

A New Agenda ... Values, World Society, Modelling

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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 2017

No. 42 B

Modelling the UK general election, 2017

1 The UK general election, 2017	2
Six headlines	2
The road to the election	2
Opinion polls, local elections and by-elections, May 2010 to June 2017	3
Front page headlines, April 17 th 2017 to June 7 th 2017	5
Front page headlines, June 8 th 2017	6
The exit poll: predicting what has just happened and what is just about to be known	7
The result: voters, MPs, prime minister, cabinet, accord	7
An election: changing roles and the rules for doing so	9
Aftermath: front page headlines, June 9 th 2017 to ...	10
The distribution of party votes: a stepped geometric series	10
Personality and voting: area comparisons	12
How social groups voted	12
The propensity to vote for a particular party	15
Geography ... the contour structure for voting Conservative	16
2 The change from 2015 to 2017	17
Volatility, 2015-2017	17
Changing distributions in political space	19
A gravitational model of flows in political space	22
3 Politics: values, society and modelling	29

1 The UK general election, 2017

Six headlines

March 16: “No Way to Govern”

April 19: “May heads for election landslide.”

May 6: “May on course for landslide. Conservatives inflict heavy losses on Labour and Ukip in local elections.”

May 31: “Shock poll predicts Tory losses.”

June 8: “Tories take seven-point lead in final poll.”

June 9: “May’s big gamble fails.”

Leading article. “No Way to Govern.” *The Times*, March 16, 2017: 33.

Elliott, Francis and Sam Coates. “May heads for election landslide.” *The Times*, April 19, 2017: 1.

Elliott, Francis and Sam Coates. “May on course for landslide. Conservatives inflict heavy losses on Labour and Ukip in local elections.” *The Times*, May 6, 2017: 1.

Coates, Sam. “Shock poll predicts Tory losses.” *The Times*, May 31, 2017: 1.

The Times. “Tories take seven-point lead in final poll.” *The Times*, [election supplement], June 8, 2017, 1.

Elliott, Francis and Sam Coates. “May’s big gamble fails.” *The Times*, June 9, 2017: 1.

The road to the election

The general election of 2010 replaced Gordon Brown’s Labour government with a coalition between David Cameron’s Conservatives and Nick Clegg’s Liberal Democrats. Partly to lock themselves into the coalition, the government introduced the Fixed-term Parliaments Act in 2011. It specified five-year parliaments and a requirement for parliamentary approval of any premature termination. The government duly ran its five-year course.

In 2015 David Cameron’s Conservatives won an unexpected absolute majority, albeit only a small majority of 12 seats. The five-year rule meant that parliament was scheduled to run from 2015 to 2020. Following a manifesto commitment, a referendum was held in June 2016 and the majority decided, contrary to the government’s preference, that the UK would leave the European Union. So Prime Minister David Cameron resigned as leader of the Conservative Party and Theresa May took his place as leader and prime minister, giving the assurance that the government would complete its full term of five years.

Almost a year later, the leading article in *The Times* on March 16th 2017 was headed “No Way to Govern”. It was prompted by the latest of several government U-turns in the face of pressure from the party’s own MPs. The article continued “... not having won an election herself, Mrs May feels wedded to [the 2015 manifesto]. If she wants more authority in the Commons [one option is] to get more [backbenchers] in an early general election.”

Leading article. “No Way to Govern.” *The Times*, March 16, 2017: 33.

A few days later there was speculation that Theresa May might call a snap election with pressure from Conservative MPs on the chief whip to change the PM's mind. "The party's headquarters is strengthening its resources to fight a campaign ... it was claimed yesterday that the Conservative Party chairman Patrick McLoughlin, the chief whip Gavin Williamson and the prime minister's private secretary George Hollingbery have talked about a May 4 ballot." "The party is appointing event managers, political advisers and voter communication volunteers ... prospective Tory MPs ... have been asked to update details ..." Andrew Gwynne, Labour's head of campaigns and elections told BBC's *Sunday Politics* that Labour would support an early election and had been making preparations for one.

Coates, Sam and Hannah McGrath. "Tory MPs pile on pressure for snap election." *The Times*, March 18, 2017: 2.
Wright, Oliver. "Labour on election footing as Tories press for early poll." *The Times*, March 20, 2017: 4.

On 18th April 2017, UK Prime Minister Theresa May 'unexpectedly' announced that the government would put an Enabling Bill to parliament proposing that a general election be held on 8th June 2017. The Bill was duly passed, having receiving support from opposition parties as well as the ruling party. Thus the government that had been due to run from 2015 to 2020 would run for only the first two of its scheduled five years. On several occasions Theresa May had said that the government would complete its full term of five years. So what had happened to make her change her mind? She explained that she needed a fresh mandate to give her strength in the negotiations of Brexit. Her critics accused her of political opportunism and said that the real reason was the destruction of the opposition Labour Party which were polling at 25% to the Conservative Party's 43%.

Opinion polls, local elections and by-elections, May 2010 to June 2017

The opinion polls in the period between the election of 2010 and the election of 2015 had been characterised by the Conservatives having a typical government decline and recovery; Labour having a typical opposition party rise and fall; Lib Dems having an early sudden large fall; and UKIP showing a steady substantial increase.

The subsequent period from the general election in May 2015 to the Brexit referendum in June 2016 showed UKIP on a further rising trend and the Conservatives somewhat down; and the other parties staying much the same.

The following period from the Brexit referendum in June 2016 to the announcement of the election in April 2017 showed a large increase in the Conservatives and a modest increase in the Lib Dems; and a large fall in UKIP and a moderate fall in Labour. The first and third rows of Table 1 below contrast the opinion polls in May 2015 and April 2017: the Conservatives are up 9% and Labour is down 8%

In the course of the campaign, between the announcement in April and election day in June, the opinion polls registered 'a return to two-party politics' with substantial steadily increasing support for Labour; the Conservatives had a fair increase then a decline; UKIP had a further sharp decline; and Lib Dems and Greens had a moderate decline.

Ford, Robert. "The polls tighten." *The Observer*, June 4, 2017: 17.

The first few weeks of the campaign coincided with the lead-up to the local elections on May 6th. May 6th marked a high point for the Conservatives, with the poll of polls just short of 50%. The local elections were held in only the more Conservative parts of England. Conservatives took control of 28 councils, Labour 9 councils. Conservatives won 1899 seats, Labour 1152 seats. This set of local councils had had elections four years previously in 2013 and the change between 2013 and 2017 was a gain by the Conservatives of 11 councils and 563 seats and a gain by Plaid Cymru of 33 seats; and losses of seats by Labour (-382 seats), UKIP (-145 seats), Lib Dems (-42 seats).

The Times. “Results point to landslide, say experts. [local election results ... projected national share figures, compiled by the BBC].” *The Times*, May 6, 2017: 6-7.

The Times. [Local election results.] *The Times*, May 6, 2017: 6-7.

The Times. “Poll of polls.” *The Times*, May 6, 2017: 8.

On the morning of election day, 8th June 2017, the poll of polls, a 14-day rolling average, showed Conservatives on 44% and Labour on 37%. More up-to-date but less stable individual polls put the Conservative lead at 7%, 10% or 12%, which might translate into a Conservative majority of 50 or 100 seats. “Sources from the two main political parties believe that the Conservatives will do significantly better [than 50 seats], with both suggesting a majority of more than 80 seats.”

Coates, Sam and Francis Elliott “Tory lead grows in election’s final poll.” *The Times*, June 8, 2017: 1.

Table 1 Opinion polls and local elections, May 2015 and April-June 2017

.	Cons	Lab	UKIP	LibD	SNP	Green	Other
7 May 2015	34	33	13	9	-	5	6
[May 2016	30	31	12	15	national predictions based on local election]		
18 April 2017	43	25	11	10	5	4	3
6 May 2017	48	28	7	10	-	4	6
[6 May 2017	38	27	5	18	national predictions based on local election]		
8 June 2017	44	37	4	8	-	2	6

Poll of polls, *The Times*, May 7, 2015

https://en.wikipedia.org/wiki/United_Kingdom_local_elections,_2016

The Times. “Poll of polls.” *The Times*, April 19, 2017: 9.

The Times. “Poll of polls.” *The Times*, May 6, 2017: 8.

The Times. “Results point to landslide, say experts. [local election results ... projected national share figures, compiled by the BBC].” *The Times*, May 6, 2017: 6.

Chorley, Matt. “Red box election countdown.” Poll of polls, 14-day rolling average *The Times*, June 8, 2017: 16.

Source: UK Polling Report. <http://ukpollingreport.co.uk/>

During this period, there were ten by-elections (between December 2015 and February 2017): six Labour holds, two Conservative holds, one Lib Dem gain and one Conservative gain. By-election swings were mostly positive for Lib Dems and mostly negative for other parties. In particular there was no indication of an improvement in the popularity of the Labour party.

<http://www.parliament.uk/about/how/elections-and-voting/by-elections/by-elections-since-2015-general-election/>
[https://en.wikipedia.org/wiki/List_of_United_Kingdom_by-elections_\(2010%E2%80%93present\)](https://en.wikipedia.org/wiki/List_of_United_Kingdom_by-elections_(2010%E2%80%93present))

Table 2 By-election swings, May 2015 and April-June 2017

	Cons	Lab	UKIP	LibD	Green	PC/[other]	
3 December 2015	-9.6	+7.3	+2.8	0	-1.0	-	Oldham, WR
5 May 2016	-5.4	+5.9	-2.2	+1.6	-0.1	-	Sheffield, BH
5 May 2016, Og	-3.3	-0.3	+1.2	-	-	+5.6	Ogmore
16 June 2016	-5.8	+8.7	-1.3	-1.4	-1.5	-	Tooting
20 October 2016	-	Tracy Brabin	-	-	-	-	Batley & Spen
20 October 2016	-15.2	-2.2	-5.7	+23.4	-1.6	-	Witney
1 December 2016	[-13.1]	-8.7	-	+30.4	-	-	Richmond Park
8 December 2016	-2.7	-7.1	-2.2	+5.3	-	[+3.6]	Sleaford & NH
23 February 2017	+8.5	-4.9	-9.0	+3.8	-1.3	-	Copeland
23 February 2017	+1.8	-2.2	+2.1	+5.7	-2.2	-	Stoke Central
no. of increases	2	3	3	6	0	2	
no. of decreases	7	6	5	0	6	0	

Front page headlines, April 17th 2017 to June 7th 2017

April

[17 North Korea defiant as US ramps up pressure]

[18 Europe fears Turkey will renege on migrant deal]

19 May heads for election landslide

20 May forced to weaken key targets on migrants

[21 Britain told to keep EU laws]

[22 Trump puts EU ahead of Britain in trade queue]

23

24 No 10 uses poll excuse to delay diesel curbs

25 Communists come out for Corbyn in historic move

26 Ministers urge May to bury Johnson during election campaign

[27 Drug giants threaten to quit Britain]

[28 Hit internet giants over danger to child safety]

[29 Isis suspect seized in raid]

30

May

1 May renews threat to walk away from EU without a deal

2 Juncker: Brexit talks are likely to collapse

3 You can't lead Brexit talks, EU tells May

4 Brussels is meddling in our election, warns May

5 -

6 May on course for landslide

- 7
- 8 -
- 9 May faces backlash over energy price cap
- 10 May pledges new vote on foxhunting
- 11 Cracks widen between chancellor and No 10
- 12 Labour fights civil war over hard-left manifesto
- 13 -
- 14 Millionaire Brexit donor targets 140 Remain MPs [Observer]
- 15 May gives all workers new rights to time off
- 16 -
- 17 Labour's tax raid in tatters
- 18 Thousands hit by new care costs
- 19 Mainstream May reaches out to Labour heartlands
- 20 Tough new controls for web giants
- 21 May's school meals plan 'to hit 900,000 poor children' [Observer]
- 22 Care crisis threatens to scupper May reform
- 23 pensioners to pay for May's social care U-turn
- 24 [Libya terror link]
- 25 [MI5 was warned]
- 26 Tory lead cut to five points as Corbyn closes in on May
- 27 [UK home to 23,000 jihadists]
- 28
- 29 [Power to ban UK jihadists has been used 'just once']
- 30 May woos working class with tough line on Brexit
- 31 Shock poll predicts Tory losses
- June
- 1 Have faith in me: May fights back with Brexit
- 2 We will use SNP to give us power, says Labour
- 3 ['Myths' by Muslims hit anti-terror campaign]
- 4 Labour pledges VAT cut to help lower-income families [Observer]
- 5 Massacre in the market
- 6 [London attacker linked to 7/7 bombing suspect]
- 7 [MI5 was warned attacker wanted to be a terrorist]

Front page headlines, June 8th 2017

Tezza vs. Jezza. Which one has the Brexit flavour for you? *Daily Star*.

