Online Appendix

A The Division Data

We received the data as a set of page images and corresponding `xml` files (one for each division); as in the original printed source, each file included basic information about the division along with the names of the MPs voting 'Aye' and 'No' and the names of tellers for each side. There are some 20,262 of these roll calls. Although the `xml` provides useful structure to the raw data, the original source did not identify the party of each MP, nor are MPs identified in a standardized way in either the original source or the `xml` markup. Thus without further processing this remarkable data source is of limited use in systematically analyzing voting cohesion or anything else. We therefore endeavored to link the voting data to our broader database, which includes every MP serving in this period along with his electoral records, speeches in parliament, and key background information including party, dates of birth and death, dates of service, constituency names, offices held, etc. Merging the named MPs in the division lists to their records in our database required a combination of custom automated processing and manual attention (ultimately requiring hundreds of research assistant hours); the merging is not straightforward because MPs are not identified in standard ways in the division lists (whether due to irregular conventions, misspellings, or OCR errors). The covariates themselves come from various standard sources, such as **Craig3285 Craig8518 Walker78 CookKeith75** and **ButlerButler94** In this way, each vote in each division list becomes part of a record on a given individual. By the end of the cleaning process, both automatic and manual, we had identified the MP being around 99% of the votes cast in each parliament; that is, we were uncertain who the MP cast was in around one percent of the 4,791,282 vote decisions in our data.[1]

B Measurement of Discipline

To clarify how our cohesion measure works, consider the following example. Let $\mathbf{w}$ be the composite whip voting vector expressed as the side he 'tells' for. That is, the vector of decisions on all the roll calls in a given parliament. The whips may 'tell' in one of three ways: for the 'aye' side (coded as 1), for the 'no' side (coded as 0), or not at all (coded as NA). In what follows, suppose there are a total of five roll calls and that the whips' voting profile is

$$\mathbf{w} = [\underbrace{1, 0, \text{NA}}_{\text{whip}_1}, \underbrace{1, 1}_{\text{whip}_2}].$$

Recall that we sometimes have more than one MP serving as a Chief Whip, and we infer the whipping vector from whomever holds that position and acts as teller at some point during the parliament. Here, the vector is implicitly divided into two parts: one MP serving as Chief Whip for the first three votes, another for the last two. Suppose a Member of Parliament i's voting vector is

$$\mathbf{m}_i = [1, \text{NA}, 0, 1, 0].$$

[1] In principle, essentially all of the votes can be linked to an individual; we viewed 1% missingness as acceptable for our purposes.

Since MP i only votes in four divisions, the denominator for any agreement scores is four. Here, i votes in the same way as the whip 'tells' on two of the four roll calls on which he attends, and thus i's agreement score is $\frac{2}{4}$. Notice that missingness in the MP's vote vector does not count against the MP's disciplinary record. Similarly, when the whips' votes are missing, that roll call is removed from consideration in terms of agreement. The distribution of all such MP's agreement scores is denoted as the "discipline distribution" or "cohesion distribution". Note that this aggregate distribution must be bounded between zero and one. Importantly, while the whip vector is party-specific, the aggregate discipline distribution merges the parties. That is, the aggregate distribution has as its ith component the agreement score between the i MP and *his* party-specific whip, though that party can be different from MP to MP. This means that a Tory MP with the same discipline score as a Liberal MP in a given parliament may have voted in exactly the same way in practice as the Liberal ('ayes' and 'noes' in the same places), or in the exactly converse way, or something in between. What matters is how often he follows his whip, and whips in different parties may in some circumstances agree (in voting terms) on specific issues. Finally, note that we do not require both party whips to vote in a given division for it to be included in our analysis—so long as one enters a preference, that division enters the data for his party.

C Relative Distributions: Intuition

Relative distribution methods allow changes in the distribution of cohesion to be due to location shifts, shape changes, or some combination of the two. In Figure 1 we make these ideas clearer in graphic form. In the top panel (a), the distributions of cohesion differ only in their location: that is, the light colored density is exactly the same as the dark colored one, but shifted 'up' to the right. The proportion of members in the left or right tails is identical in both: there has been no change in shape. In the middle panel, labelled (b), the locations (the medians) of the densities are the same, but the shapes are different: literally, the proportion of members in the tails in the light colored density is obviously larger than for the dark colored one. Finally, in the bottom panel, labeled (c), we report two cohesion densities that differ in terms of both location *and* shape: the dark colored one has a lower spread, and its median is clearly lower also. The idea of the methods, intuitively, is that if we see a change as pictured in panel (c) we may break it down into two sets of movements: a location shift (as in the top panel), and a shape change (as the middle panel). The entropy measurements tell us how much a move like that pictured in panel (a) or panel (b) captures the total movement as seen in panel (c).

