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Developing methods for understanding the nature of voting patterns and party competition in Britain

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Developing methods for understanding the nature of voting patterns and party competition in Britain

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Acknowledgments

First of all, I would like to thank my colleagues Michael Thrasher and Colin Rallings for their advice, support and help. Also, I would like to acknowledge and thank my co-authors of the publications leading up to this thesis.

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Theme 5: Candidates surveys

Declaration

The thesis “Developing methods for understanding the nature of voting patterns and party competition in Britain” is submitted for the degree of Doctor of Philosophy (PhD) on the basis of published works.

The outline of research and publications successfully undertaken while employed at Plymouth University focuses primarily on my work in developing a new method for decomposing electoral bias in cases of three-party competition. To date this particular research has resulted in five peer-reviewed journal articles and as the appendices show I have been the principal researcher in this collaboration. My other research is summarised here and references are provided with my personal contribution outlined in the appendices.

I joined the Elections Centre of the Plymouth University in the late 1990s, first on a contract that was reviewed several times on a triennial basis and since 2005 and in preparation for my inclusion in the 2008 RAE as a full-time staff member. All works in this submission are based on research undertaken 2007-2012 while employed at Plymouth University and no part of the submission has been considered for any other degree or award.

Abstract

The thesis “Developing methods for understanding the nature of voting patterns and party competition in Britain” is submitted by Galina Borisyuk for the degree of Doctor of Philosophy (PhD) on the basis of published works.

This research both develops new methods and expands upon existing methodologies in order to improve our understanding of voting patterns and party competition in Britain. The thesis comprises five sections, each of which relates to a particular research focus. The first and principal section describes the process of determining a new method for decomposing electoral bias for three-party competition under simple plurality rules of voting. The study of electoral bias is important for voting systems that requires periodic boundary reviews intended to equalise electorate and to remove malapportionment. These papers describe both the process for developing the three-party bias method and later its application to UK general elections from 1983 onwards. The second section uses aggregate data gathered for the elections to the Greater London Authority in order to understand the patterns of electoral support across the capital, particularly support for minor parties. A considerable amount of research effort has been expended upon providing reliable models for electoral forecasting both in the UK and elsewhere. The third section includes a paper that develops a forecast model that utilises aggregate local election data to estimate national vote shares for the three main parties in the UK. A fourth section brings together a series of papers that are linked by the themes of voter behaviour, either in terms of geographical or ballot context. A study of voter turnout in a London borough describes the relationship between proximity to polling station and electoral turnout at different types of election. A

number of papers included in this section also detail the effects of candidate ballot order on electoral support. The fifth and final section groups together two papers that using individual-level survey data to describe the pattern of candidate recruitment for local elections in Britain and, specifically, the under-recruitment of both women and Black, Asian and other minority ethnic candidates.

Critical appraisal

Introduction

The aim of this introduction is to guide the reader through the thinking and processes that led to the publications assembled here. This research has been a collaborative exercise and my role within each enterprise has varied and evolved over time. When I first began working with Colin Rallings and Michael Thrasher, for example, my role was largely related to the configuration of data, the interpretation of statistics and assisting graduate students with their dissertation work. Gradually my input increased as I became more familiar with the intricacies of the local government system and its complex electoral cycles! My interests also then extended to characteristics of electoral outcomes (originally the proportion of women candidates and women elected), some technical aspects of measurement, (for example, indexes of proportionality), and finally, general election forecasting methods.

With regard to other collaborations, for example those with Ron Johnston and Scott Orford, the initial contact was made through either Rallings or Thrasher but then tended to develop into a series of bi- or tri-lateral discussions involving different people and different aspects of the whole project.

It is the nature of collaborative research exercise, therefore, that requires that I guide the reader through those parts of the published outputs where I was most directly involved, in terms of formulating the research question, finding the appropriate method of analysis, compiling the data, interpreting the statistics and writing the evidence. Since all these papers are jointly authored there are necessarily parts of them where my input has been rather small – although I am happy to stand by the general conclusions that are made there.

The papers may be grouped under a number of research headings, some specific, others of a more general nature. These headings, with the relevant appendix number(s) identified are:

- Electoral bias (appendices 1-4)
- Patterns of voting and party competition in London Assembly elections (appendices 5-6)
- Electoral forecasting (appendix 7)
- Space, Place and Ballots (appendices 8-11)
- Candidate recruitment (appendices 12-13)

These research categories are examined in more detail below. For each category there is a brief description of each paper that covers the research question, data considerations and analytical methods used in providing the evidence. The references to the published works in the Appendices are intended to highlight my personal involvement in the production of that research publication. I have chosen to expand most about the first category on electoral bias partly because this is probably the most technically difficult for any new readers coming to the research output and partly because this kind of description is useful in demonstrating how the research evolves over time.

1. Decomposing electoral bias

A feature of simple plurality electoral systems is that outcomes are almost invariably disproportional and favour the two largest parties (A & B in are used in most examples) by awarding a higher seat than vote share. However, if the main party *A* obtains that bonus but main party *B*, with the *same* vote share, gets a smaller bonus, then the system is not only disproportional but also biased towards *A*.

One procedure to measure that bias was developed in New Zealand by Ralph Brookes (1953, 1959, 1960). This has the major benefits of using a readily-appreciated metric and being decomposable into the various bias sources that he identified (variations in constituency size, abstention rates, voting for third parties, and the distributions of party support). It has been widely applied to the analysis of British election results (e.g. Johnston et al, 2001, 2002, 2006).

However, its application to British elections since 1974 became constrained by the growth of 'third party' votes in England and 'fourth party' votes in Scotland and Wales that in an increasing number of cases were subsequently translated into seats. Although a third party victory component was added by Mortimore (1992: see Johnston et al. 1999) to get a more realistic appreciation of the extent, direction and sources of any observed bias, the method remained focused on the two-party situation.

Following a meeting with Ron Johnston in about 2005 it was decided to tackle this problem. The research goal was to adapt/improve/replace the Brookes' method of decomposing bias to take better account of three-party competition. After reading the original Brookes papers and the subsequent analyses by Johnston and his collaborators

I began the search for a method that could tackle the n-party case. After a short time I realised that this would prove extremely complex and instead focussed specifically on the three-party case.

Borisyuk et al 2008 provides our interpretation of what Brookes was formulating in his bias decomposition approach (Appendix 1, pp. 4-5). In Brookes' original papers bias is defined as the difference between the number of seats won by the leading party – *A* – at an election and the number that would be won by its main opponent – *B* – if *B* had obtained the same share of the votes. If *A* obtains a larger share of the seats than *B* from the same share of the votes, then the positive bias favouring *A* is the inverse of the negative bias suffered by *B*.

We re-formulate the two-party Brookes' method in such a way that will subsequently allow extension to the three-party case. More formally, let *'x'* be the number of seats the leading party A wins with given share, *'k'*, of the two-party vote, and *'y'* the number of seats the second party, B, could win if it got the same share of the votes. Then, bias towards the first party is defined as the difference between the number of seats gained by this party, *'x'*, and the mean of seats gained by both parties, i.e. the mean of *'x'* and *'y'*. Thus, for the two-party competition, bias is a function of one variable, vote share *'k'*.

Bias to party A is defined as

$$bias_{\mathbf{A}}(k) = x - \mathrm{MEAN}(x,y) = x - (x + y)/2 = (x - y)/2 \qquad (1a)$$

which is simply the negative of bias towards its rival, B:

$$bias_{\mathbf{B}}(k) = y - \mathrm{MEAN}(x,y) = y - (x + y)/2 = (y - x)/2\ . \qquad (1b)$$

There are four important elements to the Brookes method. We distinguish between:

1. introduction of the quantitative measure of bias towards a party (difference between 'x' and the mean of 'x' and 'y');
2. derivation of formulae for decomposition of bias into vote distribution effect, constituency size effect, etc.;
3. inquiry about magnitude of 'k' that should be used if we are interested in measuring bias for a particular election; and
4. inquiry about the process whereby we might obtain the figures 'x' and 'y'.

As part of our extension of Brookes' method, therefore, we explicitly address these four issues (Appendix 1; pp5-7).The first two are completely independent of any operationalising procedure: a quantitative measure of bias that can be partitioned into separate components; and formulae for the decomposition themselves. For example, if the two main parties get equal vote shares at an election then we can calculate bias without even addressing the fourth point, the process for obtaining x and y. The reason for this is that the two parties have equal vote shares at the outset and the actual seats won can be used as 'x' and 'y'. Therefore, we know that we can deal with this part of the problem (defining and decomposing bias) without discussing issues 3 and 4 above.

It is doubtful, however, that two main parties would get exactly equal vote shares at any election and the last two issues, the magnitude of 'k' and the process for obtaining x and y, have to be dealt with. So, we have to 'construct' an imaginary election with 'equal conditions' for two parties.

Issue 3 concerns the magnitude of 'k' that should be used when measuring bias for a particular election. In practise two methods are used. The first of these, the 'equal shares' approach, compares the number of seats won by each of the two parties respectively if the votes actually cast were redistributed equally between them. The second, 'reverse shares' method, on the other hand, considers what would have happened to the distribution of seats had the second-placed party (in terms of votes) obtained the vote share won by the first-placed party and the first-placed party obtained the vote of the second-placed party. In principle, it is possible to calculate bias for any *'k'* in a range between 0 and 100 (as in Johnston et al, 2002). Nevertheless, bias is usually calculated at either *'k'*=50%, i.e. equal vote shares method, or at *'k'*= actual vote share of the leading party, i.e. reverse vote shares.

Both approaches have merit. The former allows easy interpretation of bias - if two main parties get an equal share of votes but non-equal numbers of seats then the bias towards one of those parties is its 'excess'/'deficiency' in seats. The latter, it might be argued, retains more features from the actual electoral outcome — size of constituencies (electoral units), turnout and minor party support variations across constituencies, as well as magnitude of national vote share, *'k'*, of the leading party. The only difference is that two main parties swap their positions – actual second party becomes new leading party with *'k'* vote share.

The above two elements of the procedure – deriving a norm for comparison and estimating the expected number of seats for each party under certain scenarios – are clearly integral to the way in which the method is operationalised. Brookes believed that uniform swing was the simplest assumption for the first of the latter pair, but our interpretation of his original procedure is that it merely operates to construct a '*norm for comparison*', which allows us to compare data from the actual election with this benchmark. It is important, therefore, that our ‘notionals’ should be considered as technical steps that help in the necessary construction of the symmetrical multidimensional distribution that retains features of the actual electoral outcome and is independent from the size of electoral area (constituency).

In the event, although this first paper re-states the Brookes method, it is a rare example of a paper being accepted for publication that fails to achieve what is sets out to do. We had decided to construct two notional elections as well as the actual election (Appendix 1 pp. 9-11) and the method appeared to work rather well for the 2005 general election which we had decided to use as the principal test of the new method. Unfortunately, when applied to earlier elections the method did not appear to work as expected! By the time this paper appeared in print we had already worked out a better procedure.

Our interpretation of Brookes’ norm of comparison in the 2-party case is illustrated by considering the two-party percentage shares of votes cast at the 2005 British general election (i.e. [Conservative + Labour] = 100). Figure 1a shows the vote share across 627 parliamentary constituencies[1] for the largest party *A* (Labour) and Figure 1b presents party *B*’s share (Conservative). These distributions are necessarily the mirror image of each other.[2] Also indicated on both distributions is the overall vote share for each party; 52 per cent for Labour and 48 for the Conservatives.[3](In both Figure 1 and Figure 2, each constituency is shown as a separate symbol.)

[1] There were 628 constituencies in Britain in 2005 but neither of the two major parties contested the Speaker’s constituency.
[2] In effect the two dimensional problem can be reduced to a single dimension. Correspondingly, for the three-party case we can present the results in two-dimensional space.
[3]These values differ from the mean values of the distribution (54% and 46% respectively) because of the unequal size of constituencies.

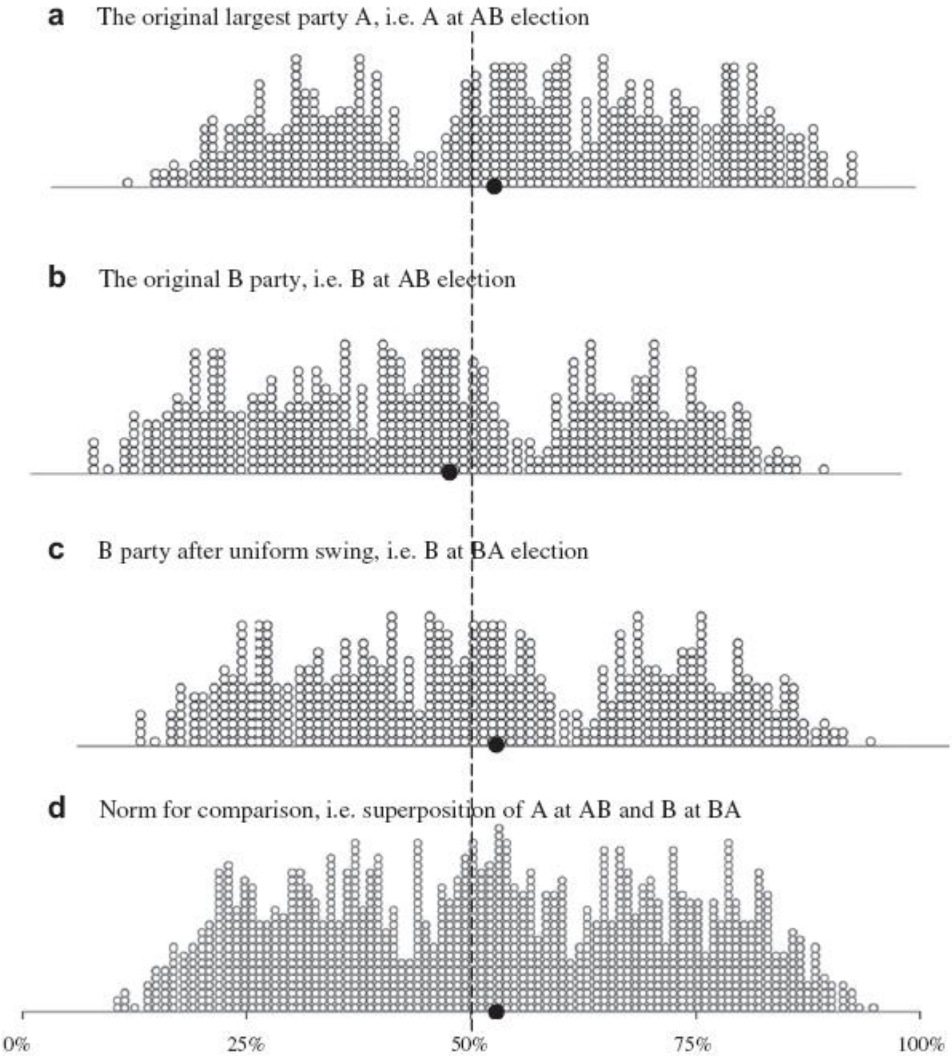

Figure 1.Brookes' two-party method: Calculation of bias.

Brookes' method begins by asking what would happen to the allocation of seats if instead of coming second at the actual election (*AB* – the parties are listed in order according to their share of the votes won, with the largest first), party *B* came first, receiving *A*'s vote share at the actual contest. Using the principle of reverse vote shares the method applies a uniform swing to each constituency to create a notional election result (the notional *BA* election) such that party *B* now wins 52 per cent of the two-party vote total. Following the application of uniform swing to the vote share in each of the 627 constituencies, party *B*'s distribution slides to the right such that its overall percentage of the votes becomes 52 per cent in the notional *BA* election (Figure 1c).

These three Figures 1a-c represent the conventional understanding of the Brookes' method. However, another interpretation is possible. Figure 1d shows the *superposition* of the distribution for party A at the actual election and the distribution for party B at the notional reverse vote share election (literally, a combination of Figures 1a and 1c). This superposition is critical to our interpretation of the Brookes method because it in effect constitutes the *norm for comparison* and retains many important features of the actual data.

Because Brookes' method focuses on the two largest parties only, all constituencies lying to the right of 50 per cent are 'won' by the respective party. Thus Figure 1a shows the number of seats won by party *A* at the actual election (i.e. '*x*' in previous notation) and Figure 1c shows the number of seats ('*y*') 'won' by party *B* at the notional election, *BA*.

In Brookes' original formulation partisan bias towards party *A* is measured as the difference between the number of points to the right of 50 per cent in Figure 1a and an *average* of the number of points to the right of 50 per cent in Figure 1d. It is clear from the graphs that, in effect, Brookes' method compares the distribution of seats at the actual *AB* election (Figure 1a) with the norm for comparison (Figure 1d).[4]

Having set out the principles underpinning Brookes' original formulation, we use these as the foundation for the extension to the three-party situation.

[4] For superposition AB and BA, vote shares now has zero correlation with size of constituency and has symmetrical shape of distribution (a norm distribution). Because of zero correlation with constituency size, the mean of the distribution equals overall vote share.

In our first attempt (Borisyuk et al., 2008) the expected norm was based on the actual election result *plus just two notional elections*. The first notional election saw the actual second-placed party awarded the same vote share as the actual first-placed party (i.e. the order of the election result was changed from *ABC* to *BAC*) whereas in the second the original third-placed party was given the vote share captured by the first-placed party at the actual election (i.e. *ABC* was converted to *CBA*). The actual number of seats won was thus compared with a norm comprising the mean number of seats gained by the leading party under three scenarios – the actual election and two notional elections.

This ignored three other scenarios, and was the reason for the unresolved problems with the empirical applications. The second paper (Borisyuk et al.,2010; Appendix 2) extends the approach to incorporate the *entire* set of possible outcomes (i.e. including the three other potential notional elections: *ACB*, *BCA* and *CAB*). This extension to the three-party case does that whilst retaining many of the basic principles underpinning the Brookes' original formulation (Appendix 2; pp. 18-22).

Three-party vote share can be best captured by triangular graphs (for early proponents of this technique see Upton, 1976; Miller, 1977; Gudgin and Taylor, 1979; for a recent example that employs this method see Curtice and Firth, 2008). Figure 2 shows the actual 2005 election result. The point for the national three-party vote share (39, 36, 25) is represented by a cross. The area inside the triangle is divided into three, each of which shows where the respective parties won seats. Where the lines intersect at the centre of the triangle the vote share for each of the three parties is 33.3 per cent. Points towards the peak of the triangle are constituencies where the largest party (in this case Labour) performed well.

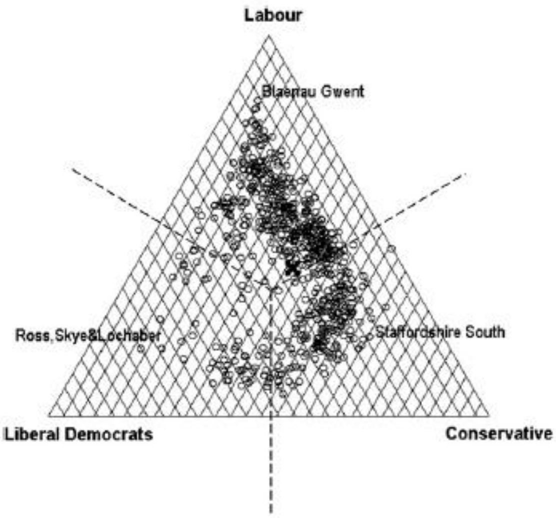

Figure 2.Distribution of the three-party vote shares.

In constructing the norm for comparison for this extended procedure we have three parties, *A*, *B* and *C* with overall vote shares, α, β, and γ respectively, where(α + β + γ = 100). The principle is to consider all six possible combinations assigning those three values to parties *A*, *B* and *C* – viz. *ABC* (actual election), *ACB*, *BAC*, *BCA*, *CAB*, and *CBA*. This is shown on six triangular graphs (Figure 3). The first (*ABC*) repeats what was shown in Figure 2 while the triangle *ACB* below it shows the notional election where the positions of the second and third-placed parties, *B* and *C*, have been reversed but that for the first party, *A*, is unchanged. It is important to note that the top of each triangle always shows the largest party, the right-hand side shows the second-placed party while the third-placed party is shown on the left-hand side.

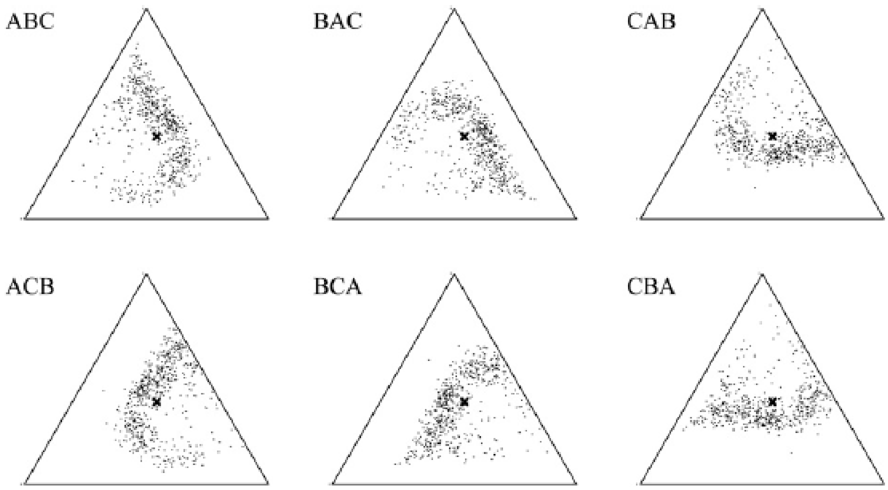

Figure 3.Distribution of the three-party vote shares: ABC (actual), ACB, BAC, BCA, CAB, and CBA (notional elections).

Figure 4 shows the superposition of these six configurations to create what will be used as the ‘norm of comparison’ (Appendix 2, pp. 23-4). This procedure is a precise extension of what was done in the two-party case, where Figure 1d represented the superposition of Figures 1a and 1c. Once again, the area inside the triangle is divided into three sections The top section, for example, shows the total number of seats that would be won by the largest party (with vote share of □). Likewise, the section on the right shows seats won by whichever party came second (vote share β) while that on the left represents seats won by the third party with national vote share γ. The next stage of the process compares the actual number of seats won by each party with the expected unbiased number of seats derived from construction of the norm of comparison.

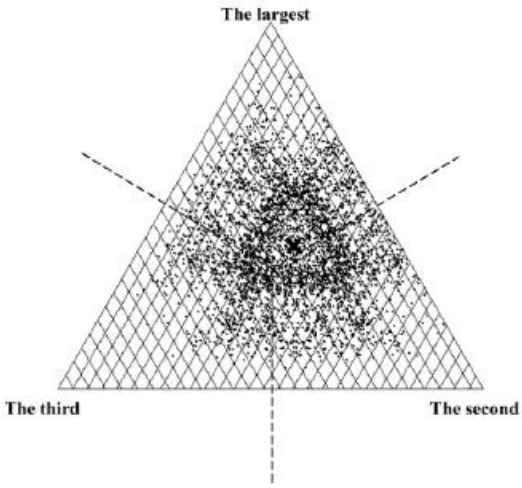

Figure 4.The superposition ABC + ACB + BAC + BCA + CAB + CBA.

A great strength of Brookes' method is that it not only estimates total bias in a readily-appreciated metric but also decomposes that bias into one of four categories (Appendix 2, pp. 24-5; pp. 27-8 for the algebraic expression of these).

The first of these has been labelled differently (gerrymander, vote distribution, efficiency) but we prefer the term 'geography'. In a 'first-past-the-post' voting system a party performs well in the translation of votes into seats (in terms of the geography of its vote across the constituencies) by winning small and losing big; it should avoid accumulating surplus votes in constituencies it wins (i.e. those additional to the number required to win a constituency) and if it cannot win a constituency then it is best to attract as few as votes as possible there since these are literally 'wasted'(see Johnston et al., 2001).

The second component within electoral bias stems from malapportionment, i.e. differences in electorate size across constituencies (denoted by component 'E'). A party that is stronger in constituencies with relatively small electorates will tend to perform better (as shown by comparing its percentage of all votes cast and percentage of seats) than one which performs better in the larger constituencies. The level of abstention (‘A’) is the third component and becomes relevant when one party wins its seats where electoral turnout is low compared with its rivals whose victories are achieved in constituencies with on average higher turnouts. Finally, there is the minor party effect, component ‘M’; here it is restricted to those parties outside the main three.

Brookes’ algebra enables the contribution of each of these four components (G, E, A and M) to be calculated, in the same metric as the total bias. We derived formulae similar to Brookes’ two-party calculations but this time for the three-party case. In the final section of the 2010 paper we examined the outcome of the 2005 general election using both the two-party Brookes method (modified to take account of third party presence) and the new three-party method (Appendix 2, p. 26).

There are a number of practical applications of this method for decomposing bias in the three-party context. One such is its application prior to and after constituency boundary reviews (Appendix 3). Understandably, there is considerable interest in the potential political impact of boundary changes – which party(s) stands to gain and which ones might lose as electorates are equalised. However, there is a widespread misconception that boundary revisions will remove electoral bias completely and that the impact will be considerable. This depends, of course, upon the size of the electorate bias component. In a paper published in Parliamentary Affairs we addressed this issue, maintaining that the boundary review implemented prior to the 2010 general election had largely succeeded in reducing the bias that followed from malapportionment and that the bias which remained was a function of other components, principally turnout (abstention) and geography. In order to undertake this analysis we needed to compare the pre- and post-boundary review outcomes using the *same election*. This meant first, comparing the actual election with an estimate of what the result would have been had the new boundaries been in place at the time and then, second, decomposing bias for each of those elections (Appendix 3, pp. 44-8).

A further application of the new three-party bias method came with a recent paper published in 2012 that reviewed UK general elections since 1983 (Appendix 4). Although these elections had been examined before this was an opportunity to examine what the new method would reveal in terms of the trend in the composition and contribution of bias – was geography becoming more important and if so, for which party? Table 2 in that paper (Appendix 4, p.58) describes the evidence.

Although it is standard practice when considering the geography or vote distribution bias component to identify surplus and wasted votes separately, in this paper we began to advocateinstead a catch-all concept of 'ineffective votes' since this may provide greater insight into how that bias develops in practice (Appendix 4, pp. 60-2). Another important contribution set out in this paper is a series of graphs that seek to highlight the occasions when votes are/are not converted into seats. Although not shown here in colour (the published version does use colour) there are clear advantages in aiding understanding using this type of visualisation (Appendix 4, pp. 64-6). A much more detailed example of our approach to data visualisation can be found in a paper that decomposes bias for the 2010 general election (Thrasher et al. 2010).

There is no disputing the fact that electoral bias is of considerable interest in the UK political context. There is also no disputing that few people appreciate the complexity of electoral bias. In developing a new method for bias decomposition for the three-party case this research has tried to explain what electoral bias is (especially in the sense that it is not equivalent to disproportionality) and those separate and sometimes conjoined elements that comprise it. The intended audience is broader than the academic community of electoral geographers and political scientists because it matters that a wider public understand the reasons that lie behind situations when there is an asymmetry in the electoral battleground where one party requires only a narrow lead over its rivals to win an overall majority whereas another party needs a much larger lead.

It has been particularly important to demonstrate that the impact of boundary changes in removing bias is directly linked to the extent of bias contributed by unequal electorates; the criticism levelled towards the independent boundary commissions has often been unjustified. Given the radical nature of proposed boundary changes to be implemented prior to the 2015 general election it is likely that interest in electoral bias among both academics and the wider public will continue.

2. Patterns of voting and party competition in London Assembly Elections

Occasionally, opportunities for interesting and novel research arise when particularly good data become available. One example of this relates to the elections for the Greater London Authority (GLA) which used electronic counting methods to determine the winner of its mayoral and assembly contests. London Elects, the body responsible for conducting these elections, released the 2004 data in machine-readable format using

London borough wards as the lowest level of aggregation. Rallings and Thrasher were working with Henk van der Kolk, principally looking at the supplementary vote system used for electing the mayor but when the 2004 data were published this opened up new research possibilities.

One of the principal weaknesses of UK election surveys, such as the British Election Study, is that the number of voters that support the smaller parties is often too small to obtain a sufficiently large number of responses. A major weakness of aggregate data analysis is that such parties also do not necessarily contest many seats, particularly in local elections where the number of vacancies is very large. This obstacle disappears when small parties are required to select a relatively small number of candidates but when many electors are eligible to vote for them. This circumstance arose in the case of London when small parties could provide lists for both the Assembly and European elections and when the data became available at the ward level.

The 2004 London elections coincided with elections for the European Parliament which meant Londoners could vote five times (two votes for London mayor, London constituency vote, London-wide list vote and the European vote). Since 1999 the UK has used regionally-based electoral districts for European elections but uniquely these voting figures became available at much smaller levels of aggregation than normal. Before we could undertake any analysis, however, it would be necessary to construct a usable data set (Appendix 5, pp.82-4). As well as using the ward-level voting data we added some demographic characteristics and also local voting figures. A combination of statistical procedures (Appendix 5, pp.86-92) began to build the case that there were patterns in support cast for the different minor parties (Respect, Green, UKIP and BNP) competing in London. But the regression models were not particularly successful in highlighting *where* those differences were. Accordingly, I used GIS to construct ward maps of the London European vote which did succeed in revealing how the votes were spatially clustered across London (Appendix 5, pp.94-6). Mapping permitted us to see clear spatial patterns in voter support for the Greens, Respect, UKIP and the BNP respectively.

When the 2008 results also became available we decided that we could test the proposition that small parties can benefit from opportunities provided by the parallel implementation of separate voting systems. In London elections to the 32 London boroughs are conducted by simple plurality, making it difficult for small parties to find candidates and difficult to attract votes. By contrast very few candidates are required to contest the London-wide list seats. Given that the 2004 data were available at the ward level would a party like the Greens, for example, note those areas where there was support and then use that information to establish target wards in time for the following local elections.

Compiling the data set meant merging separate files for 624 wards containing London borough election results for 2002, 2006 and 2010 and the London Assembly voting figures for 2004 and 2008 (Appendix 6, pp. 110-3). Multiple binary logistic regression was used with the first set of data 2002 - 2004 – 2006 to build a model while the second cycle, 2006 – 2008 – 2010 could be used for out of sample testing (Appendix 6, pp. 107-10). Once again, we used GIS to map Green support across London (Appendix 6, pp. 113-5). The analysis concluded that it did not appear that the Greens did make use of the potentially valuable data provided by the London list-vote data when identifying areas where local election candidates could stand and perhaps attract voter support.

3. Electoral forecasting

An important strand of the activity undertaken by the Elections Centre surrounds the topic of election forecasting. Rallings and Thrasher chose to take an entirely different route to most other election forecasters, preferring to use local election data to generate forecasts, first for the purposes of making predictions about local elections (Rallings and Thrasher 1996) and later to extend the method to general election forecasting (Rallings and Thrasher 1999). After joining the Centre I worked on a method based on Neural Networks (Borisyuk 2005) and although this had some success and recognition we have returned to the aggregate local electoral data for generating national forecasts.

Using local council by-election data to generate these forecasts provides an alternative source to national polling data but presents real challenges. Over recent years we have addressed the problems associated with varying patterns of party competition (Appendix 7, pp. 122-5) and it is fair to say that for us this continues to be a ‘work in progress’. Recent modelling has also incorporated opinion poll data, largely as a benchmark for comparison and for this purpose I developed a method of weighting data to take account of the different polling companies undertaking surveys with different frequencies (Appendix 7, pp.126-7). The model developed for the 2010 UK general election produced a GB national vote share forecast of Conservative 36% (actual 37%), Labour 28% (30%) and Liberal Democrats 28% (24%). The seat forecast was

Conservatives 299 seats (actual 306), Labour 237 (258) and Liberal Democrats 83 (57). At least we correctly forecast the hung parliament!

Following the lessons of 2010 we have begun to explore the possibilities of generating forecasts that take account of the impact of different configurations of party competition, i.e. Con versus Lab; Con versus LD etc. We may also return to the Neural Networks approach (Borisyuk et al 2005) or use another method entirely.

4. Space, Place and Ballots

This section has a rather catch-all description but the category reflects one of the great strengths that the Elections Centre brings to the study of voting behaviour in the UK. Over a period of more than 25 years the Centre has developed probably the world's most extensive collection of aggregate local election data. Extracting data sets from this complex database requires considerable skill and patience but the rewards are that we can address important issues, ranging from the under-representation of women (Appendix 8), voter turnout (Appendix 9), and the effect of voting procedures on voter behaviour (Appendices 10 & 11).

When we examined the presence and performance of women candidates in local government there were a number of data issues to resolve (origin time given differences in local government reorganisation, structural reforms in local government, complex electoral cycles etc. - Appendix 8, p. 136). The analysis first considers women candidates (Appendix 8, pp. 137-41) and addresses the 'contagion' question – do parties select women candidates when rival parties do so and the balanced ballot – when parties can select candidates in multimember wards do they strive for some level of gender balance. The second part of the paper tracks the pace of change in women's election before examining the relative performance of men and women candidates within party slates (Appendix 8, pp. 141-3). It appears that voters do not discriminate either for or against women. In the final section we addressed questions about tenure – are women councillors more likely to retire from office than are men and when male incumbents retire do local parties select women to replace them? The general conclusions derived from this analysis are that women are not discriminated against by voters and probably not by party selection processes leaving the most likely explanation of women's recruitment to be resource-based.

Exploring the relationship between voter turnout and geography has led to a valuable collaboration between the Elections Centre and Scott Orford of Cardiff University (Orford et al 2008, 2009, 2011). In low information elections we expect that voters take more account of the associated costs of voting than they might do when participating at a general election. The challenge lay in organising data that would permit the test of that hypothesis. A handful of local authority election officers retain detailed records of voter turnout for each polling station. One such was the London borough of Brent. We obtained these data for a twenty year period. Over this period voters had (or had not) participated in borough council, European parliament and general elections. Orford created maps of the polling station areas and we used different measures of distance (Euclidean, topography etc.) and population density in order to estimate average distances to polling station for in-person voters (Appendix 9, pp. 160-4).We finally decided to use multi-level modelling (voters are based at polling stations, in local wards within parliamentary constituencies) to examine differences in turnout for the three types of election. The analysis shows the effect on turnout at the aggregate level of such factors as deprivation and age while noting that European election turnout is most affected by network distance and local election turnout relates to ward marginality (Appendix 9, pp. 166-72).

In recent years I have also been analysing individual-level data compiled from the annual surveys of local election candidates undertaken since 2006. This research has led to reports (Rallings et al 2007; 2009; 2010) and articles in peer-reviewed journals (Rallings et al 2010; Thrasher 2012 forthcoming) with the academic output likely to increase as the annual data are pooled and examined in more detail. Much of this research is policy-oriented addressing issues of contemporary importance (for example, the under-representation of women, younger people and minority ethnic populations).

It is a feature of the research process that one line of inquiry often leads to another. This is the case for two related papers that examine a common phenomenon in local elections where voters are invited to fill multiple rather than a single seat. The first paper (Appendix 10) demonstrated that between 7-15% of total potential votes in English council elections using a block vote system remain unused; some voters with three votes, for example, would opt to use only one of them. Was this because highly partisan voters would refrain from using votes when their chosen party failed to field a full set of candidates? If not, what clues might be found from the election data that might indicate some of the causes of unused votes. Invariably, before addressing the question there were data issues to be resolved (Appendix 10, pp. 180-1).

We were able to demonstrate that the structure of party competition does not wholly explain the absolute level of unused votes (Appendix 10, pp. 181-3). Another line of inquiry was then pursued. Was there possible evidence that some voters might not understand how the voting system worked and might imagine that they had only a single vote to cast? Indeed, there was a strong alphabetic advantage for candidates placed near the top of each ballot paper (Appendix 10, pp. 184-6) that was only partly mitigated by incumbency factors. An ordinal logistic model (Appendix 10, pp. 188-92) provides strong evidence for an alphabetic bias. In the final part of the paper (pp. 193-5) we construct a regression model using the percentage of unused votes as the dependent variable and predictor variables that take account of the ward context (party competition and demographic characteristics). Decisions by local parties not to field a full slate of candidates has a large impact on the proportion of unused votes but there was also no disputing the evidence that support for candidates was affected by their order on the ballot.

Appendix 11 builds directly on the conclusions reached in this earlier paper and tests the extent of alphabetic bias in local council elections over a forty-year period. The data incorporated the names of 657,704 candidates that stood in 164,333 separate ward elections. The analysis provides stronger evidence than before about the extent of alphabetic bias, the relationship with the size of the block vote (bias increases as district magnitude rises) and the number of candidates standing (Appendix 11, pp. 207-13. The logical consequence of this, of course, is that candidates placed near the top of the ballot have a better prospect of gathering votes than do lower-placed candidates and therefore have a better chance of being elected. We tested this using Richard Webber's name origins software which reports the distribution of surnames currently within the UK (Appendix 11, pp. 216-7). We found that compared with the general population councillors are more likely to be found in top deciles and are less frequent in the lower deciles. To remove this bias we recommend the practice used elsewhere of ballot order randomisation for UK elections.

5. Candidate recruitment

Although most of my work has been undertaken while using aggregate data there are some recent exceptions. In 2006, Mary Shears of the Elections Centre introduced a national survey of local election candidates. The survey has been conducted annually since then with candidates selected randomly from nomination lists and invited to participate. About one thousand responses are collected each year and I have pooled these data noting where the same or similar questions have been asked. I have also combined the individual-level data with ward and authority-level measures and weighting data to correct for response bias (see Appendix 13 for a more detailed description of this procedure).

Two recent publications are included here (Appendices 12 & 13) that reflects the kind of research that is being undertaken with these data. I noted earlier (Appendix 8) that the aggregate data analysis of women's under-representation in local government could only advance our knowledge to a certain extent. Appendix 12 aims to take the analysis a step further by, inter alia, discovering from women candidates some of the processes that brought them to stand, the support they received from others and whether their experiences were different to those of men. It appears that women are less likely than men to take the decision to stand; they are more likely to be asked to stand. By contrast, the relatively small group of non-white candidates and those aged below 45 years that stand are more likely to make their own decision (Appendix 12, pp. 231-3). As far as the candidates are concerned the problems of under-recruitment lie mainly with supply-side issues coupled with a feeling that local parties might be doing more to select members of these under-represented groups.

For the paper examining ethnic candidates in local elections (Appendix 13) we again collaborated with Richard Webber, using his OriginInfo software to identify candidate ethnicity. This was partly to test his software reliability and partly to consider the nature and extent of sample/response bias for the Local Candidate surveys. The first part of the paper, therefore, (Appendix 13, pp. 247-8) uses the software to classify the ethnic origins of all candidates standing for election. Next, we compare the list selected to be invited to complete a questionnaire with all candidates in order to measure any sample bias. Because we use random sampling we were reasonably confident that such bias would be avoided and we were correct in this interpretation. The next procedure was to test for response bias by comparing the list of candidates that did or did not respond. This provided evidence of response bias with a lower response rate from Black, Asian and other minority ethnic candidates. The subsequent analysis was able to correct for this bias.

BME candidates are more likely to be younger and better educated but fewer women are recruited from among this group. Such candidates are electorally inexperienced, have stronger ties with community related organisations and are more likely to make their own decision to stand for election rather than being approached by a fellow party member. Community ties are also evident when respondents are asked about their support network upon becoming a candidate with almost two-thirds of BME candidates experiencing positive support from this quarter (Appendix 13, pp. 256-7).

General Discussion

These research papers seek to expand our understanding about voters and parties in Britain. Generally speaking, the research has relied upon aggregate data (especially local and parliamentary election data) but in recent years I have been working extensively with survey-level data also. These different types of data present rather separate challenges. One continuing task with the aggregate data is to check for errors and inconsistencies and, where possible, to amend the original records. When the number of candidates and elections numbers in the many thousands as happens with the local elections this can be a daunting task, particularly when the contests occurred decades ago. One major task has been the treatment of missing data. For example, one important piece of information that local authorities often failed to record was the number of ballot paper issued for elections to multimember wards. This was handled by an algorithm that took account of various patterns of party competition. A similar approach was used for the electoral forecasting model when local parties began to withdraw candidates from these contests (see Appendix 7) and in weighting opinion poll data when the frequency of polls began to vary widely.

The survey data present different kinds of problems as anyone who has worked with these types of data can attest. In one sense, however, our recent work has transformed this ‘necessary chore’ into a research programme in its own right. Recent papers that have used the annual candidates' survey have described the methodological innovations that we have developed to measure any sampling bias and, more importantly perhaps, the nature and extent of response bias. These papers have also united the aggregate and individual-level data analysis because we are extending our application of name recognition software from the survey to the aggregate data in order to explore the relationship between candidate ethnicity and patterns of vote distributions.

Facing and solving challenges in the research process often leads to methodological innovations that were not planned but instead evolved. The papers included in the first section on electoral bias, for example, provide a useful description of this process. It began with an initial discussion about the limitations of the Brookes method for three party competition in Britain and the need to search for a more effective approach to decomposing bias. One of the papers included here is rare amongst academic publications – a description of a research process that ultimately failed. But the failure led us to reassess our original thinking and then to develop a successful methodology. In turn, that methodology was then applied and has hopefully expanded our understanding of the operation of the different bias components at UK general elections from 1983 onwards.

At other times research in one area has stimulated research that takes another direction. This can be illustrated by showing how the study of unused votes led us eventually into the field of candidate ethnicity. When the research was originally envisaged the central problem lay in identifying the scale of unused votes in British local elections – how many people when given more than a single vote were making full use of those votes. It was only after considering this that our focus turned to the examination of patterns in the data. Later, it was our reporting of alphabetic bias that manifested itself by rewarding candidates placed at or near the top of ballot papers organised in order of candidate surnames that attracted the attention of Richard Webber. His own interest lay in the ethnic origins of surnames rather than their positioning in both the alphabet and specifically on ballot papers. The paper included here as Appendix 11 is the first in what promises to be a rewarding research collaboration. We are already working on a paper that after using the name recognition software to classify candidates as British white/other white/non white then considers the relationship between candidates' ethnic origins and vote change (in the case of single member wards) or finishing party position order (in the case of multi-member wards). Ultimately, for the UK context, we hope to be able to answer the question – does a candidate's name on the ballot affect the distribution of votes and what is the direction, strength and impact of that relationship?

Further collaboration with Scott Orford and the geography of voting is also being undertaken. This research is another demonstration of how we are merging aggregate and individual-level data and applying multi-level methods. The focus of this research will be on local election candidate recruitment and the relationships between a candidate's residence and the location of the ward that is being contested. We know from the candidates' surveys that just under half of all candidates (the figure is lower for councillors) live outside the ward that they contest. We also know that around one in four are 'paper' candidates, agreeing to stand on condition that there is no prospect of winning. What we do not know, as yet, is in the cases where residence lies outside ward boundaries whether the two areas are close to one another or not and how that geography varies across the country. Is it the case that parties try, where possible to select candidates that if not a ward resident are at least living close by, or are (some) parties mainly concerned with finding names to include on the ballot paper?

Finally, it is worth noting the extent to which this research impacts or seeks to impact upon the real world of politics and policy making. It is understandable that during UK general elections that people become interested in explanations that account for asymmetries in vote/seat distributions. The value of extending the Brookes' method is that we can show how far one party's advantage is a function of say, unequal electorates, and how other factors contribute also to that bias. Much of our work addresses practical issues. If ordering ballot papers according to candidate surname affects the distribution of votes should be rotate those names randomly as happens in other countries? Given that women and minority ethnic candidates are under-represented in local elections is the best approach for remedying that situation to address supply or demand issues? If the location of polling stations directly affects the proportion of voters that participate in certain kinds of low salience elections and expanding the pool of postal voters is not a positive option then how can we optimise those locations to improve turnout? Political science does not have to be relevant to be important but when it can address such questions empirically then it should.

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Appendices (Published Works)

Appendix 1

Measuring bias: Moving from two-party to three-party elections

Borisyuk, G., R. Johnston, M. Thrasher, & C. Rallings (2008) Measuring bias: Moving from two-party to three-party elections. *Electoral Studies, 27* (2), 245-256.

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Measuring bias: Moving from two-party to three-party elections

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Abstract

One method for assessing the extent of electoral bias is that first developed by Brookes. This method decomposes bias into different elements, including efficiency of vote distribution as well as effects separately produced by electorate size and turnout. Brookes' method is used to measure electoral bias largely in two-party systems but the rise of third parties, particularly in recent UK elections, has prompted the search for a reliable alternative. This paper reports upon findings from an on-going research programme. The nature and theoretical underpinnings of different procedures that might be used for decomposing bias in the three-party case are outlined. Two main procedures are constructed and then tested against the results from actual elections. The evidence shows that these procedures produce similar findings in respect of the 2005 general election but differences emerge when earlier elections are considered. Research continues to assess whether these differences follow from the nature of party competition at each election or the particular procedure employed.

Keywords: Electoral bias; Electoral geography; Third parties

1. Introduction

A well-known feature of simple plurality electoral systems is that, irrespective of any explicit political involvement in drawing district boundaries (the malapportionment and gerrymandering strategies characteristic of much redistricting in the United States), legislative contest outcomes are almost invariably disproportional—more so than with many other types of electoral system. Such disproportionality usually favours the largest of the two main parties which—as identified from Duverger's classic work (Duverger, 1954) onwards—tend to dominate such systems. What is not as well attested is whether that disproportionality is unbiased by not treating these two largest parties differentially. A system that gives the largest party a 'winner's bonus', with, say, a ten percentage points greater share of the seats than of the votes, is disproportional. However, if main party *A* obtains that bonus but main party *B*, with the *same* vote share, gets a bonus of only five points, then the system is not only disproportional but also biased towards *A*. Such a winner's bonus is sometimes termed exaggeration (Johnston et al., 2002) or responsiveness (King, 1990), or majoritarian bias (as in Calvo and Micozzi, 2005), and it differs from 'electoral bias' (Johnston

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et al., 2001) or ‘partisan bias’ (Grofman and King, 2007) which refers to an asymmetry in the way party vote share is translated into seats (the same share of the votes cast can result in substantially different shares of the seats). We will consider electoral bias only and refer to it as simply bias.

An unbiased system, according to Grofman and King (2007), is characterised by what they term *partisan symmetry* (see also King et al., 2005), a requirement that

> ‘… the electoral system treat similarly-situated parties equally, so that each receives the same fraction of legislative seats for a particular vote percentage as the other party would have received if it had the same percentage’.

Grofman and King (2007, p. 6) claim that this definition of partisan symmetry has been virtually the consensus position of social scientists as a means of assessing the partisan fairness of a districting scheme. Measuring it has been a cause of considerable experimentation and debate, however: as King et al. (2005, p. 9) note:

> ‘A consensus exists about using the symmetry standard to evaluate partisan bias in electoral systems. But such a consensus does not answer the subsidiary question: how to measure symmetry itself in order to determine whether partisan bias exists’.

(Hence the experimentation—as in King, 1990; Gelman and King, 1994; Grofman et al., 1997; Gelman et al., 2004—some of which has sought only to identify the extent of bias, without also decomposing it to uncover its sources.[1])

One procedure used to measure that bias was developed in New Zealand by Ralph Brookes (1953, 1959, 1960), which has the major benefits of using a readily-appreciated metric and being decomposable into the various bias sources that he identified (variations in constituency size, abstention rates, voting for third parties, and the distributions of party support).[2] It has been widely applied to the analysis of British election results in the last two decades (e.g. Johnston et al., 2001, 2002, 2006).[3]

Brookes’ method was ideally suited to the analysis of a system where two parties predominated—as was the case in New Zealand until the 1990s: it assumes that other parties gain a proportion of votes cast that *cannot* be translated into seats. Its application to British elections since 1974 is thus constrained by the growth of ‘third party’ votes in England and ‘fourth party’ votes in Scotland and Wales that were subsequently translated into seats. Although a third party victory component was added later by Mortimore (1992): (see Johnston et al., 1999) to get a more realistic appreciation of the extent, direction and sources of any observed bias, nevertheless the method essentially remains focused on the two-party situation. Brookes’ method—along with most others seeking both to identify and decompose the level of bias—treats third parties as, in effect, the source of relatively small amounts of ‘noise’ in a predominantly two-party system. Our goal here is to undertake a further modification of the method of decomposing bias that will make it better suited to the realities of three-party competition, where each of the parties is competing with the other two (perhaps in different places) for substantial numbers of votes and all three are potential seat-winners. This paper represents the initial stages in this process.

2. Reformulating Brookes’ measure

In this paper, we re-formulate the two-party Brookes’ method in such a way that will subsequently allow extension to the three-party case. More formally, let x be the number of seats the leading party wins with given share, k, of the two-party vote, and y the number of seats the second party could win if it got the same share of the votes. Then, bias towards the first party is defined as the difference between the number of seats gained by this party, x, and the mean of seats gained by both parties, i.e. the mean of x and y. Thus, for the two-party competition, bias is a function of one variable, vote share k.

Bias to party A is defined as

$$\begin{aligned} bias_{\mathrm{A}}(k) &= x - \mathrm{MEAN}(x,y) = x - (x+y)/2 \\ &= (x-y)/2 \end{aligned} \tag{1a}$$

which is simply the negative of bias towards its rival, B:

$$\begin{aligned} bias_{\mathrm{B}}(k) &= y - \mathrm{MEAN}(x,y) = y - (x+y)/2 \\ &= (y-x)/2. \end{aligned} \tag{1b}$$

Although Brookes’ method of measuring bias is often considered as based on electoral outcomes of uniform

[1] Grofman and King (2007, p. 32) do claim, however, that ‘The degree of deviation from symmetry of treatment is known as *partisan bias*, and is easily quantified, and made specific as to direction’.

[2] An alternative approach, developed almost contemporaneously with Brookes’, identifying the same basic bias components, is Soper and Rydon (1958), who developed early ideas of Brookes (1953).

[3] The only other attempts to measure and account for bias in the UK have been those by Curtice (2001) (see also Curtice and Steed, 1986), which although it identified the various sources of bias did not quantify their relative importance in terms of seats, and Blau’s important critique of Brookes’ approach (Blau, 2001) and his suggestion to use an ‘integrated method’ (Blau, 2001, 2004).

swing of support from one party to another across all constituencies (Rossiter et al., 1999) or cited almost exclusively in the course of criticism of the assumption of uniform swing (Blau, 2001), here we distinguish between:

1. the quantitative measure of bias towards a party (difference between x and the mean of x and y);
2. the derived formulae for decomposition of bias into vote distribution effect, constituency size effect, etc.;
3. what magnitude of k should be used if we are interested in measuring bias for a particular election; and
4. the process whereby we might obtain the figures x and y.

As part of our extension of Brookes' method, therefore, we explicitly address these four issues.

The first two issues are independent of the 'uniform swing' procedure. For example, if the two main parties get equal vote shares at an election then we can calculate bias without even addressing the fourth point, the process for obtaining x and y. The reason for this is that the two parties have equal vote shares naturally and the actual seats won can be used as x and y. Therefore, we know that we can deal with this part of the problem (defining and decomposing bias) without discussing issues 3 and 4 above.

The last two issues, the magnitude of k and the process for obtaining x and y, are however concerned with 'notional' elections—it is doubtful that two main parties would get exactly equal vote shares at any election! So, we have to 'construct' an imaginary election with 'equal conditions' for two parties.

Issue 3 concerns the magnitude of k that should be used when measuring bias for a particular election. In practise two methods have been used. The first of these, the 'equal shares' approach, compares the number of seats won by each of the two parties respectively if the votes actually cast were redistributed equally between them. The 'reverse shares' method, on the other hand, considers what would have happened to the distribution of seats had the second-placed party (in terms of votes) obtained the vote share won by the first-placed party and the first-placed party obtained the vote of the second-placed party. In principle, it is possible to calculate bias for any k in a range between 0 and 100 (as in Johnston et al., 2002). Nevertheless, bias is usually calculated at either $k = 50\%$, i.e. equal vote shares, or at $k =$ actual vote share of the leading party, i.e. reverse vote shares. Both approaches have merit. The former allows easy interpretation of bias—if two main parties get an equal share of votes but non-equal numbers of seats then the bias towards one of those parties is its 'excess'/'deficiency' in seats. The latter, it might be argued, retains more features from the actual electoral outcome—size of constituencies (electoral units), turnout and minor party support variations across constituencies, as well as magnitude of national vote share, k, of the leading party. The only difference is that two main parties swap their positions—actual second party becomes new leading party with k vote share.

This leaves only the process for arriving at the values of x and y at our notional election. Brookes used uniform swing, applying change in vote share for both parties in each available electoral district (constituency).[4] In principle other approaches might be used, for example, Monroe's (1998) variable swing or the method of simulation ('*approximate uniform partisan swing*') favoured by Gelman, King and others (Gelman and King, 1994; Grofman and King, 2007).

3. Measuring three-party bias

Whereas Brookes' method performs well in evaluating bias in electoral situations where two parties predominate, it is less satisfactory in systems where there is a strong third-party attracting support from either or both of the main contestants. This has been the situation in Great Britain since the mid-1970s, and although it is possible to use Brookes' method to compare the situation of any pair of parties in a three-party system (as in Johnston et al., 2006) this is not particularly satisfactory. Hence our search for a better procedure, based on Brookes, in which we allow for shifts in support across all three parties rather than one being treated as a 'constant' thereby restricting the focus to a contest between the other two.

The original definition of bias permits an extension to the three-party case. Bias towards the leading party

[4] Swing is a measure of the net change in support for two parties, A and B, compared across two elections and can be defined as: $[(ShareA_2 - ShareA_1) + (ShareB_1 - ShareB_2)]/2$. Two variants of swing are known: Butler swing and Steed swing. Both rely on the same formula but apply different methods for calculation of parties' share of vote. For Butler swing, vote share is calculated on the basis of the total vote cast for a party whilst Steed swing uses total two-party vote (or total three-party vote). In this paper we apply 'Steed' rather than 'Butler' swing for precisely the same reasons as discussed by Blau, 2001, p. 62 (see also Mortimore, 1992). The former is preferred because it preserves the shape of the distribution of votes of the relevant parties which feature in our estimations. Under Butler's approach parties' shares are changed uniformly across constituencies; Steed's method imposes uniform change on *relative* two/three-party shares.

is measured as the difference between the number of seats gained by the party and a norm which is the mean of seats gained by three parties under equal conditions:

$$bias_{\mathrm{A}}(k) = x - \mathrm{MEAN}(x, y, z), \tag{2a}$$

where x, y, and z are the number of seats won by parties A, B, and C respectively under 'equal conditions', i.e. with the same percentage of votes cast (in actual or notional elections). In turn, bias towards party B is measured as

$$bias_{\mathrm{B}}(k) = y - \mathrm{MEAN}(x, y, z), \tag{2b}$$

and it follows that bias towards party C is measured as

$$bias_{\mathrm{C}}(k) = z - \mathrm{MEAN}(x, y, z). \tag{2c}$$

4. How to identify different components of bias if *x*, *y*, *z* are known

Let us suppose that we know/can calculate x, y, and z.

Then the formulae (2a)–(2c) given in the definition of bias can be rearranged in the following form

$$x - \mathrm{MEAN}(x,y,z) = x - \frac{x+y+z}{3} = \frac{x-y}{3} + \frac{x-z}{3} \tag{3a}$$

$$y - \mathrm{MEAN}(x,y,z) = \frac{y-x}{3} + \frac{y-z}{3} \tag{3b}$$

$$z - \mathrm{MEAN}(x,y,z) = \frac{z-x}{3} + \frac{z-y}{3} \tag{3c}$$

We can see from these equations that bias towards party A, for example, is partitioned into two terms—bias resulting from a non-symmetry between party A and B, $(x - y)/3$, plus bias derived from a non-symmetry between A and C, $(x - z)/3$. These may both move in the same direction, or one may partly cancel out the other if they move in opposite directions.

We follow Brookes' method when decomposing terms $(x - y)/3$, $(x - z)/3$ etc. in equations (3a)–(3c).

Four main components of bias were scrutinized in Brookes' and subsequently in Johnston et al. papers:

- 'gerrymandering' (also termed the 'vote distribution' or 'efficiency' effect), i.e. asymmetry in the distribution of partisan voting strength across constituencies as indicated by skewed frequency distributions (Gudgin and Taylor, 1979);
- malapportionment, i.e. differences in electorate size across constituencies;
- abstainers/turnout effect; and
- minor party vote effect.

A fifth component, minor party victory, was introduced by Mortimore (1992) (see formulae in Johnston et al., 1999) to take into account the fact that in recent British elections the 'third' party became much more prominent since 1970 there than it was in New Zealand when Brookes was writing. Naturally, we do not need to include this fifth term in the decomposition of bias because our analysis specifically considers three-party competition from the outset.

As a result of decomposition, we get the following formulae for different bias components towards party A:

Vote distribution effect[5]

$$G_{\mathrm{toward\_A}} = \frac{y}{3}(P_x/Q_y - 1) + \frac{z}{3}(P_x/Q_z - 1) \tag{4}$$

Malapportionment or electorate size effect

$$E_{\mathrm{toward\_A}} = \frac{y}{3}(S_y/R_x - 1) + \frac{z}{3}(S_z/R_x - 1) \tag{5}$$

Abstention or turnout related effect

$$A_{\mathrm{toward\_A}} = \frac{y}{3}\left[\frac{R_x}{R_x - C_x}(C_x/R_x - D_y/S_y)\right] + \frac{z}{3}\left[\frac{R_x}{R_x - C_x}(C_x/R_x - D_z/S_z)\right] \tag{6}$$

Minor party vote effect

$$M_{\mathrm{toward\_A}} = \frac{y}{3}\left[\frac{R_x}{R_x - U_x}(U_x/R_x - V_y/S_y)\right] + \frac{z}{3}\left[\frac{R_x}{R_x - U_x}(U_x/R_x - V_z/S_z)\right] \tag{7}$$

where: $x =$ number of seats won by party A, $y =$ number of seats won by party B, $z =$ number of seats won by party C; $P_x =$ average number of combined votes for three major parties where party A won seats, $Q_y =$ average number of combined votes for three major parties where party B won seats, $Q_z =$ average number of combined votes for three major parties where party C won seats; $R_x =$ average electorate where party A won seats, $S_y =$ average electorate where

[5] Notation for the equations follows the traditional form where G represents gerrymander (Brookes' original term), E is electorate size, A is abstention and M for minor party votes. We do not believe that gerrymander is the most appropriate term ('distributional effect' is more accurate perhaps and throughout the rest of the paper we prefer this term) but we have resisted the temptation to alter the notation from Brookes' original. By so doing we believe we make more transparent our alterations to the original algebra.

party B won seats, S_z = average electorate where party C won seats; C_x = average number of abstentions where party A won seats, D_y = average number of abstentions where party B won seats, D_z = average number of abstentions where party C won seats; U_x = average number of minor party votes where party A won seats, V_y = average number of minor party votes where party B won seats, V_z = average number of minor party votes where party C won seats.

It is important to note that we compare places where parties ***win*** seats. This is the method used by Brookes but was subsequently modified by Johnston et al. (1999). Their chosen method was for, say, party A, to examine all seats where A's vote share was greater than B's vote share and not simply those seats won by party A. This was done to accommodate the principle of the 'third' party winning seats. Because we are dealing with the three-party case we can now ignore this procedure and revert to the original.

Decomposition of biases towards party B and C yields formulae analogous to those stated in equations (4)–(7) above.

5. Does it work?

To illustrate how this extension of the Brookes method takes into consideration the third party, we consider two examples where a 'third' party participates and wins seats. We compare the results of two-party bias decomposition (including a 'third party victory' component) with our three-party bias analysis.

To avoid any unnecessary discussion at this point about the approach for defining 'equal conditions' required for calculation of three-party bias (see equations 2) and whether 'equal' or 'reverse' vote shares are preferable for two-party bias, we consider examples where all parties get a virtually equal number of 'actual' votes overall, thereby avoiding the need to construct any notional elections. Furthermore, for the purpose of these examples we assume that turnout in each constituency is 100% (thereby reducing the number of components in the decomposition).

The chosen examples are admittedly rather extreme but they are used to make important general points and to demonstrate more clearly how the two approaches treat the 'third' party. Both examples show an unbiased electoral outcome when three participating parties win the same number of seats and receive virtually the same share of votes. Although bias toward any single party equals 0 in each case (the parties get an equal share of votes *and* an equal share of seats) we nevertheless can partition bias using the above formulae and find that the bias components differ from 0, operate in opposite directions, and cancel out each other. When calculating two-party bias, the party that receives a slightly smaller number of votes than the others is considered as the 'third' party.

In the first example (Table 1) parties A and B (with 225 votes each) are the two main parties with equal two-party vote shares and party C is the third party (223 votes). Parties A and B win two seats each, both have 15 surplus votes (i.e. votes cast where a party wins the seat but receives more votes than are necessary to defeat the second-placed party), and 115 wasted votes (votes that bring no return because they are cast in constituencies where the party loses). Of these 115 wasted votes, 95 are wasted in a constituency where the rival main party wins, and 20 are wasted where the third party C is the winner. The positions of parties A and B look identical and unbiased. To investigate whether there are any sources of bias that operate in opposite directions, cancelling each other out and so not immediately apparent, decomposition formulae were applied.

Unsurprisingly, Brookes' two-party method performs badly in this extreme situation when the 'third' party (smallest in terms of vote share) becomes an equal player in terms of seat distribution. As the calculations below show, the algorithm gives a false impression that party A has a more efficient vote distribution than party B (the G component is positive for A and negative for B); that the electorate size component also gives party A the advantage over B; and that A loses from third party votes whilst party B gains from that effect.

Vote distribution effect

$$G_{\text{toward\_A}} = 0.08,\ G_{\text{toward\_B}} = -0.08,$$

Electorate size effect

$$E_{\text{toward\_A}} = 0.15,\ E_{\text{toward\_B}} = -0.14,$$

Table 1
Example 1 of a hypothetical election

Constituencies	Electorate	Votes			Winner
		Party A	Party B	Party C	
I	150	60	55	35	A
II	100	50	40	10	A
III	150	55	60	35	B
IV	100	40	50	10	B
V	103	5	9	89	C
VI	70	15	11	44	C
		Overall share of vote (%)			
		33.4	33.4	33.1	

Table 2
Decomposition of three-party bias (Example 1 election)

	Toward party A			Toward party B			Toward party C		
	overall	from B	from C	overall	from A	from C	overall	from A	from B
Vote Distribution	0.30	0.00	0.30	0.30	0.00	0.30	−0.41	−0.21	−0.21
Electorate Size	−0.21	0.00	−0.21	−0.21	0.00	−0.21	0.59	0.30	0.30

Third party votes effect
$M_{\text{toward\_A}} = -0.21$, $M_{\text{toward\_B}} = 0.25$, and
Third party victories effect
$W_{\text{toward\_A}} = 0.00$, $W_{\text{toward\_B}} = 0.00$.

But we have already demonstrated that the positions of parties A and B at this election are virtually identical. Therefore, the Brookes method of decomposition in this case appears counter-intuitive.

Next, we consider for the same election how a measure of three-party bias operates. We can calculate biases toward each party using the formulae from equations (2a)–(2c) and then partition them applying the algorithm for decomposition of three-party bias, (equations (4)–(7)). The outcome is presented in Table 2.

Of course, Table 2 does not consider any turnout effect (turnout is 100%) nor does it consider a minor/fourth party effect (because the example uses only three parties). From the results of decomposition using this new method we can now see that parties A and B have equal advantage over party C in terms of the vote distribution and are equally disadvantaged in terms of size component. The total number of ineffective votes for both A and B equals 130 (surplus plus wasted votes) and for C it equals 199, (109 surplus and 90 wasted votes). Parties A and B won seats in constituencies with an average size of 125 electors while party C won in constituencies with a smaller average, just 86.5 electors. It was shown earlier that each component of bias toward a party, let's say party A, can be further partitioned regarding the source of asymmetry—an asymmetry between A and B, i.e. 'bias toward A from B', and an asymmetry between A and C, i.e. 'bias toward A from C'. Thus, we can see that the electoral disadvantages for both A and B came from C rather than from each other. Party C gets its gains and losses equally from A and B. In short, the pattern of bias decomposition using the three-party method lies in the expected direction.

The next example is used to demonstrate how the two-party Brookes method is sensitive to the precise distribution of votes between one of the major parties and the third party in constituencies won by the third party. It differs from the example in Table 1 only in the distribution of votes (bold figures in Table 3) between party A and party C in seats won by party C—in all other respects (overall vote and seat share) the two examples are identical.

The components of two-party competition bias are very different from those for example 1. For party A we can see an even larger 'distributional advantage' relative to B (0.14 vs. 0.08 in example 1) and 'minor party vote disadvantage' (−0.26 vs. −0.21).

Vote distribution effect
$G_{\text{toward\_A}} = 0.14$, $G_{\text{toward\_B}} = -0.13$,
Size effect
$E_{\text{toward\_A}} = 0.15$, $E_{\text{toward\_B}} = -0.14$,
Minor party vote effect
$M_{\text{toward\_A}} = -0.26$, $M_{\text{toward\_B}} = 0.31$, and
Minor party victories' effect
$W_{\text{toward\_A}} = 0.00$, $W_{\text{toward\_B}} = 0.00$.

By contrast, using the three-party bias method the components of the decomposition remain unaltered, as we should expect.

The purpose of these examples was to construct elections for which the Brookes' method was never intended—where there is real three-party competition and where, as in the example above, the third party actually wins most seats. That method, of course, is primarily concerned with the relationship between

Table 3
Example 2 of a hypothetical election

Constituencies	Electorate	Votes			Winner
		Party A	Party B	Party C	
I	150	60	55	35	A
II	100	50	40	10	A
III	150	55	60	35	B
IV	100	40	50	10	B
V	103	**1**	9	**93**	C
VI	70	**19**	11	**40**	C
		Overall share of vote (%)			
		33.4	33.4	33.1	

party A and party B. In an election including a significant third party the Brookes method tries to assign any special features to one or other of the two main parties. The three-party bias method, however, is precisely designed to measure relationships across three and not two parties.

6. What is 'equal conditions'? How to derive *x*, *y*, and *z*?

To calculate bias we have to know *x*, *y*, and *z*—the number of seats each of three parties could get, given share of vote, *k*. In the real world, of course, we have just one actual election. Therefore, we need to consider at least one notional election with 'similar conditions'. Analogous to the two-party case, we have a choice between constructing some form of 'equal' or 'reverse' share situations. If we construct a notional election with equal three-party votes, then we lose information about the leading party's actual vote share. Our current thinking, therefore, suggests a preference for redistribution of shares using some variant of reverse shares. Under this notional election procedure a new leading party will be awarded the same vote share as the leading party at the actual election while at the same time the relative weights of the other two parties will be retained. The attraction of this approach is that it retains more memory of the actual election.

In the three-party case, therefore, we need to consider *two* notional elections. One of these would see the actual second-placed party awarded the same vote share as the actual first-placed party. The second notional election would see the actual third-placed party awarded the same vote share as the actual first-placed party. For the calculation of bias we will use actual number of seats won by leading party, *x*, and *y* and *z* will be the respective seats won by the new leading parties in our two notional elections.

Assuming that we follow this procedure we still have to consider *how* votes are re-distributed within each constituency. The standard procedure is to assume uniform swing within each constituency. A number of objections can and have been raised with this procedure, not least the fact that when applied to some constituencies a uniform swing might take a party's vote share above 100 or below 0. These problems are magnified when it comes to the three-party case.

We need to consider adopting a different procedure, or two as it happens for this paper. The first of these methods begins by applying a uniform/homogeneous increase in share of vote for the new leading party across all constituencies. Next, it reduces the votes of the notional two non-leading parties though retaining the ratio of votes won at the constituency level between those parties at the actual election.[6] This means, in effect, that different constituencies may see a non-uniform reduction of votes for the two non-leading parties, as the example discussed below shows. The main attraction of this procedure is that it is perhaps closest to the uniform swing procedure that is currently used for the two-party bias method.

For the second approach the most important concern is to retain the ratio between national vote shares for the two non-leading parties. It does this by calculating a coefficient that becomes the proportion of decrease for the vote share of the two notional non-leading parties. This coefficient is arrived at by summing the vote share of the actual two non-leading parties and dividing the resulting total by the sum of the vote shares for the actual leading party and that party which is neither the leading party at the actual election nor the leading party at the notional election. These new votes are then added to the vote of the new leading party at the notional election.[7] As a result of

[6] The formal procedure is as follows. Assume that party A is the leading party and party B is second leading party with a difference between their national vote shares of delta_{AB}, where $\text{delta}_{AB} = \text{sh}_A - \text{sh}_B$, and where sh_A, sh_B, sh_C are national vote shares for parties A, B, and C respectively. Constructing notional election, for each constituency, ***i***, we add delta_{AB} percentage points to party B: $\text{sh}_{B\,i}^{NEW} = \text{sh}_{B\,i} + \text{delta}_{AB}$ and then redistribute remaining three−party votes between parties A and C in such a way that preserves the initial ratio between their shares (in each constituency, ***i***), $\text{sh}_{A\,i}^{NEW}/\text{sh}_{C\,i}^{NEW} = \text{sh}_{A\,i}/\text{sh}_{C\,i}$. As a result of the procedure, the new national vote share for party B (new leading party), will be the same as that for leading party A in the actual election, $\text{sh}_B^{NEW} = \text{sh}_A$. Party A becomes second largest party and party C stays the third. Notional election with party C as the new leading party is constructed in a similar way, increasing vote share of party C by delta_{AC} percentage points, $\text{delta}_{AC} = \text{sh}_A - \text{sh}_C$ and so on as above.