We've had enough of Jezza's rubbish. VOTE TORY.

Don't chuck Britain in the COR-BIN.

terrorists' friend; useless on Brexit; destroyer of jobs; enemy of business; massive tax hikes; puppet of unions; nuclear surrender; ruinous spending; open immigration; Marxist extremist. *The Sun*.

Vote for May today. PM: the future of our country depends on it. *Daily Express*.

Let's reignite British spirit. Theresa's rallying cry as she warns Corbyn will tax your work, your garden, your home and your inheritance. *Daily Mail*.

Your country needs you. Back me if you believe in Britain says May in final appeal to nation. Corbyn would not be allowed into security services. So he's not fit for No. 10. *Daily Telegraph*.

Tories take seven-point lead in final poll. *The Times*.

X marks the spot As Britain goes to the polls, eight leaders make a final appeal for support. *I*.

Corbyn and May make last pitch for votes after bruising campaign. *The Guardian*.

Lies, damned lies and Theresa May. Don't condemn Britain to five more years of Tory broken promises. *Daily Mirror*.

The exit poll: predicting what has just happened and what is just about to be known

The polling stations closed at 10pm on Thursday 8th June 2017. At 10pm the BBC reported the result of the exit poll. A shock! It predicted a hung parliament: the Conservatives would win 314 seats, falling short of the 326 needed for an absolute majority. Conservatives would have 43% of the vote (1% more than in the final poll of polls in Table 1 above) and Labour 41% - 4% more than in the final poll of polls.

Later it was to turn out that the exit poll was accurate. How did it manage to be accurate while all the other polls were adrift? An important reason is that whereas the other polls were asking people how they would vote assuming they would vote days in advance, in contrast the exit poll was asking those who had voted just a few minutes earlier how they had voted. Also the exit poll took a large sample and was less exposed to sampling bias. Matt Singh provides a very useful account.

Singh, Matt. "What are exit polls and are they reliable? In the past 25 years, the largest party's total has never been wrong by more than 15 seats." *Financial Times*, June 8, 2017.

<https://www.ft.com/content/0e38ae9e-4a16-11e7-a3f4-c742b9791d43?mhq5j=e1>

It is worth noting too that the exit poll is a tribute to the impatience of society. The television companies, newspapers and their audiences were unwilling to wait the twelve hours until the actual result would be known.

The result: voters, MPs, prime minister, cabinet, accord

The final result was very close to that predicted in the exit poll – and hence somewhat adrift from the pre-election-day opinion polls. Conservatives won 314 seats, falling short of the 326 needed for an absolute majority. So there was a hung parliament. Conservatives had 42% of the vote (somewhat less than the poll of polls in Table 1 above) and Labour 40% - substantially more than in the poll of polls. See Table 3.

Table 4 shows how the political system allocates political power on the basis of the results. It gives the percentage votes and the percentage seats for the parties, and also the seat/vote percentage ratios. The vote-to-seat system has a small bias in favour of the Conservatives and a large bias in favour of the Scottish and the two largest

Table 3 UK general election, 2017: final poll of polls (8 June 2017); exit polls; actual votes

	Cons	Lab	UKIP	LibD	SNP	Green	Other
8 June 2017	44	37	4	8	-	2	6
exit poll	43	41					
actual votes	42.4	40.0	1.8	7.4	3.0	1.6	

<http://www.telegraph.co.uk/news/2017/06/08/general-election-exit-poll-accurate-could/>
<https://yougov.co.uk/results/>

Northern Ireland parties. The vote-to-seat system is fair towards Labour and Plaid Cymru: the vote and seat percentages are the same. The vote-to-seat system is strongly biased against UKIP and the Greens – and to a lesser extent against the two smaller Northern Ireland parties.

The seat-to-government system is 100% biased in favour of the winning party who gain monopoly control over the roles of prime minister and, by the prime minister's choice, the cabinet. This is somewhat diluted because the government does not have a majority of the seats and has struggled to reach an accord with the Ulster Unionists.

Turnout was 68.7%.

Table 4 Power allocation, UK 2017: votes, seats, vote-seat ratio, prime minister, cabinet, accord

	votes %	seats %	seat/vote ratio	PM	cabinet	accord	Lords
Conservative	42.4	48.9	1.15	100	100	*	32
Labour	40.0	40.3	1.01				25
Liberal Democrat	7.4	1.8	0.25				13
SNP	3.0	5.4	1.79				
UKIP	1.8	0.0	0				
Green	1.6	0.2	0.10				
Democratic Unionist Party	0.9	1.5	1.71				
Sinn Fein	0.7	1.1	1.54				
Plaid Cymru	0.5	0.6	1.00				
Ulster Unionist Party	0.3	0.0	0			*	
SDLP	0.3	0.0	0				
Other	1.2	0.0					30
Total	100	100					100
Turnout	68.7%						

Note: 'Other Lords': crossbenchers 22%, non-affiliated 4%, bishops 3%, other 2%

<http://www.bbc.co.uk/news/election/2017/results>

https://en.wikipedia.org/wiki/United_Kingdom_general_election,_2017

<http://www.parliament.uk/mps-lords-and-offices/lords/composition-of-the-lords/>

It is common to think of a one-dimensional political space, the Left-Right political continuum with Liberal Democrats in the centre. Here, in terms of the vote, Liberal Democrats have a minority to the left of them: the combination of Labour, SNP, Green, Sinn Fein and half of 'other' had 46.6% of votes. The Liberal Democrats also have a minority to the right of them: the combination of Conservatives, UKIP, UKIP, DUP, UUP and half of 'other' had 46% of votes. So the median voter was Liberal

Democrat. So, making the assumptions of the median voter theorem, the Liberal Democrats might be thought of as the Condorcet winners. However, in terms of seats, the combined percentage for Conservatives, UKIP and DUP is 51.4%. Taking the DUP to be to the right of the Conservatives, the median MP is Conservative. In terms of seats the Conservatives might be thought of as the Condorcet winners.

An election: changing roles and the rules for doing so

We can think of society as a structure of activities. Politics is an activity involving a variety of roles and an election is the activity of changing roles. Such changes can occur at other times but a general election is a time of maximum widespread change. The calling of an election is itself an activity. A UK general election involves: changing governing party, changing prime minister, ministers, changing party leaders, changing MPs, changing associated roles. In 2017:

changing MPs

There are many new MPs including reinstated MPs and many existing MPs cease to be MPs. The media note changes involving the 'big names'. The failing to be re-elected: ministers, former Lib Dem leader Nick Clegg, SNP former leader Alex Salmond and SNP leader in the House, UKIP leader Paul Nuttall

changing parties

UKIP and Northern Ireland's UUP and SDLP are now no longer represented.

changing governing party

There is a 'hung parliament': there is now no longer any party with an overall majority. The same situation had occurred in 2010. It was not clear at that time what should happen in such a system and to a rule book was established by the civil service to suggest a procedure.

Hung parliament Peter Hennessey, Gus Macdonald

<http://www.newstatesman.com/politics/june2017/2017/06/election-2017-what-happens-if-theres-hung-parliament>
<https://www.civilserviceworld.com/articles/interview/people-need-be-ready-longer-coalition-talks-peter-hennessey-interviews-former>
<https://www.gov.uk/government/publications/cabinet-manual>

There is now no longer a majority Conservative government. The Conservatives have had intensive discussions with Northern Ireland's DUP about the conditions for the DUP's support for a Conservative minority government.

changing prime minister

a change of governing party leads to a change in prime minister.

changing

party leaders

A party leader's position is affected by the results. Labour's Jeremy Corbyn was very much strengthened. Having so dramatically failed to gain the expected landslide the Conservative's Theresa May was considerably weakened:

If a party does poorly in the election, the party leader may change. UKIP's Paul Nuttall resigned. The resignation of Theresa May was considered.

changing ministers,

changing associated roles
Theresa May's advisers resigned.

Aftermath: front page headlines, June 9th 2017 to

June

8 Tories take seven-point lead in final poll

9 May's big gamble fails

10 May stares into the abyss

May fights to remain PM [Daily Telegraph]

From hubris to humiliation [Guardian]

10/11 May clings to power as new front opens in Brexit battle [FT]

11 Down and out? ... political breakdown. Five cabinet ministers urge Boris to topple May. As Churchill said, a bad leader must be poleaxed ... [Sunday Times]

[Sunday Telegraph]

May's premiership in peril [Observer]

12 May signals soft Brexit in cabinet reshuffle

13 Austerity is over, May Tells Tories

14 Drop Brexit trade plan, Hammond tells Tories

15 [Disaster in 15 minutes]

16 Corbyn: seize properties of the rich for Grenfell homeless

17 May takes cover

18 Big business leaders press PM to rethink hard Brexit [Observer]

19 Hammond sinks knife into May for 'mistakes'

20 [Jobless 'lone wolf' held over attack on mosque]

21 DUP threat to walk out from talks with Tories

22 May facing revolt over Brexit laws

23 May says 3m citizens can stay in Britain

24 [Manchester killer used YouTube to build bomb.]

25 'Back soft Brexit', unions tell Labour

26 May aims to throw out EU inmates after Brexit

27 May buys DUP support with £1 billion 'bung'

28 May's top team splits over Brexit

The distribution of party votes: a stepped geometric series

What is the nature of the distribution of votes between parties? Commonly in elections there are a few large parties and many small parties. The results in 2017 followed this pattern with two large parties having much the same percentage of the vote and the third party having a much smaller percentage and the other parties having a gradually decreasing share.