D Verifying Changes in Disaggregated Data

Here we verify that the changes seen in the boxplots hold in less aggregated data. In Figure 2 we consider division discipline on a *year-by-year* basis, using the same whipping and coding rules as above. There, we show three indicative quantiles—the 5th, 50th and 95th percentile—over time. As can be seen very obviously from the lowess lines at the top of the graph, the most loyal (the 95th percentile) and the median are both close to one throughout our period. The least loyal MPs, the 5th percentile, start out around 0.6, fall a little in the 1840s, and then surge in cohesion from the 1860s onwards: by the close of the century they are virtually indistinguishable from the 95th percentile. For both the 5th and 50th percentile, a structural break test **BaiPerron03** finds a

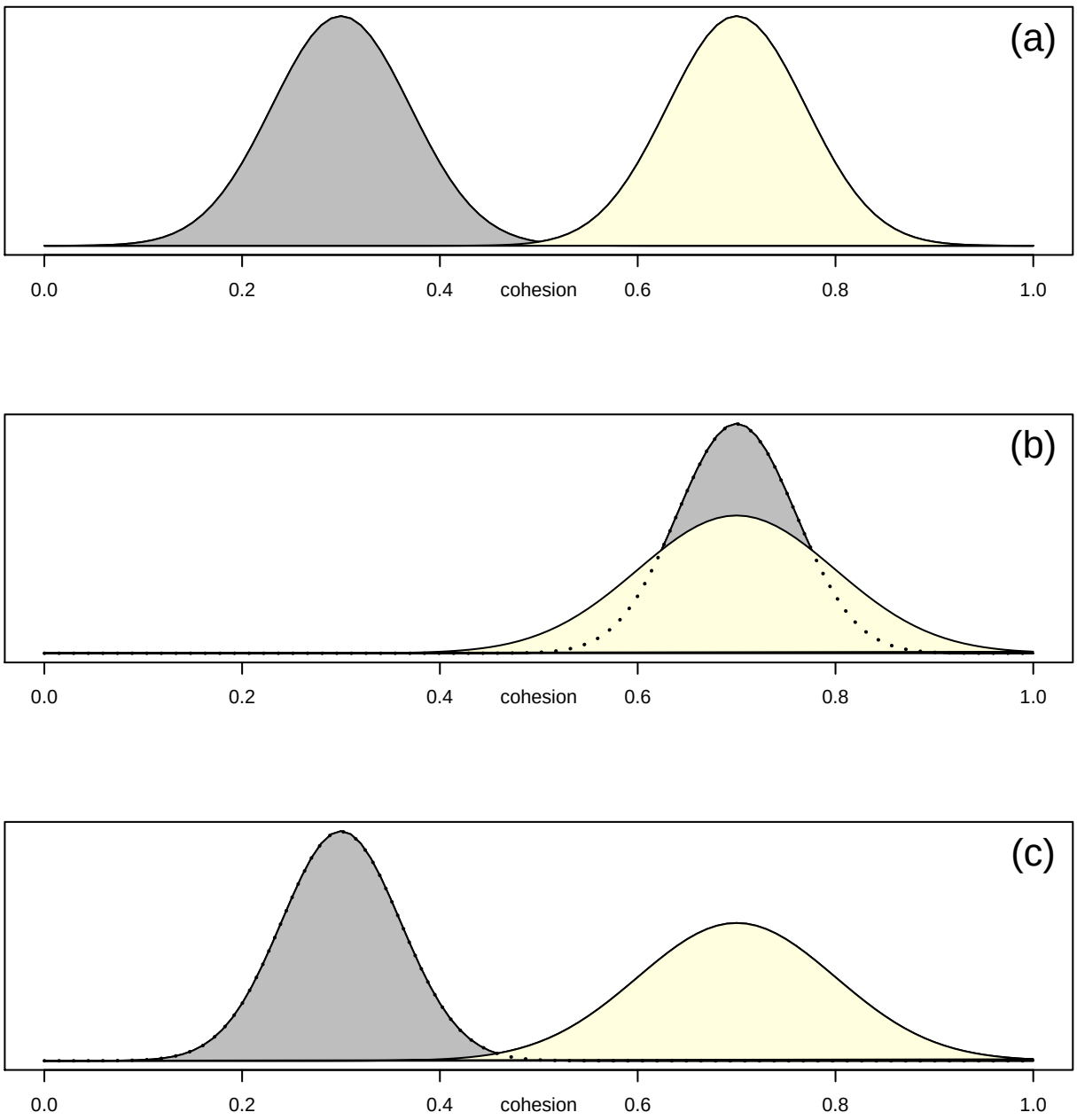


Figure 1: Relative distribution methods: if we observe a change from the dark to the light density in panel (c), we can estimate the extent to which this is the consequence of a location shift (panel (a)), and/or a shape change (panel (b))

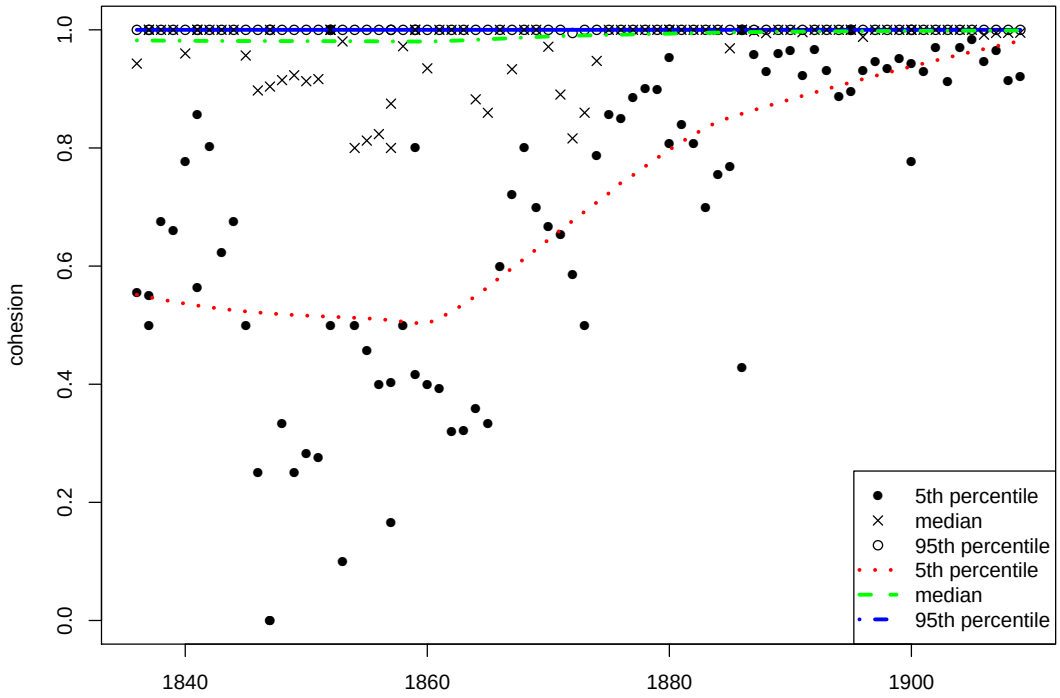


Figure 2: Cohesion in parliament on a year-by-year basis. Lines (lowess fit) trace 95th, median and 5th percentile over time. Note that the 5th percentile (dotted [red] line, solid points) increases markedly during the 1860s.

(single) change point around 1873–1874 (that is, the beginning of the first parliament after the Second Reform Act).

E 'Joiners' and 'Leavers' by Party

Table 1 reports analysis in which each Conservative MP's per-parliament cohesion score is regressed on parliament dummies and indicators for whether an MP is a 'joiner' or a 'leaver' in a given parliament. In column (1) the only RHS variable aside from parliament dummies is an indicator for whether the MP is in his first parliament; the coefficient of .005 indicates that new Conservative MPs' cohesion scores were only very slightly higher than those of other Conservative MPs (controlling for the parliament), and the effect is not statistically significant at the .1 level. When we interact our "Joiner" indicator with a dummy for pre-1852 (column 2), we see that Conservative joiners in fact voted somewhat more cohesively during the post-1852 period during which cohesion increased overall in Parliament. Columns (3) and (4) indicate that MPs in the last parliament of their career ("Leavers") were not more or less likely to vote with party whips. (The point estimate is negative but not significant at the .1 level.) When we include both indicators in the regression (Columns 5 and 6) the patterns hold: "Joiners" were somewhat more likely to vote with party whips (after 1852), but we cannot reject the null that "Leavers" were just as likely as other MPs to vote with the whips.