[7] Constructing Version 2 notional election with party B as a new leading party, we compute a ratio, gamma_{AB}, where $\text{gamma}_{AB} = (\text{sh}_B + \text{sh}_C)/(\text{sh}_A + \text{sh}_C)$, which effectively is the ratio of vote share of party A and party C together in the new (notional) election to their vote share in the actual one. For each constituency, *i*, vote shares for party A and party C are reduced proportionally: $\text{sh}_{A\,i}^{NEW} = \text{sh}_{A\,i} * \text{gamma}_{AB}$, and $\text{sh}_{C\,i}^{NEW} = \text{sh}_{C\,i} * \text{gamma}_{AB}$ (that preserves the ratio between A and C shares: i.e. $\text{sh}_{A\,i}^{NEW}/\text{sh}_{C\,i}^{NEW} = \text{sh}_{A\,i}/\text{sh}_{C\,i}$). Then vote share of party B is increased by a certain amount of percentage points: $\text{sh}_{B\,i}^{NEW} = \text{sh}_{B\,i} + (1 - \text{gamma}_{AB}) * (\text{sh}_{A\,i} + \text{sh}_{C\,i}) = \text{sh}_{B\,i} + * (\text{sh}_A - \text{sh}_B) * (\text{sh}_{A\,i} + \text{sh}_{C\,i}) /* (\text{sh}_A + \text{sh}_C)$. This value means that different percentage points will be added to the new leading party in each constituency. New leading party B will get the same national share of votes as the leading party A in the actual election: $\text{sh}_B^{NEW} = \text{sh}_A$. New ratio of vote shares of non-leading (new) parties, $\text{sh}_A^{NEW}/\text{sh}_C^{NEW}$, will be exactly the same as the initial one, $\text{sh}_A^{NEW}/\text{sh}_C^{NEW} = \text{sh}_A/\text{sh}_C$.

Table 4
Example 3 of a hypothetical election, actual election outcome

	Actual election (Party A is the leader)				
	Votes			Ratio: share A to share B	Ratio: share A to share C
	Party A	Party B	Party C		
Constituency I	500	250	250	2.00	2.00
Constituency II	500	400	100	1.25	5.00
	National share of votes (%)				
	50.0	32.5	17.5		
	Ratio: share A to share B 1.54				
	Ratio: share A to share C 2.86				

this procedure the new leading party is guaranteed to receive the same national vote share as that received by the lead party at the actual election. Another attraction of this second approach is that it avoids completely the problem of constructing party vote shares that rise above 100 or fall below zero.

Example 3 hypothetical election (Table 4) has just two constituencies, with a thousand votes cast in each. Overall, the national vote sees party A win with 50% of the vote share, party B is placed second with 32.5% and party C wins 17.5%.

Table 5 sets out two notional elections based on Table 4, using the first procedure described above. When using this procedure, party B becomes the new leading party. To take it to 50% of the overall vote we apply a uniform 17.5% percentage point increase across constituencies. The non-leading parties see a reduction in their vote share that maintains the original constituency level ratios (see the final two columns in the first part of the table).

As a result of this procedure, the new leading party gets exactly the same 'national' (overall) share of vote as that of the leading party at the actual election. The new non-leading parties keep the same finishing order that they have in the actual election. However, as we noted earlier, with this procedure we cannot guarantee the ratio of national shares of non-leading parties. Nevertheless, in this example the new national ratio of 2.81 (or 1.52 in the case when party C becomes the leading party) is close to the original value of 2.86 (1.54).

Next, in Table 6 we construct two further notional elections based on Table 4 but this time instead use the second procedure described above. Once again, we describe the notional election where the new leading party is B. In this example the use of procedure two means that parties A and C will retain 74% of their votes in each constituency (obtained by summing 32.5 and 17.5 and dividing by 50.0 plus [in this case] 17.5). These votes are then assigned to party B. In the notional election this means that in constituency I party B will receive a 19.4 percentage point increase in vote share but a 15.6 percentage point increase in constituency II.

In effect, using these two procedures means that certain (though different) information about the original election has been retained for the two constructed notional elections. The first procedure retains two

Table 5
Notional elections using procedure 1

	Party B as the leader				Party C as the leader			
	Votes			Ratio: share A to share C	Votes			Ratio: share A to share B
	Party A	Party B	Party C		Party A	Party B	Party C	
I	383	425	192	2.00	283	142	575	2.00
II	354	575	71	5.00	319	256	425	1.25
	National share of votes (%)				National share of votes (%)			
	36.9	50.0	13.1		30.1	19.9	50.0	
	Ratio: share A to share C 2.81				Ratio: share A to share B 1.52			

Table 6
Notional elections using procedure 2

	Party B as the leader				Party C as the leader			
	Votes			Ratio: share A to share C	Votes			Ratio: share A to share B
	Party A	Party B	Party C		Party A	Party B	Party C	
I	370	444	185	2.00	303	152	545	2.00
II	370	556	74	5.00	303	242	455	1.25
	National share of votes (%)				National share of votes (%)			
	37.0	50.0	13.0		30.3	19.7	50.0	
	Ratio: share A to share C 2.86				Ratio: share A to share B 1.54			

characteristics: the shape of the vote distribution for the new leading party; and the relative weight of the two non-leading parties at the constituency level. The second procedure also retains two characteristics: the relative weight of the two non-leading parties at the constituency *and* national levels.

Intuitively, it appears as though we should prefer the second procedure over the first. From a formal mathematical point of view however no such preference can be made.

7. Applying methods for calculating bias to the 2005 British general election

Johnston et al. (1999), (2002) prefer the 'equal' vote shares procedure for calculating two-party bias but because we propose here a three-party method that concentrates on the investigation of bias for/against the leading party we consider the 'reverse' shares two-party procedure as more appropriate for the comparison of the two-party/three-party analyses. We calculate three-party bias for the 2005 British general election (Northern Ireland is, as usual, excluded, as is the Speaker's seat) using the two variants of constructing notional elections described earlier and compare the results with the two-party bias method.

7.1. Two-party bias (reverse shares)

In this section, we revisit the 2005 general election using the standard Brookes two-party method (as in Johnston et al., 2006), except that we use the reverse share rather than equal share approach (see Table 7). Labour won 0.52 of the two-party vote at that election, and the Conservatives 0.48, with Labour getting 355 seats ($x = 355$ in our notation): if those shares were reversed (using the Steed swing) the Conservatives would get 255 seats (i.e. $y = 255$). Using formulae (1a) and (1b) above, this indicates a bias towards the Labour party of 50 seats.[8] Decomposing that bias we find that all the components favour Labour apart from minor party votes. For the Conservatives this feature works in the party's favour but rewards them with less than nine seats.

7.2. Three-party bias. Decomposition of bias (using procedure 1 notional elections)

We now use the first version of our three-party method to evaluate the 2005 general election result with three notional results. These produce a substantial pro-Labour bias of 89.7 seats, and biases against the Conservatives and Liberal Democrats of 21.3 and 68.3 seats respectively (Table 8). According to these estimates, Labour was clearly the main beneficiary of how the system operated (or was being operated through the geography of party vote-winning strategies: Johnston et al. (2006) distinguish between system operation and operation of the system) and the Liberal Democrats the main losers.

The bias decompositions (using formulae (4)–(7)) show not only which component favoured which party but also which of its opponents it gained that advantage from. Labour's greatest advantage came from the vote distribution effect, with three-quarters of that advantage (34 of 45 seats) coming at the expense of the Liberal Democrats, which clearly have the least efficient distribution of votes across the country's constituencies. The Conservatives, too, have a net advantage from this component (7 seats); however, this net figure comprises a loss to Labour of 15

[8] In our notation $\text{bias}_{\text{Lab}}(0.52) = +50$ and $\text{bias}_{\text{Con}}(0.52) = -50$. We thank the anonymous referee for his/her suggestion that we should characterise overall bias as $\text{bias}_{\text{Lab}}(0.52) - \text{bias}_{\text{Con}}(0.48)$. But because we are mostly interested in bias for/against *the leading party* we do not concern ourselves with overall bias.

Table 7
Electoral bias at the 2005 general election: Brookes' two-party method

	Lab	Con
Number of seats won with 52% of two-party vote share	355	255
Bias at 52%	+50	−50
	Decomposition of bias	
Vote distribution	11.6	−13.6
Electorate size	12.5	−14.5
Abstention	17.8	−20.0
Third party votes	−6.5	8.6
Third party victories	11.0	−11.0
Net interaction	3.6	0.6

seats but a gain from the Liberal Democrats of 21 seats. It should be noted that there are important differences between the three-party and two-party bias methods in respect of minor party votes and victories. Under the two-party Brookes method Labour was disadvantaged by the minor party votes component but this disappears when the Liberal Democrats are excluded from the minor party category with the three-party method.

7.3. *Three-party bias. Decomposition of bias (using procedure 2 notional elections)*

Turning to our second method of estimating bias in a three-party situation, the net figures in Table 9 are very similar to those in Table 8. Voter distribution was the main source of bias giving us 49 seats to Labour compared with 45 seats under the first procedure. The further partition of this particular term shows that Labour gained 12 seats from the Conservatives under both procedures and 37 and 34 seats from the Liberal Democrats using the second and first procedures respectively. Variation across constituencies in abstentions was the second largest component in both procedures and variation in constituency size the third. The impact of minor party votes (i.e. mainly the two nationalist parties) is small. Overall, Labour is the main beneficiary, gaining a bias advantage from each of the four components, and the Liberal Democrats are the most disadvantaged, again especially because of the vote distribution effect. The Conservatives are also largely disadvantaged, although they have a more efficient vote distribution than the Liberal Democrats; the abstention and constituency size components both work to the Conservatives disadvantage against each of the other parties.

8. Discussion and conclusion

In constructing a method for measuring three-party bias we gave close attention to four issues that relate to the original Brookes method: the definition of bias; formulae for the decomposition of that bias; and (the third and fourth issues), construction of some 'norm' for comparison, by choosing equal or reverse shares, for example, and how exactly we derive this norm. We have suggested a definition of bias for the three-party case with reference to mean values. Formulae for the decomposition of bias were derived.

Table 8
Electoral bias at the 2005 general election: three-party method, procedure 1

	Lab		Con		LD	
Number of seats won with 39% of three-party vote share	$x = 355$		$y = 244$		$z = 197$	
Expected unbiased number of seats won with 39% vote share			MEAN(x,y,z) = 265.3			
Bias at 39%	x − MEAN(x,y,z) = 89.7		y − MEAN(x,y,z) = −21.3		z − MEAN(x,y,z) = −68.3	
Decomposition of bias						
Vote distribution	45.3		6.8		−60.2	
From	Con	11.5	Lab	−14.7	Lab	−40.2
	LD	33.8	LD	21.4	Con	−20.0
Electorate size	10.8		−11.4		−3.8	
From	Con	7.1	Lab	−9.5	Lab	−6.3
	LD	3.7	LD	−1.9	Con	2.4
Abstention	16.5		−14.4		−14.4	
From	Con	10.0	Lab	−13.0	Lab	−13.0
	LD	6.5	LD	−1.4	Con	−1.4
Third party votes	2.4		−3.0		−0.4	
From	Con	1.7	Lab	−2.4	Lab	−1.2
	LD	0.7	LD	−0.6	Con	0.8

Table 9
Electoral bias at the 2005 general election: three-party method, procedure 2

	Lab		Con		LD	
Number of seats won with 39% of three-party vote share	$x = 355$		$y = 243$		$z = 187$	
Expected unbiased number of seats won with 39% vote share			MEAN(x,y,z) = 261.7			
Bias at 39%	x − MEAN(x,y,z) = 93.3		y − MEAN(x,y,z) = −18.7		z − MEAN(x,y,z) = −74.7	
Decomposition of bias						
Vote distribution		48.6		9.0		−66.4
From	Con	11.8	Lab	−15.1	Lab	−43.9
	LD	36.7	LD	24.1	Con	−22.6
Electorate size		10.7		−11.2		−4.2
From	Con	7.1	Lab	−9.5	Lab	−6.5
	LD	3.8	LD	−1.7	Con	2.43
Abstention		16.2		−14.3		−14.3
From	Con	10.0	Lab	−13.0	Lab	−13.0
	LD	6.2	LD	−1.3	Con	−1.3
Third party votes		2.3		−2.9		−0.6
From	Con	1.6	Lab	−2.4	Lab	−1.3
	LD	0.7	LD	−0.6	Con	0.7

In terms of the construction of some norm for comparison we suggested two procedures. Each was then used to re-examine the components of bias at the 2005 general election. The results showed only small differences between them with each clearly indicating a pro-Labour bias largely derived from a vote distribution effect followed by abstention and size effects. Compared with the two-party bias method the three-party approaches find a strong bias towards Labour as expected. Although the absolute size of that bias differs (50 seats in the case of two-party and nearer 90 for three-party bias) that is of no real concern because we are taking into account the disadvantage suffered by the Liberal Democrats. Moreover, there do not appear to be any substantial differences between the two procedures for constructing notional elections. When we consider the different components of the bias again the findings appear intuitively correct and potentially offer a big advantage over the two-party method since we can now identify the partitions (the direction of bias in respect of two other parties) within each bias component. As expected, the Liberal Democrats suffer, as third parties frequently do, from an inefficient distribution of votes. The calculations show the Conservatives are advantaged by an effective vote distribution but this advantage is still smaller than that enjoyed by Labour in its vote distribution.. Regarding the effects from abstention it is apparent that Labour benefits while both Conservative and Liberal Democrats are net losers.

However, and it is a rather important however, when we applied the three-party procedures to the previous five general elections (1983, 1987, 1992, 1997 and 2001) the congruence between them was reduced. The initial findings that give most cause for concern come from an examination of the 1983 general election. Both three-party methods give a different picture of the bias and moreover give quite different findings to those obtained from Brookes' two-party method. Whilst the two-party bias method shows a pro-Conservative bias (+5) the three-party methods both show a negative bias for the Conservatives (−12 for the first procedure; −53 for the second procedure). We are still assessing which of the particular features of the 1983 compared with the 2005 election are responsible for contributing to such differences in the operation of our procedures. It is worth noting that the 1983 election is the one that reveals the largest discrepancy between Brookes' two-party (see, for example, Rossiter et al., 1999) and integrated methods (Blau, 2004). While the former estimates a pro-Conservative bias the latter finds a pro-Labour bias of some 46 seats. It is possible that the 1983 election is simply unusual, but it may be that the problem is more fundamental and we have to return to what is a rather complex question: what are the most important features of the actual election that should inform the process of constructing any notional elections that are necessary for the decomposition of electoral bias?

This paper reports on research in progress and the findings demonstrate that more work is needed to develop a robust method for measuring three-party bias. However, our initial research has led us to believe that Brookes' method does permit extension to the three-party case, something that is important given the current context of UK elections. It is also clear to us that we have to give serious thought to what features of the actual election we retain when constructing alternative equal condition notional elections. The initial findings from the 2005 general election persuaded us that the impact of making different kinds of choices about those features was not significant. The findings from applying those procedures to earlier elections perhaps suggest otherwise. Currently, we are still trying to determine which of the many features of the actual election should be retained when constructing the norm for comparison when estimating bias for the three-party case.

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Appendix 2

A method for measuring and decomposing electoral bias for the three-party case, illustrated by the British case

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A method for measuring and decomposing electoral bias for the three-party case, illustrated by the British case

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ABSTRACT

The measurement of bias in election results, whereby one or more parties are advantaged in the translation of votes into seats at the expense of others, is attracting increasing attention. So far, almost all of the analytical work – aimed at both identifying the extent of bias in an election result and establishing its causes – has focused on either two-party systems or on the largest two parties in multi-party systems. Building on the firm foundations of one such approach, this paper introduces an original procedure for analysing bias in three-party systems using a readily-appreciated metric for both evaluating the degree of bias and decomposing it into the various causal factors. This is illustrated using the example of the 2005 British general election and a comparison of the results from two-party and three-party analyses of six recent elections there.

Disproportional election results, where a party's share of the votes cast is incommensurate with its share of the seats allocated, are more likely to occur under some types of electoral system than others. The greatest levels of disproportionality are mostly generated in elections determined on a plurality basis in single-member legislative districts. That disproportionality almost invariably involves a 'winner's bonus', whereby the party with the largest share of the votes cast obtains a greater share of the seats. However, the second-placed party may not be disadvantaged; its vote and seat shares may be such as to give it a seats' bonus also. Third and smaller parties generally suffer most in the allocation of seats from votes, leading to the formation of a strong two-party system as anticipated by Duverger's Law (Duverger, 1954).

A further feature of such electoral systems and their outcomes, less frequently noted, is that in many cases the disproportionality does not favour each of the two dominant parties to the same extent. For example, one party may get a larger winner's bonus than the other would with the same vote share. According to Grofman and King (2007, 6) this indicates an absence of *partisan symmetry*, a requirement that '… the electoral system treat similarly-situated parties equally, so that each receives the same fraction of legislative seats for a particular vote percentage as the other party would have received if it had the same percentage'.

Where this requirement is not met there is partisan asymmetry – or *partisan bias* (Grofman and King, 2007, 32). Its measurement has been the subject of debate (see King, 1990; Gelman and King, 1994; Grofman et al., 1997; Gelman et al., 2004), leading King et al. (2005, 9) to conclude that;

> A consensus exists about using the symmetry standard to evaluate partisan bias in electoral systems. But such a consensus does not answer the subsidiary question: how to measure symmetry itself in order to determine whether partisan bias exists.

Grofman and King (2007, 32), on the other hand, claim that 'the degree of deviation from symmetry of treatment … is easily quantified, and made specific as to direction'.

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Quantifying the reasons for such deviation has not proved straightforward, however, hence the literature to which this paper is a significant extension.

Much of the debate about the quantification of partisan bias – leading to Grofman and King's conclusion – has occurred in the context of USA elections, especially to the House of Representatives, where two parties predominate.[1] Little attention has been paid to countries which use the same electoral system but where the two-party predominance expected by Duverger's Law is absent, as in Great Britain where, since the 1970s, a third party and other smaller parties have presented a substantial challenge to Conservative and Labour, which predominated during the preceding three decades.[2] Nevertheless, analyses of partisan bias there have continued to focus on those two parties. The results, although very illuminating with regard to the situation as it affects the two major participants, present a partial view only of the extent and nature of the partisan asymmetry involved in the translation of votes into seats for all three parties.

The British case therefore indicates the need to extend discussion of partisan bias and its measurement into *three-party* situations generally. A recent paper (Borisyuk et al., 2008) laid the foundations for such an extension, but empirical applications of the proposed algebra for analysing and decomposing three-party bias produced some unresolved issues (as noted there, p. 225). That paper adapted an algebra developed for the analysis of two-party situations, and the empirical applications did not all produce sensible results. Rather than adapt it further, however, this paper returns to the first principles of the original formulation and, using the same underlying approach, develops a new algebra for identifying and decomposing bias in three-party situations. It thus represents a departure from what has become a standard approach to bias estimation in the British context over recent decades, offering an alternative new procedure built on the same foundations but specifically designed for the three-party situation, with potential wide application to other electoral systems where three parties predominate.

This paper is thus an original contribution to the analysis of bias in plurality electoral systems where three parties all win substantial shares of both the votes cast and the legislative seats into which those totals are translated. It returns to the first principles established in a seminal study of electoral bias, and derives a new algebra (set out in full in the Appendix to this paper) for the identification and decomposition of bias in three-party systems. Its application is illustrated with data for the 2005 British general election,[3] and a final section presents summary findings for the preceding five contests, all of which can readily be characterised as three-party in nature. This provides, for the first time, an evaluation of not only the degree to which each of those three parties was advantaged or disadvantaged in the procedure for translating votes into seats, and how, but also the extent to which that advantage/disadvantage involved both, or only one, of the other two parties.

Table 1
Percentage shares of the votes and seats at British general elections, 1983–2005.

		Conservative	Labour	LD	Other
1983	Votes	43.5	28.3	26.0	2.2
	Seats	62.7	33.0	3.6	0.6
	Seats-Votes	19.2	4.7	−22.4	−1.6
1987	Votes	43.3	31.5	23.1	2.1
	Seats	59.4	36.1	3.5	0.9
	Seats-Votes	16.1	4.6	−19.6	−1.2
1992	Votes	42.8	35.2	18.3	3.7
	Seats	52.9	42.7	3.2	1.1
	Seats-Votes	10.1	7.5	−15.1	−2.6
1997	Votes	31.5	44.4	17.2	6.9
	Seats	25.7	65.2	7.2	1.9
	Seats-Votes	−5.8	20.8	−10.0	−5.0
2001	Votes	32.7	42.0	18.9	6.4
	Seats	25.9	64.4	8.1	1.6
	Seats-Votes	−6.8	22.4	−10.8	−4.8
2005	Votes	33.2	36.2	22.7	7.9
	Seats	31.5	56.7	9.9	1.9
	Seats-Votes	−1.7	20.5	−12.8	−6.0

Source: C. Rallings and Thrasher, 2007.

2. Disproportionality and bias at recent British general elections: the two-party case

A method for measuring and decomposing bias developed by Ralph Brookes (1953, 1959, 1960) for use in New Zealand (he termed the outcome 'distorted representation' rather than bias) has been widely applied in recent analyses of British election results (e.g. Johnston et al., 2001, 2002, 2006).[4] His approach has the major benefits of using a readily-appreciated metric and being decomposable into the various bias sources that he identified.[5] Its major drawback, however, is that whereas it is excellent for analysing a system where two parties predominate its application to recent British elections is constrained by the growth of three-party politics. Despite modifications by Mortimore (1992: see Johnston et al., 1999), it focuses on the two largest parties only, treating the third as a source of bias affecting the other two rather than as also potentially either suffering or benefiting from bias – where its share of the seats allocated is incommensurate with its share of the votes cast.

[1] Indeed, the software designed to measure partisan bias, JudgeIt, originally developed by King and others, depends upon a two-party system and is therefore inappropriate for the British case, and other systems with strong third parties.

[2] Throughout this paper we deal with the situation in Great Britain only, rather than the United Kingdom. Northern Ireland is excluded because it has a separate party system and the dominant British parties do not compete for votes there.

[3] Data for the 2010 general election only became available after this paper was almost completed but a minor reference to it is contained in Fig. 7 towards the end of this paper. A more detailed examination of the application of the three-party bias method to the 2010 general election may be found in, G. Borisyuk et al. "*Electoral bias in 2010: Evaluating its extent in a three-party system*" paper presented to the EPOP annual conference, Essex, September 2010.

[4] The only other attempts to measure and account for bias in Great Britain have been those by Curtice (2001; see also Curtice and Steed, 1986), which although it identified the various sources of bias did not quantify their relative importance, and Blau's (2001) important critique of the Brookes' method.

[5] An alternative approach, developed almost contemporaneously with Brookes', identifying the same basic bias components, is Soper and Rydon (1958), who developed some early ideas of Brookes (1953).

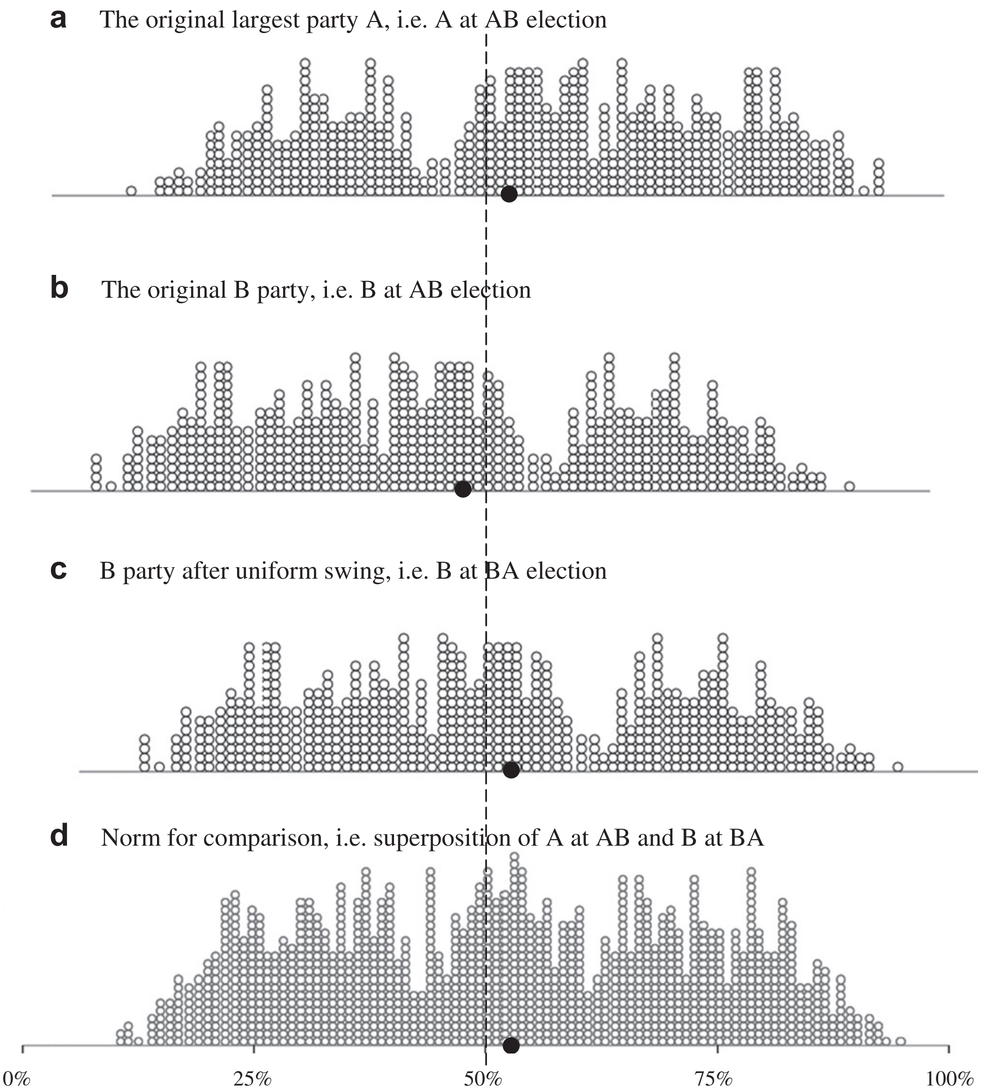

Fig. 1. Brookes' two-party method: Calculation of bias.

That Great Britain currently has a three-party system is clearly demonstrated by the vote shares data in Table 1 for the six general elections held during the period 1983–2005. In none of those contests did the winning party obtain a majority of the votes cast and, with the exception of the 2005 election, the winning party's vote share varied by only 2.4 percentage points around a mean of 43.3 per cent. There was slightly more variation in the shares obtained by the second- and third-placed parties, however, with the former obtaining on average 32.0 per cent and the latter 21.0. That final figure is crucial to the argument developed here; with a third party (in each case the Liberal Democrats[6]) gaining on average more than one-fifth of the votes cast and winning an increasing proportion of seats it is clearly not sensible to try and measure partisan bias as if it were a predominantly two-party system comparable to the United States.

The disproportionality generated by those results is shown in Table 1, which gives each party's shares of the votes cast and seats allocated. The winner's bonus (the percentage seat share less the percentage vote share) was very substantial at each contest: 20, 16 and 10 percentage points for the Conservatives at the first three elections respectively, and 21, 22 and 20 points for Labour at the last three. There is also a hint of partisan bias as the elections differ in the second-placed party's performance. In the first three elections second-placed Labour enjoyed an advantage in seat over vote share but that is not true for the Conservative party in the final set of three where it finished second. (For example, in 1987 Labour received 31.5 per cent of the votes cast but won 36.1

[6] Throughout this paper, we refer to the third party as the Liberal Democrats. In 1983 and 1987, two parties – Liberals and Social Democrat – contested the general elections as the Alliance, with an agreed single candidate in each constituency. The two parties merged in 1988 (see Crewe and King, 1995) and adopted their current name in 1989.

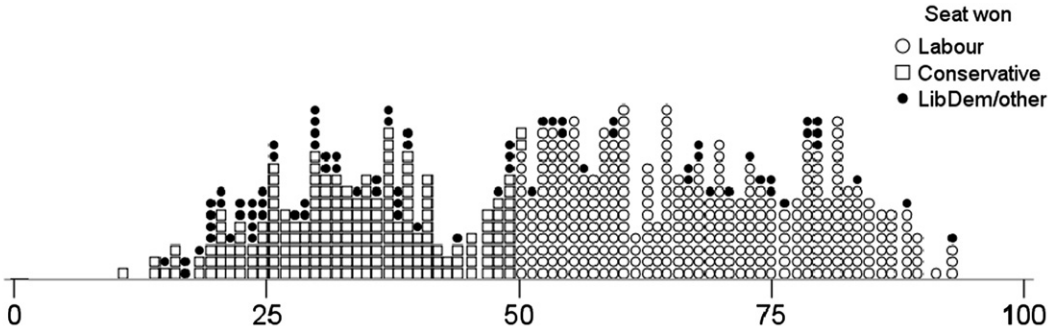

Fig. 2. Three players at 2005 British General Election.

per cent of the seats; in 2001 the Conservatives won the same share of the votes, but only 25.7 per cent of the seats.) In addition, Labour's winner's bonus was generally larger than the Conservatives'; in 2001 with 42.0 per cent of the votes Labour gained 64.4 per cent of the seats, whereas in 1992 with 42.8 per cent of the votes the Conservatives were allocated only 52.9 per cent of the seats. These figures suggest bias (or partisan asymmetry, or distorted representation) favouring Labour at each of the six contests. Substantial under-representation in the House of Commons was the experience of the Liberal Democrats at all six elections, however.

How might this asymmetry affecting all three parties be evaluated quantitatively? In answering that question, this paper presents a major extension of Brookes' method – rather than a further modification – to incorporate three-party situations. Brookes' method defines partisan bias as the difference between two parties in the number of seats they would win if they had a particular share of the votes cast. It then decomposes that bias into separate components including efficiency of vote distribution as well as effects separately produced by electorate size, turnout and minor parties' votes. Brookes (1960, 166) operationalises this decomposition by assuming 'a uniform percentage shift in support between the major parties'. We maintain that there are four important elements to the Brookes method. The first two are completely independent of any operationalising procedure: a quantitative measure of bias that can be partitioned into separate components; and formulae for the decomposition themselves. The other two elements – deriving a norm for comparison and estimating the expected number of seats for each party under certain scenarios (these are described in more detail in Borisyuk et al., 2008 and below) – are clearly integral to the way in which the method is operationalised. Brookes believed that uniform swing was the simplest assumption for the first of the latter pair, but our interpretation of his original procedure is that it merely operates to construct a '*norm for comparison*', which allows us to compare data from the actual election with this benchmark. It is not unusual, of course, for students of electoral system effects to want to derive some basis for considering the seat/vote curve. (See, for example, discussion in Blau (2001, 2004) about the use of the Edgeworth expansion of the normal distribution that retains the same mean, standard deviation and kurtosis as the actual frequency distribution of vote shares.) It is important to note that our interpretation does not offer a justification for using uniform swing as the basis for a counterfactual – 'what would happen if the election had been won by another party?'; it simply uses it as the means of establishing a reasonable norm, derived on rational grounds, against which the actual result can be compared. It is important, therefore, that our 'notionals' should be considered as technical steps that help in the necessary construction of the symmetrical multidimensional distribution that retains features of the actual electoral outcome and is independent from the size of electoral area (constituency). In short, we do not actually argue, or expect the reader to believe, that Labour gets 18.9% of the vote while the Liberal Democrats receive 42% at a general election but rather that this is merely part of a *technical construction* of the multidimensional distribution and permits us to compare the actual outcome with a norm for comparison.

In Brookes' original presentation bias is defined as the difference between the number of seats won by the leading party – *A* – at an election and the number that would be won by its main opponent – *B* – if *B* had obtained the same share of the votes. As demonstrated by the full algebra set out in the Appendix, therefore, if *A* obtains a larger share of the seats than *B* from the same share of the votes, then the positive bias favouring *A* is the inverse of the negative bias suffered by *B*.

This method is illustrated by considering the two-party percentage shares of votes cast at the 2005 British general election (i.e. [Conservative + Labour] = 100). Fig. 1a shows the vote share across 627 parliamentary constituencies[7] for the largest party *A* (Labour) and Fig. 1b presents party *B*'s share (Conservative). These distributions are necessarily the mirror image of each other.[8] Also indicated on both distributions is the overall vote share for each party; 52 per cent for Labour and 48 for the Conservatives.[9] (In both Figs. 1 and 2, each constituency is shown as a separate symbol.)

Brookes' method begins by asking what would happen to the allocation of seats if instead of coming second at the actual election (*AB* – the parties are listed in order according to their share of the votes won, with the largest first), party *B*

[7] There were 628 constituencies in Britain in 2005 but neither of the two major parties contested the Speaker's constituency.

[8] In effect the two-dimensional problem can be reduced to a single dimension. Correspondingly, for the three-party case we can present the results in two-dimensional space.

[9] These values differ from the mean values of the distribution (54% and 46% respectively) because of the unequal size of constituencies.

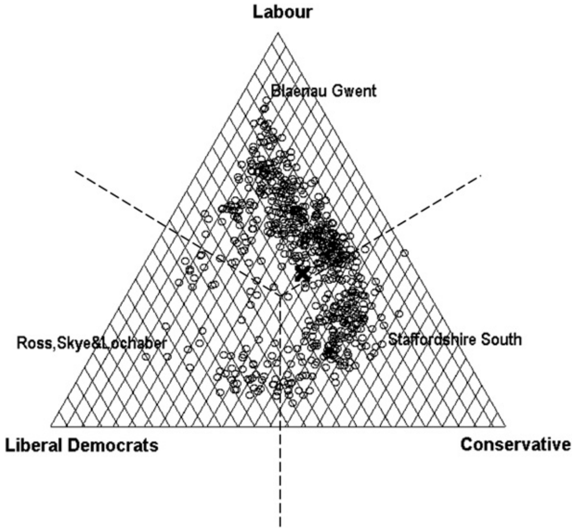

Fig. 3. Distribution of the three-party vote shares.

came first, receiving *A*'s vote share at the actual contest. Using the principle of reverse vote shares the method applies a uniform swing to each constituency to create a notional election result (the notional *BA* election) such that party *B* now wins 52 per cent of the two-party vote total. Following the application of uniform swing to the vote share in each of the 627 constituencies, party *B*'s distribution slides to the right such that its overall percentage of the votes becomes 52 per cent in the notional *BA* election (Fig. 1c).

These three figures represent the conventional understanding of the Brookes' method. However, another interpretation is possible. Fig. 1d shows the superposition of the distribution for party A at the actual election and the distribution for party B at the notional reverse vote share election (literally, a combination of Fig. 1a,c). This superposition that is critical to our interpretation of the Brookes method because it in effect constitutes the *norm for comparison* and retains many important features of the actual data.

Because Brookes' method focuses on the two largest parties only, all constituencies lying to the right of 50 per cent are 'won' by the respective party. Thus Fig. 1a shows the number of seats won by party *A* at the actual election (i.e. '*x*' in previous notation) and Fig. 1c shows the number of seats ('*y*') 'won' by party *B* at the notional election, *BA*.

In Brookes' original formulation – to which we are returning here – partisan bias towards party *A* is measured as the difference between the number of points to the right of 50 per cent in Fig. 1a and an *average* of the number of points to the right of 50 per cent in Fig. 1d. It is clear from the graphs that, in effect, Brookes' method compares the distribution of seats at the actual *AB* election (Fig. 1a) with the norm for comparison (Fig. 1d).[10]

Having set out the principles underpinning Brookes' original formulation, we use these as the foundation for the extension to the three-party situation.

Applying his algebra to the six general elections shown in Table 1 produces interesting results (Johnston et al., 1999, 2006). At the first two contests (1983 and 1987), which the Conservatives won with comfortable margins in votes cast over Labour (Table 1), there was a small total bias of below 15 seats favouring the Conservatives. Over the next four contests, however, the amount of partisan bias increased substantially, reaching a level of more than 100 seats and benefiting Labour rather than the Conservatives (Johnston et al., 2006); bias both increased substantially and changed direction.

However, these results treat the Liberal Democrats as a minor party only (its vote share in each constituency is unchanged in Brookes' procedure) and take no account of their substantial vote-winning capacity which was unmatched by the allocation of seats – although the party won 18.3 per cent of the votes it gained only 62 seats in 2005, just under 10 per cent of the total. At that election some constituencies had a clear three-party battle, whereas in others there was a two-party contest between the Liberal Democrats and one of the other two parties – with the other (i.e. either Conservative or Labour) being, in effect, a minor party.

The importance of the Liberal Democrats in redefining the nature of party competition in Britain is further illustrated from the distribution of Labour's share of the *two-party* (i.e. Labour + Conservative) vote in 2005 (Fig. 2), on which is also indicated which party won each seat. Some seats in the centre of the distribution – where Labour and the Conservatives got very similar shares of the two-party vote – were won by either the Liberal Democrats or one of the 'other' parties. Many more Liberal Democrat victories are towards the distribution's extremes, however, especially at the left-hand end, indicating constituencies where Labour got only a small share of the (Labour + Conservative) two-party vote, so that the 'real' contest was between the Conservatives and the Liberal Democrats.

This pattern in Fig. 2 complements that in Table 1; although the Liberal Democrats were the third-largest party, their share of the vote (averaging about 20 per cent across the six elections) was not evenly distributed across the constituencies. But, as Table 1 makes clear, they rarely gained sufficient votes in a constituency to win it, so that their seat share was incommensurate with their vote share. This was especially the case in 1983, when the Liberal Democrats were only two points behind Labour in the vote share but Labour won nine times more seats. The implication is that not only was the 1983 outcome slightly biased towards the Conservatives relative to Labour but also probably substantially more biased towards Labour relative to the Liberal Democrats. Similarly in 2005, whereas the Conservatives' vote share was 1.46 times that of the Liberal Democrats, the ratio for seats share was 3.18:1. These elements of the disproportionality clearly indicate the need for a bias measure which takes into account the vote and seat shares of all three parties rather than just the first two.

[10] For superposition AB and BA, vote shares now has zero correlation with size of constituency and has symmetrical shape of distribution (a norm distribution). Because of zero correlation with constituency size, the mean of the distribution equals overall vote share.

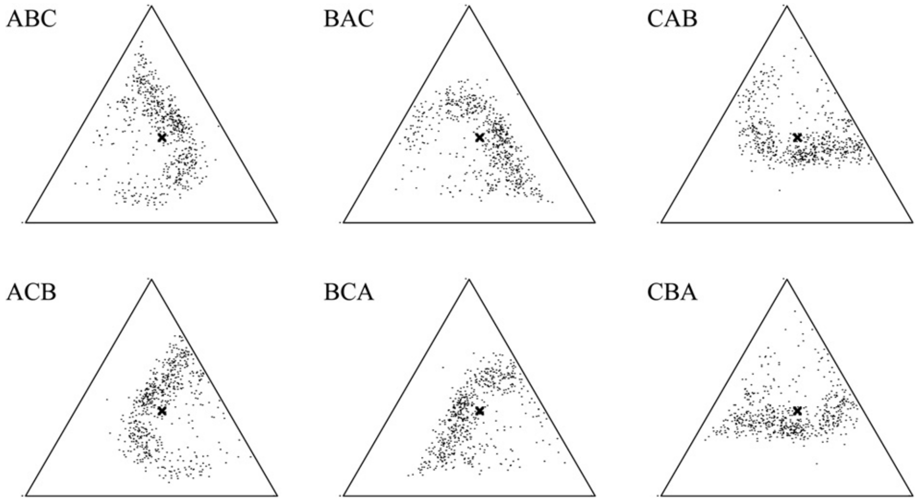

Fig. 4. Distribution of the three-party vote shares: ABC (actual), ACB, BAC, BCA, CAB, and CBA (notional elections).

3. Towards a partisan bias measure for the three-party case

In Brookes' procedure for evaluating partisan bias in the two-party case the establishment of a norm of comparison for the actual distribution of seats is central to the measurement of bias. This also applies with our proposed extension to the three-party case in which the bias towards a party is measured as the difference between the actual number of seats gained and a norm of comparison which is the expected unbiased number of seats that, on average, the three parties could win under similar conditions at a notional election; this is formally defined in the second section of the Appendix.

In Borisyuk et al. (2008) the expected norm was based on the actual election result plus just two notional elections. The first notional election saw the actual second-placed party awarded the same vote share as the actual first-placed party (i.e. the order of the election result was changed from *ABC* to *BAC*) whereas in the second the original third-placed party was given the vote share captured by the first-placed party at the actual election (i.e. *ABC* was converted to *CBA*). The actual number of seats won was thus compared with a norm comprising the mean number of seats gained by the leading party under three scenarios – the actual election and two notional elections. This ignored three other scenarios, and was the reason for the unresolved problems with the empirical applications noted above. This paper thus extends the approach to incorporate the *entire* set of possible outcomes (i.e. including the three other potential notional elections: *ACB*, *BCA* and *CAB*). This extension to the three-party case does that whilst retaining many of the basic principles underpinning the Brookes' original formulation.

In the two-party case the distribution of vote share can be depicted one-dimensionally (e.g. Figs. 1 and 2). Three-party vote share can be best captured by triangular graphs (for early proponents of this technique see Upton, 1976; Miller, 1977; Gudgin and Taylor, 1979; for a recent example that employs this method see Curtice and Firth, 2008). Fig. 3 shows the actual 2005 election result. The point for the national three-party vote share (39, 36, 25) is represented by a cross. The area inside the triangle is divided into three, each of which shows where the respective parties won seats. Where the lines intersect at the centre of the triangle the vote share for each of the three parties is 33.3 per cent. Points towards the peak of the triangle are constituencies where the largest party (in this case Labour) performed well. For example, in Blaenau Gwent, the Labour candidate received 86 per cent of the three-party vote, leaving just 6 per cent for the Conservative and 11 per cent for the Liberal Democrats.[11] The constituency of Staffordshire South occupies an entirely different part of the triangle, located towards the bottom right corner. Here, the Conservatives dominated the three-party vote, winning a 62 per cent share comfortably ahead of Labour on 21 per cent and Liberal Democrats on 17 per cent.[12] Finally, the Liberal Democrats performed exceptionally well (with 70 per cent) in their party leader's Scottish constituency of Ross, Skye and Lochaber.

In constructing the norm for comparison for this extended procedure we have three parties, *A*, *B* and *C* with overall vote shares, α, β, and γ respectively, where $(\alpha + \beta + \gamma = 100)$. The principle is to consider all six possible combinations assigning those three values to parties *A*, *B* and *C* – viz. *ABC* (actual election), *ACB*, *BAC*, *BCA*, *CAB*, and

[11] Blaenau Gwent was won by a 'fourth-party' candidate (an independent) with 58 per cent of the votes cast so that the three figures quoted here refer to the remaining 38.9 per cent of the votes won by the three main parties. Blaenau Gwent is thus an excellent example of a seat where the impact of minor parties is felt – as discussed in the section below on decomposing bias.

[12] South Staffordshire is included in our data although the election in that particular constituency was held some six weeks after the general election owing to the death of one of the original candidates.

CBA. This is shown on six triangular graphs (Fig. 4). The first (*ABC*) repeats what was shown in Fig. 3 while the triangle *ACB* below it shows the notional election where the positions of the second- and third-placed parties, *B* and *C*, have been reversed but that for the first party, *A*, is unchanged. It is important to note that the top of each triangle always shows the largest party, the right-hand side shows the second-placed party while the third-placed party is shown on the left-hand side.

Fig. 5 shows the superposition of these six configurations to create what will be used as the 'norm of comparison'. This procedure is a precise extension of what was done in the two-party case, where Fig. 1d represented the superposition of Fig. 1a and c. Once again, the area inside the triangle is divided into three sections The top section, for example, shows the total number of seats that would be won by the largest party (with vote share of α) across the six elections (the actual plus the five notional ones). Likewise, the section on the right shows seats won by whichever party came second (vote share β) while that on the left represents seats won by the third party with national vote share γ. The next stage of the process compares the actual number of seats won by each party with the expected unbiased number of seats derived from construction of the norm of comparison.

The distribution of points in Fig. 5 clearly differs from a Gaussian/normal distribution because the points are not at their densest around the overall national vote share and instead form their own distinctive shape. This means that we cannot calculate expected values for the bias equations by simple reference to a normal distribution. Instead, our approach considers all points in that scatter plot and identifies the number in each patterned area.[13] The estimate for the unbiased number of seats is 1/6th of the number of dots within each corresponding patterned area (equations (10)–(12) in the Appendix). We use this fraction because these dots represent the superposition of *six* scenarios and altogether there are *six times as many* dots as seats contested at the actual election (i.e. each constituency appears six times). Technically, we get the same outcome by separately six scenarios considering, calculating the values for each of them, and averaging the results.

In the two-party case, total bias (as defined by Johnston et al., 1999 and Blau, 2001) may be either negative or positive dependent upon the direction of bias towards or against the leading party. For three-party competition, however, there is no simple dichotomy and theoretically it may be in one of six possible directions. Three of these directions depict the situation when just one party has a positive bias while the remaining two parties have a negative bias. Three others are when two parties show a positive bias of seats while a single-party experiences negative bias. The resulting equation for total bias is in equation (13).

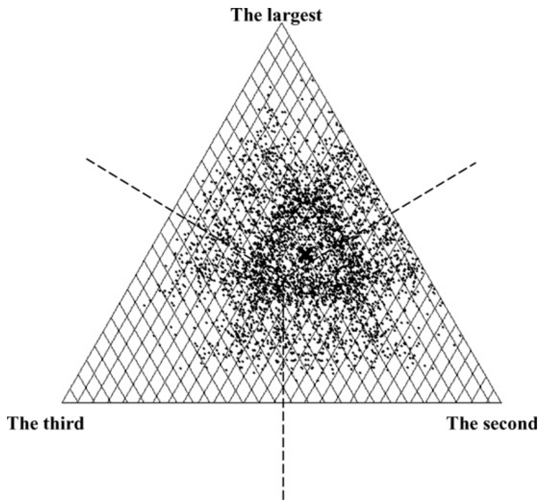

Fig. 5. The superposition ABC + ACB + BAC + BCA + CAB + CBA.

Applying equations (10)–(13) produces our estimates of bias at the 2005 British general election using this new procedure (Table 2). The six blocks give the results of the actual election (*ABC*) and those for the five notional outcomes of that election, showing for each party its share of the votes and the number of seats it would win under that scenario. Thus, for example, the second block shows that if the positions of the Conservatives and the Liberal Democrats were reversed (i.e. notional election *ACB*), the latter would just overtake the former in seats won – compared to a threefold difference between the two at the actual election; the third block shows that if the Labour and Conservative positions were reversed (i.e. *BAC*), nevertheless Labour would still have 59 more seats than the notional victor.

Overall, the results of the six separate outcomes suggest that Labour was the major beneficiary from partisan bias; not only was it the outright winner in terms of seats allocated in the two contests when it was placed first (*ABC*, *ACB*), but it also gained most seats in the two where it was placed second (*BAC*, *CAB*); indeed, in the latter it had an absolute majority over all other parties.[14] The Liberal Democrats, on the other hand, experienced substantial negative partisan bias: in the two contests in which they are placed first they come a poor second in the allocation of seats in one (*CAB*) and third in the other (*CBA*).

The figures at the foot of Table 2 confirm this; total bias is calculated for each party as the number of seats it obtained in the actual election minus one-sixth of the sum

[13] A possible alternative would be to use Monte Carlo simulation such that points/values should be randomly drawn with a sample size equal to the number of seats at the actual election. The number of points located within each of the three patterned areas may be used as an estimate for the unbiased number of seats won. Samples of the same size could be drawn randomly from the distribution repeatedly and points/values calculated for each re-sample. Taking an average of these sample results would give an approximation for the unbiased number of seats for each party (the first-, second- and third-parties). This approach has the possible additional advantage that we could calculate not only expected values but also errors and confidence intervals.

[14] Which would remain the case even if the 18 Northern Ireland MPs were included.

Table 2
Measuring three-party bias: 2005 General Election.

	Three-party Vote Share, %	Number of Seats
Election: ABC (actual)		
A (Labour)	39	355
B (Conservative)	36	198
C (Liberal Democrat)	25	62
Other		12
Election: ACB (notional)		
A (Labour)	39	374
B (Conservative)	25	112
C (Liberal Democrat)	36	129
Other		12
Election: BAC (notional)		
A (Labour)	36	308
B (Conservative)	39	249
C (Liberal Democrat)	25	57
Other	13	
Election: BCA (notional)		
A (Labour)	25	178
B (Conservative)	39	304
C (Liberal Democrat)	36	130
Other		15
Election: CAB (notional)		
A (Labour)	36	349
B (Conservative)	25	93
C (Liberal Democrat)	39	172
Other		13
Election: CBA (notional)		
A (Labour)	25	180
B (Conservative)	36	255
C (Liberal Democrat)	39	178
Other	14	
Bias towards each party		
A: $355 - [(355 + 374 + 249 + 304 + 172 + 178)/6] = 83.0$		
B: $198 - [(198 + 129 + 308 + 130 + 349 + 255)/6] = -30.2$		
C: $62 - [(62 + 112 + 57 + 178 + 93 + 180)/6] = -51.7$		
Total bias: $abs(83.0) + abs(-30.2) + abs(-51.7) = 164.9$,		

where '*abs*(.)' is the absolute value, i.e. the magnitude of a number irrespective of its sign.

of the seats it would win across all six scenarios. A positive partisan bias of 83.0 seats favours Labour, with negative biases of 30.2 and 51.7 respectively for the Conservatives and Liberal Democrats. The overall bias (i.e. the sum of those three values, irrespective of sign) is thus just under 165 seats – in a House of Commons with 627 British members (i.e. excluding the Speaker). Removing that bias would involve on average changing the result in one-seventh of the country's constituencies (83 of 627). This estimate of the pro-Labour bias is commensurate with analyses using the two-party measure (e.g. Johnston et al., 2006) but what that application could not show amongst other things was that the largest proportion of this was delivered to Labour at the Liberal Democrats' expense.

4. Decomposing the three-party bias estimates

A great strength of Brookes' method is that it not only estimates total bias in a readily-appreciated metric but also decomposes that bias into one of four categories. The first of these has been labelled differently (gerrymander, vote distribution, efficiency) but we prefer the term 'geography' (denoted by 'G' in the Appendix equations). It shows the degree of asymmetry in the distribution of partisan voting strength across constituencies for the parties being considered (Gudgin and Taylor, 1979 address the two-party situation). In a 'first-past-the-post' voting system a party performs well in the translation of votes into seats (in terms of the geography of its vote across the constituencies) by winning small and losing big; it should avoid accumulating surplus votes in constituencies it wins (i.e. those additional to the number required to win a constituency) and if it cannot win a constituency then it is best to attract as few as votes as possible there since these are literally 'wasted' (see Johnston et al., 2001).

The second component within electoral bias stems from malapportionment, i.e. differences in electorate size across constituencies (denoted by component 'E'). A party that is stronger in constituencies with relatively small electorates will tend to perform better (as shown by comparing its percentage of all votes cast and percentage of seats) than one which performs better in the larger constituencies. The level of abstention ('A') is the third component and becomes relevant when one party wins its seats where electoral turnout is low compared with its rivals whose victories are achieved in constituencies with on average higher turnouts. Finally, there is the minor party effect, component 'M'; here it is restricted to those parties outside the main three.

Brookes' algebra enables the contribution of each of these four components (G, E, A and M) to be calculated, in the same metric as the total bias. In addition, there are also interactions across each combination of bias components – the combined impact of abstentions and electorate size is an example of two-way interactions; there are also three- and four-way interactions. These are not separately calculated here; instead we just report the net interaction, which is the difference between the total bias for each party (equations (10)–(12)) and the sum of four components identified here (equations (15) and (16)).

The results of these calculations for the 2005 election are in Table 3 and allow an evaluation of the sources of the bias either favouring or disadvantaging each of the parties.[15] Thus, for example, of the total bias of 83.0 seats towards Labour the four blocks below that figure show that just under half (40.6) resulted from differences in the geography of the three parties' support across the constituencies. A further 10.5 and 16.2 seats (13 and 20 per cent of the total respectively) came from the electorate size (E) and abstentions (A) components, and a small amount (2.5 seats) from the impact of minor party (M) votes. There was also a substantial interaction effect, undoubtedly reflecting Labour's greater electoral strength in both the smaller constituencies and those with the lower turnouts (see Johnston et al., 2006).

Labour's positive bias resulting from the G component was complemented by the negative bias of −45.8 for this component for the Liberal Democrats, which accounted for

[15] The SPSS code for performing these calculations may be obtained from the authors.

Table 3
2005 British General Election: components of three-party bias.

Party	Labour	Conservative	LD
Overall result			
Three-party vote share (%)	39	36	25
Seats won	355	198	62
Expected unbiased number of seats	272.0	228.2	113.7
Bias (seats won – expected)	83.0	−30.2	−51.7
Decomposition of bias			
Vote distribution (G)	40.6	−4.5	−45.8
From: non-symmetry between other parties	−4.2	−8.6	1.2
… bigger rival*	2.5	−24.3	−32.5
… smaller rival	42.3	28.4	−14.4
Electorate size (E)	10.5	−11.5	−2.6
From: non-symmetry between other parties	0.3	−0.5	−0.1
.bigger rival	7.1	−9.4	−3.9
.smaller rival	3.0	−1.6	1.5
Abstention (A)	16.2	−13.9	−9.5
From: non-symmetry between other parties	0.6	−0.6	−0.1
.bigger rival	10.4	−12.4	−9.9
.smaller rival	5.4	−0.9	−0.4
Minor party votes(M)	2.5	−2.7	−0.5
From: non-symmetry between other parties	0.1	0.0	0.0
.bigger rival	1.8	−2.2	−0.9
.smaller rival	2.4	−0.4	0.4
Net interactions	13.2	2.5	6.7

* Note: The bigger rival for Labour is Conservative and the smaller rival is Liberal Democrats. For the Conservatives, the bigger and the smaller rival parties are Labour and the Liberal Democrats respectively. For the Liberal Democrats, they are Labour and the Conservatives.

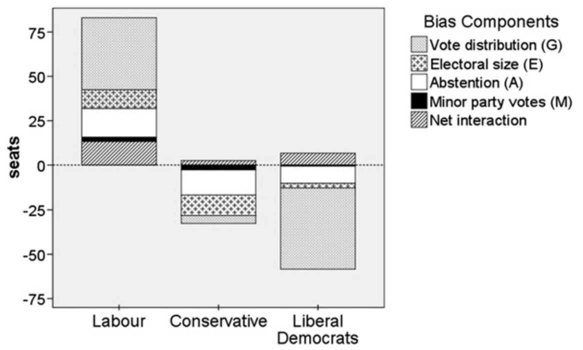

Fig. 6. 2005 British General Election: components of bias.

some 89 per cent of the total negative bias which that party experienced: the geography of its support operated very much to its disadvantage (largely, too many wasted votes in seats that it lost). For the Conservatives, on the other hand, its negative overall bias stemmed largely from the E and A components: compared to Labour especially, its support was over-concentrated in the constituencies with larger electorates and higher turnouts. Fig. 6 clearly shows the overall distribution of electoral bias at the 2005 general election and the relative contributions to that bias provided by the different components.

As well as identifying the various sources of each party's bias at the 2005 general election – which are dominated by the geography of support for Labour (positively) and Liberal Democrats (negatively) – it is also possible to identify whether each component operated at a similar scale in all cross-pair comparisons. This is shown by the three sets of data in each block of Table 3. Regarding the abstentions (A) component, for example, Labour's positive bias of 16.2 seats derived from this source, 10.4 came from the contrast with its larger rival (the Conservatives) and 5.4 from its smaller rival (Liberal Democrats): there were greater differences between Labour and the Conservatives in the average number of abstentions in the constituencies that they would win across the six contests than between Labour and the Liberal Democrats. The same is true with regards to electorate size: there is a greater difference between Labour and the Conservatives in the average electorate of seats won than between Labour and the Liberal Democrats.

Most of the results of this decomposition show how the source of each party's bias is split between its two rivals. Thus, for example, most of Labour's positive outcome from the G bias is to the detriment of the Liberal Democrats. Indeed, the 42.3 seat advantage shown there is larger than the overall benefit to Labour of 40.6 because of the asymmetry in the geography of support for its two rivals. Liberal Democrats, on the other hand, are substantially disadvantaged in the geography of their support not only relative to Labour (a negative bias of 32.5 seats) but also to the Conservatives (14.4 seats). This produces the asymmetry just noted because the Conservatives have a positive G bias relative to the Liberal Democrats (28.4 seats) which more than counters the negative bias (24.3 seats) it suffers relative to Labour.

The geography of Labour's support in 2005 was more efficient than that of either of the other two parties'; the Conservatives' was less efficient than Labour's but more efficient than the Liberal Democrats'; and the Liberal Democrats' was less efficient than that of either of the other two – they wasted too many votes won in the 'wrong places' where their chances of victory were slight. The last point is probably typical of third parties that contest constituencies everywhere; in this case, by winning only one in five votes the Liberal Democrats were almost bound to suffer from a poor vote distribution unless much of their vote-winning was highly targeted on relatively few seats.[16] It is also worth noting that the bias components regarding the votes for minor parties are small. This is to be expected given that the procedure is specifically designed for the three-party case and 'others' captured just 12 of the remaining seats at the 2005 election with 7.9 per cent of the votes. Plaid Cymru contested only the 40 Welsh constituencies, winning three of them (its share of the votes cast in Wales only was 12.5 per cent, which yielded 7.5 per cent of the 40 seats); the SNP contested all 59 Scottish constituencies, obtaining 17.6 per cent of the votes there and winning 6 (10.2 per cent) of the seats; the Respect party contested 26 constituencies in Britain, winning one; and two independents were elected.

[16] Which would be counter-productive. Unless it builds a base in a wider range of constituencies the party can never expect to be a potential party of (single-party) government.

5. Comparing the two-party and three-party analyses: Great Britain 1983–2005

This search for a new method to measure and decompose electoral bias was stimulated by the results of recent British general elections, a country which now has a party system quite different to that studied by Brookes when he first developed his procedure. (New Zealand's party system in the 1950s was even more dominated by two parties than was Britain's prior to 1970.) Although others subsequently modified his procedure to take account of the growing impact of a third party this did not fully incorporate it into the analysis and a radical redesign, based on Brookes' principles and procedures, was clearly needed. Having completed such a redesign, therefore, this section compares the two methods applied to British general elections from 1983 to 2005.

The relevant comparisons are shown in Table 4, where the two-party bias is calculated according to Mortimore's (1992) modification of Brookes' method which compares the two parties as if they each achieved the vote share obtained by the winning party *at* the actual election rather than the comparison as if they had each won half of the two-party vote total, as used by Johnston et al. (2001, 2006). There are some obvious substantial differences relating to specific elections. In 1983, for example, whereas the two-party method produces an estimated total bias of only 11 seats the three-party method comes out at 176. The small positive bias towards the Conservative (six seats) now becomes a negative bias of nine seats but the main difference lies in the large pro-Labour bias of 89 seats and the large negative disadvantage of 78 seats for the Liberal Democrats. Once the third party is incorporated into the analysis, the narrow Labour lead over the Liberal Democrats in vote share (Table 1) but the large disparity in the seat allocation between the two indicates a very substantial bias favouring the former. It is unsurprising to find rather large difference in bias estimates comparing the two- and three-party cases alongside one another. The two-party method, adapted to meet the demands of greater three-party competition, could only assign bias within the system as a whole to one or other of the two main parties whereas the three-party method is free to incorporate the third party explicitly.

Using the three-party method the least biased election of the seven is 1997 (Fig. 7; the 2010 general election is included here), when Labour won an electoral landslide.

Table 4
British General Elections 1983–2005: Comparing two- and three-party methods.

Party Method	Conservative		Labour		Liberal Democrat		Total Bias	
	2prt	3prt	2prt	3prt	2prt	3prt	2prt	3prt
1983	5.5	−8.7	−5.5	89.3	–	−78.0	11.0	176.0
1987	6.5	4.5	−6.5	60.8	–	−64.2	13.0	129.5
1992	−16.5	−11.3	16.5	55.8	–	−41.7	33.0	108.8
1997	−31.0	−5.0	31.0	14.5	–	−7.8	62.0	27.3
2001	−48.0	−35.2	48.0	56.5	–	−19.8	96.0	111.5
2005	−50.0	−30.2	50.0	83.0	–	−51.7	100.0	164.8

2prt – two-party method; 3prt – three-party method.

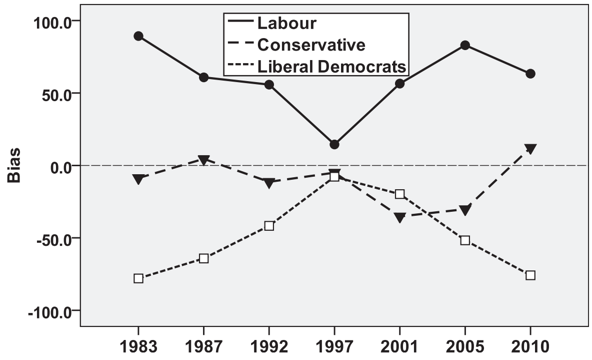

Fig. 7. Three-Party Bias at British General Elections, 1983–2010.

The Brookes' two-party method for this election shows total bias as 62 seats with a pro-Labour bias of 31 seats. By contrast, the three-party method calculates total bias at less than half that figure, with only a modest pro-Labour bias and rather small negative biases for the Conservatives and Liberal Democrats. This confirms our interpretation of the three-party method's superiority. The 1997 election result was certainly disproportional – Labour won more than two-thirds of the seats (418 of 641) with just 44 per cent of the vote – but the decomposition suggests that it was not particularly biased. The Conservative party won just 31 per cent of the votes and 26 per cent of the seats while the Liberal Democrats demonstrated the success of their seat-targeting strategy then: their overall vote share fell slightly (from 18 per cent of the three-party vote in 1992 to 17 in 1997) but they more than doubled their share of seats (20 of 634 in 1992 and 46 of 641 in 1997: Table 1). At subsequent elections, the Liberal Democrats' share of the seats increased by less than the increase in their share of the votes, thus increasing the partisan bias operating against them after reducing it between 1992 and 1997.

Furthermore, at the 1997 election – much more so than at either 1992 or 2001 – both Labour and the Liberal Democrats reduced their wasted vote totals by their connivance at tactical voting practices, whereby, for example, in seats where the Labour candidate was likely to come third many putative Labour voters transferred their support to the Liberal Democrat candidate to try and unseat an incumbent Conservative; complementing this, many Liberal Democrat supporters in seats where they were likely to come third voted Labour instead. As Curtice and Steed (1997, 309) noted, 'voters exhibited a striking tendency to opt for whichever of the two opposition parties appeared best placed to defeat the Conservatives locally'. The 1997 general election outcome was certainly highly disproportional but because both Labour and Liberal Democrats each had an effective geographical distribution of their vote, the extent of electoral bias was relatively low.

6. Conclusions

The presence of partisan bias in single-member district, plurality electoral systems is a consequence of several aspects of a country's electoral geography (Johnston and Pattie, 2006) – and can be stimulated by cartographic practices such as malapportionment and gerrymandering. Even where such practices are absent, however, and districting is undertaken by non-partisan bodies (as in the UK), nevertheless bias may be produced because of the geographies underpinning that neutral boundary-drawing process (Gudgin and Taylor, 1979).

Of the various approaches available, that developed by Brookes and subsequently modified in a number of ways, has proved valuable in understanding how the translation of votes into seats operates in the British electoral system. There has been one very important drawback, however: the method, despite the subsequent modifications, treats the British electoral situation as a two-party system, and the role of the third party – which has won on average one-fifth of all votes cast at the last six general elections – is only marginal to the bias calculation. As such, the illumination provided by the Brookes' method has been only partial – indicative of the size and direction of the bias, but not conclusive.

To address that deficiency, this paper has redesigned Brookes' approach to make it fit for the analysis of a three-party situation. Its foundational principles have been retained, but the algebra rewritten to represent the presence of three major parties. Application of that redesigned procedure to the 2005 British general election has adequately illustrated the substantial increase in understanding the nature of partisan bias in that outcome as it differentially impacted upon the three parties, as has a brief evaluation of its comparative performance to the data for a six-election sequence compared to the original Brookes' formulation.[17] As such, this paper has presented a methodology with wide potential applicability in analyses of the translation of votes into seats in situations where three parties each receive a sizeable percentage of votes.

Appendix; The algebra

The basic equations for a two-party system

We prefer to use a different notation to Brookes because of the added complexity introduced by dealing with three rather than just two parties. For all subsequent formulae the subscript relates to the party under consideration while superscripts describe the finishing order for the parties. Thus, in the two-party situation $\boldsymbol{seat_A^{AB}}(\alpha)$ identifies seats won by party A at the election where A is the leading party with α share of the two-party vote and $\boldsymbol{seat_B^{BA}}(\alpha)$ identifies seats won by party B at the notional election where B is the leading party with α share of the two-party vote.

Bias towards the leading party is set out by Brookes as:

Bias to party A is

$$bias_{\mathbf{A}}(a) = x - (x+y)/2 = (x-y)/2, \tag{1}$$

which is simply the negative of bias towards its rival, B:

$$bias_{\mathbf{B}}(a) = y - (x+y)/2 = (y-x)/2. \tag{2}$$

In our revised notation

$$\begin{aligned} bias_{\mathbf{A}}(\boldsymbol{\alpha}) &= seat_{\boldsymbol{A}}^{\boldsymbol{AB}}(\boldsymbol{\alpha}) - \left[seat_{\boldsymbol{A}}^{\boldsymbol{AB}}(\boldsymbol{\alpha}) + seat_{\boldsymbol{B}}^{\boldsymbol{BA}}(\boldsymbol{\alpha})\right]/2 \\ &= \left[seat_{\boldsymbol{A}}^{\boldsymbol{AB}}(\boldsymbol{\alpha}) - seat_{\boldsymbol{B}}^{\boldsymbol{BA}}(\boldsymbol{\alpha})\right]/2 \end{aligned} \tag{3}$$

Bias to the second-placed party (B) is then

$$\begin{aligned} bias_{\boldsymbol{B}}(1-\boldsymbol{\alpha}) &= seat_{\boldsymbol{B}}^{\boldsymbol{AB}}(1-\boldsymbol{\alpha}) - \left[seat_{\boldsymbol{B}}^{\boldsymbol{AB}}(1-\boldsymbol{\alpha}) \right. \\ &\quad \left. + seat_{\boldsymbol{A}}^{\boldsymbol{BA}}(1-\boldsymbol{\alpha})\right]/2 \\ &= \left[seat_{\boldsymbol{B}}^{\boldsymbol{AB}}(1-\boldsymbol{\alpha}) - seat_{\boldsymbol{A}}^{\boldsymbol{BA}}(1-\boldsymbol{\alpha})\right]/2 \end{aligned} \tag{4}$$

If we assume that minor parties win no seats and N equals the total number of seats then we can re-write formula 4 as

$$\begin{aligned} bias_{\boldsymbol{B}}(1-\boldsymbol{\alpha}) &= \left\{\left[N - seat_{\boldsymbol{A}}^{\boldsymbol{AB}}(\boldsymbol{\alpha})\right] - \left[N - seat_{\boldsymbol{B}}^{\boldsymbol{BA}}(\boldsymbol{\alpha})\right]\right\}/2 \\ &= \left[seat_{\boldsymbol{B}}^{\boldsymbol{BA}}(\boldsymbol{\alpha}) - seat_{\boldsymbol{A}}^{\boldsymbol{AB}}(\boldsymbol{\alpha})\right]/2 \end{aligned} \tag{5}$$

which is simply the negative of bias towards its rival, A.

Moreover, we can specify total electoral bias for the two-party case as:

$$\begin{aligned} total\_bias^{AB}(\alpha, 1-\alpha) &= |bias_A(\alpha)| + |bias_B(1-\alpha)| \\ &= \left|seat_A^{AB}(\alpha) - seat_B^{BA}(\alpha)\right|. \end{aligned} \tag{6}$$

This figure is the sum of the absolute values generated by (3) and (5) and indicates the total amount of bias generated by the system given the actual election outcome and its translation into the notional election.

