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## *Taking the Leap: Voting, Rhetoric, and the Determinants of Electoral Reform*

The Second Reform Act ushered in the age of democratic politics in the United Kingdom by expanding the voting franchise and remedying legislative malapportionment. Analyzing parliamentary debates and divisions, we investigate why reform successfully passed the House of Commons in 1867. We consider why reform passed under a minority Conservative government yet failed under a majority Liberal government despite no election or change in membership. Though partisanship is most influential for parliamentary voting, it is an incomplete explanation given the absence of modern party institutions. Rather, we argue that the narrowed scope of debate under the Conservatives was crucial in passing reform.

Over the course of the nineteenth century, the United Kingdom's electoral system was transformed from an aristocratic oligarchy to one exhibiting most of the modern hallmarks of a democracy. Parliament itself enacted these institutional changes through three reform acts in 1832, 1867, and 1884. Of these reforms, none so dramatically expanded the scope of suffrage as the Second Reform Act of 1867. This act almost doubled the size of the electorate of England and Wales by enfranchising nearly one million men by lowering the property qualifications for voting (Seymour [1915] 1970, 532);<sup>1</sup> it is credited with ushering the working class into the U.K. electorate. As one historian put it, "The Reform Act of 1867 was one of the decisive events, perhaps *the* decisive event, in modern English history. It was this act that transformed England into a democracy . . ." (Himmelfarb 1966, 97). In this article, we analyze how this transformative event came about through the quantitative analysis of an original dataset of 60 reform-related legislative votes and over 3,200 reform-related speeches. In contrast with previous explanations that focus on party competition or constituency-level factors, we argue that the dimensionality of debate was central in the Conservatives' passage of

reform. The Conservatives successfully passed reform through a more narrow discussion of the form it would take.

The passage of the 1867 bill presents a puzzle; a moderate reform bill was proposed by a Liberal government in 1866 but defeated by antireform Liberals and Conservatives. The defeat of the bill brought down the Liberal government, which was replaced by a Conservative one. Without an election, the Conservatives formed a minority government and, led by Benjamin Disraeli in the Commons, introduced a similar although more radical bill in 1867. This bill eventually passed and became the Second Reform Act. Our analysis helps resolve the puzzling circumstances of passage and, more generally, sheds light on a larger question of party development in the United Kingdom in the nineteenth century.

We examine the surprising circumstances under which the Victorian House of Commons expanded the voting franchise to include the working class and provide new representation to industrialized cities. Despite vast inequalities in representation among constituencies, we find that the most influential factor in voting on reform was the partisanship of the MP. Constituency has very little influence on the vote. But while party explains MP behavior, it fails to account for the ultimate passage since reform both failed under a majority government and passed under a minority one. This is at least in part because parties were weak, lacking most of the formal parliamentary and extraparlimentary institutions associated with strong party discipline.<sup>2</sup> We argue that reform came about as a result of asymmetries between the two parties and that debate was more dispersed and less organized under the Liberal government as compared to when the Conservatives held control. Our analysis shows that the debate on reform in 1866 contained many dimensions of conflict and that the agenda became more coherent and contained fewer dimensions in 1867. Our explanation of the passage of reform is based on Riker's concept of heresthetics, in which the introduction or removal of dimensions of debate can create new coalitions (Riker 1986, 1996). From this perspective, the number and details of aspects of alternatives debated plays a large role in determining collective choices (Feld, Grofman, and Miller 1988; Riker 1986). Importantly, this concept is distinct from persuasion via rhetoric; it is the manipulation of group decision making by changing dimensions of debate. In addition to addressing the passage of reform, our analysis also offers insights into the nature of partisanship in the context of weak party institutions. Through an empirical analysis of the legislative debate, we show that the language of reform became more focused under the Conservative government. As the "chaos theorems" show, decision making in

multidimensional contexts is unstable and difficult (Feld, Grofman, and Miller 1988; McKelvey 1976; Schofield 1978). As the number of relevant aspects is reduced, collective decision making becomes easier. We show that under the Conservative government, the debate over reform was more coherent and contained fewer dimensions of conflict. Based on this reasoning, we posit that this reduction of dimensionality facilitated the Conservatives' enactment of the Reform Bill of 1867.

### **Passing the Second Reform Act**

There are several foundational accounts of the passage of the Second Reform Act (e.g., Cowling 1967; Feuchtwanger 1968; F. Smith 1966; P. Smith 1967), and we provide a very brief overview here. The general election of 1865 returned 360 Liberal and 298 Conservative MPs to the House of Commons (Cook 1999, 76). The Liberal government was formed under Prime Minister Lord Palmerston, who died shortly after the beginning of the session. Earl Russell then became prime minister in October 1865. Under Russell's government, a moderate reform bill was proposed by William Gladstone, the Liberal Chancellor of the Exchequer and *de facto* leader of the Liberals in the Commons since Russell sat in the House of Lords. Liberals opposed to reform joined with the Conservatives to prevent the passing of the Liberal bill of 1866. The failure of the bill ultimately brought down the Liberal government. In June 1866, a new government was formed and was led by the Conservative Earl of Derby. Popular discontent with the failure of the Reform Bill of 1866 led to a series of protests around the United Kingdom, notably the Hyde Park Railings Affair on July 23, 1866, in which a procession organized by the Reform League clashed with police. The Conservatives, led by Chancellor of the Exchequer Benjamin Disraeli in the House of Commons, ultimately passed a similar though more radical reform bill than the proposed Liberal reform of 1866. Like Gladstone, Disraeli led the party in the Commons because the Earl of Derby sat in the House of Lords. The Reform Bill of 1867 was adopted without a recorded vote upon the third reading on July 15, 1867. While some scholars have emphasized the role of public unrest and popular sentiment as an explanation for the passage (Acemoglu and Robinson 2000), considerable disagreement exists among historians and political scientists as to the effect riots had on reform (Himmelfarb 1966; McLean 2001, Chap. 3). Hence, the puzzle remains.