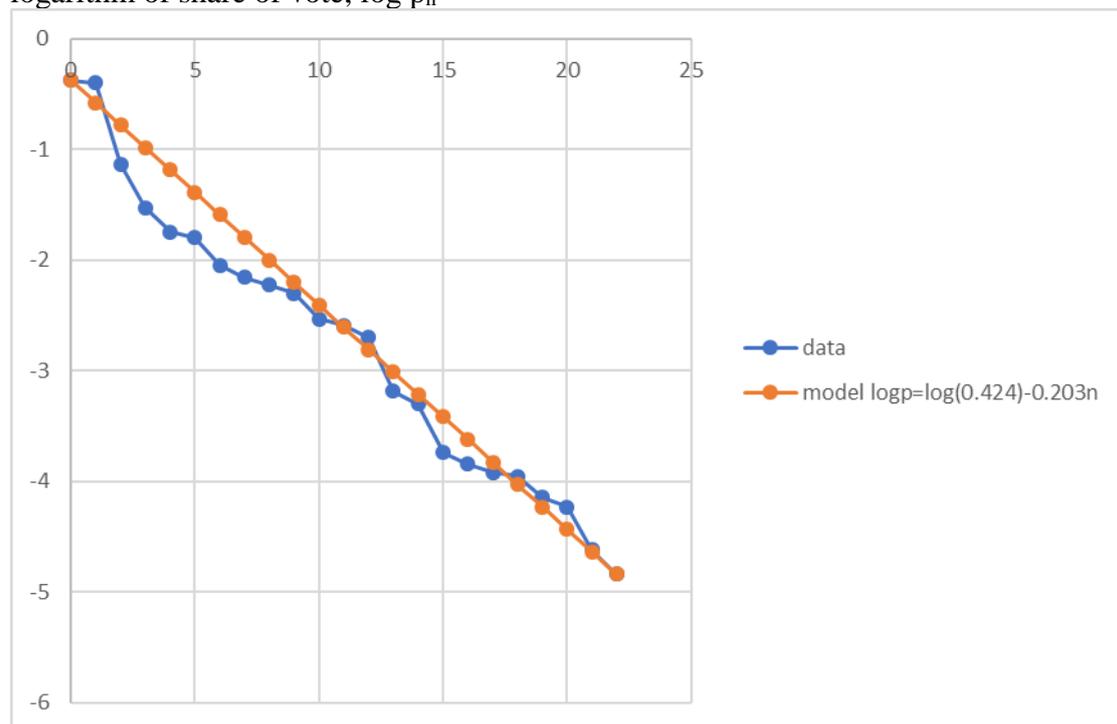
How might we characterise the distribution mathematically? Burt (2017) supposes that party votes follow a geometric series distribution. In this model the largest party has some share p of the vote and the next largest party has a share r of the remainder, and similarly for the next again largest party, and so on. Under certain assumptions $r=(1-p)$. The vote in Scotland in 2015 was very close to this with $p=r=50\%$. In other cases the geometric series distribution is not followed but still provides a useful standard model of comparison with deviations from the model being noted. Here we propose a stepped geometric series model.

[In what follows we adopt a different approach to selecting a value of r for the model. We take r to be the geometric mean r^\wedge of the r_i where $r_i=p_{i+1}/p_i$. In a geometric series r_i is constant and so $r^\wedge=r$. In general the value of r^\wedge is given by $\log r^\wedge=(\log p_N-\log p_0)/N$. The model then becomes $\log p_n=\log p_0+n \log r^\wedge$. Logarithms to the power 10 are used for ease of interpretation.]

The BBC listed 21 parties and also a category labelled ‘other’ which had 0.6% of the vote and one MP. Figure x presents the distribution of votes in the UK general election in 2017 and compares this with a geometric series model with $a=0.424$, $r=0.627$ (the 42.4% gained by the largest party, the Conservatives): $p_n=0.43(0.57)^n$; $\log(p_n)=\log(0.43)+n \log(0.57)$. There is quite a good fit for the later smaller parties but (after indicating an above-the-line vote for second-placed Labour) the first part of the series drops away sharply for the Liberal Democrats and SNP and then gradually returns to the line for the model. The curve shows some fluctuation between steep and shallow descent, suggestive of steps. The top step has Conservative and Labour.

Figure 1 Shares of the vote, UK 2017, $p_n=0.424(0.627)^n$

logarithm of share of vote, $\log p_n$



parties in order, n, of decreasing share of the vote, starting n=0

Personality and voting: area comparisons

Does the *mean* personality of an area relate to the *percentage* vote in that area? Yes it does. A recent study of geographical variation in personality looked at the personality in 380 Local Authority Districts and related that to a variety of social variables, including voting behaviour in 2005 and 2010. An area's percentage Conservative vote has positive correlations with the area's Conscientiousness and Stability, whereas an area's percentage Labour vote has negative correlations with the area's Conscientiousness and Stability. An area's percentage Lib Dem vote has positive correlations with the area's Openness and Stability.

Linking this with the referendum vote in 2016 we can now ask: does the mean personality of an area relate to the percentage Remain/Leave vote in that area? Yes it does. Openness is the personality dimension most strongly related to the vote. There is a correlation of 0.7 between the Openness in an area and the percentage voting Remain in that area. In other words Leave relates to the *lack* of Openness. 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. Note that the correlations refer to differences between areas, not differences between individuals.

How social groups voted

Age has a very strong link to voting. Figure 2 shows the almost exact linear relationship between age and vote. Older people are more likely to vote Conservative and less likely to vote Labour.

$$\begin{aligned} \% \text{ Conservative} &= \text{age} - 5 \\ \% \text{ Labour} &= 90 - \text{age} \end{aligned}$$

Note: in the survey Conservatives had 44% and Labour had 41%. In the figure the age is taken as the mid-point of the range, for example 55 for the option 50-59.

Table 5 considers the percentage vote for the Conservatives in various categories of social group. In some categories, different social groups vary only a little in their Conservative vote. For example in relation to the sex category there is almost no difference between the percentage of men voting Conservative and the percentage of women voting Conservative: 45% as opposed to 43%, a range of just 2%. In other categories, different social groups vary a lot in their Conservative vote. For example in relation to the newspaper readership category there is a large difference between the percentage of Daily Telegraph readers voting Conservative and the percentage of Guardian readers voting Conservative: 79% as opposed to 8%, a range of 71%.

The list of categories in order of increasing range is: sex, class, job sector, home, education, work, nation, age and media (newspaper readership). The most Conservative groups in each category are: male, C2 (and AB), private sector, home-owning, low education, retired, in England, over 70 and reading the Daily Telegraph. The least Conservative groups in each category are: female, C1 and DE, public sector, neither owner nor renting, high education, student, in Northern Ireland, 18 to 19 years old and reading the Guardian. The largest range is for newspaper readership but that

Table 5 The percentage Conservative vote in different categories of social group

.	gender	class	sector	home	educ	work	nation	age	media
% range	2	6	11	21	23	44	45	50	71
Daily Telegraph									79
70+								69	
Retired						63			
Low education					55				
Owner				53					
Private sector			50						
C2		47							
AB		46							
England							45.6		
Medium educ.					45				
Male	45								
Female	43								
C1		41							
DE		41							
Part-time						40			
Full-time						39			
Public sector			39						
Not working						36			
Wales							33.6		
Rent				32					
Neither owner/rent				32					
High educ.					32				
Scotland							28.6		
Unemployed						28			
Student						19			
18-19								19	
Guardian									8
Northern Ireland							0.5		

only relates to half the population (55%). The next largest range is for age and the age effect is implicit in some of the other categories such as home, education and work. The low range for social class contrasts with the strong but declining class effect in earlier decades.

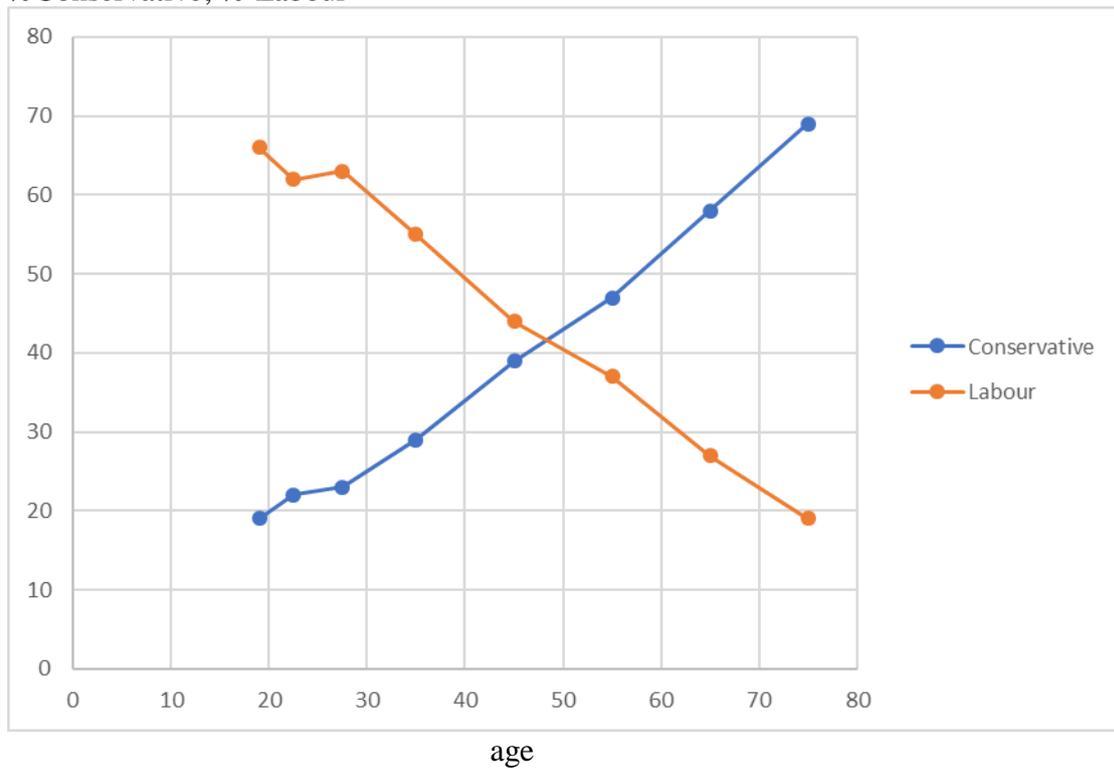
Table 6 below compares the range in the Conservative vote with the range in the labour vote for different categories of social group. The ranges are almost identical. As one would expect the source tables in the YouGov survey show that the relationships are reversed: high-vote Conservative social groups are low-vote Labour social groups and vice-versa.