Extending the equations to the three-party case

For the three-party (A, B, C with vote shares α, β, and γ respectively) situation, with the expected norm established, bias for each of the parties is stated as:

$$bias_A(\alpha) = seat_A^{ABC}(\alpha) - expected\_norm\left(\alpha|_{given\_distribution}\right) \tag{7}$$

$$bias_B(\beta) = seat_B^{ABC}(\beta) - expected\_norm\left(\beta|_{given\_distribution}\right) \tag{8}$$

$$bias_C(\gamma) = seat_C^{ABC}(\gamma) - expected\_norm\left(\gamma|_{given\_distribution}\right) \tag{9}$$

The procedure adopted elaborates further on equations (7)–(9). When calculating bias towards party A at the actual election we take the actual number of seats won by A at the election and subtract the average of the number of seats that would be won by the party with vote share α across the six contests. In similar fashion the bias towards party B is calculated with reference to the seats won with vote share β, and bias affecting party C is calculated by using vote share γ. Formally:

Decomposing the three-party bias

Total electoral bias is defined here as a sum of the absolute bias values for the three parties:

[17] Prior to the 2010 UK general election it was argued by some that the review of parliamentary constituency boundaries had apparently failed to address the extent of electoral bias that favoured Labour. Interested readers may wish to consult Borisyuk et al. (2010) for a discussion of this issue.

$$\begin{aligned} bias_A(\alpha) &= actual\_seats_A^{ABC} - norm\_seats\left(\alpha|_{given\_distribution}\right) \\ &= seat_A^{ABC} - \frac{seat_A^{ABC} + seat_A^{ACB} + seat_B^{BAC} + seat_B^{BCA} + seat_C^{CAB} + seat_C^{CBA}}{6}; \end{aligned} \tag{10}$$

$$bias_B(\beta) = seat_B^{ABC} - \frac{seat_B^{ABC} + seat_B^{CBA} + seat_A^{BAC} + seat_A^{CAB} + seat_C^{ACB} + seat_C^{BCA}}{6}; \tag{11}$$

$$bias_C(\gamma) = seat_C^{ABC} - \frac{seat_C^{ABC} + seat_C^{BAC} + seat_A^{BCA} + seat_A^{CBA} + seat_B^{ACB} + seat_B^{CAB}}{6}. \tag{12}$$

$$total\_bias^{ABC}(\alpha,\beta,\gamma) = |bias_A(\alpha)| + |bias_B(\beta)| + |bias_C(\gamma)|. \tag{13}$$

Brookes' algebra enables the contribution of each of these four components (geography – G; electorate size – E; abstentions – A; and minor parties – M) to be calculated, in the same metric as the total bias. In order to achieve that for the three-party case being developed here, we rearrange formulae (10)–(12) such that bias towards party A, for example, is:

$$\begin{aligned} bias_A(\alpha) = {} & \frac{seat_A^{ABC} - seat_A^{ACB}}{6} + \frac{seat_A^{ABC} - seat_B^{BAC}}{6} \\ & + \frac{seat_A^{ABC} - seat_B^{BCA}}{6} + \frac{seat_A^{ABC} - seat_C^{CAB}}{6} \\ & + \frac{seat_A^{ABC} - seat_C^{CBA}}{6} \end{aligned} \tag{14}$$

The notation used here replicates that used for the two-party method, as set out in Brookes' (1960) original formulation with the addition of the use of subscripts and superscripts as described earlier. We also omit here for the sake of simplicity references to vote shares, α, β and γ. Hence:

$seat_A^{ABC}$ – number of seats won by party A at actual election;
$seat_A^{ACB}$ – number of seats won by party A under ACB scenario;
$seat_B^{BAC}, seat_B^{BCA}$ – number of seats won by party B under BAC and BCA scenarios respectively;
$seat_C^{CAB}, seat_C^{CBA}$ – number of seats won by party C under CAB and CBA scenarios respectively;
$P_A^{ABC}, P_A^{ACB}, P_B^{BAC}, P_B^{BCA}, P_C^{CAB}, P_C^{CBA}$ – combined vote totals for three major parties where corresponding party won seats under particular scenarios;
$R_A^{ABC}, R_A^{ACB}, R_B^{BAC}, R_B^{BCA}, R_C^{CAB}, R_C^{CBA}$ – average electorate;
$D_A^{ABC}, D_A^{ACB}, D_B^{BAC}, D_B^{BCA}, D_C^{CAB}, D_C^{CBA}$ – average number of abstentions;
$U_A^{ABC}, U_A^{ACB}, U_B^{BAC}, U_B^{BCA}, U_C^{CAB}, U_C^{CBA}$ – average number of minor party votes.

We can now specify the formulae for the four components of bias, in this case towards party A.

Decomposition of bias towards party B and party C yields similar formulae; for example, the decomposition of the

$$\begin{aligned} G_{toward\_A} = {} & \frac{seat_A^{ACB}}{6}\left(\frac{P_A^{ABC}}{P_A^{ACB}}-1\right) + \frac{seat_B^{BAC}}{6}\left(\frac{P_A^{ABC}}{P_B^{BAC}}-1\right) + \frac{seat_B^{BCA}}{6}\left(\frac{P_A^{ABC}}{P_B^{BCA}}-1\right) + \frac{seat_C^{CAB}}{6}\left(\frac{P_A^{ABC}}{P_C^{CAB}}-1\right) + \frac{seat_C^{CBA}}{6}\left(\frac{P_A^{ABC}}{P_C^{CBA}}-1\right) \\ E_{toward\_A} = {} & \frac{seat_A^{ACB}}{6}\left(\frac{R_A^{ACB}}{R_A^{ABC}}-1\right) + \frac{seat_B^{BAC}}{6}\left(\frac{R_B^{BAC}}{R_A^{ABC}}-1\right) + \frac{seat_B^{BCA}}{6}\left(\frac{R_B^{BCA}}{R_A^{ABC}}-1\right) + \frac{seat_C^{CAB}}{6}\left(\frac{R_C^{CAB}}{R_A^{ABC}}-1\right) + \frac{seat_C^{CBA}}{6}\left(\frac{R_C^{CBA}}{R_A^{ABC}}-1\right) \\ A_{toward\_A} = {} & \frac{seat_A^{ACB}}{6}\left(\frac{R_A^{ABC}}{R_A^{ABC}-D_A^{ABC}}\left(\frac{D_A^{ABC}}{R_A^{ABC}}-\frac{D_A^{ACB}}{R_A^{ACB}}\right)\right) + \frac{seat_B^{BAC}}{6}\left(\frac{R_A^{ABC}}{R_A^{ABC}-D_A^{ABC}}\left(\frac{D_A^{ABC}}{R_A^{ABC}}-\frac{D_B^{BAC}}{R_B^{BAC}}\right)\right) \\ & + \frac{seat_B^{BCA}}{6}\left[\frac{R_A^{ABC}}{R_A^{ABC}-D_A^{ABC}}\left(\frac{D_A^{ABC}}{R_A^{ABC}}-\frac{D_B^{BCA}}{R_B^{BCA}}\right)\right] + \frac{seat_C^{CAB}}{6}\left[\frac{R_A^{ABC}}{R_A^{ABC}-D_A^{ABC}}\left(\frac{D_A^{ABC}}{R_A^{ABC}}-\frac{D_C^{CAB}}{R_C^{CAB}}\right)\right] + \frac{seat_C^{CBA}}{6}\left[\frac{R_A^{ABC}}{R_A^{ABC}-D_A^{ABC}}\left(\frac{D_A^{ABC}}{R_A^{ABC}}-\frac{D_C^{CBA}}{R_C^{CBA}}\right)\right] \\ M_{toward\_A} = {} & \frac{seat_A^{ACB}}{6}\left[\frac{R_A^{ABC}}{R_A^{ABC}-U_A^{ABC}}\left(\frac{U_A^{ABC}}{R_A^{ABC}}-\frac{U_A^{ACB}}{R_A^{ACB}}\right)\right] + \frac{seat_B^{BAC}}{6}\left[\frac{R_A^{ABC}}{R_A^{ABC}-U_A^{ABC}}\left(\frac{U_A^{ABC}}{R_A^{ABC}}-\frac{U_B^{BAC}}{R_B^{BAC}}\right)\right] \\ & + \frac{seat_B^{BCA}}{6}\left[\frac{R_A^{ABC}}{R_A^{ABC}-U_A^{ABC}}\left(\frac{U_A^{ABC}}{R_A^{ABC}}-\frac{U_B^{BCA}}{R_B^{BCA}}\right)\right] + \frac{seat_C^{CAB}}{6}\left[\frac{R_A^{ABC}}{R_A^{ABC}-U_A^{ABC}}\left(\frac{U_A^{ABC}}{R_A^{ABC}}-\frac{U_C^{CAB}}{R_C^{CAB}}\right)\right] + \frac{seat_C^{CBA}}{6}\left[\frac{R_A^{ABC}}{R_A^{ABC}-U_A^{ABC}}\left(\frac{U_A^{ABC}}{R_A^{ABC}}-\frac{U_C^{CBA}}{R_C^{CBA}}\right)\right] \end{aligned} \tag{15}$$

component relating to the electorate size effect relevant to party C would read:

$$E_{toward\_C} = \frac{seat_C^{BAC}}{6}\left(\frac{R_C^{BAC}}{R_C^{ABC}} - 1\right) + \frac{seat_A^{BCA}}{6}\left(\frac{R_A^{BCA}}{R_C^{ABC}} - 1\right) + \frac{seat_A^{CBA}}{6}\left(\frac{R_A^{CBA}}{R_C^{ABC}} - 1\right) + \frac{seat_B^{ACB}}{6}\left(\frac{R_B^{ACB}}{R_C^{ABC}} - 1\right) + \frac{seat_B^{CAB}}{6}\left(\frac{R_B^{CAB}}{R_C^{ABC}} - 1\right) \quad (16)$$

This compares the actual position of the third party C with that of the third (in terms of overall vote share) party under each of the five notional election scenarios.

There are also interactions between these four components – the combined impact of both abstentions and electorate size, for example. These (which can be two-way, three-way, and four-way) are not separately calculated here; the net interaction is simply reported, calculated as the difference between the total bias figure for each party (Table 2) and the sum of the four components calculated using the formulae above.

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Appendix 3

Parliamentary Constituency Boundary Reviews and Electoral Bias:

How Important Are Variations in Constituency Size?

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Parliamentary Constituency Boundary Reviews and Electoral Bias: How Important Are Variations in Constituency Size?

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ABSTRACT

It is frequently canvassed by some politicians and political commentators that the current British electoral system is biased against the Conservative party because of variations in constituency size: seats won by the Conservatives at recent elections have been larger than those won by Labour in terms of their registered electorates, thereby disadvantaging the former. As a consequence, it is argued that equalisation of constituency electorates by the Boundary Commissions would remove that disadvantage. The validity of this argument is addressed in two ways. First, we demonstrate that the rules and procedures applied by the Boundary Commissions when redistributing seats in the UK preclude the achievement of substantial equality in constituency electorates. Secondly, we use a recent adaptation of a widely-used procedure for establishing electoral bias in three-party systems to show that variations in constituency electorates had only a minor impact on the outcome of elections after the last two redistributions. The geography of each party's support base is much more important, so changes in the redistribution procedure are unlikely to have a substantial impact and remove the significant disadvantage currently suffered by the Conservative party.

TO many observers, the result of the 2005 United Kingdom general election was a clear exemplar of the disproportionality that characterises first-past-the-post electoral systems. The two leading parties—Labour and Conservative—were separated by only three percentage points in their share of the votes cast in Great Britain (36.1 and 33.2 per cent, respectively), but whereas Labour obtained 56.5 per cent of the House of Commons seats, the Conservatives got only 31.5 per cent. The Liberal Democrats were similarly disadvantaged—as they have been at all post-war general elections: with 22.6 per cent of the votes nationally they were allocated only 9.9 per cent of the seats. Such disproportionality was not the only consequence of the votes-to-seats translation process, however. There was also clear evidence of bias, suggesting that Labour was much better treated than the Conservatives: one analysis indicated that if they had each won 34.7 per cent of the votes cast, Labour would

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have won 111 more seats than the Conservatives.[1] Labour could remain not only the largest but also the majority party, even if it came a close second to the Conservatives at the next general election.

Following the 2005 general election, there was much discussion about this disproportionality and bias, with many suggestions about its causes and how they might be eliminated—some of which related to the current electoral system and others to its replacement by one based on principles of proportional representation. One issue attracting considerable attention was variation in constituency electorates, and the observation that the seats won by Labour tended to be smaller on average than those won by the Conservatives: of the 125 smallest constituencies in Great Britain (with electorates less than 62,600), Labour won 96 and the Conservatives only 11 (and the Liberal Democrats 12): of the 125 largest (with electorates greater than 75,400) Labour won 36, compared to the Conservatives' 69 and the Liberal Democrats' 19.[2] If constituency electorates were equalised, therefore, Labour's advantage might be removed, and 'fairer' election results eventuate—or so the argument went.[3]

The United Kingdom has an accepted procedure for equalising electorates. A Periodic Review of Parliamentary constituencies is undertaken by the four Boundary Commissions—one each for England, Northern Ireland, Scotland and Wales—every 8–12 years.[4] One of these had recently been completed prior to the 2005 election for Scotland (where constituencies have on average been much smaller than those in England, although this was changed by implementation of provisions in the *Scotland Act 1998*[5]) and the ongoing reviews for the other three countries would be reporting before the next general election. Thus it was anticipated by some observers that Labour's electoral advantage in 2005 would be eliminated and that there would be a 'level playing field' for all participants at the next contest.[6]

The outcome of the latest Review did not produce the anticipated outcome, however.[7] The number of constituencies was increased by four, they were more equal in their electorates than ever before, and yet Labour's advantage remained; if the 2005 general election were re-run in those new constituencies, there would still have been a substantial bias favouring Labour and disadvantaging both the Conservatives and the Liberal Democrats. Why should that be? One argument is that the Boundary Commissions have failed in their task: although they have significantly reduced the variation in constituency electorates substantial differences remain—which could be why Labour's advantage has not been removed. Alternatively, it could be that equalising electorates is not the key issue: the asymmetries in the translation of votes into seats that currently favour Labour result from other additional factors.

This paper addresses those arguments by focusing on two misunderstandings. The first relates to the work of the Boundary Commissions which are required to review constituency electorates regularly and to ensure that they have equal electorates 'So far as is practicable', but various constraints to their operations mean that they can never achieve anything close to genuine equality; this is addressed in a discussion of those constraints and the Commissions' working practices. The second misunderstanding relates to the role of electoral inequalities (or malapportionment) in the production of disproportional and biased outcomes to first-past-the-post elections. To counter that, we use a new method of evaluating the amount of bias in election results to show the relative unimportance of malapportionment and the very limited impact of the Boundary Commissions' changes with regard to electorate size on recent election results. Our illustrations of this point are drawn from analyses of the Commissions' last two Periodic Reviews. The most recent, the Fifth Review, will have its recommendations implemented at the next general election (although changes for Scotland were implemented prior to the 2005 general election). The Fourth Review reported after the 1992 general election, creating new constituencies deployed for the first time in 1997. We show that variations in constituency size would have made only a small contribution to electoral bias if each of these reviews had been enacted in time to be used in the 1992 and 2005 general elections, respectively. Other sources—entirely outside the remit of the Boundary Commission redistributions—are thus operating as major contributors to electoral bias.

The first section of the article clarifies the difference between the terms disproportionality and electoral bias and is followed by a brief section presenting an overview of the purpose and scope of the boundary review process using the recently completed Fifth Periodic Review as illustration. The third section describes a method for decomposing electoral bias specifically for a three-party system. This is intended to replace the original two-party method, first developed by Ralph Brookes and then subsequently modified by Roger Mortimore and others to decompose bias under conditions of three-party competition. This new method we feel better reflects the reality of the party system in Great Britain that has emerged over recent elections. Following that, we describe in the fourth section the process of estimating notional general election results following revisions to Parliamentary constituency boundaries. Crucial for our argument is that we decompose the three-party electoral bias for both the 2005 and 1992 *estimated* results and compare that with the composition of bias at the *actual* elections. This analysis of the two most recent reviews serves both to illustrate the impact of constituency boundary changes upon the distribution of seats between parties and also the effect, if any, on the components of any electoral bias contained within the system.

Disproportionality and electoral bias

A recurring feature of the UK electoral system, indeed virtually all examples of first-past-the-post voting, is disproportionality between a party's vote and seat share—larger parties usually receive a much greater share of seats than votes; smaller parties obtain a lower seat than vote share. Proponents of first-past-the-post voting systems believe this so-called winner's bonus is a strength not a weakness; the largest party will normally win a much larger share of seats than is commensurate with its share of the votes and as a consequence have a majority in the legislature even if it has only a minority of the votes cast. This advantage of seats over votes often extends to other large parties; assuming that more than two parties contest an election a relatively large second-placed party often emerges with a greater share of seats than votes. Smaller parties, particularly those with a spatially dispersed vote share, are mostly disadvantaged by first-past-the-post voting.

However, such disproportionality is not synonymous with electoral bias; an election outcome may be highly disproportional while electoral bias remains relatively low. Bias occurs when the parties are treated unequally in the process of allocating seats: if one party would get a larger share of the seats with a given share of the votes than would another party with the same vote share, then the electoral system's operation favours the former. Bias is generated when there is asymmetry in the translation of vote shares into seat shares.

The production of bias is best understood by describing an election that is both disproportional and biased. Consider one contested *only* by two parties, A and B, where each finishes with exactly half the votes. However, party A wins 60% of the seats with its half share while party B has the remaining 40%. In this example, the lucky party's bonus is a 20-point advantage of seats over votes and the outcome is highly disproportional. There is also a clear asymmetry in votes and seats—despite winning the same vote share as party A, party B suffers from a large degree of electoral or partisan bias whose production is discussed below.

By contrast to this example, Britain's 1997 general election outcome was highly disproportional (Labour won 43% of votes but 63% of seats) but electoral bias, as measured by our three-party method, was not particularly large. Given Labour's 13-point and 27-point leads in the popular vote over the Conservatives and Liberal Democrats respectively, it is an acknowledged and widely understood outcome of first-past-the-post that a party which so dominates its competitors is likely to win a clear majority of seats—the winner's bonus. However, the Liberal Democrats, which in previous elections had suffered greatly from the voting system, were much more successful in targeting seats; their votes per seats ratio at the 1997 election was three times smaller than it was for the Liberal/SDP Alliance following the 1983 election.

Electoral bias and disproportionality, although closely related therefore, are separate features of an election result.

Re-drawing constituency boundaries

The regular electoral redistributions undertaken by the Boundary Commissions are generally believed to reduce, if not entirely remove, bias from election results. And yet, it seems that they do not. Why that is the case requires a clear understanding of the nature and scope of the review process.

Regular Parliamentary seat redistributions by Boundary Commissions were introduced in 1944. Although the rules which they operate are to some extent unclear and contradictory, their main task is to ensure that constituencies in the relevant country conform to two main criteria. The first—which takes precedence in the legislation—ensures that the constituencies nest within the major local government administrative areas: the Shire and Metropolitan Counties and the London Boroughs in England; Scotland's unitary local authorities; and in Wales the eight 'preserved counties' which were abolished for all other purposes when unitary authorities were created in 1995. In Northern Ireland there is no such requirement. No constituency should cross a boundary separating two such authorities, unless a case is made that this is necessary to meet the other significant rule's requirement that, 'The electorate of any constituency shall be as near the electoral quota as is practicable', although 'a Boundary Commission may depart from the strict application of [this] rule . . . if it appears to them that a departure is desirable to avoid an excessive disparity between the electorate of any constituency and the electoral quota, or between the electorate thereof and that of neighbouring constituencies in the part of the United Kingdom within which they are concerned'.[8] The electoral quota is the relevant country's total electorate at the start of redistribution, divided by the current number of seats there. (Each of the UK's countries has its own Boundary Commission and electoral quota.).

Although the principal goal of the Fifth Periodic Review was to achieve greater electoral equality across the Parliamentary constituencies within each UK nation, a number of factors—including the interaction of the two rules outlined here—ensured that the outcome was far from equal. Although there was a reduction in the variation around both the average electorates and the quotas, considerable variation in constituency size remains with implications for the continued production of electoral bias. The reasons for this are:

- The four countries are treated differently in the first rule the Commissions must take account of, which states that Great Britain shall have not substantially greater or less than 613 constituencies, Wales not less than 35 and Northern Ireland not more than 18 and not less than 16. Following the passage of the *Scotland Act 1998*, Scotland is now required to use the same quota as England and in 2005 its constituencies were reduced from 72 to 59. Wales was not similarly treated after the 1998 devolution settlement, however, and retains 40 constituencies—at least eight more than its entitlement if its Commission also deployed the English quota.

- Each Commission can deviate from the electoral equality requirement, under the 'special geographical considerations' rule referred to above. This has always been interpreted as applying to sparsely populated, relatively inaccessible areas only, and in the Fifth Reviews was only deployed in Scotland's Highland and Islands region and Orkney and Shetland. Thus, whereas 16 Scottish constituencies had electorates larger than the English average in 2005, four had only 21,576, 33,048, 46,837 and 50,507 electors, which substantially reduced the national average constituency electorate to 65,083 (England's then was 70,203).
- Although the Commissions can combine adjacent local authority areas to reduce variations in constituency size, they have been unwilling to do this save in certain circumstances—notably at recent redistributions in Greater London and England's Metropolitan Counties. The impact of this reluctance is most apparent with the Isle of Wight, with a 2005 electorate of 109,046. The Boundary Commission for England, taking account of the opinions of island residents, has never either allocated two small constituencies to the island or attached part of it to a mainland constituency in nearby Hampshire.[9] Furthermore, even the allocation of seats within local authority areas according to their mean entitlement can generate sharp disparities. For example, Berkshire's eight constituencies after the Fifth Review had a mean electorate of 72,655, whereas for the five in neighbouring Wiltshire it was only 64,430. Within Greater London, despite some grouping of adjoining Boroughs, the differences were even greater: Croydon's three constituencies averaged 77,200 electors, for example, and nearby Wandsworth's 65,295; Islington's two constituencies averaged 59,946 electors, whereas Camden's two averaged 76,440.
- Constraints on constituency delimitation within a local government area also necessarily produce variations in electorate size. The *Parliamentary Constituencies Act 1986* rules make no reference to how this is to be done, save in Northern Ireland where 'no ward shall be included partly in one constituency and partly in another'. Nevertheless, all of the Commissions have operated this system and the constituencies they define are groupings of adjacent local government wards which almost invariably create differences between constituencies within a local authority area. Some are considerable, because wards—especially in urban areas—are relatively large and

their number is not divisible into an integer by the number of constituencies. Wandsworth, for example, had 20 wards to be allocated between three constituencies in the Fifth Review: two have seven wards and electorates of 67,111 and 69,445; one has six wards and 59,331 electors. Walsall similarly had 20 wards and its three constituencies had electorates of 58,695, 66,287 and 64,995—all well below the national quota of 69,934.

- A further possible cause of continued inequalities is a consequence of the public consultations the Commissions are required to undertake on their provisional recommendations. These recommendations are frequently challenged by local interest groups, with some (especially the political parties) preferring alternative constituency architectures. Such challenges rarely use electoral equality as their predominant criterion but instead rely on a later rule that 'It shall not be a duty of a Boundary Commission to aim at giving full effect in all circumstances to the above rules, but they shall take account, so far as they reasonably can—(a) of the inconveniences attendant on alterations of constituencies other than alterations made for the purposes of [fitting them within the current local government boundaries] . . ., and (b) of any local ties which would be broken by such alterations'. To the extent that the Commissions accept any alternative proposals promoted at, and then commended to them by the Assistant Commissioners who hold, the Public Inquiries, electoral equality is likely to retreat in importance. Thus in the Fourth Periodic Review in England, the average deviation from the mean electorate within the relevant local government area, as a percentage of that mean, in the Commission's provisional recommendations was 3.62 (with a standard deviation of 3.08); in its final recommendations, the average was 4.22 (standard deviation 3.22). The consultation process results in greater variation in constituency electorates once local community issues are brought to the fore.

- Finally, even if the Commissions achieved virtual equality across all constituencies, this will almost certainly be diluted because of population changes—variations between constituencies in deaths, the number of residents reaching the minimum voting age, in-migration and out-migration. As constituencies age, their electorates vary in their rates of net change, with some (notably in suburban areas, growing towns and popular retirement centres) expanding rapidly, whereas others (in declining manufacturing areas and inner cities, for example) decline. Thus in England, the new constituencies first deployed at the 1997 general election averaged 68,927 electors, with a standard deviation of 5835: in 2001, the same constituencies averaged 69,899 (standard deviation 6512); and in 2005 the respective figures were 70,203 and 7472. As the constituency map 'aged', inter-constituency electorate variations increased. Indeed, this happens even before an election is fought in the new constituencies. The Fourth Review in England began in 1991 and its electoral quota of 69,281 was based on the then electoral register. By the 2005 election the constituencies were 14 years old. Although some of these changes might have been anticipated—through expectations of population growth given the number of planning applications for new housing in particular areas, for example—the Boundary Commissions do not take them into account; they operate only with the electoral quota determined at the start of each Review.

Because of this combination of factors constituencies will never have equal electorates under the current rules and procedures.[10] Unequal electorates are only one of the factors that may generate electoral bias, however; because of these constraints the boundary review process may reduce but almost certainly not eradicate any bias derived from this source. However, it may be that unequal electorates make only a minor contribution to the total bias, in which case it is unreasonable to expect a Boundary Commission redistribution to ensure that all parties are treated equally in the votes-to-seats translation.

Measuring and decomposing electoral bias

A number of methods for measuring electoral bias have been proposed. We favour one developed by a New Zealand political scientist, Ralph Brookes,[11] for a predominantly two-party system that was subsequently adapted by others.[12] We have recently extended the method so that it is now specifically designed to decompose bias in three-party situations, such as that which currently operates in Great Britain.[13] This method not only provides a 'norm of comparison' against which any deviation (bias) can be assessed but also, and very importantly for our purposes, allows that assessment of the degree of bias to be decomposed into its various sources, including that derived from having unequal electorates. Its use therefore allows us not only to establish the extent of bias but also to evaluate the role and weight of unequal electorates in its production.

Brookes' interest lay in understanding whether and how the geographical pattern of voting (i.e. the distribution of each party's support across the constituencies), size of electoral units and turnout variations contribute towards one party in a two-party system receiving a bonus of seats relative to what the other would probably experience, by establishing for any election what we term a 'norm of comparison'. This benchmark comprises two elements: the actual number of seats gained by one of the parties and the number of seats that would be won if the vote share of the two parties at the actual election had been reversed. The latter figure is calculated by taking the overall vote shares at the actual election, say 53% for party A and 47% for party B, and reversing them so that party B is now assumed to have won 53% and party A 47%. This six-point reversal in vote share is then applied to each constituency, assuming a uniform shift across the whole country, and the winning party, which may now have changed, is noted. For each party, averaging the number of seats at the actual election and what we might call the 'reverse-shares election' produces the norm for comparison. Subsequently, if this average is smaller than the seats won at the actual election the party concerned is favoured by electoral bias, otherwise it is disadvantaged; formally, if one subtracts the average from the party's actual share at the election, it experiences a positive bias if it has more than the average (i.e. it gets more seats than expected if both parties were treated equally in the votes-to-seats translation process) and a negative bias if it has less than the average.

Having established the existence of and level of electoral bias Brookes then identified four of its contributory factors:

- Geography—acquiring votes requires the expenditure of resources and so the most efficient party is that which gets most seats for a given number of votes (i.e. the smallest ratio of votes to seats won[14]). This will be the party that both wins its own constituencies by narrow margins and, when it does lose, does so by a very large margin. In this way, any 'surplus' and 'wasted' votes are minimised.[15] "Win small but lose big" becomes a useful motto for a party optimising its vote distribution.

- Malapportionment—assuming turnout is constant across all constituencies and electorates vary in size, a party that wins seats in areas with small electorates will perform better than a rival that wins seats with large electorates—it will again get more seats for a given number of votes.[16]

- Abstention—assuming electorates are equal in size but turnout varies, then a party that wins its seats in the low turnout areas will need to accumulate fewer votes than a rival that wins only in the high turnout areas.[17]

- Minor party effect—as long as minor parties do not gain victories in those seats that a major party anticipates winning then the minor party effect is beneficial to the latter; the minor parties have attracted wasted votes and improved the overall situation for the winning party since it requires fewer votes itself to win (and accumulates fewer surplus votes). Conversely, should the minor party capture seats then the major party that loses them has now itself accumulated wasted votes.

- There may also be interactions between two or more of these factors—for example, if a party does well in areas where constituencies are both smaller than average and have lower turnouts than

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average.[18] In applications of Brookes' methodology these interactions are normally summed rather than separately identified.

The operation of these factors at both the actual and reverse shares' elections reveals both the direction and composition of electoral bias. *The net bias for each party is the sum of bias derived from each of four components, some of which may be negative and others positive.*

The Boundary Commissions are only striving to remove the sources of the malapportionment component directly when reviewing constituency boundaries and equalising electorates, however. Changing boundaries may, of course, have an impact on the geography of a party's vote distribution—it may now find its majorities increased in some constituencies whereas, even worse, it changes from being a narrow winner to a narrow loser in others. But this is incidental to the boundary review process; the UK's Boundary Commissions take no account whatsoever of political considerations when undertaking their reviews.

Brookes' method works well enough for elections dominated by two major parties but less well for those where three parties compete and each wins seats. At some point, admittedly not always a precise moment, a system evolves from two-party to three-party when a minor party wins seats yet the two major parties, albeit weakened, remain dominant. Currently, the UK system, where the third party Liberal Democrats now win not only about one-fifth of the votes cast (which they—and their predecessors—have done since the 1970s) but also a significant number of Parliamentary seats, might be better regarded as three- rather than a two-party system. Under such circumstances it seems appropriate, therefore, to adapt the original Brookes' method to measure and decompose electoral bias for the three-party case. We have developed such a procedure which retains many of Brookes' original features. The seats won by the principal three parties are measured against a norm for comparison which shows whether the electoral bias for that party is positive or negative. The four separate components identified earlier—geography, malapportionment, abstention and minor party effects (now referring to fourth and lesser parties)—together contribute towards the net bias for the three leading parties. A comprehensive and technical discussion of the three-party method may be found elsewhere.[19] In what follows, we apply this method to the situations following both the Fourth and Fifth Periodic Reviews of constituencies in Great Britain, to assess the impact, if any, on electoral bias brought about by the greater equalisation of constituency electorates achieved then.

Constituency boundary changes and estimating notional election results

For each of the last two reviews the partisan effects of boundary changes have been estimated for a media consortium comprising the three major UK news broadcasters—BBC, ITN and Sky News—and, on behalf of print media, the Press Association. They require an agreed set of results that show how the previous general election would have finished had the new rather than old boundaries been in place.

There is no single, correct method for compiling estimates. The Plymouth team which has undertaken this task for the media uses results from local council elections to compile estimates, as did the team that compiled notional results for the Third Periodic Review.[20] Other methods for calculating notional results have been used and there are two other estimates of the 2005 election outcome on the new boundaries.[21] Fortunately, there is general consensus about the overall impact of the boundary changes although some differences of detail remain.

Appreciating the procedure for producing estimates that rely upon local election results is important because it helps to clarify how the distribution of votes in the new constituencies is derived and underpins our assessment of the impact of the boundary changes upon the components of electoral bias. It begins by building a set of ward-level election results for the old parliamentary constituencies based on the local elections immediately prior to the general election.[22]

Some features of local elections require adjustments before the data are suitable for estimating party strength at the constituency level. To accommodate multimember wards, used in London boroughs and some shire districts, an algorithm for calculating total vote and party vote is employed.[23] Another problem affects wards where one or other of the major parties does not contest a local election vacancy. Where a candidate is elected unopposed previous local election results for that ward are examined and vote shares estimated on that basis. If no comparison is possible (the ward is frequently unopposed or its boundaries are also new and no past data are available), then the winning party is awarded a vote share equivalent to that in its best performing ward in that local authority. A party that has not fielded a candidate is given a vote share equivalent to the vote received in its worst performing ward.

A final consideration is support for Independent candidates. In some rural wards Independents may be returned unopposed. Initially, past elections are examined to find evidence of party political candidates. If none exist then the ward's social characteristics, derived from the nearest national census, are used to provide estimates of likely party voting. Where Independents and minor party candidates appear to have been given a free run by one of the three main parties their vote is given to that party as if they were its surrogate. When all the main parties contest a ward then the vote for Independents and other parties is ignored.

Once the matrix of local elections results is completed, those wards or parts of wards which are being removed from the old constituency are identified. The local votes for each party in those wards and part wards are also summed. It is then assumed that the proportion of a party's total local vote received in any given set of wards will equal the proportion of its total general election vote in the same wards. In other words, its strongest and weakest wards will remain the same regardless of any gross differences in performance between the general and local elections.

Dividing each party's local vote in the wards being removed by the total local vote across the whole constituency and then multiplying that figure by the party's vote at the actual general election provides the estimated vote for that part of the constituency that is migrating. This notional vote is then subtracted from the party's actual vote in the old constituency, awaiting transfer into a new constituency. Any wards from another constituency that are being moved into the constituency will have been subjected to the same treatment before being transferred over. This method limits the scope for error because only the parts of constituencies that are being moved are subjected to calculations of this type—the part that is left intact carries forward towards the notional vote total. Another merit of this procedure is that no votes are gained or lost—votes that are exported from a constituency must be imported intact into another; the procedure is therefore zero-sum. This means that the total votes calculated for the notional election equal the votes cast at the actual election.

Of course, this method can make no allowance for any changes to the tactical situation in a new constituency. For example, a party may move from third to second place and claim that, had the new boundaries actually been in place, then its vote would have been larger because tactical voters would have switched in its favour. The estimates reflect the work of the Boundary Commissions in equalising electorates, but do not impose any artificial interpretations of how groups of voters might have behaved in a different tactical situation.

Comparing bias components at actual and notional elections

According to our evaluation of the impact of the boundary changes, the outcome of the Fifth Periodic Review on the allocation of seats in the notional 2005 election across the parties is not dramatic (Table 1).[24] There is a small overall increase in the size of the House of Commons (from 646 to 650 seats), a net reduction of seven seats for Labour, and a 12 seat increase for the Conservatives. With the exception of Plaid Cymru, which loses one of its three seats, the smaller parties are unaffected. The increase in constituencies means that a party now requires 326 seats to acquire an overall majority. The reduction for Labour means that its majority of 66 seats in the Parliament elected in 2005 is cut to just 48 seats in the run-up to the next general election, so a net loss of 24 Labour-held constituencies at the next contest would remove its overall majority. The creation of additional Conservative seats means the party now needs to win an

1. Actual and estimated seats for the 2005 general election

	Actual	Estimate	Change
Labour	356	349	−7
Conservative	198	210	+12
Liberal Democrat	62	62	—
Plaid Cymru	3	2	−1
SNP	6	6	—
Northern Ireland	18	18	—
Other	3	3	—
Total seats	646	650	+4

2. Actual and estimated seats for the 1992 general election

	Actual	Notional	Change
Conservative	336	343	+7
Labour	271	273	+2
Liberal Democrat	20	18	−2
Plaid Cymru	4	4	—
SNP	3	3	—
Northern Ireland	17	18	+1
Total seats	651	659	+8

additional 116 seats to form a majority government instead of the 126 seats it needed formerly.

The impact of the Fourth Review was similarly modest (Table 2). The overall increase in seats was larger (from 651 to 659 seats), but the widely anticipated Conservative gains based on the conventional wisdom that they normally benefit from redistributions which eliminate many small inner-city constituencies (generally Labour-supporting) scarcely materialised: as Rossiter et al. (1999) have shown, this is partly because Labour realised that careful development of cases to be presented at the Commissions' Public Inquiries could minimise their losses, and the Conservatives failed to respond to those tactics. The Conservatives did have a net gain of seven seats, but with Labour too registering a net increase in seats (2), the Conservative advantage was minimal. The remaining changes saw a net reduction of two seats for the Liberal Democrats and an increase of one seat in Northern Ireland. At the 1992 general election the Conservative's lead in the popular vote (they obtained 41.9 per cent of the votes, to Labour's 34.4 per cent) resulted in a Commons majority of just 21 seats. The boundary changes modestly boosted the government's notional overall majority to 27, but this remained vulnerable to a less than one per cent swing to Labour.

The explanation for the rather minor overall effects produced by the two boundary reviews becomes clearer after applying the method for decomposing three-party bias for the actual and notional elections in

3. Decomposing the bias for actual and estimated election results (2005)

	Labour		Conservative		Lib Dem	
	Actual	Estimate	Actual	Estimate	Actual	Estimate
Total bias	+83	+75	−30	−21	−52	−52
Electorate	+11	+4	−12	−6	−3	+2
Geography	+41	+41	−5	+2	−46	−49
Abstention	+16	+17	−14	−14	−10	−9
Minor party	+3	+3	−3	−3	−1	+0
Net interactions	+13	+11	+3	+0	+7	+4

Note: Columns do not sum to totals because of rounding.

2005 and 1992. For 2005, Table 3 indicates a total bias at the actual election estimated by the three-party method as 165 seats, comprising a positive bias favouring Labour of 83 seats plus negative biases of 30 and 52 seats for the Conservatives and Liberal Democrats, respectively. The corresponding figures for the notional election (estimate) are total bias 148 seats, a positive bias for Labour of 75 seats, a smaller negative bias of 21 for the Conservatives and an unchanged negative bias affecting the Liberal Democrats.

Given that boundary reviews first and foremost aim to equalise electorates we begin with that element in analysis of the bias decomposition; a positive bias towards Labour of 11 seats at the actual election has reduced to only 4 seats on the new boundaries. This is to be expected given that the electorates in Labour held areas had become rather smaller than elsewhere since the last review as a result of population changes. A negative bias from electorate size of 12 seats for the Conservatives was halved, as some of the large constituencies in the areas of population growth where it is strong were reduced in size, but it remains negative at −6. Again, given that the average size of electorates in seats won by the party in 2005 was larger than for other parties a reduction in bias from this component was anticipated. For the Liberal Democrats a negative bias of three seats is replaced by a positive bias, albeit one of only two seats. Overall these changes are small—reflecting that the inequalities that had built up were not extreme save in a few areas and that the redistribution did not involve major changes to the constituency map in many parts of the country (other than in the special case of Scotland). Nevertheless, the *continuing* effects of unequal electorates favour Labour and still work against the Conservatives.

Almost half of the bias enjoyed by Labour in 2005 stemmed from geography, its superior vote distribution; on average it was more likely to 'win small but lose big' than its opponents, notably the Liberal Democrats which amassed very large numbers of wasted votes in the seats they contested but lost (566 of the 628 constituencies in Great Britain in 2005). This accounts for a positive Labour bias of 41 seats

4. Decomposing the bias for actual and estimated election results (1992)

	Labour		Conservative		Lib Dem	
	Actual	Estimate	Actual	Estimate	Actual	Estimate
Total bias	+55	+51	−11	−11	−42	−40
Electorate	+18	+8	−16	−8	+1	+3
Geography	+18	+24	+17	+9	−43	−41
Abstention	+10	+10	−8	−9	−3	−3
Minor party	+3	+3	−3	−2	+1	+0
Net interactions	+7	+6	−2	−1	+2	+0

Note: Columns do not sum to totals because of rounding.

from a total bias of 83 seats. The boundary changes made no impact at all on this component as far as Labour is concerned; the geography of its support is insufficiently altered to affect the greater efficiency of its vote distribution. Because the total bias towards Labour reduces to 75 seats on the new boundaries, however, the geography component now accounts for more than half of the positive bias. That component originally accounted for very little of the Conservative negative bias, just five seats, but the effect of moving the boundaries now produces a positive bias of two seats. The Liberal Democrats suffer most with their geographical disadvantage increased from a negative bias of 46 to an estimated 49 seats on the new boundaries.

Of the two remaining components, the largest effect derives from abstention, which in recent elections has favoured Labour over the Conservatives; turnout tends to be much lower in seats where the former wins than in those where the latter prevails. The abstention component continues to benefit Labour after redistribution (16 seats for the actual election, 17 on the new boundaries), while disadvantaging the Conservatives (unaltered on 14 seats) and Liberal Democrats (10 and 9 seats, respectively). As with the relatively small changes in the geography component, this is because in general the redistribution did not move many wards between constituencies of radically different political or social type in much of the country, thereby leaving the underlying pattern of turnout largely unchanged. The bias component from the distribution of minor party votes contributes little—unsurprisingly since the three-party method used here takes account of the Liberal Democrat presence and is only concerned with votes for nationalist and other small parties, which have an impact on the three main parties in a minority of constituencies only.

The effect of the Fourth Review upon electoral bias was even less than that for the Fifth Review (Table 4). The original election resulted in less total bias, 101 compared to 165 seats in 2005, but its *direction* (a 55 seat positive bias towards Labour, and negative biases of 11 and 42 seats towards Conservatives and Liberal Democrats, respectively) is the same as for 2005. The pressing need to re-draw constituency boundaries is reflected in the larger contribution to bias derived from the electorate component at the earlier election; it was worth 18 seats for Labour in 1992, a third of its overall bias total. This hardly impacts on the Liberal Democrats' unfavourable position, however, which is overwhelmingly caused by the party's very inefficient vote distribution (geography). As in 2005, the Conservatives were adversely affected by the electorate component, which costs 16 seats at the actual election. However, this was compensated by the positive bias the party gained from its vote distribution—John Major's majority was courtesy of some very narrow wins in marginal constituencies.

Although the boundary changes that came into force in time for the 1997 election favoured the Conservatives by halving to eight seats the negative bias from the electorate component, this benefit was cancelled out by a reduction in the positive bias from vote distribution. These movements are in the opposite direction for Labour; although the benefit from the electorate component reduces to eight seats this is almost balanced by an additional six seats gained from the geography component. Labour's more skilful exploitation of the opportunity to present evidence at the Public Inquiries to influence the boundary re-drawing is apparent; almost half of its positive bias now came from a superior vote distribution that followed from the boundary changes. The Liberal Democrats captured around one in five votes at the 1992 general election but succeeded in winning only 3% of the seats. It is unsurprising, therefore, to discover that the geography component accounts for most of its negative bias—a plethora of wasted votes again. The Fourth boundary review, like the Fifth, hardly affected the third party's overall position.

Conclusions

This analysis of the two most recent Parliamentary constituency boundary reviews in the UK shows that this process largely does not remove electoral bias, a bias that currently favours the Labour party. These reviews are first and foremost concerned with equalising electorates and therefore address only one of the elements that may contribute towards bias. The real value of Brookes' method, adapted here to deal with the reality of a three-party system, lies with its ability to disaggregate total bias and peer inside the mechanics that drive each electoral outcome, either actual or estimated. By comparing the composition of bias at the actual election with that for the estimated result we have shown the impact of boundary reviews upon bias.

In this respect, the review that will be fully implemented at the next election is similar to its predecessor implemented at the 1997 election. Various constraints that effectively limit the Boundary Commissions from completely equalising electorates mean that even the contribution towards bias by the electorate component is not totally removed. The Fifth Review has reduced Labour's advantage from electorate size from

11 to four seats while the Fourth Review still left Labour an eight seat advantage. Moreover, the four additional elements—geography, abstention, minor party and interaction effects—are largely untouched by the boundary review process. Following the 2005 general election, three of these (geography, abstention and interaction effects) made a larger contribution to the overall bias favouring Labour than did the electorate component; the Fifth Review is destined only to make a small impression in reducing Labour's overall bias advantage. The situation in 1992 was slightly different, partly because of the larger net increase in seats and partly because of Labour's superior strategy during the review process which saw it increase its advantage from the geography component.

Hopes among Labour's rivals that revising constituency boundaries might level the playing field are very largely misplaced, therefore. Labour continues to benefit from electorate size but its real advantage currently stems largely from a better distributed vote—it acquires fewer surplus and wasted votes than its rivals. It is also benefitting more than other parties from the general decline in electoral turnout, requiring fewer votes for its victories. These are the reasons why despite the boundary changes that come into force at the next general election the Conservative party needs, *ceteris paribus*, to hold a double-digit lead over Labour in the popular vote in order to secure even a slender majority in the next House of Commons.

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1 R. J. Johnston, D. J. Rossiter and C. J. Pattie, 'Disproportionality and Bias in the Result of the 2005 General Election in Great Britain: Evaluating the Electoral System's Impact', *Journal of Elections, Public Opinion and Parties*, 16, 2006, 37–54.

2 *Ibid*.

3 It even stimulated Lord Baker of Dorking—a former Conservative Home Secretary—to pilot a *Parliamentary Constituencies (Amendment) Bill* through the House of Lords (it was never debated in the Commons) in 2007 which would have both reduced the number of constituencies by 65, created a uniform electoral quota for the entire UK, and limited variations around the quota to no more than 5 per cent. The debates on this Bill (Hansard, House of Lords, 18 May 2007, Column 399) illustrate the belief that variations in constituency size contributed substantially to the anti-Conservative bias at the previous three elections. Many of the Bill's proposals became official Conservative party policy in 2009 (see, for example, *Telegraph View*, 12 April 2009: http://www.telegraph.co.uk/news/newstopics/politics/conservative/5145102/Conservatives-plan-to-cut-number-of-MPs-by-65.html).

4 For full details on the redistribution process see D. J. Rossiter, R. J. Johnston and C. J. Pattie, *The Boundary Commissions: Redrawing the UK's Map of Parliamentary Constituencies*, Manchester University Press, 1999.

5 D. T. Denver, C. Rallings and M. Thrasher, *Media Guide to the New Scottish Westminster Parliamentary Constituencies*, Local Government Chronicle Elections Centre, 2004.

6 As it happens, the new constituencies proposed by the Boundary Commission for Scotland—a reduction to 59 from the 72 used at the 2001 election—were in place in time for the 2005 election: only one—with an electorate close to the Scottish average—was won by the Conservatives.

7 Following each review estimates are made of how votes would have been distributed had the new constituencies been in place at the previous general election: see C. Rallings and M. Thrasher, *Media Guide to the New Parliamentary Constituencies*, Local Government Chronicle Elections Centre, 1997; C. Rallings and M. Thrasher, *Media Guide to the New Parliamentary Constituencies*, Local Government Chronicle Elections Centre, 2007.

8 The rules are set out in full in Rossiter et al. *The Boundary Commissions*.

9 The Liberal party did propose a subdivision of the island into two constituencies at the time of the Third Periodic Review, but put its representation in six months late.

10 The Conservatives' proposal to gain much greater equality—at least at the time when the electoral data are collected—involves weakening the importance of nesting constituencies within local government areas plus removing the 'special considerations' and 'community ties' rules, but without much more frequent and quicker reviews they cannot reduce the impact of population change.

11 R. H. Brookes, 'The Analysis of Distorted Representation in Two-Party, Single-Member Elections', *Political Science*, 12, 1960, 158–67.

12 R. Mortimore, *The Constituency Structure and the Boundary Commission: the Rules for the Redistribution of Seats and their Effect on the British Electoral System, 1950–1987*. DPhil Thesis, University of Oxford, 1992; D. J. Rossiter, R. J. Johnston and C. J. Pattie 'Integrating and Decomposing the Sources of Partisan Bias: Brookes' Method and the Impact of Redistricting in Great Britain', *Electoral Studies*, 18, 1999, 367–78 and 649–50.

13 Our initial attempts at constructing a method for measuring bias in a three-party system can be found in G. Borisyuk, R. Johnston, C. Rallings and M. Thrasher, 'Measuring Bias: Moving from two-party to three-party Elections', *Electoral Studies*, 27, 2008, 245–56. A more detailed outline of the method used here may be found in G. Borisyuk, R. Johnston, C. Rallings and M. Thrasher, *A Method for Measuring and Decomposing Electoral Bias for the Three-Party Case*, Political Methodology Working Papers, 2008, available at http://polmeth.wustl.edu/workingpapers.php?order=datedesc&title=2008&startdate=2008-01-01&enddate=2008-12-31. It has not yet proved possible to devise a method for the four-party case that applies in parts of Great Britain.

14 In England at the 2005 general election, for example, Labour obtained one seat for every 28,111 votes that it won, whereas the ratios for the Conservatives and Liberal Democrats were 41,982 and 110,591, respectively.

15 Wasted votes are those cast for a party in constituencies where it loses, and thus make no contribution to the number of seats that it wins. Surplus votes are those in excess of the number needed to defeat its main opponent in seats that it wins—in effect, its majorities there.

16 With 20,000 electors in a constituency contested by only two parties, 10,001 votes are needed for victory; with 25,000 electors, 12,501 are needed. Thus in an area with 100,000 electors and five constituencies, a party with 50,005 votes would win five seats; if that area had only four constituencies, then it would win only four.

17 The logic for this is given by reworking the data in the previous example. In a constituency with 20,000 electors and a turnout of 90%, 9001 votes would be needed for victory; if turnout were 70%, then only 7001 would be needed.

18 Johnston et al., *op. cit*.

19 Borisyuk et al., *op. cit*.

20 BBC/ITN, *The BBC/ITN Guide to the New Parliamentary Constituencies*, Parliamentary Research Services, 1983.

21 www.electoralcalculus.co.uk and www.ukpollingreport.co.uk; see also D. J. Rossiter, R. J. Johnston and C. J. Pattie 'Estimating the Partisan Impact of Redistricting in Britain', *British Journal of Political Science*, 27, 1997, 319–31.

22 For a detailed description see Rallings and Thrasher, *op. cit*, 2007.

23 L. Ware, G. Borisyuk, C. Rallings and M. Thrasher, 'A New Algorithm for Estimating Voter Turnout when the Number of Ballot Papers Issued is Unknown', *Electoral Studies*, 25, 2006, 59–71.

24 The notional partisan impact of the redistribution undertaken by the Boundary Commission for Northern Ireland is not included in any of the analyses which follow.

Appendix 4

Unequal and Unequally Distributed Votes:

The Sources of Electoral Bias at Recent British General Elections

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Unequal and Unequally Distributed Votes: The Sources of Electoral Bias at Recent British General Elections

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Using a method for decomposing electoral bias in a three-party competitive system we contend that discussion surrounding electoral reform for the House of Commons is largely based on misconceptions about bias sources at recent British general elections (Northern Ireland is excluded from the analysis). Labour is the principal beneficiary across these seven elections while the third party, the Liberal Democrats, consistently suffers from a negative bias. There is no clear pattern for the Conservative party, however; it experienced a positive net bias at two of the elections but was disadvantaged for the remaining five. For three bias components – electorate, abstentions and minor party – Labour consistently has a positive advantage and the Conservatives are always disadvantaged. Abstentions contribute relatively strongly to Labour's advantage but differences in electorate size are not a major contributor to overall bias. Despite this, legislation changing the independent boundary review process is predicated on the assumption that new rules should remove much of the pro-Labour bias. The analysis finds instead that most bias stems from the geography component: differences in the distributions of each party's votes and the translation of votes into seats. Vote distribution is clearly the largest component explaining the Liberal Democrats' disadvantage but it is also the largest component for both Conservative and Labour parties in five of the last seven general elections. Although future boundary reviews will remove the effects of unequal electorates, this process is not designed to address either the impact of turnout/abstention or vote distributions on overall electoral bias.

Keywords: electoral bias; electoral geography; third parties

Although electoral reform has been at the core of the Liberal Democrats' (and their predecessors') aspirations for many decades, both the Conservatives and Labour have generally sustained a commitment to the status quo (although with small elements within each committed to a move away from the current system). The year 2010 was thus unusual in that all three parties included some form of reform for parliamentary elections in their general election manifestos.

The Liberal Democrats' manifesto maintained their promise to introduce a 'fair, more proportional voting system for MPs' using the single transferable vote (STV); they also proposed reducing the number of MPs by 150, to 500.[1] Labour's commitment paralleled earlier flirtations with the idea of voting reform when they feared they could not win again under first-past-the-post (FPTP) rules.[2] In the early 1990s, for example, two reports were commissioned (Plant, 1991; 1993) which commended a version of the alternative vote (AV) later adopted for the election of mayors in England. When still uncertain of its prospects in 1997, the party's manifesto included a commitment to hold a referendum on the parliamentary voting system, following a report from an independent commission. The Jenkins report (1998) recommended a change to a more proportional system (known as AV+) but was quickly shelved after the landslide general election victory.

Labour returned to the issue in 2009 when victory at the forthcoming general election looked doubtful although a hung parliament appeared a distinct possibility. Gordon Brown indicated that if re-elected Labour would hold a referendum on changing from FPTP to AV; this offer was added to the Constitutional Reform and Governance Bill 2010 but the relevant clauses were removed before it was enacted. It was renewed in the party's 2010 manifesto and addressed at the Liberal Democrats, the party with most to gain from a switch to the preferential AV system (which in 2010 would probably have given them a slightly more favourable outcome than FPTP: Sanders *et al.*, 2011); were there a hung parliament, Labour would hope to form a coalition with the Liberal Democrats, so the smaller party was being offered a share of power.[3]

The Conservatives, with the exception of the small Conservative Action on Electoral Reform (CAER),[4] have always been strongly committed to FPTP. Changing the voting system has never been a manifesto commitment. However, the party became increasingly concerned with aspects of how FPTP is structured and operates in the UK and its 2010 manifesto promised measures to negate some of those. These measures were first raised in a pamphlet published by Conservative Reform (Tyrie, 2004), publicised in a bill presented to the House of Lords by Lord Baker in 2007 and, with one slight change, repeated in a proposed amendment to Labour's Constitutional Reform and Governance Bill 2010 (on which see McLean *et al.*, 2009). The 2010 manifesto indicated continued support for FPTP but also an intention to 'ensure every vote will have equal value by introducing "fair vote" reforms to equalize the size of constituency electorates, and conduct a boundary review to implement these changes within five years', while reducing the number of MPs by 10 per cent (from 650 to 585).[5]

In the post-election coalition bargaining, the Conservatives met the Liberal Democrats' desire for both a reduction in the number of MPs and putting the issue of voting reform to a referendum, although only AV and not proportional representation. After one of the longest parliamentary debates, the bill facilitating a binding referendum on a switch to AV in May 2011, reducing the number of MPs and introducing new rules for delimiting constituencies was passed on 16 February 2011. Voters rejected the move to AV but other aspects of the legislation continue.

The contention of this article, however, is that much of the discussion within and between the various political parties about the operation of the current voting system is based on fundamental misconceptions so that elements of their arguments for supporting some form of electoral reform are faulty. To clarify these points we explore recent election results, using an enhanced method of measuring electoral bias (Borisyuk *et al.*, 2010). Having identified the nature and extent of the bias affecting each party the different biases are decomposed to understand their origins better. It appears that much, but not all, of the current electoral bias will prove immune to changes in either the number of MPs who are elected or the redrawing of constituency boundaries.

Why Reform? Recent UK Election Results

The reasons why the Conservatives and Liberal Democrats are at present concerned with the current electoral system are readily appreciated by perusal of the last seven general election results. Table 1 gives each party's shares of the UK votes and seats, and the

Table 1: Results of British General Elections 1983–2010

		Per cent of		
Party	*Election*	*Votes*	*Seats*	*(Seats–Votes)*
Conservative	1983	42.4	61.1	18.7
	1987	42.2	57.7	15.5
	1992	41.9	51.6	9.7
	1997	30.7	25	–5.7
	2001	31.7	25.2	–6.5
	2005	32.4	30.7	–1.7
	2010	36.1	47.2	11.1
Labour	1983	27.6	32.2	4.6
	1987	30.8	35.2	4.4
	1992	34.4	41.6	7.2
	1997	43.2	63.4	20.2
	2001	40.7	62.5	21.8
	2005	35.2	55	19.8
	2010	29	39.7	10.7
Liberal Democrat	1983	25.4	3.5	–21.9
	1987	22.6	3.4	–19.2
	1992	17.8	3.1	–14.7
	1997	16.8	7	–9.8
	2001	18.3	7.9	–10.4
	2005	22	9.6	–12.4
	2010	23	8.8	–14.2

difference between the two. For the Liberal Democrats, the problem is acute: they were very substantially under-represented in the House of Commons, with much smaller shares of the seats than votes (the largest deficit being in 1983, when with over one-quarter of the votes cast they obtained only 3.5 per cent of the MPs).

For the Conservatives, the main problem is seen when comparing their performance *in similar situations* with Labour's. At each election Labour obtained a larger share of the seats than votes, by an average of 20.6 percentage points at the three it won – in 1997, 2001 and 2005. For the Conservatives, on the other hand, at their four victories (1983–92 and 2010) the average difference between share of seats and votes was only 13.8 percentage points. Furthermore, at the three which they lost they obtained a *smaller* share of the seats than of the votes (an average of 4.6 percentage points less) whereas when Labour lost it still gained a *greater* share of the seats than votes (an average of 6.7 percentage points more). Indeed, in 2010 Labour had a 'bonus' of some 10.7 percentage points in its share of seats compared to its vote share, which was almost as large as the Conservatives' bonus as the winning party (Dorey, 2010). Additionally, with 40.7 per cent of votes in 2001 Labour won a clear majority (62.5 per cent) of seats but in 1992 the Conservatives, despite winning a similar vote share (41.9 per cent), barely secured an overall majority of seats (51.6 per cent). The voting system in those elections clearly favoured Labour over the Conservatives (as well as the Liberal Democrats).

Decomposing Unequal Treatment

Why, over a sequence of seven consecutive general elections, has FPTP not only very substantially discriminated against the smallest of the three main British parties in the translation of votes into seats but also favoured one of the larger two parties over the other? A way of 'unpacking' such election results both to measure the extent of such 'favouritism' and also to understand its origins was proposed by Ralph Brookes (1959; 1960); he termed the unequal treatment 'distorted representation' but it is now termed 'bias' by British social scientists who have adopted and subsequently modified his method.

Brookes' approach was based on two methodological contentions. First, by using the widely deployed concept of a uniform swing it was possible to construct a 'notional election' whereby the overall strength of the parties was changed, but their relative strength (and that of all other parties, plus non-voters) across the country's constituencies remained constant. Using Brookes' two-party bias method in 1997, for example, when Labour won 43.2 per cent of the votes cast and the Conservatives 30.7 per cent, if Labour's vote share was reduced by 6.25 percentage points in each constituency and the Conservatives' share increased by the same amount, so that each had equal shares (36.95 per cent of the votes cast nationally) in that 'notional election', then Labour would have won 82 more seats than the Conservatives (Johnston *et al.*, 2001). This can be taken as the extent to which the election result is 'biased' or 'distorted', with respect to the two largest parties only: with equal shares of the votes cast, they would have been very unequally treated in the translation of votes into seats.[6]

Brookes' second contention was that the distorted representation or electoral bias could be decomposed into different sources – viz., malapportionment/unequal electoral size; abstention/turnout; impact of small parties; and vote distribution/geography (Johnston *et al.*, 2001; Rallings *et al.*, 2008). Brookes' approach (his algebra is set out in Brookes, 1960) has been adapted (notably by Mortimore, 1992, and Johnston *et al.*, 1999; 2001) and used to identify the volume and direction of bias at post-Second World War UK general elections (e.g. Johnston *et al.*, 2001; 2006).[7]

A major change in the British electoral scene over recent decades has reduced the value of the adaptations of Brookes' approach – the movement away from a two-party to a somewhat more complex party system (Curtice, 2009; 2010). The growth of electoral support since 1970 for both the Liberal Democrats and the two nationalist parties (the Scottish National party [SNP] and Plaid Cymru [PC]) has very substantially eroded the previous Conservative-Labour predominance. No longer do they together win more than 90 per cent of all the votes cast as they did in the 1950s; instead, their share has fallen to less than two-thirds (although they still gain a very disproportionate share of the MPs elected – in 2010, 89 per cent of the 632 elected on the British mainland, for example; Northern Ireland is excluded from all of the discussion in this article because of its separate party system). Indeed, only 45 per cent of all British constituencies at the 2010 general election saw Conservative and Labour candidates occupy the first two finishing positions (Johnston and Pattie, 2011a); in almost one-third the Conservatives and Liberal Democrats occupied the first two places, with Labour and Liberal Democrat candidates relegating the Conservative candidate to third place in a further 15 per cent.

A more suitable methodology for identifying and decomposing electoral bias is needed, therefore. This is done by reworking Brookes' algebra so that, while in no way violating the original method's axioms, it can identify the impact of how the FPTP electoral system translates votes into seats for each of the Conservative, Labour *and* Liberal Democrat parties. The conventional description of Brookes' method refers to creation of a 'notional election' using uniform swing. However, another interpretation is possible, useful when extending the method to the three-party situation. This 'notional election' could be considered simply as a technical step for the creation of the norm for comparison (Borisyuk *et al.*, 2010), that is, a specific symmetrical distribution that retains many important features of the actual data. Each party's bias is evaluated by contrasting its actual electoral outcome against that expected from this symmetrical distribution/the norm.

In the three-party case, the norm for comparison is a combination of six distributions – one for each of the possible orderings of those three parties (the actual election outcome and five artificial constructs/'notionals'). Similar to the two-party situation, each party's bias is defined as the difference between its actual result and what is expected from the 'norm'; the degree of bias is calculated as the difference between the observed result and the average outcome over all six notional elections (Borisyuk *et al.*, 2010).

Thus, for example, if the actual election result was that the (C)onservatives, (L)abour and Liberal (D)emocrats won 40, 35 and 20 per cent of the votes, respectively (thereby finishing in the order 'CLD'), the five 'notional' elections would recalculate the distribution of seats using the orderings CDL, LCD, LDC, DCL, DLC, where the three parties in the given order would obtain 40, 35 and 20 per cent of the votes, respectively. The net bias estimate for the Conservative party is then calculated by subtracting its average number of seats across the six 'elections' that constitute the norm for comparison (i.e. two elections when it is in the first position, two elections when it is positioned second and two further elections when it occupies the third-placed position) from the number of seats actually won at the general election. A positive figure indicates that the result was biased in the party's favour; a negative figure indicates that it was disadvantaged. The net bias towards or against each party can then be decomposed – again, using a direct extension of Brookes' algebra. Four such bias components are identified: three are the non-partisan equivalents of malapportionment (variations in constituency electorates, numbers of abstainers and minor party votes – including the SNP and PC); the fourth is the geography component, which evaluates the effect of the distribution of each party's support across the constituencies. In addition, we calculate a residual, net interaction component.[8]

Bias in Britain's Three-Party System 1983–2010

The net bias figures for each party calculated using this modification of Brookes' algebra are in the first column of Table 2. The overall picture has three main characteristics. The first is that Labour was the main beneficiary across the seven elections, with a positive net outcome in every case.[9] This was smallest in 1997; of the three elections that Labour won, this had the largest gap in vote share between it and the second-placed party (Table 1), and its landslide victory was fairly faithfully reflected in the allocation of seats; each of the other

Table 2: Bias and Its Components at British General Elections 1983–2010

Party	*Election*	*Total bias*	*Bias components* *G*	*E*	*A*	*MP*	*NI*
Conservative	1983	**–9**	5	–9	–3	–1	–1
	1987	**5**	25	–13	–3	–2	–3
	1992	**–11**	17	–16	–8	–3	–1
	1997	**–5**	13	–10	–8	–2	2
	2001	**–35**	–12	–13	–14	–3	6
	2005	**–30**	–5	–11	–14	–3	2
	2010	**13**	36	–7	–11	–2	–3
Labour	1983	**89**	75	4	3	1	7
	1987	**61**	39	12	4	2	5
	1992	**55**	18	18	10	3	7
	1997	**15**	–18	15	13	2	2
	2001	**57**	11	15	18	3	9
	2005	**83**	41	10	16	2	13
	2010	**63**	31	6	13	2	11
LibDem	1983	**–78**	–79	10	4	1	–5
	1987	**–64**	–67	12	–2	2	–9
	1992	**–42**	–43	1	–3	1	–2
	1997	**–8**	–10	–4	–5	–1	12
	2001	**–20**	–12	–4	–9	–1	6
	2005	**–52**	–46	–2	–10	–1	7
	2010	–76	–74	1	–6	–1	4

Key: G – geography; E – electorate; A – abstentions; MP – minor parties; NI – net interaction.

parties would have been treated similarly if they had won by that margin over the other two. Labour's greatest benefits from biases in the system's operation came in 1983, when it won its smallest share of the votes across the seven elections but still gained nearly one-third of the seats, and in 2005, when its share of the votes was less than three points more than the Conservatives', but the difference between the two in seats share was nearly 25 percentage points.

The second salient conclusion is that the Liberal Democrats suffered a net bias against them at all seven elections. Just as Labour's smallest advantage came in 1997, so did the Liberal Democrats' smallest disadvantage; it was the election where their vote and seat shares were closest (Table 1). The third salient aspect of this sequence of outcomes is that there was no consistent pattern in the treatment of the Conservatives: they experienced a positive net bias at two of the elections (which they won, including 2010) but were disadvantaged at the other five, substantially so in 2001 and 2005.

Table 2 identifies the size of the separate bias components which, like the net figures, can be interpreted as the number of seats' advantage or disadvantage that the parties experienced; a strong feature of Brookes' approach is its easily interpretable metric. Two features stand out with regard to the three 'malapportionment' components – electorate, abstentions and minor party: Labour has a positive advantage from all of them, whereas the Conservatives are disadvantaged in every case. In general, the Liberal Democrats are disadvantaged on all three, though they did benefit from winning relatively small constituencies in 1983 and 1987, when a substantial proportion of their victories occurred in Scotland and Wales, where constituencies have traditionally been much smaller than in England.[10]

Of these three components, the impact of minor parties on the outcomes is, not surprisingly, small.[11] That of abstentions is quite substantial, however, with Labour the major beneficiary and the Conservatives the most disadvantaged. Turnout fell substantially over the period, reaching its nadir in 2001 at 59.1 per cent of the electorate. As it fell, Labour's advantage increased, because the percentage of abstainers tended to be larger in the seats that it won.[12]

A similar difference characterises the Labour–Conservative comparison with regard to the electorate component: Labour benefited from its strength in the relatively small constituencies, whereas the Conservatives were disadvantaged by their relative strengths in the larger constituencies. Labour's advantage comes from three sources. The first is its relative strength *vis-à-vis* the Conservatives in the two parts of Great Britain with the smaller constituencies – Scotland and Wales – which was integral to the system.[13]

Labour also benefits in respect of electorate size bias from variations within each country, especially England. This is partly a result of the Boundary Commissions producing constituencies with smaller electorates in Labour's heartlands (the inner cities and industrial areas). Because they have had to fit constituencies into the local government map and not cross county and borough boundaries unless the disparities between neighbouring constituencies are extreme, areas with small entitlements may get smaller seats than the average; most of those are in urban areas, where Labour tends to be the stronger party, notably but not only London, which has some of England's smallest constituencies (as well as some of its largest; counties tend not to have as many small seats).[14] In addition, Labour tends to benefit most from demographic changes subsequent to boundary revisions being accepted. The Commissions do not take projected population and electorate forecasts into account: they use the latest figures available at the start of their redistribution exercises to define constituencies with electorates 'as equal as practicable'. As those constituencies 'age', some lose population and others grow – and areas of Labour strength tend to lose people. Thus, for example, in England the 1997, 2001 and 2005 elections were fought in constituencies originally defined on 1990 electorate data (i.e. they were some seven years out of date when first used). Of the 312 constituencies that Labour won at all three contests, the average electorate remained consistent at around 67,000, whereas in the 154 constituencies won by the Conservatives at all three it increased from 81,700 through 84,000 finally reaching 85,000 at the 2005 election.

These differences produced by the over-representation of Scotland and (especially after 2005) Wales relative to England, combined with the increasing variation in constituency electorates over time as they 'age', stimulated the Conservatives to propose the changes implemented in the Parliamentary Voting System and Constituencies Act 2011. These modified rules require every constituency with four exceptions to have electorates within +/−5 per cent of a UK-wide electoral quota (this is 76,641 for the first redistribution, which began in March 2011).[15] In addition, redistributions are to take place every five years so that each general election (under the Fixed Term Parliaments Act 2011) will be fought in a new set of equalised constituencies. In this way the Conservatives expect to remove the disadvantage that they have suffered from constituency size differences at every general election since 1959 (Johnston *et al.*, 2001).

Why is Geography so Important?

The coalition government will probably remove (nearly?) all of one of the main sources of bias in the electoral system's current operation when new constituencies are defined under the 2011 Act, therefore.[16] But, as Table 2 shows, *differences in electorate size are not a major contributor to the overall bias*, never exceeding +/− eighteen seats for any one party. Indeed, at recent elections size differences have been less substantial than those associated with abstentions. Thus the changes introduced in the new legislation are unlikely to result in election outcomes that treat each of the parties equally – and certainly not the Liberal Democrats relative to the other two.

The impact of the geography of abstentions cannot be changed by legislation, other than by making voting compulsory; it reflects individual behaviour patterns. Hence there is no reason to explore it further here. But what of the geography component, which Table 2 shows was by far the largest in its impact on the translation of votes into seats at every election for the Liberal Democrats, and the largest for both Labour and the Conservatives at five of the seven elections? Furthermore, although this component was consistently a negative source of bias for the Liberal Democrats – a very large one at two of the elections – it was positive at some elections and negative at others for the remaining two parties, as well as varying very substantially in its size, especially for Labour (from +75 to −18).

The geography component, as already noted, reflects the efficiency – or effectiveness – of a party's distribution of votes across the constituencies, illustrated by dividing each party's achieved votes into three groups:

- *Surplus votes* are those won in excess of the number needed to win in any constituency where it occupies first place; they are defined as the party's total number of votes obtained minus those won by the second-placed party, minus one. Thus if Labour wins 25,000 votes in constituency *x* and the Conservatives come second with 22,000, Labour has amassed 2,999 surplus votes.
- *Wasted votes* are those won in seats where a party loses (i.e. 22,000 Conservative votes are wasted in the above example).
- *Effective votes* are those needed for victory in seats that the party wins – as defined above (i.e. 22,001 of Labour's votes in that example).

