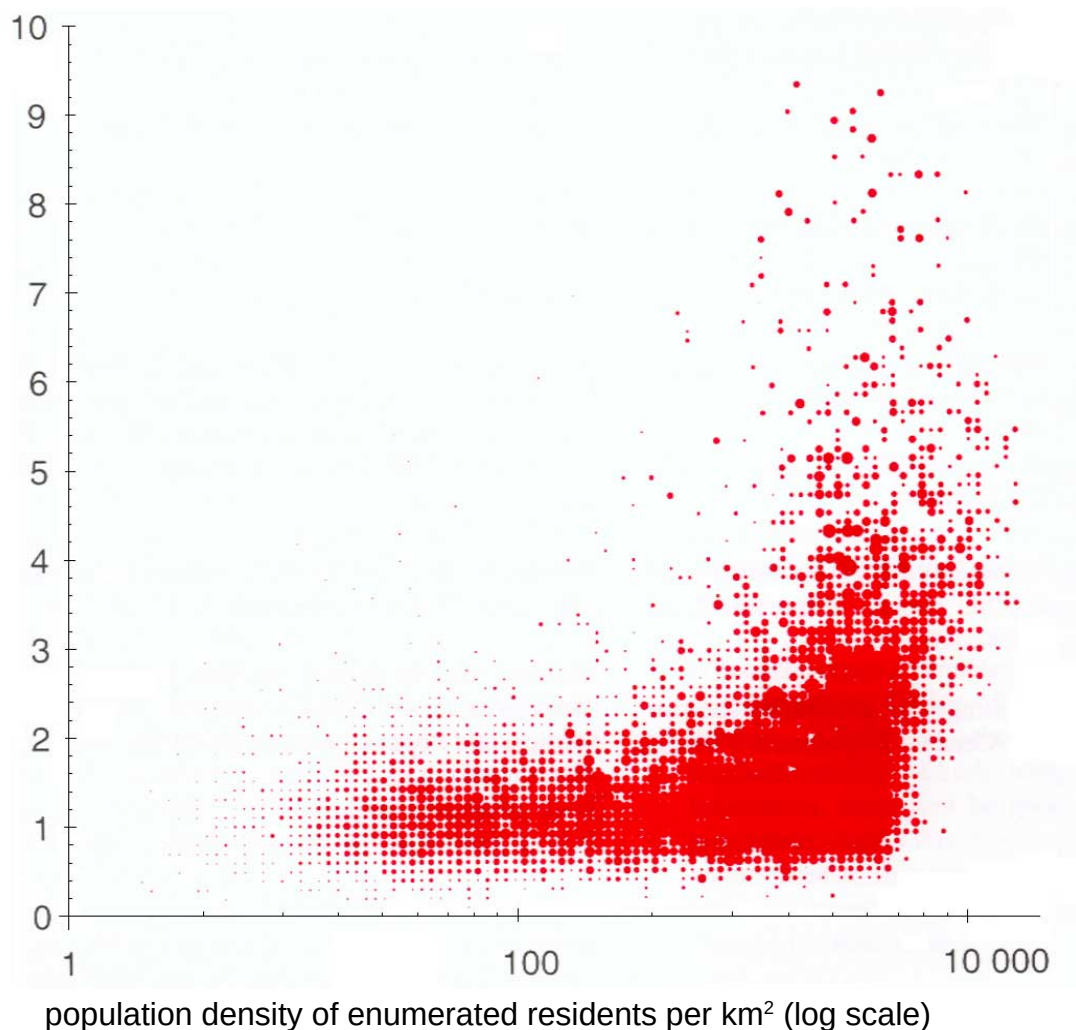
Table 10 The population centre of Britain 1991-1993

	Eastings (based on new mid-year series)	Northings	Movement (metres)
1991	430265	315759	
1992	430334	315635	142
1993	430381	315525	119

East at a rate of just over one hundred metres a year, but the speed of movement has slowed to a level last seen in the early and mid 1970s. Given the continued revival of Inner London and the very slow population growth in other large cities the continued shift south is perhaps unsurprising.

Figure 18 Census undercount and population density in 1991

% of residents not counted or imputed in each ward by the 1991 census



Estimates of the population undercount in each ward were derived from Simpson et al 1995. The graph shows population density against undercount for each ward in England and Wales

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Appendix A Connecting the 1981 and 1991 Censuses

This appendix describes the work undertaken to produce a spatial link between the 1981 and 1991 censuses as required for this study. It includes a description of what has been done, together with details of, and justification for, the methodology employed. See Atkins *et al.* 1993 for a full report – including statistical and graphical analysis of the resulting data, pseudo code of some of the algorithms used and tables highlighting the more interesting spatial changes.

Summary

An increasingly large proportion of census analysis compares variables over time. In order to obtain useful findings, such analysis needs to be founded on a consistent geographical base with a fine spatial resolution. A number of factors, including the availability of boundary data, led to the selection of 1981 Census Wards as the consistent areal base to be adopted for this study (see Section 2.2).

It became apparent before work had progressed very far that the initial geographical referencing of the 1991 Census data was not as reliable as had been hoped, and consequently a large amount of manual checking was needed to facilitate the production of an allocation table linking each 1991 enumeration district (ED) to its best fitting 1981 ward. Digitized boundaries did not become available for academic research until late in 1994.

Four independent allocations of a 1981 ward were made for each 1991 ED. This was done despite knowing that a large number of wards had unchanging boundaries so that the method, as a whole, could be checked. The data sources used include the 1981 and 1991 ED level SAS (Small Area Statistics) files, the 1981 and 1991 Area Master Files, the 1981 digitised ward boundaries and the 1991 postcode-ED directory file. The four allocations made were then combined into one robust lookup of a best fitting 1981 ward for every 1991 ED. This process was largely automated, though the programs used highlighted a large number of cases where further manual investigation was necessary.

When the available data had been combined into a single lookup table, there still existed an unacceptable number of misallocations of EDs to wards. To remedy this a number of additional checks were performed, cross checking the data in the lookup file with various other sources, paper-based maps of census geography and documentation on boundary changes.

The last stage of the work reported here was the production of 1991 SAS files aggregated to the 1981 ward level. The SAS files produced, along with the final version of the lookup file, have all been deposited at the ESRC Data Archive at Essex University and at the Census Dissemination Unit at Manchester so that they can be of benefit to other researchers.

Attention should be drawn to the following possible sources of error in the datasets:

- The process of aggregating ‘blurred’ counts has the potential to introduce significant errors (especially where the total counts are low, which is likely to be the case when performing analysis at ward level). This does not affect the population totals used in this study as they were never ‘blurred’.
- Where 1991 EDs are split between 1981 wards, misallocation is inherent to the process of assigning them solely to one or other of the wards they span. The misallocations will ‘cancel out’ locally however and so should have almost no effect on, for instance, district level analysis of ward based statistics (such as has been undertaken in Section 4.1).
- Census data for residents in ‘special EDs’ which contain very small communal establishments are suppressed in the ED level small area statistics. Consequently these people cannot be allocated to a 1981 ward using the methods outline here. This affected approximately 0.06 per cent of the 1991 population. The influence of this effect should have been insignificant for this study, and at higher geographical levels these people are included in census output.
- Where the census variables for an ED were imported or exported by Office of Population Censuses and Surveys (OPCS) to other 1991 EDs (to maintain confidentiality) which were across 1981 ward boundaries, there will be local misallocation of the population. Again this does not affect the population counts used in this study but would be important in particular areas for studies based on statistics other than population counts.
- Visitors who did not provide an accurate address of where they were usually resident were not included in the 1991 ED SAS, and hence could not be allocated. This affects approximately 0.4 per cent of the population, and would have been a similar problem in 1981 and 1971 so is unlikely to bias the results shown here.

- All the errors associated with undercount of 2.2 per cent of the population are not circumvented. This is by far the most significant source of error and eclipses the problems mentioned above. The remedy used for this study was the choice of a changing population definition which behaved similarly to the national level changes (but see Section 6).

A.1 Purpose

The purpose of this appendix is to discuss how it is possible to compare, geographically, statistics from the 1981 and 1991 Censuses of Great Britain, and to describe how this was achieved. Here, concern is with the spatial changes between the Censuses, in terms of changes to enumeration district (ED) locations, and ward and district boundaries, not with the comparability of variables between the censuses. For an analysis of the comparability of variables see Champion (1995) and OPCS *User Guide 28* (Guide to Statistical Comparability between 1981 SAS and 1991 Local and Small Area Statistics), 1994.

This study resulted in the production of a lookup file of 1991 EDs to 1981 wards, covering all of England, Wales and Scotland, and the creation of the full set of 1991 10 per cent and 100 per cent Small Area Statistics (SAS) tables aggregated to 1981 ward level. The lookup file allocates a best fitting 1981 ward to each 1991 ED, and the grid reference of the ED centroid is given along with an indication of the source from which the 1981 ward code was derived. The 10 per cent and 100 per cent SAS files are in a similar format to the OPCS ward level SAS tables.

Following the 1981 census, a great deal of work was done to link together the 1971 and 1981 Censuses, in terms of both spatial equivalence and comparability of the variables. For a criticism of the Census tract method of linking censuses see McKee, 1989. The 1971 Census data was aggregated to the 1981 ward level at Newcastle University (Dorling 1991). As a consequence of this, the vast majority of change-over-time analysis at Newcastle, covering the 1971-1981 period, makes use of the 1981 ward level (or aggregates of 1981 wards) as its areal base. As 1981 is also the mid-point in the three census period from 1971-1981-1991, the 1981 areal units are a sensible base for studies covering this period.

The purpose of linking the 1991 Census to the 1981 Census is to allow change-over-time analysis. The alternative approach, aggregation of 1981 EDs to 1991 wards, would not facilitate comparisons to the 1971 Census (unless a similar exhausting task was undertaken with the 1971 Census). Another consideration, which makes the latter approach impractical, is the fact that the 1991 digitised ward boundaries are still not yet available for academic research at the time of writing.

A.2 Methodology

The development of the lookup file was a three stage process, following which the transformed SAS files were derived from the refined version of the lookup file.

The first stage made use of OPCS ED-level data, in particular, the ED centroids (for both 1981 and 1991 EDs), together with the digitised 1981 ward boundaries. This data was used to produce three alternative lookup files from 1991 EDs to 1981 wards. The grid references of the 1991 EDs and 1981 ward boundary data were then incorporated within a GIS (Geographical Information System) database. With this visual aid a large number of EDs, suspected to be in the wrong positions, were checked interactively using on-screen maps, (see Atkins *et al.* 1993).

The second stage made use of another OPCS dataset, the PCED file, which contains details of individual unit postcode centroids and population counts and the 1991 EDs within which they fall, for all of England and Wales. Data from this file was used to produce population weighted ED centroids, which were allocated to 1981 wards by the Point-In-Polygon algorithm. This produced a further independent lookup file of 1991 EDs to 1981 wards. This was not necessary in Scotland where the Output Area (OA) naming scheme contains an intrinsic link to 1981 Census postcode geography.

In the third stage, the lookup files created in the previous two stages were combined to produce what became, after further scrutiny and revision, the final lookup file. This was achieved by choosing the 1981 ward indicated by one or other of the lookup files, the choice of which to use being determined by the matching between the 1981 wards suggested by the various lookup files for each 1991 ED.

Numerous checks were then carried out on this penultimate lookup file and corrections made accordingly. Among the checks were: ensuring one to one matching of wards in districts that have not had ward boundary changes between the Censuses; checking the distances between EDs within each ward; and, drawing 'ward polygon' diagrams (see **Figure 19**). When all the checks had been carried out, the lookup table was used to produce 1991 SAS data files aggregated to the 1981 ward level, from 1991 enumeration district level SAS data.

A.3 Data

The first data source used is the 100 per cent ED level SAS data. This file contained, for each 1991 ED, the following data: 1991 ED code, 1981 comparable ED code (if one existed), and the grid reference of the ED centroid. Using this data, for each 1991 ED, three independent 1981 wards in which the 1991 ED may lie could be calculated (in the vast majority of cases all three were identical):

Figure 19a The allocation of 1991 enumeration districts to 1981 Census wards

The vertices of each polygon are the coordinates of a group of enumeration districts or output areas which have been assigned to a single 1981 Census ward which that polygon represents. There are 151,719 vertices making up 10,444 polygons covering Britain.



Figure 19b The allocation of 1991 Enumeration districts to 1981 Census wards

Inset of South East England, 5x Magnification of Figure 19a

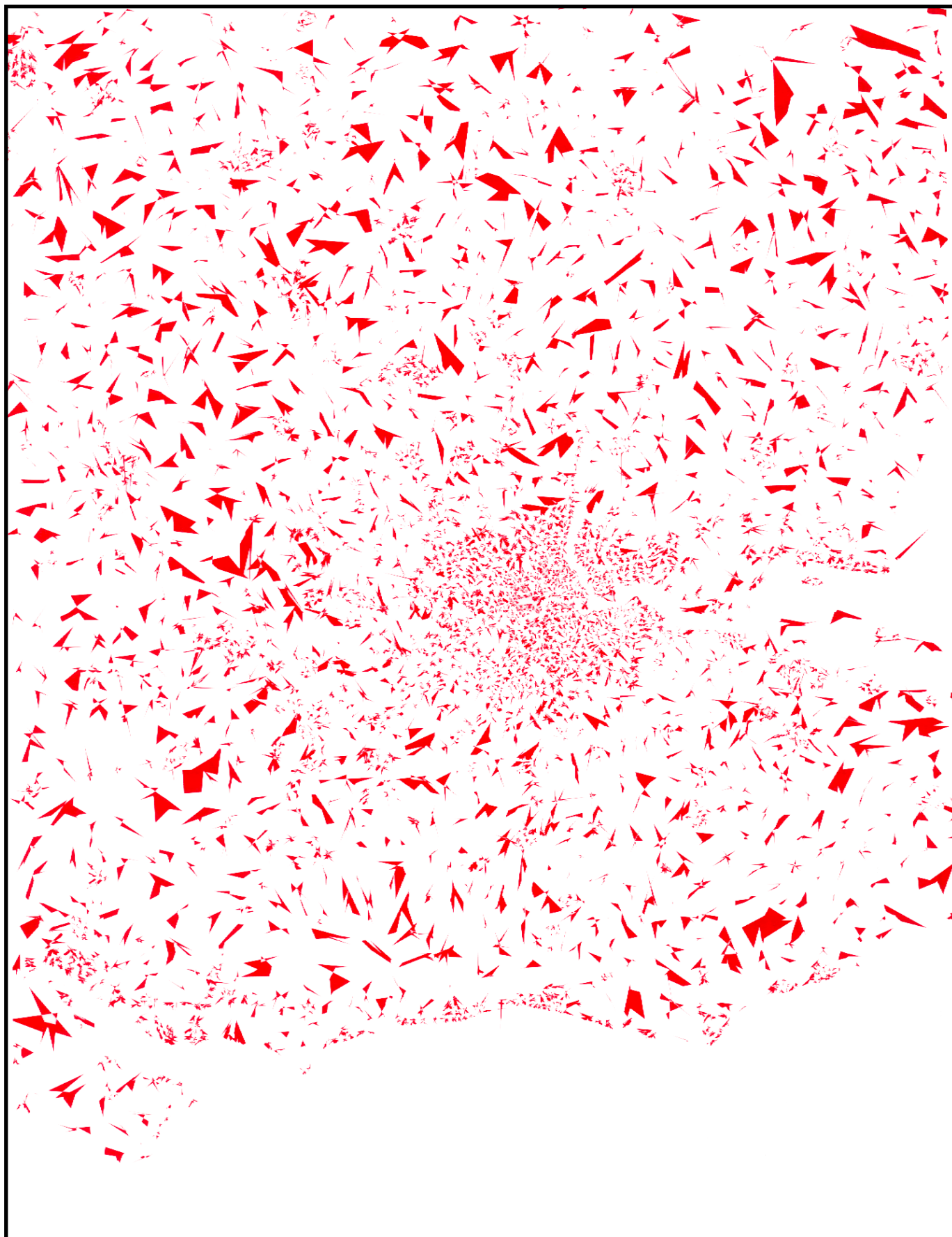


Figure 19c The allocation of 1991 Enumeration districts to 1981 Census wards

Inset of Greater London, 25x Magnification of Figure 19a.

