Cathie Marsh Centre for Census and Survey Research

Representation and local democracy: geographical variations in elector to councillor ratios

CCSR Working Paper 2005-09
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A key principal of democracy is that for each political unit the number of electors per representative should be as equal as possible. Here we examine variations in elector to councillor ratios at local authority and ward levels in England and consider whether variations relate to ethnic minority population distributions.

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ABSTRACT

In democracies, one person's vote should count as much as another's. While a range of factors can affect this, including the electoral system, party support bases, party campaigning and the effectiveness and identity of representatives, a key principal is that for each political unit the number of electors per representative should be as equal as possible. Only when equality in electorate to representative ratios is established can equity in other demographic infrastructures be pursued. To achieve representation equality in English local authorities the Electoral Commission's Periodic Electoral Review process considers for each electoral ward the number of councillors, current and forecasted electorates and revisions to boundaries. Here, using 2005 boundaries, we examine variations in elector to councillor ratios in England. Comparing these ratios with 2001 Census data, we consider whether variations relate to ethnic minority population distributions.

We found considerable differences in representation ratios between four types of local authority. Generally, County Districts have fewer electors per councillor and therefore better representation ratios. There are progressively higher ratios for Unitary Authorities and London Boroughs; Metropolitan Districts have most electors per councillor. Comparing each ward's ratio with the representation of its associated district we found most wards lie within what might be considered an acceptable range of variation. Sub-district representation variability relates to urban-rural variations in ward extent and the use of one-, two- and three-seat systems. There is no evidence that variations in ward ratios relate systematically to distributions of ethnic minorities. Despite this, we advise utilising ethnic group demographic characteristics when forecasting electorates.

Keywords: Democracy; Representation; Boundary change; Electorate; Periodic Electoral Reviews

Representation and local democracy: geographical variations in elector to councillor ratios

INTRODUCTION

In a democracy, one person's vote should count as much as another's. A fundamental principal of democracy is that across each political unit the number of electors per representative should be as equal as possible. Political representation is multidimensional, however. Pitkin (1967) argues that representation is linked to the overall structure and functioning of the political system. Key issues are: the electoral system, the location of power, the party system, the size of the representative body, the candidate selection procedures; the identity, alignment, accessibility, activities, ability and accountability of representatives and the political knowledge of the electorate. Many of these aspects have been widely debated in political science including the effect of electoral systems on votes and seats won (Johnson *et al.*, 2001; Farrell, 2001) and the impact of the cultural, ethnic or gender characteristics of a representative (Phillips, 1995; Judge, 1999; Purdam, 2000).

Rallings *et al.* (2004) and Johnston (2002) have assessed the impact of boundary changes on electoral outcomes, particularly the division of areas in relation to core party support and resulting electoral bias. Rallings *et al.* (2004) argue that ensuring equality in councillor to electorate ratios does not guarantee equality of representation and that too much weight can be given to electoral equality (see also ODPM, 2004). However, it is only when equality in electorate to representative ratios is established that the equity of other infrastructures of democracy can be pursued.

In England, variation in electorate size is defended as acceptable to ensure that communities of interest (local ties) and identifiable geographic boundaries are reflected. Previous legal decisions have made it clear, however, that electoral equality does not solely relate to numerical equality; other criteria must also be considered[1].The aim is that boundaries do not cut across natural boundaries such as railway lines, main roads, motorways or rivers (Electoral Commission, 2002). Some account is taken of the geography of party support such that during boundary reviews the claims of political parties are balanced with the aim for equity in elector to councillor ratios.

It is notable that there is a lack of a legislative requirement in England for electoral equality (Electoral Commission, 2002). It is, however, part of the statutory framework and Section 13(4) of the Local Government Act 1992 places a duty on the Electoral Commission to direct the Boundary Committee for England to undertake electoral reviews of each local authority area in England at periodic intervals. The number of electors represented by each councillor to be elected must be "as nearly as may be" the same in

[1] Decision in the London Borough of Enfield v Local Government Boundary Commission for England (1979) 1 A11 ER 950,953 (upheld in the House of Lords [1979] 3 A11 ER 717)

every ward with variations from the electoral equality needing to be fully justified (Electoral Commission, 2002). Gay (1999) notes that large discrepancies in equality can mean that some votes have more weight than others for the same local election. Moreover, certain electors may have less access to a representative than others in the same political structure. This is important in the context of reforms of local councillor roles in the Local Government Act 2000 with the emphasis on reconnecting the electorate to their representatives. The perception and reality of representation equality is vital to underpinning public confidence in democracy and ensuring its future legitimacy.

In this paper, we use the terms 'representation' and 'electoral equality' in a restricted way to describe the ratio between the size of the electorate and the number of councillors. We examine the extent to which variations exist in the ratios of electors to councillors at both local authority district and ward levels in England in 2005. We consider whether any variations relate to spatial concentrations of ethnic minority populations. This is particularly important in relation to the engagement of such populations in the democratic process (Purdam *et al.,* 2002). We begin by looking at the structure of local government, population change and the boundary review process.

PERIODIC ELECTORAL REVIEWS

In terms of local government geography, the UK has experienced numerous administrative boundary changes over time (ONS, 2003). In the 19th Century, the Local Government Act of 1888 created a structure of sub-county local administration, consisting of County Boroughs, Municipal Boroughs, Urban Districts and Rural Districts with the system of dividing local councils into wards dating back further to 1835. Although there were widespread detailed changes in the 1930s and local government units in London were revised in 1965, the same basic system survived until Redcliffe-Maud's major reforms were implemented in 1974. In the late 1990s there were substantial revisions with the creation of Unitary Authorities in some areas. Sub-district ward geography is particularly dynamic.

The Local Government Act 1992 requires that electoral arrangements in every local authority (LA) in England are reviewed on a periodic basis (Electoral Commission, 2002). The primary objective of these 'Periodic Electoral Reviews' (PERs) is to ensure that for the wards within each local authority area the number of electors represented by each councillor is as near as possible the same. PERs do not consider variations between LAs. PERs are necessary because of changes in electorates over time; change which is not evenly distributed across space (ONS, 2003). Electorates potentially increase in size when a cohort of 'attainers' become 18 and/or where there is net adult in-migration. Electorates potentially reduce through deaths and/or where there is net adult out-migration. A population's age structure will influence the balance between those achieving their majority with those who are dying, paralleled by the distinct migration patterns typical for different age-groups. In some locations the tendency is for people to age *in situ*; other areas have more transient populations (Rees *et al.,* 2004).

During the PER process the Electoral Commission and Boundary Committee for England work in conjunction with LAs to take account of various circumstances including: (i.) the need for convenient and effective local government; (ii.) reflecting the identities and interests of local communities[2]; and (iii.) delimiting identifiable electoral boundaries. The onus is on LAs to submit review proposals and lead in developing locally derived electoral schemes. The Electoral Commission can then recommend: (a.) changes to the number of councillors in each ward; (b.) changes to the locations of ward boundaries; and (c.) the creation of new wards.

