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Spatial Scale and the Neighbourhood Effect: Multinomial Models of Voting at Two Recent British General Elections

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Few studies of the neighbourhood effect in British voting patterns have addressed the important issue of spatial scale: at what level do these effects operate (if any), and do they operate simultaneously at more than one? Using the British Household Panel Study data, to which information on the characteristics of the population in the areas around each individual respondent's home have been added, this article finds significant differences in the propensity of individuals to vote either Conservative or Liberal Democrat rather than Labour at two neighbourhood levels as well as at the regional level.

Butler and Stokes's classic *Political Change in Britain* identified spatial variations in partisan choice that remain unaccounted for after individual voter characteristics have been considered.[1] The nature of and reasons for these variations have not been thoroughly explored since then, however, in considerable part because of data difficulties. Much writing about voting in Great Britain has thus been a-spatial in its emphasis, largely ignoring the importance of local context on the voter's choice.

Although this situation has changed somewhat recently, important issues regarding spatial variations in voting behaviour remain unresolved. Some relate to spatial scale – at what level, from the region and the immediate area around one's home, do such variations and their causes occur? These form the focus of this article, which reports on investigations into spatial variations in voting patterns at two recent British general elections at a range of scales. Some analysts have identified regional variations that are independent of voters' individual characteristics; some have identified variations between neighbourhoods within towns and cities: others have claimed that all of these are artefacts of under-specified models. In this article, we address the issue of whether observed spatial variations are 'real' and, having concluded that they are, for the first time identify their relative impact, indicating the extent of both regional and local variations in voting at the two British general elections held in the 1990s.

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[1] D. Butler and D. E. Stokes, *Political Change in Britain: Forces Shaping Electoral Choice* (London: Macmillan, 1969).

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SPATIAL VARIATIONS IN VOTING IN GREAT BRITAIN

A major problem facing British electoral analysts is that, other than specially commissioned survey and opinion poll data, the only information available for analysing spatial variations in voting at general elections refers to parliamentary constituencies. Most analyses of spatial variations have thus been ecological, with the potential for falling into various fallacies. However, Butler and Stokes showed that people in the same class position tended to vote differently according to the class composition of their local milieux.[2] These arguments were followed up by Miller,[3] who concluded that class polarization was greater at the constituency than the individual level.[4] Among whom people lived was more influential on their party choice than to which social class they were allocated on the basis of their occupation. Miller's account for this spatial polarization deployed a concept widely known as the 'neighbourhood effect', involving 'the power of the environment to structure social contacts plus the empirical fact (and it's only empirical, not logical) that contact across class boundaries makes a consensual impact on partisan choice'.[5] The observed convergence on an area's dominant political choice was produced by social interaction, with members of an area's minority class more likely to be converted to the majority viewpoint than vice versa.

The importance of social interaction in Miller's version of the neighbourhood effect stimulated Dunleavy's critique that 'these models have never been effectively connected with any evidence of the extensive community social interaction that is essential if they are to have plausibility. We cannot simply assume that political alignment brushes off on people by rubbing shoulders in the street, as exponents of "contagion models" invariably seem to imply'.[6] Harrop, in response, stressed the empirical evidence and claimed 'it is surely undeniable that a social influence model of some kind is needed to explain' this – with Dunleavy's preferred consumption sectors model accounting for only a proportion.[7] Dunleavy's reply was that his own analyses 'failed to show any recognizable locality effect'.[8]

A potential alternative reason for observed neighbourhood effects is voter self-selection – individuals choose to live in areas dominated by people of a particular persuasion, in which case any neighbourhood effect would reflect such residential decisions rather than the impact of the milieux into which 'atypical' individuals and households moved.[9] As Harrop *et al.* noted, however, it is unlikely that 'many people will uproot themselves just because they feel politically isolated in their current neighbourhood'; more probable is that

[2] Butler and Stokes, *Political Change*, pp. 171–89.

[3] W. L. Miller, *Electoral Dynamics in Britain since 1918* (London: Macmillan, 1978); and W. L. Miller, 'Social Class and Party Choice in England: a New Analysis', *British Journal of Political Science*, 8 (1978), 259–84.

[4] Miller 'Social Class', p. 285.

[5] Miller 'Social Class', p. 284.

[6] Patrick Dunleavy, 'The Urban Basis of Political Alignment: Social Class, Domestic Property Ownership and State Intervention in Consumption Processes', *British Journal of Political Science*, 9 (1979), 409–43, p. 413.

[7] Martin Harrop 'The Urban Basis of Political Alignment: A Comment', *British Journal of Political Science*, 10 (1980), 388–98, p. 389. Dunleavy's concept of consumption sectors divides the population into those who are reliant on the public sector for major consumption goods (such as housing, transport, and education and health services) and those who obtain them in the private sector.

[8] Patrick Dunleavy 'The Urban Basis of Political Alignment: A Rejoinder to Harrop', *British Journal of Political Science*, 10 (1980), 398–402, p. 399.

[9] Such relocation effects were introduced in Cox's pioneering essay on neighbourhood effects: K. R. Cox, 'The Voting Decision in a Spatial Context', in C. Board, R. J. Chorley, P. Haggett and D. R. Stoddart, eds, *Progress in Geography, Volume 1* (London: Edward Arnold, 1969), pp. 81–118, at pp. 101–2.

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when a move is required, they will select an area 'where they hope to feel at home', which will probably stress its socio-economic composition rather than its voting patterns.[10] Their analyses suggested that whereas people's prior voting choices were closely linked to the sort of neighbourhood they moved to, there was little evidence that people who moved into a milieu inconsistent with their previous behaviour changed their party choice.[11]

Miller's work was not followed up in the 1980s, in part reflecting the absence until recently of evidence that 'people who talk together, vote together',[12] the lack of data with which to test the argument more directly, and what Catt described as 'the linear nature of development from *Political Change in Britain* … [that] has helped to draw attention towards fierce fights over class definition and away from other kinds of group identity. Job rather than locality has been seen as defining political position and interest'.[13]

From the 1970s on, attention focused on a larger-scale aspect of the geography of voting behaviour: regional variation in support for the two main parties became much more pronounced. At its simplest, this was characterized as a north–south divide, with northern Britain (including much of Wales) and the major cities becoming increasingly Labour in their voting habits, and southern Britain more Conservative – although intra- as well as inter-regional variations reflected both urban–rural and well-being differences between constituencies within at least some regions.[14] Accounting for this new map attracted much interest – notably in a classic paper by Curtice and Steed[15] – although some remained sceptical that such regional variations were 'real' rather than artefacts of under-specified

[10] M. Harrop, A. Heath and S. Openshaw, 'Does Neighbourhood Influence Voting Behaviour – and Why?' in I. Crewe, P. Norris, D. Denver and D. Broughton, eds, *British Elections and Parties Yearbook 1991* (Hemel Hempstead: Harvester Wheatsheaf, 1992), pp.103–20, at p.116. At the local scale, of course, it is very unlikely that potential immigrants can 'know' the voting behaviour of residents of a small area they are considering moving to, though they may infer it from knowledge of its social make-up.

[11] Cox came to a similar conclusion: K. R. Cox, 'Residential Relocation and Political Behavior: Conceptual Model and Empirical Tests', *Acta Sociologica*, 13 (1970), 40–53.

[12] This argument regarding the influence of conversation was later shown to be valid, both among the population generally and in the specific case of married couples. On the former, see C. J. Pattie and R. J. Johnston, 'Context, Conversion and Conviction: Social Networks and Voting at the 1992 British General Election', *Political Studies*, 47 (1999), 877–89; C. J. Pattie and R. J. Johnston, ' "People who Talk Together Vote Together": An Exploration of Contextual Effects in Great Britain', *Annals of the Association of American Geographers*, 90 (2000), 41–66; C. J. Pattie and R. J. Johnston, 'Talk as Political Context: Conversation and Electoral Change in British Elections, 1992–1997', *Electoral Studies*, 20 (2001), 7–40; and C. J. Pattie and R. J. Johnston, 'Political Talk and Voting: Does it Matter to Whom One Talks?' *Environment and Planning A*, 34 (2001), 1113–36. On the latter, see R. J. Lampard, 'Party Political Homogamy in Great Britain', *European Sociological Review*, 13 (1997), 79–99; and M. Brynin, 'Political Values: a Family Matter?' in R. Berthoud and J. Gershuny, eds, *Seven Years in the Lives of British Families: Evidence on the Dynamics of Social Change from the British Household Panel Study* (Bristol: The Policy Press, 2000), pp. 193–214.

[13] H. Catt, *Voting Behaviour: A Radical Critique* (London: Leicester University Press, 1996), p. 97. Local effects were only briefly mentioned in a 1990 review article (P. Dunleavy, 'Mass Political Behaviour: Is There More to Learn?' *Political Studies*, 38 (1990), 453–69) and received no consideration in a major, commissioned, critique of the British Elections Studies a decade later: E. Scarbrough, 'The British Election Study and Electoral Research', *Political Studies*, 48 (2000), 391–414.

[14] R. J. Johnston, C. J. Pattie and J. G. Allsopp, *A Nation Dividing? Britain's Changing Electoral Map 1979–1987* (London: Longman, 1988).

[15] John Curtice and Michael Steed, 'Electoral Choice and the Production of Government: The Changing Operation of the Electoral System in the United Kingdom since 1955', *British Journal of Political Science*, 12 (1982), 249–98.

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models;[16] other studies reached different conclusions regarding both the importance of and explanations for regional variations.[17]

Attention has recently returned to the neighbourhood effect model. Andersen and Heath, for example, added constituency-level information to the individual respondent's characteristics in British Election Study (BES) survey data for the period 1964–97. Holding individual characteristics constant, they found significant across-constituency variations in Conservative and Labour voting, which were particularly strong in the 1980s.[18] Those findings are 'consistent with the view that people are influenced by the majority [in their constituency]',[19] though in addition to social interaction this may reflect variations in the electoral contest.[20]

Spatial scale is a major problem in using constituency data to evaluate neighbourhood effect hypotheses. The average English constituency has over 90,000 residents and 70,000 registered electors,[21] and is almost certainly much larger than the neighbourhoods within which social interaction underpinning the hypothesized effect occurs. The analyses are thus at an inappropriate spatial scale.