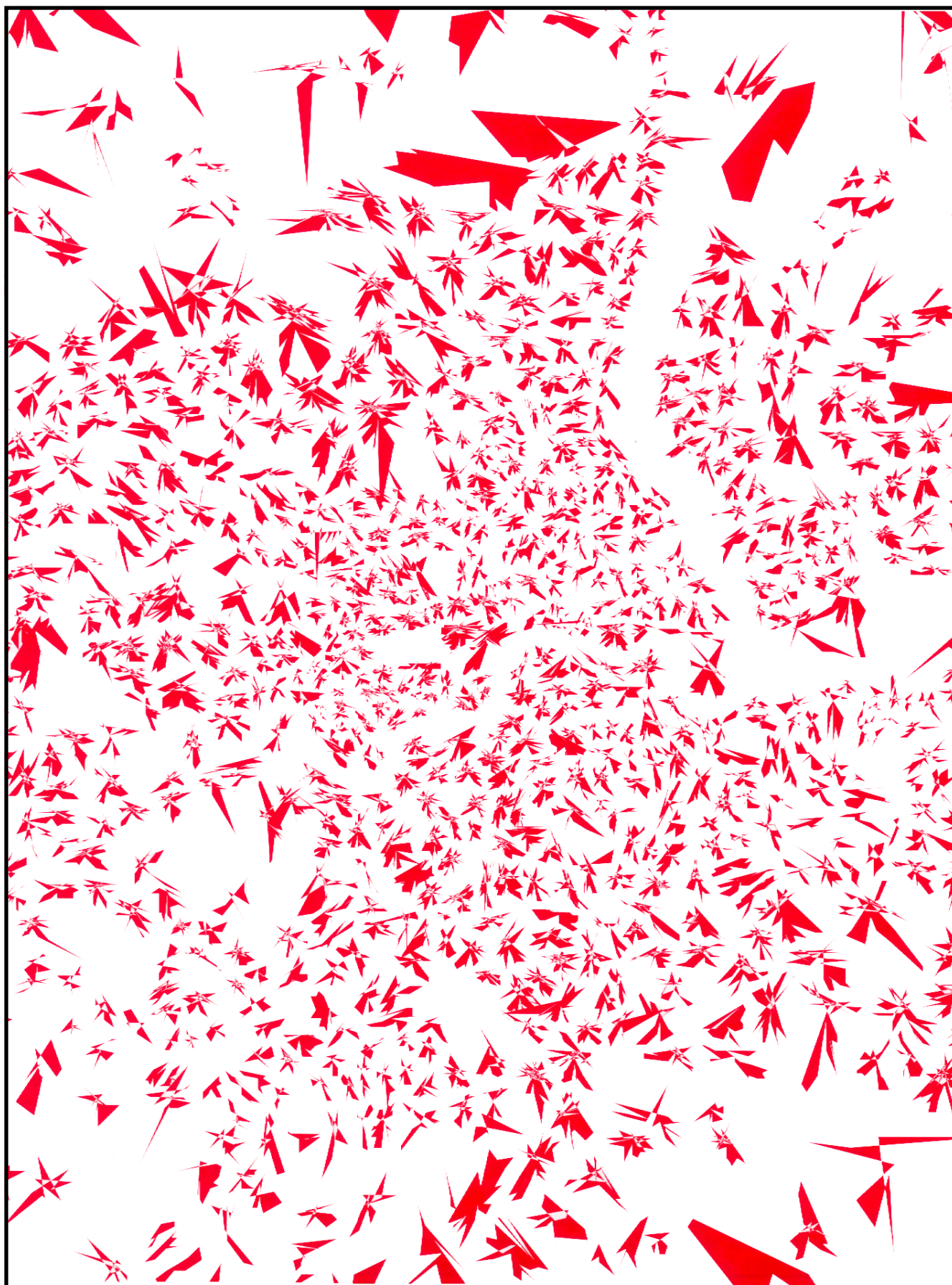


Figure 19d The allocation of 1991 Enumeration districts to 1981 Census wards

Inset of Central London, 100x Magnification of Figure 19a



The first of these 1981 wards was calculated by assigning each 1991 ED to the 1981 ward containing the 1991 ED whose centroid was geographically closest to the 1991 ED centroid grid reference. This method makes use of the centroids of 1981 EDs, which were obtained from the 1981 OPCS Area Master File. This nearest neighbour method was used because it is independent of the digitised 1981 ward boundaries, and hence can be compared with the ward allocation described in the next paragraph (which is dependent upon the ward boundaries) to highlight any ward boundary errors in the 1981 data.

The second possible 1981 ward allocation was calculated by taking the grid reference of each 1991 ED centroid and the digitised 1981 ward boundary data, and using the Point-In-Polygon algorithm to determine in which 1981 ward each 1991 ED fell. This method relies on both the ED grid references being accurate and on the 1981 ward boundary data being accurate.

The third method does not assign a 1981 ward to every 1991 ED as it is derived from the comparable 1981 ED data, which does not exist for those 1991 EDs without an exact 1981 equivalent (only 21.6 per cent of 1991 EDs had an exact equivalent 1981 ED, according to the first release of SAS files). This is the only case where it is known for sure that all of a 1991 ED is encompassed by a single ward in 1981.

The GIS package was then used to produce a map which superimposed the 1991 ED centroids onto the digitised 1981 ward boundaries. The 1991 EDs were represented as dots of various colours, the colour depending upon the relationship between the alternative ward allocations for each 1991 ED. At this stage of the study corrections to the 1991 ED centroid grid references were released. These changes were incorporated into the lookup files.

An additional check was performed to find those EDs which were in different districts in the two Census years, 1981 and 1991, by highlighting them on on-screen maps. All these cases were then identified manually using the appendices to the 1991 Census County Reports to check that the district boundary had indeed changed as the new allocation of districts suggested.

Although an algorithm was capable of highlighting the majority of EDs which were misallocated, the high degree of uncertainty as to the reasons for these misallocations meant that it was impractical to write a computer program to deduce what precisely was wrong at each of these EDs, and hence correct them. For example, an ED positioned in the sea could be assumed to be in the wrong position, but it was far from obvious where it should be located if the grid reference revisions did not include it and it had no comparable 1981 ED. Similarly, an ED positioned in a different 1981 district to its 1991 district, could, in the absence of district boundary changes, be assumed to be in the wrong position, but finding its correct position was not such a simple matter. This meant that a very large number of EDs had to be examined and

relocated manually, 2,123 EDs in total (see Atkins *et al.* 1993).

In order to simplify this task, a GIS system was designed which allowed the user to pinpoint the exact location of particular EDs and examine the neighbouring EDs. Certain coloured EDs, within the on-screen environment, represented conflicts between the three lookup files and, as such, merited further investigation. Using the GIS system the entire country was manually checked, county by county, with all 'ambiguous' EDs being examined in detail.

A similar lookup file from 1991 OAs to 1981 Part Postcode Sectors (PPSs) was produced for Scotland. This proved a great deal simpler, as there already existed an implicit link between the 1981 and 1991 Censuses in the naming scheme which GRO (Scotland) used for the 1991 OAs. This allowed the 1981 PPS to be deduced from the 1991 OA code. The 1991 OA codes and grid reference data were extracted from the headers of the 10 per cent and 100 per cent OA-level SAS file, as in the case of England and Wales. The one complication in Scotland was that 10 new PPS codes had been created since 1981, these cases were examined more closely and eventually allocated to 1981 PPS's based on their grid reference positions. Finally, after including the grid reference corrections, a number of checks were carried out to ensure none of the new grid references were significantly wrong, then the lookup file was used to create 1991 SAS files for Scotland, aggregated to the 1981 PPS-level.

One of the checks involved the use of a new, even higher resolution Census geography. Because of an interest in census statistics based on postcode geography, OPCS produced a file which links postcodes to census geography, this is referred to as the Postcode ED (PCED) File. Amongst other data it contains, for each unit postcode: its grid reference, the 1991 ED which contains it and its population (in households). Where a unit postcode is split between two or more 1991 EDs there is an entry for each part unit postcode.

The data in the PCED file was used to produce a population weighted centroid for each 1991 ED in England and Wales. However, the PCED file also suffered from problems of inaccuracy, such as the occasional transposition of digits in grid references. As with the original ED centroids, the GIS package was used to allocate these new 1991 ED centroids to 1981 wards, again using the PIP algorithm. This resulted in yet another 1991 ED to 1981 ward lookup file, which could be used as a fourth independent check on the accuracy of the Census geography.

A.4 Integration of the Lookup Files

At this stage there existed four independent lookup files: one based on the comparable 1981 EDs, another on the point in polygon allocation of 1981 wards from 1991

ED grid references, another from the independent postcode based ED grid-references and another from the allocation of 1991 EDs to their nearest neighbouring 1981 ED's wards. Additional to this information were the lists of districts within which wards had not had boundary changes.

The choice of which of the ward allocations to 'trust' depended upon the amount of corroboration between them. For example, if all four indicated that a particular 1991 ED should be allocated to the same 1981 ward then any lookup could be used. If, however, there was some disagreement, then which, if any, lookups agreed and which lookups' ward suggestions were geographically adjacent were investigated. An additional consideration was the inherent reliability, or not, of the various lookup files, which was dependent upon the method of derivation of each. This allocation process incorporated comments made by the GIS operator who had visually inspected all the problematic allocations.

Inevitably there were situations where the uncertainty was too high to automatically allocate any particular lookup file's ED to a 1981 ward. The derivation flags associated with these situations were identified and then all 1991 EDs which were assigned these derivation flags were again checked manually, making use of the GIS system described above. The number of EDs which were checked manually at this stage was 2,584 (higher than before as new inconsistencies were brought to light through the use of the PCED file).

Again a check was performed on the Master Lookup to ensure that all EDs were either allocated to the same district in both 1981 and 1991, or that any change could be explained by changes in district boundaries. The checking was performed manually by referring to the appendices of the OPCS 1991 Census County Reports which contain details of all district boundary changes.

The majority of the districts of Britain underwent very few or no ward boundary changes between the 1981 and 1991 Censuses (in fact 75 per cent of English and Welsh districts had no ward boundary changes). Bearing this in mind a check was made to ensure one to one matching of wards in these unchanged districts. This was also a check upon the process as well as a check on the lists of wards which were thought to have been unchanged. In areas which had not had ward boundary changes all 1991 EDs belonging to one 1991 ward should be assigned to the same 1981 ward, if this did not occur it might suggest a systematic bias from the method described above. In practise no systematic bias could be found, although a few anomalies were identified. For instance, although there may not have been any ward boundary changes within a district, the boundaries of the district itself could have been changed between 1981 and 1991 and as ward and district boundaries are coincident at the district border, so some ward boundaries will have changed and the allocation of enumeration districts needed to take account of these changes.

The 1981 *Census User Guide 149* (revised to include changes up to the end of 1990) was used to produce a list of those districts with no internal ward boundary changes. Then for every ward it was determined whether or not it appeared to overlap a district boundary (this could result only from a district boundary change or an error in the 1981 ward allocations to polygons or in the polygon's grid references). Where wards are entirely contained within a district which appears in the unchanged-district list, one-to-one matching of 1991 and 1981 wards is ensured. Where old wards do appear to cross new district boundaries, an attempt was made to match each instance to a district boundary change order listed in the *User Guide* and from the Appendices of the 1991 *Census County Reports*.

Following this work, a parliamentary constituency check was carried out to see which wards have changed Parliamentary Constituency Area (PCA). The data for this check was extracted from the Area Master Files (AMF) from both the 1981 and 1991 censuses. These were produced by the OPCS and contain amongst other data the PCA for every ED and ward in England and Wales.

For every 1991 ED a PCA was extracted from the 1991 AMF, and a PCA for the 1981 ward to which that 1991 ED had been allocated, was extracted from the 1981 AMF. Where these two PCAs were not identical, or not geographically adjacent, the ED's allocation to a 1981 ward was examined in detail. This check uncovered no new errors, but did highlight Milton Keynes as an area which has undergone PCA boundary changes, and which was not split into two constituencies in the 1981 AMF.

As an additional check on the accuracy of the 1981 ward allocations, a Functional Region Zone (FRZ) check was performed (FRZs form the basis upon which CURDS Local Labour Markets were constructed). FRZs are defined in terms of 1981 wards, and in this check each 1991 ED was allocated to a FRZ according to its 1981 ward allocation. The FRZ areas arrived at in this manner were then manually checked against paper maps of the 1981 FRZ boundaries, and the 1991 ward boundaries. No new errors were uncovered by this process.

As a penultimate check the distances between 'consecutive' EDs within each ward were calculated. Those cases where the separation was above 5km (in England and Wales) or 10km (in Scotland) were investigated further. This check uncovered a large number of minor grid reference errors (which do not affect the 1981 ward allocation), and also a few major grid reference errors that had not previously been detected – for instance, those EDs that had been allocated on the basis of their comparable 1981 ED, for which an accurate grid reference was not originally required.

The final stage of the refinement of the lookup file, before it was used to produce SAS files, was the production of ward polygon maps which connect the centroids of 1991

EDs clockwise within each 1981 ward thus representing each ward as a many pointed star (see Figure 19, produced from the final lookup data). These pictures are effective at showing large scale errors such as a transposition of high order digits in grid references, as they would appear as lines crossing many other wards.

A.5 SAS Files

The production of the 10 per cent and 100 per cent SAS files aggregated to the 1981 ward level involved yet another computer program. This program proceeds through the country, county by county, summing all data from those 1991 EDs allocated to each 1981 ward. In the few cases where 1981 county boundaries moved across 1991 EDs, the ED data is kept in an overflow file until it can be added to the appropriate wards' data in the remaining counties. The new importing/exporting flag was derived by declaring a 1981 ward as importing/exporting if one or more of its component 1991 EDs was importing or exporting. Similarly, the threshold indicators were transposed from the EDs to the ward level.

Nationally the statistics of roughly 30,000 people who were present in special EDs which were below the thresholds were omitted from the original enumeration district level data and hence could not be included in the

new ward level SAS files. As a terminal check on the accuracy of the allocation, ward population change statistics were calculated from these new files, and the wards gaining or losing the most people were examined to verify that the lookup file was correct.

Similarly, approximately 200,000 people who were visitors to households on census night, could not be included as their (usual resident) addresses could not be determined and they are not included as residents in the conventional 1991 ED or ward SAS files. The population present, usual residents and total household counts in the header lines of the original ED files were transferred to the header lines of these new SAS files and used in this study.

A word of warning should be included here concerning the possible problem of the aggregation process exacerbating 'blurring' errors (see Cole, 1993). 'blurring' – the process of adding ± 1 at random to data for confidentiality reasons – can result in cumulative errors upon aggregation where many counts are 0, as they can only be altered to +1, not -1. In a perverse way this compensates oddly for the population removed from some special EDs which failed to meet their thresholds, although this compensation is in different places geographically.

Appendix B Summary table of population density and distribution in Britain 1971, 1981 and 1991

- 1) 1981 boundaries of districts are being used although both 1991 and 1981 district names are given.
 2) 1971 population count is of residents present in households and establishments.
 3) 1981 population count is of all usual residents (1981 base).
 4) 1991 population count is of all usual residents (1991 base) – best comparison with 1981.
 5) Sensitivity statistic is the difference in conventional density change 1981-91 using usually resident and present population definitions.

