A New Agenda … Values, World Society, Modelling

https://sites.google.com/site/gordonburtmathsocsci/home/a-new-agenda

A New Agenda seeks to explore all aspects of society using all the academic disciplines paying special attention to values ... with special interest in modelling ... not disinterested in practice ... and aspiring to high academic standards.

Commentary, June 2016   No. 30

Brexit voting: economics, social, politics, geography, psychology

Overview

Last week the UK voted to leave the European Union ('Brexit'). Leave had 52% of the vote and Remain had 48%. So on the one hand there was a clear win for Leave; and on the other hand the country was quite evenly divided between the two options.

Advanced economies are not growing as fast as emerging and developing economies. The growth in advance economies is not shared equally and it is the richer, more educated classes who are benefitting. Remain areas are associated with low manufacturing, high education, high wages and high house prices whereas Leave areas are associated with high manufacturing, low education, low wages and low house prices.
Scottish independence referendum, 2015: %Yes = 20% + 3 (% unemployed)

I have some uneasiness about the way in which words are sometimes used to describe the numbers. Rather than thinking of people in groups it is more precise to differentiate between people and see them as points continuously distributed in some space with each point having an associated probability of voting Leave, specified by an equation. Also it is important to look at variation within units and variation between units.

The social groups more likely to vote Leave were: older, working class, less educated, not of an Ethnic minority, professing an English identity, of the 'objective' Left (class, education) and of the 'expressed' Right (vote, attitude, newspaper readership).

Variation within units is more than variation between units. The UK is divided at a number of different levels into nations, regions and areas (and individuals). The variation within nations is more than the variation between nations – very much more in the cases of England and of Northern Ireland. In England the variation within regions is much more than the variation between the regions. There is within-area variation: even in the second most unanimous area, a fifth of the people oppose the four-fifths majority. Within individuals there is variation also. We are also interested in the shape of the variation, in other words the distribution. The frequency distribution of the Leave percentage for the four hundred areas is unimodal with a skew – more areas are to the higher end than area to the lower end.

The geographical aspect of the between-unit variation in voting percentages is studied using the notion of a perimeter profile. Typically the profile exhibits a combination of global single-peakedness and multiple local peaks, a fractal structure of peakedness. The profiles of England, Wales, Northern Ireland and Scotland are presented. In Northern Ireland, Leave is high on the north and east of the perimeter and low on the south and west. In the other three countries Leave is low in cities and university towns.

The voting areas used in the referendum are the same as the areas used in a recent study of geographical variation in personality. The Big Five form a continuum: from Agreeableness to Conscientiousness to Stability to Extraversion to Openness. The Leave vote has a single-peaked correlation profile on this continuum. Openness has a high correlation with the Remain vote … and also with higher education, same-sex marriage, foreign-born, Liberal Democrat. London is particularly high on openness.

The areas in Northern Ireland can be located as points in a two-dimensional political space on the basis of voting in the UK general election of 2015. The points form a circle. The percentage Leave vote follows a cyclical pattern on this circle.

1 Introduction … economics

Overall, the world is becoming a better place – but not for everybody. Economic growth continues, but some are growing faster than others. Advanced economies are not growing as fast as emerging and developing economies. The growth in advance economies is not shared equally and it is the richer, more educated classes who are benefitting. Commenting on last week's referendum results, John Curtice comments:

'Differences [in voting] are sharper by social class with the two central issues being the economy and immigration. Older voters and those with less educational experience are more likely to be uncomfortable about immigration. They are inclined to find the cultural change unnerving and challenging and feel that it helps to reduce their wages, especially in a post-financial crash world.
Younger voters and graduates enjoy a diverse world and have few qualms about being able to hold down a well-paid job in an internationalised labour market…
… [ethnic minorities were not attracted by the Leave campaign and] it is their behaviour, together with the relative youth and advanced educational background of its population that explains why London recorded a majority for Remain'.

Curtice, John. (2016) Numbers tell a tale of two countries. The Times. June 25, p. 19. Source: Esci and Lord Ashcroft Polls.

Table 1 indicates how Remain areas are associated with low manufacturing, high education, high wages and high house prices whereas Leave areas are associated with high manufacturing, low education, low wages and low house prices. (The influence of these economic factors was also found in the Scottish independence referendum in 2015. The area results fitted an equation %Yes = 20% + 3 (% unemployed). Burt, 2016, p. 197-198).

Note that Table 1 gives the percentage of areas voting Leave, not the percentage of individuals in these areas voting Leave. The latter set of figures would have given a less dramatic contrast – which I would have preferred.

Table 1 The Leave factors: the percentage of areas voting Leave. See above Note.

.		areas	% Leave		areas	% Leave	number of areas
manufacturing		low	42		high	86	148, 232
wages		high	35		low	77	69, 309
house prices		high	28		low	79	75, 306
education	high	46		low	83		139, 240

Source: The Times (2016) The Times. How Britain voted. June 25. pp. 1-4.

Cities are at the core and have a different agenda from the periphery. Cities are characterised by a psychology of openness. In the UK Brexit referendum of 2016, London and the core lost. In the Scottish Independence referendum of 2015, London and the core won (also Edinburgh won and Glasgow lost). The 2015 same-sex marriage referendum in Ireland also pitted the core against the periphery – this time Dublin and the core won. In the 2015 UK general election the core lost ground to the periphery – with UKIP (and SNP in Scotland) gaining ground. UKIP had been advancing continually over the preceding years and similar advances were being made by other challenger parties in Europe as was evident in the European Parliament elections in 2014. In 2015, one of these parties, Syriza, won two elections and a referendum in Greece on a platform of resisting austerity. Challenger parties of the Right have been concerned about immigration, some of which has been brought about by East European countries gaining membership of the European Union. This in turn has diminished the influence of Russia and it was to prevent further diminution that Russia fostered the conflict in Ukraine. Table 2 below shows the extent to which other countries share the UK's ambivalence towards the European Union.

A more detailed account of some of these points is contained in the following Yearbook chapters.