Census data are available for two smaller areal units in Britain – the ward (average population about 5,000, although varying considerably between urban and rural areas) and the enumeration district (the area used for census administration, with on average around 100 households and a population of 500). One exercise allocated all of the 1987 BES respondents to their relevant ward. Wide variations were identified in party choice across ward types in voting patterns by different groups of voters, along with some evidence that this was a consequence of talking about politics with their neighbours. The patterns were easier to depict than their causes, however.[22]

[16] I. McAllister and D. T. Studlar, 'Region and Voting in Britain: Territorial Polarization or Artifact?', *American Journal of Political Science*, 36 (1992), 168–99.

[17] R. J. Johnston and C. J. Pattie, 'Uneven Development and Political Behaviour: An Analysis of Regional Variations in British Political Behaviour in the mid-1990s', *European Urban and Regional Studies*, 4 (1997), 347–64, and 'Composition and Context: Region and Voting in Britain Revisited during Labour's 1990s' Revival', *Geoforum*, 29 (1998), 309–29; A. Russell, 'A Question of Interaction: Using Logistic Regression to Examine Geographic Effects on British Voting Behaviour', in C. Pattie, D. Denver, S. Fisher and S. Ludlam, eds, *British Elections and Parties Review, Volume 7* (London: Frank Cass, 1997), pp. 91–109; E. Fieldhouse 'Thatcherism and the Changing Geography of Political Attitudes, 1964–1987', *Political Geography*, 14 (1995), 3–30.

[18] R. Andersen and A. Heath, 'Class Matters: The Persisting Effects of Contextual Social Class on Individual Voting in Britain, 1964–97', *European Sociological Review*, 18 (2002), 125–38.

[19] Andersen and Heath, 'Class Matters', p. 134.

[20] In this, as in almost all other work on the influence of social interaction on voting behaviour, the focus is entirely on the neighbourhood environment – social interaction is assumed to be focused on the home. Although much of it is, there is also a considerable amount – for a substantial proportion of the population at least – focused on other, place-based milieux, notably the workplace. (On which, see P. F. Lazarsfeld and J. R. W. Thielens, *The Academic Mind: Social Scientists in a Time of Crisis* (Glencoe, Ill.: The Free Press, 1958); S. M. Lipset, M. A. Trow and J. S. Coleman, *Union Democracy* (Glencoe, Ill.: The Free Press, 1956) and, in a British context, A. Piepe, R. Prior and A. Box, 'The Location of the Proletarian and Deferential Worker', *Sociology*, 3 (1969), 239–44.) No electoral surveys collect data that would allow testing of the influence of the workplace, however.

[21] Those in Scotland and Wales are somewhat smaller: see R. J. Johnston, C. J. Pattie D. F. L. Dorling and D. J. Rossiter, *From Votes to Seats: The Operation of the UK Electoral System since 1945* (Manchester: Manchester University Press, 2001).

[22] Harrop, Heath and Openshaw, 'Does Neighbourhood Influence Voting Behaviour', p.118.

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Bespoke Neighbourhoods

An extension of this approach was pioneered using the 1997 BES, employing bespoke neighbourhoods centred on each respondent's home enumeration district.[23] These individualized districts provide information about the characteristics of the individuals and households living closest to the respondent's home. Based on the respondent's home enumeration district, a simple algorithm identified the districts containing the nearest n persons to that district – where $n = 500, 1{,}000, \ldots$ – and census data for that set of districts were used to characterize the local social milieu at the various levels. Analysis of respondents' voting showed substantial spatial variations in party choice that were consistent with neighbourhood effects. The more working-class the area, for example, the greater the probability that all respondents, whatever their own socio-economic class, would vote Labour.[24] In a parallel project, Buck created similar bespoke neighbourhoods for the British Household Panel Study (BHPS) data, defining the neighbourhoods not only by the closest number of people to the respondent's home but also by the population of various distance bands around the respondent's home; we use the latter in the analyses here.[25]

Two bodies of research have therefore claimed to identify significant spatial variations in British voting behaviour. One has shown substantial inter-regional differences; the other has indicated neighbourhood-level differences, with variations in voting behaviour linked to the socio-demographic characteristics of the small areas around survey respondents' homes. The former may be little more than an aggregation of the latter, however. To examine whether this is the case, analyses are reported here which identify not only the relative significance of regional and more local effects but also indicate how substantial they are. Almost all studies of voting behaviour using survey data contain a number of individual variables each of which has a partial impact. The statistical significance of these variables is no guide to their substantial impact when all others are held constant. The analyses reported here thus go beyond the usual interpretation of partial regression coefficients and evaluate the substantial impact of spatial variations in British voting behaviour.

SPACE, SCALE AND VOTING

Although the widest inter-regional variations were reported for the 1980s, significant inter-regional differences remained in the 1990s, reflecting continuing uneven economic development and generating regional variations in unemployment and social well-being levels.[26] Those regional variations were built on a longer-established structure reflecting different patterns of political socialization and mobilization by parties – exemplified by the Liberals' strength in southwest England and parts of rural Wales, and Labour's

[23] As the name suggests, bespoke neighbourhoods are specifically tailored to the individual survey respondent's home: each respondent has her/his own neighbourhood.

[24] I. MacAllister *et al.*, 'Class Dealignment and the Neighbourhood Effect: Miller Revisited', *British Journal of Political Science*, 31 (2001), 41–60. Other studies found similar effects using housing tenure and unemployment as the local variations, rather than class structure: R. J. Johnston *et al.*, 'Housing Tenure, Local Context, Scale and Voting in England and Wales, 1997', *Electoral Studies*, 20 (2001), 195–216; and R. J. Johnston *et al.* 'Local Context, Retrospective Economic Evaluations, and Voting: The 1997 General Election in England and Wales', *Political Behavior*, 22 (2000), 121–43.

[25] N. H. Buck, 'Identifying Neighbourhood Effects on Social Exclusion', *Urban Studies*, 38 (2001), 2251–75.

[26] Johnston and Pattie, 'Uneven Development' and 'Composition and Context'.

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weakness in the Nottinghamshire Dukeries.[27] In addition, parties were more active in some regions than others. Labour's organization weakened significantly in many parts of southern England during the 1980s, with few activists available to campaign and canvass for the party;[28] the Liberal Democrats became the second largest party in some areas, capturing votes that might well have gone to Labour in previous decades.

At the local level, we suggest that 'neighbourhood-effect-like' processes operate at two spatial scales at least. First, and related to hypotheses linking party choice to social interaction, there is the individuals' immediate milieux – the local areas within which most of their informal and many of their formal social contacts are constrained. Their size is unknown, however; indeed they may vary for different types of people. We call them *locales*, Giddens's term for 'settings for interaction'.[29] Secondly, there are the wider areas which form the context within which much behaviour is structured: people will know, for example, of relative levels of unemployment in such areas, either through observation or via local media. These areas – which we term *places* – could be entire settlements, which may have their own political composition and ethos, or major segments of a large city.[30] Using the bespoke neighbourhood data, we can identify whether there are significant relationships between voting and local area characteristics at more than one level and, if so, what those levels are.

Our working hypothesis, therefore, is that in addition to individual characteristics, successful models of voting behaviour at recent British general elections should incorporate both neighbourhood and regional levels of analysis. To evaluate this, we use data taken from the 1992 and 1997 BHPS surveys, to which relevant census variables for bespoke neighbourhoods have been added.[31] The BHPS is a longitudinal study launched in 1991 in which a sample of all members of about 5,510 households (about 10,000 individuals) are re-interviewed annually, including questions on aspects of political behaviour.[32] Although the BHPS dataset constitutes a panel, for the current purposes we use the 1992 and 1997 waves as two separate cross-sectional surveys.[33]

We proceed by first establishing a baseline model without any spatial variables, to which we then add a regional classification. The next stage involves introducing continuous variables representing bespoke neighbourhood characteristics at four different spatial

[27] R. J. Waller, *The Dukeries Transformed* (Oxford: The Clarendon Press, 1983).

[28] P. Seyd and P. Whiteley, *Labour's Grass Roots: The Politics of Party Membership* (Oxford: The Clarendon Press, 1992).

[29] A. Giddens, *The Constitution of Society* (Cambridge: Polity Press, 1984).

[30] The neighbourhood is, of course, only one local context that might influence voting behaviour: another is the workplace – for which unfortunately we have no data. There may also be differences between people in the spatial extent of their 'activity spaces' within which they interact socially – perhaps linked to the length of their journey to work: exploration of these is a task for further research.

[31] Although data from the eleventh wave of the BHPS have now been released, including information on how respondents voted at the 2001 general election, the 2001 census data (only released in late 2003) have not yet been deployed to construct bespoke neighbourhoods. The 1991 neighbourhood data from the tenth wave can be assigned to those in the eleventh wave who did not move between waves, but this reduces the sample size considerably as well as employing very dated neighbourhood data from a census conducted ten years previously. (The models reported here for 1992 and 1997 have been fitted to that reduced dataset, with very similar results.)

[32] As with many such surveys that take place some time after an election, there is a problem with voter recall – and also a significant understatement of the amount of abstention. However, the overall pattern of voting between the parties by the respondents is consistent with the two election results: in 1992, the percentages who reported voting Conservative, Labour and Liberal Democrat were 37, 30 and 14 respectively, with a further 15 per cent indicating that they abstained: for 1997 the party percentages were 22, 40 and 12 and abstention 18 per cent.

[33] Full details on the BHPS can be obtained from its website: www.essex.ac.uk/iser/bhps

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scales (reflecting neighbourhoods defined according to the population resident within different distances of the respondents' homes). We then explore the simultaneous impact of two of those scales (representing place and locale). Together, these analyses separate out the relative importance of regional and local variations in terms not only of their statistical significance but also their substantive impact.