	Population Weighted Density (PWD)						Conventional Density						Density Ratios			Sensitivity
	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-1991	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-91	% by which PWD> Conv. in 1991	Absolute difference	81-91 change PWD/ Conv.	See note 5
Britain	14.96	13.48	13.21	-9.93	-2.03	-11.76	2.28	2.33	2.38	1.89	2.50	4.43	453.70	10.82	-0.81	2.72
England	16.72	15.19	14.99	-9.13	-1.34	-10.35	3.44	3.51	3.61	2.10	2.81	4.97	315.52	11.38	-0.48	2.76
Wales	6.58	6.26	6.22	-4.83	-0.65	-5.45	1.28	1.32	1.37	3.55	3.10	6.76	355.80	4.86	-0.21	2.40
Scotland	8.63	6.90	6.13	-20.10	-11.04	-28.93	0.64	0.64	0.63	-0.82	-0.71	-1.52	868.80	5.50	15.60	2.53
District Types:-																
Inner London Boroughs	102.88	85.35	87.66	-17.04	2.71	-14.79	90.42	75.53	77.99	-16.47	3.25	-13.75	12.41	9.68	0.83	9.45
Outer London Boroughs	43.19	40.84	40.79	-5.44	-0.12	-5.55	34.45	33.26	33.20	-3.45	-0.18	-3.63	22.87	7.59	0.63	3.72
Principal Metropolitan Cities	42.74	35.52	32.63	-16.89	-8.13	-23.65	27.26	24.16	22.60	-11.36	-6.46	-17.09	44.40	10.03	1.26	2.16
Other Metropolitan Cities	22.16	20.72	19.92	-6.53	-3.85	-10.13	12.61	12.52	12.26	-0.72	-2.05	-2.76	62.50	7.66	1.87	1.98
Large Non-metropolitan Cities	37.11	33.35	32.51	-10.14	-2.53	-12.41	21.31	20.47	20.26	-3.92	-1.06	-4.94	60.48	12.25	2.37	1.91
Small Non-metropolitan Cities	24.42	22.40	22.00	-8.26	-1.82	-9.92	2.89	2.89	2.95	-0.16	2.26	2.09	644.43	19.04	-0.80	0.53
Districts with Industrial Areas	10.79	10.58	10.58	-1.96	-0.02	-1.98	2.85	2.96	3.01	3.99	1.63	5.68	251.35	7.57	-0.01	2.15
Districts with New Towns	11.51	12.57	12.92	9.18	2.83	12.27	3.38	3.92	4.20	15.82	7.14	24.09	207.71	8.72	0.40	2.37
Resorts, Ports and Retirement Districts	11.72	11.61	12.30	-0.96	6.00	4.98	2.90	3.11	3.37	7.50	8.31	16.43	264.94	8.93	0.72	2.78
Urban & Mixed Urban/Rural Districts	6.81	7.14	7.49	4.83	5.03	10.11	2.02	2.22	2.36	9.79	6.14	16.53	218.08	5.14	0.82	2.78
Remoter Mainly Rural Districts	1.48	1.65	1.82	11.82	9.99	22.99	0.42	0.47	0.51	12.07	9.10	22.27	257.06	1.31	1.10	2.72
County/Scot. Region:-																
District:-																
Greater London	61.18	53.53	54.34	-12.51	1.52	-11.18	45.83	41.86	42.31	-8.67	1.08	-7.69	28.45	12.03	1.42	5.84
City of London	17.56	34.86	38.17	98.51	9.50	117.37	11.85	17.09	15.06	44.25	-11.89	27.09	153.42	23.11	-0.80	15.97
Camden	98.27	82.20	87.39	-16.35	6.31	-11.07	88.53	74.31	78.62	-16.07	5.80	-11.20	11.16	8.77	1.09	9.72
Hackney	120.61	97.44	98.67	-19.21	1.26	-18.19	112.26	92.35	93.23	-17.73	0.96	-16.95	5.83	5.44	1.32	10.75
Hammersmith and Fulham	128.57	101.63	104.32	-20.95	2.64	-18.86	112.11	89.49	91.89	-20.18	2.69	-18.03	13.52	12.42	0.98	9.91
Haringey	83.24	71.03	70.81	-14.67	-0.31	-14.93	77.33	66.77	66.62	-13.65	-0.22	-13.84	6.29	4.19	1.40	8.16
Islington	132.51	107.62	112.60	-18.78	4.63	-15.03	130.31	105.65	110.45	-18.92	4.55	-15.24	1.94	2.15	1.02	8.29
Kensington and Chelsea	150.14	110.84	122.05	-26.17	10.11	-18.71	142.18	104.74	115.14	-26.34	9.93	-19.02	6.01	6.91	1.02	18.97
Lambeth	115.51	93.23	92.90	-19.29	-0.35	-19.57	110.38	89.73	89.98	-18.71	0.28	-18.48	3.25	2.92	-1.25	10.90
Lewisham	78.16	67.62	67.76	-13.49	0.21	-13.31	76.13	66.31	66.45	-12.90	0.21	-12.71	1.97	1.31	0.96	7.06
Newham	81.95	76.65	72.59	-6.46	-5.29	-11.41	63.59	57.19	58.02	-10.06	1.45	-8.76	25.12	14.58	-3.64	5.66
Southwark	100.03	83.34	85.02	-16.68	2.02	-15.00	88.74	72.85	75.91	-17.91	4.20	-14.46	12.01	9.11	0.48	10.30
Tower Hamlets	90.75	76.74	88.65	-15.44	15.52	-2.32	80.71	70.21	80.77	-13.01	15.05	0.09	9.75	7.87	1.03	7.76
Wandsworth	91.97	79.20	79.40	-13.88	0.25	-13.67	83.60	72.15	72.20	-13.70	0.07	-13.63	9.96	7.19	3.36	6.25

Appendix B - continued

	Population Weighted Density (PWD)						Conventional Density						Density Ratios			Sensitivity
	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-1991	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-91	% by which PWD> Conv. in 1991	Absolute difference	81-91 change PWD/ Conv.	See note 5
Greater London - <i>continued</i>																
Westminster, City of	117.16	97.85	102.92	-16.48	5.18	-12.16	94.09	75.91	80.97	-19.32	6.66	-13.94	27.11	21.95	0.78	13.65
Barking and Dagenham	50.69	48.13	46.79	-5.05	-2.79	-7.70	46.34	43.43	41.89	-6.28	-3.56	-9.61	11.70	4.90	0.78	2.50
Barnet	37.46	36.12	36.64	-3.57	1.44	-2.18	33.26	32.48	32.86	-2.35	1.16	-1.21	11.51	3.78	1.24	4.34
Bexley	40.07	38.77	38.73	-3.26	-0.10	-3.36	35.37	35.29	35.50	-0.22	0.59	0.37	9.10	3.23	-0.16	2.36
Brent	71.04	62.54	59.75	-11.97	-4.46	-15.90	61.98	56.74	54.88	-8.46	-3.27	-11.45	8.87	4.87	1.36	6.75
Bromley	26.90	25.95	25.63	-3.53	-1.25	-4.74	19.65	19.42	19.16	-1.18	-1.33	-2.49	33.76	6.47	0.94	3.26
Croydon	45.88	42.94	42.58	-6.40	-0.85	-7.19	37.84	36.51	36.19	-3.50	-0.88	-4.35	17.65	6.39	0.96	4.17
Ealing	58.26	54.47	53.49	-6.50	-1.80	-8.18	53.16	50.21	49.60	-5.55	-1.23	-6.71	7.86	3.90	1.46	4.13
Enfield	42.62	41.27	42.47	-3.17	2.90	-0.36	32.54	31.72	31.76	-2.50	0.10	-2.40	33.73	10.71	28.38	3.20
Greenwich	52.31	49.40	48.62	-5.56	-1.58	-7.05	44.74	44.23	43.76	-1.14	-1.06	-2.19	11.10	4.86	1.49	3.80
Harrow	44.48	43.32	43.94	-2.62	1.45	-1.21	39.11	38.55	39.32	-1.44	2.01	0.54	11.76	4.62	0.72	2.86
Havering	26.63	26.35	25.34	-1.08	-3.83	-4.86	20.81	20.37	19.50	-2.10	-4.29	-6.31	29.96	5.84	0.89	2.23
Hillingdon	27.49	26.63	27.11	-3.12	1.81	-1.37	20.84	20.55	21.03	-1.41	2.36	0.92	28.92	6.08	0.77	2.98
Hounslow	38.71	37.65	38.55	-2.74	2.39	-0.41	34.49	34.05	34.98	-1.29	2.74	1.42	10.21	3.57	0.87	4.85
Kingston upon Thames	43.47	41.05	41.36	-5.58	0.76	-4.86	36.78	35.06	35.53	-4.68	1.34	-3.40	16.41	5.83	0.57	2.49
Merton	51.24	48.06	49.21	-6.21	2.39	-3.97	46.13	43.54	44.43	-5.62	2.04	-3.69	10.76	4.78	1.17	4.06
Redbridge	48.14	45.24	46.12	-6.03	1.95	-4.20	41.62	39.83	40.10	-4.30	0.66	-3.66	15.02	6.02	2.94	2.95
Richmond Upon Thames	37.21	34.00	34.98	-8.63	2.89	-5.99	30.99	28.69	29.31	-7.43	2.18	-5.41	19.34	5.67	1.33	4.68
Sutton	45.07	44.93	45.39	-0.33	1.03	0.70	38.33	38.66	38.97	0.87	0.80	1.67	16.48	6.42	1.30	3.44
Waltham Forest	64.32	58.92	58.46	-8.40	-0.78	-9.11	58.44	54.14	53.49	-7.37	-1.19	-8.47	9.29	4.97	0.65	4.64
Greater Manchester	28.81	25.89	24.80	-10.11	-4.24	-13.93	20.90	20.03	19.44	-4.15	-2.95	-6.98	27.57	5.36	1.44	2.47
Bolton	24.29	23.13	22.38	-4.81	-3.23	-7.88	18.38	18.62	18.51	1.35	-0.63	0.71	20.93	3.87	5.11	1.90
Bury	19.62	19.68	19.74	0.35	0.27	0.62	17.42	17.79	17.92	2.11	0.75	2.88	10.12	1.81	0.36	2.47
Manchester	51.40	41.91	39.01	-18.46	-6.93	-24.11	45.44	37.76	34.93	-16.90	-7.49	-23.13	11.67	4.08	0.92	3.29
Oldham	27.62	25.51	24.65	-7.65	-3.36	-10.75	15.75	15.59	15.38	-1.01	-1.34	-2.33	60.30	9.27	2.51	2.09
Rochdale	18.70	17.75	17.12	-5.06	-3.58	-8.46	12.62	12.92	12.66	2.37	-2.02	0.31	35.25	4.46	1.77	3.06
Salford	38.17	30.82	28.16	-19.25	-8.66	-26.24	28.54	24.94	22.77	-12.62	-8.72	-20.24	23.67	5.39	0.99	1.76
Stockport	27.61	27.03	26.55	-2.11	-1.78	-3.86	22.91	22.98	22.62	0.32	-1.59	-1.27	17.36	3.93	1.12	2.47
Tameside	25.64	24.60	24.42	-4.07	-0.71	-4.74	21.02	20.81	20.75	-1.00	-0.28	-1.28	17.69	3.67	2.50	2.44
Trafford	27.84	26.89	25.89	-3.40	-3.74	-7.01	21.26	20.92	20.13	-1.62	-3.74	-5.30	28.58	5.75	1.00	3.01
Wigan	18.61	18.49	18.27	-0.68	-1.18	-1.85	15.11	15.49	15.43	2.56	-0.39	2.16	18.37	2.84	3.03	1.65
Merseyside	35.51	30.68	28.57	-13.58	-6.89	-19.54	24.76	22.94	21.42	-7.35	-6.62	-13.48	33.36	7.15	1.04	2.08
Knowsley	27.39	23.75	21.60	-13.29	-9.03	-21.13	19.77	17.79	15.64	-10.02	-12.08	-20.89	38.10	5.96	0.75	1.51
Liverpool	60.03	50.11	45.92	-16.53	-8.35	-23.50	52.39	44.67	40.13	-14.73	-10.18	-23.41	14.45	5.80	0.82	1.68
St Helens	20.02	18.91	17.66	-5.56	-6.58	-11.78	13.97	14.15	13.37	1.30	-5.54	-4.31	32.12	4.29	1.19	1.80
Sefton	27.50	25.39	24.48	-7.68	-3.57	-10.98	19.90	19.54	18.98	-1.77	-2.91	-4.63	29.00	5.50	1.23	2.65
Wirral	28.58	26.12	25.20	-8.60	-3.54	-11.84	21.96	21.33	20.81	-2.87	-2.41	-5.22	21.07	4.39	1.47	2.59
South Yorkshire	16.93	15.54	14.57	-8.24	-6.25	-13.97	8.34	8.28	8.09	-0.67	-2.28	-2.93	79.98	6.47	2.75	1.56
Barnsley	12.52	11.98	11.58	-4.34	-3.34	-7.54	6.80	6.82	6.73	0.29	-1.32	-1.04	71.97	4.84	2.52	1.83
Doncaster	9.14	8.75	8.44	-4.32	-3.59	-7.75	4.76	4.93	4.96	3.53	0.67	4.23	70.11	3.48	-5.33	2.11
Rotherham	11.74	11.83	11.81	0.73	-0.09	0.64	8.54	8.88	8.92	3.98	0.51	4.51	32.42	2.89	-0.18	2.10
Sheffield	30.34	26.91	24.54	-11.32	-8.81	-19.13	15.24	14.45	13.65	-5.14	-5.58	-10.44	79.79	10.89	1.58	0.87

Appendix B - continued

	Population Weighted Density (PWD)						Conventional Density						Density Ratios			Sensitivity
	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-1991	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-91	% by which PWD> Conv. in 1991	Absolute difference	81-91 change PWD/ Conv.	See note 5
Tyne and Wear	31.81	28.32	26.94	-10.97	-4.88	-15.31	21.94	20.98	20.23	-4.39	-3.55	-7.79	33.14	6.71	1.37	1.06
Gateshead	25.09	21.95	20.03	-12.51	-8.78	-20.20	15.48	14.67	13.89	-5.19	-5.38	-10.29	44.23	6.14	1.63	1.38
Newcastle upon Tyne	38.73	34.29	33.10	-11.47	-3.47	-14.54	26.65	24.36	23.17	-8.61	-4.90	-13.09	42.87	9.93	0.71	0.04
North Tyneside	30.46	27.78	26.74	-8.82	-3.72	-12.21	24.29	23.53	22.91	-3.15	-2.61	-5.68	16.71	3.83	1.42	1.80
South Tyneside	36.54	32.50	30.45	-11.04	-6.32	-16.67	27.38	25.17	24.32	-8.07	-3.38	-11.18	25.19	6.13	1.87	1.78
Sunderland	29.55	26.76	25.87	-9.43	-3.35	-12.46	20.92	21.32	20.95	1.93	-1.72	0.18	23.45	4.91	1.94	0.90
West Midlands	38.28	35.60	34.18	-7.00	-3.99	-10.71	30.60	29.22	28.37	-4.48	-2.92	-7.27	20.47	5.81	1.37	2.29
Birmingham	45.89	41.58	39.89	-9.38	-4.07	-13.07	40.84	37.74	36.40	-7.58	-3.55	-10.86	9.58	3.49	1.15	3.29
Coventry	39.37	36.60	34.57	-7.04	-5.55	-12.20	34.01	32.10	30.46	-5.61	-5.10	-10.43	13.50	4.11	1.09	0.89
Dudley	30.70	31.30	31.96	1.96	2.09	4.09	29.63	30.47	31.10	2.84	2.04	4.94	2.77	0.86	1.02	1.65
Sandwell	40.62	38.01	35.78	-6.43	-5.88	-11.93	38.24	35.86	33.89	-6.23	-5.51	-11.40	5.58	1.89	1.07	1.93
Solihull	23.64	22.28	20.98	-5.73	-5.83	-11.22	10.55	10.98	11.09	4.07	0.97	5.08	89.20	9.89	-5.99	2.82
Walsall	28.18	27.44	26.95	-2.62	-1.79	-4.36	25.62	25.10	24.49	-2.05	-2.42	-4.42	10.05	2.46	0.74	1.73
Wolverhampton	40.46	38.05	36.28	-5.94	-4.66	-10.33	38.48	36.57	35.08	-4.98	-4.07	-8.85	3.42	1.20	1.15	1.38
West Yorkshire	16.72	15.75	15.38	-5.82	-2.30	-7.99	9.96	9.93	9.89	-0.31	-0.40	-0.70	55.61	5.50	5.81	1.84
Bradford	21.31	20.28	20.09	-4.84	-0.92	-5.71	12.26	12.30	12.39	0.36	0.69	1.06	62.18	7.70	-1.33	2.16
Calderdale	10.67	10.10	10.03	-5.34	-0.69	-5.99	5.30	5.23	5.27	-1.35	0.66	-0.70	90.40	4.76	-1.04	2.53
Kirklees	13.98	13.61	13.53	-2.61	-0.58	-3.18	8.90	9.04	9.11	1.57	0.69	2.26	48.63	4.43	-0.84	1.44
Leeds	20.40	18.40	17.51	-9.81	-4.81	-14.15	12.83	12.41	12.12	-3.28	-2.30	-5.50	44.49	5.39	2.09	1.72
Wakefield	11.90	11.98	11.87	0.66	-0.88	-0.22	8.94	9.32	9.35	4.25	0.33	4.60	27.00	2.52	-2.66	1.70
Avon	21.32	20.13	20.17	-5.59	0.19	-5.41	6.51	6.69	6.93	2.75	3.52	6.37	191.13	13.24	0.05	2.53
Bath	32.43	31.11	31.50	-4.05	1.23	-2.86	28.06	27.28	27.53	-2.78	0.94	-1.87	14.40	3.97	1.32	1.04
Bristol	43.29	39.83	39.02	-8.00	-2.03	-9.86	37.83	35.13	34.33	-7.13	-2.27	-9.24	13.65	4.69	0.89	2.56
Kingswood	30.53	30.27	32.17	-0.86	6.27	5.36	16.09	17.61	18.77	9.45	6.59	16.66	71.35	13.39	0.95	2.73
Northavon	6.52	7.63	7.86	16.94	3.00	20.45	2.19	2.54	2.83	16.24	11.20	29.25	177.61	5.03	0.27	2.55
Wansdyke	4.76	5.45	5.68	14.39	4.23	19.23	2.18	2.35	2.47	8.16	5.13	13.70	129.55	3.21	0.82	1.88
Woodspring	8.10	9.67	11.43	19.43	18.22	41.19	3.57	4.27	4.73	19.75	10.68	32.54	141.89	6.70	1.71	3.38
Bedfordshire	13.29	13.39	14.29	0.73	6.76	7.54	3.70	4.07	4.25	10.00	4.37	14.80	236.28	10.04	1.55	2.92
Luton	43.09	41.10	43.10	-4.62	4.86	0.02	37.19	37.76	39.72	1.55	5.18	6.81	8.50	3.37	0.94	3.81
Mid Bedfordshire	2.56	3.01	3.36	17.55	11.76	31.38	1.75	2.02	2.18	15.61	8.11	24.98	53.95	1.18	1.45	2.67
North Bedfordshire	10.75	11.33	11.32	5.42	-0.10	5.31	2.56	2.77	2.82	8.19	1.84	10.19	301.64	8.50	-0.05	2.20
South Bedfordshire	10.74	12.25	14.39	14.06	17.44	33.96	4.08	4.99	5.13	22.51	2.66	25.77	180.63	9.26	6.55	2.69
Berkshire	14.26	14.84	15.48	4.04	4.32	8.53	4.86	5.33	5.85	9.63	9.61	20.17	164.78	9.63	0.45	3.08
Bracknell Forest (was Bracknell)	11.67	16.02	16.72	37.26	4.38	43.28	5.63	7.42	8.76	31.85	18.13	55.76	90.81	7.96	0.24	3.77
Newbury	3.52	4.72	5.38	34.19	13.97	52.94	1.42	1.70	1.96	19.34	15.07	37.32	175.06	3.43	0.93	2.54
Reading	36.37	35.15	34.33	-3.35	-2.35	-5.63	33.08	32.45	31.95	-1.92	-1.54	-3.43	7.45	2.38	1.53	2.41
Slough	38.34	37.00	38.45	-3.49	3.91	0.28	36.22	35.36	36.95	-2.38	4.50	2.01	4.05	1.50	0.87	3.06
Windsor and Maidenhead	11.31	11.63	11.43	2.80	-1.69	1.06	6.07	6.55	6.71	7.83	2.49	10.52	70.46	4.73	-0.68	2.69
Wokingham	9.23	10.51	13.76	13.83	30.92	49.02	5.45	6.31	7.77	15.82	23.13	42.61	77.08	5.99	1.34	4.39