The Electoral Commission considers the number of people currently represented by each councillor and utilises forecasts of changes in electorates over the following 5 years. The PER process has successfully equalised previous imbalances (Electoral Commission 2005c; Rallings *et al.*, 2004). The last cycle of PERs was completed in October 2004 and the Electoral Commission is currently assessing areas where electoral equality was found to be worse than expected (Electoral Commission, 2002; 2005c). It is notable that the Electoral Commission is presently consulting on the PER process and the value attached to different criteria for balancing equality, effective and convenient local government and the interests and identities of local communities (Electoral Commission, 2005c).

In England the system of the number of councillor 'seats' in each ward varies by LA type. Four types of authority currently exist: County Districts (CDs), London Boroughs (LBs), Metropolitan Districts (MDs) and Unitary Authorities (UAs). Table 1 shows CDs and UAs have multi-seat systems with a mixture of one-seat, two-seat and three-seat wards. The LBs are predominately, and MDs exclusively, three-seat wards. Gay (1999) notes that single councillor wards are more common in rural areas, reflecting lower population densities.

Table 1: Structure of councillors/seats per ward by LA type: England 2005

Ward counts	One seat	Two seats	Three seats	Totals
CDs	1748	2277	1424	5449
LBS	1	9	614	624
MDs	0	0	815	815
UAs	189	355	484	1028
Totals	1938	2641	3337	7916

[2] For a recent Electoral Commission review of community identity and PER see Chisholm and Dench (2005).

DATA AND METHODS

We use the latest available elector and councillor data compatible with the boundary definitions in place in December 2004 and released as the 2005 electorates. The counts of electors for 2005 are the adults eligible to be on electoral registers and who registered to vote by 10th October 2004. The elector and councillor data were supplied by the Electoral Commission. Since we wished to compare the distribution of electors with the distribution of ethnic minority populations we obtained information for voting age adults categorised as white and the sum of all other ethnic groups from the 2001 Census. The 2001 Census data were downloaded from the Census Dissemination Unit at the University of Manchester (MIMAS, 2005). 2001 Census digital ward boundaries were downloaded from the UKBORDERS server at the University of Edinburgh and the 2004 ward boundaries were supplied by Ordnance Survey (OS). Three English LAs are omitted from this work since their electorate data were not supplied by the Electoral Commission and March 2005 boundary changes in Stockton-on-Tees (UA) created unsolvable geographical compatibility problems (see below). In our study then there were 352 LAs and their 7,916 constituent wards.

We calculated representation ratios (electors / councillors) for local authorities and wards in England. We examined these ratios to determine whether any variations (percentage difference between each ward and associated local authority ratio) relate to the distribution of ethnic minority adult populations. We devised two categorisations relating to representation and ethnic diversity through which to present summary findings. These were defined as follows:

1. Representation typology

To highlight substantial representation differences for wards the following categorisation was devised:

- **Under-represented**. Over 10% greater than the LA ratio (total electorate across all wards / total number of councillors in an LA). i.e. There are more electors per councillor than the representation ratio for the district as a whole.
- **Average representation**. Within ±10% of the LA ratio. The Electoral Commission has an aim ideally to achieve variations of ±5% from the LA ratio but acknowledge this is stringent in reality (Electoral Commission, 2005a).
- **Over-represented**. More than 10% lower than the LA ratio. i.e. There are fewer electors per councillor than for the district as a whole.

Such a typology is a little crude but allows an insight into variations in representation ratios across different wards and authority types. The published guidance allows for variations up to ±10% without particular justification. However, the Electoral Commission state that they expect variations to be well within this figure (Electoral Commission, 2002). We note that Johnston *et al.* (2004) cite the Electoral

Commission as having informed London Boroughs that inter-ward electoral variations of greater than 2-3% would only be acceptable in exceptional circumstances.

2. Diversity Typology

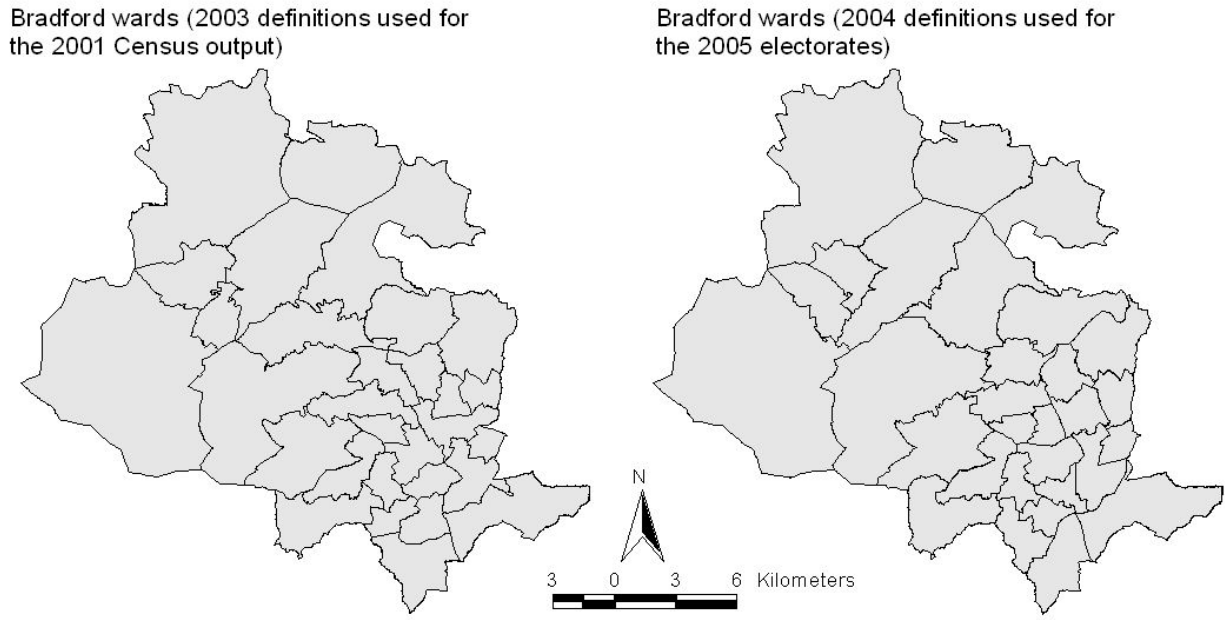
To classify wards by their ethnic diversity we utilised a categorisation developed for the Department for Work and Pensions in analyses of the labour market circumstances of UK ethnic minorities (Simpson *et al.*, 2005):

- **Unmixed.** Wards where the adult white ethnic group is 87% (the national average) of the ward adult population or greater.
- **Mixed.** Wards where the white ethnic group comprises more than 50% but less than 87% of the population.
- **Diverse.** Wards with an adult population comprising more than 50% persons in ethnic groups other than white.