THE BASELINE MODEL

The baseline model uses individual respondent characteristics available in the BHPS files which previous analyses suggest are related to voting decisions – in this case, whether to vote Conservative, Labour or Liberal Democrat; we have excluded those who voted for nationalist and other parties, those who abstained, and those who were not eligible to vote at the relevant election.[34] The BHPS does not include as wide a range of politically-relevant variables as the BES. Nine frequently used in other voting studies were available, however:

1. *Age* (a continuous variable);
2. *Sex*;
3. *Highest educational qualification* achieved (a classification; in the analyses the comparator category is those with no qualifications);
4. *Latest occupation*, using the Heath–Goldthorpe classification (with semi-skilled/unskilled manual occupations in the comparator category);
5. *Housing tenure* (with local authority tenancy the comparator category);
6. *Number of cars* available to the household (with households with three or more as the comparator);
7. *Household individualized net income*, a continuous variable derived from the BHPS return, and equivalized using a before housing costs index, deflated to January 2001 prices using the Retail Price Index (RPI) less local taxes;[35]
8. *Current financial situation* (a five-fold classification, with 'finding things very difficult' the comparator); and
9. *Financial expectations* (a three-fold categorization, with 'get worse' as the comparator).[36]

With three possible outcomes (voting Conservative, Labour or Liberal Democrat) there are two contrasts, with Labour as the base category, in the multinomial models. For each variable we show the partial regression coefficient, its statistical significance and, if significant, the related exponent which indicates its partial impact on the probability of voting either Conservative or Liberal Democrat rather than Labour respectively.[37] In 1992

[34] The BHPS surveys are conducted in the latter part of each year, which – as the two general elections studied were held in April and May respectively – means that the voting data analysed here are recalled behaviour, with the usual potential for both memory failure and/or false responses: abstention rates are significantly understated, for example. No correction mechanisms can be applied and the responses have to be taken on trust. Although turnout is overstated, the relative position of the parties from these surveys is close to the actual outcome.

[35] See E. Bardassi, S. P. Jenkins and J. A. Rigg, 'Documentation for Derived Current and Annual Net Household Income Variables, BHPS Waves 1–10' (Colchester: University of Essex, Institute for Social and Economic Research, 2000).

[36] There are some problems with including the current financial situation and financial expectations variables as the data were collected some six months after each of the general elections, and it could be argued that the election outcome may have influenced the answers to these questions. They are included, however, because of their widespread use in recent studies of British voting behaviour and the consistency of the results obtained.

[37] Standard errors for the regression coefficients are shown in Table 1.

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all variables except sex were statistically significant in accounting for differences between Labour and Conservative voters (Table 1). In general, older people, those in white-collar rather than blue-collar occupations, those who owned (or were buying) their homes and those with higher incomes were more likely to vote Conservative than Labour, as also were those with more cars available: those with degree-level qualifications were more likely to vote Labour than Conservative, whereas those with the main school-level qualifications (O-level/GCSE and A-level) were more likely than those without qualifications to vote Conservative. In addition, the better-off financially that respondents felt, the more likely they were to vote Conservative rather than Labour, as were those who thought their financial situation would improve in the near future. In 1997 (when Labour defeated the Conservatives by a substantial vote margin, having lost to them by a similar margin five years previously), the relationships involving age, occupation, housing tenure, car availability and income were very similar to those for 1992 (Table 2) but there was less variation in party choice according to educational qualifications. In addition – and probably reflecting the change of government and the post-election conduct of the survey – there were no substantial differences in propensity to support Conservative or Labour according to the two economic evaluation questions.

The contrasts between Labour and Liberal Democrat supporters contain few significant differences, especially in 1992 (Table 1). Older people were more likely to vote Liberal Democrat than Labour, as were women compared to men, and all tenure groups were more likely to vote Liberal Democrat relative to local authority tenants; those with qualifications were in general more likely to vote Liberal Democrat than were those with none; those without cars were more likely to vote Labour. Five years later, the pattern was very similar, except that many more significant differences were identified with regard to occupation: white-collar workers were much more likely than the semi-skilled and unskilled to vote Liberal Democrat rather than Labour (Table 2).

The χ^2 values indicate the relative importance of each variable. For both 1992 and 1997, the values for the baseline model (the first column of Table 3) indicate that occupation, educational qualifications, age and housing tenure had the greatest relative influence.

BRINGING REGION IN ...

The results in Tables 1–3 are consistent with other analyses of those elections. The next step involves introducing an eighteen-region categorization of Britain incorporating the standard regions, England's major conurbations, and an inner–outer division of Greater London. The baseline regressions were re-run with this additional set of variables, using Scotland as the comparator. The coefficients for the individual-level variables in the baseline model without the regional variables are very largely replicated and not reproduced here. The χ^2 values in column 2 of Table 3 suggest that regional variation was highly significant and largely independent of the other variables, although the contribution of some of these declined (notably housing tenure and car ownership – suggesting that these are themselves regionally variable).[38]

Table 4 gives the regression coefficients and associated exponents (which give the relative odds for each outcome) for each set of regional contrasts at both elections. In 1992,

[38] Nearly 80 per cent of homes are owner-occupied in the Rest of the Southeast region, for example, compared to 57 per cent in Scotland. Similarly, 40 per cent of households have two or more cars in the former region, compared to 18 per cent in Scotland and Wales.

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TABLE 1 *Results of a Multinomial Regression of Voting at the 1992 General Election: Regression Coefficients (with Standard Errors in Parentheses) and Exponents*

	Labour:Conservative		Labour:Liberal Democrat	
	Coefficient	Exponent	Coefficient	Exponent
Constant	− 3.36***		− 2.57***	
	(0.299)		(0.349)	
Age	0.03***		0.02***	
	(0.003)		(0.003)	
Sex (comparator: female)				
Male	− 0.11	–	− 0.18*	0.84
	(0.072)		(0.090)	
Highest education qualifications (comparator: none)				
Higher degree	− 0.83***	0.44	0.50	–
	(0.276)		(0.301)	
First degree	− 0.55***	0.58	0.70***	2.01
	(0.153)		(0.175)	
HND/HNC/Teaching	0.10	–	0.81***	2.26
	(0.155)		(0.185)	
A-level	0.25**	1.28	0.61***	1.84
	(0.113)		(0.144)	
O-level/GCSE	0.39***	1.47	0.50***	1.65
	(0.093)		(0.122)	
CSE	0.22	–	0.31	–
	(0.163)		(0.214)	
Latest occupation (comparator: semi/unskilled manual)				
Higher service class	0.92***	2.51	0.44*	1.55
	(0.139)		(0.172)	
Lower service class	0.74***	2.10	0.46**	1.58
	(0.112)		(0.139)	
Routine non-manual	0.76***	2.15	0.13	–
	(0.111)		(0.146)	
Personal service	0.80***	2.22	0.43*	1.53
	(0.134)		(0.170)	
Small propr. w. employees	1.29***	3.62	0.20	–
	(0.267)		(0.377)	
Small propr. w/o. employees	1.32***	3.75	0.68**	1.96
	(0.166)		(0.212)	
Farmers etc.	3.02***	20.41	1.59	–
	(0.736)		(0.876)	
Foremen/technicians	0.37**	1.44	0.02	–
	(0.133)		(0.177)	
Skilled manual	0.13	–	− 0.10	–
	(0.132)		(0.174)	
Agricultural	1.35***	3.85	0.38	–
	(0.372)		(0.544)	
Housing tenure (comparator: local authority)				
Owned outright	0.98***	2.65	0.52**	1.68
	(0.117)		(0.155)	

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TABLE 1 *Results of a Multinomial Regression of Voting at the 1992 General Election: Regression Coefficients (with Standard Errors in Parentheses) and Exponents*—continued

	Labour:Conservative		Labour:Liberal Democrat	
	Coefficient	Exponent	Coefficient	Exponent
Owned with mortgage	1.12***	3.06	0.71***	2.04
	(0.114)		(0.145)	
Housing association	0.19	1.21	0.54*	1.71
	(0.230)		(0.262)	
Private rented	0.97***	2.64	0.78***	2.19
	(0.151)		(0.186)	
Cars available to household (comparator: three or more)				
None	− 0.63***	0.53	− 0.71**	0.49
	(0.173)		(0.223)	
One	− 0.43***	0.63	− 0.33	–
	(0.156)		(0.198)	
Two	− 0.05	–	0.09	–
	(0.162)		(0.204)	
Household net income (£000s)	0.016***		0.006	–
	(0.004)		(0.005)	
Current financial situation (comparator: very difficult)				
Living comfortably	0.81***	2.24	− 0.16	–
	(0.195)		(0.213)	
Doing all right	0.70***	2.00	− 0.14	–
	(0.191)		(0.205)	
Getting by	0.53**	1.69	− 0.09	–
	(0.188)		(0.199)	
Quite difficult	0.49**	1.64	0.01	–
	(0.216)		(0.233)	
Financial expectations (comparator: get worse)				
Get better	0.66***	1.93	0.28*	1.32
	(0.101)		(0.125)	
Stay the same	0.35***	1.42	0.16	–
	(0.081)		(0.101)	

*** Statistically significant at the 0.001 level or better;
** statistically significant at the 0.01–0.001 level;
* statistically significant at the 0.05–0.01 level.

holding individual characteristics constant, respondents in all southern English regions except Inner London, plus the non-conurban areas of the Northwest and Yorkshire-Humberside, were more likely to vote Conservative than Labour than they were in Scotland, by ratios of about 3:1 in several cases. With the Labour:Liberal Democrat contrast, eight of the same nine regions also had a significant difference in these equations too, with respondents more likely to vote Liberal Democrat than Labour, when compared to a resident of Scotland, by a ratio of up to 4.41:1 (in the Southwest of England, the Liberals' traditional heartland). Much the same occurred in 1997.