Table 2 reports the same analysis for Liberal MPs. The main takeaway is that Liberal "joiners" tended to vote *less* cohesively throughout the period we examine, which is the opposite of the finding for Conservatives and contrary to the replacement story. In column (4) we find suggestive evidence that "Leavers" were somewhat less likely to vote with party whips during the period after 1852 when overall cohesion was increasing. When both indicators are included (columns 5 and 6) we again find that Liberal joiners voted less cohesively but we fail to reject the null that leavers voted as cohesively as other MPs.

F Non-Cabinet Promotion As Inducement?

In Figure 3 and Table 3 we extend the analysis of Section **??** by focusing on promotion to non-cabinet offices such as Junior Lord of the Treasury, Solicitor-General, or Under-Secretary of State for the Home Department. We use the same procedures as above, except here we restrict attention to MPs who had never held any office before (cabinet or otherwise). Comparison of the distributions of cohesion in Figure 3 shows far less of a difference between appointees and non-appointees. Regression analysis in Table 3 similarly indicates a more modest relationship between cohesion and appointment than was true for the cabinet, with a borderline significant "effect" only when we focus on the period before 1868.

Table 1: Are new MPs (joiners) more disciplined? Are exiting MPs (leavers) less disciplined? Conservatives only

	(1)	(2)	(3)	(4)	(5)	(6)
Joiner	0.005	0.0118***			0.0046	0.01**
	[0.003]	[0.0029]			[0.0038]	[0.0037]
Pre-1852		-0.0355***		-0.0342***		-0.0292***
		[0.0067]		[0.0073]		[0.0079]
Joiner × pre-1852		-0.0252**				-0.0186†
		[0.0086]				[0.0105]
Leaver			-0.0058	-0.0038	-0.0062	-0.0051
			[0.0036]	[0.0037]	[0.0047]	[0.005]
Leaver × pre-1852				-0.0072		-0.0014
				[0.0095]		[0.0118]
Joiner × leaver					0.0011	0.0043
					[0.0065]	[0.0062]
Joiner × leaver × pre-1852						-0.0153
						[0.0189]
Adj. R^2	0.125	0.126	0.123	0.123	0.123	0.124
N	5225	5225	5134	5134	5134	5134
Parliament dummies	✓	✓	✓	✓	✓	✓

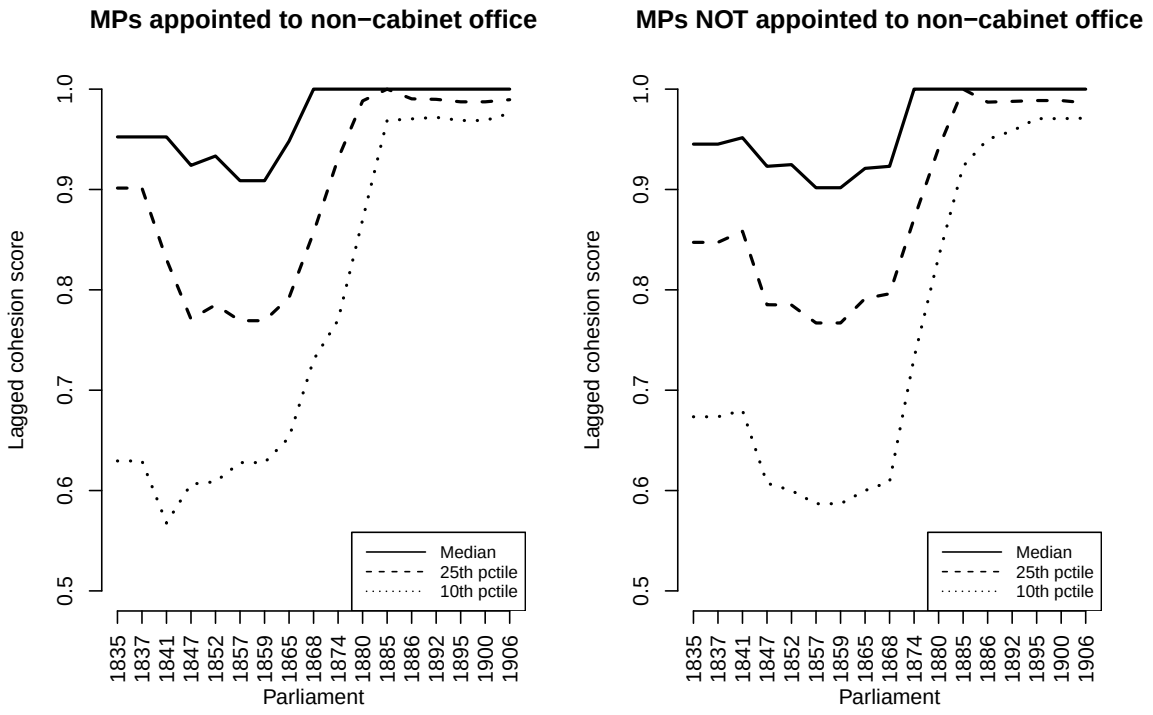
NOTE: Dependent variable is a member's cohesion score in a parliament. Heteroskedasticity-robust standard errors (in brackets) are clustered by member and parliament. Guide to significance codes: *** indicates $p < .001$; ** indicates $.001 < p < .01$; * indicates $.01 < p < .05$; and † indicates $.05 < p < .1$.