Appendix B - continued

	Population Weighted Density (PWD)						Conventional Density						Density Ratios			Sensitivity
	pers/hctr	pers/hctr	pers/hctr	% change	% change	% change	pers/hctr	pers/hctr	pers/hctr	% change	% change	% change	% by which PWD> Conv. in 1991	Absolute difference	81-91 change PWD/ Conv.	See note 5
	1971	1981	1991	1971-81	1981-91	1971-1991	1971	1981	1991	1971-81	1981-91	1971-91				
Buckinghamshire	6.33	7.29	8.16	15.22	11.93	28.97	2.46	2.99	3.37	21.54	12.84	37.14	142.27	4.79	0.93	3.32
Aylesbury Vale	3.44	4.18	4.61	21.40	10.32	33.92	1.22	1.45	1.61	18.89	11.59	32.67	185.45	2.99	0.89	3.21
Chiltern	7.10	7.33	7.31	3.25	-0.36	2.87	4.28	4.57	4.56	6.82	-0.09	6.73	60.13	2.74	4.21	3.38
Milton Keynes	7.00	9.85	12.82	40.66	30.14	83.05	2.13	3.98	5.69	87.23	43.01	167.76	125.31	7.13	0.70	3.91
South Bucks	4.97	5.16	5.23	3.72	1.46	5.24	4.15	4.27	4.33	2.93	1.24	4.21	20.87	0.90	1.18	3.96
Wycombe	10.04	10.52	10.63	4.83	1.08	5.96	4.35	4.78	4.88	9.79	2.14	12.14	117.99	5.76	0.50	2.66
Cambridgeshire	4.26	4.75	5.28	11.54	11.13	23.96	1.42	1.67	1.90	18.01	13.55	33.99	178.27	3.38	0.82	2.03
Cambridge	26.34	26.43	27.59	0.33	4.40	4.75	21.35	21.42	22.58	0.31	5.44	5.76	22.19	5.01	0.81	-6.06
East Cambridgeshire	0.81	0.92	1.03	13.59	11.63	26.79	0.72	0.82	0.92	13.91	13.11	28.84	11.43	0.11	0.89	2.69
Fenland	2.68	2.77	3.07	3.09	11.00	14.44	1.16	1.22	1.37	4.85	12.84	18.31	123.50	1.70	0.86	2.77
Huntingdonshire (was Huntingdon)	2.56	3.23	3.73	26.30	15.46	45.82	1.02	1.33	1.56	30.44	17.02	52.64	139.76	2.17	0.91	3.53
Peterborough	11.12	13.25	15.20	19.12	14.75	36.70	3.11	3.96	4.61	27.34	16.30	48.10	229.82	10.59	0.91	4.09
South Cambridgeshire	1.32	1.66	1.91	25.17	15.27	44.29	0.96	1.19	1.35	22.99	13.43	39.50	41.80	0.56	1.14	3.58
Cheshire	11.61	11.51	11.55	-0.84	0.39	-0.46	3.64	3.95	4.10	8.59	3.80	12.71	181.64	7.45	0.10	2.62
Chester	10.31	8.99	8.57	-12.88	-4.59	-16.88	2.50	2.54	2.58	1.67	1.24	2.92	232.91	6.00	-3.70	2.43
Congleton	7.02	7.94	9.02	13.15	13.52	28.45	3.27	3.75	4.01	14.48	7.06	22.57	124.89	5.01	1.91	1.84
Crewe and Nantwich	11.42	10.45	9.84	-8.50	-5.82	-13.82	2.21	2.26	2.40	2.43	5.99	8.57	310.18	7.44	-0.97	2.26
Ellesmere Port and Neston	19.50	19.05	18.45	-2.33	-3.14	-5.41	8.89	9.50	9.35	6.90	-1.63	5.16	97.30	9.10	1.93	2.36
Halton	23.43	23.42	23.41	-0.05	-0.05	-0.09	12.96	16.55	16.80	27.72	1.52	29.66	39.33	6.61	-0.03	1.92
Macclesfield	8.90	9.37	9.59	5.20	2.34	7.66	2.61	2.84	2.90	8.87	1.87	10.91	230.78	6.69	1.25	3.55
Vale Royal	6.03	6.08	6.30	0.84	3.57	4.44	2.73	2.90	2.99	6.40	3.00	9.59	110.66	3.31	1.19	2.83
Warrington	15.62	14.67	14.74	-6.09	0.53	-5.60	9.02	9.48	10.36	5.14	9.29	14.91	42.30	4.38	0.06	3.03
Cleveland	24.71	21.65	19.87	-12.37	-8.25	-19.60	9.38	9.50	9.24	1.27	-2.75	-1.52	115.11	10.63	3.00	1.45
Hartlepool	31.93	27.62	25.69	-13.49	-6.99	-19.53	10.44	10.05	9.62	-3.73	-4.31	-7.88	167.11	16.07	1.62	1.64
Langbaurgh-on-Tees (was Langbaurgh)	11.97	11.17	10.74	-6.71	-3.77	-10.23	5.90	6.15	5.93	4.15	-3.44	0.56	81.06	4.81	1.09	1.82
Middlesbrough	46.60	36.52	32.49	-21.63	-11.02	-30.27	28.72	27.61	26.07	-3.86	-5.60	-9.25	24.64	6.42	1.97	0.27
Stockton on Tees	21.97	21.47	19.49	-2.25	-9.24	-11.28	7.93	8.46	8.56	6.67	1.18	7.93	127.78	10.93	-7.86	2.03
Cornwall and Isles of Scilly	2.60	2.93	3.18	12.71	8.53	22.33	1.02	1.18	1.31	14.93	11.89	28.60	141.94	1.87	0.72	2.96
Caradon	1.77	2.39	2.69	34.85	12.29	51.43	0.78	1.00	1.15	28.71	14.14	46.91	134.30	1.54	0.87	2.71
Carrick	4.64	4.70	4.89	1.16	4.17	5.37	1.44	1.60	1.79	11.03	11.79	24.11	172.92	3.10	0.35	3.47
Kerrier	2.99	3.30	3.61	10.32	9.34	20.63	1.52	1.73	1.85	13.21	7.18	21.33	94.93	1.76	1.30	3.05
North Cornwall	0.98	1.26	1.37	28.31	8.77	39.57	0.46	0.54	0.62	16.74	15.14	34.42	120.64	0.75	0.58	3.54
Penwith	4.31	4.29	4.57	-0.25	6.31	6.04	1.60	1.75	1.95	9.39	11.43	21.89	134.26	2.62	0.55	4.52
Restormel	2.64	3.09	3.50	16.88	13.49	32.64	1.50	1.70	1.91	12.92	12.69	27.25	83.33	1.59	1.06	1.13
Isles of Scilly	1.64	1.63	1.71	-0.26	4.77	4.50	1.13	1.13	1.25	0.11	10.52	10.64	36.49	0.46	0.45	-0.22
Cumbria	4.54	4.44	4.29	-2.40	-3.33	-5.65	0.68	0.69	0.71	2.69	2.43	5.19	503.49	3.58	-1.37	1.97
Allerdale	4.32	4.20	4.14	-2.77	-1.30	-4.04	0.73	0.75	0.76	2.43	1.55	4.01	442.59	3.38	-0.84	1.96
Barrow-in-Furness	16.43	15.59	15.04	-5.08	-3.52	-8.42	9.53	9.38	9.44	-1.60	0.65	-0.96	59.35	5.60	-5.38	2.07
Carlisle	8.78	8.74	7.71	-0.51	-11.83	-12.28	0.95	0.97	0.98	1.40	1.06	2.48	688.40	6.73	-11.13	2.10
Copeland	4.71	4.67	4.57	-0.88	-2.14	-3.00	0.95	0.97	0.97	2.19	-0.23	1.95	371.67	3.60	9.37	2.17
Eden	0.44	0.49	0.55	11.48	11.99	24.85	0.19	0.20	0.21	4.48	7.44	12.25	157.87	0.33	1.61	2.41
South Lakeland	2.18	2.21	2.36	1.41	6.50	8.00	0.55	0.59	0.63	7.76	5.99	14.21	276.71	1.73	1.09	1.63

Appendix B - continued

	Population Weighted Density (PWD)						Conventional Density						Density Ratios			Sensitivity
	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-1991	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-91	% by which PWD> Conv. in 1991	Absolute difference	81-91 change PWD/ Conv.	See note 5
Derbyshire	10.55	10.32	10.51	-2.21	1.86	-0.40	3.32	3.43	3.54	3.47	2.97	6.54	197.22	6.97	0.62	2.04
Amber Valley	7.96	8.31	8.64	4.39	3.88	8.44	3.90	4.12	4.27	5.82	3.65	9.68	102.01	4.36	1.06	1.83
Bolsover	6.83	6.44	6.49	-5.70	0.86	-4.88	4.47	4.40	4.40	-1.65	0.11	-1.54	47.47	2.09	7.69	1.52
Chesterfield	18.54	18.81	19.03	1.45	1.14	2.61	14.54	14.60	14.59	0.40	-0.08	0.31	30.42	4.44	-14.04	2.01
Derby	32.83	30.31	30.19	-7.67	-0.40	-8.04	27.60	27.40	27.96	-0.73	2.04	1.30	7.99	2.23	-0.20	2.51
Derbyshire Dales (was W Derbyshire)	1.50	1.59	1.64	6.03	3.15	9.37	0.79	0.83	0.85	4.42	2.87	7.43	92.79	0.79	1.10	0.87
Erewash	17.12	16.66	17.45	-2.70	4.72	1.89	9.16	9.32	9.64	1.75	3.48	5.29	80.88	7.80	1.36	1.92
High Peak	5.32	5.42	5.61	1.87	3.53	5.46	1.41	1.50	1.58	6.41	4.81	11.53	256.04	4.04	0.73	2.75
North East Derbyshire	6.00	6.73	6.99	12.11	3.88	16.47	3.13	3.47	3.64	10.87	4.86	16.26	91.93	3.35	0.80	2.15
South Derbyshire	3.65	3.97	4.26	8.67	7.31	16.62	1.76	1.99	2.12	12.99	6.60	20.45	100.52	2.13	1.11	1.77
Devon	7.35	7.33	7.60	-0.31	3.66	3.34	1.27	1.38	1.50	8.77	8.82	18.37	405.47	6.10	0.41	2.53
East Devon	2.90	3.32	3.71	14.58	11.80	28.10	1.13	1.27	1.42	12.87	11.57	25.93	161.76	2.30	1.02	2.24
Exeter	25.64	25.61	26.93	-0.14	5.16	5.01	20.13	20.87	22.11	3.72	5.93	9.86	21.79	4.82	0.87	0.87
Mid Devon	1.16	1.38	1.51	18.96	8.82	29.46	0.56	0.63	0.70	11.69	11.74	24.80	113.80	0.80	0.75	2.52
North Devon	2.03	2.20	2.36	8.34	7.31	16.27	0.61	0.70	0.78	15.04	10.76	27.42	202.79	1.58	0.68	3.31
Plymouth	35.53	33.38	33.70	-6.05	0.97	-5.14	28.94	29.98	30.58	3.61	2.00	5.68	10.21	3.12	0.48	2.40
South Hams	1.40	1.61	2.17	15.02	34.67	54.89	0.64	0.74	0.87	16.81	17.90	37.72	148.22	1.30	1.94	4.07
Teignbridge	3.59	3.83	4.35	6.69	13.71	21.32	1.26	1.39	1.60	10.08	15.54	27.18	171.57	2.75	0.88	3.68
Torbay	19.09	19.97	21.44	4.61	7.34	12.29	16.05	17.47	18.89	8.85	8.10	17.66	13.47	2.55	0.91	2.34
Torridge	1.42	1.48	1.61	4.48	9.11	14.00	0.43	0.47	0.53	9.50	11.56	22.15	207.01	1.09	0.79	1.23
West Devon	0.87	1.02	1.16	16.27	13.74	32.24	0.33	0.36	0.40	11.25	9.27	21.57	192.63	0.76	1.48	3.70
Dorset	9.45	9.43	10.36	-0.26	9.91	9.62	1.98	2.18	2.42	9.83	11.43	22.38	327.42	7.94	0.87	2.67
Bournemouth	34.10	32.44	34.63	-4.84	6.75	1.58	31.07	30.33	32.74	-2.38	7.92	5.35	5.80	1.90	0.85	1.76
Christchurch	12.67	12.31	13.82	-2.88	12.32	9.09	6.41	7.37	8.08	15.03	9.60	26.06	71.11	5.75	1.28	3.43
East Dorset (was Wimborne)	3.31	4.54	5.14	37.19	13.33	55.49	1.42	1.91	2.22	34.08	16.32	55.96	132.10	2.93	0.82	3.58
North Dorset	1.15	1.38	1.75	20.01	27.32	52.80	0.66	0.75	0.86	14.45	13.83	30.28	104.65	0.90	1.98	1.61
Poole	20.11	20.72	23.21	3.03	12.02	15.41	15.98	18.01	20.46	12.72	13.60	28.04	13.44	2.75	0.88	3.36
Purbeck	1.84	2.17	2.58	18.26	18.99	40.72	0.85	0.97	1.05	14.28	8.29	23.76	146.18	1.53	2.29	3.58
West Dorset	2.07	2.19	2.28	5.95	4.15	10.34	0.65	0.70	0.78	7.91	11.54	20.36	190.55	1.50	0.36	1.48
Weymouth and Portland	16.74	16.74	18.22	0.00	8.86	8.87	12.20	13.06	14.51	7.08	11.09	18.96	25.53	3.71	0.80	3.57
Durham	9.16	9.06	8.76	-1.08	-3.26	-4.30	2.44	2.46	2.44	0.64	-0.91	-0.27	259.81	6.33	3.58	1.40
Chester-le-Street	11.55	11.59	11.49	0.36	-0.86	-0.50	7.31	7.85	7.93	7.30	1.09	8.48	44.78	3.55	-0.79	2.10
Darlington	24.23	22.92	23.04	-5.42	0.55	-4.91	4.85	4.92	5.00	1.42	1.74	3.18	360.76	18.04	0.31	2.67
Derwentside	7.96	7.60	7.31	-4.51	-3.77	-8.11	3.37	3.24	3.18	-3.90	-1.75	-5.58	129.90	4.13	2.16	1.93
Durham	6.23	7.30	7.03	17.22	-3.62	12.98	4.05	4.32	4.26	6.50	-1.33	5.08	65.17	2.78	2.71	-2.30
Easington	12.95	12.15	11.30	-6.14	-6.97	-12.68	7.53	7.03	6.84	-6.62	-2.69	-9.13	65.20	4.46	2.60	1.66
Sedgefield	7.68	7.55	7.18	-1.71	-4.96	-6.58	3.96	4.20	4.11	5.99	-2.08	3.79	74.50	3.06	2.38	1.89
Teesdale	0.91	0.94	0.90	2.83	-3.71	-0.99	0.28	0.28	0.29	1.02	1.16	2.20	216.44	0.62	-3.20	1.68
Wear Valley	5.80	5.79	5.57	-0.17	-3.70	-3.87	1.28	1.26	1.24	-1.32	-1.15	-2.46	348.09	4.33	3.22	1.88