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TABLE 2 *Results of a Multinomial Regression of Voting at the 1997 General Election: Regression Coefficients (with Standard Errors in Parentheses) and Exponents*

	Labour:Conservative		Labour:Liberal Democrat	
	Coefficient	Exponent	Coefficient	Exponent
Constant	− 3.17***		− 2.45***	
	(0.333)		(0.086)	
Age	0.03***		0.01***	
	(0.003)		(0.003)	
Sex (comparator: female)				
Male	− 0.01	–	− 0.24**	0.79
	(0.072)		(0.086)	
Highest education qualifications (comparator: none)				
Higher degree	− 0.59*	0.56	0.69**	1.99
	(0.242)		(0.242)	
First degree	− 0.18	–	0.88***	2.42
	(0.148)		(0.163)	
HND/HNC/Teaching	0.07	–	0.69***	2.00
	(0.145)		(0.170)	
A-level	0.41***	1.51	0.49**	1.63
	(0.110)		(0.140)	
O-level/GCSE	0.43***	1.54	0.68***	1.96
	(0.096)		(0.120)	
CSE	0.22	–	0.19	–
	(0.176)		(0.224)	
Latest occupation (comparator: semi/un-skilled manual)				
Higher service class	0.88***	2.41	0.69***	1.99
	(0.134)		(0.160)	
Lower service class	0.64***	1.90	0.45**	1.57
	(0.115)		(0.139)	
Routine non-manual	0.73***	2.08	0.38**	1.47
	(0.118)		(0.145)	
Personal service	0.39**	1.47	0.32*	1.38
	(0.140)		(0.162)	
Small propr. w. employees	1.49***	4.42	1.23***	3.41
	(0.271)		(0.329)	
Small propr. w/o. employees	0.99***	2.68	0.57**	1.77
	(0.160)		(0.207)	
Farmers etc.	2.40***	11.01	1.09	–
	(0.436)		(0.601)	
Foremen/technicians	0.34*	1.40	0.33	–
	(0.144)		(0.174)	
Skilled manual	0.20	–	− 0.12	–
	(0.148)		(0.198)	
Agricultural	1.17**	3.21	1.08**	2.93
	(0.355)		(0.403)	

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TABLE 2 *Results of a Multinomial Regression of Voting at the 1997 General Election: Regression Coefficients (with Standard Errors in Parentheses) and Exponents*—continued

	Labour:Conservative		Labour:Liberal Democrat	
	Coefficient	Exponent	Coefficient	Exponent
Housing tenure (comparator: local authority)				
Owned outright	0.99***	2.68	0.49**	1.63
	(0.130)		(0.153)	
Owned with mortgage	0.78***	2.19	0.34*	1.41
	(0.128)		(0.146)	
Housing association	0.18	–	0.53*	1.70
	(0.213)		(0.214)	
Private rented	0.84***	2.31	0.78***	2.18
	(0.163)		(0.175)	
Cars available to household (comparator: three or more)				
None	− 0.96***	0.38	− 0.61**	0.55
	(0.157)		(0.196)	
One	− 0.71***	0.49	− 0.30	–
	(0.128)		(0.165)	
Two	− 0.36**	0.70	− 0.04	–
	(0.130)		(0.168)	
Household net income (£000s)	0.016***		0.005	–
	(0.004)		(0.004)	
Current financial situation (comparator: very difficult)				
Living comfortably	0.32	–	− 0.10	–
	(0.246)		(0.257)	
Doing all right	0.09	–	− 0.28	–
	(0.243)		(0.252)	
Getting by	− 0.04	–	− 0.23	–
	(0.245)		(0.252)	
Quite difficult	− 0.25	–	− 0.15	–
	(0.288)		(0.290)	
Financial expectations (comparator: get worse)				
Get better	0.31*	1.36	− 0.17	–
	(0.121)		(0.138)	
Stay the same	0.07	–	− 0.08	–
	(0.111)		(0.124)	

*** Statistically significant at the 0.001 level or better;
** statistically significant at the 0.01–0.001 level;
* statistically significant at the 0.05–0.01 level.

Regional variations in party choice remained strong in Great Britain at the two general elections in the 1990s, therefore, and were largely independent of the differences between voters according to their personal characteristics. Indeed, the χ^2 values indicate that at both elections, inter-regional variations were more important in accounting for party choice than any single individual voter characteristic (Table 3).

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TABLE 3 *The Goodness-of-fit for Each Variable in the Multinomial Regressions: χ^2 Values*

	Model				
	1	2	3	4	5
1992					
Age	94.0***	67.8***	56.4***	56.3***	52.5***
Sex	4.5	4.4	3.9	3.8	3.7
Highest educational qualification	118.2***	115.2***	111.1***	114.6***	113.6***
Latest occupation	172.9***	159.3***	151.0***	145.4***	141.8***
Housing tenure	122.5***	98.0***	67.1***	87.3***	72.3***
Cars	48.8***	22.1**	13.5**	13.0*	11.6**
Net income	17.3***	13.6**	10.6**	11.9**	9.8***
Current financial situation	34.3***	39.9***	38.8***	41.6***	40.8***
Financial expectation	43.9***	43.0***	43.9***	44.0***	44.5***
Region		405.6***	289.1***	182.6***	176.9***
Factor 1 Disadvantage (250m)			42.6***		11.1**
Factor 2 Mobility (250m)			2.0		1.1
Factor 3 Age (250m)			9.6**		3.8
Factor 4 Ethnicity (250m)			17.4***		10.1**
Factor 5 Rurality (250m)			12.1**		4.7
Factor 1 Disadvantage (2,000m)				60.7***	28.7***
Factor 2 Mobility (2,000m)				1.0	1.8
Factor 3 Age (2,000m)				8.1*	5.9*
Factor 4 Ethnicity (2,000m)				10.6**	4.5
Factor 5 Rurality (2,000m)				13.6***	6.4*

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TABLE 3 *The Goodness-of-fit for Each Variable in the Multinomial Regressions: χ^2 Values*—continued

	Model				
	1	2	3	4	5
1997					
Age	90.6***	78.6***	65.4***	70.5***	62.3***
Sex	8.4*	8.2*	7.8*	7.4*	7.4*
Highest educational qualification	103.9***	105.4***	99.2***	102.0***	98.4***
Latest occupation	138.7***	119.0***	109.7***	102.6***	100.9***
Housing tenure	88.0***	63.9***	41.5***	53.2***	45.2***
Cars	59.3***	26.5***	20.6**	21.2*	19.6**
Net income	22.5***	20.5***	16.3***	16.9**	13.8***
Current financial situation	24.5**	30.4***	26.2***	30.9***	27.5***
Financial expectation	16.1**	14.6**	14.7**	14.4**	14.6**
Region		368.7***	278.5***	180.9***	181.5***
Factor 1 Disadvantage (250m)			38.2***		5.4*
Factor 2 Mobility (250m)			0.4		4.0
Factor 3 Age (250m)			1.0		10.7**
Factor 4 Ethnicity (250m)			13.0***		22.6***
Factor 5 Rurality (250m)			11.2**		3.9
Factor 1 Disadvantage (2,000m)				60.9***	30.1***
Factor 2 Mobility (2,000m)				2.2	7.8*
Factor 3 Age (2,000m)				7.0*	16.7***
Factor 4 Ethnicity (2,000m)				0.4	14.3***
Factor 5 Rurality (2,000m)				16.4***	5.5

Key to Models: 1. Baseline model – individual characteristics only; 2. Baseline plus region; 3. Baseline plus region and 250 metre factors; 4. Baseline plus region and 2,000 metre factors; 5. Baseline plus region, 250 metre and 2,000 metre factors.
*** Statistically significant at the 0.001 level or better;
** statistically significant at the 0.01–0.001 level;
* statistically significant at the 0.05–0.01 level.

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TABLE 4 *Regression Coefficients (Standard Errors in Parentheses) and Exponents for the Regional Variables in the Multinomial Models*

	Labour:Conservative		Labour:Liberal Democrat	
	Coefficient	Exponent	Coefficient	Exponent
1992				
Region (comparator: Scotland)				
Inner London	0.26	–	0.33	–
	(0.207)		(0.281)	
Outer London	0.92***	2.51	1.02***	1.74
	(0.173)		(0.236)	
Rest of Southeast	1.25***	3.50	1.69***	3.70
	(0.146)		(0.197)	
Southwest	1.21***	3.34	1.90***	4.41
	(0.166)		(0.213)	
East Anglia	1.13***	3.09	1.78***	3.56
	(0.212)		(0.259)	
East Midlands	0.93**	2.54	0.71**	1.30
	(0.158)		(0.229)	
West Midlands Conurbation	0.88**	2.41	0.34	–
	(0.206)		(0.323)	
Rest of West Midlands	0.57***	1.77	0.89***	1.52
	(0.182)		(0.244)	
Greater Manchester	0.10	–	0.09	–
	(0.188)		(0.276)	
Merseyside	−0.25	–	0.17	–
	(0.242)		(0.330)	
Rest of Northwest	0.84***	2.31	0.93***	1.54
	(0.185)		(0.251)	
South Yorkshire	0.09	–	0.40	–
	(0.217)		(0.300)	
West Yorkshire	0.08	–	0.19	–
	(0.205)		(0.290)	
Rest of Yorkshire/Humber	0.84***	2.33	1.00***	2.72
	(0.212)		(0.283)	
Tyne and Wear	−0.04	–	−0.42	–
	(0.219)		(0.366)	
Rest of North	0.06	–	0.07	–
	(0.181)		(0.271)	
Wales	−0.22	–	0.37	–
	(0.183)		(0.241)	
1997				
Region (comparator: Scotland)				
Inner London	0.07	–	0.39	–
	(0.256)		(0.286)	
Outer London	0.72***	2.05	0.88***	2.41
	(0.183)		(0.227)	
Rest of Southeast	1.12***	3.05	1.36***	3.91
	(0.152)		(0.190)	
Southwest	1.07***	2.90	1.66***	5.26
	(0.171)		(0.205)	
East Anglia	1.02***	2.77	1.60***	4.97
	(0.207)		(0.239)	

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TABLE 4 *Regression Coefficients (Standard Errors in Parentheses) and Exponents for the Regional Variables in the Multinomial Models*—continued

	Labour:Conservative		Labour:Liberal Democrat	
	Coefficient	Exponent	Coefficient	Exponent
East Midlands	0.78*** (0.170)	2.17	0.62** (0.222)	1.85
West Midlands Conurbation	0.87*** (0.205)	2.39	0.22 (0.308)	–
Rest of West Midlands	0.62** (0.190)	1.86	0.56* (0.245)	1.76
Greater Manchester	− 0.04 (0.227)	–	0.38 (0.268)	–
Merseyside	0.13 (0.281)	–	0.33 (0.350)	–
Rest of Northwest	0.57** (0.193)	1.77	0.19 (0.269)	–
South Yorkshire	0.10 (0.264)	–	0.83** (0.292)	2.29
West Yorkshire	0.02 (0.227)	–	− 0.19 (0.316)	–
Rest of Yorkshire/Humber	0.59** (0.212)	1.80	0.64* (0.269)	1.89
Tyne and Wear	− 0.08 (0.273)	–	− 0.39 (0.390)	–
Rest of North	− 0.15 (0.212)	–	− 0.34 (0.302)	–
Wales	− 0.22 (0.206)	–	− 0.05 (0.263)	–

*** Statistically significant at the 0.001 level or better;
** statistically significant at the 0.01–0.001 level;
* statistically significant at the 0.05–0.01 level.