For the first time, we apply modern empirical methods to historical data on the Second Reform Act, which is newly available in electronic

format. With respect to the divisions, we ourselves obtained and recorded parliamentary voting on 60 reform-related motions. We study the voting patterns of the House of Commons to understand the motivations of the MPs who directly voted on reform. For the speeches, we rely on the work of the UK Parliamentary Service which has digitized and published parliamentary debates over the past two centuries.<sup>3</sup> We analyze the nature of the agenda over reform using an expanding toolkit of empirical methods for text analysis (e.g., Bailey and Schonhardt-Bailey 2008; Grimmer 2010; Klebanov, Diermeier, and Beigman 2008; Monroe, Colaresi, and Quinn 2008; Schonhardt-Bailey 2006). Parliamentary speech is a rich source of information regarding the preferences, attention, and strategy of members. We suggest that the nature of the agenda contributed to the ability to pass reform. Specifically, we observe debate over fewer aspects of reform in 1867 and argue that group decision making was more problematic in 1866 due to multiple aspects of reform that MPs debated.

### Theories of Reform

Our primary inquiry is why reform failed under a majority Liberal government but then saw enactment under a minority Conservative House of Commons. We begin with a discussion of MP-level determinants of votes on reform and consider two sets of primary motivations. The first focuses on the influence of constituency on voting for reform. To the extent that constituency-level forces were activated between the first bill in 1866 and the second bill in 1867, MP-level determinants of votes may provide a potential explanation for initial failure and ultimate passage of reform. This explanation stresses local influences on MPs to enact reform, especially the inequalities of the electoral system, which impacted MPs differently. The second focuses on the role of party and posits competition among party leaders as the primary explanation for why the Commons expanded suffrage.<sup>4</sup> Both of these forces were influential in determining passage, yet they are both limited given the unique context of the passage of reform. The institution was composed of the same members when it voted against and then for reform.<sup>5</sup> Indeed, the same party leaders were also in power. As we detail below, our analysis finds that neither MP-level nor constituency-level determinants satisfactorily explains the passage of reform. We argue that there is a crucial chamber-level dynamic that enabled passage, and we suggest that this dynamic is the nature of debate, specifically the number of reform-related topics that were debated.

*Constituency Forces*

One view of legislative representation is that members closely adhere to the desires of their constituents (e.g., Mayhew 1974). In the case of the House of Commons, constituents mattered a great deal for representation. For instance, writing about the late eighteenth century, Namier describes “country gentleman” MPs who “had to avoid all appearance that anything counted with them for more than the approval of their constituents” (1968, 5). With respect to the Victorian House of Commons, Schonhardt-Bailey (2003) finds that MPs abandoned ideology in favor of constituency interests while voting on the Corn Laws of the 1840s. Indeed, the repeal of the Corn Laws, an import tariff that was seen as unduly raising food costs to the benefit of landed wealth, came about because Conservative MPs followed constituency to the point of destroying the electoral viability of the Conservative Party for a generation. This stands in stark contrast to the findings of Stephens and Brady (1976), which argues that, 40 years later, constituency was subordinate to party in the realm of parliamentary behavior.<sup>6</sup>

The constituency characteristics of MPs did not change dramatically between voting on the first and second bills, yet the outcomes did. Because of this, constituency can only be influential to the extent that it was activated during one of the periods. We control for a host of constituency-level factors and consider specific mechanisms of influence at work. For instance, those MPs sitting for constituencies that have the greatest number of unenfranchised poor may acutely feel pressure to support reform.<sup>7</sup> This may be either through organized political interest groups or else because of fear of violence. After the Liberal government fell, the Reform League, a pro-reform group, organized a series of protests in London. On July 23, 1866, they were prevented from entering Hyde Park and broke through railings surrounding the park. According to Acemoglu and Robinson, “the Hyde Park Riots of July 1866 provided the most immediate catalyst” for reform (2000, 1183). Although Acemoglu and Robinson (2000) makes a generalized claim about the effect of violence on reform, we consider the possibility that constituency forces were particularly influential in the aftermath of riots. That is, we examine whether MPs from those constituencies that were particularly disadvantaged by the electoral system of the day might especially prefer reform. While the mechanism in Acemoglu and Robinson (2000) originates from pressures exerted by nonelites within the citizenry, an alternative theoretical mechanism leading to reform comes from elites themselves. Lizzeri and Persico (2004) argues that it was heterogeneous preferences among elites, especially for public goods, that caused the Second Reform

