Durham is the pits (for local disproportionality)

By Democratic Audit

Disproportionality is the degree of mismatch between parties' shares of votes and their shares of seats, with measures of disproportionality usually calculated for national elections. The share of votes is simply the share of all votes cast nationwide, and the share of seats is simply the share of all seats contested. **Dr. Chris Hanretty** *of the University of East Anglia uses this model to show us that Durham is the worst place in the country to live – if only in this particular respect.*

There is, however, nothing in the concept of disproportionality which prevents us from calculating measures of disproportionality by aggregating over different units.

- We could calculate a measure of disproportionality for the single constituency. (That is, we could refuse to aggregate).

Such a measure would be extremely boring. It would simply tell us the share of the winning candidate. High measures of disproportionality would actually correspond to quite competitive (three-way or four-way) contests.

- We could calculate a measure of disproportionality for single constituencies, aggregating over time. Thus, we could, for each constituency, calculate the share of votes won over the past four or five elections, and the share of occasions upon which each party has won the seat.

Such a measure would be similar in spirit to tallies of seats which have not changed parties over the past twenty years. High measures of disproportionality would correspond to seats which (almost) never change hands.

- We could calculate a measure of disproportionality for regions, aggregating over space. Instead of summing the votes cast nation-wide, we could sum the votes cast and seats won in each region.

This would give us a measure of disproportionality for each region. This measure offers something more than a decomposition of national-level disproportionality: hypothetically, pure proportionality could be achieved even if disproportionality was high in every region, as long as those regions were equally balanced between the parties.

Measures of disproportionality which aggregate over (local) areas are important, but for some purposes they might be inadequate. We might want finer-grained measures of disproportionality which apply at the constituency-level, rather than taking each constituency within the region as interchangeable. If my constituency is on the border between a region with high disproportionality (say, the East of England) and a region with low disproportionality (say, the Greater London area), my voting behaviour might be different from someone who is in another constituency at the centre of that region.

We can use information on constituency geography to solve this problem, and offer a fine-grained picture of disproportionality aggregating over space but simultaneously providing a constituency-based measure.

The idea is simple: for each constituency, identify the twenty `closest' constituencies (including the constituency itself). Then for each party calculate the share of seats and share of votes won, and use this in a measure of disproportionality. Adjacent seats will have similar measures of local disproportionality (their lists of closest constituencies will have many members in common), but we will be able to identify local `peaks' and `troughs' of disproportionality.

I've constructed such a measure on the basis of 2010 general election results. If you are so minded, you can see the R code that I used to generate the measures (the data can be found here). That code makes a number of technical details explicit.
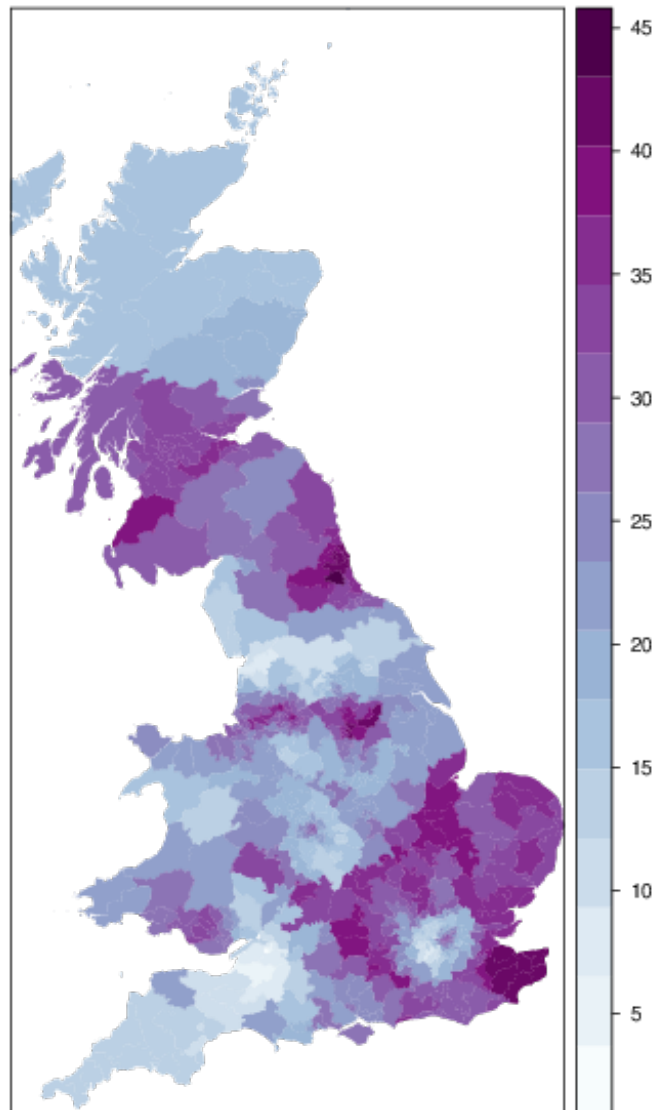
I'm using the Gallagher measure of disproportionality, rather than any other. I'm also defining the `closest' constituencies as those constituencies the centroids of which have the smallest Euclidean distance to the centroid of my target constituency. The centroid of a given constituency is simply the centre of mass of the constituency — the point from the constituency would hang level if you picked it up with a piece of string (or a huge crane). The centroid might not represent the centre of the constituency population — but it is an easy and (I think) defensible measure.

The map of disproportionality that results is shown above.

Darker values indicate greater disproportionality. Starting with areas with low levels of disproportionality, we can see two peaks — a massive spike in London, which stands out much more thanks to the levels of disproportionality in the surrounding Home counties, particularly Kent — and another second peak in Bristol. This second peak flattens out much more gradually.

Moving on to areas with high levels of disproportionality, we see not only the aforementioned ring around London, but also a great ravine cutting across the country from Liverpool through Manchester on to Doncaster. A more localised area of high disproportionality is found in the north East, centred on City of Durham, which has the highest levels of disproportionality. Further north still, the Central Belt sees high disproportionality stretch from Ayr to Edinburgh.

An ideal but myopic voter who cared about disproportionality in the surrounding region would therefore move to the South West, and avoid the Home Counties or the North East. Of course, it's rare to find voters who care about disproportionality per se rather than the impact of disproportionality on their favoured party. But the approach used here could easily be applied to create local advantage ratios for each constituency. Such measures of disproportionality and advantage could be useful in studying the detailed operation of tactical voting.

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