Appendix B - continued

	Population Weighted Density (PWD)						Conventional Density						Density Ratios			Sensitivity
	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-1991	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-91	% by which PWD> Conv. in 1991	Absolute difference	81-91 change PWD/ Conv.	See note 5
East Sussex	14.19	13.45	14.30	-5.23	6.32	0.76	3.43	3.56	3.84	3.90	7.71	11.91	272.38	10.46	0.82	3.73
Brighton	39.07	35.39	37.10	-9.43	4.82	-5.06	26.58	24.74	24.79	-6.91	0.17	-6.75	49.67	12.31	27.86	2.87
Eastbourne	19.63	21.53	23.90	9.68	11.02	21.77	14.54	16.83	18.49	15.77	9.85	27.18	29.27	5.41	1.12	2.69
Hastings	30.56	30.24	32.20	-1.06	6.47	5.34	23.28	24.79	27.21	6.48	9.78	16.89	18.32	4.98	0.66	5.14
Hove	49.54	45.14	47.38	-8.88	4.95	-4.37	36.88	35.01	35.82	-5.09	2.33	-2.88	32.26	11.56	2.12	4.92
Lewes	6.63	6.94	8.62	4.67	24.05	29.85	2.38	2.62	2.99	10.18	13.84	25.43	188.51	5.63	1.74	4.03
Rother	3.33	3.66	3.99	9.81	9.11	19.81	1.32	1.45	1.59	9.78	10.26	21.05	150.24	2.40	0.89	4.14
Wealden	2.34	2.67	3.12	14.15	16.98	33.53	1.25	1.38	1.55	10.42	12.55	24.27	100.99	1.57	1.35	3.19
Essex	11.00	11.10	11.41	0.88	2.78	3.69	3.62	3.98	4.16	10.00	4.56	15.01	174.18	7.25	0.61	2.82
Basildon	15.93	16.96	17.55	6.47	3.45	10.14	11.58	13.68	14.55	18.12	6.41	25.69	20.59	3.00	0.54	2.77
Braintree	3.39	4.65	4.96	37.34	6.65	46.48	1.50	1.82	1.95	21.87	6.97	30.36	154.55	3.01	0.95	2.76
Brentwood	8.80	8.66	8.42	-1.61	-2.72	-4.29	4.81	4.82	4.73	0.15	-1.86	-1.71	78.18	3.69	1.46	2.83
Castle Point	22.72	25.19	25.26	10.84	0.29	11.17	16.47	19.13	19.27	16.16	0.73	17.00	31.09	5.99	0.40	2.48
Chelmsford	9.86	9.73	11.05	-1.32	13.53	12.03	3.48	4.02	4.46	15.54	10.93	28.16	147.87	6.59	1.24	2.83
Colchester	8.86	9.51	10.23	7.31	7.53	15.39	3.40	3.94	4.25	15.78	7.96	25.01	140.38	5.97	0.95	2.31
Epping Forest	7.96	7.93	7.98	-0.34	0.64	0.30	3.22	3.36	3.37	4.50	0.17	4.68	137.17	4.62	3.73	2.81
Harlow	36.94	35.79	33.46	-3.09	-6.52	-9.41	30.12	30.82	29.06	2.34	-5.71	-3.51	15.14	4.40	1.14	1.58
Maldon	2.20	2.49	2.87	12.91	15.23	30.11	1.12	1.33	1.47	18.37	10.41	30.69	95.08	1.40	1.46	3.50
Rochford	11.12	10.85	11.16	-2.42	2.83	0.34	3.99	4.31	4.45	8.02	3.09	11.36	150.89	6.71	0.92	2.79
Southend-on-Sea	42.32	39.50	40.05	-6.68	1.38	-5.38	38.24	37.13	37.77	-2.90	1.73	-1.22	6.03	2.28	0.80	3.62
Tendring	7.15	7.54	8.40	5.35	11.46	17.42	2.94	3.36	3.74	14.02	11.59	27.23	124.29	4.65	0.99	3.58
Thurrock	12.31	12.13	12.41	-1.46	2.26	0.76	7.49	7.74	7.83	3.29	1.18	4.50	58.48	4.58	1.92	2.74
Uttlesford	1.13	1.39	1.50	22.83	8.30	33.02	0.83	0.95	1.02	15.57	6.83	23.47	47.36	0.48	1.21	2.77
Gloucestershire	6.27	6.38	6.67	1.67	4.64	6.39	1.72	1.87	2.00	8.65	7.14	16.40	233.52	4.67	0.65	2.77
Cheltenham	29.72	29.19	30.35	-1.79	3.98	2.12	23.65	23.97	24.99	1.38	4.23	5.67	21.47	5.36	0.94	0.90
Cotswold	1.20	1.40	1.59	17.28	13.52	33.13	0.53	0.58	0.64	10.22	10.34	21.62	148.13	0.95	1.31	3.92
Forest of Dean	1.89	2.07	2.23	9.72	7.62	18.08	1.22	1.36	1.43	10.83	5.17	16.56	56.09	0.80	1.47	2.87
Gloucester	31.42	31.27	32.25	-0.46	3.12	2.64	26.22	27.08	28.10	3.28	3.76	7.16	14.75	4.14	0.83	3.08
Stroud	3.76	4.23	4.55	12.29	7.67	20.91	1.93	2.23	2.45	15.14	10.19	26.87	85.46	2.10	0.75	3.20
Tewkesbury	3.27	3.52	3.81	7.64	8.42	16.70	1.59	1.79	1.95	12.32	9.23	22.69	95.07	1.86	0.91	2.77
Hampshire	14.20	14.16	14.31	-0.29	1.03	0.74	3.50	3.81	4.08	8.91	6.91	16.44	250.93	10.23	0.15	2.83
Basingstoke and Deane	5.77	8.23	7.96	42.71	-3.22	38.11	1.60	2.03	2.26	26.57	11.50	41.12	252.30	5.70	-0.28	3.65
East Hampshire	2.95	3.50	4.24	18.76	21.07	43.78	1.49	1.74	2.01	16.93	15.68	35.26	110.69	2.23	1.34	3.55
Eastleigh	12.46	14.40	16.37	15.61	13.68	31.43	9.72	11.58	13.32	19.12	15.04	37.04	22.93	3.05	0.91	3.46
Fareham	14.41	15.43	17.30	7.06	12.08	20.00	10.55	11.70	13.34	10.96	14.01	26.51	29.64	3.95	0.86	3.98
Gosport	32.88	33.19	32.57	0.94	-1.87	-0.95	29.44	30.66	29.99	4.12	-2.18	1.85	8.60	2.58	0.86	3.94
Hart	6.79	8.08	8.69	19.02	7.55	28.00	2.73	3.46	4.02	26.81	16.43	47.64	115.83	4.66	0.46	3.90
Havant	23.04	24.74	25.12	7.40	1.55	9.06	19.30	21.07	21.73	9.19	3.12	12.59	15.61	3.39	0.50	2.56
New Forest	4.49	4.83	5.61	7.48	16.11	24.80	1.69	1.91	2.14	12.89	12.01	26.45	162.04	3.47	1.34	2.85
Portsmouth	53.49	48.33	48.96	-9.65	1.30	-8.48	46.09	42.96	43.22	-6.79	0.59	-6.23	13.29	5.74	2.20	0.72
Rushmoor	27.09	28.41	29.21	4.88	2.83	7.85	20.08	21.45	20.95	6.82	-2.33	4.34	39.42	8.26	-1.21	2.80
Southampton	43.43	42.25	41.10	-2.72	-2.74	-5.38	40.97	40.20	39.18	-1.88	-2.54	-4.37	4.88	1.91	1.08	2.06
Test Valley	3.16	3.76	4.51	18.95	19.93	42.66	1.21	1.41	1.59	16.55	12.47	31.08	184.34	2.93	1.60	3.78
Winchester	3.62	3.82	4.23	5.57	10.58	16.74	1.22	1.34	1.46	10.09	8.83	19.81	189.48	2.77	1.20	2.49

Appendix B - continued

	Population Weighted Density (PWD)						Conventional Density						Density Ratios			Sensitivity
	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-1991	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-91	% by which PWD> Conv. in 1991	Absolute difference	81-91 change PWD/ Conv.	See note 5
Hereford and Worcester	5.50	6.26	6.82	13.83	9.03	24.11	1.39	1.59	1.72	14.14	8.38	23.71	295.69	5.10	1.08	2.02
Bromsgrove	6.73	7.28	7.85	8.25	7.88	16.78	3.48	3.97	4.17	13.79	5.25	19.76	88.22	3.68	1.50	2.51
Hereford	24.14	24.76	25.70	2.56	3.78	6.43	22.65	23.14	24.67	2.13	6.63	8.91	4.15	1.02	0.57	1.84
Leominster	0.51	0.66	0.74	29.14	11.91	44.52	0.35	0.40	0.43	13.27	7.92	22.25	72.45	0.31	1.50	2.83
Malvern Hills	1.80	2.05	2.15	14.27	4.95	19.93	0.81	0.90	0.97	11.63	6.88	19.31	123.01	1.19	0.72	0.48
Redditch	11.49	18.93	20.90	64.74	10.42	81.90	7.47	12.25	14.41	64.00	17.64	92.93	45.06	6.49	0.59	1.58
South Herefordshire	0.82	0.90	1.07	10.25	18.71	30.89	0.47	0.51	0.57	9.52	11.97	22.63	86.73	0.50	1.56	3.45
Worcester	27.65	26.39	27.79	-4.55	5.30	0.51	22.76	23.43	25.54	2.97	8.99	12.23	8.81	2.25	0.59	1.54
Wychavon	2.48	3.11	3.65	25.31	17.40	47.11	1.21	1.41	1.54	16.57	9.13	27.20	136.72	2.11	1.91	2.85
Wyre Forest	13.34	13.67	14.10	2.53	3.15	5.76	4.28	4.67	4.85	9.07	4.00	13.43	190.67	9.25	0.79	1.79
Hertfordshire	14.52	14.52	14.72	0.00	1.44	1.44	5.54	5.83	5.96	5.16	2.37	7.65	146.87	8.76	0.61	2.20
Broxbourne	19.45	20.04	20.29	3.00	1.28	4.32	13.59	15.22	15.62	11.99	2.61	14.91	29.90	4.67	0.49	2.05
Dacorum	13.53	15.09	14.73	11.54	-2.35	8.92	5.56	6.15	6.32	10.54	2.86	13.70	133.03	8.41	-0.82	1.95
East Hertfordshire	5.61	5.62	6.43	0.10	14.50	14.62	2.05	2.23	2.44	8.82	9.40	19.04	163.25	3.99	1.54	2.06
Hertsmere	16.13	15.51	15.81	-3.89	1.97	-2.00	9.24	8.94	8.96	-3.25	0.30	-2.96	76.43	6.85	6.56	1.84
North Hertfordshire	8.71	9.45	10.12	8.45	7.13	16.18	2.60	2.85	2.97	9.41	4.44	14.27	240.31	7.15	1.61	2.36
St Albans	15.17	14.73	14.74	-2.89	0.08	-2.81	7.29	7.72	7.83	5.86	1.52	7.47	88.13	6.91	0.05	2.72
Stevenage	32.55	33.09	33.38	1.67	0.86	2.55	26.50	29.33	29.64	10.69	1.07	11.88	12.60	3.74	0.80	2.13
Three Rivers	13.96	13.49	13.28	-3.42	-1.50	-4.87	9.02	8.90	8.76	-1.31	-1.57	-2.86	51.68	4.53	0.96	2.89
Watford	40.27	38.56	38.58	-4.25	0.05	-4.21	36.34	34.69	34.99	-4.54	0.86	-3.72	10.25	3.59	0.06	3.46
Welwyn Hatfield	12.37	11.84	11.91	-4.27	0.53	-3.77	7.14	7.27	7.24	1.73	-0.32	1.40	64.37	4.66	-1.63	0.86
Humberside	14.63	12.85	11.91	-12.19	-7.28	-18.58	2.33	2.40	2.44	2.98	1.74	4.77	388.02	9.47	-4.18	2.30
Boothferry	2.70	2.57	2.68	-4.86	4.28	-0.79	0.83	0.92	0.99	10.32	7.15	18.21	171.41	1.69	0.60	2.97
Cleethorpes	16.33	15.33	14.71	-6.13	-4.05	-9.93	3.98	4.17	4.21	4.79	1.09	5.94	248.92	10.49	-3.71	2.49
East Yorkshire	2.45	2.76	3.10	12.33	12.45	26.31	0.60	0.71	0.81	17.80	13.64	33.86	284.25	2.29	0.91	2.63
East Yorkshire Borough of Beverly (was Beverly)	7.79	7.86	7.89	0.88	0.36	1.25	2.44	2.59	2.76	6.12	6.45	12.97	185.59	5.13	0.06	3.34
Glanford	1.73	2.14	2.29	23.96	6.65	32.21	0.97	1.13	1.23	17.08	8.81	27.39	85.40	1.05	0.76	2.91
Great Grimsby	42.37	37.98	36.45	-10.36	-4.03	-13.96	33.08	32.59	32.22	-1.49	-1.11	-2.58	13.13	4.23	3.63	2.30
Holderness	1.75	2.02	2.36	15.60	16.74	34.96	0.73	0.85	0.95	17.09	11.21	30.21	149.65	1.42	1.49	2.85
Kingston upon Hull	46.25	40.89	38.53	-11.60	-5.77	-16.70	38.84	37.09	35.33	-4.51	-4.74	-9.04	9.05	3.20	1.22	1.42
Scunthorpe	26.76	25.26	23.52	-5.58	-6.88	-12.08	20.67	19.53	18.20	-5.53	-6.81	-11.97	29.26	5.32	1.01	2.15
Isle Of Wight	6.54	6.42	6.77	-1.80	5.43	3.54	2.72	3.03	3.28	11.32	8.44	20.71	106.30	3.49	0.64	1.12
Medina	10.61	9.93	10.29	-6.45	3.67	-3.02	5.30	5.70	6.09	7.68	6.88	15.09	68.92	4.20	0.53	3.07
South Wight	3.17	3.52	3.87	11.06	10.00	22.17	1.57	1.84	2.03	16.74	10.59	29.11	90.61	1.84	0.94	-1.44
Kent	11.21	11.15	11.38	-0.49	2.09	1.59	3.63	3.88	4.04	6.66	4.18	11.11	181.88	7.35	0.50	2.38
Ashford	5.00	4.90	5.20	-2.05	6.05	3.87	1.31	1.46	1.59	11.22	9.00	21.22	227.34	3.61	0.67	2.68
Canterbury	7.79	8.18	9.10	5.03	11.21	16.80	3.36	3.68	4.00	9.49	8.86	19.19	127.21	5.09	1.26	-0.55
Dartford	16.51	15.56	15.56	-5.79	0.00	-5.79	11.44	11.02	10.90	-3.66	-1.16	-4.77	42.75	4.66	0.00	2.21
Dover	9.24	8.94	9.13	-3.19	2.05	-1.20	3.06	3.18	3.28	3.99	3.31	7.43	177.86	5.84	0.62	1.83
Gillingham	36.31	34.99	35.79	-3.63	2.30	-1.41	25.71	28.17	28.91	9.60	2.60	12.45	23.83	6.89	0.88	2.65
Gravesham	22.71	22.09	21.51	-2.74	-2.63	-5.29	9.51	9.55	9.34	0.37	-2.19	-1.83	130.27	12.17	1.20	2.57
Maidstone	9.96	9.91	9.68	-0.54	-2.27	-2.80	3.03	3.28	3.46	8.22	5.38	14.04	180.22	6.23	-0.42	2.89
Rochester upon Medway	23.91	22.07	22.34	-7.72	1.25	-6.57	8.44	8.86	9.01	4.96	1.75	6.80	147.96	13.33	0.71	2.49