Burt, Gordon. (2016) *Values, World Society and Modelling Yearbook, 2014*. Cambridge Scholars.
7 The world today: tension and volatility in a multi-level geopolitical structure
8 World history: progress and destruction, independence and incorporation
9 Ukraine: united or divided? west and east; living with others
10 Scotland: 'our values'? independence? more varied and less distinctive
11 The world economy: growth and inequality

Values, World Society and Modelling Yearbook, 2015 In preparation.

Table 2 Countries in the European Union: percentage demand for a referendum; percentage who would vote to leave; friendliness towards the UK

.	% want referendum	% vote leave	friendliness to UK
Ireland	.	.	+2
Austria	.	.	+2
Greece	.	.	+2
Denmark	.	.	+1
Hungary	38	29	+2
Spain	40	26	-2
Germany	40	34	+2
Poland	41	22	+2
Belgium	42	29	-2
Sweden	43	39	+2
Netherlands	54	34	+2
France	55	41	-2
Italy	58	48	-2

Waterfield, Bruno, David Charter and Adam Sage (2016) European leaders are divided over a quickie divorce. The Times. June 27, pp. 8-9

2 The UK Brexit referendum

The EU referendum in the UK was held on 23 June 2016. Leave had 52% of the vote and Remain had 48%. So on the one hand there was a clear win for Leave; and on the other hand the country was quite evenly divided between the two options.
The electorate was 46,501,241 and the turnout was 72.21%. There were 99.92% valid votes. Leave had 51.89% and remain had 48.11%.
https://en.wikipedia.org/wiki/United_Kingdom_European_Union_membership_referendum,_2016

3 Using words to describe the numbers

I have some uneasiness about the way in which words are sometimes used to describe the numbers. For example consider the statement 'Britain voted to leave the EU'. The statement is true but imprecise in that it does not specify how many people voted either way. Another example is the headline 'Numbers tell a tale of two countries'. The statement is true in that there are two groups of people (countries?), one who voted Remain and the other who voted Leave. However it is more precise to differentiate between people and see them as points continuously distributed in some space with each point having an associated probability of voting Leave, specified by an equation. Also it is important to look at variation within units and variation between units.

4 How social groups voted

The social groups more likely to vote Leave were: older, working class, less educated, not of an Ethnic minority, professing an English identity, of the 'objective' Left (class, education) and of the 'expressed' Right (vote, attitude, newspaper readership).

Males and females were equally likely to vote Leave, 52%.**

Older people were more likely to vote Leave: 27%, 38%, 48%, 56%, 57% and 60%, respectively for age groups 18-24, 25-34, 35-44, 45-54, 55-64 and over 65. Note though that the percentage does not change much for the over 45s.**

The working class were more likely to vote Leave. Classes DE, C2, C1 and AB voted Leave 64%, 64%, 51% and 43%, respectively.**

The less educated were more likely to vote Leave (GCSE or lower, A level, degree).***

Ethnic minorities were less likely to vote Leave, 32%.**

National identity is a factor. Those who thought of themselves as English rather than British were more likely to vote Leave, 80%. In contrast, those who thought of themselves as British rather than English were less likely to vote Leave, 40%.**

Political location is a factor. Position on the Left-Right continuum can be indicated by social class, working class to the Left and middle/upper class to the Right. So, by that definition the Leave vote <u>decreased</u> from Left to Right.**

Position on the Left-Right continuum can be indicated by level of education, low on the Left and high on the Right. So, by that definition the Leave vote <u>decreased</u> from Left to Right.

Position on the Left-Right continuum can also be indicated by political attitudes. On the Left those who thought immigration, social liberalism and the Green movement good voted 21%, 32% and 38% Leave, respectively. On the Right those who thought immigration, social liberalism and the Green movement ill voted 80%, 80% and 78% Leave, respectively. The Leave vote <u>increased</u> from Left to Right.*

The position can also be indicated by their voting in the 2015 general election and an ordering of the parties from Left to Right: Greens, SNP, Labour, Lib Dems, Conservative and UKIP. The Leave vote <u>increased</u> from Left to Right. See Figure 1.***

The position can also be indicated by newspaper readership and an ordering of the parties from Left to Right: Guardian, Times, Telegraph, Sun, Mail and Express. The Leave vote <u>increased</u> from Left to Right.***

* Savage, Michael, Francis Elliott and Lucy Fisher (2016) Heartland turned its back on campaign. The Times. June 25, p. 7. Source: Esci and Lord Ashcroft Polls, conducted a couple of days before or on election day.
** Curtice, John. (2016) Numbers tell a tale of two countries. The Times. June 25, p. 19. Source: Esci and Lord Ashcroft Polls.

*** Coates, Sam. (2016) Who is most likely to vote? The Times. June 14, p. 14.

Figure 1 The percentage Leave vote by party voting on the Left-Right continuum
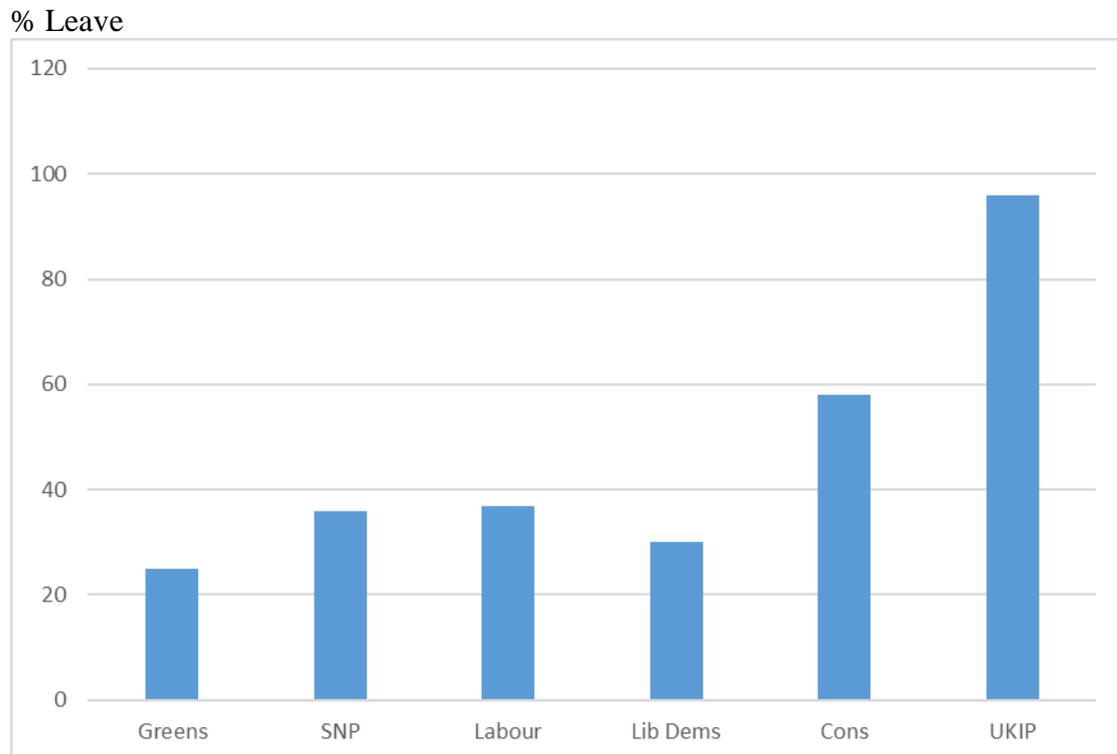
% Leave