PLACE AND LOCALE

To incorporate place and locale as influences on voting behaviour, we used the bespoke neighbourhood data referring to the characteristics of areas defined by distance – 250m, 500m, 1,000m and 2,000m – from the BHPS respondents' homes. To characterize each distance band, eighteen selected variables were subjected to principal component factor analyses because of collinearity among them and the desire to create a set of stable indices of the nature of the local milieux (these are listed in the Appendix).[39] Five components were extracted with eigenvalues exceeding 1.0 after direct oblimin rotation for each scale.

The loadings on the five factors for the analyses are extremely consistent across the

[39] This approach was also used by Raudenbusch and Sampson in their work on Chicago, where they found a very similar structure to inter-neighbourhood variations: S. W. Raudenbush and R. J. Sampson, 'Ecometrics: Toward a Science of Assessing Ecological Settings, with Application to the Systematic Social Observation of Neighborhoods', *Sociological Methodology*, 29 (1998), 1–41.

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scales – not surprisingly, since the smaller scales nest into the larger ones, so that there is some spatial autocorrelation.[40] The largest loadings on each allow categorization of each factor, as follows:

1. *Socio-economic disadvantage* – with high positive loadings on indices of disadvantage, such as unemployment and long-term illness, and high negative loadings for population groups – professionals and managers, for example – who do not generally suffer these;
2. *Mobile, one-person households* – with high positive loadings on one-person non-pensioner households and those who migrated in the year preceding the census, both measures typical of 'bed-sitter land' in inner cities;
3. *Age structure* – with a high positive loading on the number of children and a high negative loading on one-person pensioner households, thus differentiating two very different types of area in terms of household composition and structure;
4. *Ethnic minorities* living at high room-densities – with high positive loadings on each of the three non-white ethnic groups as well as on the households living at high densities of people per room; and
5. *Rurality* – with a high negative loading on the percentage working in agriculture and fairly high positive loadings on households with well-furnished homes in terms of basic facilities.

Four further multinomial regressions were run for each election year, retaining the individual characteristic and regional variables used in the previous analyses, and adding the five sets of factor scores representing the characteristics of the independent respondents' four bespoke neighbourhood spatial scales. In each case, the pattern of coefficients for the individual and regional variables was largely undisturbed by adding these further variables (although some of the coefficients for the regions were reduced slightly).

There is a consistent pattern of regression coefficients for each of the five bespoke neighbourhood components across the four scales, especially for the first factor (Table 5).[41] The 1992 and 1997 Labour:Conservative contrasts for the latter show very significant negative relationships. The more disadvantaged the local neighbourhood, the smaller the probability that residents would vote Conservative rather than Labour – holding constant their personal characteristics and regional location.

The patterns are less clear-cut for the Labour:Conservative contrast on the other four factors, though consistent over the two years. At the 250m and 500m scales there is a negative relationship with the fourth factor; the greater the concentration of non-white ethnic residents in a small neighbourhood, the smaller the probability of voting Conservative rather than Labour. The absence of such a relationship at the larger scales (1,000m and 2,000m) suggests that this influence is extremely localized. Secondly, there is some indication at the larger scales of a relationship with the fifth – rurality – factor: the more urban an area, the smaller the chances of an individual recording a Conservative rather than a Labour vote.

The contrasts between Labour and Liberal Democrat voters involve more significant links between neighbourhood characteristics and party choice, especially in 1992. At each

[40] The table of loadings and further discussion of the factor analyses can be found in R. J. Johnston *et al.*, 'Scale, Factor Analysis and Neighborhood Effects', *Geographical Analysis*, 36 (2004), 350–8.

[41] Because these are continuous variables with zero mean and unit variance, we have not reported the exponents for those coefficients.

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TABLE 5 *The Regression Coefficients (Standard Errors in Parentheses) for the Bespoke Neighbourhood Variables in Separate Multinomial Models (including Both Region and the Individual Characteristic variables)*

	1992		1997	
	Lab:Con	Lab:LibDem	Lab:Con	Lab:LibDem
Nearest 250m				
Factor 1 (Disadvantage)	− 0.27***	− 0.15**	− 0.25***	− 0.24***
	(0.042)	(0.056)	(0.046)	(0.057)
Factor 2 (Mobility)	0.05	0.01	0.02	0.01
	(0.042)	(0.052)	(0.040)	(0.047)
Factor 3 (Age)	0.05	− 0.08	− 0.01	0.03
	(0.035)	(0.044)	(0.035)	(0.042)
Factor 4 (Ethnicity)	− 0.12**	− 0.25***	− 0.15**	− 0.13*
	(0.044)	(0.071)	(0.048)	(0.059)
Factor 5 (Rurality)	− 0.04	− 0.15**	− 0.01	− 0.12**
	(0.036)	(0.042)	(0.036)	(0.039)
Nearest 500m				
Factor 1 (Disadvantage)	− 0.32***	− 0.21***	− 0.27***	− 0.28***
	(0.042)	(0.056)	(0.046)	(0.057)
Factor 2 (Mobility)	0.06	0.02	0.05	0.01
	(0.043)	(0.053)	(0.041)	(0.047)
Factor 3 (Age)	0.03	− 0.07	− 0.03	− 0.01
	(0.035)	(0.043)	(0.034)	(0.041)
Factor 4 (Ethnicity)	− 0.09*	− 0.20**	− 0.10*	− 0.07
	(0.044)	(0.069)	(0.046)	(0.056)
Factor 5 (Rurality)	− 0.03	− 0.10*	− 0.04	− 0.14***
	(0.036)	(0.040)	(0.028)	(0.030)
Nearest 1,000m				
Factor 1 (Disadvantage)	− 0.29***	− 0.20***	− 0.26***	− 0.30***
	(0.042)	(0.056)	(0.046)	(0.057)
Factor 2 (Mobility)	0.04	0.01	0.07	0.04
	(0.045)	(0.055)	(0.043)	(0.050)
Factor 3 (Age)	0.03	− 0.09*	− 0.01	− 0.06
	(0.036)	(0.044)	(0.035)	(0.041)
Factor 4 (Ethnicity)	− 0.06	− 0.21**	− 0.07	− 0.05
	(0.043)	(0.072)	(0.043)	(0.056)
Factor 5 (Rurality)	− 0.07*	− 0.09**	− 0.04	− 0.13**
	(0.037)	(0.041)	(0.036)	(0.039)
Nearest 2,000 metres				
Factor 1 (Disadvantage)	− 0.33***	− 0.29***	− 0.31***	− 0.35***
	(0.045)	(0.058)	(0.047)	(0.059)
Factor 2 (Mobility)	0.05	0.02	0.06	0.06
	(0.047)	(0.059)	(0.046)	(0.052)
Factor 3 (Age)	0.01	0.13**	− 0.01	− 0.10*
	(0.045)	(0.075)	(0.035)	(0.041)
Factor 4 (Ethnicity)	− 0.01	− 0.19**	0.01	− 0.03
	(0.038)	(0.046)	(0.042)	(0.059)
Factor 5 (Rurality)	− 0.11**	− 0.15***	− 0.08*	− 0.16***
	(0.038)	(0.043)	(0.037)	(0.041)

*** Statistically significant at the 0.001 level or better;
** statistically significant at the 0.01–0.001 level;
* statistically significant at the 0.05–0.01 level.

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of the four distance bands and at both elections there is a highly significant negative regression coefficient for the first factor: the more disadvantaged the area the smaller the probability of a Liberal Democrat rather than a Labour vote. There are also significant relationships with the rurality (fifth) factor at all levels at both elections: the more urban the area, the greater the likelihood that an individual who is not voting Conservative will choose Labour rather than the Liberal Democrats. In 1992, there was also a significant relationship with the ethnic minorities (fourth) factor in all analyses: Labour performed better than the Liberal Democrats the greater the concentration of members of non-white ethnic minorities in the local area. Intriguingly, this link largely disappeared in 1997. There were also two significant relationships with the third (age structure) factor in 1992 at the two larger neighbourhood levels, although with opposite signs.

The relative importance of these 'bespoke neighbourhood effects' is indicated by the χ^2 values in columns 3/4 of Table 3 for the two 'extreme' scales (250m and 2,000m respectively). Comparing the second and third models (i.e. that including individual characteristics plus region and that including those plus the 250m bespoke neighbourhoods) the main change is a decline in relative importance for age, housing tenure and car availability, suggesting that their separate impacts are partly contained within the influence of the local neighbourhood whose characteristics incorporate those variables. The χ^2 value for the first factor is relatively large at both dates. This parallels a considerable decline in relative importance of the regional variable, suggesting that, although very significant inter-regional variations remained, the regional division was too coarse-grained to capture detailed spatial variations: intra-regional variations at more immediate scales around the respondents' homes (notably, though not only, those depicted by the socio-economic disadvantage factor) were more important. A similar message is derived from Model 4, which reports the regressions at the 2,000m scale. In these, the first factor is even more important – having the fifth largest χ^2 value in both analyses – and the relative importance of region declined considerably compared to Models 2 and 3.