Table 6 The range in Conservative and Labour vote in different categories of social group

.	gender	class	sector	home	educ	work	nation	age	media
Cons.: % range	2	6	11	21	23	44	45	50	71
Labour: % range	4	6	10	20	16	40	49	47	61

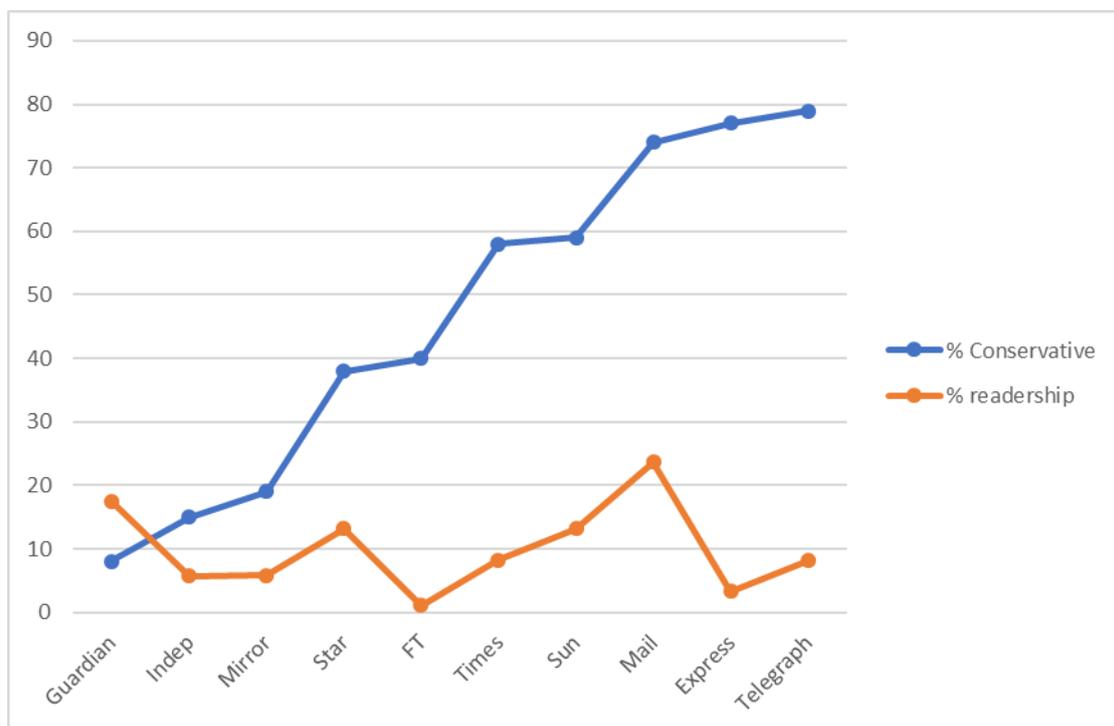
Figure 2 Conservative and Labour vote as a function of age

% Conservative; % Labour



Newspaper readership has a very strong link to voting. Figure 3 shows the percentage Conservative vote for the readership of each newspaper and also the percentage of the

Figure 3 Newspapers: percentage Conservative vote and share of readership



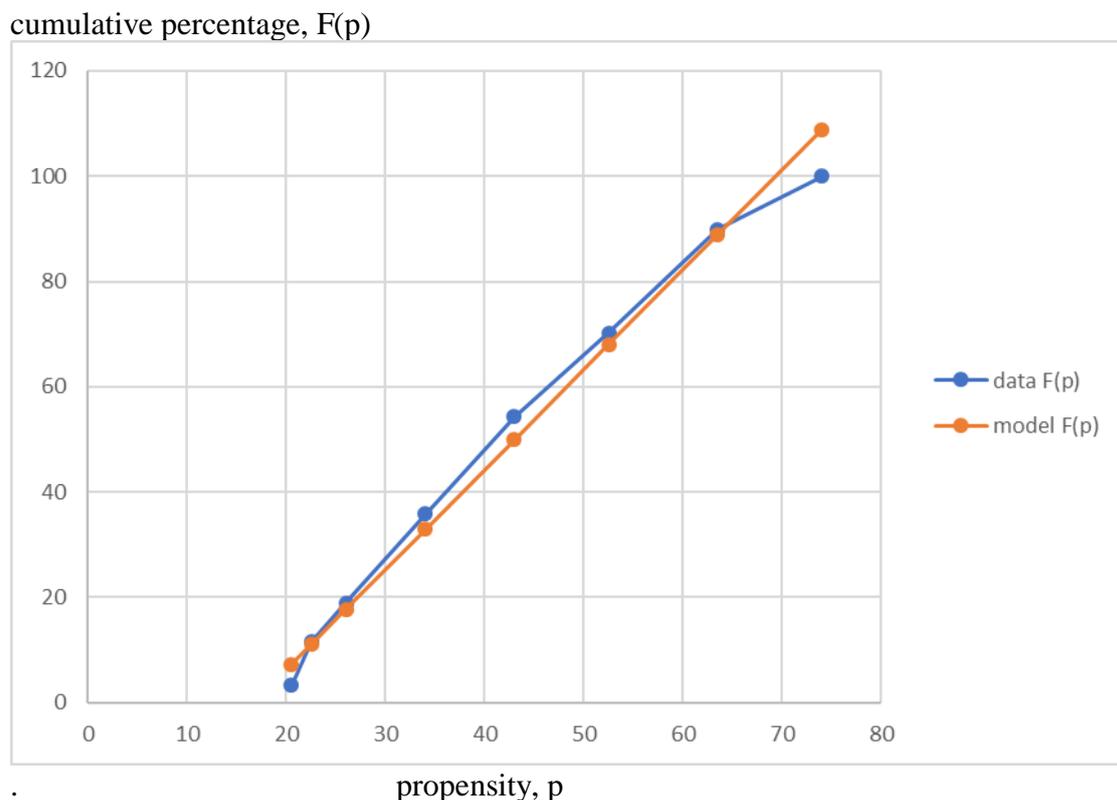
newspaper readers who read that particular paper. It might be said that each newspaper has a niche in a one-dimensional political space and the niches are fairly equally spaced along the political continuum. The location on the continuum is consistent with the front-page headlines on election day reported in an earlier section. Note that half the sample reported readership of a newspaper (55%).

The propensity to vote for a particular party

In the survey, 44% of the people voted Conservative. This of course reflects how individual people voted: some individuals voted Conservative and others did not. We would now like to think of this in terms of propensities. We think of an action as the expression (or ‘realisation’) of a probability, namely the propensity to take that action. Each individual has a propensity and a population of individuals have a distribution of propensities. Our expectation is that the mean of the propensities is close to the percentage of the population taking the action. So, here, we think the mean of the propensities is close to 44% ($p=0.44$).

What distribution of propensities might give a mean propensity of 0.44? A simple case would be if every individual has a propensity of 0.44. (Somewhat similar to every coin having a propensity of 0.5 for landing heads.) Another simple case would be if each individual had a propensity of 0 or 1. (Somewhat similar to each existing individual having a propensity of 0 or 1 for being male.) Another case would be a uniform distribution over some interval centred on the mean: if the mean is p^* then the distribution $f(p)=1/2a$ over the interval $[p^*-a, p^*+a]$. For example $f(p)=1/2p^*$ over

Figure 4 The cumulative distribution for the Conservative vote for different age groups



the interval $[0, 2p^*]$; or $f(p) = 1/2p^*$ over the interval $[100 - 2p^*, 100]$. Note that a uniform distribution has a linear cumulative distribution.

See Figure 4 above. The data on age and voting provides some insight into the distribution of propensities. Figure x plots the cumulative distribution for the Conservative vote for different age groups against the Conservative percentage propensity p . The distribution is almost linear and approximates to:

$$F(p) = 1.9 p - 31.7$$

This represents a uniform distribution $f(p) = 1/0.526$ over the range $[16.7, 69.3]$ with mid-point 43.

Geography ... the contour structure for voting Conservative

We now consider geography. We divide the country into areas and note which areas are adjacent to one another, thus giving a network of areas. We do this for the four nations; and for the nine regions in England. We then consider the voting in these areas and identify the 'contour structure' for voting Conservative.

The network map of nations is shown in Figure 5. The network map of nations and regions is shown in Figure 6.

Figure 5 The network map of nations

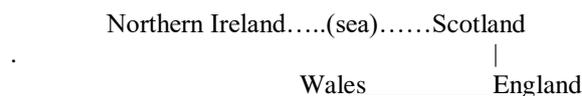
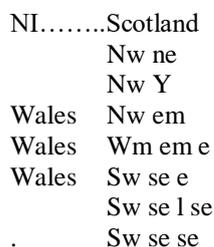


Figure 6 The network map of nations and regions



We now consider the percentage Conservative seats, $x\%$. We refer to this as the contour level x – by analogy with the contours of height above sea level in the maps of physical geography. First consider the level $x = 50\%$. We refer to this as the Conservative seat majority contour. This partitions the country into two sets: a set A of areas equal to or above 50%; and a set B of areas below 50%. Finally we identify connected subsets in A and in B.

Doing this for the four nations we obtain the following. The set A consists of England, with a Conservative seat majority. The set B consists of Wales, Scotland and

Northern Ireland, not with a Conservative seat majority. The set B is two separate subsets of connected nations, Scotland & Northern Ireland are connected and in one subset; and Wales is in the other subset.

By considering contours at different levels of x we can identify the contour structure. Table 3 presents the contour structure. For each contour level x, the table gives the set A and the set B. The connected subsets of A are listed separated by semi-colons: A1; A2; ... If a subset has more than one nation, the subset is put within brackets (J,K). Similarly for the subsets of B. The subset balance B,A is simply the number of subsets in B and A respectively.

At x=100%, all nations are in B, below x. Lowering the level x from 100% we first encounter England*. Set A has just one nation, England. Lowering the level x further we next encounter Wales*. Set A has two nations, England and Wales. Lowering the level x further we next encounter Northern Ireland*. Set A has three nations, England, Wales and Northern Ireland. Lowering the level x further still we next encounter Scotland*. Set A has four nations, England, Wales, Northern Ireland and Scotland. Finally lowering the level x again we next encounter Gibraltar*. Set A has five 'nations', England, Wales, Northern Ireland, Scotland and Gibraltar. Note that each bracketed set is a set of connected nations: (Eng, Wales), (Scot, NI) and (E, W, NI, Scotland).

Table 7 The contour structure for regions; x is % Conservative seats

x%	B: below x	A: at or above x	B,A
100	UK		1,0
86.7	UK-A	south-east*	1,1
86.2	UK-A, L	(south-east, east*)	2,1
85.5	UK-A, L	(south-east, east, south-west*)	2,1
67.4	UK-A, L	(s-east, e, sw, east midlands*)2,1	
59.3	(NI, nw, ne, yh, Sc., W); L	(s-east, e, sw, e mid, w mid*)	2,1
31.5	(NI, nw, ne, Sc., W); L	England incl. Yorks & Humber*, not B	2,1
29.2	(NI, nw, ne, Scot. Wales)	England including London*, not B	1,1
26.7	(NI, n-east, Scot.); Wales	England including north-west*, not B	2,1
22.0	NI; north-east; Wales	UK including Scotland*, not B	3,1
20	N. Ireland; north-east	UK including Wales*, not B	2,1
10	N. Ireland	UK including north-east*, not B	1,1
0		UK including N. Ireland	0,1

2 The change from 2015 to 2017

Volatility, 2015-2017

Before looking at the detail of the results, it is useful to obtain some overall estimate of the amount of change. One measure of the amount of change is volatility. It is the amount of change in the parties' shares of the votes (or of the seats) between two elections. It is the swing between the composite gainers and the composite losers.