Surplus and wasted votes do not contribute to winning seats, therefore; only effective votes do. It is thus in each party's interests to optimise its campaign efforts by maximising its effective votes and minimising the other two groups – which it can do by 'winning small and losing big': it should aim to win constituencies by only small majorities and in those seats where it is destined to lose it should accumulate few wasted votes and lose big. If a party was highly successful at that strategy, of course, it would be vulnerable to losing seats at the next election if there is a small swing against it, and would find it difficult to win other seats because of the large swing needed to overhaul the leading party locally. Nevertheless, at any one election, the closer its distribution of votes across the constituencies conforms to the maxim, 'win small, lose big', the better the outcome in the translation of votes into seats.

Table 3 gives the number of votes for each party and the percentage of these that were surplus, wasted and effective. The great majority of the Liberal Democrats' votes were wasted. They performed best in 2001 and 2005, when some 16 per cent of their votes were effective, but there was a fall-off in 2010: very few of their votes were surplus. This is the usual situation in an FPTP system when votes for a third-placed party are not spatially concentrated.[17] Few candidates win an election even in a three-party system with less than 40 per cent of the votes – in part because of the impact of small parties and independents even if the smallest of the three largest parties does not perform well (see Johnston and Pattie, 2011a). At the 2010 general election in England, for example, only 78 of the 532 seats contested by all three of the largest parties (i.e. excluding the Speaker's) were won with less than 40 per cent of the votes and just nine with less than 35 per cent.[18] Not only did the Liberal Democrats average well below that threshold at all of the elections being considered here, but they also had a relatively even distribution of their share across all

Table 3: Surplus, Wasted and Effective Vote Shares at British General Elections 1983–2010

			Per cent of votes that were		
Party	*Election*	*Total votes*	*Surplus*	*Wasted*	*Effective*
Conservative	1983	13,012,316	31.1	22.5	46.4
	1987	13,760,583	31.2	23.3	45.6
	1992	14,048,399	28	28.8	43.2
	1997	9,591,085	11.3	59.9	28.8
	2001	8,355,203	13.8	57.5	28.8
	2005	8,782,197	18.7	49.1	32.2
	2010	10,703,720	27.1	31.8	41.1
Labour	1983	8,456,934	19.1	49.5	31.5
	1987	10,029,807	24.3	46	29.8
	1992	11,560,484	24.3	42.6	33.1
	1997	13,518,167	41	20.8	38.3
	2001	10,724,953	37	23.1	39.9
	2005	9,552,436	29.1	30.5	40.4
	2010	8,606,524	23.7	41.9	34.4
LibDem	1983	7,780,949	1.3	94.2	4.5
	1987	7,341,633	1.4	94.4	4.3
	1992	5,999,606	1.3	93.2	5.4
	1997	5,242,947	4.6	80.7	14.7
	2001	4,814,321	6	78	16.1
	2005	5,985,454	5.6	78.5	15.9
	2010	6,836,718	4.7	82	13.4

constituencies: in 2010, for example, they had a mean constituency share of 23.1 per cent, with a standard deviation of 10.5, whereas for the Conservatives and Labour the comparable figures were 35.6 (standard deviation 14.6) and 31.0 (15.9), respectively. The geography of Liberal Democrat support resembles a plateau with few peaks or troughs, so while it continues to get between one-fifth and one-quarter of the votes it is unlikely to win many seats – or come close to victory in others.

Turning to the other two parties, one clear difference is between the situations when they won and lost the election overall. Each had more than 40 per cent of its votes effective in the elections that it won, and less in those that it lost. The Conservatives had more effective votes when they won in 1983, 1987 and 1992 (averaging 45.1 per cent) than Labour at the subsequent three elections (an average of 39.5). The Conservatives also had a slightly higher percentage of effective votes in 2010 than did Labour with a similar share of the votes overall in 2005. At the three elections they lost, however, the Conservatives had a smaller percentage of effective votes (averaging 29.9 per cent) than did Labour at the four they lost (average 32.1).

One clear indicator of the efficiency of a party's vote distribution is its number of surplus votes. On this measure, the Conservatives clearly 'outperform' Labour: their average surplus percentage at their four victories was 29.3, compared with 35.7 for Labour at its three victories. Similarly, the Conservatives had many fewer surplus votes when they lost (an average of 14.6 per cent) than did Labour (average 22.8). Labour traditionally had a large number of very safe seats that it won by substantial majorities – mainly in mining and industrial areas where not only was its support base large but local trades unions mobilised substantial numbers of electors to vote. Although much of the industrial and union base to that support has been dissipated by post-1980 industrial change, nevertheless Labour still has these strongholds – a lot of them in Wales and Scotland – which deliver large percentages of surplus votes (even if the vote totals there are relatively small, because of both small electorate size and high abstention rates). This accounts for its large positive geography component at the 1983 and 1987 general elections (Table 2), and again in 2010. These were the elections when Labour performed particularly badly (getting around 30 per cent of the votes) and those relatively safe constituencies ensured that its seats share fell by less than was the case for the Conservatives in 1997–2005. When there was an overall swing of votes away from Labour this was not as exaggerated in the decline in the number of seats won as was the case when the Conservatives experienced a similar loss of support.

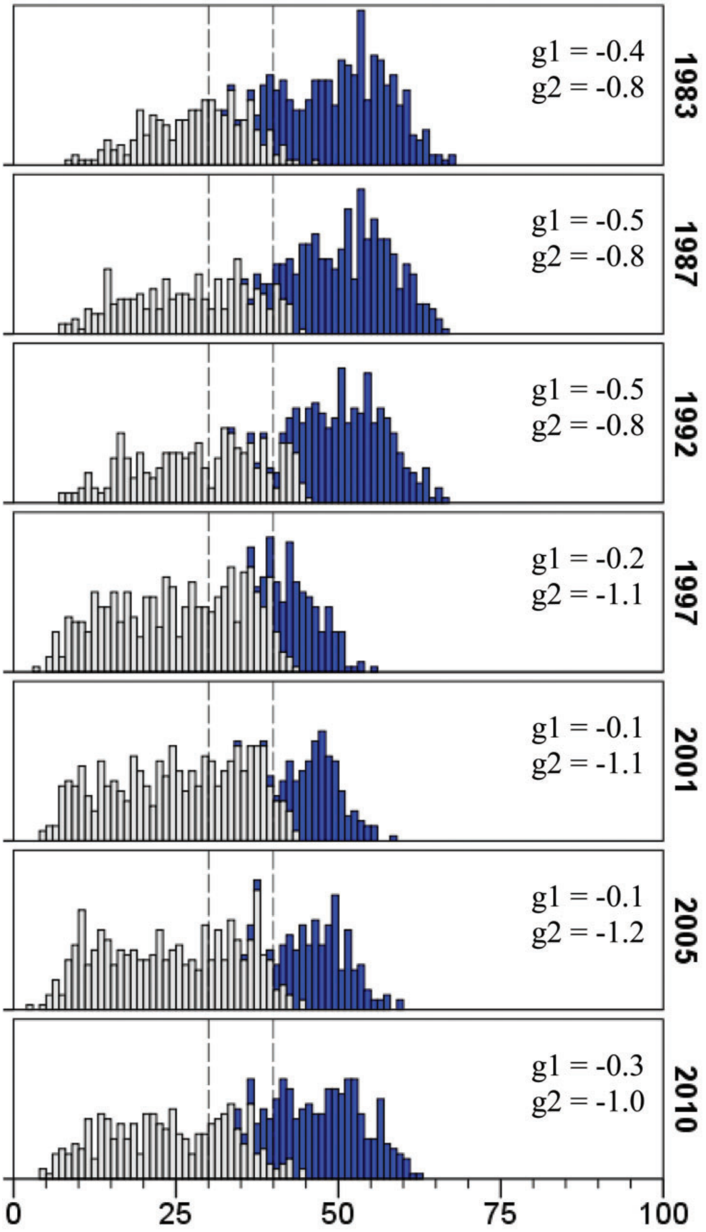
So why did Labour do so well in 1997 and 2001, when its seat share was more than 20 percentage points higher than its vote share? Its percentage of wasted votes was small – 20.8 and 23.1, respectively, probably because of tactical voting. During the campaign prior to the 1997 general election Labour and the Liberal Democrats were not only united in their desire to remove the Conservative government but also close on many policy issues, as both party leaders reported in their memoirs (Ashdown, 2009; Blair, 2010). Thus there was a great deal of (implicit and sometimes explicit, at least at the grass-roots level) encouragement to vote tactically where this could assist in the goal of defeating a Conservative candidate. Estimates suggest that substantial numbers did vote tactically (Johnston and Pattie, 2011b; Pattie and Johnston, 2010; Johnston *et al.*, 2001, pp. 168–75) so where Labour was in third place its vote fell relatively, if not absolutely, thereby reducing its number of wasted votes: the second part at least of the 'win small but lose big' maxim certainly applied then. Tactical voting was again on the (implicit) agenda in 2001, to prevent a Conservative recovery, but there was something of a 'tactical unwind' in 2005 (Fisher and Curtice, 2006). It reappeared in 2010, however, as a result of further attempts by Labour and Liberal Democrat supporters to prevent a (large?) Conservative victory, although there were also some moves by Conservative and Liberal Democrat supporters to prevent a further Labour government ensuing (Johnston and Pattie, 2010; 2011b).

Skewed Distributions and the Conversion of Votes into Seats

Tactical voting illustrates how (party-induced in many cases) voter behaviour can influence the frequency distribution of a party's support across the constituencies. Figures 1–3 show the vote distributions for Conservative, Labour and Liberal Democrat parties for all seven elections since 1983. According to the 'win small, lose big' maxim, the most efficient distribution would be negatively skewed, and the least efficient positively skewed, with the mode in the region of 45–55 per cent. In a two-party system, a party with just over 50 per cent of the votes cast and a negatively skewed distribution would win a much larger share of the seats than of the votes, with the converse for a party having a positively skewed distribution (Gudgin and Taylor, 1979; Johnston *et al.*, 2001).[19] In a three-party system in which one of them gets a substantially smaller share than the other two, a positive skew is desirable for that third party since with a relatively small share (<25 per cent) of the votes nationally a number of constituencies where its percentage is much greater than the average allows it to win some seats and establish a parliamentary presence. As it grows, however, it needs to change the shape of its distribution from a positive to a negative skew, which is a difficult task (although not impossible, as the post-war Labour experience demonstrates: it had an inefficient positive skew in the early decades, but a much more efficient negative skew by the 1990s – Johnston *et al.*, 2002). The shape of the Liberal Democrat vote distribution has posed a considerable problem at recent elections: should the party invest limited campaigning resources in the relatively small number of seats where they have a chance of winning, thereby increasing their parliamentary cohort, or should they aim to broaden the geographical base of their support and build the foundations for shifting to a negatively skewed distribution (Denver, 2001)? Figure 3 indicates little change over the period: their geography of support was very positively skewed at all seven elections, a pattern quite different to Labour's (which is very platykurtic, with both positive and negative elements but with a long negative tail, especially in 1997 and 2001 when it benefited from tactical voting: Figure 2) and the Conservatives' (which is negatively skewed: Figure 1).

In a two-party system, where minor parties gain only a very small share of the votes cast (as in Britain before the 1970s), the interconnection of the two parties' frequency distributions is crucial in determining the extent of the disproportionality and bias in general election outcomes. In a three-party system (or even a 'two-and-a-half party system', which is how some commentators describe the current British situation: Laakso, 1979; Siaroff, 2003) the interconnection of the three frequency distributions determines how their votes are translated into seats, a process further complicated by the impact of the smaller parties, which won 10 per cent of the votes cast in 2010. As the number of parties – large and

Figure 1: Conservative Share of Vote



Notes: Each bar corresponds to a percentage point range and the height of the column reflects the number of cases. Coloured elements represent constituencies where the relevant party won the seat. 'g1' and 'g2' stand for skewness and kurtosis, respectively.

Figure 2: Labour Share of Vote

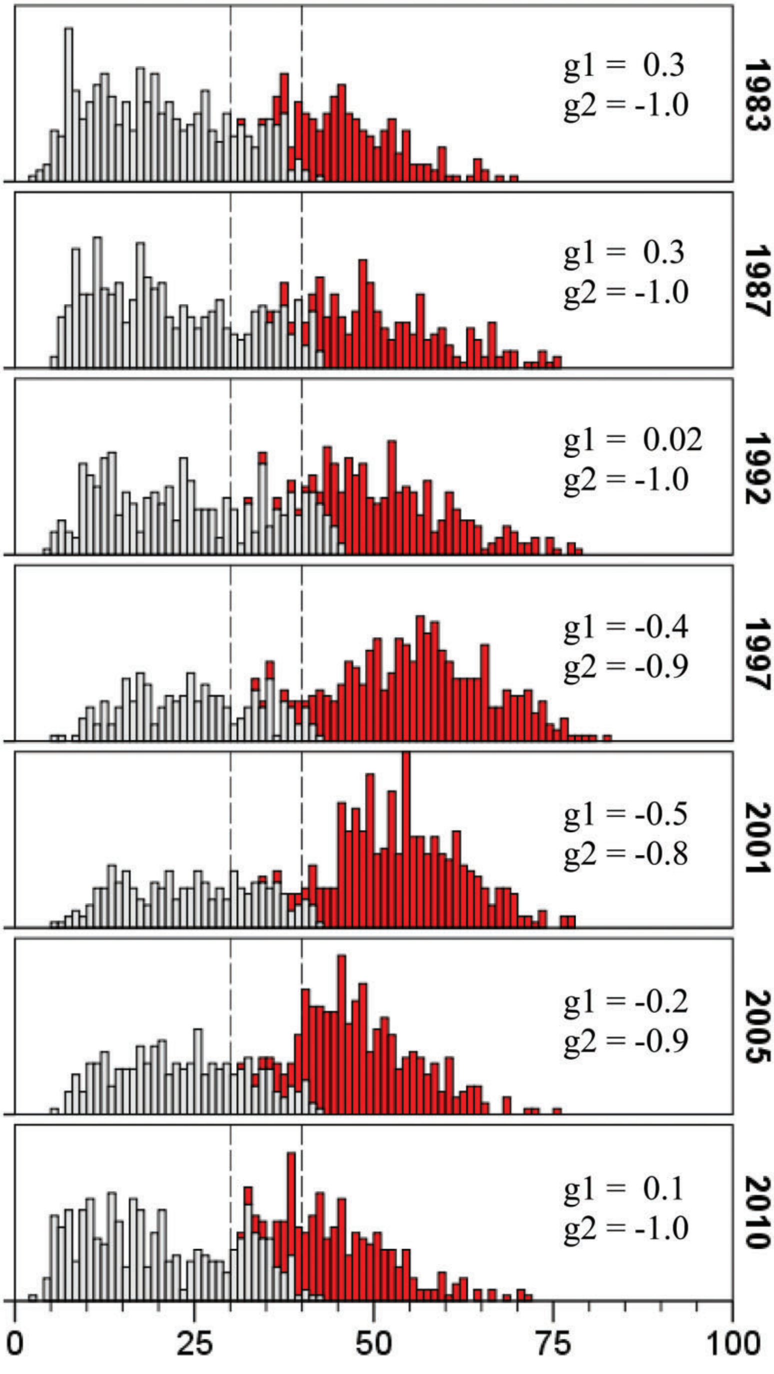
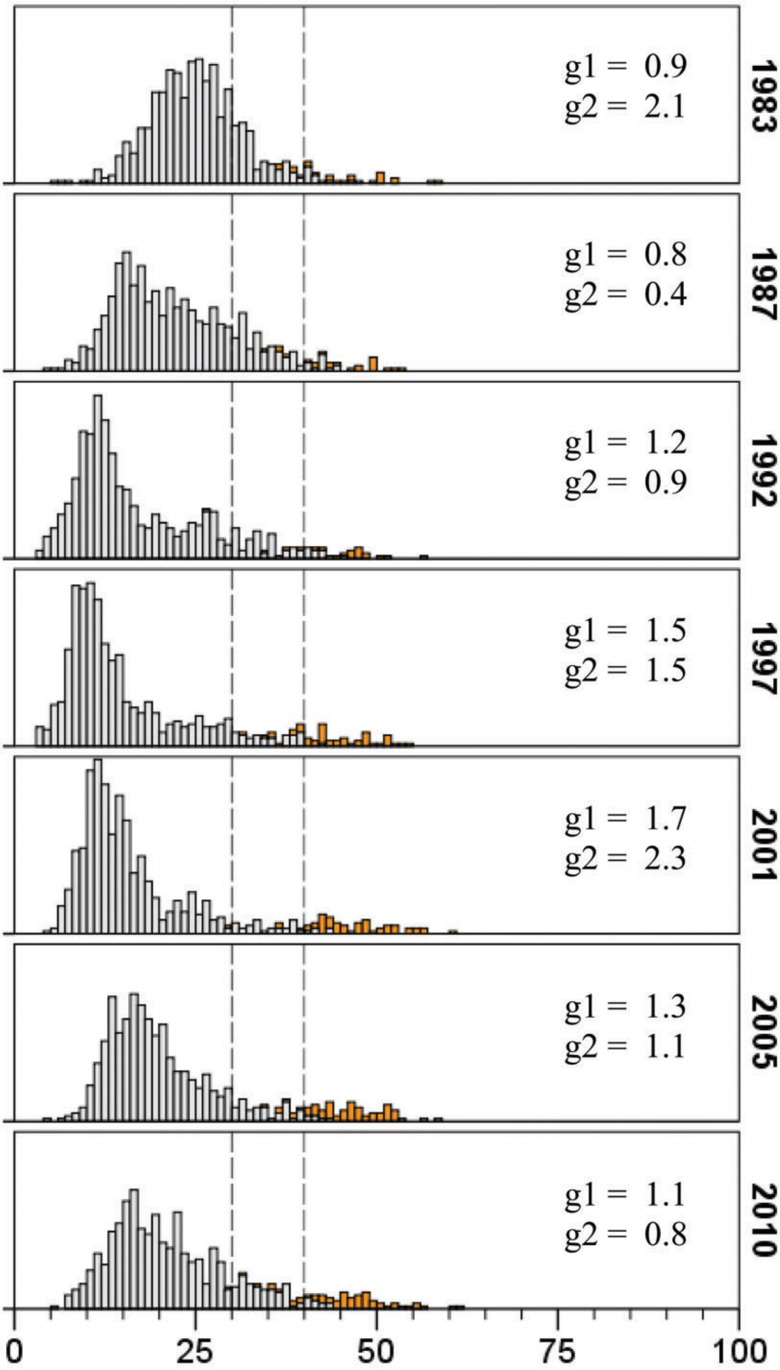


Figure 3: Liberal Democrat Share of Vote



small – increases, so the average percentage of the votes cast needed for victory is reduced in most constituencies. A share considerably below 40 per cent may deliver a constituency victory, especially if the three largest parties are all strong contenders. In 2010 only fifteen constituencies out of the 631 in Great Britain[20] had all three parties with 25 per cent or more of the votes – what might be identified as the 'three-party marginals'. In a further 78 seats, however, all parties got 20 per cent or more – although in 26 of them the winning party had a margin of 20 or more percentage points over the second placed and in a further 22 the lead was between 10 and 20 points.

What is crucial for a party in such a situation, therefore, is whether it converts its share of the votes into winning the seat. Table 4 shows that in 2010 all three parties won all of the seats where they obtained 45 per cent or more of the votes cast, and there was only one case where a party won with less than 30 per cent (the Liberal Democrats in Norwich South).[21] Crucial, therefore, is relative success in converting votes into seats where a party's share falls between 30 and 45 per cent. In 2010 there were very considerable differences among the parties in this respect. Labour won virtually all of the seats where it gained between 40 and 45 per cent of the votes, for example, whereas the Conservatives failed to win eleven of the 77 where it was in that position, and the Liberal Democrats failed to win as many as half. It was the same where the parties gained 30–40 per cent of the total; Labour achieved victory in 38 per cent compared to 26 per cent for the Conservatives and only 11 per cent for the Liberal Democrats.

Why this difference? One possibility is that Labour was more likely to get 30–45 per cent of the votes in Scottish and Welsh constituencies where the presence of a fourth substantial party nationally (the SNP and PC, respectively) meant that on average a smaller share of the votes cast was likely to result in a constituency victory than was the case in England, where in most constituencies there was no comparable fourth party. (Apart from the three incumbent independent MPs, all of whom lost their seats, there were only eight English

Table 4: From Votes to Seats at the 2010 British General Election

	Per cent of votes cast in constituency			
Party	*<30%*	*30–40%*	*40–45%*	*>45%*
Conservative				
Won	0	34	66	205
Second	82	97	11	0
Total	218	131	77	205
Labour				
Won	0	55	67	136
Second	65	91	4	0
Total	276	146	71	136
Liberal Democrat				
Won	1	9	11	36
Second	165	67	11	0
Total	495	78	22	36

constituencies where at least one of the small party candidates won 10 per cent or more of the votes).[22] Indeed, of the 112 seats where Labour won with 30–45 per cent of the votes, 28 were in Scotland or Wales (where it lost just 8 seats with that share of the votes); for the Conservatives, only 8 of their victories in that vote share band were in Scotland or Wales (where they also lost 14);[23] and the Liberal Democrats won 9 of the 18 seats there where they won 30–45 per cent of the votes.[24]

Apart from this difference between the three parties in their relative strengths in England, Scotland and Wales, a further difference in their ability to convert a vote share of 30–45 per cent into a constituency victory reflects their geographies of support. In effect, Labour was better able to win in the constituencies where the three main parties were relatively equal – that is, those that came closest to being three-way marginals. This can be illustrated by computing a simple statistic PCS:

$$\mathrm{PCS_i} = \mathrm{Sqrt}\left[\mathrm{shLab_i} - 33.3)^2 + (\mathrm{shCon_i} - 33.3)^2 + (\mathrm{shLD_i} - 33.3)^2\right]$$

where $\mathrm{shLab_i}$, $\mathrm{shCon_i}$ and $\mathrm{shLD_i}$ are the Labour, Conservative and Liberal Democrat percentages of the total number of votes cast for those three parties only in constituency i. This statistic shows how far away each constituency is from the 'equal shares' situation (perfect three-party competition). The smaller the value of $\mathrm{PCS_i}$, the more three-way marginal is the seat. In England, constituencies where Labour obtained between 30 and 45 per cent of the three-party votes had an average PCS of 18 whereas the mean PCS values in similar Conservative or Liberal Democrat seats were 21 and 25, respectively. On average, therefore, seats where Labour got 30–45 per cent of the votes in 2010 were also more likely to be three-way marginals than was the case with the other two parties, hence its higher conversion rate.[25]

As the three frequency distributions shown in Figures 1–3 move between elections, as each party's constituency average share of the votes changes and, to the extent that the changes in individual constituencies vary from a uniform swing, the distributions also change shape, so the conversion rates should alter. Table 5 shows in more detail those rates for two percentage share bands – 30–40 and 30–45 – at the seven general elections from 1983 on, plus the narrower 40–45 percentage share band; most parties would expect to win a constituency with that share in a three-party contest. A number of main conclusions stand out.

At the first three elections the conversion rates for the Liberal Democrats were much smaller than those for the other two parties in all three bands. Whatever their vote share between 30 and 45 per cent, the Liberal Democrats were less likely to win the seats than either Labour or the Conservatives, in some cases by a very large margin: in 1983, for example, the Conservatives won 88 per cent of the 67 seats where they got 40–45 per cent, and Labour won 95 per cent of the 59 seats with that share, but the Liberal Democrats' conversion rate was only 35 per cent of the 17 seats. That party's best performance was in 1997, when it won 22 per cent of the seats where it gained 30–40 per cent, 42 per cent where its share was between 30 and 45, and 94 per cent where it was 40–45. But it declined thereafter.

For the other two parties, the clearest difference is for the 2001–10 elections when Labour had substantially larger conversion rates in each band than the Conservatives; in

Table 5: Conversion Rates: Percentage of Seats Won by Each Party with Different Shares of the Vote Total

% of votes		30–40		30–45		40–45	
Party	Election	CR	N	CR	N	CR	N
Conservative	1983	24.2	128	46.2	195	88.1	67
	1987	12.4	67	35.9	170	67.1	73
	1992	5.7	106	20.8	178	43.1	72
	1997	10.4	183	34.5	275	82.6	92
	2001	2.5	162	19.1	225	61.9	63
	2005	5.5	145	28.4	211	78.8	66
	2010	26	131	48.8	211	86.3	80
Labour	1983	25.7	109	50	168	94.9	59
	1987	8.6	93	32.9	152	71.2	59
	1992	9.4	95	23.6	157	40.3	72
	1997	18.8	69	38.9	108	74.4	39
	2001	10.7	75	32.5	114	74.4	39
	2005	32.6	92	62.2	188	90.6	96
	2010	38.5	148	56.4	218	94.3	70
LibDem	1983	4.7	106	8.9	123	35.3	17
	1987	4.2	96	9.5	116	35	20
	1992	5.4	56	8.6	70	21.4	14
	1997	22.2	45	41.9	62	94.1	17
	2001	10	30	40.7	54	79.2	24
	2005	14	50	33.8	74	75	24
	2010	11.5	78	20	100	50	22

Key: CR – conversion rate (percentage of seats won); N – number of constituencies.

2005 Labour won 62.2 per cent of the seats where it gained 30–45 per cent of the votes, and 90.6 per cent of those where its share was 40–45, compared to figures of 28.4 and 78.8 per cent, respectively, for the Conservatives. Prior to that, however, the differences between the two were slight and largely patternless – although both had very low conversion rates, even in the 40–45 per cent vote share band, at the 1992 election.

The importance of the geography component to the overall bias in recent UK general election results – how efficiently each of the parties' votes are distributed across the constituencies – is thus a function of two separate factors. The first is the frequency distribution of each party's vote shares: the degree and direction of skewness is a crucial determinant of the efficiency of the process whereby votes are translated into seats. But the nature of the skewed distributions cannot account for all of the inter-party variation in the ratios of seats to votes because of variations in the percentages of their votes that were either surplus, wasted or effective (Table 3). The relative proportions of each party's votes in those three categories is apparently largely a function of variations in their success rates at winning seats when their vote share falls in the range 30–45 per cent. Below the lower figure, each party almost invariably failed to win the constituency whereas above that figure victory was assured (Table 4).

Crucial to appreciating the variations in conversion rates within that vote range is the nature of the local competitive situation. The likelihood of a party winning a seat if its vote share lies between 30 and 45 per cent depends on its competitors' relative performance. If, for example, Labour had between 30 and 45 per cent of a constituency's votes and both the Conservatives and the Liberal Democrats had a substantial share of the total too, then Labour's chances of success increased – three-way marginals are necessarily won with smaller vote shares. In addition, the better the aggregated performance of the minor/other parties, the smaller the vote share that one of the three large parties needs for victory. In a close three-way marginal constituency where the minor parties win 10 per cent of the votes, victory is quite likely for one of the major parties with just 33 per cent; where the minor parties get only 2 per cent between them, 36 per cent may be needed. On the other hand, in a constituency where the third party gets only about 15 per cent of the votes, and where the minor parties win 10 per cent, then a share of around 38 per cent is probably needed by one of the other two.[26]

Conclusions

In the context of contemporary electoral reform debates, the analyses presented here have more than sustained the Liberal Democrats' opposition to the first-past-the-post system. The Conservatives have also been disadvantaged at most of the recent elections. Their analyses of that situation have focused on differences in constituency electorates and the legislation passed in 2011 is designed to correct that. But the disadvantage they have suffered from the electorate size component has been small – as has Labour's advantage – and although removing its cause would eliminate that bias element, which could be crucial in a close contest, it does not mean a 'level playing field' in future contests between them and Labour (Thrasher *et al.*, 2011).

The geography of a party's votes – how efficiently they are distributed across the constituencies – is crucial to the creation of biased election results in the UK. Part of the reason – as others have shown (e.g. Gudgin and Taylor, 1979; Johnston *et al.*, 2002) – lies in the frequency distribution of each party's vote shares: certain distributions – where the party 'wins small but loses big' – produce better outcomes than others. Vote distribution profiles for the three main parties since 1983 reflect patterns of voter behaviour (and of party behaviour in their efforts to mobilise support, which is spatially very variable: Denver and Hands, 1997; Pattie and Johnston, 2009) which are not readily manipulated. Studies of campaign effects show that the more intensive a party's campaign in a constituency the better, *ceteris paribus*, its performance there (Johnston and Pattie, 2008), so the geography of party activity and resources is crucial.[27] That is open to manipulation at the margin through the encouragement of tactical voting – and, at the extreme, by parties agreeing not to field candidates against each other in particular circumstances, which occurred with the Alliance of the Liberals and Social Democrats in 1983 and 1987.

But as our analyses of conversion rates have shown, the interrelationships of those distributions is also crucial. Where the contest between all three of the largest parties is relatively close, then a seat may be won with less than 35 per cent of the votes – especially if one or more of the minor parties also performs well. Conversely, a party may capture above 40 per cent of the constituency vote and still lose to a stronger rival.

In a country where two parties predominate and there is not only either malapportionment or gerrymandering but also the parameters of the first-past-the-post electoral system (how constituencies are defined) and the geographies of party support show no peculiarities, then election results are largely predictable. But as the situation moves towards a three-party system, with smaller parties also winning more than a trivial share of the votes, the election outcomes become less predictable and more likely to be biased. This is the current British situation and its appreciation calls for a method that can unravel the causes of bias. That has been achieved here, using a modification of a well-tried measure of bias in two-party systems to take account of the three-party situation.

Unpredictability is a marked feature of recent British election results, which raises questions about the electoral system's 'fitness for purpose' (Curtice, 2009; 2010). So much depends on the interrelationships between a series of geographies; we can successfully predict what will happen when they interact in particular ways – but not *when* those situations will emerge. The minimal electoral reform undertaken by the Conservatives substantially to reduce variations in constituency size will not change that situation markedly.

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Notes

1 The manifesto is available at http://www.libdems.org.uk/our_manifesto.aspx [Accessed 19 January 2012].
2 The manifesto is available at http://www.labour.org.uk/labours-Manifesto-for-a-future-fair-for-all [Accessed 19 January 2012].
3 In the negotiations over the possibility of a Labour–Liberal Democrat coalition being formed immediately after the 2010 election, it is suggested that Labour offered to make the change to AV without a referendum although Mandelson (2010, pp. 548–9) suggests that holding a referendum in autumn 2010 remained the plan.
4 http://www.conservativeelectoralreform.org/

5 http://www.conservatives.com/Policy/Manifesto.aspx. Labour responded to these proposals – which it termed gerrymandering – in its manifesto by promising to establish a 'non-partisan Parliamentary Boundaries Review to examine the rules for constructing Parliamentary constituencies'.

6 For the full sequence of bias estimates calculated in that way for the seven elections since 1983 see Borisyuk *et al.* (2010); Johnston *et al.* (2001); Johnston and Pattie (2011a). In addition to this 'equal shares' approach Brookes also allowed for a procedure that involved reversing the shares of the two main parties which gave similar, though not identical, bias estimates.

7 Blau (2001; 2003) has presented a reasoned critique of this approach and proposed an alternative method, which reaches very similar conclusions about the size, direction and components of the observed bias.

8 The interaction term may also encompass some 'random noise' – bias towards or against the particular party that is not identified with one of the main components.

9 Although we use the term 'beneficiary' or 'advantage' elsewhere there is no suggestion that a party is deliberately engineering this situation but rather that it so happens that a given electoral situation is better for it than its rivals. The method of measuring electoral bias is simply one way of offering a detailed description of parties' electoral gains and losses.

10 The average constituency in England in 1987 had 68,806 electors; for Scotland and Wales the averages were 54,895 and 56,614, respectively. The constituencies won by the Liberals in Wales averaged 51,474 electors; those won in Scotland averaged 51,154. From 2000 on, Scottish constituencies had to be defined using the same electoral quota as England, but they were still smaller on average than those in England at the 2010 election (65,500 in Scotland and 71,680 in England) because of the small constituencies in the Scottish Highlands and Islands where 'special geographical considerations' were invoked by the Boundary Commission during its 2004 redistribution. The average Welsh constituency had 56,500 electors in 2010.

11 The SNP and Plaid Cymru contested only a minority of the constituencies and – with the exception of the Greens in 2010 and a small number of independents at the earlier elections – no other parties came close to victory in any constituency.

12 The average turnout in Labour-won seats in 2001 was 56.7 per cent, compared to 63.0 per cent in those won by the Conservatives and 63.8 per cent in those won by the Liberal Democrats.

13 Wales was guaranteed at least 35 seats in the 1944 House of Commons (Redistribution of Seats) Act and Scotland 71; the figure for Great Britain should be not substantially greater or less than 613, leaving 507 for England. Over time, the number has grown, more rapidly in England than in the other two countries but not sufficiently so as to counter differentials in their rates of population growth. By 2001, Wales had 40 seats, Scotland 72 and England 629. Scotland's number was reduced to 59 in 2005 as part of the 1998 devolution settlement (see above, Note 10) but Wales' complement remained unchanged at 40, and England's was increased before the 2010 election to 533. Because Labour is relatively stronger in Wales and Scotland than in England – it won 34 of the 40 Welsh seats in 2001 (85 per cent) and 56 of Scotland's 72 (78 per cent), as against 323 of England's 529 (61 per cent) – it benefits from their smaller constituencies in the votes-to-seats translation, as reflected in that bias component.

14 For example, if the electoral quota were 72,000, a borough with 194,400 electors would be entitled to 2.7 constituencies: it would be allocated 3, with an average electorate of 64,800; a county with an electorate of 914,400 would be entitled to 12.7; it would be allocated 13, averaging 70,340 electors. On the other hand, a borough with 165,600 electors would be allocated 2 (against an entitlement of 2.3) averaging 82,800 each, whereas one with 885,600 (entitlement 12.3) would have 12 constituencies averaging 73,800. The smaller the local government unit the larger the average deviation of constituency electorates from the quota – and most of the areas with small constituencies tend to be in cities where Labour is the stronger of the two main parties.

15 See the discussion of this in the Boundary Commission for England's Newsletter 2/2011, available from: http://consultation.boundarycommissionforengland.independent.gov.uk/publications/#newsletters

16 The exceptions to the +/−5 per cent rule are the Scottish constituencies of Orkney & Shetland (33,085 electors at the 2010 general election), H-Eileanan An Iar (the Western Isles – 22,266) and the Isle of Wight (which had one seat for 109,966 electors in 2010, but has been allocated two under the Act).

17 This is the case, for example, with the Bloc Québécois in Canada, which gets a share of the seats commensurate with vote share because votes are all concentrated in one province (LeDuc, 2007). In the UK, Plaid Cymru's votes are significantly concentrated within Wales, so that with 0.56 per cent of the UK total it obtained a reasonably proportional share of the 650 seats with three (0.46 per cent); the SNP was less successful, however, as with 1.65 per cent of the votes it obtained only 6 seats (0.92 per cent).

18 One was won with only 29.4 per cent: by the Liberal Democrats in a three-way marginal contest (Norwich South), where Labour won 28.7 per cent and the Conservatives 23.0.The Green party candidate won 14.9 per cent and three others shared the remaining 4.1 percentage points.

19 This was the basis for some of the early attempts to measure 'electoral bias/distorted representation' (Gudgin and Taylor, 1979; Johnston, 1979).

20 The number of seats is one less than the full total of 632 because, in line with established practice, the incumbent Speaker was not challenged by the main parties.

21 This was a rare 'three-and-a-half-way marginal': the Liberal Democrats won 29.4 per cent, Labour 28.7 per cent, the Conservatives 22.9 per cent and the Greens 14.9.

22 The BNP did so in Barking, Dagenham & Rainham, and Rotherham; the Greens did in Brighton Pavilion (which they won) and Norwich South; and Respect did in Bethnal Green & Bow, Birmingham Hall Green and Poplar & Limehouse.

23 In all eight of the Conservative victories only two parties got over 20 per cent of the votes and in none of these did either the SNP or PC get over 20 per cent. The Conservatives' successes in those two countries were all in 'straight fights' with Labour.

24 Parts of rural Scotland and Wales have long been Liberal heartlands.

25 A similar sequence of values (55.7, 57.3 and 59.8) emerges if the percentage shares used in the formula apply to all parties contesting the seat rather than just the 'big three'.

26 Detailed analyses using Mann-Whitney *U*-tests, not reported here, show that each party was significantly more likely to win a seat with a vote share in the 30–45 per cent range if either (a) the third-placed party performed well or/and (b) the minor parties performed well.

27 As exemplified by the Conservatives' successful target seats strategy in 2010 (Ashcroft, 2010; Johnston and Pattie, 2010).

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Appendix 5

Voter support for minor parties - Assessing the social and political context of voting at the 2004 European elections in greater London

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VOTER SUPPORT FOR MINOR PARTIES

Assessing the Social and Political Context of Voting at the 2004 European Elections in Greater London

Galina Borisyuk, Colin Rallings, Michael Thrasher and Henk van der Kolk

ABSTRACT

The context of support for a range of minor parties in the United Kingdom is identified using ward-level aggregate data from the 2004 European elections in London. Four parties in particular, namely Respect, Green, the United Kingdom Independence Party (UKIP) and the British National Party (BNP), which collectively obtained 3 in 10 of all European votes cast in London and performed well at the subsequent general election in 2005, are considered. Bivariate and multivariate analyses, employing socio-economic and political variables, show that for each of the four parties there is an identifiable and reasonably well-defined ward-level context of support. Regression models help to explain around three-quarters of variance in vote support. Strong similarities are found in the context of support for the anti-European Union UKIP and the far-right, anti-immigrant BNP. Close study of the geography of support shows that while the spread of votes for minor parties is fairly homogeneous across some boroughs, in others there is a fair degree of heterogeneity.

KEY WORDS ▪ elections in London ▪ empirical research ▪ minor political parties ▪ ward-level aggregate data

Introduction

The 2005 United Kingdom general election saw overall support for main-stream parties decline and relatively high levels of support in particular for four minor parties. The anti-European Union, United Kingdom Independence Party (UKIP) came fourth in the popular vote behind Labour, Conservative and Liberal Democrat parties, receiving more votes than both the Scottish

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and Welsh Nationalist parties. With candidates in over three-quarters of parliamentary constituencies, UKIP received 2.2 percent of the nationwide vote. The Green Party received more than 250,000 votes, 1 percent of the UK total, virtually doubling its share, while the far-right British National Party (BNP) polled slightly fewer than 200,000 votes, a total almost four times its previous best. Although performing less well than the other parties, the anti-Iraq War Respect Party did capture a seat in inner London. Of course, comparative analysis shows that the UK, a unitary state using the first-past-the-post electoral system, with strong party organization and low electoral volatility, does not provide fertile ground for minor party success (Gerring, 2005). However, it was not entirely a surprise in 2005 that these parties should erode the vote *share* of the three dominant parties – all had provided a foretaste of their electoral potential in the previous year.

Unfortunately, the extent to which support for such parties is simply a 'protest vote' rather than something more substantive cannot be adequately determined using the standard techniques. The post-election survey conducted as part of the 2005 British Election Study, for example, comprises 20, 6 and 45 respondents for the Green, BNP and UKIP parties, respectively. A single respondent, from a survey of over 3000 respondents, gave Respect as their partisan choice. Such numbers do not permit an in-depth analysis of a voter's motives for supporting these parties.

An alternative method would be to use aggregate data. With party vote share within a relevant electoral area as the dependent variable, the context of support for minor parties may be examined using a range of socio-economic and political characteristics as predictor variables. The main drawback with using aggregate data, of course, is that we cannot study the motives of individual voters but we can study the social context within which votes for minor parties are cast. A second drawback is that general election data are available only at the parliamentary constituency level, each with an electorate of approximately 68,000. The problems of ecological inference (EI) are acute when such large units are involved. Moreover, because minor parties generally contest only a fraction of seats, the number of cases available for analysis may be rather small.

However, there is an opportunity to study support for minor parties at an unusually low level of aggregation and where the pattern of contestation is not an issue. On 10 June 2004, electors across London voted in the European Parliament elections while simultaneously choosing the Mayor and Assembly of the Greater London Authority (GLA). Normally, European election data are only available for the relatively large areas covered by either a parliamentary constituency or local authority. However, this round of elections in London used electronic counting procedures and subsequently all voting figures for each type of election were made available for the smallest electoral districts (local council wards). Potentially, these data constitute an invaluable resource for examining the social and political context of party support.

This study is further helped by the particular electoral structure in London. Three different voting systems were used for the 2004 election (Rallings and Thrasher, 1999). The London Mayor was chosen by 'Supplementary Vote', while the Assembly election used the Additional Member 'top-up' system (AMS), with each elector receiving two votes: one electing candidates from single-member constituencies, and one choosing among parties from a London-wide list. A 5 percent threshold operates, without which both the BNP and Respect would each have won a seat in 2004. A London-wide list was used for the European Parliament election. The electoral structure therefore ensured that *all* voters within the London region had an opportunity to cast a ballot for Respect, Green, UKIP and BNP either with their constituency and/or list vote.

This may partly explain why combined support for the three main parties (Conservative, Labour and Liberal Democrat) in the three elections only ranged between 67 percent and 81 percent (Table 1). The largest combined percentage occurred at the 'presidential style' Mayoral election, widely perceived as a two-horse race between the Labour and Conservative candidates. Aside from this contest, however, between one-quarter and one-third of voters cast ballots for minor parties, prominent among these being the four parties that would later feature at the 2005 general election. In 2004, Respect campaigned almost exclusively on the Iraq War issue, while the Greens, although emphasizing environmental protection and climate change, also voiced opposition to the Iraq invasion. On the centre–right, UKIP continued its demand for withdrawal from the European Union (EU). The far-right BNP, strongly opposed to multiculturalism, issued a manifesto for London that highlighted what the party perceived as 'uncontrolled immigration' and 'bogus asylum claimants'. It did not field candidates in the Assembly constituencies, but did present candidates for both the London-wide lists.

Table 1. Results of the European, Mayoral and Assembly election in London, 2004

			London Assembly	
Party	*Euro* %	*Mayor* %	*List* %	*Const* %
Conservative	26.8	29.1	28.5	31.2
Labour	24.7	36.8	25.0	24.7
Lib Dem	15.3	15.3	16.9	18.4
Sub-total	*66.8*	*81.2*	*70.4*	*74.3*
Respect	4.8	3.3	4.7	4.6
Green	8.4	3.1	8.6	7.7
UKIP	12.3	6.2	8.4	10.0
BNP	4.0	3.1	4.8	–
Sub-total	*29.5*	*15.7*	*26.5*	*22.3*
All others	3.7	3.1	3.2	3.4

The 2004 election in London therefore presents a valuable opportunity to examine the context of support for a range of minor parties while avoiding the normal deficiencies presented by individual-level survey and/or large-scale aggregate data. First, we consider existing research to identify the potential correlates associated with voting for each of the four selected parties. The second section provides more detail about the data and methodology used. In the third section, we develop regression models that highlight the social and political context of support for minor parties. We go on to show that examining the spatial distribution of each party's vote also reveals features of the geography of support.

Votes for Minor Parties

Support for minor parties may be regarded specifically as an outlet for voters' dissatisfaction with the major parties or, more broadly, with party politics (Belanger, 2004; Denemark and Bowler, 2002; Poguntke, 1996). According to Belanger, it is the former attitude that mainly forms the basis for minor party support; the latter leads principally to voter abstention. Having said this, support for specific minor parties is not just a consequence of voters temporarily or permanently dissatisfied with the major parties. According to Gerring (2005), minor parties' support is also determined by the institutional and political context. Thus, for example, federalism is associated with minor parties, partly because of the existence of (regionally organized) minor parties. By contrast, presidentialism reduces minor party support because the focus tends to move towards a restricted number of (partisan) presidential candidates.

Additional to those factors, the literature on second-order elections states that minor parties are often less visible at the national level than at the local and the European levels (Reif, 1985; Reif and Schmitt, 1980). This is because local and European elections are used by some voters displeased with mainstream parties as an opportunity to be expressive, safe in the knowledge that the formation of a national government is not at stake.

Finally, the electoral system may have a role in shaping the 'dissatisfied vote' (Gerring, 2005). With single-member districts, for example, voters behaving strategically will deviate from their most preferred candidate to vote for the least worst 'viable' candidate. This means that even some voters dissatisfied with one of the major parties will keep voting for these parties because choosing one of the minor parties brings no advantage (Alvarez and Nagler, 2000; Cox, 1997). And it is not just voters that are affected; minor parties can decide *not* to field non-viable candidates in single-member electoral areas. By contrast, in list systems with large constituencies and virtually no threshold, such as the Dutch system, there is little reason for voters to deviate from their most preferred 'minor' party, since this party should at least win some seats. It is mainly sophisticated 'coalitional' voting which may prompt some voters to deviate from their most preferred minor party (Cox and Shugart, 1996; Irwin and Van Holsteyn, 2003). In mixed systems combining both single-member districts and party lists, some voters will decide to 'split their ticket'. Part of this will be a consequence of voters and parties behaving strategically in the constituency part of the elections, but acting sincerely on the list ballot (Gschwend and Van Der Kolk, 2006).

These findings show why it is interesting to focus on the 2004 elections in London to understand better the social basis of minor party support. In national (and local) elections, minor parties in England are hindered by the use of first-past-the-post, but system effects are different under AMS. In addition, more voters are willing to vote for a minor party in a non-parliamentary election, because it gives a clear signal to the major parties without affecting national government formation. Having said this, it is useful to summarize what is already known about the social context of support for UKIP, BNP, the Greens and Respect.

Given polling evidence, it is unsurprising to find some electoral support for parties that campaign for the country's withdrawal from the EU. Opinion polls find that opposition to the EU and further integration is greater among older respondents (Curtice, 1996; Evans, 1995). This is confirmed by aggregate data showing a positive relation between the percentage of older voters and the size of UKIP support (Curtice and Steed, 2000) as well as the proportion of self-employed living within an area (Curtice et al., 2005).

The BNP favours repatriation of foreign migrants (Margetts et al., 2004) and seeks to guarantee that native English, Scots, Welsh and Irish remain the dominant ethnic grouping. During the 1930s, similar sentiments were expressed by the British Union of Fascists, which succeeded in establishing pockets of strength in parts of east London and southwest Essex, areas that now lie within the boundaries of the Greater London Authority (Kushner and Lunn, 1990; Linehan, 1996; Lunn and Thurlow, 1980; Thurlow, 1987). More recently, the BNP has achieved local government electoral success (Renton, 2003), and in May 2006 became the main opposition on Barking and Dagenham borough council. The 2004 European election saw the party supported by almost 1 in 20 voters across Britain. Its vote is positively correlated with working-class areas and low levels of formal educational qualifications (Curtice et al., 2005), but the BNP is not as successful as UKIP in securing support among communities with relatively large numbers of small businesses and older people.

Various analyses of Green voters generally suggest that they tend to be younger, university educated, less likely to be church-goers, but more likely to have public sector jobs (Carter, 2001: 92). One study (Knutsen, 2004) asserts the largely non-religious nature of the British Greens, while another (Eckersely, 1989) argues that the correlation between support for green politics and a higher education qualification may be the most important. Analysis of the 1989 European Parliament election, at which the third-placed

Green Party posted its best ever result in a nationwide election, found support for the party strongest in middle-class-dominated areas of southern England (Pattie et al., 1991). At the same election, the socio-demographic correlates of support (and activism) among survey respondents were with young people and those with some form of higher education qualification (Rudig et al., 1991, 1996). The importance of university education is confirmed by a review of aggregate data from the European election in 1999, with Green support more associated with middle-class areas dominated by professionals rather than those working in commerce (Curtice and Steed, 2000). Such patterns of support were again in evidence at the 2004 European election (Curtice et al., 2005).

Little research has been conducted on support for the Respect Party, not least because it was only formed in 2004 following George Galloway's expulsion from the Labour Party. The 2004 European contests provided it with its first national electoral platform. Aggregate data analysis shows that the party polled best in areas containing relatively large Muslim populations. The association between Muslim voters and support for Respect was most keenly observed in London, where the party captured more than one in five votes in two of the city's boroughs. The presence of other ethnic minorities also appears to have had a positive, though modest, impact on the vote (Curtice et al., 2005).

This brief review has identified some clear associations between support for each of the four minor parties and the socio-economic characteristics of either local authorities or parliamentary constituencies. Areas supporting UKIP may contain older voters and a higher proportion of small businesses. The BNP may do better in working-class wards with lower levels of formal education. Those parts of London leaning towards the Greens should be associated with younger voters, highly educated, non-Church-going and possibly working in public-sector jobs. Respect's supporters are most likely to be concentrated in areas where the Muslim population is larger and where other ethnic groups are also located. It will be interesting to discover whether these relationships are confirmed when ward electoral data are available for examination.

Data and Methods

For this type of analysis, ward-level data bring distinct advantages over the usual level of aggregation (constituency or local authority). First, they reduce eightfold the size of the district available for analysis – the average ward electorate in London numbers only 8,000. Second, they increase the number of cases from 32 (the number of local authorities across London, excluding the Corporation of the City of London)[1] or 74 (the number of parliamentary constituencies in London) to 624 in total. A further benefit is that because of the timing of the review and implementation of ward electoral boundaries in London it is possible to match electoral and census data for the same units. The 2001 census provides extensive information about each ward population's occupational status, educational attainment, housing tenure, racial origin, religious affiliation and other characteristics. A combination of these three conditions provides an opportunity for the analysis of support for minor parties using ecological data. We are not suggesting, of course, that such data allow us to conclude precisely *who* votes for minor parties, but they do help us pinpoint more accurately than before some of the context, social, economic, political and geographic, of that support.

The dataset contains the votes cast for each candidate (in the case of the Mayoral election) or party at the 2004 elections. Each elector could vote up to a maximum of five times, viz., Mayoral first and second votes; Assembly list and constituency votes; European list vote. For various reasons, we have chosen to discard all but one of these votes. First, the Mayoral votes were influenced as much by personality as by partisan choice – the incumbent, Ken Livingstone represented the Labour Party, but had been first elected as an Independent (Rallings and Thrasher, 2000). Second, the BNP did not field candidates in the 14 Assembly constituencies, thereby largely negating the use of those contests for analysing the overall range of minor party support. Third, the correlates between each party's vote share for the two types of list vote, European Parliament and London Assembly, range between 0.96 and 1.0. Accordingly, we have chosen to concentrate on just one of these votes, that for the European Parliament; an analysis using the Assembly list vote produces virtually identical findings to those presented here.

Although data were disaggregated for the 624 wards in London, votes cast either by post or ballots counted by hand were listed separately and are available only for each local authority. There is no way of identifying from which wards these particular ballots originated. It happens that the number of manually counted ballots is extremely small, just 5,098 out of more than 1.88 million votes cast (0.3 percent), and their distribution may be regarded as having no consequence. However, the number of postal ballots is larger, approximately 13 percent of the total vote. The exclusion of such a substantial amount of data could significantly affect our findings. However, the pattern of electoral support among postal and in-person voters in each of the 32 London boroughs is highly correlated, with all coefficients higher than 0.9. Furthermore, postal vote shares for minor parties reflect (have strong linear associations with) the same socio-economic factors at the *local authority* level as the in-person vote shares do at the *ward* level. We assume, therefore, that the exclusion of postal votes from the analysis does not affect our findings.

The electoral data were augmented by a range of measures obtained by the 2001 national census. Our choice of measures was informed partly by the existing research evidence. This highlights the importance of occupational status, educational attainment, age structure, ethnic composition, as well as general indicators of poverty and deprivation (such as car ownership, unemployment, housing tenure). However, we could not exclude from consideration that the appeal of one or more of these parties was quite context-specific and conditional upon election timing. For example, we felt that Respect would make a specific appeal to Muslim voters. Accordingly, we include a larger set of socio-economic measures in the initial analysis.

We first examine the distribution of vote share for the four parties across more than 600 wards. Clearly, if there is little variance then it is unlikely that differences in ward social characteristics are linked to the level of support. Next, we consider some bivariate relationships between party vote and various socio-economic characteristics of each ward.[2]

We then proceed with multivariate analysis rather than employing one or other of the methods for EI (for example, see King [1997] and Thomsen [1987]). Our reasons for eschewing the increasingly popular method of EI are that we do not wish to restrict the analysis of social context to a limited set of dimensions (for example, black/white; Muslim/non-Muslim; university educated or not) and, moreover, given the multiparty aspect of the electoral situation we felt that current methods for EI were not particularly suitable. Instead, a series of regression models use each minor party's vote share as the dependent variable. The first set of independent (predictor) variables is based on characteristics taken from the 2001 census. However, given the high incidence of intercorrelation among these variables, we decided to reduce them to a smaller number of structural principal components or factors.[3] The factor scores are then used as the independent composite variables. Finally, we add independent variables that provide the political context for each ward, either in terms of a minor party having had some prior ward electoral profile or as a measure for capturing the existence of 'protest' voting. These variables include for the 2002 local council elections whether or not a minor party contested the ward and which main party (Labour or Conservative) won all available seats (London uses two and three member wards for local elections). Finally, we use Geographical Information Systems (GIS) to examine the geography of support for minor parties at the 2004 election.

Analysis and Discussion

Table 2 gives the distribution of vote shares at the 2004 European Parliament elections in London for both major and minor parties, while Figures 1a–d (discussed in more detail below) show the spatial distribution of votes for the minor parties only. It is clear from the minimum and maximum values that support for all parties ranges relatively widely. It is also apparent that support for the minor parties is skewed towards the lower end of the range. For example, although the BNP has a minimum value vote share of 0.6 percent and a maximum value of 21.9 percent (Garden Suburb in Barnet and Goresbrook in Barking and Dagenham, respectively), the data range

Table 2. Distribution of European vote shares for each party, 2004 (n = 624)

	Mean %	*Minimum* %	*Maximum* %	*SD* %
Major parties				
Conservative	24.6	7.0	58.2	11.0
Labour	25.5	7.4	63.4	9.2
Lib Dem	15.5	5.5	37.0	5.8
Minor parties				
Respect	5.3	0.2	47.0	5.8
Green	8.8	2.4	26.9	4.5
UKIP	12.4	2.9	28.1	5.7
BNP	4.3	0.6	21.9	3.5

has a relatively small standard deviation of 3.5. The vote shares of the Greens and UKIP reveal a similar pattern of support. The most dramatic variation in vote share is that for Respect. In two wards (Harefield in Hillingdon and East Wickham in Bexley), its vote was just 0.2 percent, but in another (Green Street West in Newham) it was as high as 47.0 percent. Of course, the skewed nature of the data should assist our objective of identifying more precisely the areas where support for these parties is either relatively small or relatively large.

A broad range of bivariate relationships between ward vote shares and socio-economic characteristics is examined in Table 3. With just two exceptions, all the correlations are statistically significant (with $p < 0.001$). Strong observed bivariate relationships, i.e. correlation coefficients with an absolute value of 0.6 or higher (Anderson and Finn, 1997) should be noted.[4]

The interplay in support between the parties shows a strong and positive relationship between UKIP and BNP – in other words, wards that supported one of these parties also tended to support the other. By contrast, there is an equally strong, although inverse, relationship between Respect and UKIP: where one party did relatively well, the other performed relatively poorly. The Green vote is also negatively correlated with both BNP and UKIP support. Given their respective ideological and policy positions, Respect and the Greens are more likely to have drawn support from left of centre voters, while the BNP and UKIP may have had more appeal to centre–right voters.

More intriguing relationships can be found, however, when the change in vote share for major parties between the 2002 local elections in London and 2004 is taken into account. Although the correlations are less strong, the worse Labour's performance in 2004 compared with 2002, the greater the support for *both* Respect and the BNP in 2004. There are also statistically significant negative associations between the Conservatives and UKIP and, more surprisingly, between the left of centre Liberal Democrats and both right-wing minor parties, the BNP and UKIP.

Table 3. Correlations between party support and census characteristics (logit transformed)

	Respect	*Green*	*UKIP*	*BNP*
Party support				
Respect	1.00	0.32	–0.73	–0.33
Green	0.32	1.00	–0.59	–0.59
UKIP	–0.73	–0.59	1.00	0.79
BNP	–0.33	–0.59	0.79	1.00
Change in vote 2004–2002				
Conservative	0.22	0.32	–0.21	–0.04[a]
Labour	–0.31	0.18	–0.04a	–0.37
Liberal Democrat	0.18	0.19	–0.36	–0.36
Census characteristics				
Age				
Aged 18–24	0.62	0.27	–0.52	–0.25
Aged 65+	–0.68	–0.42	0.66	0.33
Education				
No academic or professional qualification	0.19	–0.44	0.28	0.70
Degree qualification (level 4/5)	0.23	0.72	–0.64	–0.83
Occupation				
Standard occupational classification (SOC), Groups 1–3 (from managers and senior officials to associate professional and technical occupations)	–0.02	0.65	–0.42	–0.73
SOC Groups 4–7 (from administrative and secretarial occupations to sales and customer service occupations)	–0.12	–0.67	0.52	0.73
SOC Groups 8–9 (from process, plant and machine operatives to elementary occupations)	0.24	–0.48	0.21	0.64
Unemployed	0.75	0.27	–0.54	–0.07
Approximated social grade, AB: Higher and intermediate managerial/administrative/ professional	–0.24	0.46	–0.22	–0.65
Approximated social grade, C2: Skilled manual	0.01	–0.58	0.42	0.73
Housing				
Private rent	0.49	0.58	–0.71	–0.73
Owner-occupier	–0.60	–0.49	0.56	0.21
Deprivation				
Deprived in housing dimension	0.76	0.42	–0.72	–0.36
No car in household	0.64	0.52	–0.57	–0.23
Three or more cars in household	–0.63	–0.56	0.57	0.23
Residential mobility				
Residential migrant (from within UK)	0.43	0.68	–0.65	–0.61
Ethnicity				
UK born	–0.75	–0.38	0.84	0.65
Non-white	0.84	0.12	–0.71	–0.33
New Commonwealth (Ethnic group: Indian/ Pakistani/Bangladeshi)	0.68	–0.13	–0.46	–0.21
Religion				
Christian	–0.77	–0.21	0.74	0.49
Muslim	0.92	0.19	–0.68	–0.31
No religion	–0.17	0.69	–0.01	–0.12

[a] Non-significant correlation.

Turning to the socio-economic correlates of minor party support, the extremely high correlation between the Respect vote and the recorded Muslim ward population shines out. Conversely, there is an inverse correlation between Respect's vote and the proportion describing their religious affiliation as Christian. This suggests that religious differences may be influential in shaping certain aspects of the party system, at least regarding patterns of voting in supra- and sub-national elections.[5] Other strong relationships show that Respect is positively associated with a non-white population, younger rather than older voters, with areas of high unemployment and other economic deprivation, and low levels of owner occupation. The strongest correlations between the Green vote and social context are with the proportions of the population having a degree level qualification and stating no religious affiliation. There are also notable correlations between the party's vote share and the numbers working in managerial or professional occupations, and with the presence of those who have recently moved from elsewhere in the UK. The absence of any strong correlation between their vote shares, and the different loadings on the religious/non-religious dimension, further suggest that Respect and the Greens were not in competition in the same wards for the 'left' minor party vote.

Support for both UKIP and BNP appears to be negatively related to the percentage of people with high levels of educational attainment. Similarly, neither party performs well in areas where the population is relatively mobile or where a high proportion of properties in the private rented sector are sited. Both parties, understandably given their respective policy statements, fare best in areas where the proportion of UK born residents is highest. Although no census measures show opposite signs in the bivariate relationships for these two parties, there are other socio-economic characteristics where the pattern of association is different. For example, the UKIP vote more strongly correlates with an elderly and Christian population, whereas BNP support is more associated with wards with a high proportion of manual workers and low levels of educational attainment. Allied with the fact that the two parties seem to do best in the same wards (compare Figures 1c and 1d), this suggests that BNP and UKIP might have campaigned in similar areas, but targeted quite different categories of supporter. It will need multivariate analysis to try to distinguish those areas that show a preference to one rather than the other of these parties.

In order to capture better the context of support for all four parties, we undertook a multivariate regression analysis using each minor party's vote share as the dependent variable and, initially, ward-level census characteristics as predictors. To avoid multicollinearity the logit transformed census variables were subjected to a factor analysis. The core idea behind this procedure is the assumption that observed variables (in our case, census variables) could be considered the result of interplay (linear) between several mutually independent latent factors. The factor analysis was restricted to those socio-economic variables (categorized according to age, education, housing and occupation, etc., domains) which demonstrated stable factor solutions following a random selection of sub-samples of wards. Using the principal components procedure, four common factors were extracted (see Table 4). The factor loadings for the first factor, which explains 47 percent of the total variance, highlight areas with large non-white populations adhering to an 'eastern' religion in contrast to those with high numbers of UK born and Christian or non-religious citizens. We term this factor, 'religious minorities'. The second factor (accounting for 19 percent of the variance) focuses on economic deprivation, with unemployment, renting property and household overcrowding all featuring strongly. This second factor is termed 'economically deprived'. The third factor (16 percent of the variance) identifies a young, mobile population ('young mobile'), and the fourth factor (6 percent) picks up areas associated with a lack of educational qualifications and a low number of self-employed residents ('low status employees'). Factor scores for each ward were calculated and used as the predictor variables in the regression models.

These newly derived variables are initially employed as predictors for the vote share of the main parties (Conservative, Labour and Liberal Democrat). The purpose here is to test whether the derived factors are useful for the modelling of party support in 2004. For reasons of consistency we use logit transformed vote share although the argument for transformation is less compelling here than for the smaller parties.[6] The results (Table 5) show that the models explain 70 percent and 60 percent of the variance in Conservative and Labour Party vote, respectively.[7] Modelling the Liberal Democrat vote share proved more difficult – accounting for only 33 percent of the

Table 4. Factor loadings of selected census characteristics on four orthogonally (varimax) rotated factors

	Factors			
	Religious minorities	*Economically deprived*	*Young mobile*	*Low status employees*
Eastern religion (Hindu, Sikh, Muslim)	0.94	0.09	0.15	0.14
Non-white	0.85	0.33	0.22	0.21
Christian	–0.85	–0.22	–0.21	0.06
Born in UK	–0.75	–0.38	–0.39	0.26
No religion	–0.72	0.38	0.40	–0.23
3+ cars	–0.09	–0.88	–0.37	–0.07
Social housing	0.01	0.86	0.09	0.35
Unemployment	0.32	0.84	0.17	0.30
Population density	0.25	0.72	0.24	–0.20
Residential migration	0.11	0.33	0.81	–0.36
Aged 18–24	0.40	0.27	0.71	0.20
Aged 65+	–0.33	–0.49	–0.61	–0.17
Self-employed	–0.10	–0.13	–0.20	–0.91
No educational qualification	0.08	0.21	–0.40	0.84

Table 5. Regression model of main party support

Dependent	*Conservative*		*Labour*		*Liberal Democrat*	
R^2 *(adjusted)* =	*0.70*		*0.60*		*0.33*	
	Unstandardized coefficients, B (SE)	*Standardized coefficients, beta*	*B (SE)*	*Beta*	*B (SE)*	*Beta*
(Constant)	–1.21** (0.01)		–1.12** (0.01)		–1.77** (0.01)	
Religious minorities	–0.11** (0.01)	–0.18	0.24** (0.01)	0.49	–0.08** (0.01)	–0.18
Economically deprived	–0.36** (0.01)	–0.58	0.22** (0.01)	0.43	0.06** (0.01)	0.13
Young mobile	–0.13** (0.01)	–0.21	0.10** (0.01)	0.20	0.15** (0.01)	0.35
Low status employees	–0.33** (0.01)	–0.51	0.19** (0.01)	0.36	–0.18** (0.01)	–0.41

**Coefficient is significant at the 0.01 level.

variance. However, this finding is not wholly discouraging. Previous attempts at modelling the party's vote using aggregate data have met with a similar lack of success (Dorling et al., 1998), and even results using survey derived individual-level socio-economic characteristics have been disappointing (Clarke et al., 2004). We are confident, therefore, that the derived factors are reasonably good predictors of party support.

The results of the regression modelling for minor parties are given in Table 6. The explained variance ranges from a high of 82 percent for Respect to a low of 70 percent for the Greens. Examination of the standardized beta coefficients shows that the four factors contribute in *different* ways in each of the models. The most important factor for Respect's vote, as might be expected from the earlier bivariate analysis, is the religious minorities factor.

Table 6. Basic regression model of minor party support

Dependent	*Respect*		*Green*		*UKIP*		*BNP*	
R^2 *(adjusted)* =	*0.82*		*0.70*		*0.81*		*0.75*	
	B (SE)	*Beta*	*B (SE)*	*Beta*	*B (SE)*	*Beta*	*B (SE)*	*Beta*
(Constant)	–3.29** (0.02)		–2.45** (0.01)		–2.07** (0.01)		–3.38** (0.02)	
Religious minorities	0.65** (0.02)	0.68	–0.07** (0.01)	–0.14	–0.30** (0.01)	–0.58	–0.28** (0.02)	–0.37
Economically deprived	0.47** (0.02)	0.48	0.27** (0.01)	0.50	–0.24** (0.01)	–0.44	–0.10** (0.02)	–0.13
Young mobile	0.29** (0.02)	0.30	0.25** (0.01)	0.47	–0.22** (0.01)	–0.41	–0.28** (0.02)	–0.37
Low status employees	0.13** (0.02)	0.13	–0.25** (0.01)	–0.45	0.17** (0.01)	0.30	0.54** (0.02)	0.68

**Coefficient is significant at the 0.01 level.

The same factor has a similar ranking in the UKIP model but the sign on the coefficient is reversed. Although the economically deprived factor is of principal importance in modelling the Green vote it is closely followed by the young mobile (positive sign) and low status employees factors (negative sign). Low levels of formal educational attainment and lower levels of self-employment are characteristics of those areas that lend support to the BNP. Areas having a high proportion of young residential migrants and ethnic populations are not, as expected, fertile territory for the anti-immigrant, anti-multicultural BNP. Similar wards tend to support UKIP candidates also, although the different size of the betas on both the economically deprived and low status factors could suggest that UKIP may be drawing its support from more affluent areas than does the BNP.

To test whether the impact of socio-economic factors on support for these two apparently similar parties is significantly different, we examined the difference in logit transformed vote shares for UKIP and BNP. If a factor has the same explanatory power for both parties then its impact on variations for the new dependent variable (difference in logits) will be non-significant. If, however, these differences can be explained by the factors, we should be able to say something more about the differences between the two parties. In effect, a difference in the logit transformed vote shares of small parties approximately equals the logarithm of the *ratio* between their shares.[8] Table 7 presents a model for the explanation of the variability in the ratio between UKIP and BNP shares. It shows that only the religious minorities factor is non-significant at the 0.01 level (but reaches significance at the 0.05 level). It is clear that the fourth factor, the lack of an educational qualification and absence of small businesses, plays a critical role in a model that accounts for 69 percent of the overall variance in the difference between UKIP and the BNP. Given the negative influence of the factor, and taking into account that the UKIP vote share is always higher than the BNP share, we should expect a smaller difference between UKIP and BNP in a ward that has a higher factor 4 score (higher proportion of low status employees). Factors

Table 7. Regression model of differences between support for UKIP and BNP

Dependent	*Difference UKIP/BNP*	
R^2 (adjusted) = 0.69	*B (SE)*	*Beta*
(Constant)	1.31** (0.01)	
Religious minorities	–0.03* (0.01)	–0.05
Economically deprived	–0.14** (0.01)	–0.29
Young mobile	0.06** (0.01)	0.14
Low status employees	–0.37** (0.01)	–0.76

**Coefficient is significant at the 0.01 level.
*Coefficient is significant at the 0.05 level.

2 and 3 make a much smaller impact on the dependent variable, although the latter does have a positive association. This suggests that areas with a young mobile population may express a stronger preference for UKIP over the BNP. Overall, therefore, it appears that the BNP gets closer to UKIP in winning support in areas characterized by populations with low educational qualifications and lower than average numbers of self-employed.

Interestingly, there are clear differences in the types of areas supporting the Conservative and UKIP parties. For the Conservatives, the regression in Table 5 shows a negative sign for low status employees, but the sign is positive for UKIP in Table 6. Furthermore, the two factors that contribute most towards explaining variability in the Conservative vote are associated with economic conditions, whereas for UKIP the most significant (and negative) factor is religious minorities. On the other hand, there are scant differences between areas that opted for Labour and Respect.

Thus far the analysis has considered only the social context of support for parties. Support can, of course, also be influenced by a ward's political context. We might expect, for example, that a minor party would benefit in 2004 from having contested a ward at a previous contest. Accordingly, for each party, we coded the variable '2002 candidate' as '1' when it had at least one candidate in the ward at the 2002 London borough elections, and '0' when it did not.[9] Another set of variables assesses the direction of any protest vote that minor parties may have captured. Party control in each ward is divided into one of three categories – first, where Conservatives won all the available seats; second, where Labour did so; and third, all other cases.[10] This dimension is presented as two dummy variables – 'Conservative ward' and 'Labour ward'.