Savage, Michael, Francis Elliott and Lucy Fisher (2016) Heartland turned its back on campaign. The Times. June 25, p. 7. Source: Lord Ashcroft Polls.

5 Within-unit and between-unit variation

The UK is divided at a number of different levels into nations, regions and areas (and individuals).

In the UK there are four nations: England, Wales, Scotland and Northern Ireland. England is further split into 9 regions. A more detailed division consists of 326 areas in England, 32 areas in Scotland, 22 areas in Wales and 18 areas in Northern Ireland – 398 areas in total. (Gibraltar was arbitrarily designated an 'area' and assigned to one of the English regions.)

How did the different nations, regions and areas vote? See Table 3.

Two of the four nations (50%) voted Leave; and two did not. Eight of the nine English regions (89%) voted Leave; and one did not. Seventeen of the twenty-two areas in Wales (77%) voted Leave; and one did not. Eight of the eighteen areas in Northern Ireland (44%) voted Leave; and one did not. None of the thirty-two areas in Scotland (0%) voted Leave. Of the 403 areas, 67% voted Leave. Note that these are percentages of nations, of regions, of areas.

We now turn to percentages of people. England and Wales both voted Leave. The population of England is much larger than the populations of the other nations and so

its Leave vote of 53% is close to the overall UK Leave vote of 52%. Wales also had a 53% Leave vote. So the difference in England between Remain and Leave was quite small – it was quite evenly divided. Similarly for Wales.

In contrast Northern Ireland and Scotland both voted Remain. Northern Ireland had a 44% Leave vote and Scotland had a 38% Leave vote. So the differences in Northern Ireland and in Scotland between Remain and Leave were greater – less evenly divided. Gibraltar had a 4% Leave vote.

We now consider the range of percentages across different nations and regions.

Across the 4 nations the percentage Leave vote varied between 38% and 54%, a range of 16%.
Across the 12 regions the percentage Leave vote varied between 38% and 59%, a range of 21%.
Across the 398 areas the percentage Leave vote varied between 21% and 76%, a range of 55%.

Across the 326 areas in England the percentage Leave vote varied between 21% and 76%, a range of 55%.
Across the 22 areas in Wales the percentage Leave vote varied between 40% and 62%, a range of 22%.
Across the 18 areas in Northern Ireland the percentage Leave vote varied between 22% and 62%, a range of 40%.
Across the 32 areas in Scotland the percentage Leave vote varied between 26% and 50%, a range of 24%.

Table 3 Range of variation in the Leave vote in nations, regions and areas

.	n	overall %	min	max	range
overall	1	52			
nations	4		38	54	16
regions	12		38	59	21
areas	382		21	76	55
England areas	326	53	21	76	55
Wales areas	22	53	40	62	22
N Ireland areas	18	44	22	62	40
Scotland areas	32	38	26	50	24
East Midlands	40	59	42	76	34
West Midlands	30	59	41	69	28
Yorks & Humber	21	58	42	69	27
North East	12	58	49	70	21
Eastern	47	57	26	73	47
North West	39	54	40	67	27
South West	32	53	38	63	25
South East	67	52	30	65	35
London	43	40	21	70	49
Gibraltar	1	4			

Within each area there is variation, indicated by the percentage. In some areas there is an even split, 50% and 50%. In Gibraltar there is almost unanimity: 96% voted Remain. The area closest to unanimity for Leave is Boston with 76%. The area closest to unanimity for Remain is Lambeth with 21% Leave – in other words a fifth of the people oppose the four-fifths majority. So there is at least some degree of division of opinion in all areas.

Even within individuals there is variation, indicated by how their opinion changes over time. At some point in time before voting each person moves from not having decided how they will vote to being decided how they will vote: 9% on polling day; 8% in the last few days; 6% in the last week; 18% in the last month; 14% since the start of the year; 6% longer than a year; and 39% always decided.
** Curtice, John. (2016) Numbers tell a tale of two countries. The Times. June 25, p. 19. Source: Esci and Lord Ashcroft Polls.

So the variation within nations is more than the variation between nations – very much more in the cases of England and of Northern Ireland. In England the variation within regions is much more than the variation between the regions. There is within-area variation: even in the second most unanimous area, a fifth of the people oppose the four-fifths majority. Within individuals there is variation also. See Table 3.

We are also interested in the shape of the variation, in other words the distribution. The frequency distribution of the Leave percentage for the 399 areas is unimodal with a skew, with the long tail being to the left – in other words most areas are to the higher end with just a few areas to the lower end. See Figure 2. [A similar skew is evident in the corresponding distribution for the regions: 38; 40, 44; ; 52, 53 ,53, 54; 56, 58, 58, 59, 59.]