Party choice differed significantly according to certain aspects of the neighbourhood structure, therefore, even when individual voter characteristics and region are held constant in the regression. Where people live – in particular, how socio-economically disadvantaged and urban their local area is – is an important influence on how they vote: Labour performs much better than either of the other two parties in the more disadvantaged and the less rural areas. Furthermore, the declining importance of the regional variable once the bespoke neighbourhood variables are included indicates that to a considerable extent observed regional variations in voting behaviour in many studies is a result of aggregating the dominant neighbourhood variations within each region. Nevertheless, region remains a very substantial contributor to the models, indicating a multi-scale geography to voting in Britain.

Place and Locale

The bespoke neighbourhood relationships provide strong supporting evidence for the case regarding neighbourhood effects, though aggregate patterns cannot identify why they appear. More importantly, they cannot indicate the level of spatial context at which the relevant processes operate since, with one intriguing exception, the same pattern is identified at each of the four levels analysed here.

To inquire further about the relative importance of place (the larger distances) and locale (the smaller), a further multinomial regression for each year included the five factors for

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both the smallest (nearest 250m) and largest (nearest 2,000m) bespoke neighbourhoods. Again, the impact on the regression coefficients for the individual-level and regional variables was minimal, so we concentrate on the neighbourhood regression coefficients. The χ^2 statistics (Model 5 in Table 3) indicate no substantial changes in the relative importance of most variables: for the bespoke neighbourhoods, however, they indicate that variations at the 2,000m (place) scale are more important than those at the smaller 250m locale, especially for the socio-economic disadvantage factor.

The main conclusion from the regression coefficients for this further set of regressions is that some of the relationships occurred at both scales simultaneously (Table 6), suggesting the simultaneous operation of processes at both levels. In particular, there are highly significant, negative relationships involving the first factor – socio-economic disadvantage – at both levels in the Labour:Conservative contrasts. The processes operating at the two scales are apparently additive: the more disadvantaged an area at the more distant level (the place according to our definition here), the greater the likelihood that an individual will vote Labour rather than Conservative; and, nested within it, the more disadvantaged the individual's immediate locale, the higher still the probability that he/she will vote Labour rather than Conservative. This is not repeated in the Labour:Liberal Democrat contrast at either election; for that, the significant differences occur at the more distant (place) level only, suggesting the absence of very local processes influencing the choice between those two parties among non-Conservative voters.

The other major finding with regard to the Labour:Conservative contrast is strongest in 1997. At the nearest 250m scale, the larger the ethnic minority presence the greater the probability of a Labour rather than a Conservative vote. At the 2,000m scale, however, the sign indicates that the more members of the ethnic minority groups there are in a place, the larger the Conservative relative to the Labour vote. This potentially counter-intuitive finding suggests that intense local pockets of ethnic minority residents stimulate very strong Labour support; in the wider areas in which those pockets are set, however, the presence of the minority groups within their midst (but not their immediate locales) stimulates more people to vote Conservative rather than Labour.

There are no consistent relationships across the two elections with the Labour:Liberal Democrat contrast, other than for Factor 1. In 1997, however, there is a strong negative link with Factor 3 (age structure) at the larger level but a strong positive link at the smaller. The implication is that the more young people in the immediate neighbourhood the greater the probability that a non-Conservative voter will plump for the Liberal Democrats rather than Labour, whereas at the larger level the opposite is the case – a further counter-intuitive finding but one that is less readily accounted for. In general, however, even with all of the neighbourhood effect variables incorporated the models are less successful at predicting Labour:Liberal Democrat than Labour:Conservative voting. This parallels other work, and indicates not only that, unlike the other two parties, the Liberal Democrats lack a well-defined social base within the electorate but also – because the party only campaigns intensively in relatively few parts of the country – that they are not sustained in a wide range of neighbourhoods.[42]

This inclusion of both locale- and place-scale neighbourhood characteristics provides strong evidence that there are processes generating spatial variations in voting patterns within regions at more than one level. In particular, patterns of neighbourhood social

[42] See A. Russell, E. Fieldhouse and I. D. MacAllister, 'The Anatomy of Liberal Support in Britain', *British Journal of Politics and International Relations*, 4 (2002), 49–74.

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TABLE 6 *Regression Coefficients (Standard Errors in Parentheses) for Place and Locale†*

	1992		1997	
	Lab:Con	Lab:LibDem	Lab:Con	Lab:LibDem
Nearest 250 metres				
Factor 1 (Disadvantage)	− 0.15**	− 0.09	− 0.12**	− 0.07
	(0.049)	(0.065)	(0.054)	(0.067)
Factor 2 (Mobility)	− 0.01	− 0.07	− 0.09	− 0.11
	(0.058)	(0.074)	(0.056)	(0.067)
Factor 3 (Age)	0.08	− 0.01	− 0.02	0.17**
	(0.045)	(0.057)	(0.045)	(0.055)
Factor 4 (Ethnicity)	− 0.21**	− 0.21*	− 0.32***	− 0.23**
	(0.071)	(0.108)	(0.075)	(0.092)
Factor 5 (Rurality)	0.05	− 0.08	0.04	− 0.07
	(0.045)	(0.057)	(0.049)	(0.054)
Nearest 2,000 metres				
Factor 1 (Disadvantage)	− 0.24**	− 0.29***	− 0.25***	− 0.30***
	(0.051)	(0.067)	(0.055)	(0.069)
Factor 2 (Mobility)	0.08	0.10	0.15*	0.16*
	(0.065)	(0.082)	(0.063)	(0.074)
Factor 3 (Age)	0.16*	0.12*	− 0.01	− 0.21***
	(0.071)	(0.113)	(0.045)	(0.053)
Factor 4 (Ethnicity)	0.06	0.02	0.24***	0.16*
	(0.048)	(0.058)	(0.067)	(0.091)
Factor 5 (Rurality)	− 0.12*	− 0.09	− 0.09*	− 0.10*
	(0.046)	(0.057)	(0.050)	(0.057)

† The regression coefficients for the bespoke neighbourhood variables in separate multinomial models (including both region and the individual characteristic variables), with the bespoke neighbourhood variables for 250m and 2,000m both included.
*** Statistically significant at the 0.001 level or better;
** statistically significant at the 0.01–0.001 level;
* statistically significant at the 0.05–0.01 level.

disadvantage clearly have a twin-scale impact: the more disadvantaged the place, the greater the probability of a Labour vote; and, within those places, the more disadvantaged the locale the greater still the probability of a Labour vote.

THE ORDER OF MAGNITUDE OF THE SPATIAL DIFFERENCES

Although the size and significance of the various regression coefficients indicate the statistical impact of independent variables on voter choice, it is difficult to appreciate their extent because the relationships assume that all other influences are held constant. This section reports estimates of the probability of voting either Conservative or Liberal Democrat rather than Labour to illustrate the magnitude of both the regional variations and the differences between the places and locales; we focus on the socio-economic disadvantage factor in 1992.[43]

[43] This is to save space: those for 1997 are very similar.

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Formally, the multinomial logistic regressions have the form:

$$\ln[p/(1-p)] = a + b_1X_1 + b_2X_2 \ldots + b_nX_n, \quad (1)$$

where p is the probability of supporting the named party; ln is the natural logarithm; a is the regression constant; and $b_1 \ldots b_n$ are the regression coefficients for the n independent variables.

The value of p can then be obtained as

$$p = [\exp(a + b_1X_1 + b_2X_2 \ldots + b_nX_n)]/[1 + \{\exp(\mathrm{a} + b_1X_1 + b_2X_2 \ldots + b_nX_n)\}]. \quad (2)$$

To evaluate the impact of one of the n variables, the equation is solved by setting all others to fixed values, and then calculating the values of p for different values of the remaining variable.

For illustrative purposes four 'voter types' are used, stereotypical individuals identified by their individual characteristics:

1. *Type 1: working-class*. A male, aged 45, with no qualifications and a semi-skilled/unskilled last occupation, living in a local authority rented home and with no car available to the household, whose net income is £5,797 (one standard deviation below the average). His current financial situation is 'all right' and he anticipates no change in that.
2. *Type 2: middle-class*. A male, aged 45, with a first degree and a higher service last occupation, living in a mortgaged home with two cars available to the household, whose net income is £26,985 (one standard deviation above the average). His current financial situation is 'all right' and he anticipates no change in that.
3. *Type 3: prosperous employer*. A male, aged 45, with A-level qualifications who is a small proprietor with employees, living in a home that is owned outright with three or more cars available to the household, whose net income is £37,579 (two standard deviations above the average). His current financial situation is 'comfortable' and he anticipates that it will 'get better'.
4. *Type 4*: *poor working-class*. A male, aged 45, with no qualifications and a semi-skilled/unskilled last occupation, living in a local authority rented home with no car available to the household, whose net income is £5,797 (one standard deviation below the average). His current financial situation is 'very difficult' and he expects it to 'get worse'.