Appendix B - continued

	Population Weighted Density (PWD)						Conventional Density						Density Ratios			Sensitivity	
	pers/hctr	pers/hctr	pers/hctr	% change	% change	% change	pers/hctr	pers/hctr	pers/hctr	% change	% change	% change	% by	Absolute	81-91		
	1971	1981	1991	1971-81	1981-91	1971-1991	1971	1981	1991	1971-81	1981-91	1971-91	which PWD> Conv. in 1991	difference	change PWD/ Conv.	See note 5	
Population density, change and concentration in Great Britain 1971, 1981 and 1991	Kent - continued																
	Sevenoaks	4.55	5.21	5.30	14.36	1.82	16.44	2.62	2.95	3.00	12.59	1.59	14.37	76.84	2.30	1.15	2.50
	Shepway	8.82	8.86	9.64	0.44	8.74	9.22	2.19	2.36	2.56	7.68	8.22	16.53	276.78	7.08	1.06	4.33
	Swale	7.16	7.19	7.60	0.48	5.60	6.11	2.67	2.94	3.12	10.15	6.19	16.97	143.12	4.47	0.90	2.13
	Thanet	21.62	22.83	23.69	5.62	3.73	9.56	10.64	11.45	11.97	7.63	4.51	12.48	97.95	11.72	0.83	3.49
	Tonbridge and Malling	6.62	6.82	7.16	2.99	4.88	8.01	3.82	4.00	4.23	4.50	5.76	10.52	69.31	2.93	0.85	2.65
	Tunbridge Wells	7.03	7.40	7.50	5.27	1.47	6.82	2.72	2.88	3.01	5.77	4.51	10.54	149.17	4.49	0.33	1.99
	Lancashire	15.09	14.43	14.34	-4.42	-0.61	-5.00	4.31	4.46	4.53	3.61	1.55	5.22	216.50	9.81	-0.39	2.01
	Blackburn	24.42	23.29	21.85	-4.60	-6.22	-10.54	10.13	10.27	9.95	1.30	-3.04	-1.78	119.50	11.89	2.04	2.73
	Blackpool	50.07	48.14	48.14	-3.85	0.01	-3.84	42.37	41.88	41.96	-1.17	0.20	-0.97	14.73	6.18	0.07	2.43
	Burnley	28.29	23.04	22.76	-18.56	-1.20	-19.54	8.13	7.93	7.86	-2.36	-0.93	-3.26	189.54	14.90	1.30	2.65
	Chorley	7.41	8.18	8.58	10.44	4.86	15.81	3.74	4.41	4.71	17.91	6.70	25.81	82.37	3.88	0.73	2.40
	Fylde	9.74	9.24	9.64	-5.13	4.36	-0.99	3.92	4.11	4.31	4.77	4.75	9.75	123.96	5.34	0.92	2.25
	Hyndburn	16.75	15.97	15.18	-4.64	-4.98	-9.39	10.90	10.78	10.71	-1.10	-0.60	-1.69	41.65	4.46	8.33	2.55
	Lancaster	12.22	11.79	12.37	-3.51	4.91	1.23	2.08	2.11	2.20	1.09	4.44	5.57	462.33	10.17	1.11	0.09
	Pendle	12.50	11.96	11.38	-4.33	-4.87	-8.99	5.03	5.09	5.06	1.15	-0.53	0.61	124.73	6.31	9.16	2.68
	Preston	26.39	22.58	22.05	-14.43	-2.36	-16.45	9.19	8.72	8.83	-5.11	1.34	-3.83	149.59	13.21	-1.76	0.67
	Ribble Valley	3.09	3.30	3.14	6.66	-4.65	1.69	0.87	0.90	0.87	3.45	-2.45	0.92	260.04	2.27	1.90	1.59
	Rossendale	5.70	5.97	6.14	4.79	2.74	7.66	4.40	4.66	4.75	5.88	1.92	7.91	29.25	1.39	1.43	2.41
	South Ribble	12.68	14.39	15.32	13.52	6.43	20.82	7.72	8.75	9.19	13.32	5.05	19.05	66.62	6.13	1.27	2.12
	West Lancashire	5.74	6.93	6.95	20.67	0.37	21.11	2.64	3.15	3.20	19.12	1.50	20.91	117.45	3.75	0.25	1.72
	Wyre	11.93	12.02	12.20	0.78	1.47	2.27	3.29	3.44	3.59	4.61	4.42	9.23	239.48	8.60	0.33	2.52
	Leicestershire	11.51	11.26	11.19	-2.17	-0.57	-2.73	3.06	3.28	3.40	7.11	3.81	11.20	229.04	7.79	-0.15	1.37
	Blaby	9.73	9.45	10.35	-2.85	9.49	6.37	5.68	5.90	6.37	3.86	7.95	12.12	62.41	3.98	1.19	1.79
	Charnwood	7.00	7.50	7.87	7.14	4.84	12.33	4.34	4.77	5.09	10.00	6.68	17.35	54.54	2.78	0.73	1.75
	Harborough	1.92	2.39	2.80	24.43	17.30	45.96	0.85	1.02	1.14	19.77	11.46	33.51	145.94	1.66	1.51	2.24
	Hinckley and Bosworth	5.66	6.28	6.91	11.06	9.98	22.15	2.51	2.94	3.24	16.72	10.34	28.78	113.37	3.67	0.97	2.44
	Leicester	43.31	41.38	40.14	-4.45	-2.99	-7.31	38.04	37.79	37.00	-0.67	-2.08	-2.73	8.49	3.14	1.43	0.84
	Melton	2.37	2.74	2.81	15.37	2.89	18.70	0.80	0.89	0.94	11.62	5.13	17.34	199.97	1.88	0.56	2.13
	North West Leicestershire	4.33	4.97	5.07	14.82	1.88	16.98	2.48	2.79	2.87	12.42	2.75	15.52	76.69	2.20	0.68	1.53
	Oadby and Wigston	23.69	23.89	23.49	0.81	-1.66	-0.86	20.20	21.36	21.71	5.75	1.66	7.51	8.18	1.78	-1.00	-0.17
	Rutland	1.23	1.49	1.61	21.30	8.62	31.76	0.66	0.76	0.80	15.53	4.97	21.28	101.16	0.81	1.73	-0.49
	Lincolnshire	2.77	3.00	3.23	8.24	7.80	16.68	0.83	0.92	0.99	10.32	7.66	18.77	225.99	2.24	1.02	2.34
	Boston	4.82	4.67	4.68	-2.97	0.18	-2.80	1.34	1.46	1.49	9.15	1.95	11.28	215.00	3.20	0.09	2.09
	East Lindsey	1.32	1.53	1.85	15.95	20.96	40.26	0.53	0.59	0.67	11.82	13.59	27.02	176.60	1.18	1.54	1.57
	Lincoln	22.27	23.07	24.73	3.58	7.23	11.07	20.12	21.32	23.12	5.96	8.42	14.89	6.98	1.61	0.86	2.06
	North Kesteven	1.56	1.76	1.77	13.36	0.06	13.43	0.77	0.85	0.87	10.28	2.20	12.71	103.59	0.90	0.03	2.84
	South Holland	1.40	1.51	1.67	7.72	11.15	19.73	0.75	0.84	0.91	10.86	9.13	20.99	83.59	0.76	1.22	2.41
	South Kesteven	3.52	3.97	4.31	12.94	8.53	22.57	0.89	1.03	1.16	15.14	12.36	29.37	273.07	3.15	0.69	2.77
	West Lindsey	1.39	1.51	1.46	8.42	-2.98	5.19	0.61	0.65	0.66	7.42	1.17	8.67	121.52	0.80	-2.56	2.80
	Norfolk	3.83	4.06	4.19	6.14	3.18	9.52	1.13	1.27	1.38	12.55	8.62	22.24	202.73	2.81	0.37	1.98
	Breckland	1.15	1.68	1.85	46.45	9.96	61.04	0.57	0.73	0.82	29.81	11.80	45.13	125.22	1.03	0.84	1.96
	Broadland	4.07	4.45	4.59	9.25	3.20	12.75	1.53	1.76	1.92	15.46	9.05	25.91	138.96	2.67	0.35	2.52
	Great Yarmouth	11.61	11.21	11.11	-3.43	-0.86	-4.25	4.11	4.45	4.87	8.32	9.48	18.59	128.11	6.24	-0.09	2.57

Appendix B - continued

	Population Weighted Density (PWD)						Conventional Density						Density Ratios			Sensitivity
	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-1991	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-91	% by which PWD> Conv. in 1991	Absolute difference	81-91 change PWD/ Conv.	See note 5
Norfolk - <i>continued</i>																
Kings Lynn and West Norfolk (was West Norfolk)	1.68	1.95	2.13	15.54	9.28	26.27	0.77	0.84	0.91	9.36	8.20	18.33	134.16	1.22	1.13	2.47
North Norfolk	1.25	1.51	1.76	21.15	16.34	40.95	0.74	0.83	0.93	11.74	12.95	26.21	87.83	0.82	1.26	1.77
Norwich	34.00	33.21	33.09	-2.33	-0.34	-2.67	30.09	30.68	30.97	1.97	0.95	2.94	6.83	2.12	-0.36	1.13
South Norfolk	1.29	1.53	1.72	18.50	12.51	33.33	0.86	1.02	1.13	18.16	10.81	30.94	52.86	0.60	1.16	1.46
Northamptonshire	7.91	8.32	9.12	5.23	9.55	15.27	1.95	2.22	2.44	13.81	10.26	25.48	273.12	6.68	0.93	2.28
Corby	22.00	19.92	19.02	-9.44	-4.55	-13.56	6.52	6.55	6.63	0.33	1.24	1.57	187.00	12.39	-3.67	2.16
Daventry	1.42	1.77	1.96	24.07	11.14	37.89	0.70	0.86	0.95	22.45	9.68	34.31	107.64	1.02	1.15	2.47
East Northamptonshire	3.15	3.50	3.85	11.44	9.96	22.53	1.10	1.20	1.33	8.96	10.90	20.83	190.63	2.53	0.91	1.78
Kettering	12.76	12.30	12.82	-3.55	4.19	0.49	2.76	3.02	3.26	9.36	7.78	17.88	293.54	9.56	0.54	1.97
Northampton	25.64	25.82	27.79	0.69	7.65	8.39	16.28	19.30	22.40	18.51	16.09	37.58	24.05	5.39	0.48	2.51
South Northamptonshire	1.20	1.45	1.75	21.46	20.17	45.96	0.87	1.01	1.11	15.41	10.44	27.45	57.06	0.63	1.93	2.85
Wellingborough	7.64	8.86	9.90	15.99	11.69	29.55	3.37	3.93	4.16	16.60	5.90	23.47	137.79	5.74	1.98	1.97
Northumberland	4.45	4.69	4.64	5.34	-0.93	4.36	0.54	0.59	0.61	8.53	3.13	11.92	666.00	4.04	-0.30	2.33
Alnwick	1.26	1.28	1.32	1.82	2.56	4.42	0.25	0.26	0.28	3.80	7.34	11.42	372.32	1.04	0.35	2.22
Berwick-upon-Tweed	1.14	1.31	1.33	14.72	1.73	16.71	0.25	0.26	0.27	3.17	4.73	8.05	384.30	1.06	0.37	2.39
Blyth Valley	17.08	16.91	17.48	-1.00	3.39	2.35	8.56	10.89	11.26	27.25	3.44	31.63	55.18	6.21	0.98	1.55
Castle Morpeth	2.69	2.65	2.65	-1.25	-0.19	-1.44	0.74	0.80	0.81	7.83	1.37	9.31	225.82	1.84	-0.14	2.70
Tynedale	1.25	1.30	1.40	4.21	7.57	12.09	0.23	0.24	0.26	3.98	7.59	11.87	442.52	1.14	1.00	4.28
Wansbeck	14.60	13.69	13.05	-6.21	-4.72	-10.63	9.45	9.34	9.13	-1.14	-2.23	-3.35	42.90	3.92	2.11	1.41
North Yorkshire	3.80	3.80	3.94	0.09	3.58	3.67	0.73	0.79	0.85	8.12	7.45	16.18	365.67	3.09	0.48	2.04
Craven	1.22	1.29	1.34	5.96	3.70	9.88	0.38	0.40	0.42	4.48	7.50	12.32	214.70	0.91	0.49	2.18
Hambleton	0.94	1.07	1.17	13.55	8.90	23.65	0.50	0.56	0.61	12.61	8.01	21.62	92.00	0.56	1.11	2.66
Harrogate	5.11	5.36	5.57	4.85	4.01	9.05	0.92	1.02	1.07	11.17	4.85	16.56	418.69	4.50	0.83	3.07
Richmondshire	1.22	1.19	1.29	-2.62	8.37	5.53	0.31	0.31	0.34	1.18	7.04	8.31	284.94	0.96	1.19	3.43
Ryedale	1.29	1.71	1.89	33.12	10.32	46.86	0.44	0.52	0.57	17.91	9.16	28.71	232.71	1.32	1.13	1.77
Scarborough	6.38	6.13	6.40	-3.94	4.33	0.22	1.13	1.21	1.30	6.63	7.52	14.65	391.70	5.09	0.58	1.26
Selby	1.72	1.87	2.16	9.01	15.28	25.66	0.91	1.05	1.23	15.41	17.37	35.45	75.98	0.93	0.88	2.50
York	37.16	35.41	35.98	-4.71	1.64	-3.16	34.54	33.07	33.59	-4.24	1.55	-2.75	7.14	2.40	1.06	0.02
Nottinghamshire	14.97	13.92	13.94	-6.97	0.14	-6.83	4.41	4.51	4.59	2.36	1.75	4.16	203.91	9.36	0.08	1.78
Ashfield	11.31	12.01	12.30	6.22	2.39	8.76	9.18	9.66	9.89	5.24	2.39	7.76	24.37	2.41	1.00	1.81
Bassetlaw	3.71	3.85	4.16	3.77	7.95	12.02	1.48	1.58	1.63	6.81	2.83	9.83	155.59	2.53	2.81	1.85
Broxtowe	18.78	19.35	19.38	3.00	0.17	3.17	11.99	12.62	13.21	5.24	4.63	10.11	46.75	6.17	0.04	2.18
Gedling	19.39	20.12	19.70	3.73	-2.08	1.57	8.48	9.26	9.47	9.13	2.33	11.67	107.93	10.22	-0.89	2.09
Mansfield	17.27	17.26	17.59	-0.06	1.88	1.82	12.17	12.87	13.01	5.78	1.03	6.88	35.22	4.58	1.82	1.91
Newark and Sherwood (was Newark)	3.69	3.64	3.71	-1.33	1.80	0.45	1.47	1.57	1.61	6.35	2.59	9.10	130.61	2.10	0.69	-0.31
Nottingham	45.56	39.50	38.52	-13.29	-2.50	-15.46	39.16	36.03	35.39	-7.99	-1.77	-9.62	8.83	3.12	1.41	1.87
Rushcliffe	5.20	5.33	5.98	2.51	12.11	14.92	2.03	2.24	2.38	10.47	6.08	17.18	151.21	3.60	1.99	2.77