Figure 2 Frequency distribution of the Leave percentage for the 399 areas
Number of areas

.   percentage Leave
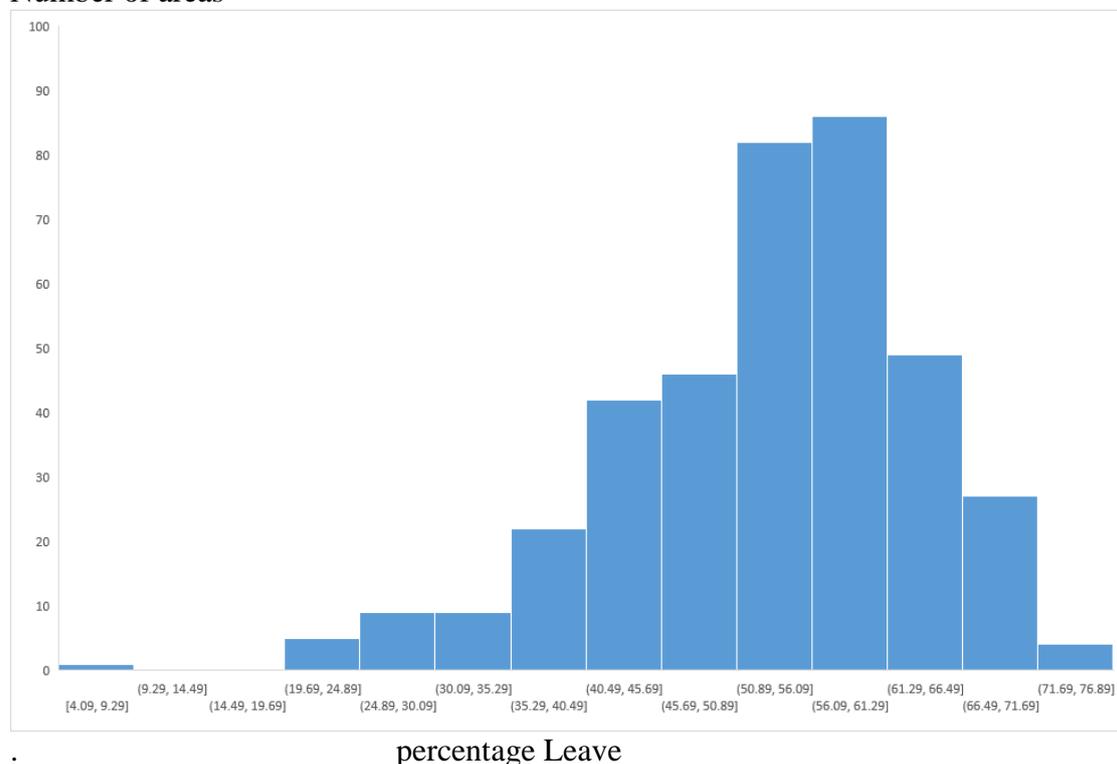
Note that in this section although we have been looking at variation between units we have not considered the geographical location of the units. This is what we turn to now in the following section.

6 Geography … perimeter profiles

We now consider the geographical aspect of the between-unit variation in voting percentages. Here the geography is studied using the notion of a perimeter profile. Typically the profile exhibits a combination of global single-peakedness and multiple local peaks, a fractal structure of peakedness. (There is a link here to Lewis Fry Richardson who noted the fractal structure of boundaries.)

First we consider the four nations and their capital cities: London, Cardiff, Edinburgh and Belfast. Looking at the nations, the dominant nation England has 53%. Defining nearness in terms of distance between capital cities, the nearest nation to England is Wales with 53% (slightly lower than England). The two nations which are farther away from England, Northern Ireland and Scotland, have much lower Leave percentages, 44% and 38% respectively.

One way of picturing the map is in terms of a perimeter. Going round the UK clockwise, one can start in England in the south, move on to Wales in the west, then up to Northern Ireland in the north-west and then Scotland in the North (and then back to England). A perimeter profile for the Leave percentage for the four nations can then be constructed. The profile is single-peaked. See Figure 3.