All three new measures are included in the extended regression models in Table 8. It is clear that the addition of these particular political variables does not generally improve the models, with the possible exception of Green support where the adjusted R^2 value rises from 0.70 to 0.74. However, whether or not a party fielded candidates at the previous local elections in 2002 does appear to have a statistically significant impact on levels of support for both the Greens and BNP. We should interpret the value of the coefficient associated with the dummy variable as follows. Given two wards with identical socio-economic compositions, but where a Green candidate contested only one of the wards in 2002, then the party's vote share in that ward in 2004 will be at least 16 percent *larger* than in the ward where no candidate contested in 2002.[11] A similar calculation shows that the impact of the BNP contesting a ward in 2002 is even greater. Where the BNP had contested at the prior local elections we should expect its vote share to be at least 24 percent larger than in a comparable ward which did not have a BNP candidate in 2002.[12] We expected that the level of support for minor parties might also be affected by the prevailing political complexion of each ward, i.e. Conservative, Labour or other. Holding socio-economic characteristics constant, it appears that in Labour wards support for Respect and

Table 8. Extended regression model of minor party support

Dependent	*Respect*		*Green*		*UKIP*		*BNP*	
R^2 (adjusted) =	*0.82*		*0.74*		*0.81*		*0.76*	
	B (SE)	*Beta*	*B (SE)*	*Beta*	*B (SE)*	*Beta*	*B (SE)*	*Beta*
(Constant)	–3.30** (0.03)		–2.53** (0.03)		–2.06** (0.02)		–3.38** (0.03)	
Religious minorities	0.64** (0.02)	0.67	–0.10** (0.01)	–0.19	–0.29** (0.01)	–0.56	–0.27** (0.02)	–0.37
Economically deprived	0.45** (0.02)	0.45	0.22** (0.01)	0.39	–0.23** (0.01)	–0.42	–0.09** (0.02)	–0.12
Young mobile	0.28** (0.02)	0.29	0.22** (0.01)	0.40	–0.21** (0.01)	–0.40	–0.28** (0.02)	–0.37
Low status employees	0.11** (0.02)	0.11	–0.28** (0.01)	–0.51	0.18** (0.01)	0.33	0.54** (0.02)	0.68
Party's candidate at 2002 election (dummy variable)			0.18** (0.03)	0.17	0.04 (0.03)	0.02	0.27** (0.09)	0.06
Conservative ward (dummy variable)	–0.06 (0.05)	–0.03	–0.13** (0.03)	–0.11	0.03 (0.03)	0.02	0.02 (0.04)	0.01
Labour ward (dummy variable)	0.07 (0.05)	0.04	0.06* (0.03)	0.06	–0.05† (0.03)	–0.05	–0.03 (0.04)	–0.02

**Coefficient is significant at the 0.01 level. *Coefficient is significant at the 0.05 level. †Actual *p*-value is 0.056.

the Greens is higher and support for UKIP and BNP is lower. Conversely, in Conservative wards support for UKIP and BNP is higher while for Respect and the Greens it is lower. However, these findings are only statistically significant for the Green Party. Overall, therefore, these regression models indicate that the relative impact of aspects of the political context of a ward is rather small once social composition factors are taken into account.

At this point it is interesting to be reminded of the similarities between this analysis of the European vote in London and earlier research that examined the country as a whole, at a much higher level of aggregation and largely using only bivariate analysis (Curtice et al., 2005). In both studies, support for the Respect Party is highly correlated with the proportion of Muslims and other minority ethnic populations. Multivariate analysis indeed confirms that this is the most important factor for estimating the party's level of support. Green Party support is associated with the university educated, but our bivariate analysis does not find a strong correlation with younger people as such. However, the multivariate analysis shows that young residentially mobile communities, areas of social deprivation and social housing show support for the Greens, while communities associated with low status, poorly educated employees are not fertile ground for the party.

Both studies find older people associated with UKIP, but for London alone we did not find a strong relationship with the presence of self-employed workers. UKIP's vote is inversely related with Muslim and non-white populations. The absence of formal educational qualifications and the proportion of manual workers are strong correlates with BNP support in both London and elsewhere. However, the regression modelling shows that the presence of low status employees is the most powerful predictor of the BNP vote. Importantly, the analysis employing only local authority-level data concluded that while BNP support was strong in areas with large non-white and Asian populations across parts of northern England and the West Midlands, that pattern was not evident for London (Curtice et al., 2005). We can confirm that this finding is robust even at much smaller levels of aggregation.

Although it is known that using different geographical scales can sometimes produce rather different research findings (Fotheringham and Wong, 1991), in this case we get largely similar results to those of the earlier study by Curtice and colleagues. Had the pattern of minor party support within each borough been homogeneous across all wards, then it is unsurprising that two studies using different levels of aggregated data should produce similar conclusions. But when we map minor party support for all London wards (see Figures 1a–d),[13] it is apparent that *within* London boroughs there are rather different patterns of support that, by definition, could not be identified using local authority aggregate level data alone. For example, although Respect polled a virtually identical vote share (11 percent) across the boroughs of Hackney and Waltham Forest (Figure 1a), the variability in ward shares is very different (standard deviations 3.3 and 6.2, respectively). In both Southwark and Wandsworth (Figure 1b) the Greens polled 11 percent, but the standard deviation in Southwark (4.4) is two and a half times higher than in Wandsworth (1.7). For UKIP (Figure 1c), we can consider two pairs of London boroughs which show similar patterns of differences. For both Bromley (UKIP vote share 19 percent, SD = 4.3) and Barking and Dagenham (22 percent, SD = 4.1), the standard deviation in ward level support is virtually twice that found across Bexley (23 percent, SD = 2.3) and Sutton (18 percent, SD = 2.1) even though the borough level vote shares for UKIP are roughly comparable. Similarly, in Newham and Bromley (Figure 1d), while the BNP vote is virtually identical to the support across London as a whole (4.7 percent) the variability in Newham (3.0) is almost twice that in Bromley (1.7). Close study of the geography of support, therefore, shows that while the spread of votes for minor parties is fairly homogeneous across some boroughs, in others there is a fair degree of heterogeneity.

Although mapping minor party support in this way provides important insights into the distribution of support, it also produces some surprising puzzles. For example, the regression models generally show a good fit to the data, with levels of explained variance ranging from 74 percent to 82 percent. Moreover, there is no evidence of multicollinearity; the size and direction of effects from the independent variables are intuitively correct. The number of outliers[14] is also commensurate with the size of sample.

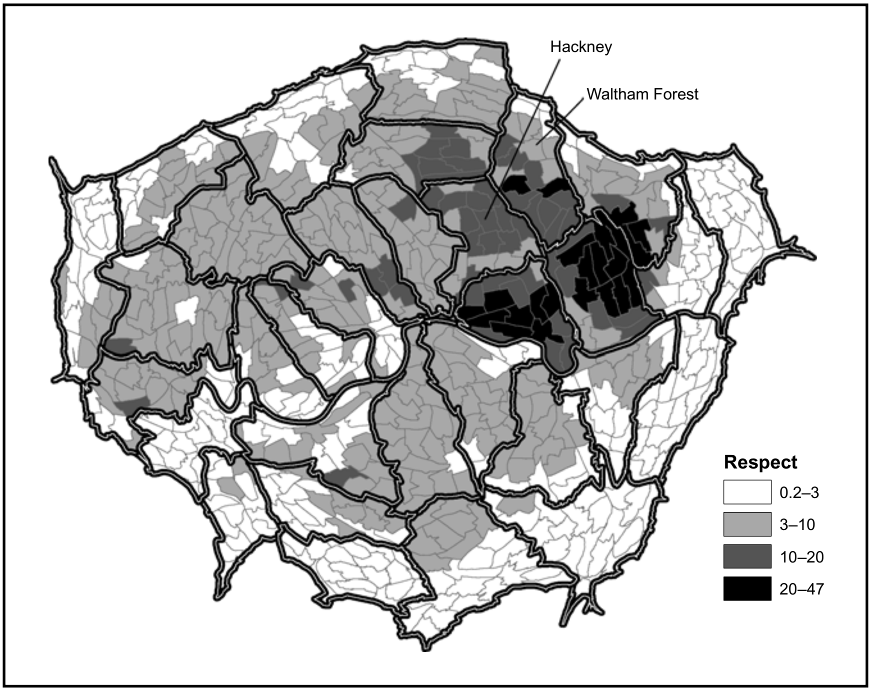

Figure 1a. Distribution of percentage vote shares for Respect

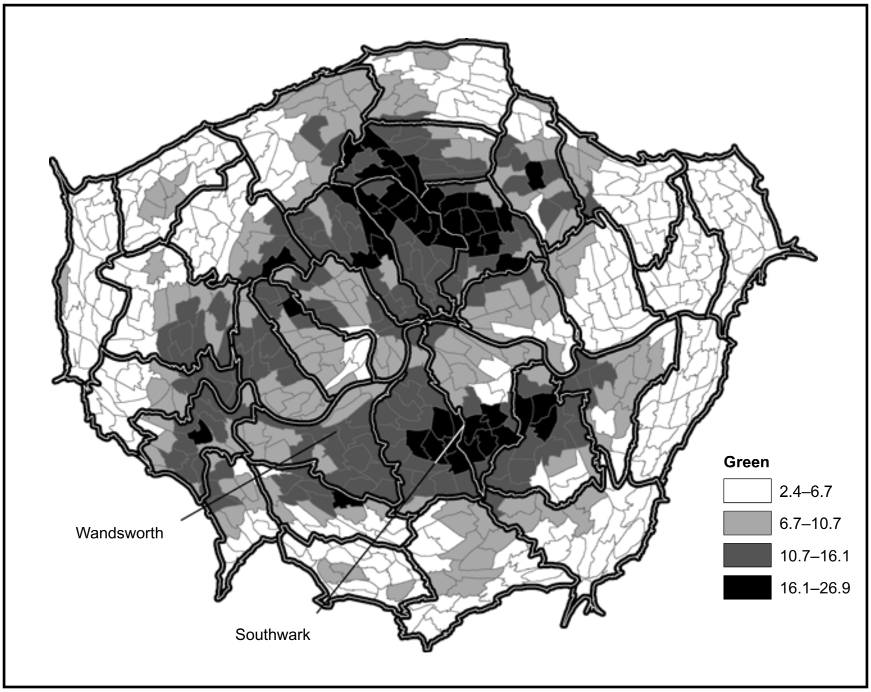

Figure 1b. Distribution of percentage vote shares for Green

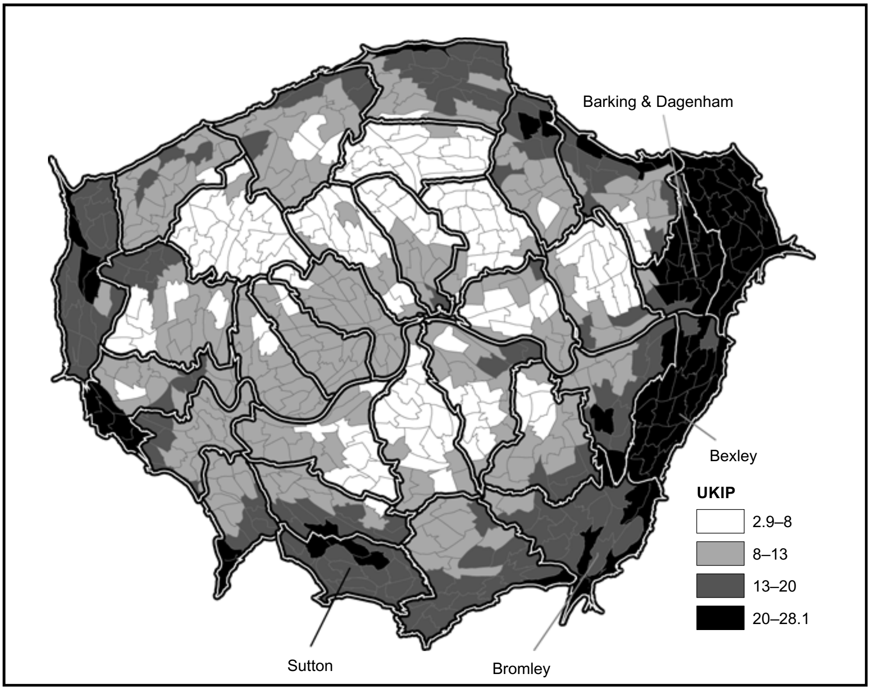

Figure 1c. Distribution of percentage vote shares for UKIP

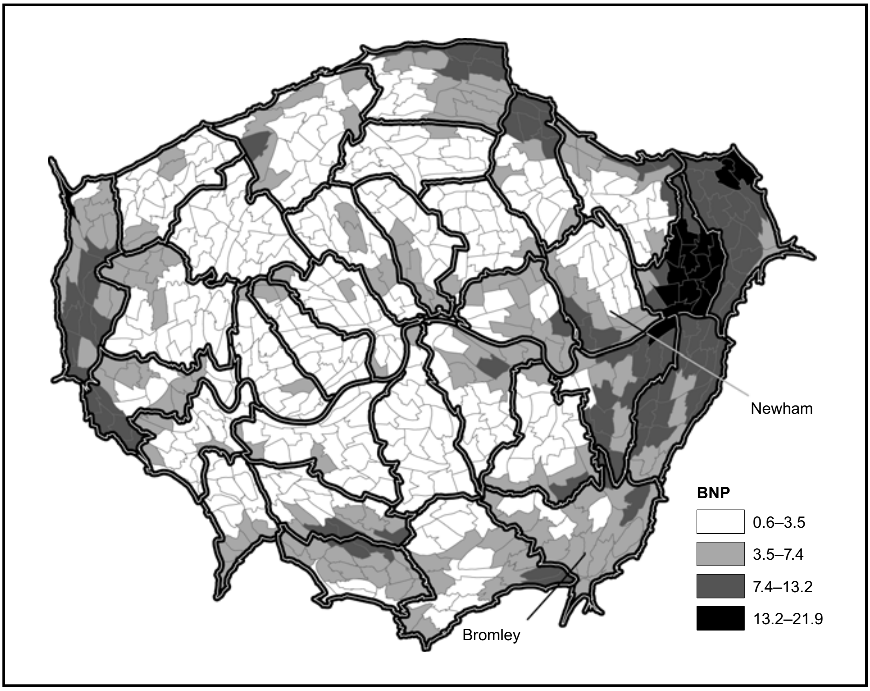

Figure 1d. Distribution of percentage vote shares for BNP

Standard techniques for the analysis of residuals do not reveal a problem – there is no substantial deviation from normality and no clear patterns in the scatterplot of residuals against values of the dependent variable. However, after *mapping* the residuals it is obvious that they tend to cluster – areas where the model underestimates a party's share group together. The same is true for areas where vote share is overestimated. Admittedly, most residuals are very small, but nevertheless the pattern suggests some sort of spatial dependence. The existence of spatial autocorrelation is confirmed by the Moran statistics,[15] which serve to characterize overall spatial correlation (Lee and Wong, 2001). We conclude from this that there is some omitted predictor(s) in the models; there is something in the 'geography of support' that our regression models are failing to capture.[16]

But this takes us into very deep waters indeed. Should we agree with King (1996), in saying that the value in exploring the political geography partly lies in helping political scientists to understand more about aspects of their data? In short, it is not so much a case that context matters but rather more a question of trying to understand better those factors, for example, the effects of party canvassing and campaigning, which are revealed from mapping the geography of party support. Or is it that we should lean more towards explanations such as 'neighbourhood effects' (Johnston et al., 2004) in order to appreciate why the residuals from what appear to be reasonably specified regression models should cluster rather than be randomly distributed? Unfortunately, the available data do not permit us to test either of these hypotheses.

Conclusions

Access to this unusual dataset has helped to identify and clarify the social and political contexts of support for minor parties, which in 2004 captured roughly one in four votes in London. They each appear to have identifiable bases of support which, in turn, fit with the ideological and policy stances they have adopted. The analysis confirms a religious cleavage; areas with large Muslim populations were more likely to express support for Respect, while Christian populations did not. Respect also polled well among areas with younger voters, areas of unemployment and low owner occupation households. It still appears that support for the Greens is strongest among those with a degree qualification, those working in professional and managerial occupations and residential migrants. Separating apart those areas that swung towards either UKIP or BNP proved a fairly difficult problem. Although votes for UKIP outweigh those for the BNP, the relative distribution of support is, as the maps clearly show, remarkably similar. Regression models using factor scores suggested that UKIP, more than the BNP, was drawing support from more affluent areas. Using difference in support for these two parties as the dependent variable showed that areas characterized by low educational qualifications and low levels of self-employed occupations were also wards where the BNP vote was closer to the support enjoyed by UKIP. Our analysis also showed the importance of having fought a prior electoral campaign. For both the Greens and BNP the ward vote was notably larger following a local election campaign. This may have consequences for these and similar parties contemplating whether or not to field candidates at future local elections.

The analysis, however, has raised other questions that aggregate data analysis alone is ill-suited to answer. To what extent, for example, are such levels of voting for minor parties simply a function of political protest and to what extent are they symptoms of a more profound disengagement with mainstream parties? The 2005 general election too resulted in a higher proportion of votes cast for parties outside the political mainstream, but, as we noted earlier, the small number of people recorded in the British Election Study as supporters of these particular minor parties does not permit a thorough analysis. There is some evidence though that repeated opportunities to vote for one of the smaller parties bring electoral dividends. For example, both the Greens and BNP had a higher than expected level of support in London in 2004 in those wards which they had previously contested at the 2002 borough council contests. Another round of London borough elections took place in May 2006 and we shall compare these results with the 2004 contests in order to understand better the context of support for these minor parties.

Notes

Earlier versions of this article were presented at seminars at Trinity College, Dublin and Nuffield College, Oxford. We are extremely grateful for contributions from seminar participants and also for comments and suggestions from this journal's referees.

1 The Corporation of the City of London covers the financial area of the city, where the pattern of local government administration and electoral competition is different compared with other parts of the capital. Accordingly, we exclude this area from our analysis.

2 Histograms of vote shares for the four parties across electoral wards show extremely skewed distributions, with many cases concentrated on the left side of the range. The skewed bounded data might cause a critical problem when applying correlation and regression analysis techniques, each of which require an assumption of normality in the data. Accordingly, all vote shares were transformed using a logit transformation of the form $[ln(p/(100 - p)]$, where ln denotes the natural logarithm and p the percentage share. This transformation was chosen because it disperses values near the boundaries and provides a more normal distribution than occurs with the untransformed data (Atkinson, 1985). Some of the 2001 census characteristics for each London ward also show skewness in the data (for example, social housing, ethnic minorities and religion). Subsequently, the census variables were also logit transformed.

3 Factor analysis attempts to identify underlying latent variables, or factors, that explain the pattern of correlations within a set of observed variables (Gorsuch, 1983).

4 Variables that did not have a correlation with an absolute value of 0.6 (or higher) with *at least one* minor party are excluded completely from the table.

5 Indeed, the religious cleavage may be identified from voting at the 2005 general election. In a number of parliamentary constituencies with relatively large Muslim populations, candidates from the Respect Party performed rather well. In Bethnal Green and Bow, the Labour incumbent was defeated by the party's leader, George Galloway.

6 All analyses reported in this article relate to logit transformed variables, which follow a Gaussian distribution. The findings remain valid when non-transformed variables are used (available from the authors on request). However, for minor parties, there is a special reason for applying logit transformation (see Thomsen, 1987).

7 As the size of each ward varies between 4,000 and 12,000 electors, ward electorate was used for weighting purposes in all regression models.

8 We can demonstrate this point as follows:

$$\mathrm{logit}_1 - \mathrm{logit}_2 = ln(\mathrm{share}_1/(100\text{-}\mathrm{share}_1)) - ln(\mathrm{share}_2/(100\text{-}\mathrm{share}_2))$$
$$= ln(\mathrm{share}_1/\mathrm{share}_2/((100\text{-}\mathrm{share}_1)/(100\text{-}\mathrm{share}_2)))$$
$$= ln(\mathrm{ratio}/(1 - (\mathrm{ratio} - 1)/(100/\mathrm{share}_{2-1})))$$
$$\sim ln(\mathrm{ratio}) \text{ if share}_2 \text{ is small.}$$

9 Most wards in London return either two or three council members. At the 2002 London borough elections, Green candidates stood in 311 wards, while UKIP and BNP candidates were present in 53 and 18 wards, respectively. Establishment of the Respect Party came after the 2002 election.

10 One-hundred-and-ninety-nine wards fall in the first category, 269 in the second and 156 in the third.

11 When drawing conclusions about the importance of a particular independent variable, we should note that a regression model with logit transformed variables is essentially a non-linear model in terms of variables of interest (i.e. party support and/or change in party support). Because of this condition, the marginal effect of a dummy variable is not constant but rather depends on the level of other variables in the model. If the socio-economic composition of a ward implies a small Green vote share, then the ratio equals approximately $e^{0.18} = 1.20$, i.e. we can expect about a 20 percent increase in Green vote share if the party contested previously. When calculated for the actual socio-economic composition of all 624 London wards, this ratio ranges between 1.20 and 1.16.

12 A ward whose socio-economic composition implies a small BNP share might expect to see a 31 percent ($e^{0.27} = 0.31$) larger BNP share if the party had fielded a candidate in 2002. When calculated for the actual socio-economic composition of all 624 London wards, this ratio ranges between 1.31 and 1.24.

13 The ward cartograms were kindly prepared for us by John Pritchard at the University of Sheffield. Ward maps using standard methods can be viewed at http://www.plymouth.ac.uk/Elections

14 Cases are regarded as outliers where the actual observation differs from the estimated one by more than 2 SD.

15 For each of our four models, Moran's statistics take values well above those expected for uncorrelated data.

16 To address this problem, we developed additional models in which different measures of 'political' context were used. These included at the ward level, the winner's vote share, the combined vote share for major parties, minor party vote shares in 2002, percentage point difference between the first- and second-placed party. At the borough level, we also used the vote shares of Conservative and Labour parties. None of these models improved upon those described in Table 8 and, moreover, none solved the problem of spatial autocorrelation.

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Appendix 6

Voting systems in parallel and the benefits for small parties:

An examination of Green Party candidates in London elections

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Voting systems in parallel and the benefits for small parties: An examination of Green Party candidates in London elections

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Abstract

In simple plurality voting systems smaller parties facing resource constraints may struggle to field candidates, particularly when the number of electoral districts is large. In the absence of a strong coordinating party organization, the pattern of contestation may also be sub-optimal – the small party fields candidates where support is minimal, ignoring other electoral districts where voters would support the party if it had stood a candidate. This article considers how and whether the separate operation of an Additional Member voting system running parallel to a simple plurality system assists smaller parties by providing low-cost information about the spatial distribution of voter support. Using aggregate voting data collected at the London ward level for both simple plurality local council elections and the separate mixed-member proportional system used to elect the Greater London Assembly we test whether the Green Party demonstrated an ability to modify and optimize its pattern of contestation. There appears to be little evidence of either a contagion or learning effect in respect of the location of Green candidates, suggesting that a free but valuable data source is unexploited.

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Introduction

Research shows that smaller parties generally perform better in voting systems based on some form of proportional representation (PR) than in those that employ simple plurality voting or 'first past the post' (FPTP) (Cox, 1999; Lijphart, 1994; Lijphart and Grofman, 1984; Rae, 1971; Taagepera and Shugart, 1989). Additionally, studies of mixed-member systems also suggest that the combinations of PR and FPTP voting methods create particular opportunities for smaller parties (Bohrer and Krutz, 2004; Dunleavy and Margetts, 2004; Johnston and Pattie, 1999, 2002; Karp, 2009; Siaroff, 2000). Less well researched and understood is whether, when PR and FPTP systems operate not in combination as with say the Additional Member System (AMS) but in parallel (in the sense that electors in the same geographies have discrete opportunities to vote in these systems), smaller parties take advantage of free-rider opportunities provided by one system that are then exploited to enhance the party's performance under the other system.

Specifically, can smaller parties with resource constraints that struggle with the mechanical and psychological effects of FPTP (that contribute towards a limited pattern of electoral competition and poor seats to vote ratios) receive benefits from separate opportunities to compete under more favourable PR conditions? Furthermore, is there evidence that valuable data about potential electoral support derived from these opportunities are subsequently transferred to the less favourable environment of a FPTP election? One such condition, for example, would be where large district magnitude electoral areas used at a PR election are simple aggregations of smaller electoral units used in a FPTP election *and* where data on the PR election result are subsequently disaggregated to the FPTP electoral district level. Such information would be of significant benefit to a smaller party that might struggle to find sufficient candidates to stand in every FPTP electoral district. Simply by scrutinizing the PR results (where the costs of finding candidates were relatively low), a small party could identify those areas where support is strongest and then use that information to optimize the location of its candidates at a subsequent FPTP election. The research question is: Does a party's performance at a PR election provide it with low-cost but vital information about its relative standing among voters that is then utilized strategically at a subsequent FPTP election? This article addresses that question by analysing data from six elections covering the Greater London area between 2002 and 2010.

Local government in London is shared among different authorities. Thirty-three borough councils operate alongside a Greater London Authority (GLA) comprising a directly elected mayor and 25-member Assembly. Three separate voting systems are used to select these institutions. The boroughs utilize FPTP voting with councillors elected in two or three-member units (wards) every four years.[1] Wholesale boundary revisions were introduced prior to the 2002 borough council elections and these particular wards, 624 in total, have now held three separate council elections in 2002, 2006 and

2010. By contrast, the London Assembly uses a two-vote mixed-member proportional system. Under this system, which combines elements of FPTP and PR, one vote is cast for individual candidates in 14 single-member electoral districts and winners are determined by simple plurality. The second vote is cast for parties that present a London-wide list to voters. The remaining 11 seats are allocated after the distribution of constituency seats has been taken into account and subject to a party receiving at least 5 percent of the total list vote. The inaugural GLA elections were held in 2000 with subsequent contests in 2004 and 2008.[2] There is a research literature that considers the immediate interaction of this mixed electoral system both for voters and political parties (Benoit, 2001; Ferrara, 2004; Ferrara and Herron, 2005; Johnston and Pattie, 2002; Karp, 2009; Kostadinova, 2006), but no investigation of the parallel operation of separate voting systems. Crucially, voting data for the 2004 and 2008 London Assembly elections were subsequently made available at the ward level used for the London borough elections. It becomes a simple process thereafter to compare and contrast patterns of voting under FPTP and AMS conditions.

One clear advantage for smaller parties of a mixed-member over a simple plurality system is the different requirements in terms of candidates (Shugart and Wattenberg, 2001). In the particular case of London, whereas a FPTP election would need more than 600 candidates if each elector is given the opportunity to support the party, a list vote procedure means *de facto* considerably fewer candidates (11 in this instance) have the same electoral presence. In some wards a party may have fielded a candidate in a FPTP election prior to the AMS version but in other cases it will not have done so. Is there evidence that a party witnessing relatively strong support in some areas at the list vote element of the AMS election uses that information when presenting candidates at a subsequent FPTP election? This re-configuration may either consist of finding additional candidates to contest wards where PR-voting has suggested stronger than average support in places not previously contested or, alternatively, where the pool of candidates is relatively constant, withdrawing candidates from poorly performing wards and locating them into better prospects.

The next section of the article provides a brief summary of party contestation and performance from 2000 onwards when the first GLA election was held and introduces the Green Party as the test case for the research. The second section summarizes the data being considered and outlines our approach to the research question. The substantive analysis is contained in the third section followed by the conclusions.

Voting systems and party performance

The pattern of party competition in recent London borough elections shows that the three largest parties (Labour, Conservative and Liberal Democrats) contest a large majority of the total 624 wards (almost 100 percent in the case of Labour and Conservative and around 90 percent for the Liberal Democrats) (see Table 1). These parties are therefore unsuitable for this type of analysis since there is insufficient variation in contestation between the FPTP and the AMS election. The Green Party, on the other hand, is the largest of the smaller parties in terms of both contestation and vote-share, but has failed to field candidates in a large minority of wards. Although its electoral presence has been increasing, a third of wards did not have a Green candidate in 2010.

Table 1. Summary results of London borough elections 2002–2010

	Vote %	Wards cont	%	Seats cont	%
2002					
Con	34.2	605	97.0	1,769	95.1
Lab	34.1	624	100.0	1,858	99.8
LDem	20.6	535	85.7	1,478	79.4
Green	5.5	311	49.8	523	28.1
Other*	5.6				
2006					
Con	35.0	620	99.4	1,811	97.3
Lab	28.0	620	99.4	1,828	98.2
LDem	20.8	564	90.4	1,537	82.6
Green	7.9	357	57.2	567	30.5
Other	8.1				
2010					
Con	31.7	624	100.0	1,846	99.2
Lab	32.5	620	99.4	1,850	99.4
LDem	22.4	580	92.9	1,536	82.5
Green	6.6	418	67.0	845	45.4
Other	6.8				

*Contestion by 'other parties' is not included because of over-counting in multi-member wards.

The proportion of seats contested is even less, with most two and three-member wards featuring only a single Green candidate. In 2002 the party stood 523 candidates for 1,861 vacancies, 28 percent of the total. In 2010 there were 845 Green candidates contesting 45 percent of all vacancies. Under FPTP conditions the Green Party has struggled to get elected those candidates it does field. In 2002 a single Green councillor was elected; in 2006 an 8 percent share of the vote yielded a dozen councillors; and in 2010, when the borough contests coincided with a general election, the party had just two successes.

Table 2, similarly, summarizes the results of elections for the London Assembly. The Greens fielded a full 11-candidate slate for list votes on each occasion and, thanks to AMS, have always won 'top up' seats – three in 2000 and two in both 2004 and 2008. More than one in ten voters supported Green candidates with both their constituency and list votes at the 2000 election with about 8 percent doing so in the subsequent two contests.

The aim in the remainder of the article is to identify variations in contestation by Green Party candidates in the FPTP borough council elections that may be associated with ward-level support received by the party in the list vote element of a previous AMS election. The stronger that association, the greater the likelihood that small parties such as the Greens are able to apply valuable information obtained from the pattern of voting across large electoral district areas to the more candidate-intensive FPTP electoral areas.

Of course, an alternative method of investigating this question would be to interview senior Green Party organizers responsible for managing London elections. These

Table 2. Voting for the London Assembly 2000–2008

	Constituency % vote	List % vote
2000		
Con	31.2	28.5
Con	33.2	29.0
Lab	31.6	30.3
LD	18.9	14.8
Green	10.2	11.1
Other	6.0	14.9
2004		
Con	31.2	28.5
Lab	24.7	25.0
LD	18.4	16.9
Green	7.7	8.6
Other	18.1	21.1
2008		
Con	37.4	34.6
Lab	28.0	27.6
LD	13.7	11.4
Green	8.1	8.4
Other	12.9	17.9

organizers might be asked whether aggregate data were scrutinized for clues about the spatial distribution of electoral support; were decisions about where to locate election candidates made strategically and centrally? There may be some small parties where such an approach might work, but the Greens are not necessarily one of them. Early successes made by local Green parties were heavily dependent upon grassroots supporters tapping into sympathetic voters (Bennie, 2004; Burchell, 2002). The Greens remain, ‘a very decentralized party, [and] the decision of which wards to target in local elections is left to the individual local parties’ (Spoon, 2009: 621). Although the Green Party took a rather more strategic approach towards targeting parliamentary constituencies, culminating in the victory in Brighton Pavilion in 2010, a large element of discretion is still retained by local activists. It is unlikely, therefore, that our analysis will reveal a grand master plan, but it may reveal prima facie evidence that on the grounds some local Green parties in London did become aware of pockets of support that had hitherto remained dormant but were awakened by the opportunities provided by the availability of data on list votes at the London Assembly elections.

Data and method

Two partially overlapping sets of elections are considered with each set comprising the 624 wards located across the 32 London boroughs. The first set comprises the 2002 borough elections, the 2004 city-wide list votes cast at the London Assembly election and another cycle of borough elections in 2006. The second set also contains three elections, viz., the 2006 borough elections, the 2008 Assembly list votes and the 2010 borough elections. Both sets, therefore, feature two FPTP elections at either end of the time period with a PR-list vote in the middle. The main research hypothesis is that the likelihood of the Greens fielding candidates in a ward at a FPTP borough election is related to both their presence in that ward and neighbouring wards at a previous borough election *and* their relative success at winning votes there on the London-wide list. The primary variable of interest is whether or not the Green Party fields a candidate in a ward at a borough election (e.g. 2006) that is preceded by both a previous FPTP contest (2002) and an AMS list vote (2004).

Multiple binary logistic regression analysis was used in an effort to test two subsidiary hypotheses. The first hypothesis addresses a *contagion effect*, i.e. whether a Green candidate standing in a ward at a previous borough election may persuade other Green candidates to stand in neighbouring wards (those whose geographic boundaries are shared with a ward fielding a Green candidate) at the next borough elections. The second hypothesis might be said to be concerned with a *learning effect* – does relative success (at the ward level) at a recent London-wide list vote affect the chances of the Greens fielding or not fielding a candidate in the ward at the immediately subsequent borough election?

The first set of data (2002, 2004 and 2006) is used for model building, whereas the second set (2006, 2008 and 2010) is used for out-of-sample model testing. Thus, when building the logistic regression, the dependent variable, '*Green2006*', indicates whether a Green candidate contested a ward in 2006 (a dummy variable, takes the value 1 if there is at least one Green candidate in the ward and 0 otherwise). Two independent variables are: a categorical variable, '*pattern2002*', that describes the 2002 pattern of the Green contestation in the ward and its neighbouring wards, and a continuous variable, '*share2004*', that is the percentage of the vote-share cast for the Greens in a ward based on results from the London-wide list vote in 2004. The categorical variable 'pattern2002' takes three values: the value 1 if the Greens stood in the ward in 2002; the value 2 if the Greens stood in a neighbouring ward but not in the ward itself; and the value 3 if they did not stand in either the ward or a neighbouring ward in 2002.[3] It was decided that the addition of ward-level demographic data was unnecessary since the London-wide Green vote is itself a proxy measure for certain social-demographic characteristics, e.g. young, residentially mobile, well educated (Borisyuk et al., 2007).

This modelling produces a general equation for the location of Green candidates at a London borough election. The equation is then used to *predict* the pattern of competition for the second election set at the 2010 borough elections. So, when performing the out-of-sample test and 'predicting' the 2010 outcome, the base year becomes the 2006 borough elections (categorized as for the 2002 contests above) and a continuous variable showing level of support for Greens on the London-wide list in 2008.

Results

Table 3 gives the parameter estimates for a logistic regression fitted to the first set of elections. The dependent variable is binary and takes the form – stood in 2006/did not stand in 2006. Both independent variables, '*pattern2002'* and '*share2004'*, are

Table 3. Pattern of Green Party competition: London borough elections 2006

Variables in the equation	B	S.E.	Wald	d.f.	Sig.	Exp(B)
share2004 (%)	0.280	0.034	67.990	1	0.000	1.323
pattern2002			57.323	2	0.000	
green2002ward (Green candidate in a ward)	1.873	0.368	25.905	1	0.000	6.509
green2002neighbour (no Green candidate in a ward; at least 1 Green in neighbourhood)	0.410	0.360	1.295	1	0.255	1.506
no Green candidates in a ward; no Green candidates in neighbourhood			Reference category			
Constant	–3.024	0.410	54.496	1	0.000	0.049

significant ($p < 0.001$) and contribute independently in the logistic regression equation.[4] A one percentage point increase in the 2004 list vote increases the odds of finding a 2006 Green candidate in a particular ward by more than 30 percent (the odds ratio of 1.32), all other circumstances being the same. The categorical variable '*pattern2002*', which comprises two dummy variables, should be discussed in more detail. It appears that while the presence of a Green candidate in the ward in 2002 increases significantly the likelihood of a Green standing in the same ward again in 2006, such influence does not extend to neighbouring wards, i.e. those that share some common boundaries with the ward of interest. The resulting equation can be written in the following form:

$$\text{Logit (green2006)} = -3.02 + 0.28 * \textit{share2004} + 1.87 * \textit{green2002ward} + 0.41 * \textit{green2002neighbour},$$

where the dependent variable *green2006* and continuous independent variable *share2004* are described above, and *green2002ward* and *green2002neighbour* are dummy variables that constitute the categorical *pattern2002.* The statistical non-significance of the dummy variable 'green2002neighbour' means that the model fails to find evidence that the contagion effect hypothesis is valid. To be more precise: when information about 2004 Greens' share of vote is taken into account, the impact from the Greens contesting neighbouring wards in 2002 is positive but weak and statistically non-significant.[5]

An intuitively appealing way to evaluate the predictive ability of a logistic regression is to compare the original dichotomous variable (the dependent variable) with the model estimates. A logistic model calculates the likelihood/probability of a particular outcome (a Green candidate contesting a ward, in our example). Calculated probability, however, can be used for deriving a dichotomous variable – if the model produces a probability greater than a cut-point (let's say, 50 percent) then the ward is classified as a ward that is expected to have a Green candidate standing. Table 4 gives the cross tabulation of the original dependent variable with the derived dichotomy and provides a summary of the results of the fitted logistic regression while evaluating its predictive ability. The model overall correctly classifies 74 percent of cases/wards but is rather better at predicting where the Greens will field candidates rather than those cases where a Green candidate will not stand.

Table 4. Classifying pattern of candidates at the 2006 London borough elections Classification Table[a]

		Predicted		
		green2006		
Observed		Green candidate in a ward	No Green candidate in a ward	Percentage correct
green 2006	Green candidate in a ward	278	79	77.9
	No Green candidate in a ward	85	182	68.2
Overall percentage				73.7

[a] The cut value is 0.500.

Table 5. Application of the 2006 equation to the 2010 London borough results Cross-tabulation

		% within *green2010*		
		Expected '*green2010*' (from 2006 model)		
		Green candidate in a ward	No Green candidate in a ward	% correct predictions
Actual '*green2010*'	Green candidate in a ward	80.4%	19.6%	80.4
	No Green candidate in a ward	27.2%	72.8%	72.8
Overall percentage				77.9

This logistic model can be used for out-of-sample tests and to predict the location of Green candidates at the 2010 borough elections. Indeed, equation (1) can be re-written in a more general form that is suitable for any election set comprising the base year borough election (*'year0'*, similar to 2002 election as in model (1)), the subsequent London Assembly election ('*year1'*, similar to 2004 in model (1)), and finally the borough election of interest ('*year2'*, i.e. 2006 in model (1)):

$$\text{Logit(greenYear2)} = -3.02 + 0.28 * shareYear1 + 1.87 * greenYear0ward + 0.41 * greenYear0neighbour.$$

When applying the above model to 'predict' the 2010 election, the base year becomes the 2006 borough election (did a Green candidate stand in the ward, was a Green standing in a neighbouring ward; did no Green candidate stand?) and the vote-share is the ward-level Assembly list vote for the Greens in 2008. Using this general model, the aim is to predict whether a Green candidate would stand in a ward or not in 2010. If the equation produces a probability of above 50 percent for a ward, then the ward is classified as one expecting the presence of a Green candidate in 2010. If the probability is below 50 percent, then the model predicts no Green would contest in the 2010 borough election.

The result of this modelling is then compared to the *actual* outcome in 2010 and the results are given in Table 5. In total, 78 percent of all outcomes were predicted correctly. However, it is clear that the model finds it more difficult to predict cases where a Green candidate was absent from a ward contest at the 2010 London borough election in exactly the same way as happened for the 2006 elections. In effect, this means that according to the model the relationship between the pattern of 2010 Greens' contestation and the actual results of two previous elections remains the same as it was in 2006. In 27 percent of the 206 wards without a Green candidate in 2010 the model wrongly predicted a Green would have stood. Conversely, the model shows that in 20 percent of the 418 wards where the Greens did field a candidate their prior pattern of contestation and list-vote performance might suggest that such a challenge in 2010 was possibly not a good use of scarce resources.

When considering wards where the Greens stood a candidate for the first time in 2010 (i.e. no candidates in 2006), we can compare 73 places where the model predicts 'no Green candidate' and 31 wards where the model predicts 'yes'. In those wards where the presence of Green candidates corresponds with the model prediction the mean share of vote for the Green party in 2010 is 11.1 percent. By contrast, in wards that Green candidates contested but the model predicts no contestation the average vote-share reached just 7.5 percent. Nine wards which the Greens contested in 2006 but were not viable according to the model were then compared with 305 wards where there was correspondence between the model and actual pattern of Green contestation. The difference in the means of the Green vote-share is striking – 5.3 percent and 10.1 percent accordingly, although we accept that the number of cases may be a factor here. There remain 56 further cases/wards where the model does not correspond with the actual 2010 pattern of contestation: a Green candidate does not contest but the model prediction disagrees with that. We do not know, of course, what outcome there might have been in such places, but it is quite possible that from the viewpoint of the Green Party that this is a real opportunity lost.

In general, therefore, the Greens have performed reasonably well in targeting the places they did or did not field candidates in 2010, but their strategy was not as good as it might have been had the 2008 list vote been fully taken into account. In short, despite a reasonably powerful model for predicting the presence or not of Green Party candidates at London borough elections the pattern in 2010 is, from the viewpoint of our modelling, sub-optimal – Green candidates contesting a fraction of wards where the prospect of votes is marginal and at the same time not contesting other wards that might have contributed positively to the party's overall vote if not their total of seats.

Finally, in order to understand this distribution of candidates further, the spatial pattern of Green borough election contestation and GLA party list support across London for the two election sets is mapped in Figures 1 and 2. In Figure 1, four categories (using different shadings) are used to classify wards according to Green Party list vote-share at the 2004 London Assembly election; categories were determined by identifying natural breaks in the data as calculated by ArcGIS (the Jenks method – see Kennedy 2009: 349). Patterns

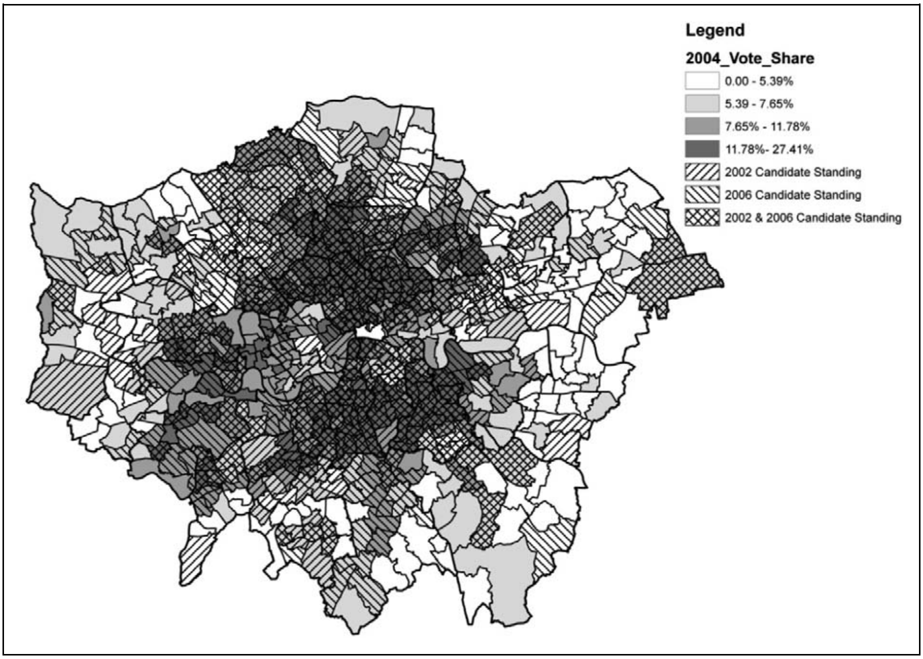

Figure 1. Pattern of Green Party competition and 2004 London Assembly list vote support

of party competition (using different hash lines) between the 2002 and 2006 borough elections overlay these vote-share categories. There are three such categories: where a Green contested a ward in 2002 but not in 2006; wards with a Green standing in 2006 but which had not been contested in 2002; wards with Green candidates at both these elections. Where there is no patterning at all, the ward was not contested at either of the borough elections although there is of course some level of Green list vote at the 2004 election.

It is immediately clear that support for the Greens is spatially concentrated into two darker bands (relatively high vote-shares and competition in both 2002 and 2006) that are fairly central and run more or less parallel to one another. These dark shaded wards (indicating a relatively high vote-share in 2004) are also those where the party contested both of the borough elections. The wards that lie within these two bands are located on or very near to the River Thames, which divides the city into its northern and southern halves. A more detailed inspection also reveals in the southwestern part of the capital a number of wards where the Greens polled between 7.6 and 27.4 percent of the 2004 list vote, and where a Green candidate stood in 2006 but had not stood in 2002. Conversely, there are few wards where the level of support in 2004 is low, but where a Green candidate did contest in 2006 although some can be seen in north and east London.

Turning to Figure 2, which maps data relating to the second period 2006–2010, the general spatial pattern is similar. Green support is again concentrated in the inner London wards that run north and south of the River Thames. Similarly, wards situated on the outer edges of the capital remain areas providing few Green party votes. That said, there are a number of wards in the far south of the capital where Green candidates stood in

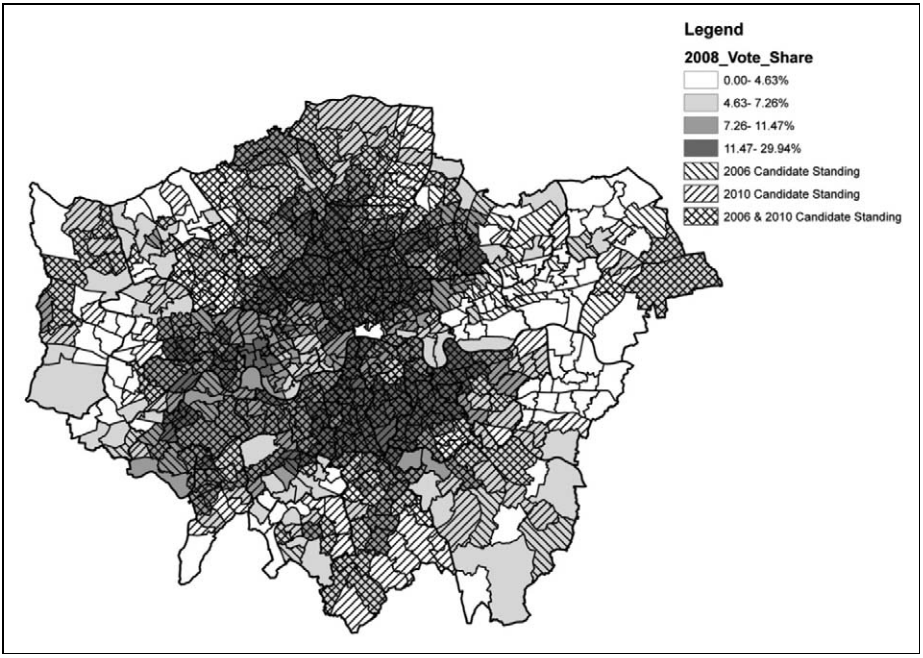

Figure 2. Pattern of Green Party competition and 2008 London Assembly list vote support

2010 despite a relatively poor performance at the 2008 election – contrary to what might be expected if a party was optimizing the location of its FPTP candidates. Generally speaking, however, as the regression analysis implies, the distribution pattern of Green candidates in 2010 that also contested in 2006 (cross hatching) is mostly in areas with a relatively strong level of support in 2008 (dark shading).

Conclusions

The original research question addressed whether a party's performance at a PR election would provide it with low-cost information about its relative standing among voters that is utilized strategically at a subsequent FPTP election. More specifically, could smaller parties that struggle under FPTP conditions exploit the more favourable circumstances of a proportional voting system and subsequently transfer that advantage – fielding candidates in areas of strongest support and ignoring places where little support might be expected. Our approach to this question was to divide the results from parallel voting systems taking place across London into two separate datasets. The first of these sets, featuring results from elections from 2002 to 2006, generated a regression equation that was then used to forecast those places where the Greens would or would not field candidates for the 2010 local elections.

However, analysis of the aggregate voting data does not demonstrate unequivocally that a small party, in this case the Greens, did successfully exploit the information contained about the distribution of voter support across a large number of electoral districts supplied by list voting at the London Assembly elections in both 2004 and 2008. While the initial regression model correctly forecast three-quarters of cases where Green candidates would or would not stand at the 2006 borough elections, the model's performance was not significantly better in relation to the pattern of Green candidates contesting the 2010 borough elections. Although both independent variables (share and pattern) contribute independently to the logistic regression the increase in odds of finding a Green candidate was modest. Some may regard such a finding as acceptable, suggestive of a party organization transferring information from one type of election to improve its performance at another. Others, may take a different view, maintaining that the results, although somewhat better than chance, are insufficient evidence of a party that is exploiting the circumstances of parallel voting systems. The real conclusion probably lies somewhere between these two extremes.

There does appear to be some process of taking into account the list vote patterns when organizing the location of candidates at a subsequent FPTP election, but the process is haphazard rather than strategic. Those places where Green candidates stood, but the model suggested they would not, may simply be a product of the enthusiasm of local activists keen to stage a presence with electoral support a secondary consideration. Rather more difficult to explain are those voting districts where Greens did not stand but where the prior list vote and our modelling suggested that a relatively large voter support base could be exploited. It is possible that some local ward Green parties were aware of (and did respond to) the party's performance at the list vote element of the Assembly elections in 2004 and 2008 but that other ward organizations were unaware of this performance and failed to act.

There is no clear evidence, therefore, that in general a small party such as the Greens can and does exploit the opportunities provided by different voting systems that run in parallel to one another. However, simply by highlighting the availability of these data and in undertaking and publishing this analysis we may be contributing towards a more optimal pattern of party competition in the future. All small parties that struggle to find sufficient candidates to contest FPTP vacancies henceforth could make a point of closely examining the distribution of support at a list vote election and use that information to target specific wards at the following plurality elections. The next London Assembly elections are scheduled for May 2012 with the borough elections following two years later. In 2014 we may return to this question and encounter a rather different outcome to the one considered here.

Acknowledgement

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Notes

1. This analysis excludes one borough, the City of London, because local elections to that authority are mostly non-partisan.
2. Although not considered here, the directly elected mayor is chosen by a method known as the Supplementary Vote (SV) (Van der Kolk et al., 2006).
3. To incorporate the nominal categorical variable 'pattern2002' within the logistic regression model, a reference/dummy coding is used that transforms the 3-level categorical variable into

two dummy/binary independent variables with a common reference category 'no Greens either in the ward or in neighbouring wards'.

4. The correlation between the only continuous predictor 'share2004' and the two dummy variables that constitute 'pattern2002' is fairly moderate (the point-biserial correlation coefficients are approximately 0.4) and indicates that there is no serious problem with multicollinearity. The collinearity diagnostic statistics, the Variance Inflation test and the eigenvalues used to measure the presence of multicollinearity, do not reveal potential problems (the Variance Inflation Factors do not exceed 4 and the Condition Index is less than 8), although the relevance of these tests is open to question because of the type of independent variables (just one continuous and two dummies).
5. To check whether the presence of Green candidates in neighbouring wards in 2002 is reflected in the level of Green share of vote in a given ward in 2004, another variant of the contagion effect hypothesis may be formulated. This states that at the ward level the Green share of vote in the London Assembly election in 2004 is itself associated with the presence of Green candidates in neighbouring wards at the 2002 borough election. Examination shows that the Greens received a mean share of 7.1 percent in 2004 across 256 wards where some neighbouring wards stood Green candidates in 2002, while in 57 wards where no neighbouring wards featured Green candidates in 2002 the mean share was 6.4 percent. This difference of 0.7 percentage points is statistically non-significant according to Student's *t*-test ($p = 0.063$) meaning that the data do not reveal any evidence of a contagion effect from the 2004 results (and that the regression model (1) has no hidden, indirect through 2004 shares, contagion effect component).

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Appendix 7

Forecasting the 2010 general election using

aggregate local election data

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Forecasting the 2010 general election using aggregate local election data☆

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ABSTRACT

The paper presents a revised method for estimating national vote shares using aggregate data from local government by-elections. The model was originally developed to forecast the annual outcome of local elections but was adapted in time to provide an accurate forecast of Labour's landslide victory at the 1997 general election. However, over the past decade the changing pattern of party competition which has seen parties becoming more selective about which elections to contest has led to more elections being excluded from the modelling because they failed to meet the exacting criteria that all three major parties, Conservative, Labour and Liberal Democrats, had contested both the by-election and the previous main election, normally held in May. Relaxing these criteria, although increasing the number of available cases would adversely affect the forecast, over- or under-estimating party votes. Instead, the revised method overcomes the problem of differential competition by estimating vote shares for parties that contest one but not both elections. A further innovation is the calculation of a weighted moving quarterly average which takes account of the number of days elapsed between the by-election date and the date of forecast. Using the new method we provide estimates for likely party shares for the 2010 general election.

1. Introduction

Unlike most other election forecasting models, the example described here is primarily designed not to forecast a national parliamentary election but instead to forecast national equivalent votes at annual local elections. Judged by this criterion it has proved successful. The model uses aggregate level data obtained from local council by-election results from the early 1980s onwards that take place in virtually every week of the year. It operates by calculating change in vote share across two elections, the main election and the subsequent by-election, using cases that feature candidates from all three of the main parties, viz., Conservative, Labour and Liberal Democrats at both types of contest.. The theoretical basis behind the approach is that, unlike their parliamentary equivalents that generate a media circus and become a vehicle for voters' protests, local council by-elections are relatively straightforward electoral events where people behave in a normal manner and where any idiosyncratic outcomes have a way of cancelling themselves out over the longer term.

From 1995, when we began using the model for forecasting the May local elections, it immediately demonstrated its value, so much so that we used it to forecast the 1997 general election and were pleased to see that it outperformed the national polling companies (Rallings and Thrasher, 1999). A retrospective look at the 1992 election, however, found that in common with the main polling companies the model forecast was a narrow Labour victory instead of an eight-point Conservative lead (Rallings and Thrasher, 1999).

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Prior to the 2001 general election we encountered problems caused by an outbreak of foot and mouth disease which led some local authorities to restrict local by-election activity. This meant that from the end of February to the synchronous local/general election in June there were just 51 cases, many fewer than normal and none of which were held in the month prior to the general election itself. Nevertheless, our forecast for The Sunday Times published on June 2 used our analysis of split-ticket voting at the synchronous 1997 elections to generate figures from the model data (Rallings and Thrasher, 1998, 2001, 2003). The forecast read Labour 41% (42.0% actual), Conservative 32% (32.7%) and Liberal Democrats 20% (18.8%). Interestingly, three of the five companies conducting national polls over-estimated Labour by 3–5 points in their eve of poll surveys, continuing the pattern from the early 1990s.

Following the 2001 election, where recorded turnout fell below 60%, voter apathy appeared to spread to the local parties. It was not that there were many fewer by-elections than before but that the pattern of party competition started to change. Where three-party contests had once been commonplace they now became less so as one or other of the main parties failed to present candidates. Furthermore, in some areas more candidates from minor parties began to participate and secure significant electoral support, thereby making such cases unsuitable for national forecasting purposes. In short, an increasing number of cases were being excluded from the by-election modelling because the pattern of party competition at both the by-election and its May predecessor were incompatible with the task of estimating national vote shares. On May 1, 2005 our Sunday Times forecast was again adjusted on the basis of split-ticket voting (now 2001 as well as 1997 aggregate level data were available). The forecast was Labour to win a majority of 96 seats having polled 37% (36.1%), the Conservatives 34% (33.2%), and Liberal Democrats 21% (22.6%). The eve of poll findings from the polling companies proved as accurate.

During the recent parliament, however, the need to address the problem of declining case selection has become imperative. In the following section we outline the initial by-election model before reporting on our efforts to address the problems affecting the admission/exclusion of cases. Next, we introduce the revised model and then assess its utility by applying forecasts retrospectively both to the May local electoral cycle from the 1990s onwards. Finally, we use recent evidence to forecast the likely outcome of the 2010 general election. Although we are committed to the value of these data for forecasting since these are, “real votes in real ballot boxes” and constitute in Austin Ranney’s terms the ‘hardest’ data political scientists can get (Ranney, 1962) the model remains a work in progress. We are still testing whether the number and location of by-elections, to an extent affected by the wider electoral cycle, is a factor that influences forecasts and, if so, in what direction. We are also working with data that records the cause of the by-election vacancy since the circumstances (enforced resignation, retirement or death of incumbent for example) may affect the distribution of subsequent party support.

2. The original by-election model

We have been collecting local council by-election results from across Britain since the mid 1980s. Each year sees an average of 290 vacancies although this fluctuates with the broader electoral cycle. The forecast model requires information about both the by-election result and the outcome at the preceding May-election for each ward (the local electoral district). Clearly, assuming that the pattern of party competition is identical across elections it is straightforward to calculate change in vote share and swing for a given ward but forecasts, generalising from the particular, require a set of benchmark figures that are common across a range of wards. This comes in the guise of the ‘national equivalent vote’ (NEV) an estimate of how the country as a whole might have voted extrapolated from actual local election voting in any given year (Curtice and Payne, 1991; Rallings and Thrasher, 1993).

For any given ward election in May, therefore, we know both the distribution of party support in the ward and how that compares with the country as a whole. The original method used only by-elections which featured candidates from Conservative, Labour and Liberal Democrat parties at both the May election and the by-election. An additional caveat was that cases would be excluded from consideration where votes for other parties and Independents at either the May or by-election were greater than 10% of the total vote. The exception to this was cases where the intervention and support for other parties/independents was consistent across the two elections. Because of a non-uniform local electoral cycle it was important to note the particular year when a by-election ward had held its May election since this became an important part of the calculation. A worked example is provided in Table 1 while the method is described formally in the Appendix.

3. The revised by-election model

From 2001 the rather dramatic change to the pattern of party competition had implications for modelling. In 2000 some 68% of by-elections featured candidates from all three main parties; this dropped to 62% in 2001 with a further fall to 55% in 2002. Although the proportion of three-party contests recovered from this low point it did not match the

Table 1
Calculating the current national equivalent vote from the November, 1996 by-election result in Ixworth ward, St Edmundsbury Council.

Steps in the method	Conservative	Labour	Lib Dem
a) By-election share in ward	43.4	26.2	30.4
b) 1995 May vote in the ward	36.1	29.6	34.3
c) Change in vote share (a−b)	+7.3	−3.4	−3.9
d) 1995 National Equivalent Vote	25	47	23
e) Estimate of current NEV (d + c)	32.3	43.6	19.1

Of course, in a given ward it is possible that the change in a party’s vote share may be greater than its NEV for a particular year, leading to a current NEV estimate that is nonsensical. However, by averaging the estimates across all by-elections over a month/three month period, any extreme results are smoothed out. In essence, therefore, between the May and the subsequent by-election the model is calculating change in each party’s vote share, adding/subtracting that change to the NEV value for the relevant year and averaging across cases to estimate a current NEV for a given point in time.

consistent levels seen throughout the 1990s. This, combined with a retreat from three-party contests in the main May elections, especially in the English shires, led to model estimates being sourced from a declining base of data.

The initial response was to investigate thoroughly the changing structure of party competition and second to devise methods that might then compensate for missing values, permitting more cases to be used to estimate national support. A third aim was to determine the optimal time frame for averaging – it should be a trade-off between averages being responsive to new information and yet not over- sensitive to random variations.

A starting point was to examine for every case the structure of party competition at both the by-election and the previous May election. In more than 7000 by-elections there was three-party competition at both the May and by-election in 3425 cases. In a further 544 by-elections a Liberal Democrat candidate, present for the May contest was missing from the subsequent by-election. In another 250 and 77 cases it was the Labour and Conservative candidate respectively that missed the by-election. Of course, the process worked in the opposite direction with by-election vacancies attracting greater party competition than had the May equivalent. For example, in 648 cases where three main parties contested a by-election the Liberal Democrats had not challenged when the main May election was fought. In a further 255 and 155 cases it was Labour and the Conservative candidates respectively that are missing from the May election but are present at the by-election contest. In other examples the structure of party competition was partial but stable in the sense that perhaps only two of the three parties competed at both elections. In 457 cases, for example, only Conservative and Labour challenge one another with the Liberal Democrats absent on both occasions. In a further 331 examples the two protagonists are Conservative and Liberal Democrats while 104 cases are Labour versus Liberal Democrats only. The structure of party competition, therefore, dictated differing responses in devising new procedures designed to include more cases for devising model estimates.

The first examples consider cases where the pattern of party competition is more extensive at the main elections in May than it is for the subsequent by-election. Local voters in May could select from Conservative, Labour and Liberal Democrat candidates but the Liberal Democrats (in the example shown) decide to stand aside from the by-election contest (Example 1, Appendix). Previously, the model ignored such cases but a different method is now employed, providing a notional by-election share for the Liberal Democrats which is equal to the minimum share value the party achieved across the relevant local authority at the May election. The theoretical basis for this assumption is that the likely explanation for the Liberal Democrats to withdraw from the by-election is the expectation of receiving a low level of votes. The votes for the parties that did contest the by-election are then adjusted to take account of the estimated vote for the absent party. It is important that the process of normalising votes in this way does not distort the actual result, for example, transforming a positive change in vote share for one of the parties that did contest into a negative one. In order to prevent this from happening the share change for a party that both contests and increases its share is never allowed to fall below zero. Following these adjustments the by-election result is then treated in the usual way for the purposes of estimating national vote shares.

There are other occasions when the extent of party competition is further fragmented; three main parties contest the May election but now **two** fail to contest the by-election. For example, both Labour and Liberal Democrats do not present by-election candidates to challenge the Conservatives (Example 2 in Appendix). The problem here is that the change in Conservative vote share from May is likely to be inflated because of the absence of two of its competitors. In such cases we proceed with the method described above, now estimating by-election shares for both Labour and Liberal Democrats based on the minimum values across the local authority at the previous May election. Following this procedure the Conservative by-election share is recalculated by subtracting from its actual share the estimated shares for both Labour and Liberal Democrats. Again, if the actual Conservative by-election share is an increase from its share in May but the process of estimating shares for the two missing parties transforms that to a decrease then change is limited to zero. Where the Conservative by-election share does actually decrease, despite the two missing parties but presumably because of the support for independents or other smaller parties, then no estimates are made for change in share for Labour and Liberal Democrats while the Conservatives are given the actual May to by-election change.

Another scenario is that now just two parties contest the May election but only one of these parties has a by-election candidate. An example is that Conservative and Labour challenge one another in May but that Labour does not contest the by-election (Example 3, Appendix). Since there is no Liberal Democrat standing at either election its change is regarded as missing data in the modelling. An estimate for Labour's by-election vote is made in the usual manner by assuming that its by-election vote would be equivalent to its share in its worst performing ward across the local authority at the previous May election. The adjusted Conservative by-election vote share then becomes its actual share minus the estimated Labour share with the caveat that the direction of change cannot be counter-intuitive: it is set to zero if an actual positive change becomes a negative one after adjustments and estimated vote shares are made.

The examples discussed so far have focused on procedures when the pattern of party competition at the by-election is less than at the previous May election. There are cases where the opposite situation applies and more parties challenge for the by-election vacancy. The first situation involves two main parties with candidates in May but these are subsequently joined by the missing party when the by-election is fought. We assume that Conservative and Labour are rivals in May but the Liberal Democrats put in a by-election appearance (Example 4, Appendix). In such a case an estimated May vote for the Liberal Democrats is based on the party's worst performing ward across the local authority. A restriction is imposed and this assumes that its by-election vote share is a positive change in vote from the estimated May election; if not then change in share is limited to zero. For the two parties that contested both elections change is set to zero if after estimating a May vote for the Liberal Democrats a negative change in vote becomes a positive one.

A minor adjustment to the example given above is that two parties contest the by-election but only one of these two was present at the previous May election. In May the Conservatives compete against independents and/or minor parties only but are then subsequently challenged by a Labour by-election candidate (Example 5, Appendix). Since there is no Liberal Democrat at either election its change is treated as missing. Labour's estimated May vote share is that in its worst performing ward across the local authority. The Conservative share in May is recalculated to be its actual vote minus the estimated Labour share. The restriction is that Labour's by-election share cannot be less than its estimated May share and is set to zero if that would happen. Similarly, Conservative change is set to zero if the consequences of these adjustments are that the direction of change is altered.

A more extensive adjustment is required when only one of the main parties contests the seat in May but the by-election sees all three parties contest. One such situation would be where the Conservatives stood a candidate on each occasion its two rivals did not fight the May election (Example 6, Appendix). Estimates are calculated in the normal manner for each of Labour and Liberal Democrats that are equal to vote share in their weakest wards across the authority.

Finally, a more complex pattern of party competition occurs when two participate in the May election but a different pair of parties contest the by-election. For example, Conservative and Labour compete for the seat in May but then the by-election has no Labour candidates but local Liberal Democrats decide to contest (Example 7, Appendix). Step one estimates a May vote share for the Liberal Democrats calculated in the usual manner. Step two sees Labour's May vote reduced by subtracting its worst performing ward result while step three recalculates the share for the Conservatives. The normal restrictions are then applied.

The result of making such compensations is that a greater proportion of by-election cases may be included in modelling national equivalent vote estimates. The extent of that increase is shown in Fig. 1. The two curves show the proportion of by-elections used in estimating national vote shares. The broken line is the proportion that were usable under the strict criteria of three-party competition in both the May and by-elections and a large fraction of total votes cast for the main parties. The solid line is the proportion

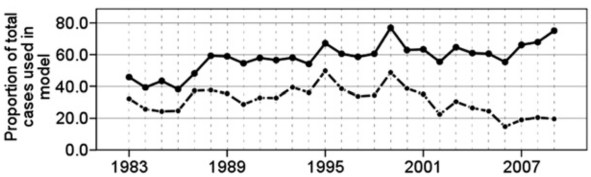

Fig. 1. Consequence of new data selection criteria: proportion of by-elections used by the original and the revised model.

after compensating for incomplete three-party competition and allowing for missing values when one or other of the three main parties fails to compete at either election. The most dramatic difference occurs in the period after 2001 when, as we reported earlier, there was a significant move away from the pattern of party competition that had evolved over an almost twenty-year period before then.

Of course, we need to be assured that the effects of estimating missing vote shares do not introduce inaccuracies to a model that enjoyed a proven track record of forecasting national support for the annual round of local elections. Plotting each party's forecast vote share over a long period reveals that the effect of estimating votes for missing parties is to reduce the amount of volatility in the monthly estimates due to the increased number of cases used. In the period from 2005, for example, the Conservative three month average varies between 18 and 44% (range 26 points) using the original method while the range is just 10 percentage points (19–32%) for the revised method. Similarly, Labour varies between 19 and 32% and between 22 and 30% for the old and new methods respectively while the Liberal Democrats were ranging between 19 and 49% and now lie between 22 and 34%. Another measure of volatility is the level of change of support from one month to the next. Fluctuations that are very pronounced are more likely to be of a random nature rather than reflecting real changes in the public mood. Compared with the original method the revised model estimates demonstrate greater stability in short-term support[1].

The final element in the revision process was to consider how best to create estimates for a given point in time. Providing estimates of national support based on by-elections from a single week would be ill advised since these can vary considerably, influenced by a range of local and national factors and also being affected by relatively small numbers of cases. A more robust approach is to use a broader time period. This has the effect of smoothing large fluctuations that may occur using weekly data. Closer examination of results and trends over a twenty-five year period suggested that a more reliable procedure is a weighted quarterly moving average[2]. Thus, each forecast is based not simply on the figures for a single month but also some information from the preceding two months. The weighting procedure takes into consideration the time elapsed from when each by-election occurs and the date of forecast, usually the last day of the month of interest. Thus, a by-election that happens on the last day of June has a bigger impact on June's averages compared to a by-election that held on April 1. There is a linear decrease in

[1] In terms of Conservative support during the 2005 parliament the original method suggested a maximum increase of 12 percentage points and a maximal decline of minus 24 points (standard deviation = 4.5) while using the revised method the Conservative figures do not change by more than 5.6 points (std = 1.9) across a two month period. The equivalent figures for Labour are +5 to −6 (std = 2.0) now changing between +4 and −3.5 (std = 1.4) and Liberal Democrats +19 to −15 (std = 4.7) using the old method to change between +4 and −10 (std = 2. 2) on the revised model.

[2] Our experience is that employing a three month average provides a better smoothing of the data than a two month average.

weights that reflects the days elapsed from the forecast date. In turn, the above June by-election will also have an impact on July and August 'averages' but its impact on the model estimate is reduced with time. In short, if the number of by-elections stays more or less the same across all months then the influence of this June by-election decreases linearly (it is highest for June, smaller for July, and smallest for August) before it is completely removed from the quarterly calculation.

4. Estimating national equivalent vote share using the revised model

The first test of the revised model lay in its ability to forecast correctly the May elections using the April model estimate. The first iteration of the model was a reliable method for forecasting the national equivalent vote for local elections and it would be a retrograde step if the revised method performed less well. Fig. 2a–c shows for each election year since 1993 both the April by-election model vote share (comprising data from the April, March and February results) and the eventual May NEV for the three main parties. The solid line represents the by-election model share and the dotted line is NEV. Overall, the methods for estimating missing data do not appear to impact negatively on the model forecasts.