The probabilities of these types voting either Conservative or Liberal Democrat rather than Labour in 1992, according to the baseline equation (Table 1) and with no spatial variables included, were:

Voter Type	1	2	3	4
Conservative:Labour	0.15	0.51	0.86	0.05
Liberal Democrat:Labour	0.07	0.40	0.27	0.05

Inter-Regional Variations

Adding the regional variable introduces considerable differences relative to the situation in Scotland (Table 7). For example, the range of probabilities for voting Conservative

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TABLE 7 *Probability of Voting Conservative or Liberal Democrat rather than Labour by Voter Type and Region, 1992*

	Voter type voting Con.				Voter type voting Lib. Dem.			
	1	2	3	4	1	2	3	4
Inner London	0.22	0.63	0.91	0.08	0.15	0.61	0.47	0.12
Outer London	**0.30**	**0.72**	**0.94**	**0.12**	**0.20**	**0.69**	**0.56**	**0.17**
Rest of Southeast	**0.34**	**0.76**	**0.95**	**0.14**	**0.27**	**0.78**	**0.66**	**0.24**
Southwest	**0.33**	**0.75**	**0.95**	**0.13**	**0.30**	**0.80**	**0.69**	**0.26**
East Anglia	**0.31**	**0.73**	**0.94**	**0.12**	**0.21**	**0.77**	**0.66**	**0.23**
East Midlands	**0.28**	**0.71**	**0.93**	**0.11**	**0.12**	**0.57**	**0.43**	**0.10**
West Midlands Conurbation	**0.34**	**0.76**	**0.95**	**0.14**	0.13	0.57	0.43	0.11
Rest of West Midlands	**0.22**	**0.64**	**0.91**	**0.08**	**0.15**	**0.61**	**0.47**	**0.12**
Greater Manchester	0.17	0.55	0.88	0.06	0.08	0.45	0.32	0.07
Merseyside	0.14	0.49	0.85	0.05	0.09	0.47	0.33	0.07
Rest of Northwest	**0.28**	**0.70**	**0.93**	**0.11**	**0.16**	**0.63**	**0.49**	**0.13**
South Yorkshire	0.16	0.54	0.87	0.06	0.10	0.50	0.36	0.08
West Yorkshire	0.17	0.55	0.88	0.06	0.09	0.47	0.34	0.07
Rest of Yorkshire/Humber	**0.27**	**0.69**	**0.93**	**0.10**	**0.15**	**0.62**	**0.48**	**0.13**
Tyne and Wear	0.16	0.54	0.87	0.06	0.05	0.34	0.22	0.04
Rest of North	0.16	0.53	0.87	0.06	0.07	0.42	0.29	0.06
Wales	0.12	0.46	0.83	0.04	0.09	0.49	0.35	0.08
Scotland	0.15	0.51	0.86	0.05	0.07	0.40	0.27	0.05

Note: The probabilities in bold are significantly different from those for Scotland at the 0.001 level or better.

rather than Labour is 0.12–0.34 and 0.04–0.14 for the two working-class types respectively (1 and 4) and 0.05–0.30 and 0.04–0.26 for voting Liberal Democrat rather than Labour. There was more than a six-fold inter-regional difference in the propensity of these stereotypical working-class individuals to vote Liberal Democrat rather than Labour (with the highest value in the Southwest region), and around a three-fold difference in their propensity to vote Conservative. For the other two types, the range of probabilities for voting Conservative was 0.46–0.76 for the middle-class male voter (Type 2) and 0.34–0.80 for voting Liberal Democrat; for the prosperous employers (Type 3) the ranges were 0.83–0.95 and 0.35–0.69 respectively. Members of the latter type were very likely to vote Conservative rather than Labour on the basis of their individual characteristics, but even more likely if they lived in the southern than in the northern regions.

VARIATIONS BY PLACE AND LOCALE

The regional variations indicate a very clear north–south divide in the pattern of voting by the selected stereotype voters. To illustrate the additional impact of variations by place and locale we focus on two regions, selected to represent each side of the north–south divide – the West Yorkshire conurbation and the Rest of the Southeast region (i.e. the Home Counties around London). Equation 1 gave two estimated odds ratios (one per region) for each voter type, and we then calculated for each region the estimated value for various points along the socio-economic disadvantage factor at the chosen neighbourhood scale

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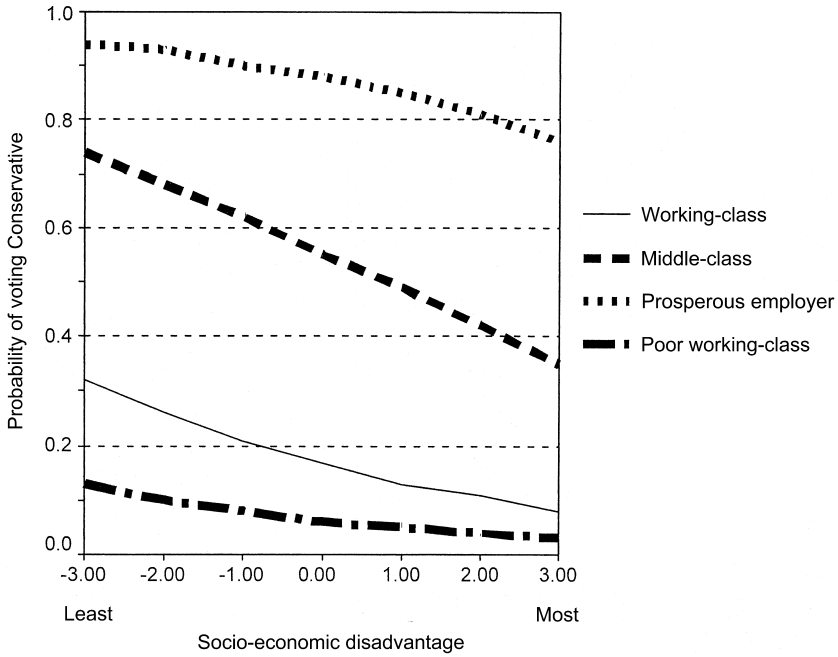

Fig. 1. The probability of voting Conservative rather than Labour by the four selected 'voter types' across the socio-economic disadvantage scale (250m) in the West Yorkshire region

– ranging between ± 3 standard deviations from the mean. The estimated probabilities of voting for one of the parties were then obtained using Equation 2 and graphed over the range for the socio-economic disadvantage factor.

Figures 1 and 2 show the probabilities of voting Conservative rather than Labour across the socio-economic disadvantage scale for each of the two regions and each of the four voter types in the 250m bespoke neighbourhoods. In West Yorkshire, the probability of working-class individuals (Types 1 and 4) voting Conservative is never high – just over 0.3 in the least disadvantaged areas for Type 1 and 0.13 for Type 4 – but both show a notable drop as the level of socio-economic disadvantage increases (Figure 1). The probability of voting Conservative is much higher in Types 2 and 3, but also varies more in absolute terms according to the level of socio-economic disadvantage. For the middle-class voter (Type 2), the probability of voting Conservative was 0.74 in the least disadvantaged areas, but 0.35 in the most disadvantaged areas. The decline was less for the prosperous employers (Type 4), who were very likely to vote Conservative whatever their locale's characteristics; nevertheless, the probability that they voted Conservative rather than Labour fell by nearly 0.2 between the least and the most disadvantaged areas.

The slopes were much the same in the Rest of the Southeast region as in West Yorkshire (Figure 2), although the probability of members of all types voting Conservative was higher in the former at every level of locale socio-economic disadvantage. In general the gap in the probability of voting Conservative was greatest across the two working-class types (1 and 4) in the least disadvantaged areas (from 0.54 for Type 1 in the Rest of Southeast to 0.13 for Type 4 in West Yorkshire); among the other two types (2 and 3) it was greatest

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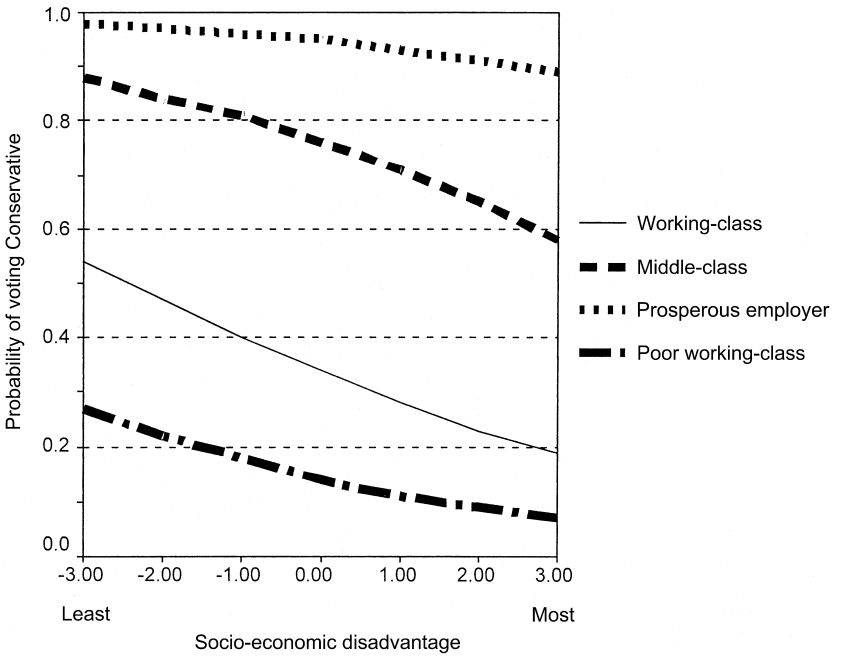

Fig. 2. The probability of voting Conservative rather than Labour by the four selected 'voter types' across the socio-economic disadvantage scale (250m) in the Rest of Southeast region

in the most disadvantaged areas (from 0.89 for the prosperous employers in Rest of Southeast to 0.35 for the middle-class individuals in West Yorkshire).

Turning to the probabilities of voting Liberal Democrat rather than Labour, Figures 3 and 4 show the comparable graphs to those in Figures 1–2 for Conservative voting. In both West Yorkshire and the Rest of the Southeast, the probabilities of working-class individuals (Types 1 and 2) voting Liberal Democrat were generally low and differed very little between the two. There was a clear downward trend as socio-economic disadvantage increased, however, especially in the latter region, where the probability almost halved between the least and the most disadvantaged areas (Figure 4). The probability of a Liberal Democrat rather than Labour vote was much higher in the other two types, especially in the Rest of Southeast region: again, however, there was a marked decline in that probability as locales became more socio-economically disadvantaged – especially in West Yorkshire (Figure 3).