Boundary Changes

To compare variations in representation ratios and distributions of ethnic minority adults we needed to make the 2001 Census and 2005 councillor and elector data geographically consistent. Many areas experienced boundary changes between the 2001 Census (data were disseminated for the 2003 ward boundary definitions) and the electoral wards existing in 2005 (released for the end of 2004 ward definitions). Fig. 1 shows the extent of boundary changes in Bradford (MD) where only two wards remained unchanged.

Figure 1: Ward boundary changes in Bradford (MD)



Simpson (2002b) and Norman *et al.* (2003) devised methods to convert between different geographical systems and thereby ensure data are geographically consistent when ward boundaries change. Socio-demographic data can be apportioned between boundary systems using counts of unit postcodes weighted by population headcounts to allow for unequal population distributions across geographical areas. This technique is well-established and has been used, for example, to ensure that population and health data are adjusted to a consistent ward geography over time (see Rees *et al.*, 2003; Rees *et al.*, 2004; Norman and Simpson, 2005). Thus the 2001 Census data on adults by whites and all other ethnic groups were converted to be consistent with the geography of the 2005 electorates with the ward names and codes checked against the Office for National Statistics (ONS) 'Ward History file' (ONS, 2005a). This stage of our research revealed differences in area names and alphanumeric coding systems used by the Electoral Commission, ONS and OS. This is despite the ONS led promotion since the late 1990s of a harmonised cross-departmental approach to the geographic aspect of statistics including standard names and codes (ONS, 2003). The digital boundaries supplied by OS were for late 2004 but in Stockton-on-Tees (UA) boundary definition changes occurred in March 2005. In this LA, geographical data conversions were not possible.

RESULTS

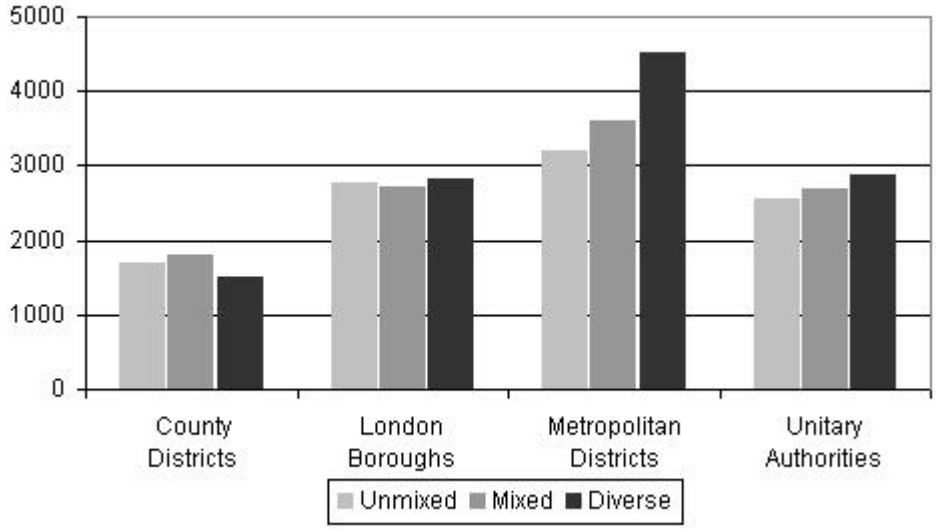
First we present results for local authorities summarised by type and by the representation and ethnic diversity typologies. Second, we describe results for wards. Finally, we use case studies to illustrate examples of representation variation.

Variations in representation ratios for Local Authorities

The total number of electors and councillors in each LA type result in considerable differences in representation ratios. Overall CDs have a ratio of 1,694 electors per councillor, UAs 2,564, LBs 2,745 and MDs the most electors per councillor at 3,307. There are wide differences within each type though: ratios in CDs range from 628 electors per councillor in Teesdale to 3,192 in Northampton; UAs range from 1,039 in Rutland to 4,049 in Bristol, LBs from 1,826 in Kensington to 3,760 in Bromley; and MDs from 1,732 in Knowsley to 5,290 in Birmingham. LAs also vary considerably in size in terms of both numbers of electors (in 2005 from 20,083 to 710,349) and councillors (from 24 to 120). The Electoral Commission accept these differences as being the result of the historical development of political structures in England and acknowledge such differences are largely beyond their control (Electoral Commission, 2005a).

With the electorates and councillors summed by the diversity categorisation described above for each LA type, Fig. 2 highlights the low ratios found in CDs and that the lowest ratios are in the diverse category (although only five wards are in this category). In the LBs there is little evidence of differences in relation to diversity. The MDs have a gradient of increasing ratios across diversity categories, all higher than the other LA types. In UAs there are shallow increasing representation ratios across the diversity categories.

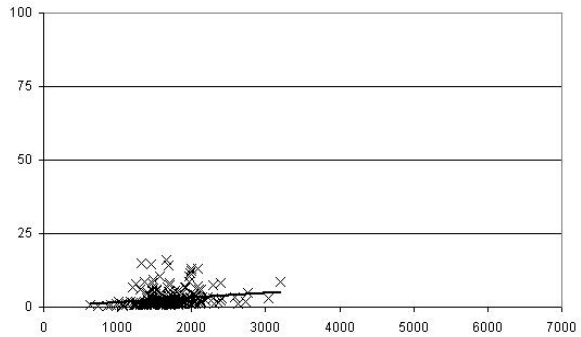
Figure 2: Representation ratios by LA type and ethnic diversity



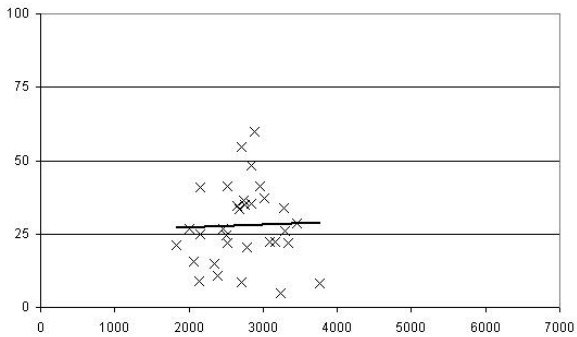
Ethnic minority populations tend to be concentrated in the more urban areas. It is important to identify if these locations are the LAs with lower overall levels of representation. The scatterplots in Fig. 3 show LA level relationships between representation and ethnic minority adult populations. The correlation in LBs, where the largest percentages of ethnic minorities are found, is just +0.03 (p = 0.00). The trend lines suggest weak positive relationships in UAs (R = +0.15, p = 0.00) and in CDs (R = +0.20, p = 0.00). Metropolitan Districts have a somewhat stronger positive correlation (R = +0.45, p = 0.00) which suggests that ethnic minority populations are more predominant in the MDs which, at LA level, have lower levels of representation.