For the Conservatives the two curves are close together but there is no consistent pattern in terms of the forecast accuracy. The largest gap over the period is in 2005 when the model over-estimated the Conservative NEV (note: this is the party's local election performance rather than its general election vote share) and both 2007 and 2008 when it did somewhat better at the actual elections than had been forecast from the by-election data. A close examination of the pattern of support for Labour again shows that the two curves are close together with two clear exceptions, both of which are general election years (2001 and 2005). The 1997 general election does not repeat this gap but it should be noted that this period (1995–1997) represented the peak of Labour's local electoral performance and it is unlikely that the party could have improved further on its by-election results. The 2001, 2005 data are suggesting that Labour appears to raise its game (or its supporters take notice) where a general election contest arises. It is very rare for Labour to do better in by-elections than in the main May local elections; the one exception over this period is in 1997 but the gap is rather small. For the Liberal Democrats (Fig. 2c) the pattern is the reverse of Labour's performance. The tendency is for the by-election model to give a higher estimate than Liberal Democrats' actual NEV. This feature is particularly noticeable in both 2003 and four years later in 2007, the peak of the local electoral cycle in terms of council seats up for election. It does seem that the Liberal Democrats perform better in the by-election situation than at the national level when much of the country is voting in the main May elections. Of course, compared with the party's general election performance this gap (between by-election model forecast and general election vote) is greater still for reasons addressed earlier.

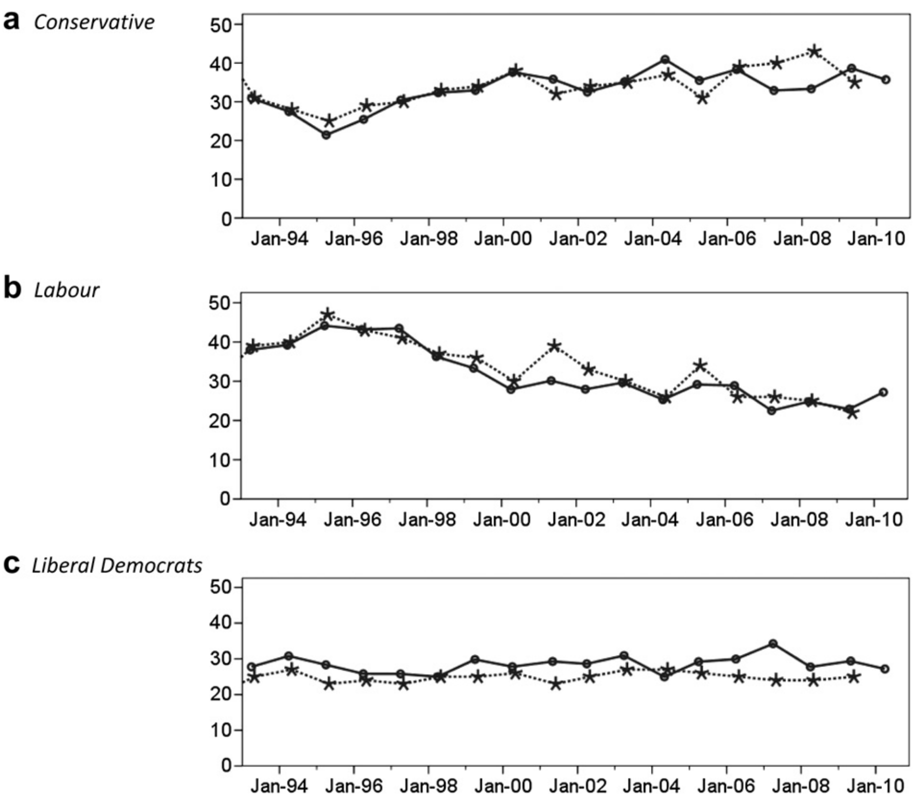

Fig. 2. The revised by-election model and NEV, 1993–2010. (a)Conservative, (b)Labour, (c)Liberal Democrats.

5. The trends in the by-election model and opinion polls since 2005

In this section we consider how the model has estimated support since the 2005 general election and compare that with the opinion polls using weighted moving quarterly averages. The intention, using Fig. 3a–d, is to show more clearly the relationship between model estimates and the polls. Fig. 3a tracks support for the Conservatives and shows that although both curves run close together, seldom being more than a few percentage points apart, there is no consistent pattern in the sense that one estimate is always above/below the other. In the immediate aftermath of the May 2005 election Conservative support rises gradually but then, following Brown's hesitation about a snap election in autumn 2007 it accelerates towards a peak in midsummer 2008 according to the by-election model but two months later in terms of poll rating. Since then the trend has been gradually downwards.

In the run-up to the 2005 general election Labour's estimated national vote using the by-election model was around 30% while the polls were somewhat higher, averaging in the high 30s (Fig. 3b). Following the general election the party receives a small boost in the polls but its performance in by-elections notably declines towards the mid 20s. Thereafter the two curves track one another whilst remaining between 6–12 percentage points apart – however people are responding to opinion surveys it appears that Labour is unable to translate such support into actual votes. Blair's announcement to leave office appears to be the catalyst that turns the party's fortunes around on both measures, noticeably so in terms of the poll ratings. Brown's hesitation over the election date pops the ratings bubble until the economic crisis and the Prime Minister's

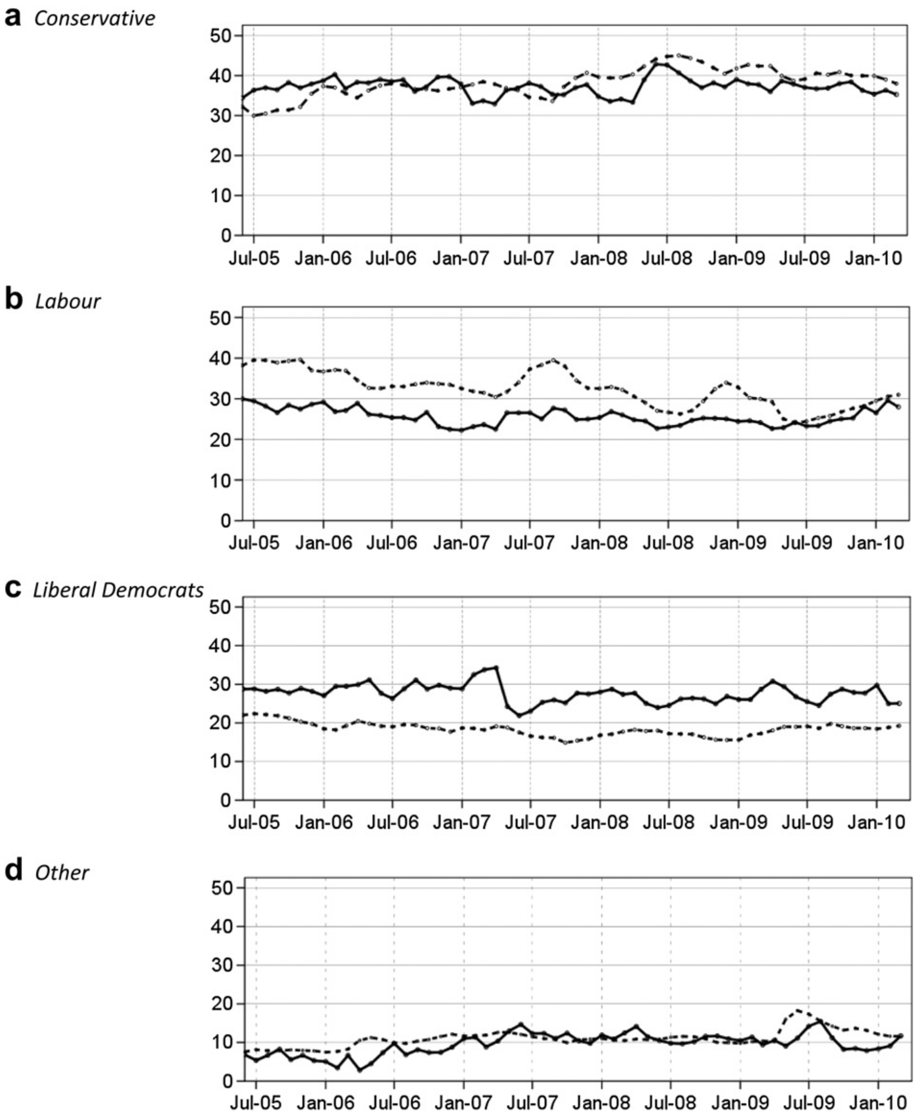

Fig. 3. The by-election model and opinion polls, 2005–2010. (a)Conservative, (b)Labour, (c)Liberal Democrats, (d)Other.

role in brokering international agreements contributes to another bounce in the polls for his party. In the meantime, Labour's by-election performance has remained lacklustre with any improvement barely registering on this measure. In June 2009 the two measures intersect for the first time this parliament when the weighted poll average reaches 24.1% and presumably hits the bedrock support for Labour; the by-election model had been estimating support of around that level for the previous year.

The post 2005 data for the Liberal Democrats confirm the pattern of the previous two decades. The party consistently performs better at local elections than its national poll rating suggests (Fig. 3c). For the eighteen months following the 2005 general election the party hovers on or around 30% but January 2007 sees a significant improvement in its fortunes, reaching a four-year high of 34% in April that year. But then there is a rather dramatic 10-point collapse in May and June followed by a recovery over the autumn and winter months. Polling suggests that party support has ranged over a few percentage points throughout the entire parliament, entering the run-in to the 2010 general election a point or two lower than for the previous election.

Finally, Fig. 3d shows the trend in support for other parties. The two measures are close together for most of the time although the influence of the approaching European elections in June 2009, which triggers a growth in support for such parties in the opinion polls is delayed slightly for the by-election model (a case of polls driving votes?) and is short-lived although as the general election nears the two lines may be intersecting.

Any student of parliamentary by-elections and their outcomes would know that they are not reliable guides to how people might vote at a general election but it does appear that aggregate local electoral data are picking up similar movements in electoral opinion to the individual level data acquired in national surveys. The votes cast there are real votes and voters have incurred some costs in performing these actions. There is no need to adjust them in terms of weighted past vote or the likelihood of actually voting but there is a need to take account of variance in the pattern of party competition. On some occasions the by-election model takes time to respond to issues that are immediately apparent in the polls but on other occasions they may be a better guide to the underlying trends. They provide a more reliable indicator of how local voters may behave than surveys but what do they portend for the 2010 general election.

6. Estimating the 2010 vote shares

At the outset we stated that the model is principally designed for a purpose different to the one outlined here. Judged solely on the basis of its ability to forecast national equivalent vote shares for the annual local election cycle it is a success, seldom being more than a couple of percentage points out for any single party if general election years are excluded. There is no doubt, however, that for the model to work to estimate parliamentary voting then certain adjustments may be required, dependent upon the general election context. In the past the main adjustment affects support for the third party, the Liberal Democrats, both in terms of the level of protest voting that it has received and also the extent of split-ticket voting (either because they genuinely prefer to vote Liberal Democrat at local council elections or because of tactical voting reasons). The context of the 2010 general election, however, is that support for the two main parties has declined with the Liberal Democrats the principal beneficiary of this swing against the two-party system establishment. There are other, perhaps less prominent factors, that should also be taken into account when adapting this model to generate general election forecasts. One such is Labour's general weakness in apparently getting its vote out. Even allowing for some over-estimation of its support by the pollsters, Labour has under-achieved in the past, with the notable exception of the pre-1997 period.

The April NEV estimate is showing Conservatives 35.7%, Labour 27.2% and Liberal Democrats on the same figure, 27.2%. In preparing this general election forecast we assume, in a departure from the recent past, that no downward adjustment of the Liberal Democrat vote is necessary. Indeed, we are proposing on this occasion to add a percentage point to both its and Labour's support to take account of additional supporters for these parties entering the general election contest. This produces, after rounding, a national vote share forecast of Conservative 36%, with Labour and Liberal Democrats each on 28%. However, an additional adjustment is made to the seat forecast based on a more complete understanding of by-election voting in Conservative-target parliamentary constituencies. Two separate forecast models were created, one comprising only wards located in the top 150 Conservative-target parliamentary constituencies with all other wards entered into the second model. This demonstrated that the Conservatives were performing slightly better in their target seat areas vis a vis Labour. Accordingly, the seat projection does not assume national uniform swing but a rather higher swing from Labour to the Conservatives in their battleground seats. The seat forecast, therefore, is Conservatives 299 seats, Labour 237 seats, Liberal Democrats to win 83 seats while other parties win 31 seats.

Appendix

Estimation of current national equivalent vote shares

The model may be formally expressed as follows:

Let ***CONsh***, ***LABsh***, and ***LDsh*** be the ward vote share at the by-election for Conservative, Labour and Liberal Democrats respectively while the parties' vote share at the previous ward election held in May would be $\boldsymbol{CONsh_{May}}$, $\boldsymbol{LABsh_{May}}$, and $\boldsymbol{LDsh_{May}}$. The national equivalent vote at the date of the relevant previous May local election is designated as ***NEV.CON***, ***NEV.LAB***, and ***NEV.LD***.

The difference in share of vote between May and By-elections for enumerated parties might then be represented as follows:

$$\boldsymbol{CONchange = CONsh - CONsh_{May}}$$
$$\boldsymbol{LABchange = LABsh - LABsh_{May}}$$
$$\boldsymbol{LDchange = LDsh - LDsh_{May}}$$

Finally, to estimate the current national equivalent vote we add to the previous national equivalent vote the difference between a party's by-election vote share and its vote share recorded at the May election.

Estimates of current NEV are calculated as follows, $\textbf{\textit{NEV.CON}} + \textbf{\textit{CONchange}}$, $\textbf{\textit{NEV.LAB}} + \textbf{\textit{LABchange}}$, $\textbf{\textit{NEV.LD}} + \textbf{\textit{LDchange}}$.

This process is repeated for as many by-elections as fit our specified criteria and each party's current national equivalent vote is arrived at by averaging the results over a stated time period.

Missing data imputation

Example 1: *Imputation for missing vote share for Liberal Democrats absent from by-election contest*.

Let all three main parties have candidates in May election but Liberal Democrats provide no candidate in the by-election:

May election→By-election

con + lab + ld→con + lab

The imputation procedure implies the following notional by-election result:

$LDsh^{new} = MINIMUM_{across\ district\ in\ May}(LDsh)$

$CONsh^{new} = CONsh - CONsh/(CONsh + LABsh) \times LDsh^{new}$

$LABsh^{new} = LABsh - LABsh/(CONsh + LABsh) \times LDsh^{new}$

In order to preserve the actual *direction* of changes for all parties some restrictions are imposed:

If $CONsh > CONsh_{May}$ but $CONsh^{new} < CONsh_{May}$ then we set $\textbf{\textit{CONchange}} = 0$.

If $LABsh > LABsh_{May}$ but $LABsh^{new} < LABsh_{May}$ then $\textbf{\textit{LABchange}} = 0$.

Note: In above formulae and everywhere else in the paper, superscript '*new*' reflects notional by- or May election when any procedure of imputation is applied. Following the imputation procedure, notional election result (i.e. 'new') is then treated in the usual way for the purposes of estimating NEV.

Example 2: *Imputation for missing vote share for both Labour and Liberal Democrats absent from by-election contest* (con + lab + ld→con)

Notional By-election result:

$LDsh^{new} = MINIMUM_{across\ district\ in\ May}(LDsh)$

$LABsh^{new} = MINIMUM_{across\ district\ in\ May}(LABsh)$

$CONsh^{new} = CONsh - LABsh^{new} - LDsh^{new}$

If $CONsh > CONsh_{May}$ but $CONsh^{new} < CONsh_{May}$ then we set $\textbf{\textit{CONchange}} = 0$.

If $CONsh <= CONsh_{May}$, then

$\textbf{\textit{LABchange}} = \textbf{\textit{MISSING}}$, $\textbf{\textit{LDchange}} = \textbf{\textit{MISSING}}$; $CONchange = CONsh - CONsh_{May}$

Example 3: *Imputation for missing Labour by-election share in case when Liberal Democrats absent from both May and by-election contest* (con + lab→con)

$\textbf{\textit{LDchange}} = \textbf{\textit{MISSING}}$

Notional By-election result:

$LABsh^{new} = MINIMUM_{across\ district\ in\ May}(LABsh)$

$CONsh^{new} = CONsh - LABsh^{new}$

If $CONsh > CONsh_{May}$ but $CONsh^{new} < CONsh_{May}$ then we set $\textbf{\textit{CONchange}} = 0$.

Example 4: *Imputation for May vote share for Liberal Democrats* (con + lab→con + lab + ld)

Notional May-election results:

$LDsh^{new}_{May} = MINIMUM_{across\ district\ in\ May}(LDsh)$

$CONsh^{new}_{May} = CONsh_{May} - CONsh_{May}/(CONsh_{May}+LABsh_{May}) \times LDsh^{new}_{May}$

$LABsh^{new}_{May} = LABsh_{May} - LABsh_{May}/(CONsh_{May}+LABsh_{May}) \times LDsh^{new}_{May}$

Restrictions:

If $LDsh < LDsh^{new}_{May}$ then $\textbf{\textit{LDchange}} = 0$.

If $CONsh < CONsh_{May}$ but $CONsh^{new} > CONsh^{new}_{May}$ then we set $\textbf{\textit{CONchange}} = 0$.

If $LABsh < LABsh_{May}$ but $LABsh^{new} > LABsh^{new}_{May}$ then we set $\textbf{\textit{LABchange}} = 0$.

Example 5: *Imputation for missing Labour May vote share in case when Liberal Democrats absent from both May and by-election contest* (*con→con + lab*)

There is no LD candidate in May and by-elections. So, we cannot assess LD changes:

$\textbf{\textit{LDchange}} = \textbf{\textit{MISSING}}$

Notional May-election results:

$LABsh^{new}_{May} = MINIMUM_{across\ district\ in\ May}(LABsh)$

$CONsh^{new}_{May} = CONsh_{May} - LABsh^{new}_{May}$

Restrictions:

We have to get at least a non-negative change for LAB, so

If $LABsh < LABsh^{new}_{May}$ then $\textbf{\textit{LABchange}} = 0$.

If $CONsh < CONsh_{May}$ but $CONsh^{new} > CONsh^{new}_{May}$ then we set $\textbf{\textit{CONchange}} = 0$.

Example 6: *Imputation for missing May vote shares for both Labour and Liberal Democrats* (con→con + lab + ld)

Notional May-election results:

$LABsh^{new}_{May} = MINIMUM_{across\ district\ in\ May}(LABsh)$

$LDsh^{new}_{May} = MINIMUM_{across\ district\ in\ May}(LDsh)$

$CONsh^{new}_{May} = CONsh_{May} - LABsh^{new}_{May} - LDsh^{new}_{May}$

Then usual procedure for calculation of changes and estimated shares is applied.

Restrictions:

We have to get at least a non-negative change for *LAB* and *LD*, so

If $LABsh < LABsh^{new}_{May}$ then $\textbf{\textit{LABchange}} = 0$.

If $LDsh < LDsh^{new}_{May}$ then $\textbf{\textit{LDchange}} = 0$.

If $CONsh < CONsh_{May}$ but $CONsh^{new} > CONsh^{new}_{May}$ then we set $\textbf{\textit{CONchange}} = 0$.

Example 7: *Imputation for missing vote shares for both May and by-elections for different parties* (con + lab→con + ld)

Notional May-election results:

$LDsh^{new}_{May} = MINIMUM_{across\ district\ in\ May}(LDsh)$

$LABsh^{new}_{May} = LABsh_{May} - MINIMUM_{across\ district\ in\ May}(LABsh)$

$CONsh^{new}_{May} = CONsh_{May} - LDsh^{new}_{May} + LABsh^{new}_{May}$

Restrictions:

We have to get at least a non-negative change for *LD*:

if $LDsh < LDsh^{new}_{May}$ then $\textbf{\textit{LDchange}} = 0$.

If $CONsh < CONsh_{May}$ but $CONsh^{new} > CONsh^{new}_{May}$

or $CONsh > CONsh_{May}$ but $CONsh^{new} < CONsh^{new}_{May}$

then we set $\textbf{\textit{CONchange}} = 0$.

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Appendix 8

Women in English Local Government, 1973-2003: Getting selected, getting elected

Borisyuk, G., C. Rallings, & M. Thrasher (2007) Women in English Local Government, 1973-2003: Getting selected, getting elected. *Contemporary Politics* 13 (2): 181-200.

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Women in English local government, 1973–2003: getting selected, getting elected

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Although women comprise over half of the UK electorate, their relatively low numbers in elected office continues. The 2005 general election saw 128 women members returned—19.8% of the House of Commons. Despite the recent upward trend the UK still ranks rather low in the Inter-Parliamentary Union's league table of women's representation. The situation is little better for the European Parliament where the UK lies below the EU average. In 2004 the proportion of elected women actually declined from 24.1% to 23.1%. Women's representation is, in common with many other countries, better for sub-national units of government. Currently, women comprise up to one-third of candidates and more than a quarter of local councillors, leaving the UK midway among member states of the European Union.[1] A similar story is found within the new devolved institutions of the Scottish Parliament and Welsh Assembly.[2] The UK, therefore, certainly confirms the 'law of minority attrition', whereby the proportion of women holding elected office decreases as the perceived importance of political office increases.[3]

Relatively speaking, local government has been enlightened in providing women with the vote and encouraging them to stand for election. Unmarried women taxpayers could vote in local elections from the 1830s onwards. By 1875, nearly half a century before they were even permitted to vote in parliamentary elections, women could be and were elected to such local authorities as Boards of Guardians. Local government has consistently provided more political career opportunities for women. A study in 1964, for example, estimated that 16% of all local election candidates were women, more than three times as many that fought parliamentary constituencies at the time.[4]

Although women's recruitment as candidates and their electoral success has been widely studied for the UK parliament it is largely ignored at the local government level.[5] This neglect is partly because of data availability but it also replicates the situation for other polities; national parliaments are studied but lower levels of government are overlooked.

This paper partly redresses that imbalance, using newly available local electoral data to track and analyse aspects of the recruitment and retention of women candidates and councillors since the early seventies. In order to set this research within the broader literature on women's recruitment we provide a brief review of existing research on national legislatures. Following this we

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outline the data before framing a series of research questions based on the prior evidence. The data analysis concentrates first on women candidates and second on women councillors.

Determinants of women's (under-)representation in elected office

Norris and Lovenduski identify three main factors affecting women's recruitment to a career in national politics.[6] First are systemic factors, including the voting system, district magnitude (the number of seats in each electoral district or constituency) and the party system.[7] For our specific purposes here we add electoral frequency and different types of local authority to this list. A second set of factors are party political, comprising organization, rules and ideology. Although Darcy rejects the view of a male-dominated, party-establishment conspiracy restricting women's recruitment, Sanbonmatsu points to the gatekeeping role exercised by party elites.[8] Certainly, some party organizations have been slower than others in responding to the imbalance in women's representation.[9] In the UK, while the Labour and Liberal Democrat Parties guarantee that women candidates appear on shortlists for parliamentary seats, the Conservative Party, at the time of writing, does not. Accordingly, our analysis pays close attention to party effects in the recruitment of women. The third factor identified by Norris and Lovenduski is socio-economic circumstance, including the individual's access to resources. This 'eligibility pool' is critical because fewer women are located in the customary occupations held by aspiring elected politicians. Moreover, women are less likely to be encouraged to stand and less likely to perceive themselves as qualified to stand.[10] Resource pressures are also key deterrents to women standing for local election in the UK.[11] Indeed, women councillors leaving local government complain of difficulties in balancing commitments.[12]

Being selected is only the first rung on the political career ladder and getting elected is a hazardous business. Some of the sharpest differences in women's representation again relate to the electoral system used. The proportion of women in PR-elected legislatures, for example, is roughly twice that for majoritarian systems.[13] A key part of the explanation for this lies with district magnitude. Large district magnitudes, as frequently used in PR systems, may encourage parties to select both men and women candidates.[14]

Majoritarian systems, including our own 'first past the post', are not restricted to single-member electoral districts, however, and as district magnitude rises more opportunities may arise for women.[15] Research on the relationship between plural voting and district magnitude from the USA is inconclusive. Some studies show women candidates fare better, or certainly no worse, in multi-member than in single-member districts but other research struggles to find statistical significance.[16] Previous, though limited, research on English local elections (where multi-member wards are used in some authorities) concludes similarly, finding no clear linear relationship between district magnitude and women's success.[17]

It is widely acknowledged that a major obstacle to increasing women's representation is political incumbency.[18] At the 2005 UK general election, for example, in almost nine out of ten constituencies at least one candidate was an incumbent. From the total of 573 incumbents, just 50 (8.7%) failed to be re-elected. Since most MPs are men, incumbency becomes an obvious obstacle to women's representation. Although incumbent advantage may be less pronounced in local contests, women must wait for vacancies to arise. To counteract this some US states introduced 'term limits' whilst in Wales, prior to the 2004 council elections, men incumbents of long duration were encouraged to stand down.[19]

Another potential obstacle to increasing women's representation is that some voters may dislike women candidates. However, individual-level data show that voters respond positively towards female candidates.[20] This question is overlooked in the UK context because of single-member constituencies and because so few voters allow a candidate's sex to override partisanship. But local electoral data allow the question to be addressed because sometimes parties present not one but rather a slate of candidates when more than one seat is at stake. One previous analysis, limited to two sets of local elections, could find no statistical difference between the electoral fortunes of men and women, but we can consider this question more fully here.[21]

Data

The Local Elections Database used in this article has been compiled by the Local Government Chronicle Elections Centre, University of Plymouth, with funding provided from the Economic and Social Research Council.[22] The database includes, *inter alia*, the result from every local government election in Britain from 1973 (1964 for London). However, this paper concentrates only on England since 1973 because the pattern of local government structure and party competition in both Scotland and Wales are substantially different. Further exclusions to the scope of data are necessary because of certain structural change since 1973.[23] These changes include the abolition of the Greater London Council and six metropolitan counties in 1986, and the replacement, since 1996, of some two-tier local government areas with single-tier, all-purpose unitary local authorities. In order that our over-time analysis is not unduly affected by these changes, we include only those types of local authority in existence over the entire period—see Table 1.[24] Such omissions do not affect our substantive findings.

Additional, though useful, complexity in the data follows from different electoral arrangements for different types of local authority. As Table 1 shows, some types of authority re-elect their whole council every fourth year, but for others there are elections in most years with a fraction of the seats, normally a third, becoming vacant. District magnitude (the number of councillors per ward) varies. Currently, almost all multi-member wards (termed divisions in

Table 1. A typology of English local authority electoral cycles

Type of local authority	Electoral cycle	Partial/whole	District magnitude
London boroughs	Quadrennial	Whole	1–3
Metropolitan boroughs	'Annual'	Partial	1 per election
District councils (*c*.2/3 of cases)	Quadrennial	Whole	1–3
District councils (*c*.1/3 of cases)	'Annual'	Partial	1 per election
County councils	Quadrennial	Whole	1

county councils) elect either two or three members. These differences mean that we can control both for electoral frequency (annual or quadrennial) and district magnitude (one seat versus many seats) when analysing the selection and election of women.

Excluding reorganized authorities, noted above, reduces the cases to 140,000 separate elections covering the period 1973–2003. Each result includes each candidate's sex, party, vote and incumbency with details available for over half a million candidates. These cases are used for the broad description of overall trends in the recruitment of women to local government since the seventies. Smaller sub-sets of data are used to address more specific research questions described below.

Research and methodology questions

Although much of the research on women's selection and election has had a national focus, the literature helps in identifying some key structural factors. Additionally, there are specific aspects of local government structure that provide opportunities for greater analytic purchase. Accordingly, this paper addresses the following research questions. Are there differences in trends in the recruitment and election of women among the various types of local authority, county, district and borough? While differences exist in the proportions of women representing political parties in the House of Commons, are they also present in local government? Electoral context may also play a role in women's recruitment. Is the variable nature of the electoral cycle relevant, with annual elections offering more decision points for candidates deliberating about whether or not to stand?

Once the decision to stand is made are the seats that women contest the most likely to result in victory or defeat? Are these candidates invariably competing against men incumbents? Some local elections use multi-member wards/divisions and this additional variable allows for a more nuanced analysis of women's recruitment. Is there evidence that local parties take advantage of multi-member seats, presenting voters with a more gender-balanced ticket? Prior research has identified 'a contagion effect', suggesting parties follow one another in selecting women candidates and we discover whether this phenomenon occurs in English local government.

Once elected is there evidence that women fare differently from men, both in terms of voter support and the length of time served as councillors? When women retire from the council are parties more likely to select a woman candidate as replacement, thereby at least maintaining the proportion of women council members? This is a lengthy list of research questions but one which reflects the paucity of existing research.

The analysis begins by considering women *candidates*. The initial focus is on the proportion of women candidates and whether over time any patterns that emerge are conditional upon either the type of local authority or the candidate's party. The critical role of local parties in selecting women candidates will be addressed in light of the questions posed above, i.e. electoral competitiveness, gender balance and the presence of incumbents. The second part of the analysis considers women *councillors*. Again, we begin by considering the overall trends, comparing how types of local authority and different political parties vary in the proportion of women councillors. Next, we assess how well women councillors do in terms of voter support and whether there are significant differences in the duration of men and women's political careers. Finally, we investigate the pattern of succession in seats when women incumbents retire from the council.

Women candidates in English local government

Women now comprise around 30% of total candidates, double the figure for the first post-reorganization elections in 1973 (see Figure 1). The early years showed little movement: women comprised a fifth of all candidates on only three occasions prior to 1986. However, in the subsequent four-year period, women rose to a quarter of candidates. From then onwards the general trend continued upward, although the pace of progress slowed. One aspect of the data requiring explanation is the four-yearly dip beginning in 1989. This decline coincided with the county council elections. Geographically speaking they are the largest local authorities and, during the period 1989–2001, used single-member electoral districts. It is plausible that women are more reluctant to stand in these elections because of the resource implications of travelling to what may be quite distant council meetings. Unfortunately we have no spatial data that would facilitate examination of this possibility. Women candidates may also be less likely in single-member electoral districts because local party selection meetings show preference towards men. We shall consider this question below.

Figure 2 charts the trends in women candidates for the different types of local authority identified in Table 1. During the seventies the highest proportion of candidates was in the London boroughs and the lowest in the metropolitan boroughs. These authorities cover some of the most densely populated areas and share many demographic characteristics. The lowest points on the metropolitan borough line

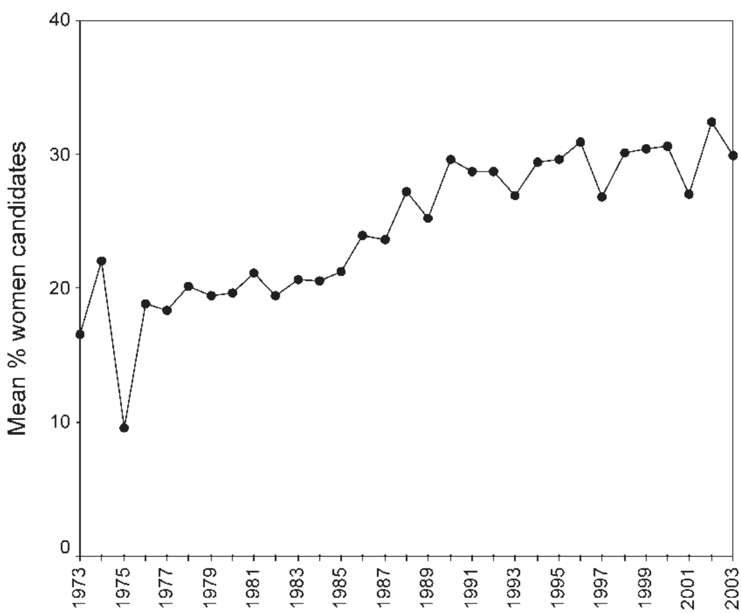

Figure 1. Women candidates in English local elections.

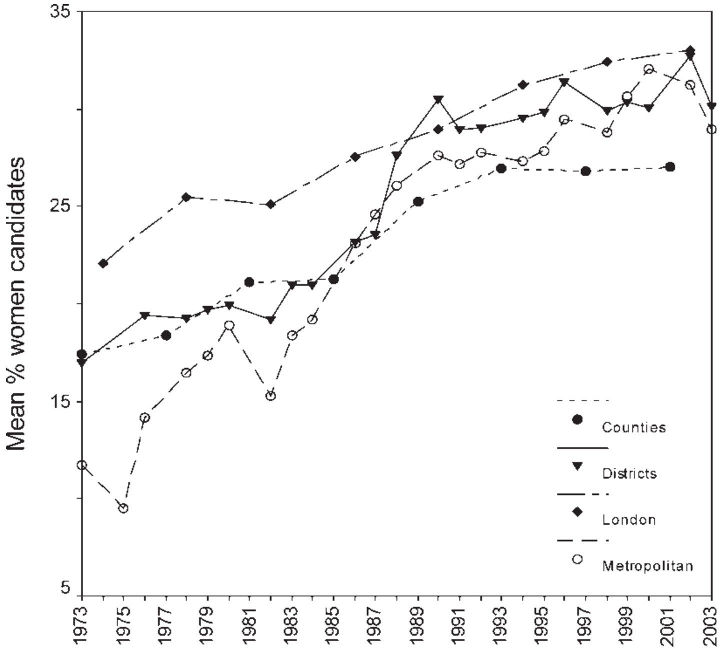

Figure 2. Women candidates and type of authority.

coincide with special whole-council elections in multi-member wards that follow periodic boundary changes; in other words, precisely when electoral arrangements closely approximate those in London. As the proportion of women challengers increased during the eighties, so differences between the different types of local authority diminished. There was a particularly steep climb in the metropolitan boroughs after the nadir of 1982, while the trend line for London boroughs stabilized. By the beginning of the nineties convergence was almost complete, despite the slight lag for the county councils.

Another aspect in the selection of women candidates relates to possible party effects. As Figure 3 shows, the Liberal Democrats (including formerly Liberals and the SDP/Liberal Alliance) chose proportionally more women than either of the two main parties, namely Conservative and Labour. Following establishment in the late eighties the Liberal Democrats made an effort to select more women, a tactic more successful at local than for parliamentary elections.[25] Another factor that may account for the party gap is that the two main parties have been restricted in selecting more women until men first elected in the late seventies retire from office.

Figure 2 shows that the proportion of women recently contesting single-member seats at county council elections was lower than for other types of authority—this may be because of reasons discussed above but may also relate to district magnitude. In their study of US state legislatures, Darcy and others found that women candidates were more numerous in multi-member districts and that this did not occur by chance.[26] In order to test for a similar effect here the analysis considers those authorities that use whole-council elections and

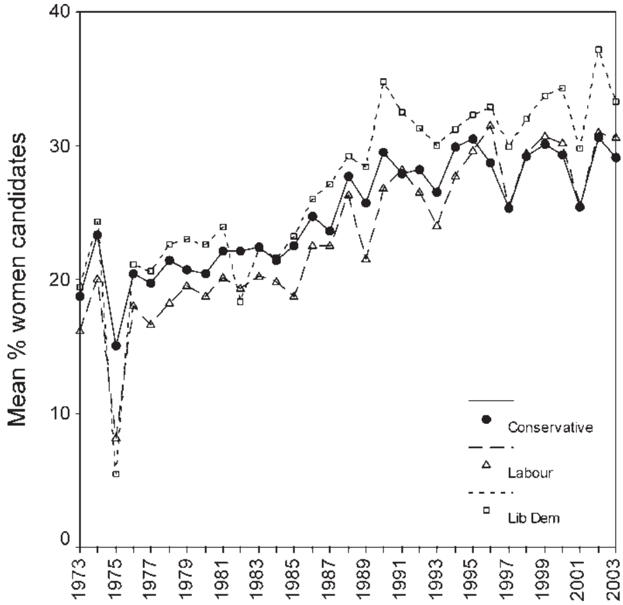

Figure 3. Women candidates by political party.

variable district magnitudes—effectively the London boroughs and a majority of shire districts. The results are shown in Figure 4.[27]

Data for London are restricted to two- and three-member seats because the number of single-member cases is small.[28] In 1974 women were much more likely to have stood in three-member rather than two-member districts. In 1986, the reverse position held. In other years, however, there appears to have been very little variation between the two. Over the whole period, women comprised 28% of candidates in two-member and 29% in three-member seats. In this situation a useful procedure for considering the relationship between more than two categorical variables simultaneously is loglinear analysis.[29] This analysis

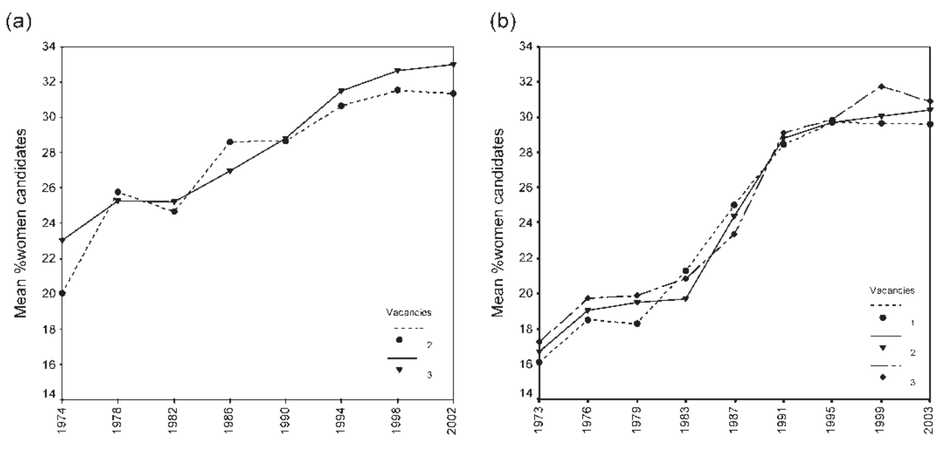

Figure 4. Ballot structure and women candidates: (a) London; (b) districts (whole).

shows that, in London at least, there is no statistically significant relationship between candidate sex and district magnitude.[30] A more detailed analysis is conducted for the shire districts where there is a wider range of one, two and three-member electoral districts and more than 100,000 individual candidates. But this analysis also does not reveal a significant relationship between women candidates and increasing district magnitude.

Although the proportion of women candidates has risen overall, that growth is unlikely to lead to an equality of representation if the seats that women contest are the most difficult to win. There are two principal factors that may impact on women's success. First, there is the size of the winner's majority in the seat for which they are the challenger. Second, it is important to know whether or not they are challenging an incumbent or instead fighting an open seat.

In order to test whether women challengers are mainly provided opportunities to fight more difficult seats we selected cases where district magnitude is one and where the incumbent party was either Conservative, Labour or Liberal Democrat. We then divided seats according to, first, whether the percentage majority at the previous election was greater than 20% (safe seat) or less than 20% (marginal seat) and, second, whether or not an incumbent councillor was contesting.

For metropolitan boroughs, the mean percentage of women challengers was 21.7% in marginal seats and 25.6% in safe seats. In seats without an incumbent standing there was a mean of 20.5% for women candidates in marginal seats, but 24.2% in safe seats. Where an incumbent stood the percentage of women challengers was 22.9% in marginal and 26.7% in safe seats. Loglinear analysis reveals statistically significant two-way associations between seat marginality, whether it is an open seat, and the participation of women candidates. We conclude that women candidates in the metropolitan boroughs are more likely to be found fighting difficult-to-win seats and challenging incumbents.[31]

The picture is less clear for the two types of district councils. Loglinear analysis of authorities that use whole-council elections does not reveal statistically significant associations between seat marginality and number of women candidates when incumbency is taken into account. However, two-way associations between number of women and marginality, and between marginality and incumbency are significant. The proportion of women candidates was 29.0% in marginal seats, 31.4% for safe seats. Women comprised 30.2% of challengers to incumbents in marginal seats but 34.7% in safe seats. In authorities with partial council elections, women comprised 24.5% of the candidates in more marginal seats but 26.4% in safe seats. In open seats women comprised 22.0% of challengers in marginal and 24.6% in safe seats. However, in seats with an incumbent seeking re-election, there was less than a one percentage point difference in the two types of seats (27.8% and 28.5%). We have no satisfactory explanation at this point for why the pattern of women's recruitment in the metropolitan boroughs should be so clear but more opaque for the shire districts.

Previous research shows that women candidates sometimes 'cluster', in the sense that when one party selects a woman its rivals often follow suit.[32] Focusing on contests with only one seat at stake and where candidates stood from each of the three main parties—Conservative, Labour and Liberal Democrat—we identified sufficient cases to test for clustering in the metropolitan boroughs, county and district councils. Table 2 confirms that there appears to have been a contagion effect for each type of authority. In the metropolitan boroughs, for example, even

Table 2. The contagion effect: percentage of Conservative (CON) women candidates conditional on gender of Labour (LAB) and Liberal Democrat (LD) candidates

				County		Metropolitan		Shire district (partial)	
				CON Woman	*N*	CON Woman	*N*	CON Woman	*N*
LAB	Man	LD	Man	23.2%	7,036	26.1%	6,780	25.2%	9,376
			Woman	25.3%	2,482	28.2%	2,511	27.8%	3,755
	(Subtotals)			23.7%	9,518	26.6%	9,291	25.9%	13,131
	Woman	LD	Man	24.8%	2,034	27.8%	1,794	26.5%	3,317
			Woman	27.6%	797	30.4%	759	26.9%	1,459
	(Subtotals)			25.6%	2,831	28.6%	2,553	26.6%	4,776

when there was no female Labour candidate, the chance that the Conservatives fielded a woman candidate was higher when the Liberal Democrats also selected a woman (29.6% against 23.1%).[33] When Labour fielded a woman candidate, once again it was more likely that the Conservatives would complete the all-female slate of candidates if Liberal Democrats had done the same (32.3% against 29.6%). A similar pattern was present for both the counties and districts.

We conducted a loglinear analysis of three-way contingency tables to assess the statistical significance of these findings. The independence model (that the presence of women candidates for Conservative, Labour and Liberal Democrat is mutually independent) is rejected for all types of election.[34] In short, there is a statistically recognizable tendency for women candidates to cluster together. Interesting though this is, there is no reliable method using aggregate data, for discovering *why* this should be the case. A supply-side argument may be that women locally are aware of other women deciding to stand and feel it is appropriate that they too should stand. A demand-led argument might be that local parties observe their rivals' behaviour and when at least one selects a woman then efforts are made also to find a woman candidate.

Women councillors in English local government

The increase in the number of women elected to local office over time (see Figure 5) has followed a similar path to the growth in women candidates noted in Figure 1. Until 1985, and despite fluctuations from year to year, women filled roughly 16% of all seats in local government. Over the following decade, however, there was an almost uninterrupted rise. Any noticeable downturns tended to coincide with county council elections in 1989, 1993, 1997 and 2001 (recall Figure 1). It is ironic that the synchronous general and county council elections in 1997 resulted both in a record number of women MPs (120, 18.2%) but a lower than average number of women elected to the county councils (522, 23.7%).

A more formal control for the type of local authority shows that in the immediate post-reorganization period women county councillors were relatively numerous, but thereafter progress was comparatively restrained (see Figure 6). The London boroughs, originally with the greatest proportion, were later largely matched by both the shire districts and metropolitan boroughs. The pattern

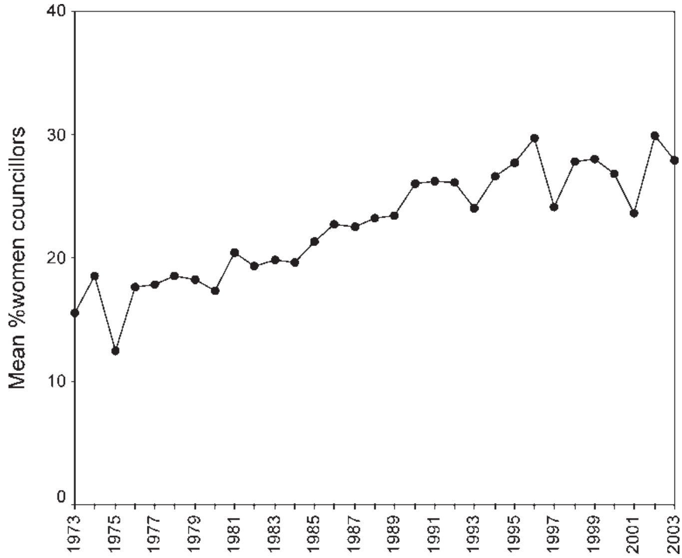

Figure 5. Women councillors in English local government.

in the metropolitan boroughs has been somewhat erratic, but closer examination reveals a cohort effect, with a relatively high proportion of men incumbents seeking re-election at certain points of the four-year electoral cycle.

There are also differences among parties in the proportion of women elected (see Figure 7). For example, at the beginning of the period, although women were few in number they comprised a larger proportion of the Liberal Party's

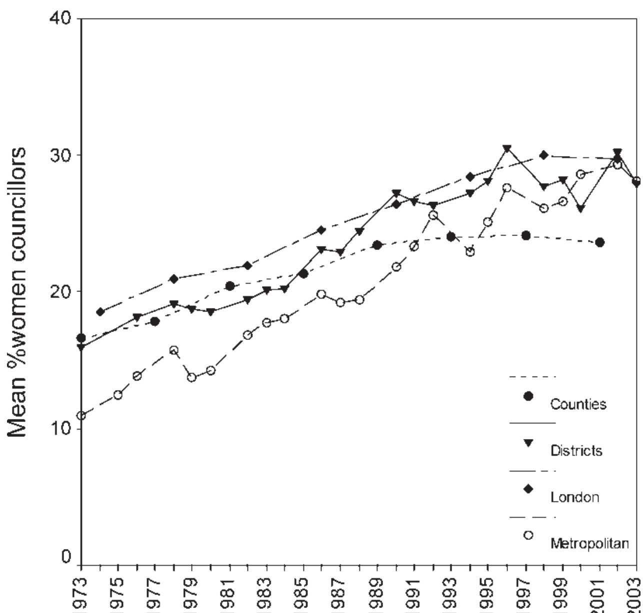

Figure 6. Women councillors and type of authority.

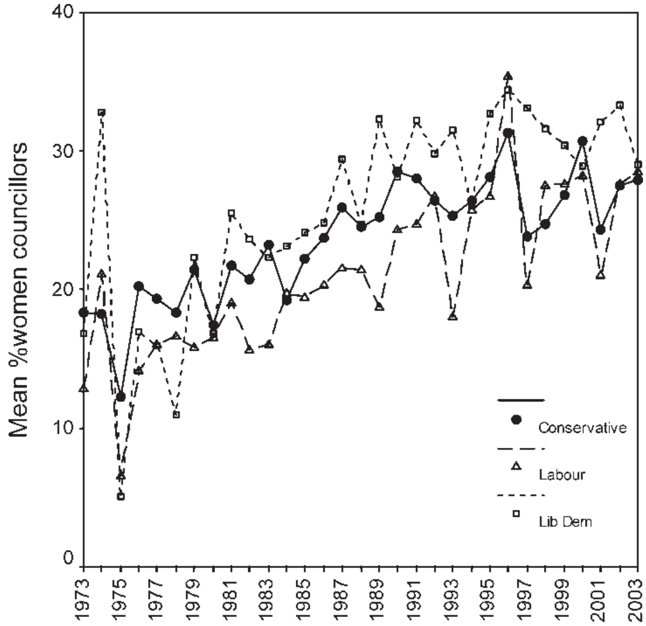

Figure 7. Women councillors by political party.

overall representation than was the case for either the Labour or Conservative Parties. As the party's council membership has grown, so it has maintained its record for being 'women-friendly'. In turn, Conservative women councillors have generally formed a greater proportion of their party's local government membership than have Labour women. Labour women county councillors (and indeed candidates) are especially scarce.

Of course, for women candidates to make the transition to women councillors requires sufficient support from voters. When using aggregate data, unwarranted inferences about individual-level behaviour should be avoided. But the unusual structure of local elections in England means that opportunities arise to identify whether, other things being equal, voters discriminate for or against women. For the first of our analyses we selected multi-member electoral units among the London boroughs and district councils where a major party fielded more than one candidate and where only one of those candidates was a woman. If there was evidence of bias, for or against, then the finishing positions of women within each party's slate of candidates would differ from that expected (calculated under the assumption of random finishing order). Negative residuals between observed and expected frequencies in the higher positions of a party's slate would imply that fewer women than expected occupied these positions—evidence of voter discrimination against women. On the other hand, positive discrimination would mean positive residuals in the higher positions on party slates. The third possibility, of no voter preference for candidates on the basis of sex, would produce no pattern in the distribution of residuals.

The analysis suggests that electors do not discriminate against women and in some cases we found statistically significant evidence of a positive bias. For all three main parties positive residuals could be found in either first or second positions and negative residuals in third place or lower. In county and district (partial) elections, the difference between actual finishing order and the expected one was not statistically significant. In London and districts (whole), voters had a statistically significant preference for women candidates from all three main parties. In metropolitan boroughs there was indifference to candidate sex among Conservative and Liberal Democrat voters but Labour voters had a small preference for women. This analysis does not control for alphabetical order on the ballot, nor candidate ethnicity, although we would expect any effects from these to be randomly distributed.

Another method for indirectly considering voter preference towards a candidate's sex is to examine the change in percentage share of the vote for candidates who succeed in capturing a seat for the first time. Are men swept to power on a stronger or weaker tide of voter support or should we accept the null hypothesis that there are no differences in mean change in percentage vote share for newly elected men and women councillors?

Figure 8 shows the pattern of inter-election swing (defined as change in share of vote between one election and the next) in single member seats in the metropolitan boroughs, county councils, and district councils with partial elections. In two cases—the counties and districts—the respective means were very similar. However, in the metropolitan boroughs, the mean percentage change for newly elected men was three percentage points but for women it was nearer to two points. A two-way ANOVA test (candidate sex and time/year of election were used as fixed factors) showed that time had a significant influence on swing (reflecting non-constant change in vote shares through time) but gender was insignificant. We considered whether these differences were a function of the incoming councillor replacing an incumbent party. Given that women are more likely to challenge in safe seats it is, in fact, more likely that the percentage change in vote for a newly elected woman will be greater than for a man. Dividing seats into those won from the same or a different party does not explain why differences in the metropolitan boroughs exist.

Once elected, is there evidence that the duration of a woman's political career is likely to be different from that of a man's? Given the emphasis on resource pressures we anticipate that women will voluntarily remain in office for a shorter period than men. Accordingly, we selected a number of starting points for a range of council types and wards whose boundaries remained unchanged until 2003. Identifying newly elected councillors, we then monitored their

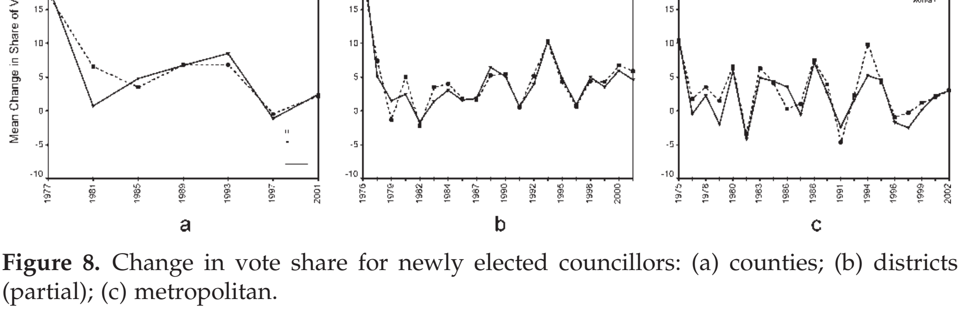

Figure 8. Change in vote share for newly elected councillors: (a) counties; (b) districts (partial); (c) metropolitan.

careers, noting the time when they voluntarily stood down (councillors defeated at the ballot box are excluded from the analysis). Table 3 shows only small differences in career duration between men and women. The *t*-test for independent samples revealed no statistical significance ($p > 0.1$ for all comparisons). This does not provide support for the view that the duration of women's political careers is adversely affected by resource pressures.

These data were compared with two councillor surveys conducted in 1997 and 2000 although these were not restricted to those voluntarily retiring from elected office.[35] The 1997 survey found that the average tenure was 7.6 years for women councillors and 9.4 years for men—a difference of 1.8 years. The subsequent survey in 2000 reported tenure as 8.3 and 9.4 years for women and men, respectively, a narrower though still significant gap. We attempted to replicate these surveys using candidate-level data instead; defeated councillors as well as those that retired voluntarily were examined. The analysis moved backwards in time, originating in 1997 or 2000, and traced the duration of careers for the county councils, metropolitan boroughs and district councils that elect by thirds. The findings showed quite small differences in career duration. For the counties the difference was non-significant while for the metropolitan boroughs and district councils the differences were only significant at the 5% level.

These two sets of data—our own and I&Dea surveys—differed slightly but there may be an explanation for this. First, our selection technique was determined by our data. Extensive boundary changes sometimes meant that an elected member was forced to move to another electoral district and we were unable to maintain contact. Additionally, the method that was used to calculate duration in office in Table 3 was to use fixed time periods and many of these councillors will continue in office, leading us to underestimate the longevity of political careers. Finally, with the survey data, we should allow for both faulty memory and non-response bias. This is clearly an issue that requires further investigation.

Above, we noted that for candidates elected for the first time there were no differences, controlling for candidate sex, in the level of voter support. Furthermore, in multi-member wards, women candidates performed well on their party slates. There are two further tests that we can conduct. By selecting all single-member electoral districts and controlling for sex, we can measure first, the relative swing against incumbents and second, the level of turnout. Figures 9 and 10 confirm our initial findings. There were no significant differences

Table 3. Duration of political careers

	Mean time on the council (years) (No. of cases)	
	Men	Women
Counties	9.1	8.8
New councillors elected in 1981	($N = 649$)	($N = 157$)
Districts (whole)	9.2	8.8
New councillors elected in 1979	($N = 378$)	($N = 87$)
London	7.1	6.8
New councillors elected in 1978	($N = 808$)	($N = 231$)
Metropolitan	8.4	8.6
New councillors elected in 1982–4	($N = 889 + 307 + 291$)	($N = 193 + 78 + 73$)

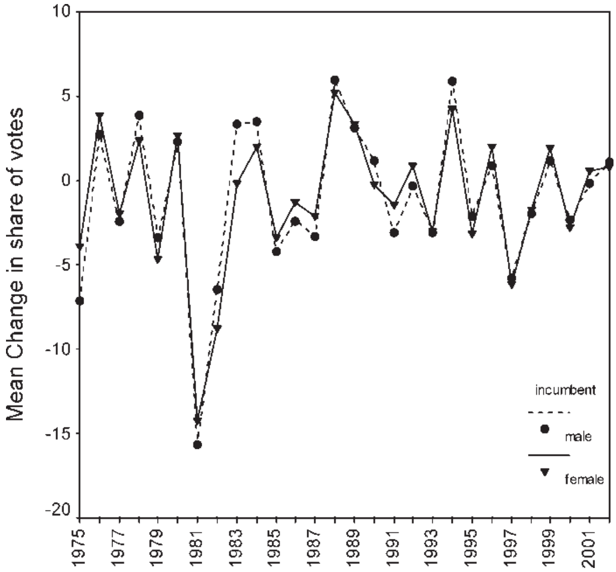

Figure 9. Voting for and against incumbents.

in vote swings amongst men and women incumbents seeking re-election. Neither were there differences in levels of turnout. In short, the local electorate as a whole does not appear at any time during the past 30 years to have expressed a preference towards councillors on the basis of their sex.

How concerned are local political parties that the proportion of women councillors, if not improved, is at least sustained? We address this question by focusing on single-member electoral districts, noting what happens in the selection process when councillors stand down. Table 4 suggests that the incumbent party does try

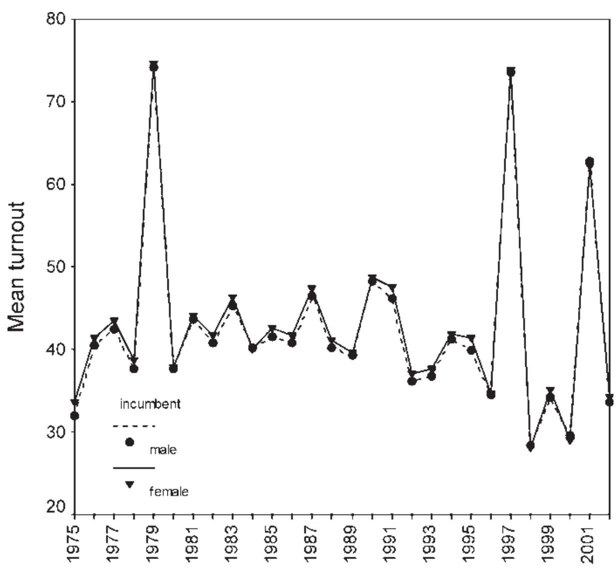

Figure 10. Turnout and councillor gender.

Table 4. Maintaining women's representation

	Type of authority	Women candidates	Total *N*
Woman resigned	Metropolitan	26.5%	1,015
	Counties	28.4%	894
	Districts (whole)	45.4%	603
	Districts (partial)	26.3%	2,660
Man resigned	Metropolitan	18.4%	4,190
	Counties	20.6%	3,471
	Districts (whole)	13.8%	2,676
	Districts (partial)	19.7%	9,346
Incumbent remains	Metropolitan	26.0%	1,790
	Counties	20.7%	208
	Districts (whole)	22.6%	164
	Districts (partial)	28.0%	2,378
Total *N*	Metropolitan	1,507	6,995
	Counties	1,011	4,573
	Districts (whole)	680	3,443
	Districts (partial)	3,204	14,384

to maintain, if not improve, the proportion of women. In the metropolitan boroughs, for example, when a man stands down his party selects a woman replacement in just under a fifth of cases (18.4%). By contrast, when a woman retires, a woman is the party replacement in more than a quarter of cases (26.5%). The pattern is more apparent in districts that use whole-council elections. In just under one in eight cases of a man retiring, a woman is selected but in almost half the seats where a woman resigns another woman is the replacement. All differences are statistically significant.

Conclusions

The availability of such a large data set covering a 30-year period permits both a longitudinal analysis and sufficient diversity to test for some subtle, though important, electoral system effects. The first part of our analysis focused on women being selected; the second dealt with women being elected.

Since local government reorganization in the early seventies to recent times the proportion of women candidates has doubled. The rate of growth was particularly rapid in the second half of the eighties and it would be fascinating to identify this pattern in other polities. Small perturbations in the trend line coincided with elections to the shire county councils. This may follow from resource pressures on women since these authorities cover the largest geographical areas. Each of the three major political parties recruited more women candidates over the period, although the Liberal Democrats maintained an advantage over Labour and the Conservatives.

We found that, unlike some other plurality systems, and certainly unlike PR systems, the proportion of women candidates is unrelated to increases in district magnitude, at least to a maximum of three. Women candidates were selected more frequently than men to fight difficult-to-win seats, although this may reflect a bias among party selection panels and/or the personal wishes of women, happy to stand but unwilling to win. In some types of council, women candidates are handicapped by being selected to challenge an incumbent. There is a contagion effect in the recruitment of women candidates; when one party selects a woman, there is a good chance that its rival(s) also select a woman. This effect is found in certain types of PR voting but it is unexpected—and so far unexplained—in single-member plurality systems.

The second part of the analysis focused on elected women. Given that women were more likely to be selected for less winnable seats, it was expected that the proportions of women elected would lag slightly behind the trend line for candidates. This was the case throughout, with the growth in both women candidates and councillors tending to flatten out in recent years. Women have comprised a consistently higher proportion of Liberal Democrat than Conservative or Labour councillors.

Variability in the structure of local elections meant that we were able to test whether voters as a whole expressed a preference for men or women councillors. In multi-member electoral districts women candidates tend to receive more votes than do men on the same party slate, controlling for ballot-position effects. This was generally true for all types of local authority. Again, it is difficult to say with any conviction why this should be the case. Candidate sex also seemed to weigh lightly with voters when a councillor sought re-election. There is no evidence that either swing or turnout differs according to the incumbent's sex. Political parties do appear to be mindful of at least maintaining the proportion of elected women. When a woman councillor retires efforts are made to find another woman to replace her. According to the aggregate data, the careers of men and women councillors are comparable in duration.

In general terms, therefore, systemic factors, such as district magnitude and the cycle of local elections, do not operate to the detriment of women candidates or councillors although aggregate data cannot explain *why* women are more often challengers in safe rather than marginal seats. Similarly, party political factors do not appear to constrain women's involvement. Indeed, local parties appear conscious of the need to safeguard, if not expand, the proportion of women standing for elective office. There is no evidence that the explanation for the under-representation of women lies with voter preference. There is no prima facie reason, therefore, why political party selection meetings should discriminate against women as candidates.

And yet the proportion of women candidates and councillors in local government remains relatively low. There is a limited amount of evidence that resource issues may explain some of this trend. Why would local parties necessarily select women to fight the more difficult seats when the evidence suggests that voters respond positively to their selection? Women's representation on relatively large (geographically speaking) local authorities has become lower than in authorities whose areas are smaller, despite the fact that responsibility for services such as education and social care are entrusted to the larger authorities.

In describing the general trends in the recruitment of women as both candidates and councillors we have opened up a new set of research questions. While the evidence is strong that systemic factors do not suppress the numbers of women it is less clear what role is played by party political and resource factors. There are no studies of local party selection panels and processes that could confirm whether or not that a person's sex becomes relevant. Equally, there is no evidence that parties are proactive in prompting women to stand or that the parties now find it harder to recruit women for county elections. This type of research would need to be conducted alongside large-sample surveys of candidates and councillors that address personal resource issues. There is a suggestion, but no firm evidence, that the progress in women's recruitment may have stalled because of an imbalance in opportunities for men and women. This article has shed light on the recruitment of women as candidates and councillors to local government since the early seventies, but without knowing more about what goes on inside local parties and how men and women cope with the resource pressures of serving as a local councillor it is difficult to design policies that could overcome women's under-representation.

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27. The analysis ignores uncontested elections and therefore considers only those elections where the number of candidates exceeded the available number of vacancies.
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34. More precisely, for the metropolitan boroughs and country-level elections, there are statistically significant associations between the appearance of Liberal Democrat women and the presence of Conservative women candidates and between Liberal Democrat and Labour women candidates. The association between Labour and Conservative women candidates is statistically insignificant at the conventional level. For district council elections all two-way associations are statistically significant.
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Appendix 9

Electoral salience and the costs of voting at national, sub-national and supra-national elections in the UK: a case study of Brent, UK

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25% of the work for the paper was undertaken by Galina Borisyuk

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Transactions of the Institute of British Geographers

Electoral salience and the costs of voting at national, sub-national and supra-national elections in the UK: a case study of Brent, UK

Scott Orford*, Colin Rallings, Michael Thrasher** and Galina Borisyuk****

This paper considers the impact of distance to polling station upon electoral turnout. Using polling station level data from a London borough, it examines three types of election – parliamentary, European and local elections – over a twenty year period. The UK is notable among western liberal democracies for its relatively large turnout gap – the percentage point difference between turnout at elections for the Westminster parliament compared to that for other institutions, including local councils and the supra-national European parliament. This research considers the hypothesis that in high information, high salience elections for the national parliament the costs of voting associated with travelling to a polling station to vote in person are perceived as either low or insignificant but that in low information, low salience elections, those costs are perceived as higher and may act as a deterrent upon voting. A series of multi-level models consider the relationships between the dependent variable, percentage turnout, and a range of independent variables, including socio-economic characteristics, marginality as well as the spatial context. We show that there is indeed a relationship between distance and voter turnout, and other spatial and contextual variables, which are stronger for the lower salience European and local elections than for the higher salience national elections. Hence we conclude that the local geography of the polling station can have a significant impact on voter turnout and that there should be a more strategic approach to the siting of polling stations.

key words electoral geographies voter turnout multi-level modelling GIS distance marginality

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Introduction

This paper considers the impact of distance to polling station upon voter turnout to three different types of elections in three time periods in Britain. The three types of election are parliamentary, local and European elections and cover the period from the late 1970s onwards. Our basic hypothesis is that in high salience elections, for example, a national general election, the distance travelled to the polling station to vote is discounted more than for other elections; in short where there is less at stake, electorally speaking, geography matters and turnout declines with distance. If this relationship is demonstrated, and distance measures are related to levels of participation, then that becomes relevant

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to the explanation for low and declining turnout and should be factored into policy initiatives that address this problem.

The gap between turnout at general elections in Great Britain and that for other types of election held at different times is among the largest of any western liberal democracy. This gap, ranging between 25 and 40 percentage points, is rarely subject to systematic examination; rather, explanations of voter turnout concentrate on specific types of elections and seek explanations for turnout/abstention within that context. This may be due to the lack of useful data. Survey data are most abundant for national elections and relatively scarce for local and European elections, for example. Even then, respondents to national election surveys are rarely asked about their participation or otherwise across the range of elections. Moreover, there is the longstanding problem associated with the over-reporting of turnout given the close associations between voting and civic duty. The alternative is to use aggregate data but problems exist here also. Apart from the problems of making inferences about individual level behaviour from ecological data, it is unsuitable because there is often no common comparative unit of analysis, or if there is, it is much too large to facilitate analysis.

However, there is scope for comparative analysis when local authorities retain records of voters' participation at the level of individual polling stations. The numbers of voters allocated to each polling station are rather small and the communities served are likely to remain reasonably stable (in terms of social composition) over relatively short time periods. Unfortunately, many local authorities in Britain do not compile detailed records of turnout at this level but there are exceptions, one of which is the focus of this paper. Having access to such low-level aggregate data and over a relatively long time period (the late 1970s onwards) allows us to test for the effects that a range of distance measures for the journey to vote may have upon the numbers of voters that participate.

The paper proceeds as follows. First, we examine existing research on turnout at elections in Britain, identifying those variables considered most relevant to the level of turnout but also focusing on potential explanations for the gap in turnout. In the same section we review existing studies where the costs associated with the journey to vote at a polling station appear sufficient to affect the level of electoral participation. The existing evidence informs our choice of independent variables when modelling turnout at the polling station level. The second section describes some of the political context for the London borough of Brent that comprises the basis of this study, while in the third section we describe the methods used in constructing the data set. In the fourth section we describe in a series of multi-level models the testing of the hypothesis regarding the effect of geography on low/high salience elections. The concluding section summarises the research findings and considers both future research and the possible policy implications.

Explaining turnout

Most studies of electoral participation in Britain focus on one specific type of election and very few consider turnout across the range of elections. For parliamentary elections turnout is influenced by the social composition and political marginality of individual constituencies (Denver and Hands 1997) while individual characteristics such as age, strength of party identification, interest in the campaign, caring who wins the election, and the perceived ideological difference between the parties and the closeness of the overall contest (Heath and Taylor 1999, Pattie and Johnston 1998) all have a bearing on who and who does not participate. Geography too plays its part in affecting turnout with measurable effects due to neighbourhood and other spatial units (Huckfeldt and Sprague 1995; Johnston and Pattie 2006; Johnston *et al*. 2007). Clarke *et al*. (2004), after examining the British Election Study, conclude that models of 'general incentives' and 'cognitive mobilisation' perform best when explaining turnout. Electoral participation, it seems, 'is partly a matter of calculations of the costs and benefits of certain courses of action, and partly a matter of characteristics which define the "good" citizen, such as attentiveness to the campaign, political knowledge, and especially, civic duty' (Clarke *et al*. 2004, 274). Although far fewer in number, local election studies have identified similar variables and drawn similar conclusions. Aggregate data analysis, for example, shows that electors in 'safe' seats are less likely to participate than those in marginal ones while the proportion of elderly residents and population stability are positively correlated with turnout (Rallings and Thrasher 1990; Rallings *et al*. 2000). At the individual level, age, length of residence, a sense of involvement in local politics and strength of party identification all appear to be important in determining the

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propensity to vote (Miller 1988). Crucially, perhaps, voters can be separately identified from non-voters at local elections because of their stronger sense of both civic duty and perception of electoral salience (Curtice *et al*. 2001).

Lower voter turnout at both local and European elections is addressed by the theory of 'second-order' elections (Reif and Schmitt 1980; Reif 1984). Turnout is expected to be lower at second-order (local/ European) than at first-order (general) elections simply because less is at stake and fewer people care about the outcome. Specific issues relevant to the election at hand tend to be of lesser salience. Studies in Britain, however, have found evidence that the choice of electors is influenced by context-specific factors at both local elections (Heath *et al*. 1997) and referendums (Denver 2002). The turnout 'gap' also resonates with the classical rational choice theory of the 'calculus of voting'. In Riker and Ordeshook's (1968) terms, if the costs of voting are substantially similar at the two contests, but the expected benefits rather less at one type of election than the other, then there is less reason to turn out.