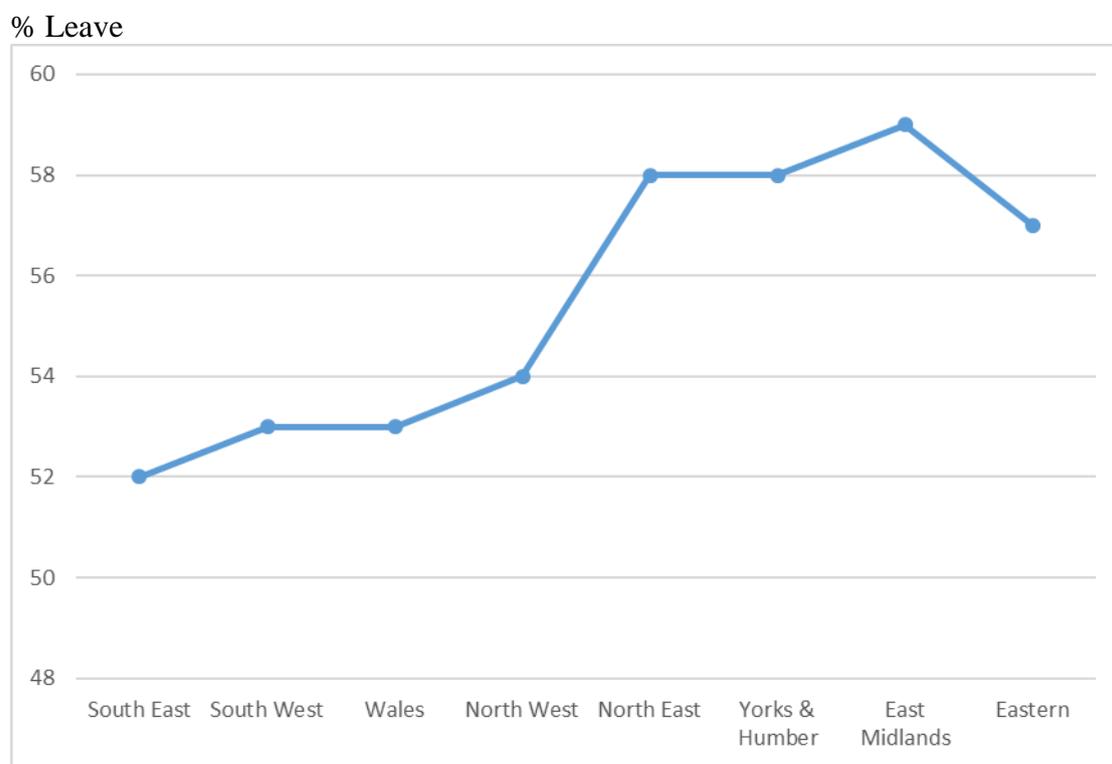**Figure 3** Perimeter profile for the Leave percentage for the four nations in the UK
% Leave
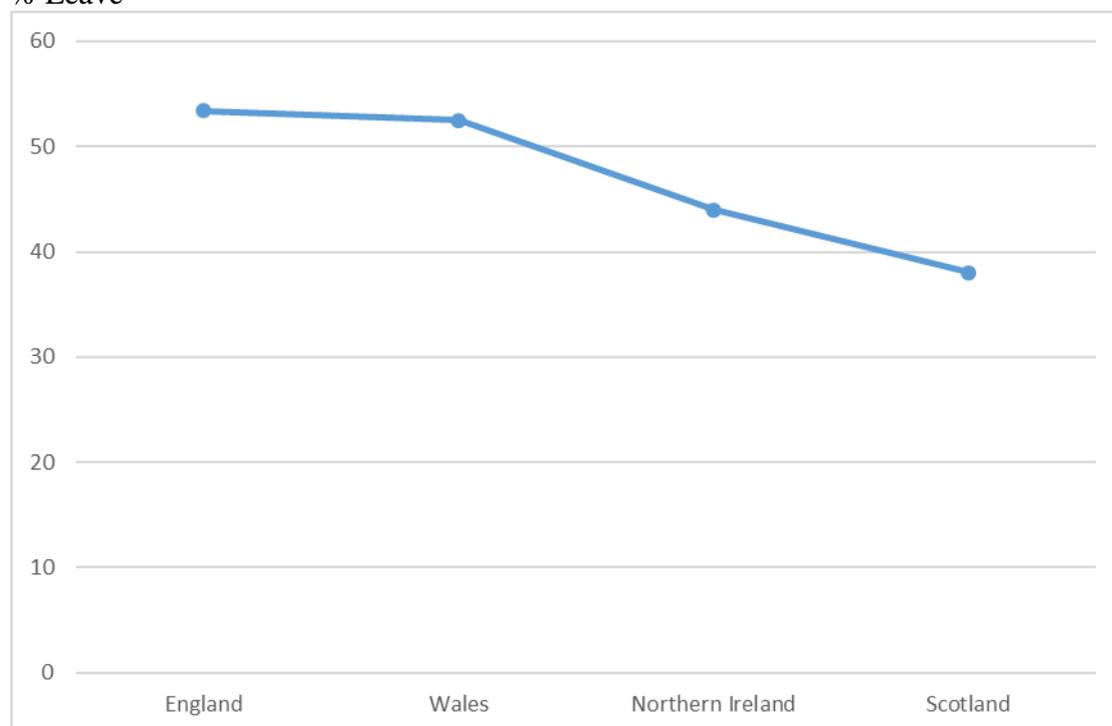
. coastal/border perimeter, clockwise from England to Scotland

Consider now the nine regions in England. The top four regions were West Midlands, East Midlands, North East England and Yorkshire & Humber with 59, 59, 58 and 58 respectively, forming a connected central spine of the country; East of England (below the spine) and North West England (above the spine) had 56 and 54 respectively; in the south (below the spine), South West had 53% and South East had 52%; and finally, sandwiched between the South East and the East of England, London had 40%. The English regions which are farther away from London have lower Leave percentages.

The perimeter profile for the Leave percentage for regions in England is single-peaked. (Not displayed, London 40% and West Midlands 59% are separate interior points). See Figure 4.
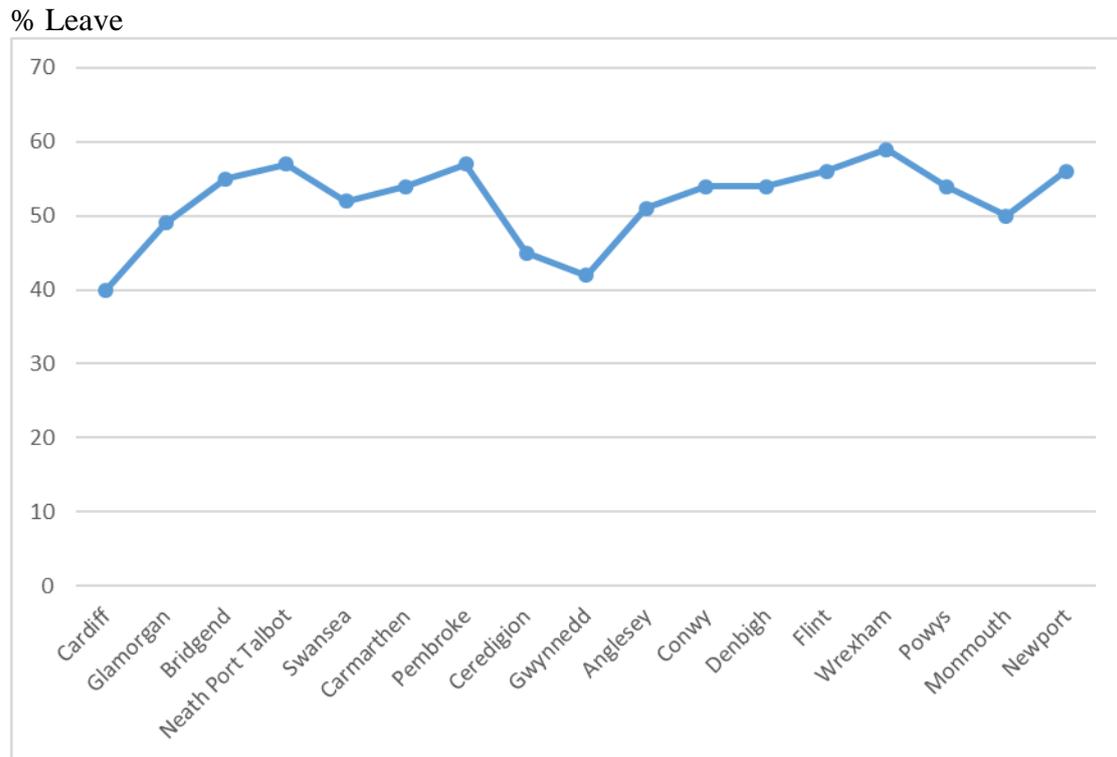
Figure 4 Perimeter profile for the Leave percentage for regions in England