Figure 3: Relationship between LA representation ratios (x axis) and % ethnic minority adults (y axis)

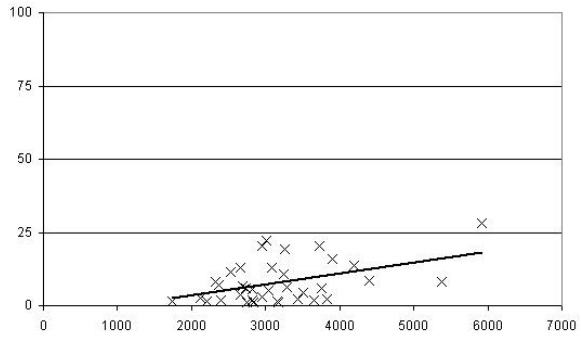
a.) County Districts



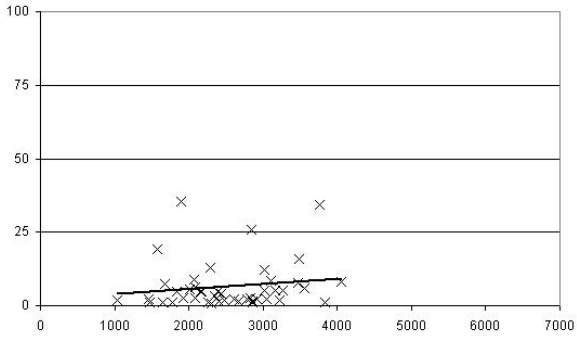
b.) London Boroughs



c.) Metropolitan Districts



d.) Unitary Authorities



The LA level analyses reported above show that differences in representation ratios between and within each of the LA types can be quite marked. Also, those MDs with larger ethnic minority populations tend to have higher elector to councillor ratios. It is, however, variation in representation ratios between wards within any one LA which is the primary focus of the PER process. We consider ward variations in the following section.

Variations in representation ratios for wards

Table 2 shows the numbers of wards in each LA type categorised by the representation typology. Across England nearly 83% of wards are within 10% of their respective LA and there is effectively a balance between under- and over-represented wards. This pattern is consistent across all LA types. At over 93%, LBs have the largest proportion of wards within 10% of their LA. At 80% CDs have the lowest proportion, but still a balance between under- and over-representation.

Table 2: Numbers of wards by LA type and representation category

LA type	Under-represented	Average representation	Over-represented	Totals
CDs	566 (10.39%)	4362 (80.05%)	521 (9.56%)	5449 (100%)
LBs	18 (2.88%)	583 (93.43%)	23 (3.69%)	624 (100%)
MDs	35 (4.29%)	740 (90.80%)	40 (4.91%)	815 (100%)
UAs	91 (8.85%)	854 (83.07%)	83 (8.07%)	1028 (100%)
Totals	710 (8.97%)	6539 (82.60%)	667 (8.43%)	7916 (100)%

We aim to determine whether variations in representation relate to the presence of ethnic minority adult populations. The totals of wards in the right hand column of Table 3 show an uneven distribution of the ethnic diversity categories across the LA types. In CDs unmixed wards predominate, but in London the majority of wards are of mixed ethnicity and the LBs contain the largest number of diverse wards in England. Whilst the MDs and UAs have mainly unmixed wards, both of these LA types have substantial numbers of mixed and diverse wards.

Table 3: Numbers of wards by LA type, representation and ethnic diversity categories

LA type	Diversity	Under-represented	Average representation	Over-represented	Totals
CDs	Unmixed	562	4260	508	5330
	Mixed	4	98	12	114
	Diverse	0	4	1	5
	Total	566	4362	521	5449
LBs	Unmixed	2	131	2	135
	Mixed	9	388	18	415
	Diverse	7	64	3	74
	Total	18	583	23	624
MDs	Unmixed	33	593	30	656
	Mixed	2	127	10	139
	Diverse	0	20	0	20
	Total	35	740	40	815
UAs	Unmixed	78	773	70	921
	Mixed	4	73	13	90
	Diverse	9	8	0	17
	Total	91	854	83	1028
	Totals	710	6539	667	7916

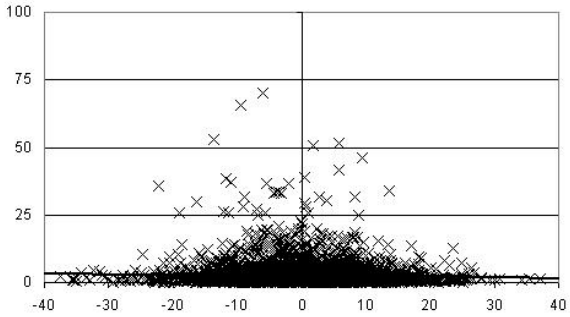
In CDs, the vast majority of mixed ethnicity wards have representation ratios within 10% of their district's overall ratio but substantial numbers of wards are either under- or over-represented. There are only five diverse wards. For each diversity category in the LBs, the majority of wards are of average representation with generally a fair balance between under- and over-representation. This indicates no difference in representation whether or not a ward is ethnically diverse. For unmixed wards in MDs the same pattern exists. For the mixed wards, slightly more are over-represented than under-represented, but all ethnically diverse wards in MDs have representation within ±10% of their respective LA ratio. UAs have mainly unmixed wards, most of these have average representation. The majority of mixed wards have average representation ratios but more are over- than under-represented. Of the seventeen wards of diverse ethnicity in UAs, none are over-represented, eight are average but nine are under-represented.

We investigate this further by examining the relationship between percentage variation from each ward's LA representation ratio and the ward percentage of persons in ethnic groups other than white (Fig. 4). The

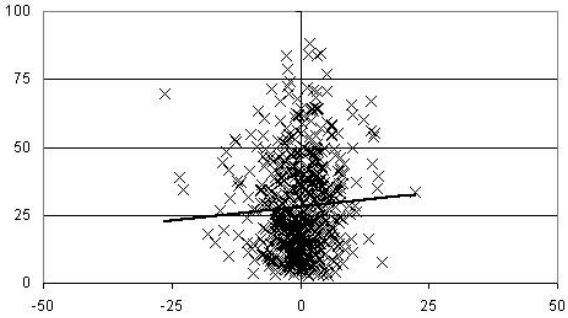
general clustering between ±10% variation and symmetry around zero percentage difference indicates a lack of systematic relationship with ethnicity and a balance between under- and over-representation. LBs have substantial numbers of wards with high percentages of ethnic minorities; despite the trend line on the graph, a correlation of +0.06 (p = 0.00) indicates no relationship. The situation is similar for MDs (R = -0.08, p = 0.00). In CDs and UAs, whilst there are no apparent relationships between ward variation and ethnic minority adult populations (CDs: R = -0.05, p = 0.00; UAs: R = +0.04, p = 0.00) and the balance persists between under- and over-representation, there is substantially more variation from the LA ratios, especially for CDs.