Appendix B - continued

	Population Weighted Density (PWD)						Conventional Density						Density Ratios			Sensitivity
	pers/hctr	pers/hctr	pers/hctr	% change	% change	% change	pers/hctr	pers/hctr	pers/hctr	% change	% change	% change	% by which PWD> Conv. in 1991	Absolute difference	81-91 change PWD/ Conv.	See note 5
	1971	1981	1991	1971-81	1981-91	1971-1991	1971	1981	1991	1971-81	1981-91	1971-91				
Oxfordshire	5.60	6.07	6.87	8.38	13.20	22.69	1.81	1.95	2.10	7.42	7.96	15.97	226.92	4.77	1.66	0.85
Cherwell	4.40	5.91	7.03	34.30	18.96	59.76	1.55	1.80	2.00	16.28	11.12	29.21	250.99	5.03	1.71	3.59
Oxford	31.48	31.14	31.53	-1.06	1.25	0.18	27.09	26.35	27.30	-2.71	3.59	0.78	15.51	4.23	0.35	-8.11
South Oxfordshire	4.14	4.10	4.33	-0.80	5.56	4.72	1.79	1.86	1.94	3.81	4.04	8.01	123.72	2.39	1.38	3.09
Vale of White Horse	3.29	4.08	5.30	24.16	29.71	61.05	1.54	1.73	1.89	12.59	9.51	23.29	179.68	3.40	3.13	1.84
West Oxfordshire	2.48	2.85	3.52	14.68	23.50	41.63	1.02	1.11	1.26	9.45	13.19	23.89	178.91	2.26	1.78	3.13
Shropshire	3.61	4.34	4.85	20.03	11.91	34.33	0.94	1.06	1.16	13.03	9.73	24.03	316.53	3.69	1.22	2.34
Bridgnorth	1.77	1.91	2.00	8.00	4.36	12.71	0.73	0.78	0.80	6.57	2.48	9.22	150.55	1.20	1.76	3.49
North Shropshire	1.48	1.62	1.95	9.11	20.57	31.56	0.67	0.72	0.78	8.19	7.70	16.52	150.40	1.17	2.67	2.66
Oswestry	2.80	2.88	3.34	2.64	16.28	19.35	1.14	1.17	1.31	3.36	11.40	15.15	155.69	2.04	1.43	1.02
Shrewsbury and Atcham	6.14	6.27	6.90	2.12	9.99	12.33	1.33	1.41	1.52	6.39	7.79	14.68	352.90	5.38	1.28	3.02
South Shropshire	0.72	0.72	0.86	0.21	19.99	20.24	0.31	0.33	0.37	5.57	14.38	20.75	132.01	0.49	1.39	2.08
The Wrekin	9.23	12.40	13.16	34.33	6.11	42.53	3.29	4.26	4.82	29.47	13.10	46.44	173.25	8.34	0.47	1.59
Somerset	3.51	3.69	4.26	5.28	15.36	21.45	1.08	1.21	1.33	12.14	10.28	23.67	219.12	2.92	1.49	2.19
Mendip	2.85	3.07	3.72	7.91	21.04	30.61	1.04	1.17	1.30	11.78	10.93	24.00	187.24	2.43	1.92	1.16
Sedgemoor	4.01	4.27	5.46	6.42	27.89	36.09	1.39	1.56	1.72	12.02	10.37	23.63	216.79	3.73	2.69	1.49
South Somerset (was Yeovil)	2.93	3.26	3.59	11.29	10.05	22.47	1.15	1.35	1.48	16.79	9.57	27.96	142.90	2.11	1.05	3.02
Taunton Deane	6.86	6.53	6.91	-4.75	5.75	0.73	1.70	1.85	2.05	8.88	10.51	20.33	237.36	4.86	0.55	1.80
West Somerset	1.31	1.32	1.53	0.44	15.74	16.25	0.38	0.39	0.43	4.08	10.56	15.07	251.31	1.09	1.49	4.62
Staffordshire	12.13	11.99	11.92	-1.11	-0.58	-1.69	3.49	3.70	3.80	5.96	2.54	8.64	214.02	8.12	-0.23	1.82
Cannock Chase	19.54	19.89	20.65	1.80	3.79	5.65	9.99	10.76	11.30	7.75	4.99	13.13	82.78	9.35	0.76	1.66
East Staffordshire	9.59	8.97	9.12	-6.45	1.68	-4.88	2.40	2.43	2.49	0.99	2.80	3.82	265.66	6.63	0.60	1.63
Lichfield	7.45	8.21	8.35	10.26	1.62	12.05	2.39	2.67	2.81	11.68	5.16	17.44	197.12	5.54	0.32	2.50
Newcastle-under-Lyme	14.28	13.70	13.66	-4.09	-0.29	-4.37	5.56	5.56	5.65	0.14	1.60	1.75	141.61	8.00	-0.18	1.98
South Staffordshire	4.23	4.74	4.97	11.96	4.89	17.44	1.99	2.35	2.58	18.02	9.67	29.44	92.48	2.39	0.51	2.24
Stafford	7.00	6.86	6.48	-2.03	-5.59	-7.50	1.79	1.93	1.96	7.99	1.72	9.84	229.91	4.51	-3.25	1.93
Staffordshire Moorlands	4.03	4.18	4.16	3.87	-0.53	3.32	1.54	1.65	1.66	7.55	0.31	7.89	151.03	2.50	-1.69	2.23
Stoke-on-Trent	29.83	28.05	27.53	-5.96	-1.86	-7.71	28.44	27.03	26.46	-4.96	-2.08	-6.93	4.01	1.06	0.89	1.16
Tamworth	15.24	23.87	25.75	56.59	7.88	68.94	13.38	20.96	22.85	56.59	9.05	70.76	12.69	2.90	0.87	2.07
Suffolk	5.13	5.31	5.43	3.53	2.34	5.95	1.37	1.55	1.67	12.91	7.81	21.73	225.06	3.76	0.30	2.04
Babergh	1.90	2.21	2.48	15.98	12.12	30.04	1.02	1.21	1.34	18.59	10.07	30.52	85.40	1.14	1.20	3.43
Forest Heath	2.14	2.52	2.66	17.83	5.58	24.41	1.02	1.37	1.47	34.53	7.10	44.07	81.31	1.19	0.79	-2.65
Ipswich	32.45	32.21	31.24	-0.75	-3.02	-3.75	29.95	29.76	29.22	-0.66	-1.79	-2.43	6.88	2.01	1.69	2.06
Mid Suffolk	1.04	1.33	1.60	27.28	20.54	53.43	0.69	0.80	0.90	16.26	13.04	31.42	77.92	0.70	1.58	2.59
St Edmundsbury	3.71	4.45	4.81	19.87	8.12	29.60	1.06	1.30	1.40	22.49	7.49	31.67	244.89	3.42	1.08	2.91
Suffolk Coastal	2.33	2.68	2.99	15.06	11.63	28.44	0.96	1.05	1.20	9.89	14.50	25.82	149.23	1.79	0.80	2.42
Waveney	9.73	9.91	10.23	1.89	3.14	5.09	2.38	2.64	2.86	11.24	8.42	20.60	257.01	7.36	0.37	1.99
Surrey	10.90	11.00	11.29	0.87	2.62	3.51	5.76	5.91	6.07	2.58	2.57	5.22	86.06	5.22	1.02	2.91
Elmbridge	15.36	14.87	15.15	-3.19	1.89	-1.35	11.52	11.50	11.85	-0.21	3.03	2.81	27.88	3.30	0.62	3.96
Epsom and Ewell	24.56	24.20	23.93	-1.49	-1.12	-2.60	20.42	20.10	19.65	-1.56	-2.23	-3.76	21.76	4.28	0.50	2.51
Guildford	8.40	8.89	9.52	5.80	7.11	13.32	4.26	4.39	4.53	2.94	3.27	6.30	110.20	4.99	2.18	1.88
Mole Valley	5.65	5.79	6.10	2.49	5.45	8.08	2.85	2.94	3.06	2.99	4.20	7.32	99.24	3.04	1.30	3.22
Reigate and Banstead	13.48	12.98	13.06	-3.64	0.55	-3.11	9.02	8.94	9.12	-0.95	1.99	1.02	43.22	3.94	0.28	3.47

Appendix B - continued

	Population Weighted Density (PWD)						Conventional Density						Density Ratios			Sensitivity
	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-1991	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-91	% by which PWD> Conv. in 1991	Absolute difference	81-91 change PWD/ Conv.	See note 5
Surrey - <i>continued</i>																
Runnymede	12.52	12.01	12.31	-4.03	2.45	-1.68	9.36	8.97	9.19	-4.14	2.37	-1.87	33.99	3.12	1.03	2.14
Spelthorne	19.92	19.58	19.00	-1.67	-2.96	-4.58	16.79	16.40	16.03	-2.31	-2.22	-4.48	18.52	2.97	1.33	3.49
Surrey Heath	9.73	11.72	12.06	20.49	2.92	24.01	6.55	7.83	8.17	19.50	4.31	24.65	47.67	3.89	0.68	3.51
Tandridge	5.59	5.24	5.10	-6.26	-2.71	-8.79	3.02	3.03	3.05	0.39	0.81	1.20	66.93	2.04	-3.33	2.14
Waverley	4.95	5.48	5.90	10.69	7.67	19.17	2.88	3.13	3.28	8.67	4.97	14.07	79.72	2.62	1.54	2.16
Woking	15.84	16.78	18.72	5.93	11.53	18.15	11.82	12.73	13.58	7.66	6.72	14.89	37.85	5.14	1.72	3.46
Warwickshire	7.08	7.17	7.44	1.29	3.82	5.16	2.24	2.37	2.45	5.90	3.07	9.15	204.07	4.99	1.24	2.47
North Warwickshire	3.46	3.52	3.65	1.84	3.55	5.45	1.98	2.09	2.13	5.64	1.86	7.60	71.34	1.52	1.91	1.88
Nuneaton and Bedworth	17.06	17.16	17.76	0.61	3.50	4.14	13.43	14.27	14.79	6.26	3.62	10.11	20.11	2.97	0.97	2.18
Rugby	9.76	9.23	9.03	-5.48	-2.12	-7.48	2.28	2.39	2.38	4.64	-0.15	4.49	279.01	6.65	14.57	3.38
Stratford-on-Avon	1.56	1.77	1.99	12.87	12.78	27.30	0.94	1.02	1.08	8.25	6.22	14.98	84.53	0.91	2.06	3.06
Warwick	12.26	12.36	12.93	0.79	4.64	5.47	3.85	4.02	4.14	4.62	2.82	7.57	212.66	8.80	1.65	1.83
West Sussex	9.40	10.02	10.66	6.49	6.44	13.36	2.89	3.27	3.53	13.17	8.02	22.25	202.10	7.13	0.80	3.08
Adur	17.25	17.93	18.49	3.96	3.11	7.19	12.71	13.66	13.77	7.53	0.81	8.41	34.25	4.72	3.81	2.02
Arun	11.36	12.63	14.35	11.19	13.62	26.33	4.52	5.22	5.84	15.53	11.84	29.21	145.79	8.51	1.15	4.49
Chichester	2.55	2.98	3.23	16.94	8.21	26.54	1.11	1.21	1.29	9.57	6.01	16.16	150.66	1.94	1.37	2.88
Crawley	23.36	25.82	25.45	10.50	-1.41	8.94	18.41	19.96	19.46	8.43	-2.53	5.69	30.81	5.99	0.56	2.24
Horsham	3.47	3.64	4.47	4.95	22.86	28.95	1.55	1.88	2.21	21.49	17.29	42.50	102.42	2.26	1.32	2.72
Mid Sussex	7.44	8.45	8.88	13.60	5.08	19.37	2.91	3.49	3.82	19.82	9.57	31.29	132.21	5.05	0.53	2.91
Worthing	32.75	33.10	35.28	1.07	6.60	7.74	26.37	27.86	29.54	5.64	6.03	12.01	19.44	5.74	1.09	3.49
Wiltshire	5.44	5.49	6.16	0.89	12.20	13.20	1.36	1.48	1.63	8.26	10.11	19.21	278.87	4.53	1.21	2.92
Kennet	1.74	1.67	1.81	-4.41	8.53	3.74	0.64	0.66	0.72	3.40	9.06	12.77	152.36	1.09	0.94	1.83
North Wiltshire	3.28	3.38	3.71	3.05	9.60	12.93	1.20	1.31	1.46	9.20	10.73	20.91	154.70	2.25	0.89	3.47
Salisbury	3.12	3.02	3.24	-3.18	7.13	3.73	0.98	0.99	1.05	1.05	6.11	7.23	208.17	2.19	1.17	3.09
Thamesdown	20.26	18.46	21.17	-8.85	14.63	4.48	6.00	6.57	7.45	9.57	13.34	24.18	184.21	13.72	1.10	3.15
West Wiltshire	4.80	5.49	6.02	14.35	9.49	25.20	1.63	1.91	2.09	16.98	9.25	27.80	188.09	3.93	1.03	2.49
Clwyd	5.57	5.91	6.14	6.03	3.86	10.12	1.44	1.59	1.68	10.66	5.84	17.12	264.63	4.46	0.66	2.81
Alyn and Deeside	7.32	7.54	7.52	3.01	-0.28	2.72	4.16	4.65	4.75	11.66	2.12	14.02	58.43	2.77	-0.13	2.24
Colwyn	4.85	5.14	5.93	5.99	15.56	22.48	0.77	0.86	1.00	11.02	16.42	29.26	494.48	4.94	0.95	4.44
Delyn	3.81	4.12	4.11	8.13	-0.29	7.82	2.02	2.34	2.44	15.60	4.52	20.82	68.31	1.67	-0.06	2.30
Glyndwr	0.81	0.89	0.97	9.35	9.29	19.50	0.37	0.40	0.43	8.01	7.33	15.94	124.45	0.54	1.27	3.84
Rhuddlan	11.80	12.91	14.42	9.41	11.71	22.22	4.23	4.73	5.02	11.68	6.25	18.65	187.15	9.40	1.88	2.97
Wrexham Maelor	8.60	8.96	9.04	4.20	0.92	5.15	2.82	3.03	3.15	7.66	3.80	11.76	187.19	5.89	0.24	2.45
Dyfed	2.03	1.94	1.96	-4.56	0.88	-3.72	0.53	0.56	0.60	6.29	6.33	13.02	228.35	1.36	0.14	2.51
Carmarthen	0.72	0.73	0.78	0.82	7.27	8.15	0.41	0.43	0.47	5.80	8.33	14.61	66.89	0.31	0.87	2.19
Ceredigion	0.77	0.76	0.84	-0.74	10.04	9.22	0.28	0.31	0.35	10.18	13.98	25.58	138.53	0.49	0.72	2.70
Dinefwr	1.65	1.52	1.56	-8.09	2.53	-5.77	0.36	0.38	0.39	4.80	4.43	9.44	297.21	1.16	0.57	1.90
Llanelli	6.79	6.25	6.21	-7.91	-0.58	-8.44	3.26	3.19	3.20	-1.96	0.32	-1.64	94.00	3.01	-1.80	1.95
Preseli Pembrokeshire (was Preseli)	2.18	2.23	2.20	2.29	-1.46	0.80	0.53	0.59	0.61	11.94	3.65	16.03	260.71	1.59	-0.40	3.07
South Pembrokeshire	2.67	2.75	2.98	2.90	8.19	11.33	0.77	0.86	0.96	11.29	11.04	23.57	210.98	2.02	0.74	3.76