The tipping point for voter participation at low salience elections, therefore, may become sensitive to minor adjustments to voting costs. For example, in experiments with all-postal voting in Britain and elsewhere, when all electors receive ballot papers at home and are able to vote prior to the election day, there should be, in theory, fewer circumstantial abstainers (Blondel *et al*. 1998). Indeed, the effect of all-postal ballots in raising turnout at low salience local and European elections is now well documented for the British case (Rallings and Thrasher 2007). Research, mainly conducted in the United States, is ambivalent about how, if at all, those who are drawn to vote by all-postal elections differ from those who vote where normal electoral procedures are in place. Some research (Berinsky *et al*. 2001; Berinsky 2005; Karp and Banducci 2000) concludes that voting by mail has the effect of increasing turnout most among those who are already predisposed to vote, but Southwell (2004) finds that postal voting expands the pool of potential voters by facilitating participation by 'soccer moms' or employed people whose busy schedules may make them circumstantial abstainers.

A close examination of marked electoral registers in the UK, showing who had and had not voted and where they lived, demonstrated, among other things, that electoral turnout is sensitive to changes in geography relative to the location where people are required to vote (Orford and Schuman 2002a 2002b; Taylor 1973); in short, distance matters, a feature not simply restricted to the UK (Haspel and Knotts 2005). Even subtle changes in electoral procedure and their effect on aggregate levels of turnout merely serve to emphasise the importance of the costs of voting and the price sensitive voter. Those visiting a polling station, for example, will factor in costs associated with the distance to travel and the estimated journey time. Other things being equal, it appears that those living in the densest populated urban areas perceive this cost as lower than do those living in outer suburbs where traffic congestion between home and work is relevant to the calculus of voting (Gimpel and Schuknecht 2003). Offering voters some relief from this cost by permitting either early voting or a postal ballot does have the desired effect. In their study of Clark County, Nevada, Dyck and Gimpel (2005) established that voting by post became more popular as the voter's distance from the polling station increased, but it is worth noting that the distances involved were as high as 65 miles. There is also evidence that word of mouth among busy commuters about the availability of early voting facilities could play a positive role in affecting turnout (Gimpel *et al*. 2006). Further confirmation of sensitivity to polling place location comes from a study of the 2003 California recall election (Brady and McNulty 2005), which found that the consolidation of polling places in some areas had a negative impact on turnout; for some electors the disruption to their voting routine and the additional travelling costs proved a sufficient disincentive to voting.

While it appears that a number of factors are common across explanations of voter turnout at different types of election, there are clues that the costs of voting contribute to relative differences in turnout. We now begin describing some of the political context for this examination of the effects of geography upon voter turnout.

Case study and context

The key concern of the paper is to investigate the impact of distance to the polling station on voter turnout. This would require individual level data on who had and had not voted, where they lived and the location of the polling station. Such data are often available from local authorities in the form of marked electoral rolls and these have been used in previous (small-scale) research (e.g. Orford

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and Schuman 2002a 2002b). However, their use in a large-scale study such as this one is limited by the fact that they are not available in a digital format which necessitates their manual input. For a single election in one constituency this could relate to several tens of thousands of records. Moreover, these marked rolls are rarely kept for more than 5 years after an election, which prohibits an investigation into long-term trends in turnout. Instead, turnout data aggregated to the level of the polling district will be used as this tends to be available in a digital format and for longer periods of time. A proxy measure of distance will be constructed – in this case the average distance between voters' homes and the polling station for each polling district, looking at small groups of homes using unit postcode data. This is explained in more detail in the next section.

The focus for this case study is the London Borough of Brent, which has compiled complete polling-district-level data on turnout for parliamentary, European, and local elections for the period 1978–2001. These data include the number of voters, the number of registered electorate and the number of postal voters for each polling district. It does not contain information on the non-registration of voters or how voters travelled to the polling station to vote (e.g. walking, by car etc.). Each electoral ward (used for local elections and as the building blocks for parliamentary constituencies) is subdivided into a number of polling districts and each has a polling station where people go to vote. Electors can only cast their vote at a specified polling station, usually the closest one. As parliamentary and European elections are not distinctly ward-level elections, polling districts are a useful spatial scale to study and also provide an unusually fine-grained analysis of aggregate voting data (averaging about 1300 electors).

Brent has the added advantage of encompassing three entire parliamentary constituencies (Brent East, Brent North, and Brent South), thus providing greater opportunities for direct comparisons. Figures 1 and 2 illustrate the electoral geography of Brent in 2001. Figure 2 shows that not all polling stations are located within the polling district that they serve, reflecting the policy of using certain buildings as polling stations, which is discussed later. The three time periods examined here cover a 20-year span. Time period one relates to the 1979 parliamentary election, the 1979 European election, and the 1978 local election; two relates to the 1992 parliamentary election, the 1989 European election, and the 1990 local election; and three to the 2001 parliamentary election, the 1999 European election, and the 1998 local election. The polling districts used in each election are very stable, ranging from 114 used in time period one to a maximum of 118 used in the parliamentary election in time period two. Generally the same polling districts have been used in all of the elections in all three time periods. Statistical summaries of percentage turnout at each election in each of the three time periods are reported in Table I. Graphical summaries indicated that percentage turnout approximates a normal distribution in all of the elections across the three time periods. The mean turnout reveals the turnout gap between the three elections with twice as many voters, on average, turning out to parliamentary elections than to European elections across all three time periods. Also, turnout is generally declining across the three time periods, with an average decrease of 25 percentage points in turnout between time periods one and three, with this drop being

Table I Percentage turnout by polling district to each election in each time period

	Period 1[a]			*Period 2*[b]			*Period 3*[c]		
	Euro	*Local*	*Parl*	*Euro*	*Local*	*Parl*	*Euro*	*Local*	*Parl*
Maximum	46.13	68.22	82.48	41.62	57.06	81.24	32.21	54.43	67.21
Minimum	7.04	11.71	44.72	14.01	18.43	51.92	2.03	3.82	13.83
Mean	27.62	46.86	71.16	31.4	42.91	68.02	21.78	36.22	49.15
Standard deviation	7.21	8.72	7.08	4.72	6.72	6.03	4.41	7.4	7.27
No. of registered electorate	187 140	188 076	186 759	181 180	179 723	162 240	171 476	167 058	181 516
No. of polling districts	114	114	114	114	117	118	115	115	115

[a]1979 European elections, 1978 local elections, 1979 parliamentary elections.
[b]1989 European elections, 1990 local elections, 1992 parliamentary elections.
[c]1999 European elections, 1998 local elections, 2001 parliamentary elections.

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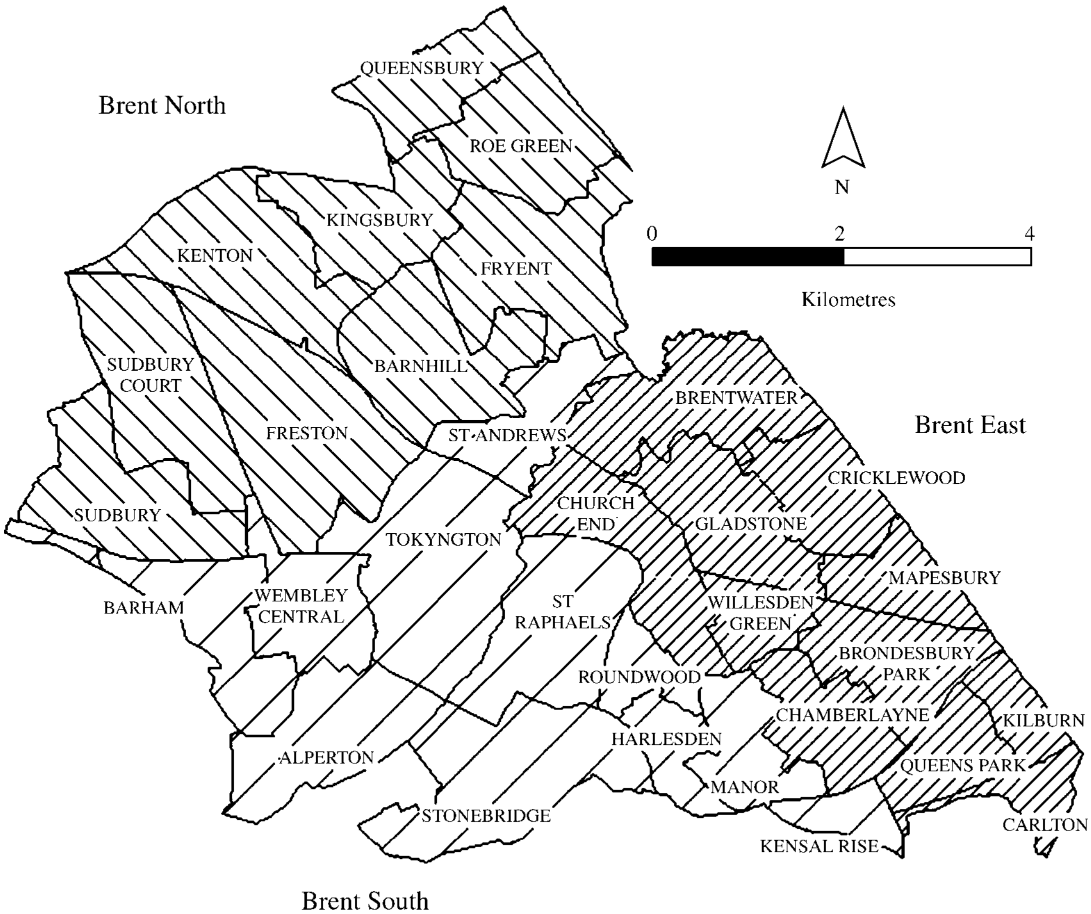

Figure 1 Constituencies and wards in the London Borough of Brent, 2001

the greatest for parliamentary elections. The standard deviation measures the variation in turnout between polling districts for each election. Within each time period the greatest variation in turnout occurs in local elections, although the differences with parliamentary elections are rather small and for period three there is very little difference. In short, the gap in turnout between parliamentary, local and European elections is consistent with the general trend, while the national secular decline in electoral participation is also captured by these data.

The political context can change substantially between elections and there is a need to understand this, particularly when interpreting the impact of party competition and marginality upon turnout. To this end we have examined election results in Brent for the elections prior to those from which our polling district data are drawn in order to identify the possible impact of political competition and mobilisation on turnout levels. Brent East is likely to have been treated by the parties as a semi-marginal in the 1979 general election with a consequent slight possible increase in mobilising activity. A similar pattern was observed before the 1978 local elections. The 1979 European Parliament election was the first of its kind and campaigning was conducted at a very broad level with no difference likely between polling districts.

At the 1992 general election the highly marginal constituency of Brent East (4.5%) was the only seat in the borough to register an increase in turnout. In local elections there were just six wards throughout Brent with majorities of less than 10% at the time of the 1990 contests, two in North and four in East. There is no evidence to suggest that electors in one part of Brent were mobilised any more or less

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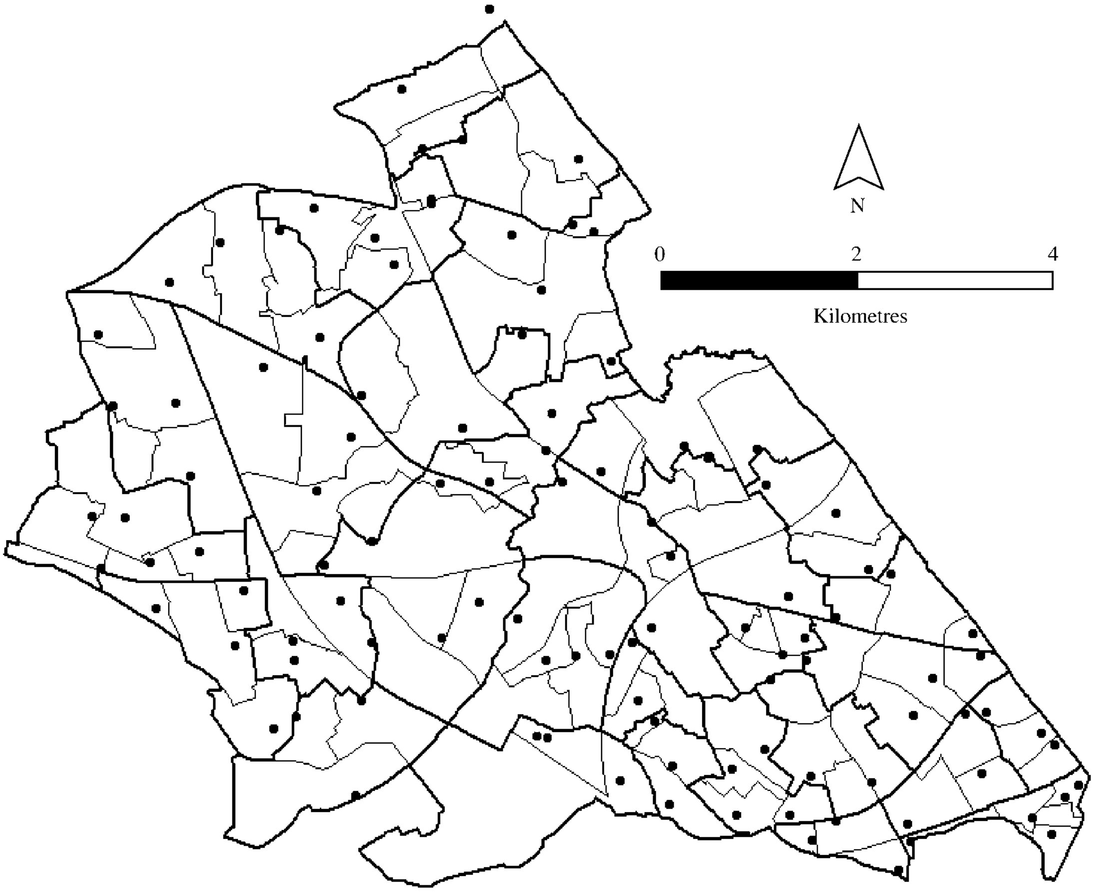

Figure 2 Wards, polling districts and polling stations in the London Borough of Brent, 2001

than in any other at the 1989 European parliament election contest.

The surprise gain of Brent North for Labour in the 1997 general election meant that it became a key 'defend' seat for the party in 2001, perhaps prompting comparatively high levels of turnout in its constituent wards. Most electoral activity at the 1998 local elections was likely to be concentrated in East, where five out of the 11 wards had majorities of 5% or less. The introduction of a new electoral system within a London-wide regional European parliament constituency probably meant that there was no special ward-level or polling-district-level campaign activity in Brent itself. In each time period, therefore, it would seem likely that turnout variation between polling districts will be more apparent at parliamentary and local than at European election level.

Data assemblage and description

Constructing a GIS for voter turnout in Brent

Brent authority supplied digitised boundary data for its polling districts, a list of the polling stations for each polling district and turnout data for each of the nine elections. Boundary changes during the 20-year period were negligible, making the construction of the GIS easier. The locations of the polling stations were identified on maps and georeferenced to the nearest metre as individual points. The British Ordnance Survey (OS), the national mapping organisation, supplied digital road network data (OS MERIDIAN). Although this is the contemporary road network, there have not been any substantial changes to this in Brent over the past 20 years. The locations of the electorate in the polling districts were captured using postcode data

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obtained from the All Fields Postcode Directory (AFPD). This provides the location of every postcode in Brent geo-referenced to the nearest 10 m and is available for all three time periods. Each postcode represents approximately 14 individual addresses and is represented by point data in the GIS. Although it is acknowledged that the geography of voters and the geography of postcodes may not be identical, we argue that postcodes make a very good proxy for where voters live, particularly for analysis aggregated to polling districts as is the case here. Non-residential postcodes and postcodes where the grid-reference was flagged in the AFPD to be of poor quality were removed. Although the OS can provide digital point data on the location of individual addresses geo-referenced to the nearest 1 m, these data are only available for time period three. Similarly, up-to-date OS postcode data also provide the number of addresses per unit postcode which allows each postcode to be weighted, but these data are not available for time periods one and two. Hence, to be systematic and consistent, the AFPD data were used in all three time periods. Each postcode was assigned to a polling district using Point-in-Polygon analysis in the GIS. This could introduce some error given the 10 m resolution of the postcode data in that the postcodes may be assigned to the wrong polling district. However, the high density of postcodes across most of the study area should cancel out the effects of any systematic mis-allocation of postcodes to polling districts. Terrain data were obtained from the OS (OS Land-form PROFILE) that provided average height information at a spatial resolution of 10 by 10 m and this was used to assign a height value to each of the polling stations and to all of the postcodes.

Generating spatial data in the GIS

The GIS was used to generate an array of spatial variables that is used to examine the spatial effects on turnout; or to put it another way, the contribution of geography towards the calculation of voting costs. Table II contains a summary of the spatial variables. The first set of variables is chosen to capture the effect of distance on turnout. It is assumed that each voter travels from their home to the polling station (although this journey may include other activities, such as shopping or commuting) and so distances are measured from individual postcodes to the elector's assigned polling station. Two sets of distances were generated representing aggregate travel behaviour in each polling district. The first, Euclidean (or straight line) distance was calculated from each postcode to the polling station in metres and then the overall average Euclidean distance was calculated for each polling district, together with the minimum, maximum and standard deviation of distance. The second distance measure is road network distance. This was calculated from each postcode to the polling station in metres and then the overall average network distance was calculated for each polling district, as well as the minimum, maximum and standard deviation of distance. It should be noted that the road network digital data do not contain information on footpaths and so road network distances may overestimate walking distances in some cases. Table III provides a summary of the distance variables. As expected, network distance is greater than Euclidean distance across all three time periods. Time period two has the greatest variation in distances as measured by the standard deviation, reflecting the slight changes to the polling district and polling station geography at this time. Generally though, distances have got shorter between time period one and three, with average Euclidean distance being just over 300 m and average network distance around half a kilometre.

The second set of spatial variables addresses the possible effect of terrain on turnout and in this case the effect of having to travel up hill to the polling station (or return home after voting). This may have a significant effect on voters who walk to the polling station and subsequently their perception of the costs of voting. The absolute height difference in metres between each postcode and the polling station was calculated and the overall average height difference was calculated for each polling district together with minimum, maximum and standard deviation of height differences. Although this measure captures the aggregate effect of terrain in a polling district, it does not capture specific nuances, such as if a postcode and polling station are located at similar heights but are separated by a hill or valley. Table III shows that although the average height differences have remained the same (just over 4 m), the variation between polling districts has got smaller.

The third set of spatial variables is concerned with the context of the polling district itself. These variables relate to its shape or compactness, its marginality at a previous election and the nature of the polling station. Compactness, or how tightly an area is packed, is often used as a characteristic of shape and the electoral studies literature suggests

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Table II The four sets of spatial variables for polling districts (PD) generated by the GIS

Variable description	*Variable name*
Distance measures (10 m)	
Average Euclidean distance of every postcode to the polling station in each PD	Linear distance decay ED
	Non-linear distance decay: $1/ED^1$
	$1/ED^2$
	$1/ED^3$
Average road network distance of every postcode to the polling station in each PD	Linear distance decay ND
	Non-linear distance decay: $1/ND^1$
	$1/ND^2$
	$1/ND^3$
Terrain measures (10 m)	
Average difference in height between polling station and every postcode in each PD	Terrain
Polling district context measures	
Cox compactness measure of PD	Cox
Fractal dimension of PD	FD
Dummy variable – status of the road that the polling station is situated upon	A road
	B road
	Minor road
Dummy variable – polling station building type	School
	University/college
	Community centre
	Library
	Temporary hut
	Church hall
	Hall – other
	Other
Dummy variable – marginality of the ward that polling district is located	Marginal
Voter dispersion (density) measures (these do not appear as variable names in the tables)	
Percentage of postcodes less than X m from polling station in each PD	
Where X is 100, 200, 300, 400, 500, 600, 700, 750, 1000, 1250 and 1500 m based on Euclidean distances	
Where X is 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1250, 1500, 2000 and 2500 m based on road network distances	

Table III Descriptive summary of the principal spatial variables

	Period 1[a]				*Period 2*[b]				*Period 3*[c]			
	Min	*Max*	*Mean*	*SdDev*	*Min*	*Max*	*Mean*	*SdDev*	*Min*	*Max*	*Mean*	*SdDev*
Average Euclidean distance	111	840	327	141	99	880	339	147	91	680	314	110
Average network distance	175	1189	487	194	165	1467	513	218	132	1466	475	181
Average terrain difference	1	22	4.38	3.2	1	22	4.66	3.56	0	15	4.41	2.97
Compactness – Cox	0.18	0.81	0.53	0.14	0.18	0.81	0.53	0.14	0.18	0.81	0.53	0.14
Fractal dimension – FD	1.2	1.38	1.25	0.03	1.2	1.38	1.25	0.03	1.2	1.38	1.25	0.03

[a]1979 European elections, 1978 local elections, 1979 parliamentary elections.
[b]1989 European elections, 1990 local elections, 1992 parliamentary elections.
[c]1999 European elections, 1998 local elections, 2001 parliamentary elections.

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Table IV Polling station context in each election in each time period

	Period 1[a]			*Period 2*[b]			*Period 3*[c]		
	Euro	*Local*	*Parl*	*Euro*	*Local*	*Parl*	*Euro*	*Local*	*Parl*
Church hall	25	25	24	24	25	26	25	23	24
Community centre	8	8	8	11	9	7	15	15	13
Hall – other	7	7	7	6	7	7	7	7	6
Temporary huts	7	7	7	6	8	11	9	9	12
Library	2	2	2	0	0	0	1	1	1
Other	6	5	6	3	6	4	3	4	4
School	56	57	57	60	59	59	54	54	53
University/college	3	3	3	4	3	4	1	2	2
A road	20	19	20	19	19	21	20	19	22
B road	10	10	10	9	9	9	9	8	7
Minor road	84	85	84	86	89	88	86	88	86

[a]1979 European elections, 1978 local elections, 1979 parliamentary elections.
[b]1989 European elections, 1990 local elections, 1992 parliamentary elections.
[c]1999 European elections, 1998 local elections, 2001 parliamentary elections.

many different measurements of compactness, although many of these are simple transformations of one another (Niemi *et al*. 1990). Two measures of compactness are used here. The first is the Cox measure, an easy to calculate measure commonly used in electoral studies (Young 1988), which is the ratio of the area of the district to the area of a circle with the same perimeter: Cox = $(4\pi A)/P^2$ where A is the area and P is the perimeter of the polling district. It has the added advantage that the measure is bounded by 0 (as the polling district approaches a straight line) and 1 (as the polling district approaches the shape of a circle). The second measure of compactness uses the fractal dimension of the polling district, which falls between one and two (Longley and Batty 1989). Both compactness measures were calculated in the GIS. Table III shows that there is very little difference between the compactness of the polling districts between the three time periods, reflecting the overall stability of the polling district geography, with very little variation in the compactness of polling districts within each time period, as shown in Figure 2. Generally, most of the polling districts are small and roughly circular with a small number of larger, more irregularly shaped districts. In order to measure marginality, a dummy variable flagged whether a polling district was located in a marginal ward (majority of 10 percentage points or less) in the local elections for each of the three time periods.

The nature of the polling station refers to the building that it is located within (e.g. school, library, temporary hut/cabin), and the status of the road that it is situated upon (a major A road, a lower status B road or a minor road). These are summarised in Table IV. Generally the same buildings are used as polling stations for each election, hence there is very little variation within or between each time period. Schools account for almost one half of all polling stations, followed by church halls. Community centres and temporary huts have both seen an increase in use as polling stations since time period one. Nearly three quarters of polling stations are situated on minor roads, with just over 15% on A roads and the rest on B roads.

The final set of spatial variables captures the geographic dispersion or density of voters in each polling district. This is measured by using the proportions of postcodes within specific distances of the polling station that are calculated as percentages of all the postcodes in the polling district. Both Euclidean and network distances are used to create two sets of measures. These measures provide a more sophisticated means of capturing the effects of distance to the polling station and the compactness of voters within each polling district. In terms of Euclidean distance, a quarter of electors on average live within 200 m of a polling station and nearly half within 300 m. Very few live beyond three quarters of a kilometre and electors are generally living closer to the polling station between

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Table V The data obtained from the three Census of Populations (1981; 1991; 2001)

Percentage population aged 18–29
Percentage population economically active
Percentage population unemployed
Percentage population economically inactive
Percentage population retired
Percentage population students
Percentage population sick
Percentage population belonging to a white ethnic group
Percentage population belonging to an Asian ethnic group
Percentage population in professional/managerial occupations
Percentage population having degree level qualifications
Percentage households in local authority tenure
Percentage households in private rented tenure
Percentage households with access to three or more cars
Percentage households with no access to a car
Percentage migrants in year before census

time period one and three. A similar situation occurs with respect to network distance, although the distances are greater. However, on average around three quarters of electors live within three quarters of a network kilometre of a polling station.

Generating social data in the GIS

As well as spatial variables, the prior research on turnout demonstrates that it is also important to include social variables in the analysis. These variables were generated using census data for Brent. As the study is over a 20-year period, data from three censuses were used: the 1981 census for time period one; the 1991 for time period two; and the 2001 census for time period three. The data obtained from the three censuses are summarised in Table V. These data reflect the main socioeconomic effects on turnout based on published research. The data were obtained as count data for the smallest areas possible, which were enumeration districts (EDs) in the 1981 and 1991 censuses and output areas (OAs) in the 2001 census. Using the GIS the count data were re-apportioned from EDs and OAs to polling districts and the variables in Table V calculated. Since these variables are taken from three different censuses, there are some differences in their definitions and measurements over time. Because of this and also the potential problems posed in the analysis by multi-collinearity between the different variables, factor analysis (with Varimax rotation and Kaiser normalisation) was used to collapse the census data into a smaller number of uncorrelated variables in each of the three censuses. The factor analysis reveals that 80% of the variance in the census variables in each of the three censuses is explained by just four factors. The first factor is positively loaded against the census variables in the list that are commonly associated with areas of deprivation. The second factor is positively loaded against the census variables commonly associated with areas that have large student populations. The third factor is positively loaded against the census variables that are commonly associated with areas that have a large proportion of retired people. The final factor is positively loaded against census variables that are commonly associated with areas that have a large proportion of white people in professional occupations. Hence, four variables based on the four factors were used to capture the continua of socioeconomic variation in Brent in the three time periods. The first measures the relative deprivation of a polling district; the second measures the student population of a polling district; the third measures the retired population of a polling district; and the final variable measures the proportion of white people in professional occupations in a polling district.

Modelling spatial effects on turnout using multi-level analysis

In order to test hypotheses regarding the effect of geography on high/low salience elections, three multi-level models were estimated for European, parliamentary and local elections in each time period. Since the organisation of elections is multi-levelled – in the sense that people vote within polling districts that are nested within particular wards within constituencies – we should expect a complex spatial geography of turnout, something that was demonstrated to occur in Brent in Orford *et al.* (2008). The dependent variable in all the models is percentage turnout at the polling district (i.e. total number of votes/registered electorate) with the (small) number of postal voters removed. The first model, represented by equation (1) is the null model and calculates the contribution of each level (polling district, ward and constituency) to the total variance in turnout across all three levels, without taking into account any predictor variables. The second model, represented in equation (2), estimates the impact of the social, spatial and polling district context variables on the variation in election turnout (the random intercepts model). The final model, equation (3), estimates the interactions of the predictor variables at higher

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levels to examine whether their effects on turnout vary spatially across Brent (the fully random model). The models were estimated using iterative generalised least squares (IGLS) in the multi-level modelling package MLwiN version 2.0 (Rasbash *et al*. 2003)

$$T_{ijk} = \alpha_{jk}X_{0ijk} + \nu_{\text{constit}(k)}X_{0ijk} + \mu_{\text{ward}(jk)}X_{0ijk} + \varepsilon_{\text{pd}(ijk)}X_{0ijk} \tag{1}$$

$$T_{ijk} = \alpha_{jk}X_{0ijk} + \beta_m X_{mijk} + \nu_{\text{constit}(k)}X_{0ijk} + \mu_{\text{ward}(jk)}X_{0ijk} + \varepsilon_{\text{pd}(ijk)}X_{0ijk} \tag{2}$$

$$T_{ijk} = \alpha_{jk}X_{0ijk} + \beta_m X_{mijk} + \nu_{\text{constit}(k)}X_{0ijk} + \mu_{\text{ward}(jk)}X_{0ijk} + \tau_{\text{ward}(jk)}X_{mijk} + \varepsilon_{\text{pd}(ijk)}X_{0ijk} \tag{3}$$

where $i = 1, \ldots, I$ polling districts; $j = 1, \ldots, J$ wards; and $k = 1, \ldots, K$ constituencies; $m = 1, \ldots, M$ predictor variables; T_{ijk} is turnout at European (or local or parliamentary) election in polling district i within ward j from constituency k; X_{mjk} is a predictor variable in the same polling districts; X_{0jk} is a column vector which consists entirely of ones; α, β are the fixed parameters to be estimated; $\nu_{\text{constit}(k)}$, $\upsilon_{\text{ward}(jk)}$ and $\varepsilon_{\text{pd}(ijk)}$ are three random parameters to be estimated that represent the variation of turnout between constituencies, between wards within constituency, and between polling districts within a ward and are assumed to be normally distributed with zero mean values and unknown variances σ^2_{const}, σ^2_{ward} and σ^2_{pd}, respectively. In equation (3), the random intercept $\gamma_{\text{ward}(jk)}$ is assumed to be normally distributed with zero mean value and τ_{ward} variance. In addition, at ward level the random components are allowed to be correlated with covariance coefficient ρ_{ward}.

The null models, reported in Table VI, estimate the average rate of turnout for the whole of Brent for each election in each time period (the constant term) and these are similar to the means reported in Table I. The null model allows the variation around the estimated average turnout to be partitioned into variation at the level of the individual polling district, ward and constituency. The numbers in brackets are the standard errors of the coefficients and can be used to judge significance of the estimated parameters. This works well for the fixed parameters but for the random parameters which follow an approximate normal distribution, Rasbash *et al*. (2003) also recommend using a likelihood ratio test. By checking if the likelihood ratios of successive models are significantly different

Table VI The null model for each election in the three time periods. Numbers in parenthesis are standard errors

	European			Local			Parliamentary		
	Period one 1979	*Period two 1989*	*Period three 1999*	*Period one 1978*	*Period two 1990*	*Period three 1998*	*Period one 1979*	*Period two 1992*	*Period three 2001*
Fixed									
Constant	27.22	31.32	21.77	46.48	42.84	36.40	70.72	67.83	49.19
	(2.66)**	(0.82)**	(0.55)**	(2.92)**	(1.37)**	(1.02)**	(2.72)**	(1.65)**	(1.88)**
Random									
Constituency level	19.44	0.81	0.00	22.27	2.96	0.00	20.53	6.62	9.12
	(17.29)	(1.68)	(0.00)	(20.70)	(4.66)	(0.00)	(18.01)	(6.67)	(8.66)
Ward level	12.00	8.81	5.68	26.67	21.79	23.47	12.62	10.87	4.82
	(4.83)**	(3.37)**	(2.45)*	(9.28)**	(7.45)**	(8.37)**	(4.72)**	(4.31)*	(4.32)
Polling-district level	20.62	12.96	13.48	27.62	21.32	30.69	17.27	18.74	37.92
	(3.20)**	(2.01)**	(2.08)**	(4.29)**	(3.25)**	(4.65)**	(2.68)**	(2.84)**	(5.83)**
−2 log-likelihood	711.16	655.59	654.42	754.45	740.73	761.37	696.05	721.51	762.25

*Significant at the 0.05 level or better; **significant at the 0.01 level or better.

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compared with a chi-squared distribution, the significance of the estimated variance terms can be evaluated. There is no significant variation at the constituency level for any of the elections (shown by the large standard errors), indicating that a constituency level effect does not exist, not even in parliamentary elections, but this may be due to the small number of constituencies in the study (only three). The greatest variation in turnout occurs between polling districts, although significant variation in rates of turnout also occurs at ward level, with the exception being parliamentary election turnout in time period three which is insignificant at the ward level with all the variation occurring at polling district level. Due to its insignificance, the constituency level was removed and the models re-estimated, but this had very little effect on the estimated parameters. Hence for the sake of consistency the estimated parameters of all the models are shown with the constituency included as level 3. A comparison of the proportion of the significant variation in the models (that is, at the polling district and ward levels) indicates that around one half of the variation in rates of turnout occurs at the ward level in local elections. This compares to between two fifths and one third in European elections from time period one to three and between one third and zero in parliamentary elections over the same time period.

The random intercepts models, which include the influence of the social, spatial and polling district context variables, were estimated for the nine elections. Diagnostic tests were undertaken on the residuals to check the validity of each of the models. These revealed that two neighbouring polling districts in the ward of Alperton had exceptional influence in the models with respect to distance measures. Upon further investigation it was revealed that the polling stations in these polling districts had been juxtaposed by Brent council when they supplied the data. These two were subsequently removed from the analysis as was a polling district in Stonebridge that was consistently revealed as an outlier due to very low turnout in all the elections across the three time periods. The nine models were re-estimated and are reported in Table VII, where, for the sake of clarity, only the fixed coefficients that are significant at the 5% level or better are shown. The differences in the likelihood ratio statistics of the random intercept models with the corresponding null models are statistically significant at the 1% level, strongly indicating that the predictor variables have an important effect in explaining variation in turnout in all three elections.

The inclusion of the predictor variables has resulted in a decline in the polling district level and the ward level variances. Indeed, ward level variance is no longer significant in any of the models, with the exception of the local elections in time periods two and three and instead all the significant variation in turnout occurs at the polling district level. This supports the findings in Orford *et al.* (2008), in which the residual significant ward level variance in local election turnout was attributed to the possible effects of local campaigning in the local elections. Moreover, the proportion of variance at ward level in local elections has increased between time period two and three from one quarter to one third of the total variance, indicating that, perhaps, the impact of local campaigning has become more important through time.

The random intercepts models assume that, while the relationships between the predictor variables and turnout to elections in each ward are the same, some wards have uniformly higher rates of turnout than others. In order to investigate whether the relationship between the predictor variables and turnout varies between wards, the predictor variables were included at the ward level (equation 3) in the two random intercept models that had significant ward level variance and the models were re-estimated. None of the estimated ward level variance and covariance terms in these fully randomised models was significant, suggesting that the relationship between the predictor variables and local election turnout are as described by the random intercepts models in Table VII.

Analysis of the predictor variables

The social variables show that an increase in the relative deprivation of a polling district is associated with a drop in voter participation and this variable is the most significant in all elections in all time periods. Polling districts with a higher proportion of retired people tend to be associated with larger turnout for all elections, as is expected, particularly for parliamentary elections. Polling districts with a higher proportion of students tend to have a larger turnout to European elections. The most interesting point is that as turnout declines in all three elections between time periods one and three, the significance of the social variables also declines. This suggests that social characteristics of the polling districts are

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Table VII The random intercepts model for each election in the three time periods. Numbers in parenthesis are standard errors

	European			*Local*			*Parliamentary*		
	Period one 1979	*Period two 1989*	*Period three 1999*	*Period one 1978*	*Period two 1990*	*Period three 1998*	*Period one 1979*	*Period two 1992*	*Period three 2001*
Fixed									
Constant	27.20	29.32	26.40	45.25	40.81	38.00	71.02	70.40	49.40
	(0.36)**	(1.10)**	(0.88)**	(0.76)**	(0.89)**	(1.53)**	(0.32)**	(1.63)**	(0.45)**
Deprived	–4.46	–2.58	–2.62	–4.32	–3.15	–3.12	–4.25	–4.00	–2.92
	(0.34)**	(0.31)**	(0.34)**	(0.44)**	(0.57)**	(0.62)**	(0.31)**	(0.54)**	(0.45)**
Student	–1.15	1.20	2.22	–4.13			–3.20		
	(0.34)**	(0.29)**	(0.49)**	(0.43)**			(0.31)**		
Retirement	2.72	1.09		1.94	2.07	1.92	2.21	2.12	3.90
	(0.35)**	(0.29)**		(0.40)**	(0.48)**	(0.59)**	(0.31)**	(0.44)**	(0.46)**
White and prof. occup.	1.15	1.51		–1.13					–1.01
	(0.34)**	(0.29)**		(0.38)**					(0.43)*
Terrain		–0.36	–0.48						
		(0.13)**	(0.11)**						
Temporary huts	5.49	2.90					3.39		
	(1.35)**	(1.25)*					(1.30)*		
Marginal				4.61	3.75	4.10			
				(0.85)**	(1.26)**	(1.46)**			
$1/ED^3$	11 324 200								
	(2 531 210)**								
ND					–0.006	–0.007		–0.007	
					(0.002)**	(0.003)*		(0.002)**	
$1/ND^1$		1514	673						
		(332)**	(260)*						
Random									
Constituency level	0.00	0.00	0.00	1.08	0.00	0.00	0.00	4.70	0.00
	(0.00)	(0.00)	(0.00)	(1.22)	(0.00)	(0.00)	(0.00)	(4.41)	(0.00)
Ward level	0.88	0.00	1.14	0.55	5.79	9.73	0.53	3.75	1.73
	(1.05)	(0.00)	(0.89)	(1.29)	(2.87)*	(3.50)**	(0.85)	(2.00)	(1.70)
Polling-district level	10.42	8.60	7.79	13.37	18.42	17.13	8.92	12.62	16.30
	(1.64)**	(1.15)**	(1.21)**	(2.13)**	(2.85)**	(2.83)**	(1.41)**	(1.94)**	(2.53)**
–2 log-likelihood	583.20	553.81	565.70	599.98	679.14	676.00	558.77	646.80	646.15

*Significant at the 0.05 level or better; **significant at the 0.01 level or better.

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becoming less important in explaining the variation in turnout.

The terrain variable, the average difference in height between the polling station and all the postcodes in the polling district, was insignificant in all the models except for European elections in time periods two and three. Here, an increase in height difference is associated with a drop in turnout of 3.6% per 10 m in the 1989 election and 4.8% per 10 m in the 1999 election, indicating greater sensitivity to variations in geography through time. The compactness variables, described earlier, are insignificant in all three elections in all time periods. This is perhaps understandable given the general similarity in the compactness indexes of the polling districts and the fact that they are very stable between time periods one and three. Therefore there is very little variation to explain the differences in voter turnout, with most polling districts being very small, compact and generally regular in shape. The status of the road that the polling station is situated upon has no significant effect on turnout in any of the elections. The type of building where the polling station is located is also insignificant, with the exception of temporary huts for European elections in time periods one and two and parliamentary elections in time period one. Temporary huts are located in central areas, such as on shopping streets or in supermarket car parks, and hence they represent locations where voters may engage in more than one activity. In European elections their use as polling stations increased turnout in polling districts by 5.5% on average in 1979 but only by 2.9% on average in 1989. Although the use of temporary huts as polling stations has increased through time, their impact on turnout appears to have diminished as perceived costs of voting has increased. Finally, the marginality of the ward within which the polling district is located is significant in local elections as hypothesised, increasing turnout by 4.6% on average in time period one, 3.75% on average in time period two and around 4% on average in time period three.

The third set of variables in Table VII refers to distance measures, and these are more fully reported in Table VIII. Since it is not possible to determine, *a priori*, the functional form of the relationship between distance and turnout, four different functional forms were estimated for the average Euclidean and average network distance measures in Table II. The first is a linear distance decay curve (ED and ND, Euclidean and network distances, respectively), which assumes that turnout declines at a constant rate with distance and hence the distance coefficient will be negative. The next three are nonlinear distance decay curves ($1/ED^n$ and $1/ND^n$). These assume that turnout declines at a non-constant rate with distance; the larger the exponent '*n*', the steeper the curve and the quicker the voter drop-off with distance. The parameters in Table VIII were estimated by adding one of the eight distance variables (starting with the linear Euclidean distance variable – ED) into the fully specified random intercepts model and the model estimated. The fully specified random intercepts model contains the social variables, the terrain variable and the polling district context variables, but not the density variables (these are investigated later). Variables insignificant at the 5% level were removed as part of the model estimation. Once the model was estimated, the parameters of the distance variable were recorded in Table VIII and then the variable was removed. The process was then repeated with the next distance variable until the parameters of all eight of the distance variables had been estimated. This process avoids the problems of collinearity that would occur if all the distance variables were added into the model at the same time and the model estimated.

The distance variable with the largest statistical significance in Table VIII for a particular election in a particular time period is deemed to have the strongest relationship with turnout and best captures the voter drop-off with distance. These are marked in bold in Table VIII and are also reported in Table VII. The distance measures in Table VIII show that distance is a significant variable in all three European elections, in local elections from time period two onwards and in parliamentary elections in time period two only. These results appear to confirm our hypotheses on the importance of geography at low salience European and local elections. Moreover, in both time periods two and three, network distance is more significant than Euclidean distance in European turnout, with Euclidean distance being totally insignificant in the last time period. In both time periods it is the nonlinear distance decay curve ($1/ND^1$) that has the most statistical significance. This suggests that voter turnout declines at an increasing rate with distance from the polling station. Hence at 250 m from the polling station, voter turnout is estimated as (1514/250) = 6.1% above the polling district average in the 1989 election and (673/250) = 2.7% above the

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Table VIII Effects of Euclidean distance (ED) and network distance (ND) on voter turnout in the three elections in the three time periods. Numbers in parenthesis are standard errors

	European			*Local*			*Parliamentary*		
	Period one 1979	*Period two 1989*	*Period three 1999*	*Period one 1978*	*Period two 1990*	*Period three 1998*	*Period one 1979*	*Period two 1992*	*Period three 2001*
ED	−0.004	−0.007	−0.001	−0.001	−0.008	−0.009	−0.002	−0.008	−0.001
	(0.003)	(0.002)**	(0.004)	(0.003)	(0.003)*	(0.004)*	(0.002)	(0.003)*	(0.004)
$1/ED^1$	573	895	91	217	708	337	304	554	118
	(243)*	(224)**	(189)	(292)	(321)*	(312)	(214)	(251)*	(227)
$1/ED^2$	71 391	94 860	10 345	30 139	68 076	12 031	39 825	48 258	8576
	(25 934)**	(23 498)**	(17 118)	(34 870)	(33 392)*	(29 411)	(23 458)	(24 701)	(25 597)
$1/ED^3$	**11 324 200**[a]	10 463 640	1 073 802	4 418 915	6 668 978	−1 447 239	3 100 545	1 946 207	1 179 678
	(2 531 210)**	(2 677 525)**	(1 205 168)	(4 861 887)	(4 697 295)	(3 431 782)	(6 571 318)	(2 767 698)	(2 521 663)
ND	−0.002	−0.005	−0.005	0.001	**−0.006**	**−0.007**	0.000	**−0.007**	−0.002
	(0.002)	(0.002)*	(0.002)*	(0.002)	(0.002)**	(0.003)*	(0.002)	(0.002)**	(0.002)
$1/ND^1$	518	**1514**	**673**	−154	1078	379	71	955	187
	(401)	(332)**	(260)*	(431)	(494)*	(445)	(343)	(389)*	(390)
$1/ND^2$	88 785	254 313	73 413	−27 026	16 0817	−12 536	18 692	113 455	27 358
	(69 499)	(56 280)**	(35 357)*	(75 368)	(81 112)*	(56 729)	(59 211)	(60 588)	(49 388)
$1/ND^3$	15 318 462	44 435 980	8 273 651	−564 266	30 075 254	−7 432 851	338 921	15 926 542	4 125 430
	(13 925 875)	(10 651 600)**	(5 014 334)	(2 257 064)	(16 238 449)	(9 313 042)	(11 297 367)	(13 497 069)	(6 817 710)

Bold coefficients have the largest significance for a particular election.
*Significant at the 0.05 level or better; **significant at the 0.01 level or better.
[a]In the calculation of the effect of distance on percentage turnout, the reported coefficient forms the numerator and the distance measure forms the denominator. Hence, in the example of $1/ED^3$, the percentage turnout at 200 m is calculated as $11\,324\,200/(200)^3 = 1.42\%$. At 500 m the calculation is $11\,324\,200/(500)^3 = 0.09\%$. Therefore, as distance increases, percentage voter turnout decreases.

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polling district average in the 1999 election and at 500 m this falls to (1514/500) = 3.0% and (673/500) = 1.3%, respectively. This indicates that voter drop-off with distance has become larger over time for European elections. In time period one, network distance was insignificant for European elections. Rather, Euclidean distance was significant, with this significance increasing with steeper distance decay curves. This suggests that in the 1979 election, voter drop-off was very rapid with distance (as is shown in Table III, Euclidean distance is shorter than network distance) and this may have been caused by voter fatigue due to the parliamentary election being held just a month earlier.

In terms of local election turnout, there are no significant distance effects in time period one, but network distance becomes significant in time periods two and three. In comparison to European elections in these time periods, it is the linear distance decay curve that is the most significant, indicating that voter drop-off is less steep with distance for local elections, again supporting our hypotheses. Hence turnout declines by a steady 0.6% per 100 m in the 1990 election and a steady 0.7% per 100 m in the 1998 elections, again indicating that turnout is declining more rapidly with distance through time.

In parliamentary elections, distance generally has an insignificant effect on turnout, with the exception of the 1992 general election in which turnout tended to decline by 0.7% per 100 m from the polling station. This particular election was generally perceived as competitive and nationally the turnout was high. We have no clear idea at this moment why geography should appear significant, although other factors such as bad weather on the day of the election or particular traffic conditions may have made proximity to the polling station more important than usual.

The final part of the analysis concerns the effect on turnout of the geographic dispersion or density of voters in each polling district as measured by the percentage of postcodes in each polling district within specific distances of the polling station. Euclidean and road network distances were both used to calculate the distance intervals from the polling station but only road network distances are reported here as they had the most significant effects in the models. Similar to the estimation of distance, the density variables were entered into the fully specified random intercepts model one at a time, the model estimated, and then the variable removed. The fully specified random intercepts model contains the social variables, the terrain variable and the polling district context variables, but no distance variables (as the density variables will capture the effect of distance and so the inclusion of distance may cause collinearity problems). For the sake of brevity, the parameter estimates for the density variables are not reported, with the exception of the variables with the largest significance for each election in each time period, which are reported in the discussion. Figures 3(a–c) are summaries of t-statistics (the density coefficient/standard error) for the network distances (e.g. 100 m, 200 m etc.) from the polling station for each time period. T-statistics greater than 1.96 and less than –1.96 are significant at the 5% level and these are indicated in each figure by dashed lines. Figure 3(a) shows that the dispersion of voters within polling districts has no significant effect on turnout with t-statistics for all three elections being insignificant and falling between the two dashed lines. This is understandable given the insignificance of distance on turnout in time period one for local and parliamentary elections and the very steep voter drop-off with distance in European elections. Figure 3(b) shows that the geographic dispersion of voters within polling districts has a significant effect on turnout in all three elections in time period two. This effect is largest in European elections and is very similar in local and parliamentary elections. The significance peaks in European elections at around 500 m from the polling station (with a coefficient of 0.05 significant at the 1% level or better) and at around 600 m from the polling station in local elections (with a coefficient of 0.05 significant at the 1% level or better) and 800 m in parliamentary elections (with a coefficient of 0.065 significant at the 1% level or better). Hence, at 500 m, the average increase in turnout in European elections is 0.05% per percentage increase in voter density. Thus if 50% of the voters in a polling district live within 500 m of the polling station, then this will increase turnout in this polling district by 2.5% compared with the Brent average . This increase in turnout rises to 5% on the Brent average for polling districts with 100% of voters living within 500 m of the polling station. In local elections, the increase in turnout at the significant peak of 600 m is again 0.05% and in parliamentary elections the increase in turnout at the 800 m significance peak is 0.065%. Again, this supports the previous findings on the effects of road network distance on turnout and

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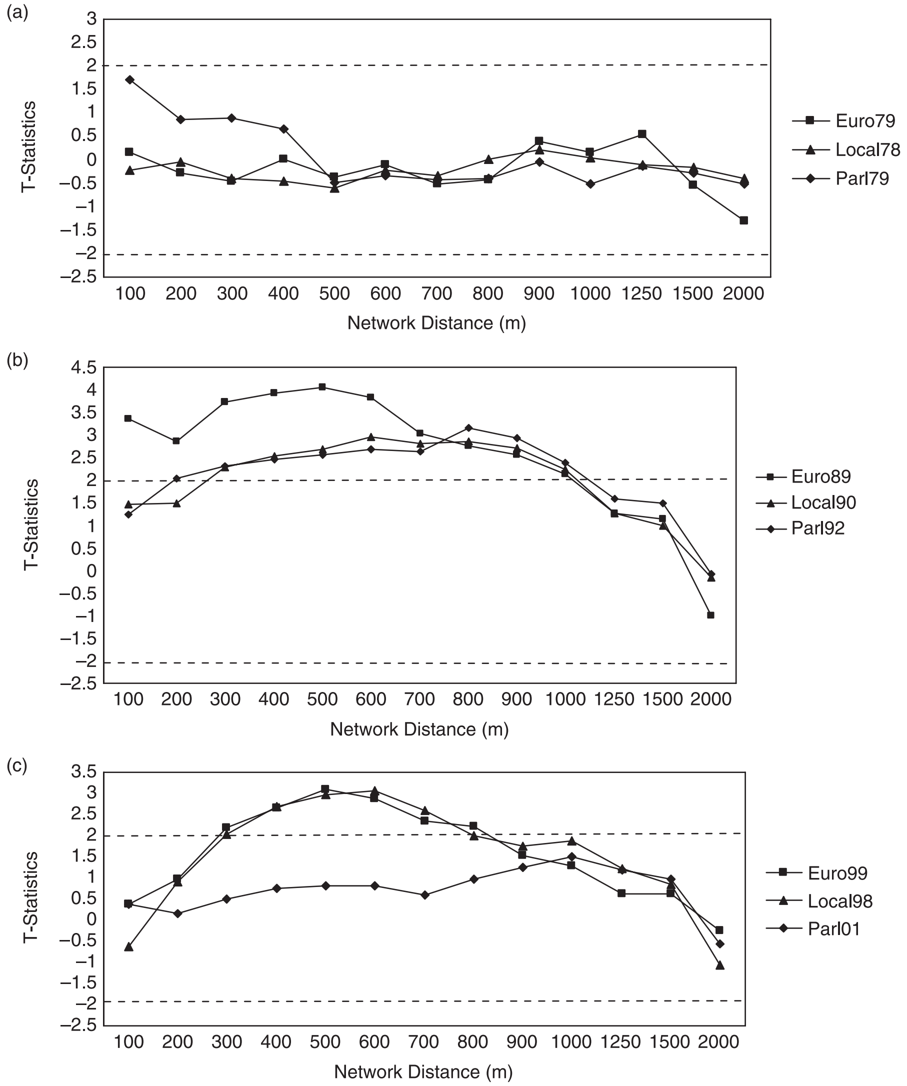

Figure 3 Significance of voter density on turnout by network distance in time period one (a), time period two (b) and time period three (c)

helps corroborate the hypothesis that turnout to European elections is much more sensitive to distance effects than in local elections and turnout in local elections are more sensitive to distance effects than in parliamentary elections, with voter drop-off occurring sooner with distance from the polling station as electoral saliency moves from high to low.

Figure 3(c) shows that the geographic dispersion of voters within polling districts in time period three has a significant effect in local and European elections but not in parliamentary elections, again supporting the previous findings. In this case though, there is very little difference between local and European elections in respect to the significance of voter density in percentage turnout. The significance peaks again at around 500 m in European elections (with a coefficient of 0.04 significant at the 1% level or better) and 600 m in local elections (with a coefficient of 0.07 significant at the 1% level or better). Hence, at the 500 m peak, the average

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increase in turnout in European elections is 0.04% per percentage increase in voter density and at the 600 m peak in local elections it is 0.07%. Nearly twice as many people turn out to vote in local than in European elections for similar voter densities, which is an increase from time period two when there was no difference. Therefore, although Figure 3(c) suggests that that the effects of distance in European and local elections are becoming similar through time in terms of their significance, in terms of actual number of voters the drop-off is still greater for European elections as less people turn out to vote for a given density of voters.

Summary and conclusions

The analysis demonstrates that, for European and local elections, polling districts with longer average distances between postcodes and polling stations tend to have lower turnout than districts with shorter average distances, and this condition holds after social factors such as deprivation are taken into account. A similar result occurs when average distance is substituted for postcode density within polling districts. Although based on ecological rather than individual level voting data, these results nonetheless give support for the contention that geography matters more at low salience, second-order local and European elections but matters less for turnout at parliamentary elections. Distance and density measures are most important at European elections where the problem of low turnout is most acute. Moreover, voter drop-off with distance has become larger over time and turnout to European elections is also increasingly sensitive to terrain. Reasons for the increasing importance of distance may reflect the increased time pressures faced by prospective voters, such as longer commuting time and changing work and home commitments, meaning that the costs of voting have become more significant over the past 20 years.

Interestingly, ward marginality, a good proxy for competitiveness, does have a noticeable effect on turnout at local elections and in time periods two and three ward level variance remained significant in local elections after other factors had been taken into account, but this was not the case in any of the other elections. Hence, while it is clear that social factors continue to be important for the explanation of turnout, it is also apparent that electors also appear to be engaging in some assessment of the costs and benefits of voting (Blais 2000). Finally, the context of the polling district and polling station, beyond the marginality of the ward, does not appear to have an effect on turnout, although there are indications that in earlier elections the use of temporary huts in central locations did increase voter participation but this no longer seems to be the case.

Of course there are factors other than the ones discussed here that may affect voter turnout, but these have not been included, principally due to the lack of data. These include the weather on the day of the election, with bad weather generally resulting in an increase in the perceived costs of voting and hence lower turnout. It could also be the case that those living close to a polling station are encouraged or reminded to vote by the sight of others voting on the day of the election. This effect can only be captured with recourse to more detailed individual level data geo-referenced at a finer spatial scale. There is also the issue of non-registration in relation to turnout in the sense that turnout will generally be lower than the current data suggest if the people who are eligible but have not registered to vote are also considered. These people are not likely to be randomly distributed across the study area but will be found in particular polling districts, such as those with a high incidence of social deprivation, making the geography of people who do and do not vote more complicated.

In conclusion then, turnout would appear to be lower the greater the average distance that voters have to travel to the polling station at both European and local elections, especially in more recent times, which generally conforms to our hypothesis. It is not likely to be important at first-order parliamentary elections for the reasons discussed above. Of course, we should be wary of making broad generalisations on the basis of a single case study based within a London borough. Clearly, more research is needed that, ideally, should include areas that are geographically different from one another. Are electors that reside in less densely populated areas and where polling stations may be further apart more or less sensitive to distance from polling station than their urban neighbours? Is there a tipping point where the distance to travel rules out the probability of walking and what, if any, is the effect on participation. When various government initiatives, from all-postal voting to electronic counting, have either encountered significant problems or have had no effect on turnout it is, perhaps, time that more attention is given towards facilitating

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voting by a more strategic approach to the siting of polling stations. In this respect, future research will investigate the impact of polling stations that have moved between elections within polling districts whose boundaries have remained the same. It will compute optimal locations of polling stations, informed by these results, and calculate the aggregate effects on turnout and the possible impact in marginal wards. It will also investigate in more detail the context of the polling station in terms of making it easier for people to vote, such as car parking and general accessibility, in order to overcome some of the perceptions of the costs of voting.

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Appendix 10

Unused votes in English Local Government Elections:

Effects and Explanations

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Unused Votes in English Local Government Elections: Effects and Explanations

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ABSTRACT *Examination of ward-level aggregate data for English local council elections that employ a form of block voting demonstrates that 7–15% of total potential votes are unused. We test two possible explanations for this phenomenon. Firstly, unused votes occur when electors have a restricted choice of candidates, principally when parties fail to field as many candidates as there are available seats. Secondly, unused votes stem from a misunderstanding of the voting procedure. We find that both sources make statistically significant contributions to the explanation of the level of unused votes. The number of unused votes does decrease when more candidates stand for election. However, we also find that within each party's slate of candidates those placed higher on the ballot paper have a clear advantage over those lower in the alphabetic order and hence lower in ballot paper order. Moreover, the level of educational attainment of a ward's population is a statistically significant predictor of unused votes, suggesting perhaps that some voters are failing to understand the voting system. This analysis raises issues concerning voter awareness of block voting procedures and whether ballot paper order should be randomized in such cases in order to eradicate alphabetic bias.*

Introduction

The chaos that attended the counting and subsequent exclusion of more than 100,000 ballot papers from the Scottish Parliament election in 2007 demonstrates the need for clear and unambiguous instructions to voters (Electoral Commission, 2007). Electoral legitimacy is compromised when a significant fraction of voters misunderstand the ballot paper, as with this and the so-called "butterfly ballot" at the 2000 US Presidential election (Wand *et al*., 2001). Various reforms of ballot paper design, including the inclusion of party descriptions alongside candidate names, the use of party logos and proposals to include candidate photographs, are designed to facilitate elector understanding and engagement with the voting process (Reynolds & Steenbergen, 2006). Yet, while some progress has been made,

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problems clearly remain, affecting voting systems that are normally regarded as user-friendly from the voters' point of view.

For example, one of the advantages claimed for "first past the post" or plurality voting over other systems is its apparent simplicity. In single-member electoral districts marking a cross alongside the chosen candidate is all that is required and generally results in a low number of spoiled ballots. Of course, plural voting does not only use district magnitudes of one, i.e. single-member constituencies. One popular variant of plural voting is the block vote.[1] Under this arrangement, each voter can "X" vote for as many candidates as there are seats to be filled. This method was widely used in the UK to elect MPs prior to the mid-1880s when single-member constituencies became the norm (Joyce, 2004). Elsewhere, block voting is now used rather sparingly, employed in a handful of US state elections, Lebanese parliamentary elections and in the election of the Polish Senate. Although block voting for parliamentary elections ceased in the late 1940s it still continues for local government council elections in parts of the UK and these form the subject of this article.

What potential problems are there with block voting that stem from an elector misunderstanding the nature of the ballot? First, electors may not realize that they have more than one vote, despite an instruction printed on the ballot paper, "You may vote up to N times". Second, some electors, even after reading that instruction, may take it not to mean "up to and including N times" but rather "vote N–1 times". A third problem could result from ballot paper length – as district magnitude increases and more candidates compete, a long ballot may deter voters from scanning across all candidates. Taken together, these responses could result in the total number of actual votes being smaller than the number of potential votes – in short, some proportion of votes will remain "unused".

Of course, unused votes may arise following a deliberate choice rather than from some misunderstanding of the rules. When a partisan voter has a restricted choice because their party has not fielded a full slate of candidates, then it is perhaps rational not to re-distribute "spare" votes to other candidates. Equally, a voter might not wish to support a particular candidate for personal reasons, whatever the party label. Distinguishing between the causes of unused votes is obviously important: voters making conscious choices are rather different from those misunderstanding the voting rules. What evidence is there then that a significant number of voters do not or cannot follow instructions about completing the ballot paper?

Surveys investigating voter comprehension of novel and sometimes complex ballot design and voting systems have been undertaken (for example see Dunleavy *et al.*, 1992; Dunleavy *et al.*, 1997; Bowler & Farrell, 1995), but these have involved mock election ballots rather than a real election. The evidence that emerges from the 2007 Scottish election study is that just over half the post-election sample claimed to understand the voting system. Almost a third did not understand it well and one in ten did not understand it at all. The re-design of the ballot paper led to rejected ballots reaching one in eight of constituency ballots cast in the most extreme examples. There was a strong association between the proportion of rejected ballots in a constituency and the level of social deprivation (Carman & Mitchell, 2007).

The focus of this article is local councils in England that employ block voting methods. We use aggregate rather than individual-level data (which do not exist for these particular elections) to examine ballot effects (Brockington, 2003; Geys & Heyndels, 2003; Hamilton & Ladd, 1996; Robson & Walsh, 1973). Making inferences about individual-level behaviour from aggregate data is problematic but these data could at least show *what* is happening when people's choices are affected by the nature of the ballot.

The research questions are simply stated. What is the extent of unused votes and are there significant differences between types of local authority? Can we explain the absolute level of unused votes simply by controlling for the level of party contestation: are voters unwilling to cast votes for candidates representing parties that rival their own partisan choice? Finally, if other factors apparently influence the level of unused votes, what clues about the possible behaviour patterns of individual voters can be identified from the aggregate data?

The first section describes the data and shows the extent of unused votes in block voting for English local authorities. We find that for elections to each of the four types of local authority a sizeable number of potential votes are unused although the proportion varies. In the second section the impact of contestation upon the level of unused votes is considered. Although it is clear that the proportion of unused votes is directly related to the range of choice, it is also apparent that this factor alone does not account for unused votes. In the third section, therefore, we consider the set of decision heuristics that might possibly guide voter choices. Initially, we hypothesize that partisan voters employ a rather simple heuristic, scanning the ballot paper downwards and stopping when a candidate from the chosen party is identified. Such voting behaviour is entirely consistent with the habit of voting in a single-member election. In the case of a block vote election it will manifest itself in evidence of an alphabetic bias in the distribution of support across candidates from the same party. Ordinal logistic regression reveals that an alphabetical bias does indeed exist and stays significant even when controlling for a candidate's incumbency status. This finding gives strong support to the contention that some voters misunderstand the voting procedure. In the fourth section we use each of these factors together – the level of contestation and level of voter understanding – and test their contribution to the explanation of the level of unused votes. Using aggregate data, of course, we have no direct measure of any one individual's understanding of the voting system. Accordingly, as a proxy measure we use the proportion of people without a formal educational qualification resident in each local electoral ward. The multivariate regression model demonstrates that both factors (party contestation and decision heuristic) have a significant impact on the level of unused votes. The final section considers the implications of this research for the future application of block voting both generally and specifically for some local council elections within the UK.

Estimating Unused Votes

The analysis is based on ward-level data for four types of local authority. Two of these types, the 32 London boroughs and 174 districts (including the post-1995 unitary authorities) conduct whole council elections every four years using multi-member wards. Local voters in these areas, therefore, should be reasonably familiar with the procedure for block voting. The remaining two types of authority, the 36 metropolitan boroughs and 52 district (and unitary) councils, normally fill single seat vacancies for a fraction of their council members annually. However, following a periodic review of ward boundaries, they experienced untypical whole council elections in 2004 and 2002 respectively. These elections provide us with an interesting field experiment about what happens when local parties and voters familiar with single-member plurality voting instead participate in a block vote election.

Excluding those wards where the election was uncontested, we have a potential pool of 2,770 cases available for detailed analysis (614 London wards with elections in 2006; 812 Metropolitan wards with elections in 2004; 926 district wards with whole council election in 2003; and 418 wards in those district councils implementing boundary reviews in 2002).

Unfortunately local authorities that employ block voting seldom report for each electoral district (ward) the precise number of ballot papers issued and included in the count (Ware *et al.*, 2006). We assume, however, that the ward turnout and electorate details which are provided by each local authority are accurate.[2] Using both the reported percentage turnout and electorate size we calculate the number of ballot papers included in the final count. Since percentage turnout is mostly given to one decimal place there is some loss of precision but any overall error is likely to be small. The total number of potential votes is calculated, therefore, as the product of valid ballot papers included in the ward count (number of voters) and its district magnitude (number of vacancies). The percentage of unused votes is calculated by dividing the difference, potential votes minus actual total of votes cast, by the total number of potential votes.

After initial examination of the data we chose to reduce the number of cases available for analysis because of clear or suspected errors. In some 25 wards it became apparent that since either the percentage turnout or electorate figure was incorrect these cases should be excluded from the analysis. In a further 11 wards more than 40% of potential votes appear to have been unused. These may be genuinely extreme cases but they could instead be caused by inaccurate reporting, either of percentage turnout or electorate size. In order that these and similar data would not skew the distributions and distort our analysis we decided to exclude all wards within the top percentile of unused votes at each election. This lowers the mean values for unused votes slightly but it makes the overall findings more robust. Following deletion of uncontested wards, erroneous cases and the top percentile of extreme cases there remained 2,718 three-member wards available for analysis.

Table 1 shows the minimum, maximum, and mean level of unused vote for each type of authority. In London about one in thirteen of potential votes are unused while

Table 1. Unused votes in three-member wards

	Mean	Std. Dev	Min.	Max.	No. wards
London boroughs, 2006[a]	7.7	3.9	1.1	25.0	607
Metropolitan boroughs, 2004[b]	15.2	7.1	0.8	36.2	801
Unitary and shire districts, 2003[c]	13.7	8.6	0.3	38.6	905
Unitary and shire districts, 2002[d]	10.6	6.5	0.5	31.2	405

Notes:
[a] Referred to as London in following tables.
[b] Metropolitan.
[c] Whole council elections, or "W" districts.
[d] Council elections by thirds, or "T" districts.

in the metropolitan boroughs the figure is rather higher, more than one in seven are unused. Figures for the district councils lie somewhere between the two extremes. We tested the hypothesis that there is no statistically significant[3] difference between the mean level of unused votes across all types of authorities and rejected it.[4]

Of course, many unused votes may be a function of the available choice of candidates, with differences between local authorities explained by the wide disparity in patterns of the contestation for seats. For example, a Labour identifier might vote only for the two Labour candidates and not use her/his third vote. There are indeed different patterns of party contestation (see Table 2). The mean number of candidates at each ward election varies from ten for the London boroughs to seven in the whole council districts. Elections in London and the major urban areas that comprise the metropolitan boroughs are more party political than are those in the districts where the challenge from Independent candidates is higher. The London borough elections attract the largest proportion of full slates (that is a candidate for each vacancy) from the main parties, followed by the metropolitan boroughs. In around three-quarters of London wards electors had an opportunity to use all of their available votes for candidates representing one of the Conservative, Labour or Liberal Democrat parties. In the metropolitan boroughs fewer than half the wards featured full party slates, perhaps reflecting reluctance by the Conservatives and Liberal Democrats to challenge in entrenched Labour wards. The pattern of party contestation among the district councils shows that those authorities normally elected by "thirds" have a higher density of party candidates than do those who use the whole council election method, but that both have a lower proportion of full slates than the other two types.

Many partisan voters may act rationally when facing a restricted range of candidates and refuse to donate "spare" votes to other candidates. We test for this possibility by considering the level of unused votes in wards where *only* the three main parties contested the election (752 wards in total). In this competitive structure it follows that when each party has as many candidates as there are vacancies the number of "unfilled positions" is zero. If just one party fields two, rather than three candidates then the overall number of unfilled positions is equal to one and so on.

Table 2. Patterns of party contestation in three-member wards

	(a) Mean candidates	(b) Main parties	(c) Full slates	(d) Minor party	(e) Independent candidate
	(per ward)		(% wards)		
London	10.3	90.0	72.3	73.8	16.8
Metropolitan	9.0	83.1	47.7	60.4	19.7
"W" districts	7.3	53.8	18.1	30.1	31.3
"T" districts	8.2	71.6	41.2	28.9	24.4

Notes:
Column (a) presents the mean number of candidates standing for election in a ward.
Columns (b) – (e) indicate percentage of wards where:
(b) each main party fields at least one candidate for election;
(c) all main parties have full slate of candidates;
(d) at least one minor party has a candidate;
(e) at least one Independent candidate stands for election in a ward.

With zero unfilled positions as our starting category we then combined cases with one or two unfilled positions into a second category, leaving all other possibilities, of three or more unfilled positions, coded as a third category. If party contestation is the *only* explanation for unused votes then we expect to find that in wards where there are no unfilled positions the number of unused votes should approach zero. Conversely, the more restricted the choice of candidates presented to voters, the higher the expected level of unused votes.

Table 3 shows the mean percentage of unused votes as a function of the number of unfilled positions. For London wards in 2006 the mean value of unused votes is still 6% even when all three parties each field three candidates (and there are no other candidates). This rises to a mean of 9% unused votes when at least one party fields just two candidates. For these boroughs we reject the hypothesis that the level of unused votes does not differ from zero in the case of full slates (one-sample t-test) and also reject the hypothesis that there is no difference between the "all full slates" group of wards and wards where one of the main parties had an incomplete slate of candidates (independent-samples t-test). Although the number of cases is rather small in two categories, the findings are statistically significant. Findings from the 2004 metropolitan borough elections, while similar in trend to the London boroughs, show proportions of unused votes higher across the range of categories. At first glance that could suggest the interruption to the normal pattern of single-member voting in the metropolitan boroughs is itself responsible for the higher rate of unused votes. However, that conjecture is not supported by the district council data. There appears to be little difference in unused votes between those authorities that normally have multimember ward elections and those where they are a rare occurrence following revisions to ward boundaries.

Table 3. The mean of unused votes by unfilled positions (three-member wards; only main parties contesting)

	Full slate	1–2 unfilled positions	3+ unfilled positions
London	6.2	8.9	17.5*
	N = 112	N = 14	N = 1
Metropolitan	9.7	16.4	28.5
	N = 104	N = 104	N = 24
"W" districts	6.6	11.2	21.3
	N = 68	N = 110	N = 45
"T" districts	6.7	11.0	19.1
	N = 106	N = 54	N = 10

Note: *for London, this category was excluded from the statistical analysis because of small N.

If we relax the rather stringent conditions of only three major party contestation and include wards where one or more other parties fielded candidates, the number of available cases increases to 1,989 (see Table 4). However, the mean values remain comparable for both type of council and number of positions unfilled.

We can draw two broad conclusions from the findings thus far. First, that unused votes are an important function of the pattern of party contestation. It seems that a sizeable proportion of voters, when offered a restricted choice of candidates, prefer not to cast any spare votes for another party's candidate(s). Second, that even when parties present a full slate of candidates, some voters (about one in fifteen in London and the districts; about one in nine or ten in the metropolitan boroughs) do not use their full quota.