Act to come about. As elites increasingly favored public goods over particularistic benefits to members from highly malapportioned boroughs, the expansion of suffrage became a preferable option to the status quo. Members who were from the largest constituencies would most likely prefer wide-ranging public goods to narrow particularistic goods. Their larger constituencies were too expensive to buy off voter-by-voter, and therefore it would be preferable to appeal to them through the broader distribution of public goods. Both mechanisms—while conceptually distinct—suggest that constituency-level factors (specifically demand of public goods and threat of electoral violence) contributed to voting behavior of MPs. The circumstances of the passage of the Second Reform Act provide an opportunity to test this hypothesis under both the Reform Bill of 1866 as well as the Reform Bill of 1867.

### *Partisan Competition*

The 1860s saw the very beginning of stronger parliamentary parties, and one set of explanations for reform has focused on political competition among party leaders (Collier 1999; Hibbert 2006; Himmelfarb 1966). According to this line of argument, each political party saw incentives in claiming responsibility for expanding the electorate. Himmelfarb (1966) argues that the Conservative and Liberal leaders were attempting to outbid each other for the highest levels of reform. Collier states that the Second Reform Act “must be understood above all in terms of the political competition between Liberal and Conservative parties” (1999, 62). These arguments suggest that those who are most invested in the success of the party should be especially supportive of the party’s position on reform. The Second Reform Act allows particular insights into this reasoning because of the circumstances of its passage.

Between the failed Reform Bill of 1866 and the successful Reform Bill of 1867, which became the Second Reform Act, there was no general election. The same members from the same constituencies voted on both bills.<sup>8</sup> What did change was the party in control who was pushing for passage of the legislation. To the extent that party competition was a dominant force in the drive for reform, Liberals should have supported the Reform Bill of 1866 and opposed the Reform Bill of 1867. For Conservatives, we should observe the opposite pattern. Obviously, this is not the case since Liberal MPs helped to bring down the Liberal government and the Conservatives passed a bill while in the minority. Himmelfarb suggests that this is because it was “the party leaders themselves” who “forced up the price of reform” (1966, 107). Partisan

competitive spirit was not uniformly allocated among MPs. In the context of legislative behavior, this clearly suggests that party effects should be strongest among party leaders and party elites such as those individuals serving as ministers in the House of Commons. Other studies have challenged this explanation. For instance, Acemoglu and Robinson argues that “the evidence does not support” an explanation based on party competition since the “Conservatives lost the 1868 election immediately after having passed the franchise extension” (2000, 1187).<sup>9</sup>

While this explanation provides reasons why party leaders pursued the reform in the first place, it does not necessarily explain why the institution collectively passed it. While the motivation for party dominance may have motivated Gladstone and his lieutenants to propose reform, it was obviously not enough for the bill to pass in the Liberal-majority Commons. As we show, party is a dominant force in voting for reform, but we make two caveats. First, the political parties of the 1860s lacked the formal parliamentary institutions associated with British parties of the twentieth century and beyond. Most notably, the prime minister and cabinet had yet to take the full control of the business of the house associated with modern party government (inter alia Cox 1987; Eggers and Spirling 2014; Lowell 1926). Gash (1974, 393) refers to this era as one of “club government,” when associations were based not on tightly organized parliamentary parties but London social clubs with shared but hardly monolithic political views.<sup>10</sup> So to the extent that party influenced voting on parliamentary reform, its force was fragile and its mechanisms were amorphous. Second, we find that party operated asymmetrically between the Liberals and the Conservatives. Regardless of the effect that partisanship had on MP voting, it fails as a chamber-level explanation for reform.

### *Nature of Debate*

We propose a third explanation for the passage of reform and argue that it represents the most proximate cause for why the Second Reform Act passed. This explanation focuses on the nature of debate surrounding reform. Specifically, we argue that the reduction in the number of aspects of reform that were debated created the opportunity for passage. The Second Reform Act allows for an unusual opportunity to investigate this chamber-level explanation of reform because of the change in leadership between 1866 and 1867 without a general election. We leverage this change to examine the nature of debate over reform in each period. A possible mechanism by which parties can exercise various degrees of control in legislative environments is through the nature of the



debate. A well-established literature argues that the greater the number of aspects of an alternative that are considered, the more difficult collective decision making becomes (Feld, Grofman, and Miller 1988; McKelvey 1976; Schofield 1978).<sup>11</sup> By influencing the scope and content of collective decision making, parties may affect legislative change.

Any issue may be discussed in a variety of ways, and various aspects of it may be more or less relevant to decision makers. The more aspects of debate are considered, the more unstable and difficult collective choice, *ceteris paribus*. As we argue below, the nature of reform debate under the Liberal government in 1866 was complex and varied, while the relevant aspects of reform discussed and considered were more concentrated under the Conservative government in 1867.