[Volatility V equals the modulus of the swing S , $V=|S|$. Because the percentages add to the fixed sum of 100%, V is also the sum G of the gains; and the sum L of the losses, $V=G=L$. Thinking in terms of abstract space, the 2015 result is a point in percentage space and the 2017 result is a point in percentage space. The volatility V measures the distance d between the two points in percentage space. The distance function used involves the modulus function: $d_{AB}=\sum |x_{Ai}-x_{Bi}|$, where A and B are the two points, and i is the i^{th} party. We have $d=G+L=2V$.
https://en.wikipedia.org/wiki/Taxicab_geometry]

The volatility in the percentage vote from 2015 to 2017 was 15.5%. In other words, the parties which increased their vote in 2017 gained an extra 15.5% and the parties which lost votes in 2017 lost 15.5%. Almost all of the gain was accounted for by Labour and Conservatives who gained a combined total of 15.1%. Most of the loss was accounted for by UKIP who lost 10.8%. The SNP lost 1.7%, more than a third of their share in 2015. In Northern Ireland DUP and Sinn Fein together gained 0.4% while the UUP and SDLP together lost 0.1%. Volatilities in the four nations were similar to the UK value of 15.5%: England 15.4%; Wales 18.4%; Northern Ireland 15.2%; and Scotland 16.5%.

The volatility in the percentage of seats from 2015 to 2017 was 6%. So in 2015-2017 the vote volatility of 15.5% was *much more* than the seat volatility of 6%. The parties which increased their number of seats in 2015 gained an extra 6% and the parties which lost seats in 2015 lost 6%. Most of the gain was accounted for by Labour who gained 4.6%. Most of the loss was accounted for by SNP and Conservatives who together lost 5.2%. In Northern Ireland, DUP and Sinn Fein together gained 0.8% while the UUP and SDLP together lost 0.8%.

Our discussion of volatility provides an overall view of the change from 2015 to 2017. Table 9 presents the details, showing the percentage votes and seats and the change in these percentages for the parties at the UK elections in 2015 and 2017.

Table 9 UK general election, 2015-2017: votes and seats for the parties

	votes % 2015	votes % 2017	2017 -2015	seats % 2015	seats % 2017	2017 -2015
Conservative	36.9	42.4	+5.5	50.9	48.9	-2.0
Labour	30.4	40.0	+9.6	35.7	40.3	+4.6
Liberal Democrat	7.9	7.4	-0.5	1.2	1.8	+0.6
UKIP	12.6	1.8	-10.8	0.2	0.0	-0.2
SNP	4.7	3.0	-1.7	8.6	5.4	-3.2
Green	3.8	1.6	-2.2	0.2	0.2	0
Sinn Fein	0.6	0.7	+0.1	0.6	1.1	+0.5
Democratic Unionist Party	0.6	0.9	+0.3	1.2	1.5	+0.3
Plaid Cymru	0.6	0.5	-0.1	0.6	0.6	0
Ulster Unionist Party	0.4	0.3	-0.1	0.3	0.0	-0.3
SDLP	0.3	0.3	0	0.5	0.0	-0.5
turnout	66.1%	68.7%				
volatility: gains=losses			15.5			6.0

In this section we have been looking at the most basic model of change. Given a variable X , we consider its values X_t and X_{t+1} at times t and $(t+1)$, and the difference between these two values, dX . We now proceed to more complex models of change.

$$X_{t+1} = X_t + dX$$

Changing distributions in political space

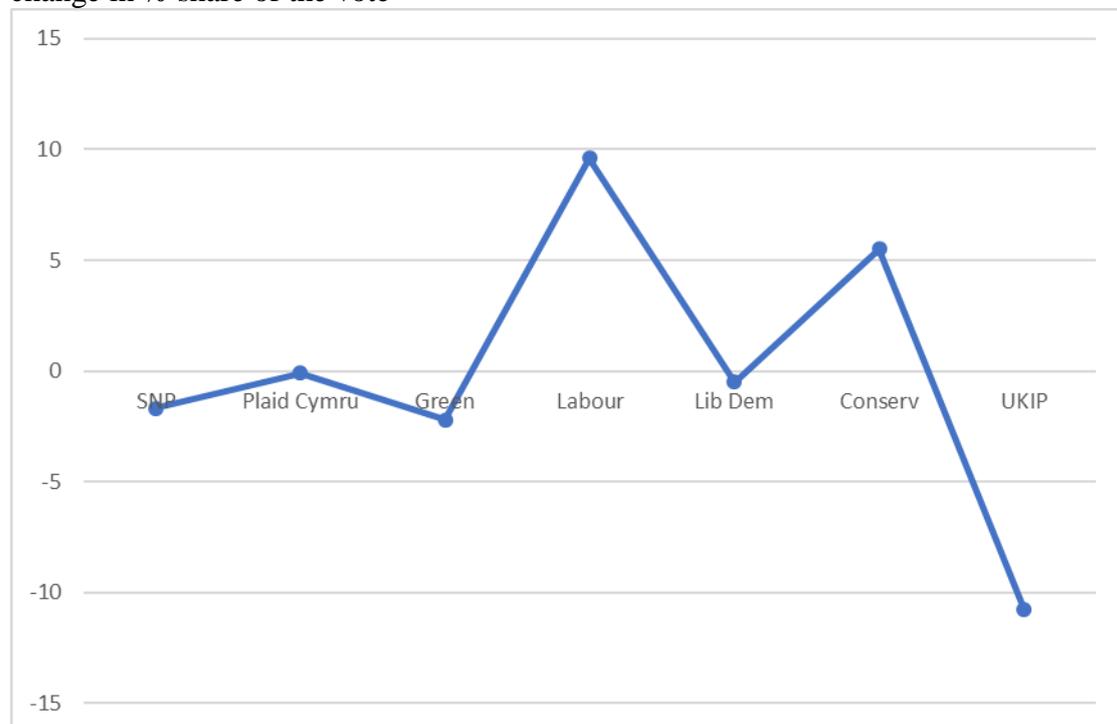
We now locate the volatility in political space. We think of voters and parties as being located in space. The population of voters have a distribution over political space with different densities at different points in space. The percentage vote for a party reflects its position in space and the local density of the voting population. Changing party percentages represent changing population densities.

Political space in the UK (apart from Northern Ireland) places Labour on the left and Conservatives on the right as the two major established parties, with the Liberal Democrats the established party of the centre. Outside these established three parties are Green, Plaid Cymru and SNP to the left and UKIP to the right. Northern Ireland has its own distinct parties – see later.

Figure 7 shows the change between 2015 and 2017. The horizontal axis orders the parties from left to right. The vertical axis gives the change in percentage share of the vote between 2015 and 2017. The M-shaped line indicates increased share for the two main parties, Conservatives and Labour, reduced densities at the extremes, mainly at UKIP, but without benefitting the Liberal Democrat centre.

Figure 7 UK without NI, votes, 2015-2017: increased share for the two main parties

change in % share of the vote

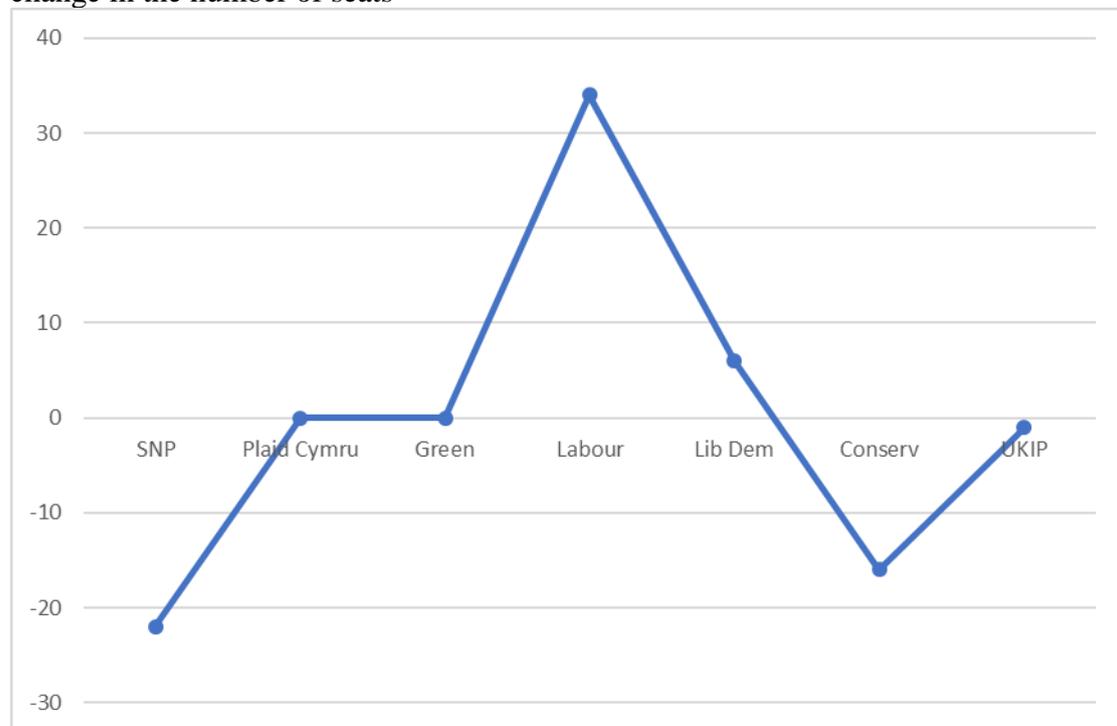


The change in the distribution of percentage votes resulted in a change in the distribution of the number of seats. There were reduced shares on the right and on the extreme left and increased share in the centre-left. See Figure 8.

Finally this increased share in the centre-left in the number of seats was transformed into government with the majority Conservative government giving way to a hung parliament and a minority Conservative government supported by the DUP ... an increased share of government on the right.

Figure 8 UK, seats, 2015-2017: increased share in the centre-left

change in the number of seats



Different parts of the country exhibited different changes. The pattern of change for England and for Wales was similar to that shown above. Scotland however was different. The decline of the SNP noted in the above figures was of course solely located in Scotland. The increased density in Scotland occurred for the Conservatives. The contrast between Conservative gains in Scotland and Conservative losses elsewhere prompted praise for Ruth Davidson, the leader of the Scottish Conservatives, and indeed pressure from the Scottish Conservatives for a greater say and a degree of independence for Scottish Conservatives from the UK Conservatives. See Figure 9.

We now consider the change in Northern Ireland between 2015 and 2017. An analysis of the general election results for Northern Ireland in 2015 identified a one-dimensional model of political space with parties ordered along a continuum from Sinn Fein at one extreme, the DUP and Conservatives at the other extreme and the other parties at various points in between. Using this scale the change in vote between 2015 and 2017 is indicated in Figure 10. There is a reduction in the centre with the two extremes increasing their share of the vote.