% Leave

.   coastal/border perimeter, clockwise from South East to Eastern

The perimeter profile for the Leave percentage for areas in Wales exhibits a combination of global double-peakedness and multiple local peaks. The profile has four peaks and four troughs (Cardiff, Swansea, Ceredigion (Aberystwyth) with Gwynnedd (Bangor) and Monmouth). The troughs include the two major cities and the areas with two major university towns. (Not displayed, there are five connected interior points). See Figure 5.

Figure 5 Perimeter profile for the Leave percentage for areas in Wales

% Leave

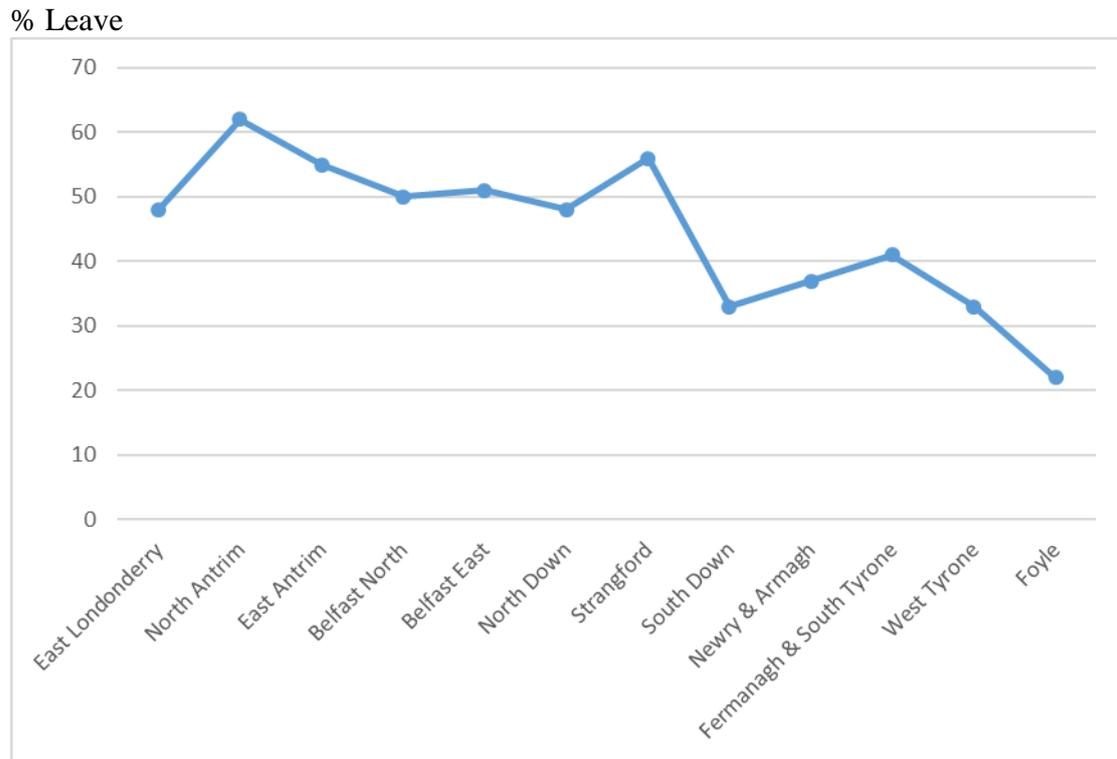.   coastal/border perimeter, clockwise from Cardiff to Newport

The perimeter profile for the Leave percentage for areas in Northern Ireland exhibits a combination of global single-peakedness and multiple local peaks. The profile has four peaks and four troughs. Percentage Leave is high on the north and east of the perimeter and low on the south and west. (Not displayed, there are six connected interior points). See Figure 6.

The perimeter profile for the Leave percentage for areas in Scotland exhibits a combination of global double-peakedness (?) and multiple local peaks. The profile has seven peaks (Midlothian, Dumfries & Galloway, North Ayrshire, Moray, Angus, and Clackmannan) and seven troughs (Edinburgh, East Lothian, Renfrew (Glasgow), Aberdeen, Perth & Kinross (next Dundee) and Stirling). More generally the more rural areas in the Borders in the south and the Highlands in the north are high and the cities in the central belt are low. (There are six connected interior areas and three offshore areas). See Figure 7.

The perimeter profiles for Wales and Scotland indicate that low Leave votes are associated with cities and towns, particularly university cities and towns. A similar situation exists in England as is demonstrated by the following listing of the lowest Leave areas in England. (The '.' indicates a London area and the 'x' indicates a non-London area.)