Analogous arguments are made in different contexts by scholars examining legislative outcomes in the context of interest groups and lobbying. For instance, Baumgartner and Jones argues that the number of topics or dimensions over which a specific issue is discussed is directly relevant to its legislative passage. This is because “anytime political actors can introduce new dimensions of conflict, they can destabilize a previously stable situation” (2009, 14) and “[i]n any situation where voting matters, stability is dependent on the dimensions of conflict present” (13).<sup>12</sup>

The primary fight for reform in Victorian Britain was not between those who outright opposed or supported it. There was substantial agreement over the need or at least inevitability of the expansion of democratic suffrage. The debate was over the form it ought to take. Yet, some previous scholarship has chosen to ignore the importance of these debates. Saunders (2007) points out that some have characterized the record of the parliamentary debates on reform as “a corpse,” “rich only in the ability to irritate and to bore” (Hoppen 2000, 237); a rhetorical “humbug” that proved “sadly ineffectual” in shaping legislation (F. Smith 1966). Other studies argue that the parliamentary debate was crucial in the passage of reform as a means to reconcile the hotly contested “*nature* of reform” with the more generally accepted “*principle* of change” (Saunders 2011, 22). The barrier to earlier passage was the “complexity of reform” (22), which was overcome for passage to occur. Our findings present quantitative evidence for these arguments.

To summarize, from the three frameworks described above, we analyze the dynamics of the passage of the Second Reform Act. The first focuses on the role of partisanship as determining the views of MPs. We refer to this as the *partisanship* explanation. The second argues that constituency was the decisive influence on MPs, and we refer to this as the *preferenceship* explanation. Finally, we consider an institution-level



explanation based on the structure of the debate over parliamentary reform. We refer to this as the *rhetorical structure* explanation. We consider each explanation and its implications for the passage of reform.

### Passing Reform: Votes

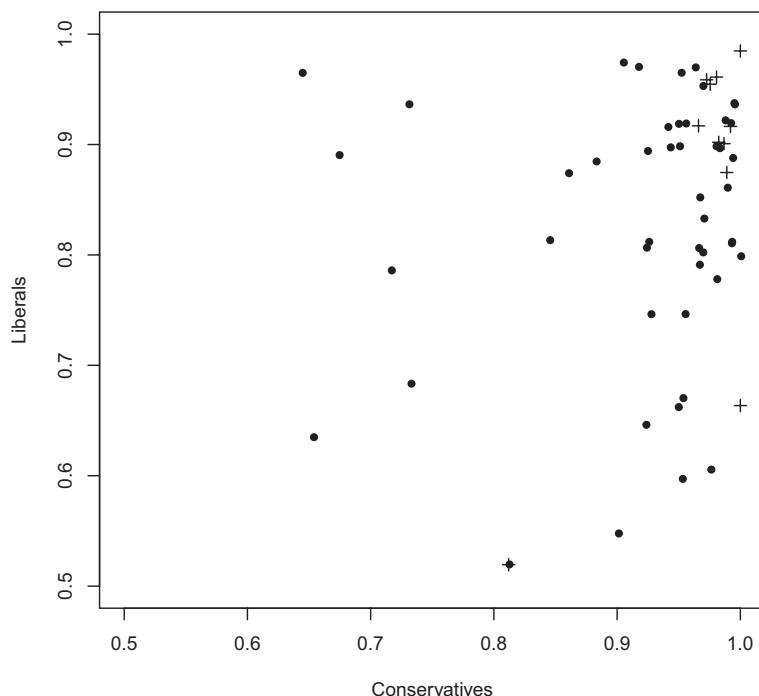
In this section, we investigate the role of party and constituency in the domain of parliamentary voting. We analyze votes on the Reform Bills of 1866 and 1867. There were a number of recorded votes on reform-related legislation including 10 divisions on the Reform Bill of 1866 and 50 divisions on the Reform Bill of 1867, which passed and became the Second Reform Act.<sup>13</sup> Before we turn to the multivariate analysis, we conduct an analysis of party cohesion among the Liberals and the Conservatives on matters of reform. Figure 1 presents a basic analysis of the cohesiveness of votes. Each point indicates the proportion of the party in the majority for each party on a single division. As is clear, there are strong partisan divides on most votes. We often see 90% of each party voting together. Yet we also see divisions where the Conservatives vote as a block and Liberals do not (these divisions are located in the lower-right-hand corner of the figure). We see fewer votes (although some) where Liberals vote together and Conservatives split. And we see a single instance where party unity fall below 70% for both parties.

Within each party, there is substantial variation in ideology with respect to reform. Yet there is suggestive evidence that ideology is secondary to party. Consider John Stuart Mill and Robert Lowe. Both were Liberal MPs with polar opposite ideological views toward reform.<sup>14</sup> While Lowe vocally opposed reform, the political philosopher Mill argued for even more including suffrage for women, a radical notion in the 1860s. Despite these ideological differences, Mill and Lowe had strikingly similar voting records, voting together on 32 out of a total of 46 motions for which they were both present.<sup>15</sup> This most basic analysis of votes suggests influences on voting other than the ideology (as distinct from partisanship) of MPs.