Figure 4: Relationship between % variation from each ward's LA representation ratio (x axis) and the ward % of ethnic minority adults (y axis)

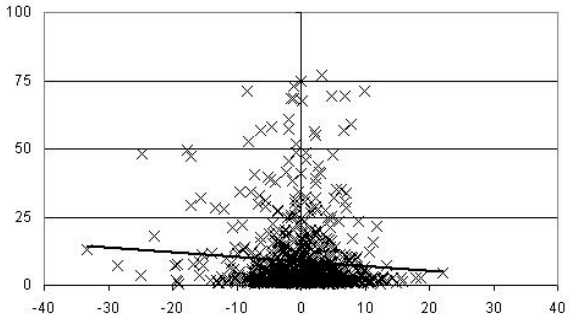
a.) County Districts*



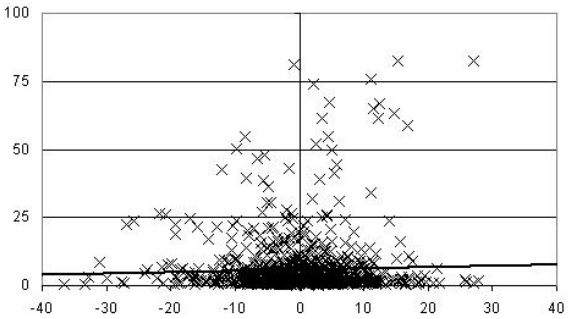
b.) London Boroughs



c.) Metropolitan Districts



d.) Unitary Authorities



**A minority of observations are beyond the range of –40% to +40% variation*

Local authority district case studies

For any one LA, the relationship between variation in ward representation ratios and presence of adults in ethnic groups other than white might differ from the overall situation for each LA type. We therefore examined the LAs with the largest ethnic minority adult populations. Indicators used are the correlation between ward variation from the LA ratio and the percentage ethnic minority population and the standard deviation of ward variation.

Table 4 lists the LAs with the largest percentage ethnic minority adults for each type. Of the CDs only Watford has a positive correlation between ward level percentage of population in ethnic groups other than white and variation from the LA representation ratio. All but two wards in Watford are between ±5% of the district's ratio and despite the positive correlation there is no geographical coincidence of under-representation and ethnically mixed or diverse wards. A very similar situation exists in the LBs of Newham, Brent and Ealing where the vast majority of wards are within ±10% of their respective LA level ratios. All of the LBs and MDs in Table 4 have mean variations of zero indicating a balance of under-and over-enumeration. For MDs, all but Birmingham (R = +0.07, p = 0.00) have negative correlations between percentage in ethnic groups other than white and ward variation suggesting that wards with larger ethnic minority populations experience better than average representation.

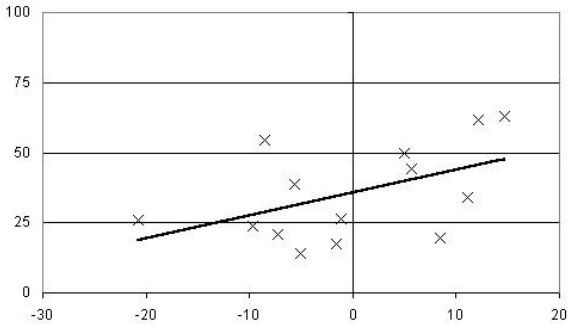
Table 4: Summary measures for case study local authorities

	Local authority	Mean of ward variation	Standard deviation of ward variation	% Ethnic minority adults	Correlation of ward % ethnic minority & variation
CDs	Oadby & Wigston	-0.50	7.14	16.02	-0.39
	Pendle	0.05	5.15	15.07	-0.37
	Preston	-0.68	16.13	14.48	-0.40
	Watford	0.00	4.35	14.05	0.29
	Bedford	1.98	9.94	13.03	-0.11
LBs	Newham	0.00	7.08	60.59	0.37
	Brent	0.00	7.27	54.72	0.30
	Tower Hamlets	0.00	11.95	48.60	-0.22
	Ealing	0.00	3.25	41.28	0.26
	Harrow	0.00	5.07	41.23	-0.26
MDs	Birmingham	0.00	6.99	29.65	0.07
	Wolverhampton	0.00	6.39	22.20	-0.43
	Bradford	0.00	6.98	21.73	-0.20
	Sandwell	0.00	3.78	20.30	-0.31
	Manchester	0.00	7.63	19.04	-0.11
UAs	Slough	-0.17	10.11	36.30	0.49
	Leicester	0.14	12.24	36.15	0.52
	Luton	-0.18	6.28	28.10	0.66
	Blackburn with Darwen	0.09	8.42	22.08	0.14
	Nottingham	-0.32	6.60	15.09	-0.26

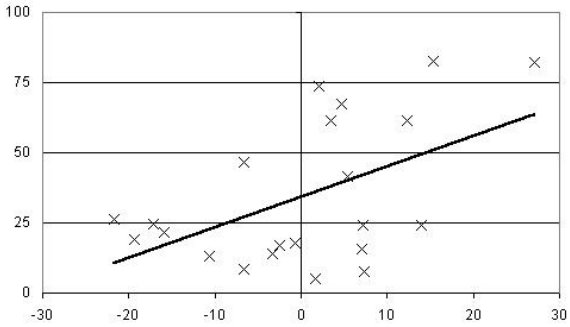
In UAs the situation appears somewhat different. Table 4 shows that the four with the largest ethnic minority adult populations all have positive correlations, a mean variability away from zero and large standard deviations. These measures suggest that as ward percentage ethnic minority adults increases, so does the representation ratio (i.e. there are more electors per councillor) and also indicate somewhat skewed and relatively large variability away from the district level representation ratios. Fig. 5 shows that for both Luton and Leicester there is a wide range of variability in terms of both under- and over-representation and in scatter about the trend lines. In Luton, the levels of variability and scatter are less and the correlation ($R = +0.66$ $p = 0.00$) indicates a stronger relationship between ethnic minority populations and poorer representation than elsewhere. This is illustrated by the mapped distributions of the representation and diversity categories in Fig. 6 which show that the two under-represented wards are ethnically diverse. It must be noted, however, that all but three wards are within ±10% of the district's ratio. In Blackburn with Darwen, there is a large amount of variability both above and below the district's ratio whether or not wards have large ethnic minority populations.

Figure 5: Unitary Authorities: relationship between % variation from each ward's LA representation ratio (x axis) and the ward % of ethnic minority adults (y axis)