London Lambeth 21%, … Cambridge 26, … Oxford 30, … Brighton and Hove 31 … St Albans 37 … Bristol 38 … Manchester 40, South Cambridgeshire 40 … Winchester 41, Warwick 41, Waverley (next Guildford) 42, Liverpool 42, York 42,

Figure 6 Perimeter profile for the Leave percentage for areas in Northern Ireland

% Leave

. coastal/border perimeter, clockwise from East Londonderry to Foyle

Figure 7 Perimeter profile for the Leave percentage for areas in Scotland

% Leave
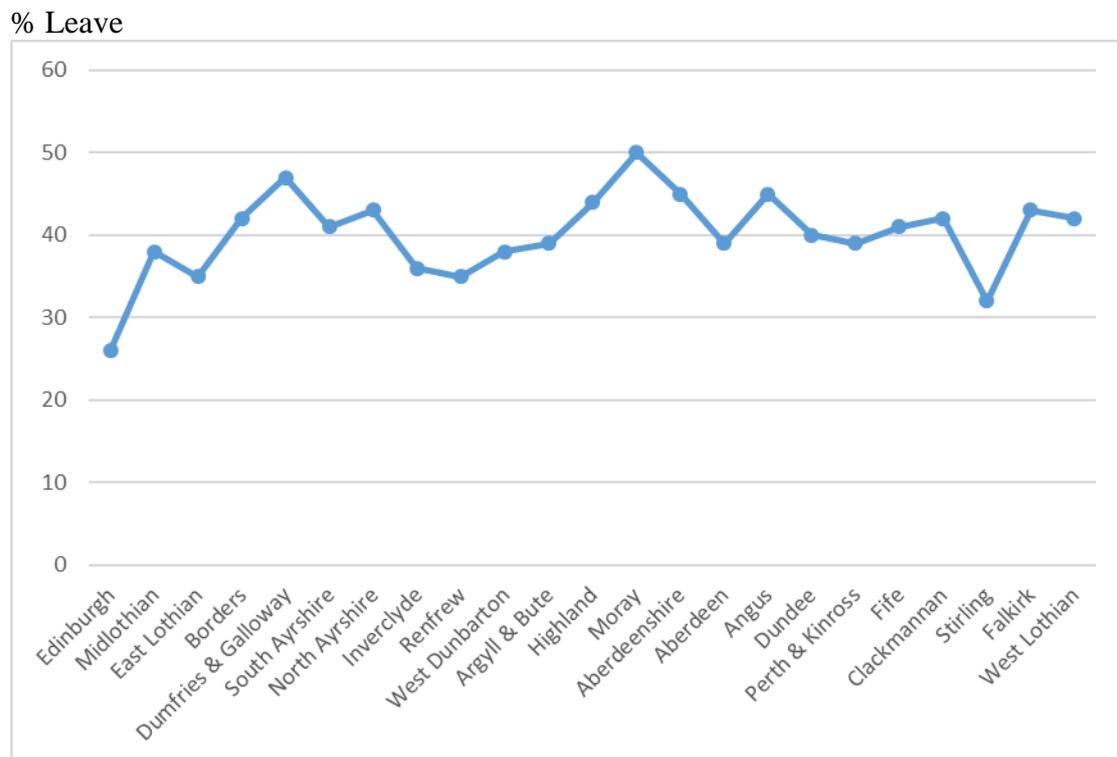
. coastal/border perimeter, clockwise from Edinburgh to West Lothian

Reading 42 Bath and North East Somerset 42, Trafford (next Manchester) 42, x x x x, Norwich 44, Cheltenham 44, Guildford 44, x .. Exeter 45, xxxxxxx Leicester 49, xxxx.. Newcastle 49, Leeds 50 … Birmingham 50, … Nottingham 51, … Sheffield 51, … Canterbury 51, Lancaster 51, … Colchester 54

The ten highest Leave areas are the rural areas around the Wash ('w' in the following list); Bolsover and Mansfield in the East Midlands; the coastal resort of Great Yarmouth; and Thurrock and Castel Point in the Thames estuary:

Boston w 76, South Holland w 74, Castle Point 73, Thurrock 72, Great Yarmouth 72, Fenland w 71, Mansfield, 71, Bolsover 71, East Lindsey w 71, NE Lincolnshire w 70.

7 Psychology and geography … openness relates to voting Remain

It so happens that the voting areas used in the referendum are the same as the areas used in a recent study of geographical variation in personality …

'The second part of Chapter 8 of the 2015 Yearbook (Burt, in preparation) is on psychology and geography and a range of important social variables. How do regions within the UK differ? How do the different variables relate to one another? 'Friendly Scots and grumpy Londoners' was typical of the superficial newspaper headlines, belying the depth of the actual study of 380 Local Authority Districts in the UK by Rentfrow and his colleagues. The pattern of results was similar to findings from previous research which looked at national differences or regional differences in the USA: personality traits are unevenly distributed geographically and this is associated with a range of important political, economic, social, health and demographic outcomes. Personality was assessed using the Big Five Inventory. In this chapter an analysis of the correlations at the individual and group level locates the Big Five along a continuum: from Agreeableness to Conscientiousness to Stability to Extraversion to Openness. The correlations for each of the Five had a single-peaked profile on the continuum. Likewise the correlations for each of twenty-four political, economic, social and health variables had a single-peaked or single-troughed profile on the continuum. This type of analysis of points in abstract space is further discussed in Chapter 14.'

Consistent with the preceding paragraph, the correlations for the Leave vote have a single-peaked profile on the personality continuum. Note that the correlations refer to differences between areas, not differences between individuals. See Figure 8. The Leave vote correlates +0.2 with Agreeableness, +0.3 with Conscientiousness, -0.2 with Stability, -0.4 with Extraversion and -0.7 with Openness. Thus Openness is the personality dimension most strongly related to the vote: Openness is associated with voting Remain.

The correlation between Leave and Openness of -0.7 is over all areas; this increases in magnitude to -0.8 for areas in England; and decreases to -0.6 for those areas in England which are not in London. In other words the inclusion of London boosts the magnitude of the relationship. Note that Rentfrow finds that openness is high in London.