We consider the possibility that reform passed because Disraeli manufactured an ideological realignment within his party. By estimating and comparing MP's ideological preferences for reform—their ideal points on reform—we consider the possibility of a reversal of MP preferences between the first and second bill. If this were the case, we would see Conservatives move to the left closer to ideological stalwarts like John Stuart Mill who support reform and away from MPs like Lowe who oppose it. Figure 2 shows the result of such an analysis between the two periods. Along the *x*-axis, we plot the estimated reform ideal points of

FIGURE 1

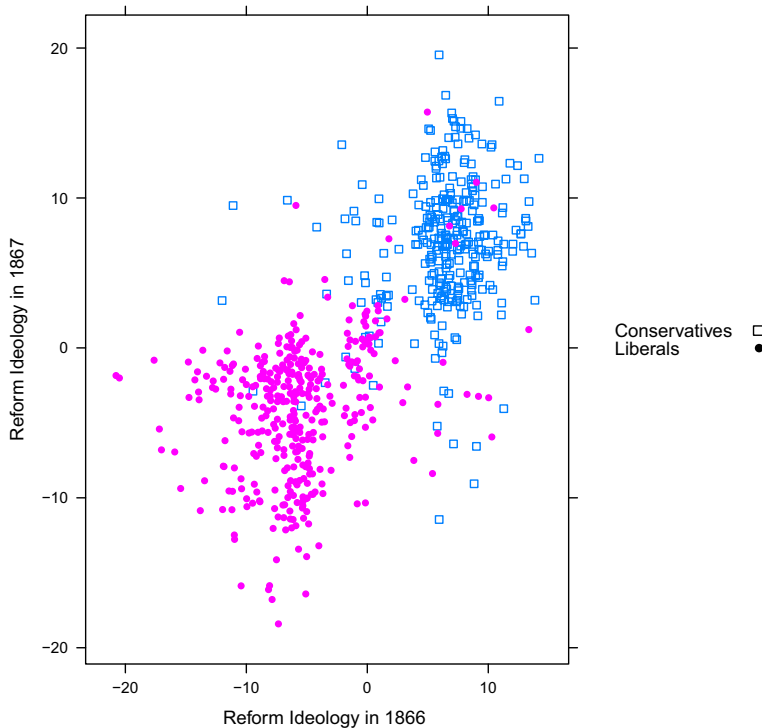
Liberal and Conservative Cohesion on Divisions on Reform Bill of 1866 (+) and Reform Bill of 1867 (•). Each Point Represents the Size of the Liberal Majority (on the y-axis) and the Conservative Majority (on the x-axis)



MPs using divisions on reform only in 1866. Along the y-axis, we plot estimated ideal points of the same MPs using divisions from reform in 1867.<sup>16</sup> Members close to the 45-degree line indicate little change in ideology between 1866 and 1867. Boxes show Conservative MPs and circles show Liberal MPs. The picture presented in Figure 2 does not suggest an *en masse* repositioning of the Conservative Party with respect to parliamentary voting.<sup>17</sup> Voting in both periods was fairly consistent without much variability, showing no evidence of ideological repositioning of either party. It does not seem that Conservatives realigned themselves to become more pro-reform between 1866 and 1867.

Taken together, this analysis of the divisions shows several things. First, Conservatives were generally more cohesive than Liberals, but both parties were relatively stable when voting on reform. We also see no

FIGURE 2  
MP Ideal Points Derived from Votes on Parliamentary Reform during  
Debates on the First Reform Bill ( $x$ -axis) and Second Reform Bill  
( $y$ -axis)



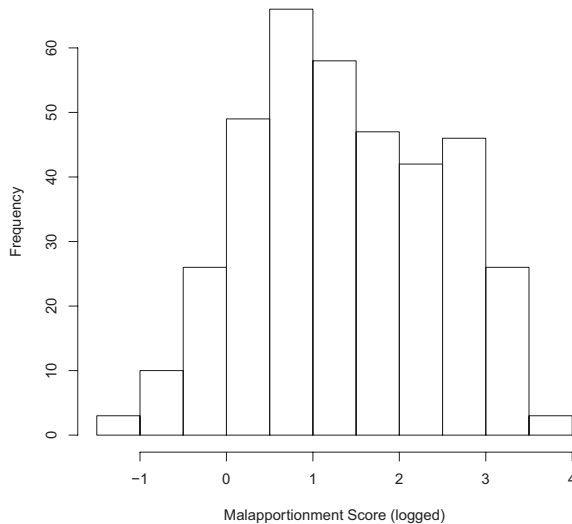
major shift in voting patterns among Liberals and Conservatives between 1866 and 1867. Finally, to the extent that voting behavior is based on ideological considerations, there is no evidence for either a change in ideology from 1866 to 1867, or a substantially large difference in the ideological heterogeneity between Liberals and Conservatives.