Table 2: Are new MPs (joiners) more disciplined? Are exiting MPs (leavers) less disciplined? Liberals only

	(1)	(2)	(3)	(4)	(5)	(6)
Joiner	-0.0157***	-0.0157**			-0.014*	-0.0123*
	[0.0044]	[0.0048]			[0.0056]	[0.0061]
Pre-1852		-0.133***		-0.1485***		-0.1478***
		[0.0092]		[0.0091]		[0.0096]
Joiner × pre-1852		-0.0001				-0.0098
		[0.0113]				[0.015]
Leaver			-0.0051	-0.0089†	-0.0036	-0.006
			[0.0044]	[0.0049]	[0.0055]	[0.0061]
Leaver × pre-1852				0.0143		0.0081
				[0.0107]		[0.013]
Joiner × leaver					-0.0038	-0.0077
					[0.0088]	[0.0097]
Joiner × leaver × pre-1852						0.022
						[0.0226]
Adj. R^2	0.2	0.2	0.186	0.186	0.187	0.187
N	5125	5125	4952	4952	4952	4952
Parliament dummies	✓	✓	✓	✓	✓	✓

NOTE: Dependent variable is a member's cohesion score in a parliament. Heteroskedasticity-robust standard errors (in brackets) are clustered by member and parliament. Guide to significance codes: *** indicates $p < .001$; ** indicates $.001 < p < .01$; * indicates $.01 < p < .05$; and † indicates $.05 < p < .1$.

Figure 3: Are more cohesive voters more likely to be promoted to non-cabinet offices?



NOTE: Figure indicates quantiles of cohesion scores for MPs who were appointed to non-cabinet office in a given parliament (left panel) and those who were not (right panel). To smooth the data each estimate is based on all parliaments within 15 years of the parliament indicated. MPs are included in the analysis only for parliaments in which they have not previously occupied a cabinet office and their party formed a government at some point during the parliament.

Table 3: Are more cohesive voters more likely to be promoted to non-cabinet offices?

	(1)	(2)	(3)
Lagged cohesion score	0.0015	0.0101†	0.0101†
	[0.0085]	[0.0054]	[0.0056]
Seniority	0.0003*	0.0003*	0.0003†
	[0.0002]	[0.0002]	[0.0002]
Age	-0.0003**	-0.0003**	-0.0003**
	[0.0001]	[0.0001]	[0.0001]
Post-1868		0.0621	0.0686
		[0.0439]	[0.051]
Lagged cohesion $\times$ post-1868		-0.0612	-0.0694
		[0.0448]	[0.0519]
Adj. R^2	0.001	0.004	0.005
N	3150	3150	3150
Parliament dummies included			✓

NOTE: Dependent variable is 1 if an MP occupied a cabinet office in a given parliament. MPs are included only if they have not previously occupied a cabinet office and only if their party formed a government at some point during the parliament. Heteroskedasticity-robust standard errors (in brackets) are clustered by member and parliament. Guide to significance codes: *** indicates $p < .001$; ** indicates $.001 < p < .01$; * indicates $.01 < p < .05$; and † indicates $.05 < p < .1$.