Figure 9 Scotland, votes, 2015-2017: increased density for the Conservatives

change in % share of the vote

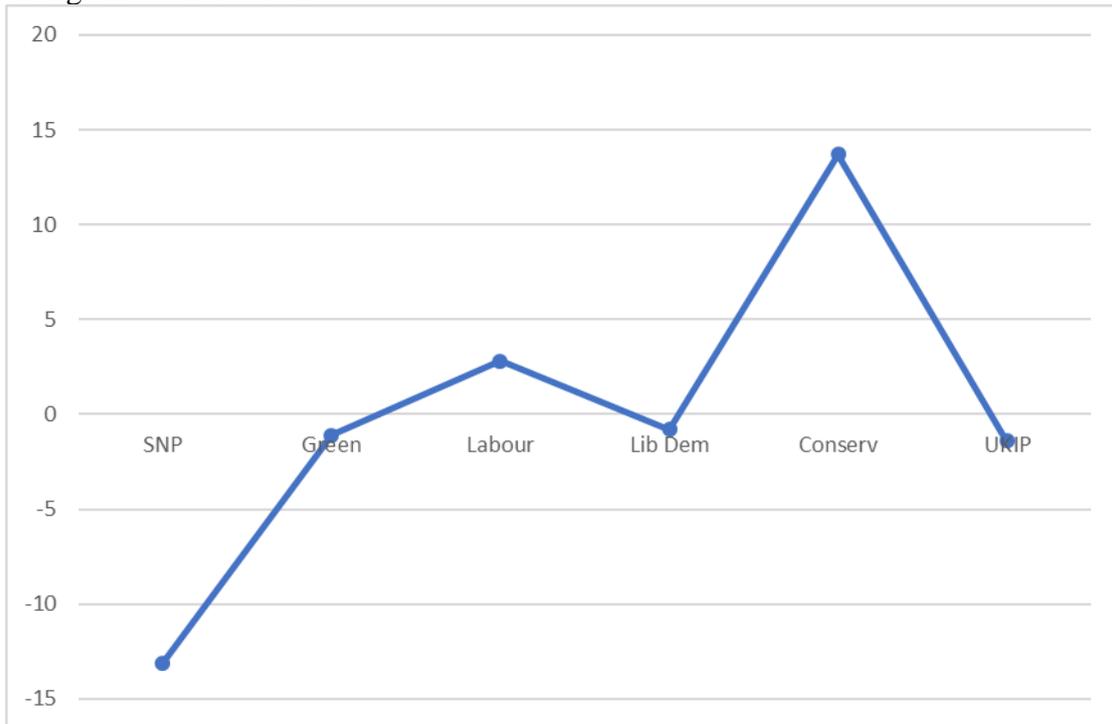
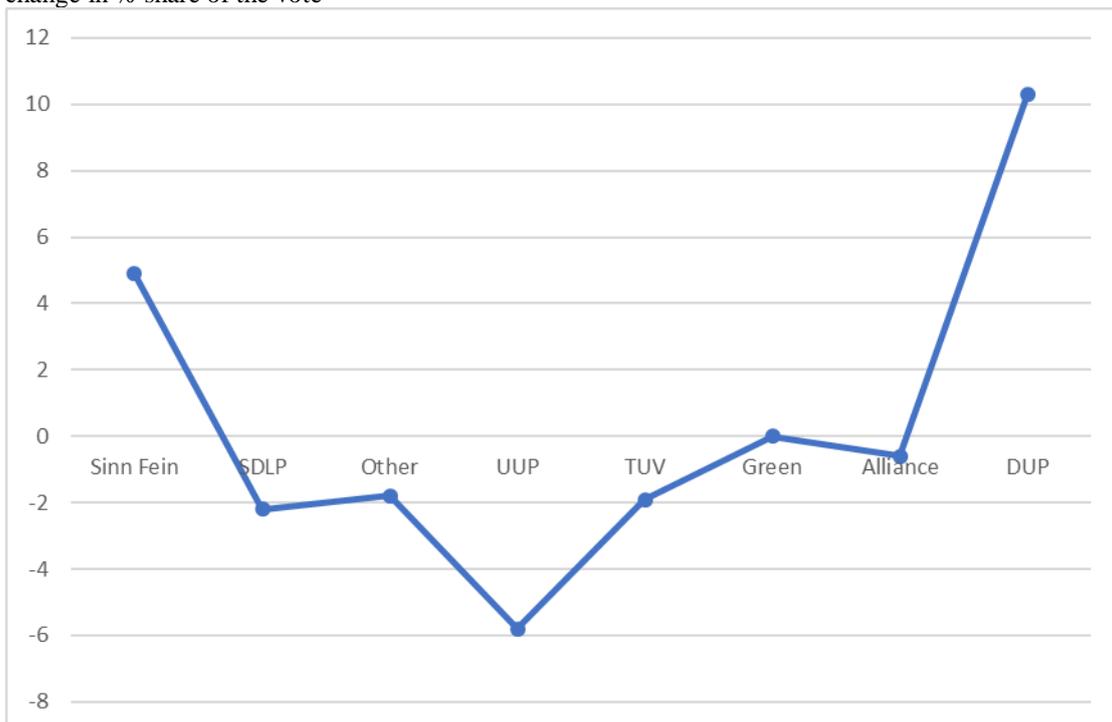


Figure 10 Northern Ireland, votes, 2015-2017: increased share in the extremes

change in % share of the vote



A gravitational model of flows in political space

Having conceived of changing party percentages as changing population densities in political space, we now consider how these changing percentages/densities are brought about by population flows. Just as we have considered percentage votes and seats so we can consider flows of votes and flows of seats. The advantage of looking at seats is that the flows are publicly known, whereas the flows of votes are known only indirectly and imperfectly from surveys. On the other hand flows of seats involve quite small numbers of seats changing hands.

There are three stages in our analysis: first the identification of the transition matrix M , then the derivation of the relative attraction matrix A . The underlying equations are necessarily true because they follow from the way I have defined the concepts. The third stage relates relative attraction to distance. Whether such a relationship exists, and what its nature is, is an empirical matter. This is so because the distances are independently given – although their specification is problematic. An alternative (not followed here) is to define the distance in terms of the relative attraction.

The proposed relationship between attraction and distance provides a link to Newton's law of universal gravitation: the gravitational force F of attraction between two bodies A and B equals the product of their two masses m_A and m_B times a function $f(r)$ of the distance r between them, where $a=f(r)=\gamma/r^2$.

$$F = a m_A m_B = f(r) m_A m_B = \gamma m_A m_B / r^2 \quad [1]$$

By analogy we have a law of political flow: the flow F between two political parties A and B equals the product of their two political percentages p_A and p_B times their relative attraction a which is a function $f(r)$ of the distance r between them. In what follows we take $f(r)$ to be simply the inverse square distance ($1/r^2$). The derivation of equation [2] is given in equations [4] to [6] below.

$$F = a p_A p_B = f(r) p_A p_B = p_A p_B / r^2 \quad [2]$$

$$a = f(r) = 1/r^2 \quad [3]$$

We consider a number of cases. Case 1 concerns the simplest situation and introduces the key concepts in the analysis. Equation [3] is taken as a model in Figures 14 to 16 below and gives a rough approximation to the data and leaves open the possibility that a more judicious choice of distance measures and of $f(r)$ might provide a better fit.

Case 1 Seats, 2015-2017: Conservatives and non-Conservatives

Here we consider just two groups, Conservatives and non-Conservatives, the latter group comprising all the other parties. There are 650 seats in total. In 2015 the Conservatives had 330 seats and the non-Conservatives had 320. So the two groups had 50.8% and 49.2% of the total number of seats, respectively. In 2017 the Conservatives had 317 seats and the non-Conservatives had 333. So the two groups had 48.8% and 51.2% of the total number of seats, respectively.

	Con	Non
Con	[1.84	0.12]
Non	[0.20	1.84]

These numbers provide an illustration of the first part of equation [2] above. The flow from Conservative seats in 2015 to Conservative seats in 2017 is 45.7%. The voting percentages for Conservatives in 2015 and 2017 were 50.8% and 48.8%. The relative attraction is 1.84.

$$F = a p_A p_B = f(r) p_A p_B = p_A p_B / r^2 \quad [2]$$

$$0.457 = 1.84 \times 0.508 \times 0.488$$

Note that equation [2] follows from the way I have defined relative attraction a_{cc} :

$$F_{cc} = p_{cc} p_t \quad p_t=0.508; p_{cc}=0.90 \quad [4]$$

$$a_{cc} = p_{cc} / p_{t+1} \quad p_{t+1}=0.488; a_{cc}=1.84 \quad [5]$$

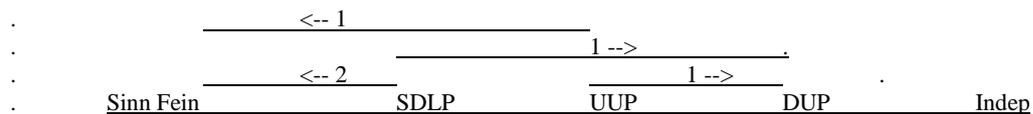
$$F_{cc} = a_{cc} p_{t+1} p_t \quad [6]$$

We have already noted that each group has a high relative attraction to itself and a low relative attraction to the other group. If we take the distance between self and self to be 0 and the distance between self and other to be 1, then we can say, rather trivially in this simple case, that relative attraction is a decreasing function of distance.

Case 2 Seats, 2015-2017: Northern Ireland

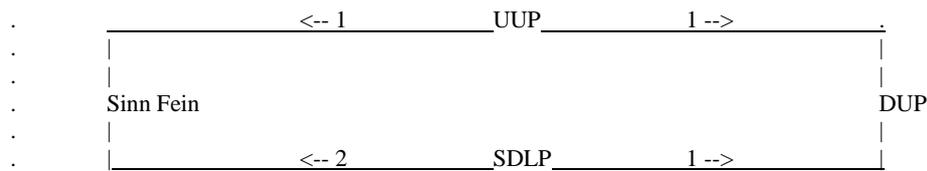
A one-dimensional model of political space in Northern Ireland places the four main parties and Independents in the following order: Sinn Fein, SDLP, UUP, DUP and Independent. In 2017 five seats changed parties. All were changes from a centre party to an ‘extreme’ party. Three of the changes were between adjacent parties: from a centre party to ‘its’ own extreme. Two of the changes were from a centre party to ‘its other extreme’. There were no changes from one extreme party to the other extreme party. See Figure 12.

Figure 12 Flow of seats in Northern Ireland; one-dimensional political space



A two-dimensional model of political space in Northern Ireland places the four main parties on the perimeter of a circle in the following order: Sinn Fein, SDLP, DUP and UUP. In 2017 five seats changed parties. All of the changes were between adjacent parties on the circle. There were no changes across the circle to a diametrically opposed party. The effect was a polarisation of the circle with two poles. See Figure 13.