At the larger scale of the place – i.e. using data on the characteristics of the population living within 2,000m of the individual's home, as against 250m for the locale – the regression coefficients in Table 1 suggest very similar relationships to those already described from the smaller areas. This is borne out by graphs (not reproduced here) of the relationships between socio-economic disadvantage and the two voting choices: the more disadvantaged the area, the smaller the probability of an individual in each type voting Conservative rather than Labour or Liberal Democrat rather than Labour – with much lower probabilities for the two working-class types (1 and 4).

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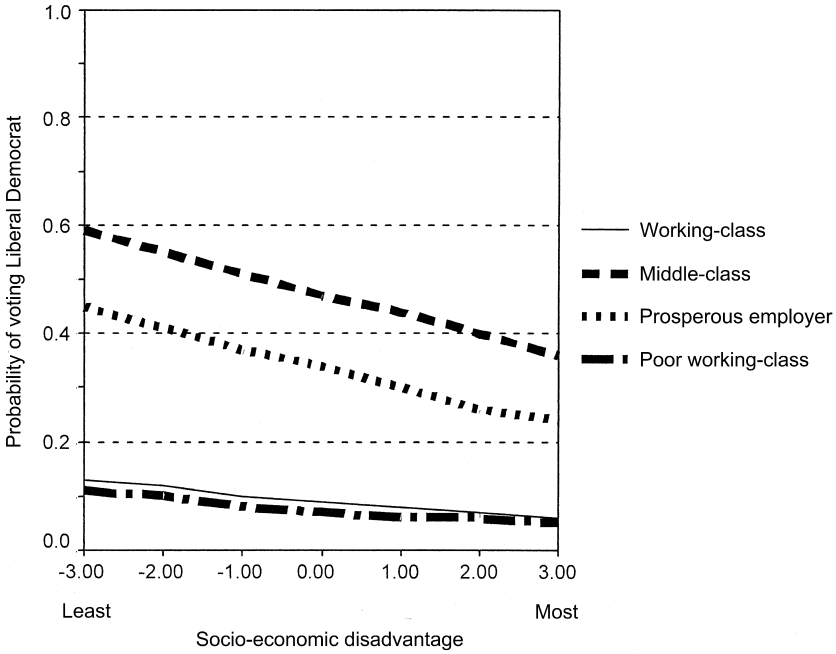

Fig. 3. The probability of voting Liberal Democrat rather than Labour by the four selected 'voter types' across the socio-economic disadvantage scale (250m) in the West Yorkshire region

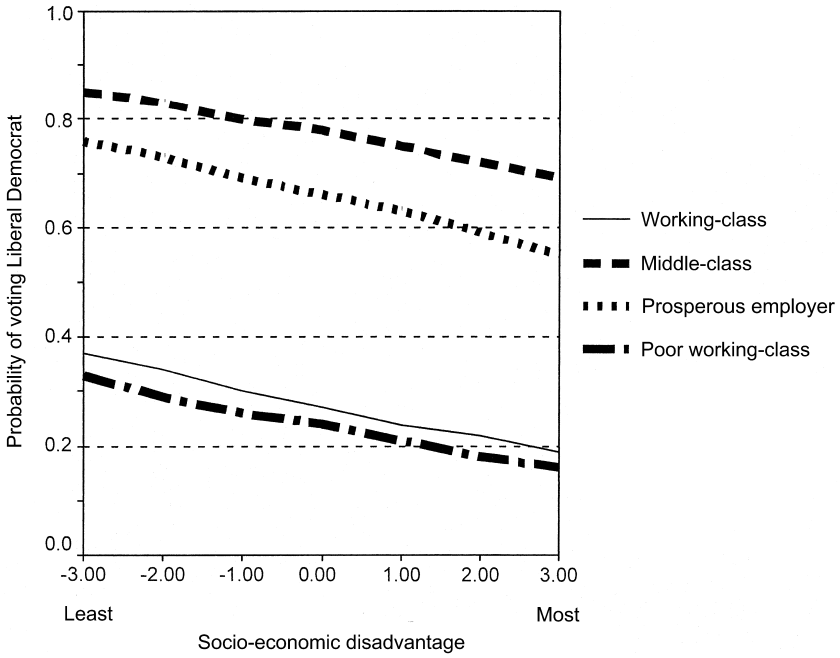

Fig. 4. The probability of voting Liberal Democrat rather than Labour by the four selected 'voter types' across the socio-economic disadvantage scale (250m) in the Rest of Southeast region

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CONCLUSIONS

There is increasing evidence, despite the claims of some sceptics,[44] of spatial variations in British voting behaviour that cannot be accounted for by the voters' individual characteristics. Similar people living in different areas vote differently. Much of that evidence has not specified the spatial scale at which such differences occur: studies focused on inter-regional variations, on constituencies and on even more local areas have all identified spatial variations, but because the levels nest within each other it has been difficult – even where it has been attempted in multi-scalar investigations – to identify the relative importance of different levels and their impact.

The analyses reported here have not only provided further, strong circumstantial evidence of spatial variations in British voting behaviour but, more importantly, have also provided substantial new insights gained by decomposing those effects. At both general elections studied,[45] there were substantial inter-regional variations in support for each of the three main parties, which accounted for more of the variation than most of the individual voter characteristics incorporated in the models. Furthermore, although some of this inter-regional variation reflects intra-regional differences operating at smaller scales, as identified in the studies of bespoke neighbourhoods, much of it is independent of those patterns. There is a clear regional patterning to British voting behaviour that cannot be attributed to either variations in the characteristics of the voters living in the various regions or to more local variations that simply aggregate up to regional differences.

There are also much more local differences, as shown by the analyses of the five dimensions of neighbourhood characteristics, some of which are simultaneously identifiable at two different spatial levels – the locale (the immediate neighbourhood, comprising the area within 250m of the survey respondents' homes) and the place (a wider area, within 2,000m of their homes).[46] There are intra-regional variations within the inter-regional, which are also independent of the voters' personal characteristics. Furthermore, as the graphs in Figures 1–4 illustrate, these differences are considerable, even when the voters' individual characteristics and regional locations are held constant. Differences between neighbourhoods are both significant and substantial.

These analyses substantiate and substantially extend studies of spatial variations in voting behaviour but provide no significant new information regarding the social and other processes that create them. A number of interacting processes is almost certainly involved,[47] varying in their relative importance across space and time. Parties vary in the intensity with which they mobilize support at a number of areal levels, for example – not only by constituency, for which there is much evidence of differential activity reflecting seat marginality and party tactics,[48] but also in the neighbourhoods where grassroots campaigning and canvassing is focused.[49] Alongside, and undoubtedly interacting with

[44] Dunleavy, 'The Urban Basis'; McAllister and Studlar, 'Region and Voting'.

[45] And also at the 2001 general election, to the extent that available data allow it to be analysed.

[46] The implication from the regression coefficients shown in Table 6 is that the variations are greater at the larger than at the smaller scale. To some extent this is counter-intuitive, since there is greater variation in the independent variables at the small than the larger scale. Methods of identifying the relative importance of variations at each scale are currently being explored: see Johnston *et al.*, 'Scale, Factor Analysis and Neighborhood Effects'.

[47] Harrop, Heath and Openshaw, 'Does Neighbourhood Influence Voting'.

[48] E.g., R. J. Johnston and C. J. Pattie, 'Where's the Difference? Decomposing the Impact of Local Election Campaigns in Great Britain', *Electoral Studies*, 16 (1997), 165–74; and C. J. Pattie and R. J. Johnston, 'Campaigning and Advertising: An Evaluation of the Components of Constituency Activism at Recent British General Elections', *British Journal of Political Science*, 28 (1998), 677–86.

[49] D. J. Cutts, 'Party Campaigning and Voting in Bath' (doctoral dissertation, University of Bristol, 2003).

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this, there is the neighbourhood effect, with people's voting decisions influenced by contact not only with local party workers but also with their friends and neighbours in formal and informal local settings – some of which operate at the scale of the locale and others at that of the place. There are also variations in the local material environment – such as levels of unemployment and inflation in housing prices – which people observe in their local milieux and which may influence how they vote, especially if local media and others stress their likely impacts. And there is probably some self-selection, with individuals choosing to live in areas which reflect their self-assessed class and status within society.

Social life is complex and multi-scalar, and it is rare to identify a single cause for most behavioural choices. This is certainly the case with voting, in which a myriad of influences – local, regional and national – interact with well-established social patterns of behaviour to produce a particular outcome. Analyses such as those presented here depict aspects of that complexity and show that voting decisions at the 1992 and 1997 British general elections are intricately patterned spatially as well as socially. Those spatial patterns are consistent with arguments regarding the operation of various social, economic and political processes and provide strong and consistent – albeit circumstantial – evidence which supports the arguments first presented by Butler, Stokes, Miller and others three decades ago: there is an important geography to voting in Great Britain, every bit as important as the political sociology.

APPENDIX: THE EIGHTEEN VARIABLES USED IN THE BESPOKE NEIGHBORHOOD FACTOR ANALYSES

% unemployed	Percentage of the workforce unemployed and seeking work
% long-term sick	Percentage of people aged 16–64 with long-term illnesses
% owned-outright	Percentage of dwellings owned outright by their occupants
% local authority rent	Percentage of dwellings rented from a local government
% central heating	Percentage of dwellings with central heating
% exclusive facilities	Percentage of households with exclusive use of an indoor WC, bathroom and kitchen
% no car	Percentage of households without access to a car
% 1 + per room	Percentage of households living at densities of 1 person per room or more
% lone parent	Percentage of households containing a lone parent
% 1-person pensioner	Percentage of households comprising a single person aged 65 or over
% 1-person non-pensioner	Percentage of households comprising a single person aged under 65
% black	Percentage of individuals reporting black (African or Caribbean) identity
% Indian	Percentage of population reporting Indian ethnicity
% Pakistani/Bangladeshi	Percentage of individuals reporting Pakistani or Bangladeshi identity
% migrant in last year	Percentage of individuals who moved in the previous year
% working in agriculture	Percentage of workforce employed in agriculture
% aged 0–15	Percentage of population aged 0–15
% professional-managerial	Percentage of workforce in professional/managerial occupations

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