Appendix B - continued

	Population Weighted Density (PWD)						Conventional Density						Density Ratios			Sensitivity
	pers/hctr	pers/hctr	pers/hctr	% change	% change	% change	pers/hctr	pers/hctr	pers/hctr	% change	% change	% change	% by which PWD> Conv. in 1991	Absolute difference	81-91 change PWD/ Conv.	See note 5
	1971	1981	1991	1971-81	1981-91	1971-1991	1971	1981	1991	1971-81	1981-91	1971-91				
Gwent	8.98	8.59	8.45	-4.43	-1.55	-5.91	3.15	3.17	3.21	0.65	1.31	1.96	163.25	5.24	-1.19	2.60
Blaenau Gwent	7.87	7.36	7.14	-6.52	-2.92	-9.25	6.69	6.26	6.04	-6.36	-3.48	-9.62	18.20	1.10	0.84	2.26
Islwyn	9.29	9.29	9.31	-0.03	0.16	0.13	6.65	6.52	6.51	-1.94	-0.15	-2.09	42.94	2.80	-1.07	2.05
Monmouth	2.19	2.52	2.64	14.92	4.88	20.53	0.75	0.85	0.91	13.06	6.60	20.52	191.65	1.74	0.74	3.24
Newport	19.18	17.28	16.66	-9.87	-3.59	-13.10	6.64	6.61	6.77	-0.33	2.37	2.03	146.12	9.89	-1.51	2.91
Torfaen	8.51	8.60	8.57	0.96	-0.32	0.63	6.97	7.11	7.18	2.07	0.88	2.97	19.38	1.39	-0.37	2.43
Gwynedd	2.16	2.12	2.21	-1.93	4.33	2.31	0.54	0.57	0.61	6.96	5.92	13.30	264.18	1.60	0.73	1.50
Aberconwy	3.82	4.19	4.53	9.81	8.22	18.83	0.77	0.82	0.87	5.76	6.71	12.86	419.82	3.66	1.22	2.83
Arfon	4.11	3.54	3.65	-13.86	2.99	-11.29	1.21	1.23	1.30	1.78	5.97	7.86	180.69	2.35	0.50	0.48
Dwyfor	0.92	0.97	1.01	5.62	4.33	10.19	0.40	0.41	0.44	2.70	6.54	9.41	130.48	0.57	0.66	-3.94
Meirionnydd	0.52	0.52	0.57	0.24	9.55	9.81	0.19	0.20	0.22	3.28	8.26	11.81	165.49	0.36	1.16	3.40
Ynys Mon-Isle of Anglesey	2.35	2.21	2.25	-5.63	1.40	-4.31	0.80	0.93	0.97	16.16	3.99	20.80	132.35	1.28	0.35	2.56
Mid Glamorgan	7.53	7.47	7.48	-0.70	0.06	-0.63	5.15	5.25	5.25	1.89	0.06	1.95	42.37	2.23	1.05	2.08
Cynon Valley	7.20	6.70	6.76	-6.90	0.87	-6.09	3.81	3.73	3.62	-2.22	-2.76	-4.93	86.56	3.14	-0.32	1.91
Merthyr Tydfil	10.01	9.49	9.13	-5.19	-3.83	-8.81	5.60	5.38	5.32	-3.87	-1.21	-5.03	71.68	3.81	3.16	2.34
Ogwr	6.12	6.68	7.05	9.15	5.64	15.31	4.25	4.52	4.65	6.29	2.94	9.42	51.61	2.40	1.92	2.92
Rhondda	10.02	9.24	8.88	-7.77	-3.86	-11.33	9.15	8.42	8.12	-7.96	-3.60	-11.27	9.41	0.76	1.07	2.41
Rhymney Valley	7.74	7.90	7.80	2.08	-1.20	0.86	5.72	5.94	5.89	3.92	-0.95	2.93	32.53	1.92	1.27	2.14
Taff-Ely	6.08	6.31	6.36	3.85	0.78	4.67	4.93	5.48	5.66	11.19	3.29	14.85	12.44	0.70	0.24	0.54
Powys	0.52	0.65	0.69	23.51	7.21	32.42	0.19	0.21	0.23	13.28	8.64	23.07	199.73	0.46	0.83	2.99
Brecknock	0.61	0.73	0.73	19.59	-0.90	18.51	0.20	0.22	0.23	10.57	4.00	14.99	216.71	0.50	-0.23	2.51
Montgomeryshire																
(was Montgomery)	0.50	0.63	0.68	26.80	7.92	36.85	0.20	0.23	0.26	12.86	10.56	24.78	165.43	0.42	0.75	2.54
Radnorshire (was Radnor)	0.44	0.55	0.67	25.78	23.27	55.05	0.14	0.17	0.19	19.86	13.07	35.52	247.54	0.48	1.78	4.81
South Glamorgan	25.21	22.51	22.34	-10.71	-0.72	-11.36	9.04	9.02	9.41	-0.16	4.26	4.09	137.47	12.93	-0.17	3.11
Cardiff	34.66	31.44	30.61	-9.29	-2.62	-11.67	23.03	22.30	23.09	-3.17	3.56	0.27	32.57	7.52	-0.74	2.24
Vale of Glamorgan	10.30	9.72	10.32	-5.64	6.15	0.16	3.34	3.62	3.83	8.31	6.03	14.84	169.09	6.48	1.02	5.29
West Glamorgan	10.65	10.08	9.91	-5.36	-1.67	-6.94	4.47	4.45	4.42	-0.32	-0.63	-0.95	124.07	5.49	2.66	1.86
Lliw Valley	3.21	3.47	3.71	8.19	7.07	15.84	2.61	2.80	2.98	7.19	6.62	14.28	24.54	0.73	1.07	2.38
Neath	5.77	5.55	5.54	-3.77	-0.23	-3.99	3.22	3.20	3.17	-0.59	-1.01	-1.59	74.75	2.37	0.23	2.44
Port Talbot (was Afan)	9.49	8.85	8.58	-6.69	-3.11	-9.59	3.83	3.56	3.34	-7.02	-6.21	-12.80	156.80	5.24	0.50	2.51
Swansea	19.82	18.37	17.97	-7.30	-2.17	-9.31	7.53	7.51	7.42	-0.37	-1.19	-1.56	142.30	10.55	1.82	1.29
Borders	0.28	0.28	0.30	0.61	7.95	8.61	0.20	0.20	0.22	1.60	6.85	8.57	37.98	0.08	1.16	3.32
Berwickshire	0.22	0.24	0.26	7.67	8.08	16.36	0.19	0.20	0.22	4.33	7.14	11.78	20.07	0.04	1.13	3.83
Ettrick and Lauderdale	0.37	0.38	0.43	2.35	11.21	13.83	0.23	0.23	0.25	-1.63	9.95	8.16	71.12	0.18	1.13	2.05
Roxburgh	0.28	0.27	0.28	-3.13	3.32	0.08	0.23	0.23	0.23	-0.30	2.20	1.89	20.61	0.05	1.51	3.46
Tweeddale	0.18	0.19	0.21	4.31	10.83	15.61	0.13	0.14	0.16	11.38	11.21	23.86	28.99	0.05	0.97	5.26
Central	5.87	5.33	4.89	-9.22	-8.11	-16.58	0.96	1.00	0.99	3.66	-0.21	3.44	392.07	3.90	38.54	1.60
Clackmannan	4.76	4.62	4.58	-2.96	-0.97	-3.89	2.82	2.96	2.98	5.03	0.68	5.75	53.31	1.59	-1.42	1.87
Falkirk	9.95	9.33	8.66	-6.22	-7.12	-12.90	4.79	4.90	4.80	2.28	-1.94	0.30	80.29	3.86	3.67	1.54
Stirling	2.41	2.04	1.84	-15.49	-10.01	-23.94	0.33	0.34	0.35	5.47	2.47	8.08	420.71	1.48	-4.04	1.70

Appendix B - continued

	Population Weighted Density (PWD)						Conventional Density						Density Ratios			Sensitivity
	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-1991	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-91	% by which PWD> Conv. in 1991	Absolute difference	81-91 change PWD/ Conv.	See note 5
Dumfries and Galloway	0.49	0.49	0.52	0.38	6.47	6.87	0.22	0.22	0.23	2.42	4.19	6.71	127.77	0.29	1.54	2.38
Annandale and Eskdale	0.36	0.38	0.41	6.61	5.59	12.58	0.22	0.22	0.24	3.64	5.97	9.83	70.51	0.17	0.94	1.65
Nithsdale	0.81	0.79	0.82	-2.79	3.69	0.79	0.38	0.38	0.40	1.46	3.82	5.33	107.15	0.42	0.97	2.76
Stewartry	0.20	0.21	0.23	5.45	8.75	14.68	0.13	0.13	0.14	4.00	5.63	9.85	65.43	0.09	1.55	3.24
Wigtown	0.53	0.52	0.58	-2.09	13.28	10.91	0.17	0.17	0.17	1.61	1.68	3.33	238.16	0.41	7.89	1.85
Fife	5.60	5.47	5.45	-2.28	-0.41	-2.68	2.40	2.45	2.58	2.39	5.06	7.57	111.23	2.87	-0.08	0.91
Dunfermline	6.99	6.90	7.02	-1.24	1.73	0.47	3.82	3.97	4.15	4.00	4.50	8.68	69.15	2.87	0.38	1.76
Kirkcaldy	9.98	9.64	9.45	-3.38	-1.98	-5.29	5.62	5.63	5.80	0.18	3.04	3.23	62.90	3.65	-0.65	1.21
North East Fife	0.85	0.89	1.00	4.58	12.09	17.22	0.76	0.79	0.88	4.57	10.99	16.06	14.12	0.12	1.10	-1.30
Grampian	4.14	3.39	3.30	-17.93	-2.92	-20.33	0.48	0.53	0.57	9.87	8.86	19.60	474.83	2.72	-0.33	4.20
Aberdeen City	27.91	22.31	21.41	-20.07	-4.03	-23.29	10.74	10.66	10.93	-0.71	2.53	1.80	95.88	10.48	-1.59	4.11
Banff and Buchan	1.69	1.87	1.91	10.38	2.05	12.65	0.46	0.52	0.55	12.18	6.48	19.45	244.22	1.35	0.32	4.20
Gordon	0.29	0.45	0.62	58.84	35.67	115.51	0.20	0.28	0.35	42.31	24.03	76.51	78.25	0.27	1.48	4.76
Kincardine and Deeside	0.20	0.28	0.40	39.99	45.24	103.33	0.13	0.16	0.21	26.65	30.32	65.05	93.26	0.19	1.49	6.53
Moray	0.97	0.96	1.05	-0.57	9.31	8.68	0.32	0.35	0.37	10.06	4.32	14.82	184.38	0.68	2.15	2.84
Highland	0.30	0.33	0.34	11.16	2.62	14.07	0.06	0.07	0.08	14.73	8.96	25.02	338.69	0.26	0.29	4.20
Badenoch and Strathspey	0.05	0.05	0.06	10.29	18.54	30.74	0.04	0.04	0.05	9.39	17.57	28.61	30.51	0.01	1.06	12.81
Caithness	0.23	0.22	0.22	-1.91	-1.93	-3.80	0.15	0.15	0.15	-0.09	-0.87	-0.96	50.03	0.07	2.23	3.58
Inverness	2.36	2.09	1.79	-11.65	-14.09	-24.10	0.16	0.19	0.21	15.56	14.55	32.38	738.00	1.58	-0.97	4.00
Lochaber	0.08	0.09	0.09	4.48	-0.55	3.91	0.04	0.04	0.04	7.83	1.50	9.45	114.03	0.05	-0.36	-0.83
Nairn	0.72	1.23	1.27	70.80	3.23	76.32	0.19	0.23	0.25	18.65	10.20	30.74	404.66	1.01	0.32	3.97
Ross and Cromarty	0.18	0.25	0.27	37.44	9.07	49.91	0.06	0.09	0.09	34.98	9.09	47.25	184.26	0.17	1.00	4.29
Skye and Lochalsh	0.04	0.04	0.05	9.81	20.19	31.98	0.03	0.04	0.04	10.72	18.22	30.90	24.73	0.01	1.11	5.74
Sutherland	0.04	0.05	0.04	3.11	-2.24	0.80	0.02	0.02	0.02	3.50	2.24	5.81	104.03	0.02	-1.00	6.71
Lothian	16.82	14.76	14.26	-12.23	-3.41	-15.23	4.04	4.07	4.08	0.59	0.40	1.00	249.16	10.17	-8.51	2.33
East Lothian	3.63	3.41	3.65	-5.97	6.92	0.54	1.04	1.09	1.16	5.04	6.54	11.90	213.51	2.49	1.06	3.39
Edinburgh City	38.09	32.81	31.56	-13.85	-3.81	-17.14	17.11	16.02	15.78	-6.36	-1.49	-7.76	99.98	15.78	2.56	1.98
Midlothian	4.76	4.82	4.58	1.28	-5.11	-3.90	2.16	2.26	2.18	4.55	-3.47	0.92	109.62	2.39	1.47	2.35
West Lothian	4.10	5.61	5.84	37.06	4.04	42.60	2.60	3.20	3.36	23.17	5.04	29.38	73.71	2.48	0.80	2.75
Strathclyde	17.33	13.58	11.88	-21.63	-12.51	-31.43	1.83	1.72	1.63	-5.70	-5.30	-10.69	628.68	10.25	2.36	2.35
Argyll and Bute	0.19	0.20	0.20	2.01	4.17	6.26	0.09	0.09	0.10	5.90	3.60	9.71	107.52	0.11	1.16	4.34
Bearsden and Milngavie	12.17	13.59	13.85	11.73	1.84	13.79	9.66	10.76	11.10	11.37	3.20	14.94	24.71	2.74	0.58	2.57
Clydebank	29.66	24.49	20.40	-17.42	-16.72	-31.23	16.70	14.90	13.10	-10.80	-12.08	-21.58	55.71	7.30	1.38	1.95
Clydesdale (was Lanark)	0.73	0.83	0.87	13.88	4.40	18.89	0.39	0.42	0.43	8.63	1.73	10.51	101.01	0.44	2.54	2.20
Cumbernauld and Kilsyth	10.84	13.28	12.21	22.49	-8.04	12.64	4.45	5.99	6.08	34.77	1.43	36.69	100.80	6.13	-5.64	2.84
Cumnock and Doon Valley	0.81	0.85	0.84	4.45	-0.70	3.72	0.59	0.56	0.53	-6.08	-4.79	-10.58	59.28	0.31	0.15	2.19
Cunninghame	5.15	5.71	5.34	11.00	-6.55	3.73	1.37	1.53	1.53	11.14	0.41	11.60	248.17	3.81	-15.85	2.97
Dumbarton	3.23	3.13	3.12	-3.00	-0.41	-3.40	1.41	1.45	1.46	2.42	0.46	2.89	114.35	1.66	-0.89	2.98
East Kilbride	12.71	12.81	12.05	0.84	-5.97	-5.18	2.54	2.88	2.89	13.57	0.21	13.81	317.45	9.16	-27.86	1.89
Eastwood	13.89	12.82	13.51	-7.70	5.39	-2.72	4.25	4.61	5.18	8.41	12.29	21.73	160.89	8.33	0.44	3.02
Glasgow City	63.54	47.07	40.49	-25.92	-13.98	-36.27	47.32	37.34	32.77	-21.08	-12.25	-30.75	23.57	7.72	1.14	2.40
Hamilton	12.07	12.02	11.73	-0.42	-2.38	-2.80	7.83	8.18	7.98	4.47	-2.53	1.82	47.04	3.75	0.94	2.16
Inverclyde	18.78	16.22	13.88	-13.63	-14.41	-26.08	6.50	6.06	5.49	-6.82	-9.49	-15.67	153.10	8.40	1.52	2.68

Appendix B - continued

	Population Weighted Density (PWD)						Conventional Density						Density Ratios			Sensitivity
	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-1991	pers/hctr 1971	pers/hctr 1981	pers/hctr 1991	% change 1971-81	% change 1981-91	% change 1971-91	% by which PWD> Conv. in 1991	Absolute difference	81-91 change PWD/ Conv.	See note 5
Kilmarnock and Loudoun	6.35	6.08	5.61	-4.23	-7.84	-11.73	2.10	2.15	2.10	2.11	-2.30	-0.24	167.54	3.51	3.40	1.90
Kyle and Carrick	5.20	5.12	5.22	-1.50	1.81	0.28	0.81	0.84	0.85	4.20	0.34	4.56	515.68	4.37	5.25	1.49
Monklands	13.27	13.09	12.21	-1.33	-6.72	-7.97	6.75	6.54	6.10	-3.02	-6.81	-9.63	100.27	6.11	0.99	1.60
Motherwell	13.84	13.60	13.14	-1.71	-3.41	-5.05	9.00	8.64	8.24	-4.05	-4.58	-8.44	59.38	4.90	0.74	1.76
Renfrew	16.99	14.98	13.71	-11.79	-8.52	-19.31	6.35	6.50	6.24	2.46	-4.06	-1.70	119.71	7.47	2.10	2.46
Strathkelvin	9.26	9.91	9.49	7.06	-4.27	2.49	4.49	5.17	5.08	15.14	-1.68	13.21	86.74	4.41	2.54	2.24
Tayside	5.24	4.08	3.66	-22.22	-10.22	-30.17	0.50	0.50	0.51	-0.07	0.30	0.23	624.01	3.15	-34.28	2.01
Angus	1.10	1.09	1.16	-1.34	6.19	4.76	0.40	0.45	0.46	11.90	3.31	15.60	150.73	0.70	1.87	3.17
Dundee City	27.92	23.27	22.47	-16.67	-3.41	-19.51	8.11	7.52	7.02	-7.31	-6.57	-13.40	220.00	15.45	0.52	1.25
Perth and Kinross	0.90	0.78	0.77	-13.81	-0.59	-14.32	0.21	0.21	0.23	3.66	8.61	12.58	231.70	0.54	-0.07	2.55
Islands	0.23	0.27	0.28	15.42	3.45	19.40	0.11	0.13	0.13	16.54	-0.23	16.28	117.64	0.15	-15.09	9.10
Orkney	0.24	0.27	0.30	15.66	9.77	26.96	0.16	0.18	0.19	11.95	6.48	19.20	55.42	0.11	1.51	4.96
Shetland	0.26	0.32	0.33	23.04	1.01	24.28	0.11	0.16	0.15	37.36	-1.08	35.88	113.27	0.17	-0.93	17.65
Western Isles	0.22	0.24	0.24	7.87	0.91	8.84	0.09	0.10	0.10	7.14	-3.62	3.26	148.62	0.14	-0.25	4.15