In order to conduct a multivariate analysis, we have obtained, digitized, and compiled several pieces of member- and constituency-level data. These covariates provide measures of both party and constituency in order to evaluate their influence on voting behavior.<sup>18</sup> We also include indicators for those MPs who were in the cabinet including junior ministers. We expect that, when it comes to voting, these MPs will be especially influenced by party since they both have more to say on the nature and content of the divisions and a more vested stake in the

cohesion of the party.<sup>19</sup> We operationalize constituency pressure for reform based on the level of malapportionment and employ a measure used in Ansolabehere, Gerber, and Snyder (2002) and adapted from David and Eisenberg (1961). We calculate these malapportionment scores as a ratio of how much parliamentary representation a district actually receives versus how much it should receive in an equal elector representation scheme where every man entitled to vote had an equal share of parliamentary seats in the Commons.<sup>20</sup> The amount of representation that a district *should receive* is the total number of electors of the district divided by the total number of electors over all constituencies. The amount of representation that a district *actually receives* is the number of seats that the individual constituency receives divided by the total number of seats in the House of Commons.<sup>21</sup> Consider a nation which has 1,000 electors and a legislature with 100 seats. *District One* has 150 electors and seven seats in the legislature. If the 100 seats are divided equally among 1,000 electors, then equal representation would be one seat for every 100 electors. *District One's* malapportionment score is .47 ( $\frac{7}{150} / \frac{100}{1000} = .47$ ), a value which indicates that *District One* received less than half of the representation that it would under an equal representation system. *District Two* has 200 electors and 45 seats and a malapportionment score of 2.2 ( $\frac{45}{200} / \frac{100}{1000}$ ), meaning that *District Two* receives over twice the amount of representation it would under an equal representation system. Because of the skewed nature of the variable, we take the natural log, and so it is interpreted as a multiplicative index of malapportionment. Because of this transformation, a score of zero reflects equal population representation. Figure 3 presents the distribution of logged malapportionment scores for all constituencies in the House of Commons. Negative values represent constituencies that are underrepresented, while positive values represent overrepresented constituencies. In the online supporting information, we use alternative measures of demand for reform based on indicators of the numbers of voters who would be enfranchised under reform. Those measures include government reports on the number of working-class voters (for boroughs) and the number of individuals living in dwellings at different levels of estimated rental. The results are substantively similar to those found in this section, and we refer the interested reader to the online supporting information for more details.

In order to measure the demand for public good in the constituency, we include its population growth from 1851 to 1861.<sup>22</sup> Increases in the size of the constituency were followed with increasing need for government spending on public health infrastructure (Lizzeri and Persico 2004). For example, Birmingham saw its population increase over 27% from

FIGURE 3  
Malapportionment Scores (logged) for Constituencies in the House of Commons, 1866

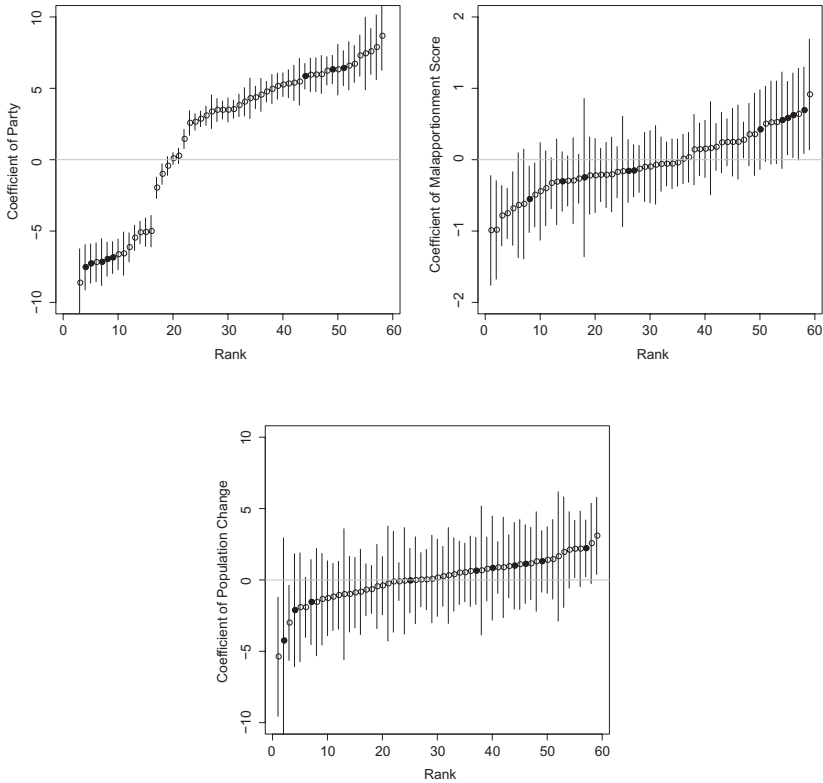


1851 to 1861. While fair representation may have concerned MPs, so likely was the provision of paved roads and clean water. To account for other potential systematic differences in parliamentary voting, we include indicators for the type of constituency for which the MP sits designating whether it is an English, Welsh, Irish, or Scottish county or borough or a university seat. Additionally, we recorded from *The Parliamentary Papers* constituency-level measures of the economy recording the amount of per capita taxes collected from each constituency.<sup>23</sup>

Our multivariate analysis of divisions on reform involves conducting 60 logistic regressions where the dependent variable is a binary indicator (0 = No; 1 = Aye) of how an MP voted on a measure. This is modeled as a function of an MP's party, his ministerial status, and constituency-level factors described above. Our analysis shows that party is consistently a strong and statistically significant predictor of vote choice, while the constituency measures of malapportionment and population growth are not. Figure 4 presents the unstandardized coefficient for party, population change, and constituency malapportionment for each reform bill division. Other independent variables—constituency type, region, taxes collected, and ministerial status of MP—are included in the models though not shown in Figure 4. We present these figures in the