Table 4. The mean of unused votes by unfilled positions (three-member wards; each main party has at least one candidate and other parties may be fielding candidates)

	Full slate	1–2 unfilled positions	3+ unfilled positions
London	7.0	8.9	13.4*
	N = 439	N = 101	N = 6
Metropolitan	11.2	16.6	26.4
	N = 382	N = 230	N = 54
"W" districts	6.8	10.8	19.8
	N = 164	N = 202	N = 121
"T" districts	6.5	10.5	17.9
	N = 167	N = 97	N = 26

Note: *For London, this category was excluded from the statistical analysis because of small N.

Decision Heuristics

The previous analysis has shown that even where there is complete contestation a proportion of block votes remains unused. In this section we explore whether there is any pattern to their distribution that may help our understanding.

Alphabetic Order

Among candidates from the same party we could discover evidence of alphabetic bias (for previous analyses citing evidence of positional bias see, Bain & Hecock, 1957; Masterman, 1964; Mackerras, 1968; Hughes, 1970; Scott, 1972; Robson & Walsh, 1973; Brooke & Upton, 1974; Upton & Brook, 1974, 1975; Taebel, 1975; Upton, 1976; Bakker & Lijphart, 1980; Kelley & McAllister, 1984; Darcy, 1986; Lijphart & Pintor, 1988; Darcy and McAllister, 1990; Hamilton & Ladd, 1996; Miller & Kroznick, 1998; Rallings *et al*., 1998; Koppell & Steen, 2004; Ho & Imai, 2006a, 2006b; but see Darcy, 1998 for different findings). This is presumably because people generally scan the ballot paper from the top downwards before finding their target party. Those voters who understand the voting rules continue scanning until the requisite number of votes is cast. Those who do not realize that they have up to three votes to cast may select the first party candidate they locate and then finish voting (see Bullock & Hood, 2002, for the US experience). A further group of voters, perhaps intent on "split-ticket" voting, will operate a different search algorithm: scan downwards and vote for the target (or alternative) party and then resume downwards seeking the alternative (or target) party. If the latter groups of voters exist in numbers then the aggregate data should provide evidence. In order to investigate this we first establish whether or not there is an alphabetical advantage in block votes and, if there is, whether and how this relates to the distribution of unused votes.

To examine whether there is any significant correlation between a candidate's rank in the alphabetic order within the party slate and that candidate's finishing position within the slate, we consider three-member wards where the major parties fielded a complete set of candidates. The Spearman rank correlation coefficients are higher for London (0.44) than for districts (0.35 for 2002 "thirds" districts and 0.28 for whole council districts) and the metropolitan boroughs (0.2), but all are statistically significant. In short, the higher a candidate's position in the ballot order (i.e. the higher a candidate's surname in the alphabet), the better a candidate performs *relative to candidates from the same party* placed lower in the alphabetic/ballot order.

Although the correlation analysis shows a relationship it is not clear how much of an advantage accrues to candidates from a superior ballot order position. Table 5 considers full-party slates in three-member wards. Candidates are located according to both their ballot order and finishing position within the slate, i.e. their vote relative to party colleagues.

We examined, for example, 1,750 separate party slates at the 2006 London borough elections. Of the candidates placed highest in alphabetical/ballot paper

Table 5. Alphabetical order and finishing position within three-candidate slates

London	Finishing position		
Alphabetical order	First	Second	Third
First	57.8	28.3	13.9
Second	28.6	43.1	28.3
Third	13.6	28.6	57.8
Metropolitan	Finishing position		
Alphabetical order	First	Second	Third
First	43.0	31.9	25.1
Second	33.9	37.4	28.7
Third	23.2	30.7	46.1
"T" districts	Finishing position		
Alphabetical order	First	Second	Third
First	53.1	30.6	16.2
Second	27.2	42.3	30.5
Third	19.7	27.1	53.2
"W" districts	Finishing position		
Alphabetical order	First	Second	Third
First	49.0	30.0	21.0
Second	30.6	40.8	28.6
Third	20.4	29.2	50.4

Note: Table entries are row percentages.

order some 58% finished first within the party group, 28% finished second and just 14% finished in third and last place. A candidate positioned highest on the ballot order was thus more than twice as likely to finish at the top rather than in second place on the party slate. The advantage is even greater when first is compared with third alphabetically: the former is four times more likely to have finished ahead in votes received.

The alphabetic effect is smaller although still statistically significant for the metropolitan boroughs where voting in multimember electoral districts is not the usual practice. An examination of 1,934 separate party slates in these authorities shows that candidates highest in the ballot paper order were placed first in the party vote in 43% of cases and last in just 25% of cases. The reverse applies for candidates whose surname places them third within the party list. This is clearly different than would happen by chance, although the effect is apparently not as strong as it is in London.[5]

In districts using whole council elections those placed highest on the ballot were more than twice as likely to finish top of their party's support as in third place (1,649 party slates were available for analysis). In districts where partial council elections were the norm (930 slates), alphabetic advantage was even more pronounced. There was a better than even chance that someone placed highest in alphabetic order would finish in first place relative to their party colleagues. There was a better than even chance that someone placed lowest in the ballot order would finish with the smallest number of votes.

We also considered political parties separately in order to assess whether alphabetic voting was something that affected some rather than others. This is not the case: votes for *all* parties appear skewed towards candidates at the top of each party's ballot ordering. Moreover, even when a party selects just two candidates rather than three, the data suggest that voters still favour ballot order. In theory, candidates from the same two-party slate have a more or less even chance of finishing ahead of one another. In fact, a candidate in the leading ballot order position is about twice as likely to finish above their colleague after votes are counted.

Impact of Incumbency

At this point we can conclude that there is strong evidence of alphabetical advantage.[6] However, one important aspect of the data that has been ignored thus far is the effect, if any, of incumbency. Candidates seeking re-election probably believe that four or more years serving on the local council will provide them a degree of public recognition. Surely, supporters of the incumbent ward party will recognize candidates who are sitting councillors rather more than a candidate who is perhaps contesting an election for the first time. We started to answer this question by examining separately only party slates where *all* nominated candidates are incumbents seeking re-election (919 slates in total). The results (not shown here) are virtually identical to those in Table 5 and confirm the continuing presence of alphabetic advantage amongst incumbents.

To test further for the possible effect of incumbency, we examine situations where a party slate consists of a single incumbent and two non-incumbent or "novice" candidates as we shall call them. In total there are 990 party slates in the data set with this particular configuration of candidates. Table 6 suggests that incumbents do have an advantage but that alphabetic order remains relevant.

For example, in the 2004 metropolitan borough elections incumbents highest in the ballot order finished in first place in 72% of cases, that is almost seven times more likely than in third place (11% of cases). The pattern is even more pronounced both at the 2006 London borough elections and for district council elections generally. Nevertheless, as incumbents descend the ballot order so their advantage over non-incumbents also diminishes. Indeed, a sitting councillor seeking re-election in London in 2006 and placed third in ballot paper order behind two novice candidates

Table 6. Ballot position effect for incumbent with two non-incumbents seeking election

	Finishing position		
London			
Alphabetical order	First	Second	Third
First	83.8	13.5	2.7
Second	51.4	34.3	14.3
Third	34.5	27.3	38.2
Metropolitan			
Alphabetical order	First	Second	Third
First	72.3	16.9	10.8
Second	69.0	16.7	14.3
Third	52.0	29.3	18.7
"T" districts			
Alphabetical order	First	Second	Third
First	79.0	17.3	3.7
Second	52.7	29.1	18.2
Third	56.6	22.6	20.8
"W" districts			
Alphabetical order	First	Second	Third
First	82.9	8.5	8.5
Second	66.4	26.1	7.6
Third	48.2	28.6	23.2

Note: Table entries are row percentages.

was more likely to finish in third rather than first place, although the differences are rather small.

When we consider the reverse position to that above, with one novice candidate alongside two incumbents on the party slate (1,124 slates), the data show that a novice candidate placed at the top of the ballot paper order had a good chance of overcoming any incumbency effects at the London borough and partial district council elections – see Table 7. For other authorities, however, the pattern is different. In both the metropolitan boroughs and whole council election districts, incumbency clearly dominates over ballot paper position advantage: the novice, even when placed at the top of the ballot order, was more likely to finish third than first in the popular vote. Nevertheless there remains some degree of alphabetical advantage. A novice who happens to be in first place on the party slate is always less likely to finish third than is the novice who finds that their name appears after that of their two incumbent colleagues.

Table 7. Ballot position effect for non-incumbent with two incumbents seeking re-election

London	Finishing position		
Alphabetical order	First	Second	Third
First	37.6	35.3	27.1
Second	18.8	40.0	41.2
Third	11.6	25.3	63.2
Metropolitan	Finishing position		
Alphabetical order	First	Second	Third
First	12.4	31.0	56.6
Second	14.4	37.5	48.1
Third	8.7	18.3	73.1
"T" districts	Finishing position		
Alphabetical order	First	Second	Third
First	33.9	32.2	33.9
Second	14.3	32.1	53.6
Third	5.5	21.8	72.7
"W" districts	Finishing position		
Alphabetical order	First	Second	Third
First	27.8	32.2	40.0
Second	9.9	32.2	57.9
Third	8.6	18.1	73.3

Note: Table entries are row percentages.

Ordinal Logistic Model

Although both incumbency and position on a party slate appear to be important, their relative strength remains less clear. To take account of these issues simultaneously and evaluate their relative effects on a candidate's electoral success, we conducted a multivariate analysis. The dependent variable represents a candidate's finishing position within a party slate, i.e. 1, 2, or 3. The independent variables are a candidate's position on the ballot paper as a whole, his/her alphabetic rank within the party slate, his/her incumbency status and whether at least one other incumbent stood for re-election. Finally, an interaction term between a candidate's incumbency status and alphabetic rank on a party slate is explicitly incorporated into the model specification. This additional term is designed to capture the possibility that the impact of alphabetic rank on a candidate's success can be different for an incumbent and a novice.

Because the dependent variable takes on values in a set of naturally ordered categories, an ordinal regression model was an obvious choice (Agresti, 2002). Trying to keep the model as parsimonious as possible, we began with the proportional effects cumulative logit model.[7] The model consists of several logistic regressions. Each regression has its unique constant, (similar to the intercept term – "threshold" in SPSS terminology) and common location parameters, the slope coefficients. The proportional odds assumption states that the relationship between the independent variables and the logits are the same for all logits. However, our data reject the proportionality assumptions and the general form of the cumulative logit regression was used instead.[8] The generalized ordinal model estimates for the threshold and location parameters are presented in Table 8.

The first panel gives results that are similar to that of the logistic regression:

$$logit_1 = \alpha_1 + \overline{\beta}_1 * \overline{x}$$

with the binary dependent variable being "*first* finishing position within a party slate" vs. "*second or third* position". The dependent variable in the second panel contrasts "*the first or second* finishing position" with the "*third* position" category:

$$logit_2 = \alpha_2 + \overline{\beta}_2 * \overline{x}$$

Parameters in the two logistic regressions are estimated simultaneously using the Maximum Likelihood method.

It is important for our research questions that all predictors are significant at least at the 0.05 level and that the direction of their influence on the dependent variable is consistent with the findings from our initial bivariate analysis. For example, the positive coefficient for "a candidate's alphabetic rank on a ballot paper" in the first equation indicates that as a candidate moves one position further from the top of a ballot paper, the odds of finishing in the first place within his or her party slate decreases by 3%, controlling for other variables. The regression coefficient for the dummy variable "another incumbent" is negative and the odds ratio (Table 8, the last column) of 2.67 indicates that the odds of finishing at the top of the party slate increase by more than double if there is no other incumbent seeking re-election, controlling for all other variables (including the candidate's own incumbency status). The positive coefficient for "incumbency status" (with *incumbent* as the reference category) and positive influence of the interaction term "incumbency by position within slate" means that being a novice candidate decreases the odds of finishing at the top of a party list (with all other circumstances equal). The direction of the effect of the independent variable "alphabetic rank within party slate" on the dependent variable is similar to that of "a candidate's position on a ballot paper" discussed above. However, it makes a much stronger impact: adjusting an incumbent's location within the slate downwards by one position results in a fully 43%

Table 8. Ordinal cumulative logistic model: impact of incumbency and alphabetic rank on a candidate's finishing position within party slate

Parameter		B	Std. Error	95% confidence interval Lower	Upper	Exp (–B)
1 (Threshold)		0.734**	0.073	0.591	0.876	
Incumbency:	novice	0.797**	0.094	0.613	0.982	0.45
	incumbent	0.0[a]				
Another incumbent	no	–0.982**	0.043	–1.067	–0.898	2.67
	yes	0.0[a]	.			
Alphabetic rank within party slate		0.568**	0.040	0.490	0.647	0.57
Alphabetic rank on ballot		0.027**	0.008	0.012	0.043	0.97
Incumbency by alphabetic rank within party slate	novice	0.198**	0.045	0.111	0.286	0.82
	incumbent	0.0[a]				
2 (Threshold)		2.43**	0.096	2.241	2.617	
Incumbency:	novice	0.701**	0.114	0.477	0.926	0.50
	incumbent	0.0[a]	.			
Another incumbent	no	–0.679**	0.040	–0.758	–0.601	1.97
	yes	0.0(a)				
Alphabetic rank within party slate		0.667**	0.045	0.580	0.755	0.51
Alphabetic rank on ballot		0.018*	0.008	0.003	0.032	0.98
Incumbency by alphabetic rank within party slate	novice	0.099*	0.048	0.005	0.194	0.91
	incumbent	0.0[a]	.			

Notes:
Dependent variable: a candidate's finishing position on a party's slate (Ascending).
Link function: Logit.
[a]Set to zero because this parameter is redundant
** Significant at the 0.01 level
* Significant at the 0.05 level
N = 18,789
Pseudo R Squares
Cox and Snell0.14
Nagelkerke0.16
McFadden0.07

reduction of the odds of finishing with the largest number of votes. The effect is even more pronounced for a novice candidate.

The examples in Table 9 amply demonstrate how dramatically the probabilities of different finishing positions within the party slate may change as the conditions alter. We consider six types of condition and calculate the probability of a candidate finishing first, second or third within the party slate. The final column shows the

Table 9. Probability of candidate's finishing position under different conditions

	Probability of finishing position			
Conditions	First	Second	Third	Changes in probability of first finishing position
1	**0.75**	0.16	0.08	–
2	0.53	0.32	0.15	–0.22
3	0.53	0.30	0.16	–0.22
4	0.74	0.17	0.08	–0.01
5	0.48	0.26	0.26	–0.27
6	0.08	0.27	0.65	–0.67

Notes: The conditions are that the candidate is:
1 The only incumbent, in top position within the party slate and also in first position on the ballot paper.
2 An incumbent in top position within the party slate and also in first position on the ballot paper; there is also *at least one more incumbent* seeking re-election.
3 *A novice* in top position within the party slate and also in first position on the ballot paper; also there is no incumbent on the ballot.
4 The only incumbent, who lies in top position within the party slate but is moved to *third* position on the ballot paper.
5 The only incumbent, in *third position* within the party slate and is moved to *third* position on the ballot paper.
6 *A novice* in *third position* within the party slate and is moved to *third* position on the ballot paper; there is also *at least one other incumbent* seeking re-election.

reduction in the probability of finishing in first position compared with the first of our six conditions.

If alphabetic voting does not exist, candidates would have an equal chance of finishing in either first, or second or third position, controlling for incumbency of course. Clearly, that is not happening. The best condition (from an individual candidate's point of view) is that they are the only incumbent, that their surname places them at both the top of the overall ballot and, by definition, at the top of their own party's list of candidates. In this situation there is a 75% chance of finishing in first place in the party slate and only an 8% chance of being in the third position. This situation could be contrasted with that which holds for the fifth condition. What happens if two novice candidates from the same party appear before the incumbent in ballot order? Now, the incumbent is in third place alphabetically within the party slate although the party slate as a whole remains in the first three positions on the ballot paper. The model reveals that this candidate has a 48% chance of finishing in first position on the slate – a 27 point reduction compared to the situation in the first condition. The worst condition considered here is number 6. Here, there is a novice, non-incumbent candidate who is third on both the party slate and overall ballot position order and is also facing a challenge from an incumbent seeking re-election. This person has just an 8% chance (67 points lower than the candidate described in the first condition) of receiving more votes than her party colleagues but a 65% chance of receiving the least votes.

We can conclude at this point that there is a statistically significant alphabetic advantage but we do not yet know whether unused votes are associated with the effect. As we noted before, the alphabetic advantage may occur as a result either of "split-ticket" voters and/or the incomplete use of available votes. Split-ticket voting can produce an even stronger alphabetic bias than the incomplete use of votes because just one split-ticket voter may provide alphabetical advantage for candidates from two (or three) party slates. However, this kind of voting behaviour does not result in any unused votes. We can expect quite the opposite from a confused voter's behaviour: the phenomenon of alphabetic bias and unused votes would be the result of the same kind of behaviour and are therefore related. This important distinction between two possible sources of alphabetic bias provides us with a chance to test (and hopefully reject) the hypothesis that an alphabetic bias is a pure consequence of split-ticket voting and does not relate in any manner to unused votes. If the hypothesis is not to be rejected then in the specific situation when all main parties supply full slates of candidates and neither Independents nor minor parties contest, we would expect that there is no association between the percentage of unused votes and the extent of alphabetic bias in a ward.

To determine the ward-level degree of alphabetic bias, we first calculate the overall alphabetic bias for each party contesting a ward. This can be characterized by the difference between the vote cast for a party's candidate placed at the top of the party slate and that of the candidate positioned last. A party's alphabetic bias describes how many potential partisan votes are "lost" for the party. The maximum alphabetic bias across all parties contesting a ward comprises the ward-level extent of alphabetical voting. However, in order to control for ward size, we consider a measure of *relative* bias by dividing the difference between votes cast for "the first" and "the last" of each party's candidates by the total number of votes cast in a ward.

The contestation pattern in 390 wards corresponds to the required conditions (that only the three main parties contest a ward and that each fields a full slate of three candidates) for testing the hypothesis of no association between unused votes and alphabetical voting. In these wards the explanation for unused votes due to a restricted choice of candidates is not relevant. Two further possibilities remain. Either unused votes occur simply by chance (and, thus, are uncorrelated with alphabetic bias), or both unused votes and alphabetic bias may arise from voters who misunderstand the system. In this case we should find a positive association between the level of alphabetic bias and unused votes. Correlation analysis indeed reveals a statistically significant Pearson correlation ($r = 0.3$, $P < 0.001$) between the percentage of unused votes and ward-level relative alphabetic bias. Thus, the hypothesis that alphabetic bias is a pure consequence of split ticket voting is rejected. It appears that (at least in the case of *a ballot paper with a complete party slate*) where a large number of voters do not use their full allocation of votes, a strong alphabetic bias towards candidates nearer the top of the ballot paper is revealed.

Unused Votes: A Multivariate Model

We have established that unused votes for all types of authorities are some function of the pattern of party contestation. But, it is also clear that contestation is not the only explanation since even when parties field a full slate of candidates a proportion of votes still remain unused. We have also now demonstrated that the level of unused votes is associated with alphabetical voting, suggesting that both are the result of some voters' confusion about the requirements of block voting. To bring together these different lines of enquiry we employ a multiple regression approach to examine how the factors listed above contribute to the explanation of the variations in the level of unused votes. The linear regression model includes the percentage of unused votes at the ward level as the dependent variable. The choice of independent variables is driven partly by the research hypotheses and partly by the findings from our initial data analysis.

The first group of core predictor variables in the model are based on the principle of "limited choice of candidates" as a source for unused votes. These variables are:

- the combined number of unfilled positions in a ward for the three main parties;
- the number of unfilled positions in a ward for minor parties;
- a dummy variable "Independent", which indicates whether at least one Independent candidate is standing for election in a ward – some non-partisan voters could choose to vote for a particular independent candidate(s) only and consequently use just one/two votes.

Despite the potential redundancy of some variables, we also test for the possibility that unused votes could result from ballot paper length if some voters become unable or unwilling to cope with a long list of names. Growing party contestation means that the average length of the ballot paper in multimember ward elections is increasing over time (Rallings & Thrasher, 2002). Therefore, the model includes the total number of candidates at the ward election as an independent predictor (the variable "ballot length"). We take into account the possibility that candidate incumbency could be a salient factor; when just one or two incumbents stand for re-election, a voter may decide that they are the only choice and respectively use only one or two of the three available votes. A dummy variable "incomplete set of incumbents" takes the value of one when just one or two incumbents stand in a ward election, zero otherwise.

A second group of independent variables is designed to capture evidence that unused votes could stem from a misunderstanding of the block-voting system. Whilst aggregate data do not permit us to assess directly the extent of (mis)understanding, we use a proxy measure that may reflect people's ability to comprehend the block vote ballot (see Herron & Sekhon, 2003; Knack & Kropf, 2003; Sinclair & Alvarez, 2004; Kimball & Kropf, 2005). Accordingly, we extracted data from the 2001 census for the proportion of adults resident in a ward without any formal educational qualification. The idea that unused votes and alphabetical voting are, to some extent, the result of the same behaviour is incorporated in the model through the variable, "ward-level relative alphabetic bias" (calculated as discussed earlier). Finally, we also include three dummy variables for London boroughs, metropolitan boroughs, and for "thirds" districts. These variables take account of the different average level of unused votes in these types of local authority and are compared against the whole council district election authorities as their reference point.

The OLS estimates for the ward-level percentage of unused votes are presented in Table 10. The model as a whole is statistically significant and explains 56% of the total variance in the dependent variable. All regression coefficients are statistically significant, indicating that each explanatory variable affects the percentage of unused votes while controlling for other variables.

The conclusions which are drawn from this model reprise major findings from the bivariate analysis. The independent variable for low educational qualification levels

Table 10. Unused votes as a function of party contestation and (mis)understanding of block voting system (OLS estimates)

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	8.91**	0.82		10.9	0.000
London[a]	2.93**	0.36	0.17	8.1	0.000
Metropolitan[a]	6.04**	0.31	0.37	19.6	0.000
"T" Districts[a]	0.78 *	0.30	0.05	2.6	0.011
Ballot length	–1.06**	0.08	–0.33	–13.9	0.000
Unfilled positions, main parties	1.39**	0.10	0.34	14.6	0.000
Unfilled positions, minor parties	0.79**	0.09	0.12	8.4	0.000
Independent[a]	1.84**	0.26	0.11	7.1	0.000
Incomplete set of incumbents[a]	0.54**	0.19	0.04	2.8	0.005
% without qualification	0.17**	0.01	0.25	16.4	0.000
Ward-level alphabetic bias	7.93**	2.01	0.05	3.9	0.000

Notes:
Dependent variable: ward-level percentage of unused votes.
Regression includes control for type of election (local authority), party contestation in a ward and level of educational attainment. Detailed description of the independent variables is presented in the text.
Cells show the OLS estimates, their standard errors, beta coefficients, t statistics, and associated p-values.
[a]Dummy variable
**Significant at the 0.01 level
*Significant at the 0.05 level
N = 2718
Adjusted R-square = 0.56

in a ward has a positive effect on the level of unused votes, as do the number of unfilled positions for main and minor parties and the participation in the election of Independent candidates. Similarly, finding just one or two incumbents standing for re-election also increases the percentage of unused votes.

Although the length of the ballot paper appears to be a significant independent predictor, the direction of its impact (negative) is perhaps contrary to our initial expectation that a long ballot might lead to confusion and thereby an increase in unused votes. Although multicollinearity causes no serious concerns in the model,[9] it should be noted that ballot paper length is highly negatively correlated (–0.7) with the number of unfilled positions. High correlation implies that the effects of these variables might confound each other. This allows for different interpretations of the negative sign on the regression coefficient. One interpretation is that a longer ballot paper probably means more choice for a voter and a corresponding decrease in the percentage of unused votes. Another is that it is also possible that when a partisan voter faces a long ballot paper, he or she could identify several candidates from a rival party before encountering the first in the list from their own preferred party. The fact that there is more than one candidate from the same party might be the cue to the voter that more than one vote is available. Nevertheless, it is more likely that the length of the ballot paper *per se* is not as important for the explanation of unused votes as the limited choice of candidates from a voter's preferred party.

Although the regression coefficient for the variable "ward-level relative alphabetic bias" is positive, we are not suggesting that it makes a *direct* impact on the dependent variable. Rather, we assume that the level of unused votes and ward-level alphabetic bias are both the result of some voters misunderstanding the voting rules. Nevertheless, it is interesting to note that the variable remains significant even after controlling for other variables in the model.

For predictors that are continuous variables, standardized betas help to assess the *relative* effect on the dependent variable. Thus, we conclude that the "ward-level relative alphabetic bias" has a statistically significant positive association with the dependent variable but its influence is small, with the standardized beta of 0.05. By contrast, the highest beta (0.34) relates to the independent variable "unfilled positions, main parties". The respective regression coefficient of 1.39 implies that we could expect up to a 5 percentage point difference in the level of unused votes if the three main parties had a complete slate of candidates in one ward and there were three unfilled positions in a second ward. The beta coefficient associated with the ward level of educational attainment, the proxy designed to reflect voters' ability to comprehend the block voting rules, takes the value of 0.25 and the regression coefficient is 0.17. We conclude from this modelling that for each ten percentage point increase in the proportion of adults without formal educational qualification, there is approximately a two point increase in the percentage of unused votes.

This analysis confirms that for all types of local authority the extent of party contestation contributes most to the level of unused votes, but that low levels of educational attainment among the population at large is also relevant to the explanation.

Conclusions

A significant fraction of voters do not use their full allocation of votes in local council elections that use the block vote method. Whilst contestation, or, strictly speaking, its absence, is significantly related to the level of unused votes there is additional evidence that other factors must be relevant to the explanation. The analysis shows a clear relationship between ballot order position and finishing position, and further examination controlling for the structure of contestation and incumbency effects confirms an alphabetic advantage. This is found for different types of local authority and across the range of parties.

This evidence for alphabetic voting, identified in the previous research literature and now confirmed for recent local elections, together with a significant level of unused votes, raises some important issues of both a general and specific nature. There are good reasons for believing that a fraction of voters do not understand the voting rules, despite their apparent simplicity. Of course, we have no sure way of knowing from this analysis alone whether this level of misunderstanding is found elsewhere but the fact that other countries that use a similar electoral method have taken steps to alleviate some of the effects of alphabetic voting suggests that the problem could be widespread.

This leads to the specific issue of what, if anything, should be done in the UK. The evidence is mounting that the introduction of different voting systems that sit alongside one another are causing problems of understanding.[10] There is also evidence presented here that candidates whose surnames appear towards the top of the ballot paper have a distinct advantage over their rivals. Is it appropriate that the votes received by candidates from the same party are apparently related to their respective surnames? Is it acceptable that the chances of someone being elected or not may hinge on where their surname happens to place them on the ballot paper? One solution would be to emulate practice elsewhere. In Australia, for example, a method of double random draw is used for Federal elections while the "Robson rotation" is used for elections to the Tasmania House of Assembly and for the Australian Capital Territory Legislative Assembly. The Robson rotation means that the favoured positions of top and bottom are shared equally among all candidates across a party slate.[11] Since 1975 ballots for some elected officials in the state of California have been randomized to help nullify the effects of alphabetic voting as have those in some US Presidential primary elections, for example most recently in New Hampshire in January 2008.

Another, more radical solution, would be to review the continued use of block voting. There has been examination of the value such wards have in local government (Stewart & Game, 1991; Electoral Commission, 2003) but little consideration of how voters interact with the voting system itself. While it is a minority that do not use their full allocation of votes the spillover effect from this is that preference is given to candidates higher on the ballot paper order. Local authorities that use this method of election could, of course, undertake programmes designed to educate voters but we suspect that such publicity is likely to be missed by the very group that it is intended to assist. At the very least local authorities that use this voting method should ensure that the ballot paper is designed with clear instructions to voters.

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Notes

1. Terminology varies with some texts referring to "bloc" voting, "plurality-at-large" or simply "at-large" voting. Throughout we use the term block voting. This system should not be confused with the Limited Vote. For a discussion see Cox (1999).
2. In some cases local authorities are calculating and reporting ward-level turnout by counting both valid and invalid ballots. However, we do not believe that the number of invalid ballots is sufficiently large to undermine our analysis.
3. Throughout we consider the result as statistically significant if the p-value is 0.01 or less.
4. Welch and Brown-Forsythe statistics were used to test the hypothesis that the means of four groups are not significantly different. These statistics are alternatives to the usual F-test in a one-way ANOVA table when the group variances are not equal (in our case the Levene statistic rejects the null hypothesis about equality of variances). When the variances of the dependent variable are not equal across groups, the results of the ANOVA table are unreliable.
5. At the 2002 London borough election, the pattern of alphabetical advantage (not presented in this article) is exactly the same as that for the 2006 London election and stronger than in metropolitan boroughs.
6. Significance of relationships in the cross-tabulations were tested with chi-square statistics and found to be significant.
7. Statistical analysis was conducted using SPSS 15.0 for Windows (SPSS, 2006).
8. Violation of the proportional odds assumption can lead to invalid results. However, in our case, the proportional odds and general cumulative logit model give estimates that are almost identical.
9. Maximum VIF, variance inflation factor, is 3.4 and condition indices do not exceed 30. For a discussion see Belsley *et al*. (1980).
10. A good example is the confusion that has arisen over voters' understanding of the Supplementary Vote that is used for the election of local government mayors (see van der Kolk *et al*., 2006).
11. We tested whether there was any bias towards candidates placed at the very bottom of the ballot paper because there is a school of thought that these candidates are also favoured by the heuristic adopted by some voters. We found no evidence that shows candidates at the very bottom of the ballot paper are preferred.

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Appendix 11

Ballot order positional effects in British local elections, 1973-2011

Webber, R., C. Rallings, G. Borisyuk, & M. Thrasher (2012) Ballot order positional effects in British local elections, 1973-2011. *Parliamentary Affairs* (doi: 10.1093/pa/gss033).

65% of the work for the paper was undertaken by Galina Borisyuk

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Ballot Order Positional Effects in British Local Elections, 1973–2011

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Ballot order positional effects, electoral advantage gained from a candidate's surname location on the ballot paper, have been extensively studied. For 'low-information' elections especially candidates located at or near the top of the ballot paper are advantaged relative to their competitors. This examination of alphabetic bias uses data from local council election results in Britain. The examination of election contests featuring more than half a million candidates provides evidence of an alphabetic bias which increases as the number of vacancies increases. We calibrate the effects upon votes and vote share of alphabetical ordering of candidates. Comparing votes cast for last- and first-placed candidates in the ballot order demonstrates a clear advantage to those placed first. This increases in size as both the number of seats and competing candidates increases. Those located in the top half of the ballot paper are more likely to finish in the top half of the vote order. Subsequently, the distribution of surnames among elected councillors is clustered towards the top of the alphabet. Measures could remove the effects of alphabetic bias, such as randomising name order and introducing experiments in local council electoral practice, a cost-effective means for evaluating change.

In a recent analysis (Rallings *et al.*, 2009), it was found that in local elections voting is biased towards candidates appearing at the top of ballot papers; because candidates are listed in alphabetic order on these papers, there is a corresponding alphabetic bias. The evidence further shows that where parties field a slate of candidates (two or more) the finishing order within the party group

[†]In the spirit of the paper the authors drew lots to determine the order in which their names should

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Appendix 12

Parties, recruitment and modernisation:

Evidence from local election candidates

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Parties, Recruitment and Modernisation: Evidence from Local Election Candidates

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ABSTRACT *Using pooled data from four separate nationwide surveys of local election candidates conducted from 2006–09 the paper assesses the role and importance of parties in the recruitment and selection of candidates. In many respects candidates are similar to councillors with men outnumbering women in a two to one ratio, with very few non-white candidates coming forward for selection and an age bias towards older rather than younger people. Candidates are found generally to have higher educational qualifications and to be employed in professional and managerial populations than in the public at large. Although a majority of candidates are resident in the ward that they contest a large fraction live elsewhere, suggesting that local parties cast the net widely during the recruitment process. The data suggest that the recruitment networks used by parties are relatively closed with many candidates reporting prior experience as local party officer holders or as members of charitable organisations and local public bodies. For two-thirds of candidates the initial decision to stand follows from a request by someone else, often a fellow party member. Women are more likely to be asked than men. Although candidates are aware of the current under-representation of some social and ethnic groups they are generally against using affirmative action measures to redress any imbalance. Although local parties are sometimes seen as contributing towards the problem of under-representation of some groups on council benches the data suggest than an increase in independent candidates would be unlikely to improve the situation and could perhaps cause it to deteriorate still further.*

KEY WORDS: Election candidates, under-representation, local parties, recruitment

One criticism aimed at local government in Britain is that it is ‘male, pale and stale’; council benches are often dominated by white, middle aged and retired men. The broad evidence is unequivocal (Bochel & Bochel, 2000;

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NFER, 2009; Rao, 2005) but there are good reasons for questioning why this situation prevails. Is it that recruitment processes, mostly undertaken by local party organisations, implicitly favour this demographic to the exclusion of others? Or is the fundamental problem that some sections of society, especially women, people from the Black, Asian and other minority ethnic populations (BAME) and younger people are under-represented because these groups are reluctant to come forward for selection? If it is largely white, middle-aged males that come forward for selection then it is unsurprising that these people are the most frequently elected. The answer to these questions ultimately affects the identification and likely success of any strategies for addressing the issue of under-representation in local government (Councillors Commission, 2007).

This paper examines the evidence on recruitment using pooled data from four surveys of local election candidates in England and Wales (excluding town and parish councils) conducted since 2006 (for evidence about Scotland see MacAllister, 2003). The great strength of these data is that they provide information not only about the people eventually elected as councillors but also those that try but fail to be elected. Given the long-standing interest in the nature, scope and role of political parties in local government it is important to discover the extent to which parties are crucial in the recruitment process and how these organisations thereby affect the local electoral process generally (Adolino, 1998; Ball & Solomos, 1990; Barron *et al.*, 1989; Bristow, 1980; Brown *et al.*, 1999; Canavon & Smith, 2001; Gordon, 1979; ODPM, 2003). A useful starting point is to identify whether party organisations are proactive in seeking people to stand or reactive in terms of responding to and facilitating someone's own electoral ambitions. Each candidate was asked about the first time that they contested a local election. Did the individual arrive at their own decision to stand, motivated by the desire to fulfil an ambition, to pursue a career in politics, or did they stand after being asked to do so? Simply knowing what proportion of candidates fall into each of these categories serves to define the nature of the task in addressing under-representation in local government. Identifying differences between candidates that decide to stand and those that are asked may provide clues that under-representation follows from a failure of some social groups to engage politically or it may confirm the suspicion that local party elites recruit from within their own social networks and that parties, far from being agents of change are key features of the problem itself.

Surveying Local Election Candidates

One fundamental weakness of existing surveys of councillors is that they provide only information about those that win elections; winners may or may not be typical of those that stand. Concerned at the limited scope of such surveys, therefore, we began to survey not just councillors but also candidates contesting an election for the range of principal local authorities, viz., London and metropolitan boroughs, district and unitary authorities in England and Wales. The process began in 2006 and the full electoral cycle was complete after the 2009 elections. Surveying all candidates, not just councillors, is crucial if progress is to be made in addressing the representativeness of local government and the role of political parties in this process.

Candidates are randomly selected from the nomination lists published by each local authority. Sampling procedures vary according to the number of candidates that are contesting in a given year. In 2009, when the number of contests and therefore of candidates was relatively small, the random selection interval lay between one in two and one in three. In 2007, when 28,379 candidates contested, the sampling interval was closer to one in every 10 candidates. The target for each survey is to collect the names and addresses of more than 3,000 candidates and to achieve at least 1,000 responses assuming a final response rate of about a third (see Table 1). Those selected were issued a postal questionnaire to their home addresses immediately after the election. As well as providing demographic information about each candidate (age, sex, ethnic background, occupational and employment status, and educational qualifications) the surveys addressed questions concerning party membership, political and electoral experience, recruitment and campaigning. Candidates were also invited to consider issues pertinent to the representativeness of local government, specifically the under-recruitment of women, people from the BAME populations as well as younger people. This analysis uses pooled data from all four postal surveys conducted among local election candidates between 2006 and 2009, amounting to a total of 4,646 individual respondents.

Because the procedure uses random sampling, there is a reasonable expectation that, unless there is response bias, respondents are an accurate reflection of the candidate population. Nevertheless, further checks are conducted when the aggregate election data are available. For example, it is verified that the proportion of men and women respondents to each survey reflects the proportion across all candidates and that the proportion of seats contested by each party is reflected in the distribution of partisanship among our respondents. For other characteristics (for example, ethnic background,

Table 1. The local election candidate surveys

		Questionnaires		
Survey year	Selection criterion	issued	returned	Response (%)
2006	1 in 5	2,800	1,181	42.2
2007	1 in 10	2,848	1,255	44.1
2008	1 in 4	3,142	1,105	35.2
2009	1 in 2.5	3,534	1,105	31.3

age profile), however, it is not practical to undertake similar checks. Notwithstanding the standard caveats about interpreting data that apply to random sampling procedures in surveys of this size (margin of error about $+/-$ 3%, confidence interval at the .05 level), we believe that these data provide an accurate picture of people currently contesting local elections across England and Wales.

Who Stands?

Examination of local election results shows that the percentage of women standing for local election rose rapidly during the 1980s but then in the following decade stabilised to its current level. Generally speaking, about 30% of candidates are women and a slightly smaller percentage than that (about a two-point difference) become councillors. There is no evidence at all that voters discriminate against women – if anything, women appear to do slightly better than men when candidates from the same party contesting multiple vacancies are considered. The aggregate data show that the three main parties, Conservative, Labour and Liberal Democrats, are broadly similar in their recruitment of women whilst differences emerge amongst the smaller parties contesting local elections (Borisyuk *et al.*, 2007). These patterns are also found in the survey data (see Table 2).

Two-thirds of Labour and Liberal Democrat candidates are men as are seven in 10 Conservative candidates – a small but notable difference perhaps given the national party's current difficulties in recruiting women to fight parliamentary elections. The Green Party is a clear outlier, recruiting men and women candidates in almost equal numbers. Conversely, the British National Party (BNP) recruits one woman candidate for every nine men that stand. Somewhere between these two extremes is a range of smaller parties and groups, the United Kingdom Independence Party (UKIP), Plaid Cymru (PC), Independents, and all 'Others'. Although the Registration of Parties Act (1998) has contributed towards a reduction in independents (many

Table 2. Local candidates by party

	Men (%)	Women (%)	White (%)	Non-white (%)	Age	
					Mean years	Std dev.
Conservative	70.0	30.0	97.1	2.9	55.2	13.9
Labour	66.6	33.4	95.1	4.9	54.7	12.9
Lib Dem	66.5	33.5	97.0	3.0	55.0	13.1
Green	54.7	45.3	99.2	0.8	49.6	13.8
UKIP	76.6	23.4	98.2	1.8	59.5	13.7
PC	75.8	24.2	100.0	–	54.6	10.4
BNP	89.7	10.3	100.0	–	52.3	13.5
Independent	76.5	23.5	96.7	3.3	57.5	11.0
'Others'	75.5	24.5	94.1	5.9	53.4	14.3
All candidates	68.3	31.7	96.7	3.3	54.8	13.4

preferring to stand for one of the many micro parties) such candidates continue to stand in some areas. The demise of independents is regarded by some as symptomatic of the excessive power of political parties but it is not entirely clear whether encouraging more people to stand as independents would transform the local councillor demographic – indeed it may exacerbate the problem.

Candidates for all parties are likely to be men; it is even more likely that they are white. Across all four surveys candidates describing themselves as white (white British, white Irish, other white) are an overwhelming majority. Non-white candidates account for slightly more than 3 per cent of the total, compared with 8 per cent in the overall population at the 2001 census and an estimated 10 per cent in the current population. Two parties, BNP and Plaid Cymru, fielded no BAME candidates but even the gap between these and Labour, whose candidates are the most ethnically mixed of the major parties, is not particularly large. Further examination reveals that BAME candidates are found in larger numbers in elections for the London boroughs. In these authorities, they account for 16 per cent of the total, but in other larger cities the proportion is about a quarter of that figure. The shortage of electoral candidates among the BAME population is a serious issue for local government and beyond but the causes of this are not entirely clear (Saggar, 1998, 2000). We suspect that the problem in local government continues to be one of both demand (party membership and recruitment processes fail to engage with these particular communities) and supply (members of these communities are not coming forward as candidates). What is now clear is that the problem affects all political parties.

Candidates are predominately male and white; they are predominantly middle-aged as well. The mean age of all candidates is 54.8 years (standard deviation of 13.4 years) with only the Greens fielding candidates whose average age is (just) below 50 years. The oldest are those standing for UKIP (59.5 years, std dev 13.7 years) while there are no significant differences across candidates contesting for the main parties. A more detailed examination that takes account of the type of local authority, however, does reveal some variations between parties. For example, in the 2006 London borough elections the mean age of Labour candidates is 48 years compared to 50 and 53 years for the Conservative and Liberal Democrat parties respectively. The mean age of independents contesting in London is rather higher at 56 years. By contrast, in the metropolitan boroughs, Labour candidates have a higher average age, 53 years, than do candidates for their main rivals whose average age is two years lower. To an extent this age difference correlates with incumbency – many Labour candidates in metropolitan boroughs are incumbent councillors seeking re-election. In general, for all the main parties, candidates that contest in the English shires are older than their colleagues campaigning in the cities. In the shire districts the mean age is around 56–57 years while for the county elections in 2009 the average is a year or two higher. The average age of independents is higher than that for party candidates for all types of local authority election.

These surveys clearly demonstrate that the injunctions about the unrepresentativeness of councillors apply to candidates generally. Further confirmation of this is found after considering the range of educational qualification, employment and occupational status across candidates (see Table 3). However, while there are no dramatic differences between the parties in terms of candidates' sex, ethnicity and age, this does not apply to their education and occupational characteristics. Approximately six in 10 Labour and Liberal Democrat candidates hold a university degree but this falls to four in 10 amongst Conservatives, UKIP members and independents. The Greens boast the highest percentage of university graduates amongst their candidates but only one in 10 of those challenging as BNP holds an equivalent qualification.

It is not wholly surprising given their average ages that one in three candidates is retired from work. There is no significant difference among the main parties but while only one in five Green candidates is retired double that level of UKIP candidates are no longer in work. The Conservative party recruits from among the self-employed; one in five of its candidates run their own business compared to 11 per cent in the overall working population. The proportion of self-employed among Labour candidates is close to the national figure but for independents, one in four of whom is self-employed, it is more than double that level. Half of Labour and Green party candidates are in part- or full-time employment but only a third of Conservatives are similarly employed. Less marked differences in occupational status are found between parties. Half or slightly more of all party candidates have professional/managerial occupations with the exception of UKIP and, especially, the BNP whose candidates are likely to be in more routine employment.

Table 3. Educational attainment and occupational status

Party	No formal education qualification	University degree	Employed full-time/ part-time	Self-employed	Retired	Professional	Manager/ technical
Conservative	8.9	41.5	34.8	21.6	33.9	49.8	31.4
Labour	10.0	59.6	49.5	9.5	31.5	49.5	25.6
Liberal Democrats	3.8	63.3	42.3	15.7	33.0	55.3	27.1
Green	1.4	78.5	50.3	18.1	20.1	57.5	20.5
UKIP	13.9	37.3	34.5	15.5	42.9	44.5	26.2
BNP	17.6	10.8	42.5	16.4	23.3	27.0	17.6
PC	6.3	65.6	43.8	15.6	28.1	50.0	23.3
Independent	18.1	38.3	30.3	25.8	34.8	49.8	28.6
'Others'	9.1	45.5	42.9	18.6	29.3	40.3	32.1
All candidates	8.2	53.5	41.6	16.7	32.0	50.7	27.5

Other studies of participation in politics paint a similar picture with some social groups active, others inactive (see Electoral Commission, 2004, 2007; Fieldhouse & Purdam, 2002; Gill, 2000; Henn *et al.*, 2002; Jowell & Park, 1998; Pattie *et al.*, 2004). A crucial question then becomes whether the parties could make a real difference about who stands if they gave more attention to recruitment processes. There is little systematic research into the ways and means that local party organisations recruit candidates (Copus, 2001, 2004; Meadowcroft, 2001; Seyd & Whiteley, 2004; Wheeler, 2006). This contrasts with a growing literature examining the recruitment of parliamentary election candidates (Childs *et al.*, 2006; Cutts *et al.*, 2008; Evans, 2008; Norris & Lovenduski, 1993, 1995; Studlar & Welch, 1993) and candidates seeking election to the newly devolved institutions (Bradbury *et al.*, 2000; Chaney & Fevre, 2002; Mitchell & Bradbury, 2004). When candidates seek nomination for a parliamentary constituency his or her personal links with the area are often a key factor in the selection criteria. Being born, raised and currently resident locally are all virtues for prospective candidates. A useful starting point in investigating the recruitment process, therefore, is the extent to which local election candidates are ward residents. Table 4 shows that overall 55.1 per cent are resident but, by definition, the remaining 44.9 per cent are not. Among the major parties the Conservatives are most likely to select a ward resident with Labour the least likely. A clear exception to the general trend, however, is independents; overall, almost eight in 10 of these are living in the ward that they contest, unsurprising, given that their reasons for standing are often closely associated with the locality.

What is unexpected, perhaps, is that local parties so often select candidates that are *not* ward residents. Among different types of local authorities some parties may struggle, it seems, to find candidates from amongst the immediate local community. Local Conservative parties in the London and metropolitan boroughs, for example, recruit a majority of candidates from outside the ward but two thirds of their county council candidates are living in the division that they contest for the party. Although Labour generally recruits ward residents this is certainly not true of the London boroughs, where only a third of its candidates live in the area. With the clear exception of independents (although we should be mindful of relatively smaller numbers of candidates when making this point) all parties

Table 4. Percentage of candidates residing in ward contested

Authority type	Con	Lab	LD	Minor	Ind	All
London	45.3	33.3	42.6	50.0	100.0	42.2
Mets	43.1	55.7	39.0	47.2	93.8	48.5
Districts/Unitaries, all-out	61.4	53.9	55.7	64.3	76.6	60.4
Districts/Unitaries, thirds	51.6	50.6	53.4	57.0	74.0	53.5
Counties	65.1	54.3	58.0	53.8	87.9	59.0
All authorities	56.0	51.2	52.2	55.3	79.2	55.1

appear to find it difficult to recruit ward residents to contest London borough elections – overall, a majority of these candidates live outside the ward. The explanation for this finding may include population migration and residential stability, the size and compactness of ward boundaries and also, perhaps, party organisations.

We have found few differences in the social characteristics of people that currently sit on council benches and those that seek to replace them. It may be that the enduring dominance of certain groups (men, white, middle-aged and professional) is because the social networks where such people predominate overlap with one another (Putnam, 2002) leading to relatively closed party recruitment processes. The surveys asked candidates about their involvement in other activities, including as a candidate for parliamentary election, or holding office in the local party, trade union and other type of association (see Table 5). Few candidates have stood for parliament although a greater proportion has done so for Liberal Democrats and the smaller parties than for the two main parties. Almost half the candidates have held office for the local party organisation, however. This figure rises to more than two-thirds among Labour party candidates but is rather smaller for Conservatives. The proportions involved with both charitable and professional associations are relatively uniform across all of the parties; about four in 10 for the former and less than half that for the latter. Labour candidates are naturally most likely associated with trade union activity but other parties, and even independents, have also had involvement. Women's organisations, including the Women's Institute, do not feature prominently within the recruitment network but candidates are associated with a variety of other local public bodies and community groups. These activities include serving as school governors or as members of housing trusts. Independent candidates are most likely to feature as members of charitable organisations as well as local community groups.

Of course, these categories are not mutually exclusive because an individual may be involved across a range of these organisations and associations. That said, the nature and scale of these social networks suggests that the pool that parties recruit from may be somewhat restricted.

Table 5. The recruitment network

	Con (%)	Lab (%)	LD (%)	Minor (%)	Ind. (%)	All (%)
Parliamentary candidate	4.5	6.2	11.0	16.8	4.4	8.5
Local party	43.5	69.6	52.3	32.5	18.1	49.2
Charitable organisation	39.1	40.8	40.5	33.9	45.3	39.3
Professional association	17.7	18.1	18.1	13.9	19.6	17.4
Trade union	6.4	44.0	17.1	17.5	19.3	21.1
Women's organisation	7.4	9.0	3.8	5.4	2.2	6.4
Local public body	33.8	43.7	32.9	17.8	35.9	33.7
Local pressure group	15.5	26.2	23.8	32.1	34.7	23.9
Local community group	39.8	47.1	42.4	41.3	55.8	43.4

In sum, candidates like councillors come from a rather narrowly defined segment of the total population. They are more likely than the general population to have a university degree or its equivalent qualification and to work in some professional or managerial capacity; women, BAME and younger people are under-represented across all parties and in both the shires and the cities. Participation in politics and other activities in the local community also mean that candidates are socially engaged, often before being selected to contest an election. But this is only part of the picture. What is not yet clear is whether the motivation to stand affects who stands. In short, are the people that decide to stand any different from those that are actively recruited to stand?

Motives to Stand

Table 6 groups candidates according to whether the initial decision to contest a local election was entirely their own decision or whether they stood after being asked and encouraged to do so by others. The data show that for only one candidate in three is the initial decision to stand entirely their own

Table 6. Distribution of candidates and the decision to stand (row percentages)

	Entirely own decision	Approached/encouraged by others
London	33.6	66.4
Mets	33.7	66.3
Districts/Unitaries, all-out	32.9	67.0
Districts/Unitaries, thirds	28.2	71.8
Counties	36.4	63.6
All candidates from main parties	32.4	67.6
Con	31.8	68.2
Lab	34.5	65.5
LD	30.8	69.2
First time candidate	27.7	72.3
Incumbent	35.6	64.4
Female	23.4	76.6
Male	36.6	63.4
White	32.1	67.9
Non-white	46.4	53.6
45 yrs and under	37.3	62.7
46 yrs and over	30.9	69.1
No qualification	32.0	68.0
GCSE or A level	31.8	68.2
Degree	32.6	67.4
Full/Part-time employment	32.5	67.5
Self employed	33.9	66.1
Retired	31.2	68.8
Other	34.8	65.2
Professional	33.0	67.0
Managerial/ technical	32.7	67.3
Other	31.6	68.4
Live in the ward	32.6	67.4
Do not live in the ward	32.2	67.8

decision; two in three candidates are invited to stand by others. What is perhaps most striking about this finding is its uniformity. Dividing candidates by type of authority makes little difference, although county council candidates are somewhat more likely to be self motivated and those in district and unitary authorities with thirds elections rather less likely. Similarly, local party organisations across the political spectrum are actively recruiting two in three candidates although it does appear that finding candidates may be becoming more difficult – more than seven in 10 first-time candidates were approached but fewer than two-thirds of incumbents remember being invited to stand.

Some interesting differences do though emerge when considering candidate demographics. The ratio of the category, own decision/asked to stand, among men is 1:2; the corresponding ratio among women is 1:3. Women appear more likely to need to be encouraged to stand as local party organisations try to address the shortage of women in local government and take steps to remedy the current imbalance. Data suggesting that fewer than one in four women come forward of their own accord support previous research observing that large numbers of women do not currently consider a political career in local politics (Briggs, 2000; Giddy, 2000; Hills, 1983; Rao, 2005).

Non-white candidates appear more likely to arrive at their own decision to stand rather than responding to others' invitations but we should note the low numbers involved. Moreover, even if this finding is valid its cause is open to interpretation. Are these candidates highly motivated but atypical of that section of the general population? Or is it that local party organisations are connecting poorly with these communities and hence finding it difficult to recruit as easily there as among the white community? The same question may be asked about the recruitment of younger people. Candidates aged 45 years and under are more likely to take their own decision to stand but their numbers generally among local election candidates are rather low. Are the obstacles and constraints on a council career deterring younger people or is that existing party networks do not embrace this fraction of the population?

It becomes clearer still that there is something unusual about the recruitment of women, ethnic minorities and younger people after controlling for other factors. In terms of educational attainment there is no difference between those deciding to stand and those who are asked to do so. Similarly, characteristics relating to employment status, occupational activity and place of residence do not affect the ratios between the proactive and reactive candidates.

Of course, these factors may be working together or separately and it is better to employ a multivariate analysis in order to estimate their overall impact. One method for considering this is to use logistic regression where the binary dependent variable is whether the candidate made their own decision to stand or not. The independent variables include gender, age, and ethnicity, a candidate's employment status (a binary variable that distinguishes between a rather wide 'other' category versus the remaining categories of full/part-time employed, self-employed, and retired), and finally elective experience (a binary variable *that codes candidates as 1 if a first-time contestant, otherwise 0*). A binary variable that characterises how a candidate estimates his/her chances of winning the election was also included (binary variable *very low chance* vs. *some positive chance*) because it is clear that many candidates that contest local elections are little more than 'paper' candidates (Rallings *et al.*, 2007, 2008, 2009).

The logistic regression model correctly classifies 67 per cent of cases although Nagelkerke R Square is rather low at 0.044. All the independent variables mentioned above are statistically significant at least at the 5 per cent level. Older candidates (aged over 45 years), female and first time candidates are less likely to decide on their own to be a candidate. Those candidates who estimate their own chances of winning the seat as very low are also less likely to say that it was their own decision; this fits with an explanation that prior to the May elections parties seek out volunteers to stand in wards where there is little prospect of winning but fielding a candidate is important. The probability of a respondent saying that the initial decision to stand for election was entirely their own is higher for ethnic minority candidates, confirming the pattern seen above that parties appear more reactive than proactive in the recruitment of such candidates.

Causes of Under-recruitment: Supply or Demand?

Perhaps further clues about the causes of under-representation of some groups among candidates may also be found after examination of their views of the modernisation agenda. The surveys contained questions about the shortage of women, BAMEs and younger people and explored some of the reasons for this situation.

Table 7 describes responses specific to women's under-representation. Candidates from the main parties respond in similar vein to a question that considered whether women fail to stand because of a lack of interest in politics. Independent candidates are slightly more likely to agree with this statement and less inclined to disagree with it. With the exception of minor party candidates, a majority disagree that the under-supply of women in local politics results from a lack of confidence but between a fifth and a quarter do agree. The strongest agreement occurs when the explanation for women's under-recruitment is presented as political career versus family commitments. More than six in 10 in all parties agree that women's responsibilities in the home and to the family create obstacles to recruitment. However, when candidates are asked about the role of local political party organisations in recruiting women, sharper differences emerge. Only a fifth of Conservatives agree that parties 'don't do enough'

Table 7. Attitudes towards women's recruitment (%)

Women are ...	Con	Lab	LD	Minor	Ind
Not interested in politics					
Agree	15.7	15.5	11.6	18.4	19.7
Neutral	20.2	14.7	17.1	19.8	23.3
Disagree	64.1	69.8	71.3	61.8	57
Lack confidence for politics					
Agree	20.7	26.6	24	25.1	21.5
Neutral	22.8	18.3	22.1	26.5	24.7
Disagree	56.5	55.1	53.9	48.4	53.8
Put families above political career					
Agree	64.9	64.1	64.7	63.2	61
Neutral	21.7	22.8	23.9	24.6	26.5
Disagree	13.5	13.2	11.4	12.1	12.4
Political parties don't do enough to recruit					
Agree	21.6	38.5	29.2	34.8	35.2
Neutral	24.1	16.2	27.9	32.5	43.8
Disagree	54.3	45.3	42.9	32.7	21.1

to recruit women, whereas Labour candidates are almost twice as likely to hold that view. Liberal Democrats lay between the two. Of course, it is not entirely clear what these responses mean. It might be that Labour candidates are castigating their own party or alternatively they might be criticising the failures of other parties. The proportions from the three main parties disagreeing with the suggestion that parties are failing in the recruitment of women are both similar and large. Among independents, while around a third is willing to blame parties, a plurality adopt a neutral position on this issue.

Various questions, asked in some but not all surveys, have sought to tackle the issue of affirmative action measures designed to improve the number of women on council benches. In 2006 and 2007, for example, the principle of party quotas for women candidates was considered. Eight in 10 Conservatives and six in 10 Liberal Democrats disagree with the idea; only Labour candidates, with 43.8 per cent disagreeing and 38.1 per cent agreeing, could be described as ambivalent. In 2006 a clear majority of candidates in all parties were against all-women shortlists – including an 85.4 per cent disagreement amongst Conservative members. There was a similar level of hostility to the proposal for reserved council seats for women; 85 per cent of Conservatives, 75 per cent of Liberal Democrats and 61 per cent of Labour candidates disagreed with the idea. This creates a real difficulty for the political parties whose leaders are anxious to recruit more women but face opposition from their local activists to affirmative action measures.

Candidates, the vast majority of whom are white, are more reticent about voicing opinions about under-representation among BAMEs than women. Table 8 shows that around a third prefer to stay neutral on whether they lack political interest. Nevertheless, nearly a fifth of Conservative and minor

Table 8. Attitudes towards recruitment of BAMEs

Black, Asian & other minority ethnic people are ...	Con	Lab	LD	Minor	Ind.
Not interested in politics (2007–09)					
Agree	18.9	11.2	9.6	18.1	13.8
Neutral	34.5	25.0	29.8	32.7	42.9
Disagree	46.6	63.8	60.6	49.1	43.3
Do not have the confidence for politics (2007–09)					
Agree	17.7	19.8	19.9	17.9	15.9
Neutral	37.8	29.6	35.7	39.7	45.8
Disagree	44.4	50.6	44.5	42.4	38.3
Put their families above a political career (2007–09)					
Agree	21.9	19.8	18.3	19.1	19.6
Neutral	47.5	48.6	56.2	51.3	55.8
Disagree	30.5	31.6	25.5	29.6	24.6
Political parties don't do enough to recruit					
Agree	25.0	48.5	47.7	35.3	42.1
Neutral	32.6	21.1	28.5	36.0	38.8
Disagree	42.4	30.3	23.8	28.7	19.0

party candidates do feel that this may be among the reasons for the under-representation of BAMEs compared to half that level among their Labour and Liberal Democrat rivals. Whereas family commitments were viewed as an obstacle to women barely a fifth of all candidates hold a similar view about BAMEs. Respondents do, however, place rather more of the blame on local party organisations for the under-recruitment of BAMEs. Compared with women's recruitment, candidates are more likely to agree that the parties could do more. Almost half of Labour and Liberal Democrats took this line but only a quarter of Conservatives did so. Once again, though, there is opposition to the idea of special treatment. Only 3 per cent of Conservatives support party quotas for BAMEs, fewer than one in 10 Liberal Democrats do so and even among Labour candidates only a quarter agree with this idea. Generally, candidates are less certain about the possible reasons for the under-representation among BAMEs but are certain of their dislike for active measures to remedy the situation.

Given that the average local election candidate is in his mid-fifties it is unsurprising to discover that across the parties two-thirds agree that the lack of interest by younger people in politics is a factor in their under-recruitment with only one in four disagreeing (see Table 9). It does not appear that confidence is seen as the key factor and it is certainly not that younger people put their families above a political career in local government. But what does become clear is that it is this group, rather more than women and BAMEs, candidates feel that parties should be doing more to recruit. Over half the Conservatives think parties could do more but this rises to two-thirds of Liberal Democrats and three-quarters of Labour candidates. Even among independents, two in three feel that parties should be reaching out to younger people in order to redress the imbalance in council compositions.

Table 9. Attitudes towards recruitment of younger people

Younger people are ...	Con	Lab	LD	Minor	Ind.
Not interested in politics (2007–09)					
Agree	63.9	63.3	58	62.7	71.4
Neutral	9.8	9.0	12.2	12.1	8.0
Disagree	26.3	27.6	29.8	25.1	20.7
Do not have confidence for politics (2007–09)					
Agree	35.8	36.8	35.9	40.4	39.8
Neutral	25.3	24.1	26.4	27.0	30.3
Disagree	38.8	39.1	37.7	32.6	29.9
Put their families above a political career (2007–09)					
Agree	24.2	14.3	17.8	14.3	21.9
Neutral	30.7	32.4	31.7	33.6	39.5
Disagree	45.1	53.3	50.6	52.2	38.6
Political parties don't do enough to recruit					
Agree	52.7	73	63.4	59.4	66.9
Neutral	17.1	8.2	16.4	22.0	23.6
Disagree	30.2	18.8	20.3	18.6	9.4

Even in this case, however, concern for under-representation does not lead to approval for positive discrimination. Only one in 20 Conservative candidates positively agree that quotas of some kind for younger people might be a legitimate policy. Among Liberal Democrats this rises to around one in 10 and to one in five amongst Labour candidates. The consensus is that not enough younger people come forward to be candidates but that parties should react to this by a process of more active recruitment, short of introducing formal quotas, of course!

Parties: Part of the Problem or Part of the Solution?

There has been a long debate about the role of political parties in British local government. Whilst they are acknowledged as essential for mobilising electors and administering local authorities emotive terms such as 'the nationalisation of local politics' and the 'decline of independents' place parties as responsible for undermining the qualities of localness. Removing some of the power that has transferred to these parties may assist a return to the golden age of local democracy and autonomy. This is not the place to rehearse the arguments for and against parties in local government (Copus, 2004; Gyford, *et al.* 1998; Jones & Stewart, 1993; Stewart & Game, 1991; Wilson & Game, 2002) but these survey data do help us to assess attitudes towards the post-1997 modernisation agenda introduced by the Labour government and largely embraced by the other mainstream parties. This agenda sets out the need for greater inclusiveness and a broadening of the electoral base. So central is this issue to the future health of democracy that in 2007 Prime Minister Gordon Brown announced the establishment of a Speaker's Conference that would, 'consider, and make recommendations for rectifying, the disparity between the representation of women, ethnic minorities and disabled people in the House of Commons and their representation in the UK population at large, (Speakers Conference, 2008).

It is legitimate to ask, therefore, whether in respect of the similar disparity in local government, political parties are part of the problem (in as much as they perpetuate the under-recruitment of some groups) or part of the solution (that they are the most effective recruitment agencies and should be reformed, not removed). We answer this question after first categorising candidates into one of three types, main party, minor party and independent, and then identifying any significant differences between them (see Table 10). Distinguishing candidates that contest on behalf of the Conservative, Labour and Liberal Democrat parties from smaller parties, largely the Greens, UKIP and BNP, may be useful in clarifying whether candidates from outside the party mainstream are similar/dissimilar to those whom they would supplant. The third category, independents, is useful in profiling the types of people that eschew party organisation and the constraints of party ideology and discipline, preferring instead to ask voters to support them as individuals rather than as a party representative.

In terms of the initial decision to stand the ratio between candidates making their own decision or being asked to stand is identical for major and minor parties alike; a majority of independents stand after committing to the decision without outside encouragement. Three in 10 candidates representing both party categories but only a quarter of independent candidates is a woman. There are no differences between all three categories in terms of candidate ethnicity. Younger candidates aged 40 years or under are more common among the ranks of local parties than within the category of

Table 10. Main party, minor party and independent candidates

	Main party	Minor party	Independent
Entirely own decision to stand	33.0	32.8	54.0
Women	31.5	33.1	23.5
White	96.2	97.5	96.7
40 yrs and under	15.5	17.3	7.8
41–50 yrs	16.8	17.1	16.9
51–60 yrs	26.6	30.1	33.7
61–70 yrs	32.2	25.6	32.9
71 yrs and over	10.0	9.9	8.6
Age, years (mean)	55.0	54.1	57.5
Age, years (std.)	13.4	13.6	11.0
No educational qualification	9.4	5.3	18.1
GCSE or A level	40.7	34.2	43.6
Degree	49.9	60.5	38.3
Full/part-time employment	41.6	43.2	30.3
Self-employed	16.0	16.4	25.8
Retired	32.8	30.6	34.8
Other	9.6	9.8	9.0
Professional	49.7	52.3	49.8
Managerial/technical	28.7	25.6	28.6
Other	21.6	22.0	21.6
Live in the ward	53.8	53.7	79.3

independents. The mean age of independents is two to three years older than party candidates. An independent is between two and three times more likely to hold no formal education qualification than a party candidate. Retired people comprise a third of candidates across the range, parties and independents, but the self-employed are more in evidence amongst independents whilst employees are more abundant within the parties. There are no significant differences between candidates in terms of occupational status but there is no disputing that independents are more centred in their local communities than are party candidates, a bare majority of whom are ward residents.

A multivariate logistic regression analysis uncovers more of the complexity surrounding these differences between independents and party candidates. Here, the dependent variable represents a candidate's party affiliation with independents coded as 1 and main/minor party candidates 0. Independent variables include a candidate's gender, age, employment status (a binary variable, *self-employed* versus *other*), educational qualification, elective experience (a binary variable *first time candidate* coded as 1, otherwise 0), whether a candidate lives in the ward, and how (s)he estimates his/her chance of winning (binary variable that contrasts *medium to high chance to win* against *low/very low chance to win*). The model has a Nagelkerke R Square of 0.11 and classifies correctly approximately 67 per cent of respondents with the cut-off point of 0.06. All variables are significant at least at the 5 per cent level and the direction of their influence is in the expected direction. First time candidates who are older males with lower levels of educational qualification, are self-employed, live in the ward, and estimate their chance to win as medium to high, are more likely than other types of candidate to be found in the ranks of the independents.

These data do not support an argument that the main parties, by dominating local councils, are preventing an influx as Independents of people who are currently under-represented in local government– women, BAME and younger people. Even if it were practically possible to wrestle power away from the three main parties there is no evidence here that one of the effects would be to transform the councillor demographic. Indeed, the net result of having more independents elected might be to increase the ratio of men to women, increase the average age of councillors and quite probably increase in small business owners on council benches. Of course, set against that line of reasoning we should say that those councillors would be more likely to reside in the area that they represented and would no doubt strengthen the association between geography, community and local government representation.

Conclusions

Surveys of local election candidates demonstrate that there is little difference in the social characteristics of councillors and those that seek to replace them. Even if every incumbent seeking re-election were to be defeated at the polls and replaced by a challenger the councillor demographic would alter very little. Candidates themselves respond differently to possible explanations for the unrepresentativeness of local government and to proposed solutions. On the one hand, there is recognition of the obstacles that women, BAME and younger people might have in coming forward to stand for election and some support for recruiting more candidates from these groups. On the other hand, the large majority of current candidates see no need for affirmative action to achieve such a goal. Of course, central government has the constitutional power to transform this picture by mandating that a certain fraction of council seats are reserved for specific groups. Equally, the leaders of the national political parties could unilaterally impose strict selection criteria on local branches. Our evidence suggests that any such action would encounter major objections from most local party activists.

Although positive action measures are likely to prove unpopular this does not relieve local parties from any responsibility in engineering change. A major priority is to assemble more evidence about party memberships and specifically the candidate recruitment process. Given that two in three candidates are asked to stand, often by fellow party members, it is important to discover how many and what types of people are approached. It may be that parties are actively trying to recruit under-represented groups but that these efforts are thwarted either because such people do not become party members or when asked to stand decline. Or it may be that parties simply recruit from established networks which suffer from the same kinds of imbalances as the candidate demographic. About one thing our surveys do seem clear. Working with the established political parties in advancing the modernisation agenda in local government appears a more credible option than unconditionally extolling the virtues of independents. The current profile of independents suggests that more of them would actually exacerbate rather than alleviate the problems of under-representation.

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Appendix 13

Minority ethnic candidates in local elections

Thrasher, M., C. Rallings, G. Borisyuk, & M. Shears (2012) BAME candidates in local elections in Britain. *Parliamentary Affairs* (doi:10.1093/pa/gss087)

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BAME Candidates in Local Elections in Britain

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Differences between white and Black, Asian and other minority ethnic (BAME) local election candidates in Britain are examined using survey data. BAME candidates are more likely to be younger and better educated but fewer women are recruited from among this group. Such candidates are electorally inexperienced, have stronger ties with community-related organisations and are more likely to make their own decision to stand for election rather than being approached by a fellow party member. Community ties are also evident when respondents are asked about their support network upon becoming a candidate with almost two-thirds of BAME candidates experiencing positive support from this quarter.

1. Introduction

Local government in Britain is sometimes characterised as 'male, pale and stale', reflecting concerns that women, ethnic minorities and younger people, are under-represented while council benches are dominated by white, middle-aged and older men. For all three under-represented groups it is not unclear whether relative absence is a function of supply (insufficient numbers from these groups seek nomination as election candidates) or demand (political parties recruit/select from a restricted pool of candidates (Hazan and Rahat, 2010).

Since 2006 we have conducted annual surveys of candidates contesting local elections across England and Wales. One objective of these surveys is to shed light on the processes that might explain why relatively few people from Black, Asian and other minority ethnic (BAME) groups are elected as councillors (Local Government Association, 2009). As well as gathering evidence about candidates' age, sex, ethnicity,[1] employment and occupational status, the surveys examine the broader context of party selection and recruitment and also the

[1] The questionnaires employ the standard format for ethnic origin as the 2001 national census.

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