Figure 13 Flow of seats in Northern Ireland; two-dimensional political space



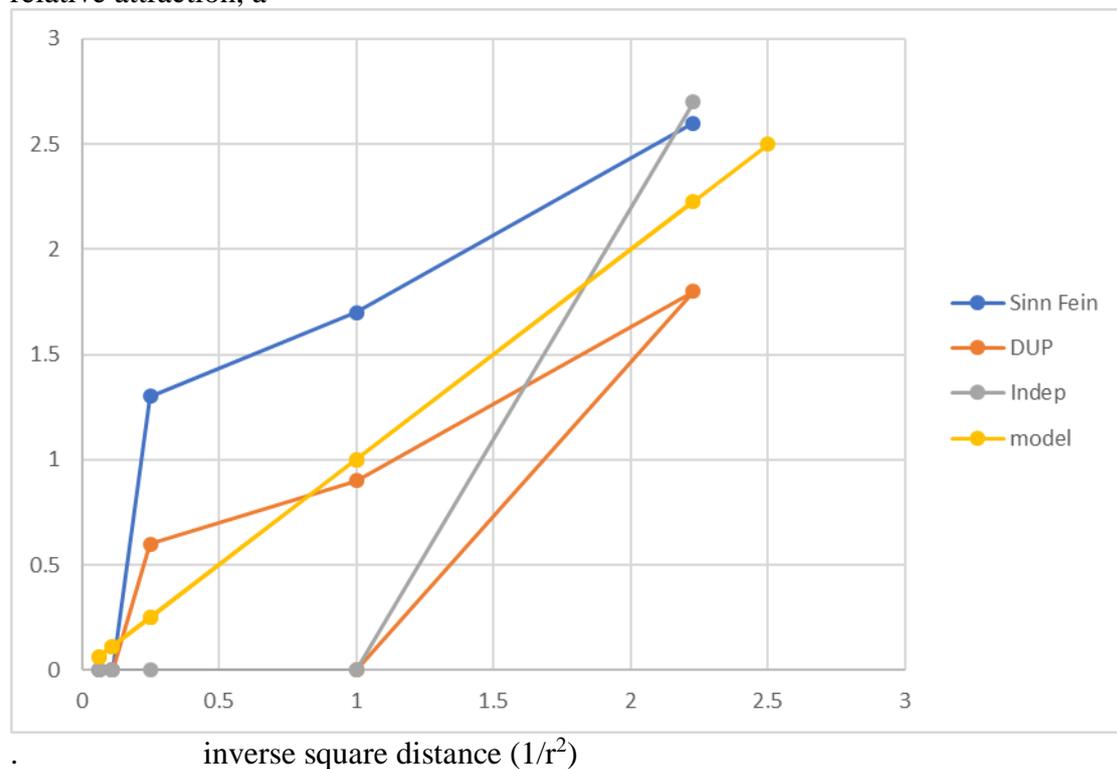
We now think of this in terms of the gravitational model. Following the method used in Case 1, we note the percentage seats for each party in 2015 and 2017; from the flow of seats between parties we deduce the transition matrix M ; and from these we deduce the attraction matrix A , given below. The rows are single-peaked, self-attraction being the peak. The high self-attraction for Independent follows because it is a small ‘party’ which neither gains nor loses seats. The ‘-’ indicates that the relative attraction is undefined being equal to $0/0$: the general attraction and the specific attraction are both zero.

	SF	SDLP	UUP	DUP	Indep
Sinn Fein	[2.6	1.7	1.3	0	0]
SDLP	[-	-	-	-	-]
UUP	[-	-	-	-	-]
DUP	[0	0.6	0.9	1.8	0]
Independent	[0	0	0	0	20.0]

We now assume a one-dimensional model of political space with unit distance between adjacent parties. Figure 14 plots relative attraction against the inverse square

Figure 14 N. Ireland, seats, 2015-2017: relative attraction and inverse square distance

relative attraction, a



distance. Equation [3] above provides the model $a=1/r^2$. The model gives a rough approximation to the data and leaves open the possibility that a more judicious choice of distance measures and of $f(r)$ might provide a better fit – but see the following paragraph.

To make the data fit the equation some modification of the data has been necessary. It seems natural to take self-distance as zero. However if $r=0$ then a is infinite. To avoid this problem self-distance is taken to be 0.67. This corresponds to a relative attraction of 2.25 which is chosen because it is between the self-attraction scores of Sinn Fein and DUP. This creates problems for the large attraction score of 20 for Independent and so Independent is given a new self-attraction score of 2.7. Note that an attraction score of 20 corresponds to a distance of $r=0.2$ which is quite close to zero.

Case 3 Seats, 2015-2017: UK (apart from Northern Ireland)

We think of this in terms of the gravitational model. Following the method used in Case 1, we note the percentage seats for each party in 2015 and 2017; from the flow of seats between parties we deduce the transition matrix M ; and from these we deduce the attraction matrix A , given below.

Three parties - UKIP, UUP and SDLP - did not have any seats in 2017 and so had undefined attraction towards themselves. Three parties continued with their existing one seat with no gains and no losses and so had only zero attraction from others and a non-zero self-attraction, high in the case of a small party such as Green, Speaker and Independent.

The relative attraction matrix A for the other parties is as follows. The notion that the rows are single-peaked, self-attraction being the peak, gives only a very approximate account of the situation.

.	SNP	PC	Lab	LibD	Con	UKIP
SNP	[11.6	0	0	0	0	0]
PC	[0	162.6	0	20.3	0	0]
Lab	[0.27	0	2.42	0.62	0.21	0]
LibDem	[2.9	0	0	27.0	0.82	0]
Con	[0.44	0	0.05	0.26	1.84	2.05]

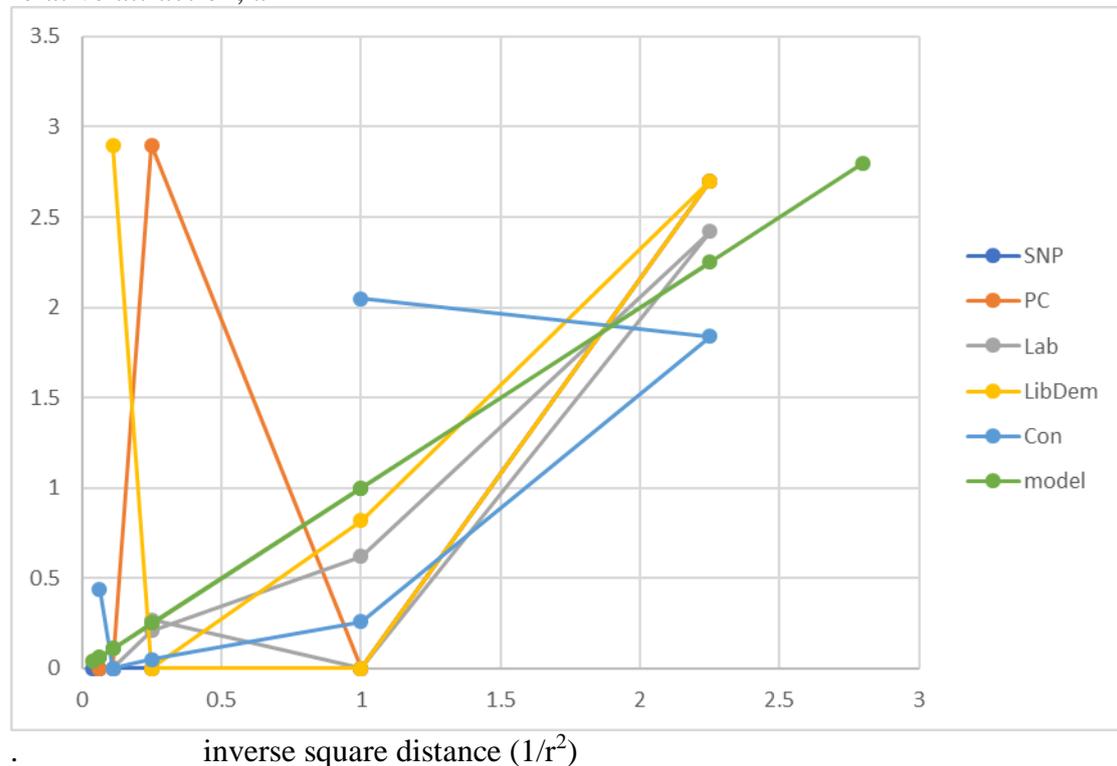
We now assume a one-dimensional model of political space with unit distance between adjacent parties. Figure 15 plots relative attraction against the inverse square distance. Equation [3] above provides the model $a=1/r^2$. The model gives only a rough approximation to the data but leaves open the possibility that a more judicious choice of distance measures and of $f(r)$ might provide a better fit – but see the following paragraph.

As in the previous case, to make the data fit the equation some modification of the data has been necessary. It seems natural to take self-distance as zero. However if $r=0$ then a is infinite. To avoid this problem self-distance is taken to be 0.67. This corresponds to a relative attraction of 2.25 which is chosen because it is between the self-attraction scores of Labour and Conservative. This creates problems for the large

attraction scores for the other parties and so they are given new self-attraction scores of 2.7. Note that the self-attraction scores of 11.6, 27 and 162.6 correspond to distances of $r=0.3$, 0.2 and 0.1 which are quite close to zero.

Figure 15 UK (apart from Northern Ireland), seats, 2015-2017: relative attraction and inverse square distance

relative attraction, a



Case 4 Votes, 2015-2017: Conservatives and non-Conservatives

Here we carry out a similar analysis, this time carried out on the flow of votes, not on the flow of seats. The data comes not from the actual votes but from a survey - the General Election Day Poll 2017 with fieldwork carried out during 6th to 9th June 2017 by Lord Ashcroft Polls. The sample were asked which party they voted for in 2015 and 2017. A cross-tabulation of the answers to these two questions was provided in Table 2, page 5 of the Full Tables. There were 14,384 respondents, 64% voting in person and 36% voting by post and 0.2% by proxy.

General Election Day Poll 2017, Lord Ashcroft Polls.

<http://lordashcroftpolls.com/wp-content/uploads/2017/06/GE-post-vote-poll-Full-tables.pdf>

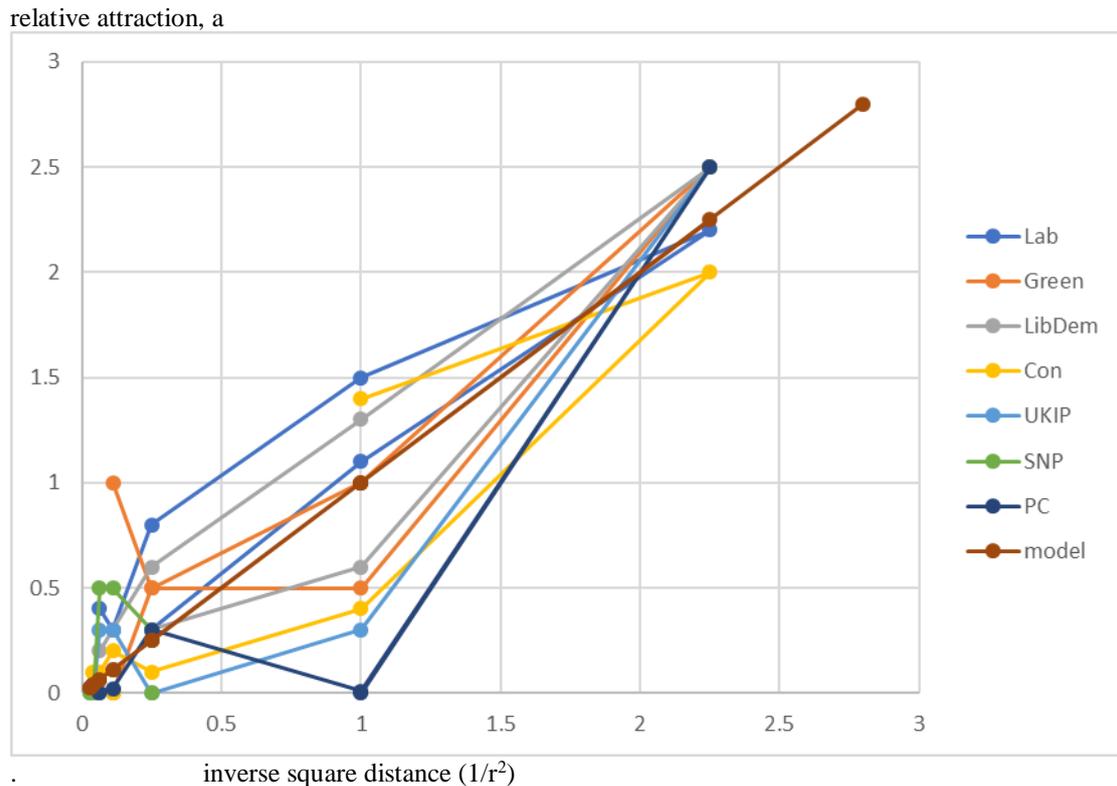
We think of this in terms of the gravitational model. Following the method used in Case 1, we note the percentage votes for each party in 2015 and 2017; from the flow of seats between parties we deduce the transition matrix M ; and from these we deduce the attraction matrix A , given below. To some extent the rows are single-peaked, self-attraction being the peak*. The ‘-’ indicates that the relative attraction is undefined being equal to 0/0: the general attraction and the specific attraction are both zero.