Figure 8 Correlation with percentage Leave for the Big Five personality factors

Correlation with % Leave
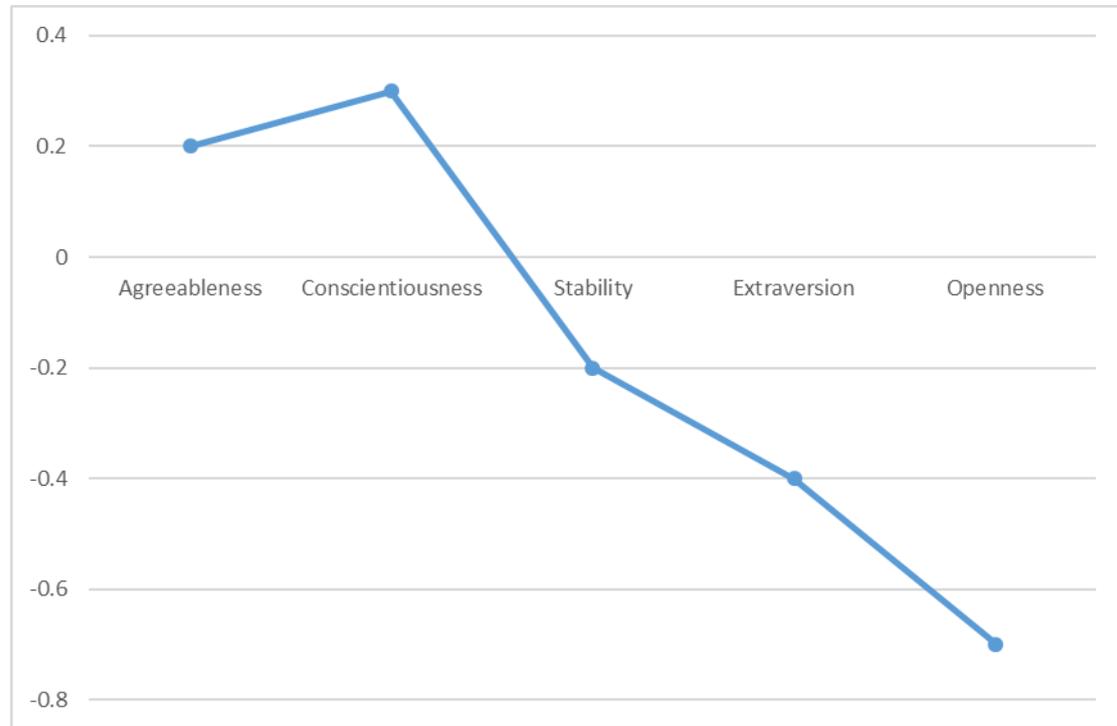
. ACSEO continuum

Rentfrow reports that Openness is highly correlated with a number of social variables: positively with the percentage in an area having a higher degree, having a same-sex partner, being foreign-born, voting Liberal Democrat; and negatively with being in a service or admin role had a high negative correlation. In my own analysis I was able to show that Rentfrow's twenty-four social variables can be located on the ACSEO continuum and exhibit either a strong single-peaked profile or a strong single-troughed profile. Figure 9 shows demonstrates the single-peakedness or single-troughedness for the six variables which correlate highly with Openness.

Figure 9 Social variables which correlate with Openness with largest magnitude

Correlation (decimal point suppressed)
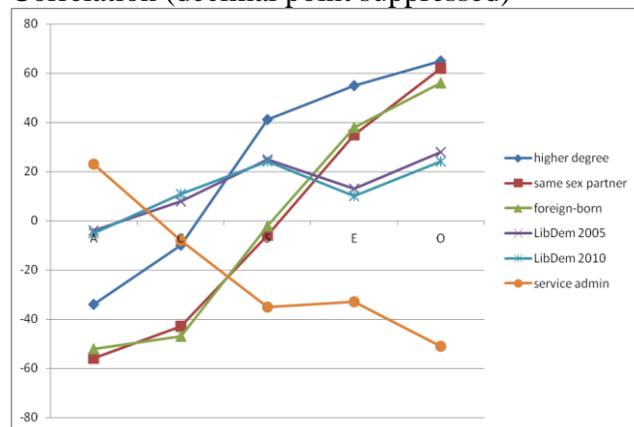

. ACSEO continuum

8 Voting Leave in political space

The 18 areas in Northern Ireland can be located as points in a two-dimensional political space on the basis of voting in the UK general election of 2015 (Burt, 2016b). The points form a circle. Support for each of the parties in 2015 tended to follow a cyclical pattern around the circle.

The points on the circle can be expressed as a list, the 'political circle list', starting from Belfast South on to Foyle … coming round to Belfast North and then back to Belfast South. In the first three constituencies SDLP was the winner in 2015; in the next four constituencies Sinn Fein was the winner in 2015; in the next two constituencies UUP was the winner in 2015; in the next seven constituencies DUP was the winner in 2015; then Independent was the winner in 2015; and finally back to DUP as winner in 2015.

The percentage Leave vote in 2016 also follows a cyclical pattern on the political circle list. See Figure x. Starting with 30% for Belfast South, it moves down to a low of 22% for Foyle, increasing fairly steadily to a high of 62% and then falling slightly ending with 50% for Belfast North; and, going back to the beginning, falling sharply with 30% for Belfast South. See Figure 10.

Figure 10 The cyclical pattern of the percentage Leave vote on the political circle list.

% Leave

.   political circle list
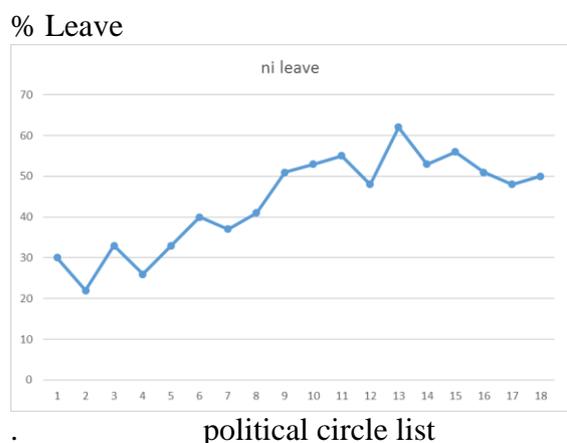
References

Curtice, John. (2016) Numbers tell a tale of two countries. The Times. June 25, p. 19. Source: Esci and Lord Ashcroft Polls.

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7 The world today: tension and volatility in a multi-level geopolitical structure
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11 The world economy: growth and inequality
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8 Social and psychological space - international and regional variation
9 Time: world history - social value, violence and population
10 Nigeria, Greece and Ireland: geography and one-dimensional political space
11 Northern Ireland: multidimensional political space and geography
12 The UK general election 2015: prelude and outcome
13 The aftermath: Jeremy Corbyn .., preference space and utility space
14 Time: UK general elections - 2010 to 2015; 1945 to 2015