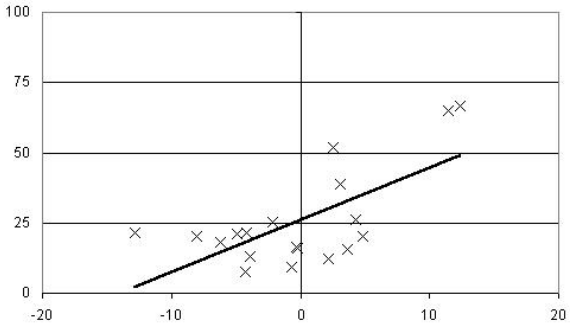
a.) Slough



b.) Leicester



c.) Luton



d.) Blackburn with Darwen

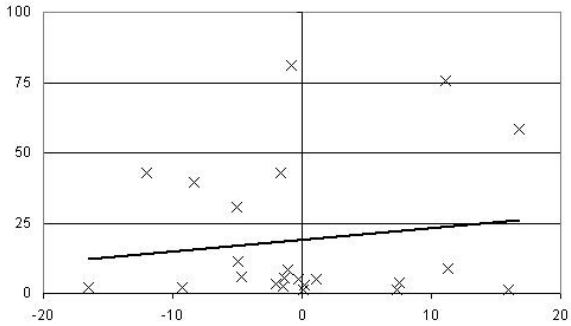
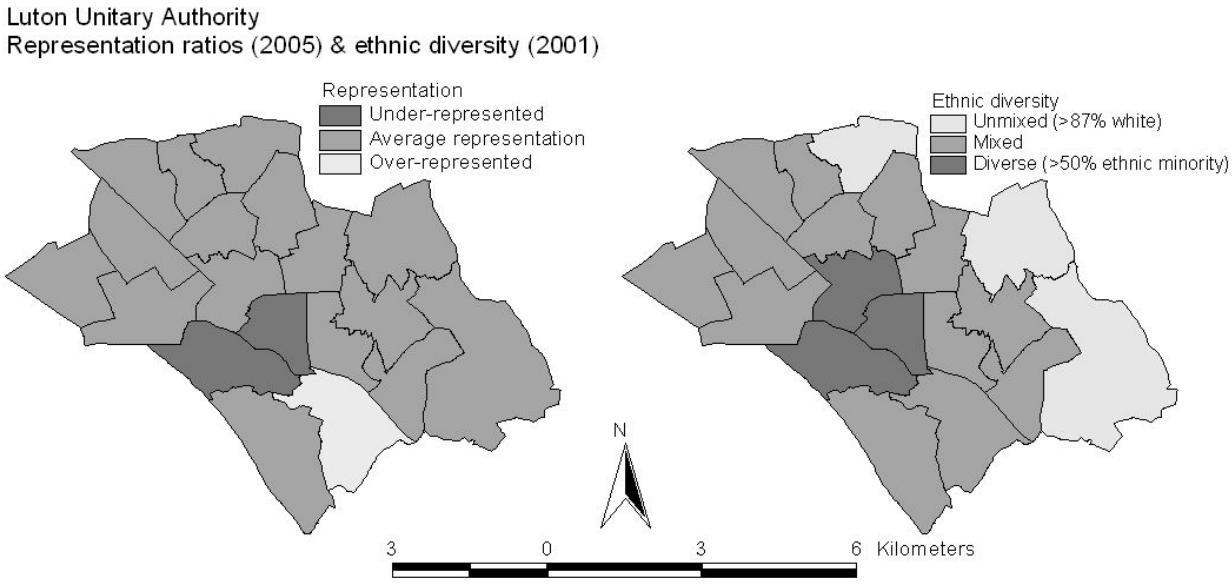


Figure 6: Luton Unitary Authority: distribution of representation and ethnic diversity categories



We have focused above on LAs with relatively large ethnic minority adult populations and used the standard deviation as an indicator of variability in ward representation. Thus we now consider those LAs with large standard deviations (SDs) to investigate further how variations in representation may occur. Of the 20 LAs with the largest SDs, 18 are CDs. The five highest are listed in Table 5. Of these, Corby CD is described below since the situation is typical but the LA has a small number of wards and is thus more straightforward to describe.

Table 5: Local authorities with the highest standard deviations of ward representation variation

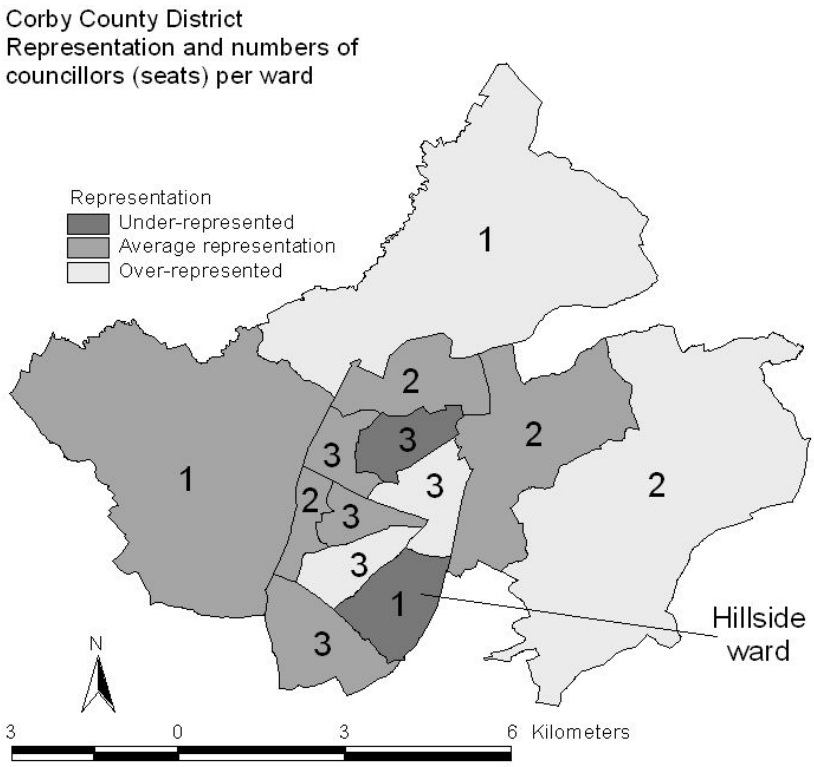
LA type	LA name	Mean of ward variation	Standard deviation of ward variation	% Ethnic minority adults
CD	Chichester	2.77	26.67	1.65
CD	Corby	1.97	26.32	1.64
CD	North Kesteven	1.72	25.82	1.08
CD	North Hertfordshire	1.93	18.18	6.78
CD	Basingstoke & Deane	0.49	16.80	3.43

Corby, as with many County Districts, has a variety of one-, two- and three-seat wards. The wards vary in areal extent from those in the town centre to those in the more rural periphery (Fig. 7a). All of the three-seat wards are located in the town centre, the two-seat wards are more suburban and the one-seat wards more rural. There are obvious exceptions: an extensive two-seat ward in the east of the district and a one-seat ward (Hillside) to the south of the town centre. There is no apparent geographical relationship between numbers of seats and under- or over-representation. Fig. 7b graphs ranked counts of electors by number of councillors per ward and the percentage variation from the LA's representation ratio on a separate y axis. The three-seat wards all have more electors than the other wards but the wide range of