.	SNP	PC	Lab	Green	LibD	Cons	UKIP
SNP	[19.8* -		0.3	0.5	0.3	0	0]
PC	[-	50*	0.01	0.3	0.02	0.004	0.04]
Lab	[0.3	1.1	2.2*	1.5	0.8	0.3	0.4]
Green	[0	0.5	0.5	11*	1.0	0.5	1.0]
LibDem	[0.2	0.3	0.6	1.3	5.6*	0.6	0.3]
Cons	[0.1	0.1	0.2	0.1	0.4	2.0*	1.4]
UKIP	[0	0	0.3	0.3	0.3	0.3	6.3*]

We now assume a one-dimensional model of political space with unit distance between adjacent parties. Figure 16 plots relative attraction against the inverse square distance. Equation [3] above provides the model $a=1/r^2$. The model gives a rough approximation to the data and leaves open the possibility that a more judicious choice of distance measures and of $f(r)$ might provide a better fit – but see the following paragraph.

As in the previous case, to make the data fit the equation some modification of the data has been necessary. It seems natural to take self-distance as zero. However if $r=0$ then a is infinite. To avoid this problem self-distance is taken to be 0.67. This corresponds to a relative attraction of 2.25 which is chosen because it is close to the self-attraction scores of Labour and Conservative. This creates problems for the large attraction scores for the other parties and so they are given new self-attraction scores of 2.5. Note that the self-attraction scores of 5.6, 6.3, 11, 19.8 and 50 correspond to distances of $r=0.4, 0.4, 0.3, 0.2$ and 0.1 which are quite close to zero.

Figure 16 UK (apart from Northern Ireland), votes, 2015-2017: relative attraction and inverse square distance



3 Politics: values, society and modelling

The preceding discussion relates to earlier work which has been brought together in *Politics: values, society and modelling*:

<https://docs.google.com/viewer?a=v&pid=sites&srcid=ZGVmYXVsdGRvbWFpbmxb3Jkb25idXJ0bWF0aHNvY3NjaXxneDpmMjM0NTQ4ZjI2OGNmN2E>

Relevant are:

II Yearbook 2014

10 Scotland: 'Our Values'? Independence? More Varied and Less Distinctive

III Yearbook 2015

9 Northern Ireland: multidimensional political space and geography

10 The UK general election, 2015: prelude and outcome

11 Democracy: satisfaction? ... dissatisfaction? ... value space

12 Time series: UK general elections - 1945 to 2015

IV Yearbook 2016 (in preparation)

7 The UK Brexit referendum: voters in social space

And of these, the following are the most relevant:

II Yearbook 2014

10 Scotland: 'Our Values'? Independence? More Varied and Less Distinctive

On 18 September 2014 a referendum was held on Scottish independence. It was a debate between those claiming 'our Scottish values are exceptional' and those claiming 'our British values are exceptional'. The relationship with England has been central to the geo-political history of Scotland. Personal memories of and attachments to Scotland are in all our minds but what sometimes happens is that invalid extensions are made to these personal memories and attachments, giving rise to a discourse of exceptionalism. A case in point is the Scottish exceptionalism of a golfing Presbyterian east-coast lowlander. In comparison with the simplicity of group exceptionalism, scientific analysis may find that each group is more varied within itself and less distinctive from other groups than is imagined – and this is shown to be the case for Scottish exceptionalism. Scotland's history has seen the formation of the nation, independence, union with the rest of Britain and over the last century, particularly the last half-century, measures of partial autonomy, culminating in the independence referendum of 2014. Support for political parties has fluctuated over the past couple of centuries, with increasing support for the Scottish National Party (SNP) in recent times. Opinion polls consistently indicated that the referendum voting would reject independence although in the weeks before the voting the gap narrowed. Some studies found support for alternative options to those on the ballot paper. Independence was rejected by 55% to 45%. A somewhat greater support for independence was found in local areas which had high unemployment and low Conservative support, which were in the west central area of the country and which had lower turnout. Glasgow and Edinburgh, Scotland and England, are each more varied and less distinctive than is sometimes supposed. As in other chapters special attention is given to the conceptualisation of group differences.

Leaving the political sphere behind, the last three chapters in Part II turn to the world economy, gender relations and world sport (not, of course, that these spheres are without a political aspect!).

III Yearbook 2015

9 Northern Ireland: multidimensional political space and geography

This chapter, like the previous one, is about the relationship between political space and geographical space. Unlike the previous chapter, the political space considered here is multi-dimensional because it is based on the percentage votes in a case where there are many options. Also, in this chapter it is the political space that receives most attention with only a brief consideration of the geographical aspect.

The chapter is about the Northern Ireland election of 2015 (held as part of the UK general election which is discussed in the following Chapters 10 to 12). Voters can choose between many parties. So the voting percentages can be represented by a point in multidimensional political space. The overall result is a point in political space; each constituency result is a point in political space; and the set of constituency results can be represented as a set of points in political space. The space is a percentage space and so is finite with a well-defined centre. What is the shape of the set of points in relation to the centre?

There are a few large parties and many small parties and so the ‘overall point’ is quite far from the centre of the space. Moreover, many of the individual constituency results show dominance by a single party – and so the constituency points are quite far from the overall point. Different parties have dominance in different constituencies (‘multidimensional polarisation’) and so the constituency points are quite far from one another - in different directions from the overall point.

Larger parties vary more across constituencies than smaller parties do, and this is reflected in differential variation in different dimensions. The first component in a principal component analysis concerns the competition between the two largest parties: Sinn Fein against the Democratic Unionists. It explains 30% of the total variance. The thirteen parties can be ordered along this primary continuum with Sinn Fein at one extreme and the Democratic Unionists (and the smaller Alliance and Conservative parties) at the other. The eighteen constituencies can also be ordered along this primary continuum with Belfast and Newry & Armagh (where Sinn Fein is strong) at one extreme and Belfast East and North Down (where Democratic Unionists, Alliance and Conservatives are strong) at the other. Restricting attention to the subspace containing the five largest parties, another analysis finds the same first component as before, and a second component being Ulster Unionists versus the Social Democratic and Labour Party.

On a one-dimensional continuum, parties tend to peak to the left or to the right. In a two-dimensional space, constituencies are located on a closed loop and parties peak at the point on the loop nearest the party vertex, giving an approximately sinusoidal curve.

Political space relates to geographical space. There is a gradient of increasing X score (DUP strong) running from South-West to North-East – with contours of equal X-score at right angles to the gradient. The borders reflect the gradient, the North-East looking to Scotland and the UK and the South-West adjoining Ireland – Ulster Unionists look to the UK and Sinn Fein looks to Ireland.

10 The UK general election, 2015: prelude and outcome

The UK general election of 2010 had replaced Gordon Brown’s Labour government with a coalition between David Cameron’s Conservatives and Nick Clegg’s Liberal Democrats. The subsequent party fortunes in the period between the 2010 and 2015 can be gauged from a number of sources. Opinion polls had tracked the almost immediate collapse of Liberal Democrat support and the steady rise in UKIP support. In Scotland, Scottish Nationalists overtook Labour, briefly in 2011 and again, massively, in 2015. Less dramatically, in the UK overall, Conservative support had fallen and Labour support had risen but the gap closed as the 2015 election approached. The results of by-elections, local government elections and European elections were broadly consistent with the patterns indicated by the polls. Migration of support on the left-right continuum was characterised by a flight from the centre.

Widespread dissatisfaction and disagreement characterised the debate in the run-up to the election. On election morning the poll of polls indicated a hung parliament. The day before, the press on the right, left and centre had warned the electorate of the consequences of making the wrong choice. Over the preceding month The Times had headlined: ‘panic in the markets’, Farage and Sturgeon winning the seven-way leaders’ debate, Clegg opening the door to a Miliband government backed by SNP, Cameron inching ahead, and the Queen to take control of the election aftermath.

... Then the dramatic change in just 24 hours: the belief on election morning that this was going to be ‘the closest vote for decades’; and at 10pm the same day the Exit poll put the Conservatives well ahead. It was the ‘sweetest victory’ for the Conservatives and in the north ‘the Scottish lion [had] roared’. In the aftermath the performance of the opinion polls was appraised.

... The chapter studies the distribution of shares of the vote, overall and by nation; and power and representation are considered.

12 Time series: UK general elections, 1945 to 2015

This is the second chapter about time. The first chapter on time discussed time series for international measures of social value, violence and population. Here we discuss UK general elections. The first part of the chapter is about change from one point in time to the next: from 2010 to 2015. The second part of the chapter is about time series: from 1945 to 2015.

Volatility measures are used to check the claim that the result of the 2015 general election was a political ‘earthquake’. Some things stayed the same and some things changed. Some things changed just a little and some things changed a lot. The flight from the centre is noted – in terms of both aggregate and individual vote. Detailed results for votes and for seats for the four nations are noted and related to party contributions to volatility.

IV Yearbook 2016 (in preparation)

8 The UK Brexit referendum: voters in social space

The concept of an abstract space was a central theme in many of the chapters in the 2015 Yearbook. The concept of space also informs our analysis here of the Brexit referendum to decide whether the UK should remain a member of the European Union (EU) or leave. 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.

Psychology. The voting areas used in the referendum are the same as the areas used in a recent study of geographical variation in personality. Openness has a high correlation with the Remain vote ... and also with higher education, same-sex marriage, foreign-born and Liberal Democrat. London is particularly high on openness.

The social groups more likely to vote Leave were: older, working class, less educated, professing an English identity and not of an ethnic minority.

Politics. Defining Left-Right in terms of voting in the 2015 general election, in terms of newspaper readership and in terms of political attitudes, the Leave vote *increased* from Left to Right. However there is what might be called the class-politics/Brexit paradox. Defining Left-Right in terms of social class we obtain the opposite result: the Leave vote *decreased* from Left to Right - the working class voted Leave and the middle class voted Remain.

Economics. Leave areas are associated with high manufacturing, low wages, low house prices and low education; and Remain areas are associated with low manufacturing, high wages, high house prices and high education.

Variation *within* units is greater than variation *between* units. This is the case whether the UK is divided into nations, regions or areas. Looking at the shape of the variation, 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 are to the lower end.

The geographical aspect of the between-unit variation in voting percentages is studied looking at the ‘contour areas structure’. At one level the country is divided between one connected High-Leave area (the Midlands and north England) and three separate connected Low-Leave areas (south England and Wales; Scotland and Northern Ireland; and Gibraltar). Leave is low in cities and university towns.

Sources

The following are some of the data sources used for this report. In addition, please see references in text.

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