FIGURE 4

Coefficients for Party (Top Panel, 0 = Conservative; 1 = Liberal),  
 Logged Malapportionment Score (Middle Panel) and, Population  
 Change for All Votes on Reform. Solid Circles Represent Votes Taken  
 in 1866, Open Circles Votes in 1867



supplemental information. The y-axis shows the size of the coefficient, and the vertical lines through each point represent the 95% confidence interval. The coefficients are ordered along the x-axis from smallest to largest, with solid circles indicating those divisions voted on in 1866. What is clear is that, even while controlling for a host of constituency-level characteristics, partisanship was a key determinant of voting on reform. Only three divisions see no significant party effects. Meanwhile, very few votes see statistically significant effects of malapportionment. Taken together, these results suggest that party was the driving force behind voting behavior. Malapportionment scores and population change

were infrequently related to vote, and so MPs from underrepresented industrial cities were no more or less likely to support reform than an MP from a constituency controlled by a single patron.<sup>24</sup>

While our analysis suggests that party drove voting behavior on reform, it falls short of explaining why reform passed. Our results emphasize the puzzle: if party was the dominant force, then how was it that the Liberals failed to pass reform with a majority of 360 to 298 and the Conservatives were successful with minority control? We have shown that controlling for several constituency-level characteristics, party consistently predicts votes on reform, but we have not resolved how the Conservatives succeeded or why the Liberals failed. In the next section, we analyze parliamentary speech and propose that the structure of the agenda under the Conservatives enabled the passage of the reform.

### Passing Reform: Speeches

Results from the previous section indicate that party is a powerful and significant predictor of voting behavior, much more so than constituency. The question remains however, as to how party operated to pass reform under a minority government when it was earlier defeated by a majority government. Modern parties in the British House of Commons are highly organized, cohesive entities. They exert considerable discipline on their members through parliamentary and partisan institutions and a combination of organizational rewards and punishments. Such was not the case when the reform bills were debated. At the time of the Second Reform Act, parties were not formal organizations but rather loose collections; the first national party organization did not appear until 1868. Modern parliamentary parties (e.g., Duverger 1951) did not exist in 1860s Britain, and so modern party institutions were not present to influence member behavior. In the absence of party institutions, we argue that the size and scope of the nature of debate was instrumental in leading to the passage of reform in that asymmetric party leadership allowed the Conservatives to control and focus the agenda and thereby pass a bill.

To explore party's role in legislative behavior, we examine the corpus of parliamentary debates made on the issue of reform. We use unsupervised machine-learning techniques, specifically topic models (Blei and Lafferty 2009), to uncover aspects of the reform debate and to quantify speeches and speakers.<sup>25</sup> From the corpus of debates, speeches are used to uncover topics, or dominant aspects of the reform debate. Using these methods, we estimate the structure of the reform debate— aspects of reform members talk about such as suffrage, apportionment,



electoral corruption, etc. We interpret topics as *aspects* of the reform debate. This structure is used to measure the thematic content of individual speeches. We then describe the extent to which a speech is about each of the topics that we uncover. For example, a given speech might be about suffrage and corrupt landlords, or it could focus on the moral fitness of the poor to vote. Our analysis allows us to summarize the similarities regarding which aspects of reform are discussed by each party and describe that difference between the Liberal reform bill of 1866 and the Conservative bill of 1867, as well as examine within-party differences in the framing of the debate.

We suggest that the number of aspects of the reform debate facilitated the passage of the Reform Bill of 1867 and contributed to the defeat of the Reform Bill of 1866. In the presence of multiple aspects or dimensions of conflict, achieving a collective decision is difficult and even unlikely (McKelvey 1976; Schofield 1978); however, as dimensions of conflict decrease, the possibility of collective decision making increases. In brief, our argument employs the spatial model of collective decision making and relies on results from social-choice theory. In the spatial model framework, voters and alternatives are conceived of as points in a large (and potentially multidimensional) space. In such a setting, group decision making is difficult, and the “chaos theorems” of McKelvey (1976) and Schofield (1978) show that, when voters have preferences over a multidimensional space of alternatives, majoritarian procedures often result in outcomes that are unstable and easily changed.<sup>26</sup> By examining the results of the topic model, we are able to identify contentious aspects of the reform debate and how they changed in size and scope over time.

Advances in computational linguistics and natural language processing have resulted in new methods—specifically topic models—allowing for the estimation and quantification of prominent aspects of political debate. *Which* aspects of reform MPs consider are reflected in the words used to discuss and debate alternatives. Hence, one valuable source of information concerning the dimensions of reform in 1866 and 1867 is the speeches used by MPs when deliberating reform. As noted elsewhere (Hopkins 2011), conceptualizing an aspect of political debate as a thematically coherent group of words is a useful way forward. Topic models (Blei and Lafferty 2009) implement this strategy by decomposing reform speeches into aspects or topics. Topic models are statistical methods for discovering themes contained in original texts by analyzing the words that run through them. Importantly, these techniques do not require prior labeling of documents; the topics themselves are estimated from the original texts. Fitting a topic model yields a low-dimensional

representation of the corpus of reform debates in terms of a small number of prominent themes used in deliberation of reform in floor debates and speeches. We use this method to estimate and quantify how MPs discussed reform.