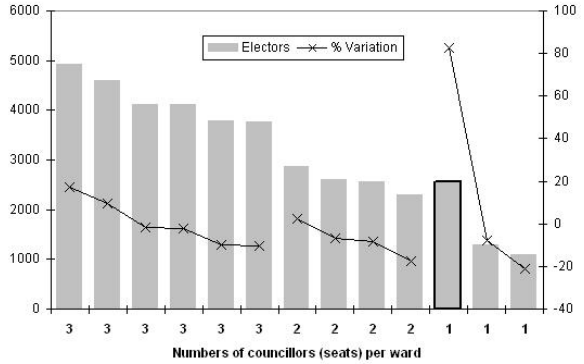
electors results in substantial variations in representation relative to Corby. Representation in the two-seat wards is more consistent; all but one are within ±10% of the district. There are three wards having one councillor, but one ward in each of the three representation categories due to differences in electorate size. Hillside ward is marked on the map and in Fig. 7b the bar of the number of electors is highlighted. 2,557 electors in Hillside ward are represented by one councillor, resulting in a representation ratio over 80% higher than the district ratio of 1,401. There is no relationship between the district's 1.64% ethnic minority adults and variations in representation (Fig. 7c). The combining of ward elector counts (which are continuous data) with numbers of councillors/seats (which are categorical data) across urban-rural geographic space in Corby is one of the more extreme examples of variability, but the issues are typical. We note that the Boundary Committee for England carries out 'Further Electoral Reviews' in areas where the PER process identifies electoral equality as being worse than expected. Corby is one of these locations (Electoral Commission, 2005b).

Figure 7: Corby County District: components influencing variations in representation

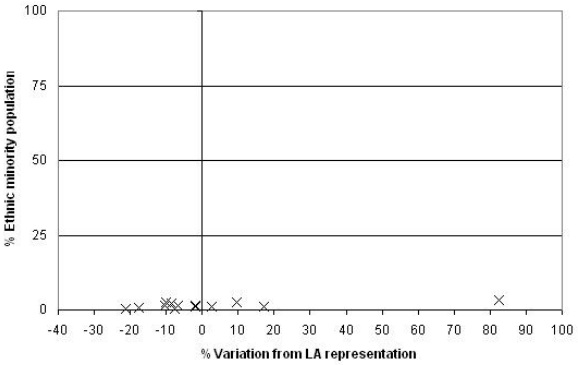
a.) Distribution of numbers of councillors (seats) per ward and representation categories



b.) Electors, councillors (seats) and representation variation in Corby



c.) Relationship between % variation and ethnicity in Corby



The SDs of percentage variation from each ward's respective LA ratio indicate overall levels of sub-district variability for each LA type. Across the CDs we find the highest SDs (9.02) followed by the UAs (8.24). MDs and LBs have lower SDs (6.22 and 5.36 respectively) indicating more consistent representation. Increased variability in representation ratio relates to the urban-rural gradients which are common in CDs and UAs and are combined with one-, two- and three-seat systems traditional in these LA types. The more urban environments and three-seat systems in LBs (predominant) and MDs (mandatory) appear to result in less variation in representation.

DISCUSSION

Using elector to councillor ratios at local authority level for 2005 we have found marked differences in representation ratios between and within each of the types of authorities in England. These differences tend to persist because to improve the ratios in the more populous LAs (e.g. Birmingham where 710,349 electors are represented by 120 councillors) would mean increasing the number of councillors, potentially making the council unwieldy and reducing each councillor's power. Conversely, LAs with small populations and advantageous representation ratios cannot have numbers of councillors reduced below a point at which the council cannot operate. The differences we find in LA representation ratios are substantial and cannot be ignored when considering the infrastructure of democracy and representation in England.

However, it is the aim for equality in elector to councillor ratios between wards in any one LA that is fundamental to the Electoral Commission's Periodic Electoral Review process. Indeed, the Electoral Commission and Boundary Committee for England can only seek equality of representation *within* a local authority area, not *between* areas. Moreover, during the PER process advice can be given on changes to sub-district ward boundaries but the Boundary Commission for England has no power at present to recommend changes to external LA boundaries (Electoral Commission, 2002).

When we investigated each ward's ratio in comparison with the overall level of representation for its associated district we found the majority of wards lie within ±10% variation. This range of variation is considered acceptable by the Electoral Commission (2005a). Although ethnic minority populations tend to live in the more populous LAs (mainly London Boroughs and Metropolitan Districts), we found no evidence to indicate that poorer ward representation ratios relate systematically to distributions of ethnic minority adult populations. The evidence is not strong, but in some Unitary Authorities there is a tendency for wards with relatively large ethnic minority populations to have less favourable representation ratios. Despite CDs and UAs generally having better representation ratios than LBs and MDs, we found greater amounts of ward level variability in these LA types. On the whole, the Electoral Commission's PER process is successful in achieving ward level equality in representation ratios within their stated parameters. However, some questions remain about the size of the differences that are considered acceptable and about whether aspects could be improved in some CDs and UAs in terms of the Boundary Committee for England's consideration of the number of councillors, the location of boundaries and the current and forecasted electorates in each ward.

In CDs and UAs, the tradition of having one-, two- and three-seat wards appears to offer greater flexibility than the three-seat systems which dominate LB and MD councils, yet these LA types have less within-district variability. The adoption of all three-seat wards in CDs and UAs is impractical since many have rural wards with sparse populations. Wards in these types of locations invariably have large areal extents, even with just one councillor. A multi-seat system allows, in theory, large gradients in urban-rural population density to be accommodated. However, the categorical nature of multi-seat systems results in discontinuities in ratios at the changeover points between numbers of councillors (as implied in Fig. 7b for Corby). Wards with two or three seats are never likely to have their boundaries delimited with electorates twice and three times as large as the electorates in one-seat wards.

A further consideration is the need for ward boundaries to "reflect the identities and interests of local communities" (Electoral Commission, 2002: 5). In rural areas, the areal extent of villages are readily identifiable and other geographies, particularly the traditional parishes, are known and often favoured by local people. There may then be less flexibility in the location of ward boundaries than in urban conurbations where communities are hard to delimit and therefore less of a constraint on boundary reviews. Thus the adjustment of a shared boundary to equalise electorates in two wards each with three councillors in the city centre of Bradford (MD) will be more readily achievable and perhaps less locally contentious than in the contiguous multi-seat system County District of Craven which includes a number of very rural wards in the Yorkshire Dales. Evidently, in any location there may be conceptual and technical difficulties in creating a correspondence between communities of interest and territorially bounded communities (Forest, 2004). To reflect identities, particularly in urban areas, it can be argued

that defining administrative boundaries which differentiate communities would be counter-productive to social integration.

During the PER process the Boundary Committee for England considers each area's current electorate size as well as changes (proposed by the LA) in the number and distribution of electors likely to occur over the next five years (Electoral Commission, 2002). Population forecasts are operationalised by ageing on a base population and applying a range of plausible fertility, mortality and migration rates. Forecasts can include location-specific drivers of population change such as planned new housing developments (Simpson, 1998). Population forecasts are made more complex when exploring the impact of redefining ward boundaries. Since a population's structure largely predicts later demographic birth, death and migration events, redefining boundaries also redefines population composition and has a knock-on affect on the population's subsequent size and characteristics. We would stereotypically anticipate, for example: a youthful population to be more fertile and more migrant over longer distances; a more middle-aged population to live in suburban locations and to age *in situ*; and a more elderly population to experience higher levels of mortality and to migrate for care-related reasons. The PER process needs to take account of what can be quite rapid changes in population in certain areas.

We have noted in some UAs a tendency for locations with relatively large ethnic minority populations to be slightly less well represented. In relation to population forecasts, there are good reasons for including information by ethnic group since some sub-groups often have population structures and fertility, mortality and migration rates distinctive from the population as a whole (Haskey, 2002). It could be that differential population change, not anticipated in electoral forecasts, has influenced representation variability in UAs. This will be exacerbated by the urban-rural gradients and multi-seat systems discussed above.

Changing a ward boundary not only directly affects the age-sex structure of the base population being forecasted, but creates practical difficulties in carrying out a forecast since the composition of the newly delimited population will be unknown. In the 2001 Census 'Output Areas' (OAs) nested within the 2003 wards and they were the most local geography used for Census data dissemination (Martin, 2002; ONS, 2003). ONS are consulting on geographies to be used for the 2011 Census including the proposal that 2001 OAs be held constant over time (ONS, 2005b). Where ward boundary changes have occurred since the 2001 Census, OAs will no longer nest within those wards. During the post-censal period, if OAs were used as building bricks of new wards during the PER process this would inform on the population age-sex structure (as well as provide ethnic group information) and thereby aid the forecasting and analysis of electorates. As well as the decennial census, other regularly released administrative data on, for example, benefits claimants and Vital Statistics on births and deaths are also disseminated for wards. Boundary changes create discontinuities in time-series data and difficulties in analysing change over time (see

Norman *et al.*, 2003; Norman, 2004; Rees *et al.*, 2004). If ward boundaries were changed by whole OAs, the geographical harmonisation of other socio-demographic data would be simplified. Moreover, effective dialogue between the Electoral Commission, the Office of National Statistics, the Ordnance Survey and local authorities regarding area names, data codings and dates of changes together with accessible and compatible file formats would underpin accurate and efficient electoral and social science analyses.

The stage in the PER process may also be influencing results. For example, if LBs and MDs have recently had ward adjustments made, this may well explain the lack of correlation between under-representation and ethnic group composition. Growing ethnic minority populations will over the next few years increase the electorates in diverse and mixed wards and as a result may increase correlations with under-representation. The Electoral Commission (2005c) report that for most councils it has been 20–25 years from their previous electoral review to the latest round in 2004. Reviews themselves took eight years to complete. More frequent reviews would clearly maintain a more even equality in relation to electorate and councillor numbers.

In our study there are data quality issues to consider. The counts of electors for 2005 are adults eligible to be on electoral registers and who registered to vote by 10th October 2004. Despite registration being mandatory, non-registration occurs (Norman, 1997; Purdam *et al.*, 2005). Only limited data on non-registration exists but evidence suggests it is concentrated in certain population sub-groups (including ethnic minorities, the unemployed, students, recent migrants and persons in private rented accommodation) and types of location, particularly those which are more deprived (Pattie *et al.*, 1996; Smith, 1993; Todd and Butcher, 1982). Recent research by the Electoral Commission (2005d) using the 2001 Census and the Labour Force Survey suggests that non-registration in 2000 was around 9%. Non-registration is thought to be as high as 25% amongst certain groups and in certain urban areas (Dorling *et al.*, 1996). Young people are more likely not to be registered than older people with, for example, a 2001 BBC Radio 1 first time voters poll revealing that 15% of respondents were not registered to vote (Newsbeat, 2001). Among ethnic minority populations, those of black Caribbean and black African heritage have the highest levels of non-registration (Anwar, 1998) and the recent research by the Electoral Commission (2005d) found an estimated 37% of black African and 30% of Chinese people were not registered to vote. However, many of these results are based on limited sample sizes and some non-registered people may be ineligible to be on electoral registers due to their country of birth.

If electors are undercounted in some wards, these locations will artificially appear to have better representation ratios. The range of variability found in this study may have been somewhat tempered, particularly in Metropolitan Districts and London Boroughs where non-registration rates have been shown to be high. A refinement would be to scale electorates using undercount evidence should this become available. When representation variability is compared with 2001 Census adult distributions of all

ethnic minorities, undercount distortions should be minimal since Census data are affected by the same factors as electoral registration (Rees *et al.*, 2004; Simpson, 2002a). We have, of course, also compared distributions obtained at different time points, April 2001 and October 2004.

CONCLUSIONS

A fundamental aspect of democracy is that one person's vote should count as much as another's. A key principal is that across each political unit the number of electors per representative should be as equal as possible. It is only when equality in electorate to representative ratios is established that the equity of other infrastructures of democracy such as the electoral system, the role of political parties and the elected representatives themselves can effectively be pursued. To achieve this democratic equality in English local authorities, the Electoral Commission's Periodic Electoral Review process considers for each ward the number of councillors, current and forecasted electorates and the location of the ward's boundaries.

Using elector to councillor ratios at local authority level for 2005 we found marked differences in representation ratios between and within each of four types of authority in England. These differences have considerable implications for the equity of representation and democracy more generally in England. It is the somewhat more limited aim of equality in elector to councillor ratios between wards in any one local authority that is the primary objective of the PER process. We found that when each ward's ratio is compared with the overall level of representation for its associated district the majority of wards are within a ±10% range of variation.

Comparing the ward representation ratios with Census data we found no evidence to indicate that variations in ward representation for 2005 relate systematically to 2001 distributions of ethnic minority adults in the London Boroughs and Metropolitan Districts; the local authority types with the largest ethnic minority populations. We recognise that any results obtained here relate to the registered electorate and that for any one local authority reflect the stage in the implementation of boundary reviews reached by 2005.

Whilst County Districts and Unitary Authorities generally have better representation ratios than the LBs and MDs, these LA types tend to have higher levels of within district variability. This sub-district variability relates most to urban-rural variations in electorate size and is compounded by the use of one-, two- and three-seat systems for wards. In addition, some UAs have a tendency for locations with relatively large ethnic minority populations to be less well represented. This may be a consequence of youthful, growing populations and the stage in the boundary review cycle. Although there are resource implications, in certain locations it may be advisable to allow for ethnic group demographic differences when forecasting future electorates during the boundary review process. Certainly, the young age structure of most inner urban areas should be explicitly modelled in the PER process as young age

structures imply a rapidly growing electorate. Many aspects of tracking and forecasting change over time in electorates as well as analysing other social change over time would be simplified if known geographical building bricks such as 2001 Census Output Areas were used in the boundary review process.

ACKNOWLEDGEMENTS

This research uses data provided by the Electoral Commission, Ordnance Survey and the Office for National Statistics. The research includes 2001 Census and GIS boundary data obtained via MIMAS CASWEB and EDINA UKBORDERS; both services are supported by ESRC and JISC. The authors are grateful to the above organisations and to Dr Paul Williamson, University of Liverpool, who has provided useful comments. All electoral, census, National Statistics and digital boundary data are copyright of the Crown and are reproduced with permission of the Controller of HMSO.

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