We analyze all legislative speeches given in the House of Commons in 1866 and 1867 related to electoral reform.<sup>27</sup> This constitutes some 3,200 speeches made by individual members.<sup>28</sup> For each speech, words are stemmed,<sup>29</sup> and frequencies are recorded in a term document matrix. This is a  $D \times V$  matrix where  $D$  is the number of speeches,<sup>30</sup>  $V$  is number of words appearing in the corpus, and cell entries record the number of times word  $v$  occurs in speech  $d$ . After pre-processing the corpus of reform debates, we are left with 2,645 speeches made by 309 MPs (out of 712 unique members in this time period). We then uncover the aspects of reform debates by fitting a variety of topic models to these data.

We model speeches as a hierarchical process in which each consists of words from many topics. A topic is, formally, a probability distribution over words, and the composition of a speech is assumed to be a mixture of several different topics (Blei and Lafferty 2009).<sup>31</sup> We rely on two specific topic models—Latent Dirichlet Allocation (LDA) (Blei, Ng, and Jordan 2003) and Correlated Topic Models (CTM) (Blei and Lafferty 2006). This estimation technique allows for both the identification of *ex ante* undefined topics, as well as the scaling of speeches and speakers. In our analysis, each speech is assumed to be composed of words from a number of *topics* where a topic is a thematically coherent collection of words and *ex ante* unknown.<sup>32</sup> A feature of these models is their ability to capture polysemy, multiple meanings of a single word.<sup>33</sup>

Concerns about the consequences of reform are likely to use words such as “corrupt,” “bribe,” and “vote” whereas concerns for the moral aspects of reform are likely to be expressed using words such as “unfit,” “representation,” “majority,” and “class.” A single speech made by an MP may consist of many aspects. For example, it may consist of honorific ornamentation (“... I rise to address the house ...”; “The hon. and learned Gentleman ...”), followed by arguments for or against loosening suffrage qualifications. Hence, a speech is on more than one aspect of reform (i.e., topic) and may take various positions on those aspects.<sup>34</sup> Further, two speeches addressing the same aspects of reform may express differing points of view. In addition, the same word can be used in different contexts and have different meanings. For example, “Newark,” a two-member borough in Nottinghamshire could be used in an honorific context (as in “. . . the honorable member for Newark”), in a geographical context (“... boroughs with populations between 8,000 and 10,000 . . . Maldon, Newark, Stamford, Tavistock, Windsor . . .”) or in reference to

the activities of one of its representatives, Grosvenor Hodgkinson. Hodgkinson was a Liberal MP for Newark who introduced a major amendment abolishing household compounding in May of 1867. In this last meaning, the word “Newark” is used when discussing substantive aspects of the reform debate. Hence merely counting word frequencies is not sufficient to estimate different aspects of the debate: a single word can be used in multiple contexts to have multiple meanings. Topic models overcome this by allowing topic usage to depend on each specific document by accounting for and analyzing the co-occurrence of words and not their mere occurrence.

For the remainder of the article, we use the results of a 10-topic Latent Dirichlet Allocation, using Gibbs sampling for the estimation stage.<sup>35</sup> We consider a range of number of topics, but settle on 10 for a number of reasons. First, our 10 topics yield categories that are substantively meaningful and identifiable by us the researchers and consistent with the understanding of the reform debate. Second, there is statistical evidence that this is an appropriate number of topics. The 10-topic model specification presents the best fit for the data based on held-out perplexity. Further investigation of the number of topics is presented in the supporting information.

Table 1 presents the results of our fitted topic model along with the most probable word stems per topic.<sup>36</sup> Since we are limiting the corpus to only speeches made on the issue of reform, words used together frequently indicate an aspect of reform. As can be seen in Table 1, some topics are largely procedural, while others are substantive frames through which reform was discussed. Several topics frame different ways of specifically discussing suffrage (topics 5, 8, and 10). These include: *suffrage qualifications*, which focuses on the qualifications to vote especially in respect to taxation and property ownership (topic 5); *the consequences of extending suffrage* including bribery, corrupt landlords, etc. (topic 8) and; *technical* words discussing electoral statistics (topic 10). There is also a topic dealing specifically with *apportionment* (topic 2), the redistribution of seats. Another deals with MPs discussing the *House of Lords and the precedent of reform* (topic 3). Topic 4 consists of enlightenment-era ideas of *class and power* and discusses reform in broad philosophical terms.<sup>37</sup> We estimate three procedural topics: an *ornamental* category containing the platitudes of parliamentary debate (topic 1); a *process* topic containing scheduling, amending, and instruction to committees (topic 9); a *chancellor* category (topic 6) primarily containing the procedure conducted by the Chancellor of the Exchequer, the *de facto* party leader during both governments since the prime ministers were in the House of Lords (Gladstone prior to June 1866, Disraeli

TABLE 1  
The 10 Most Probable Word Stems from a 10-topic LDA Model  
Fitted on Reform Speeches

Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6	Topic 7	Topic 8	Topic 9	Topic 10
<i>ornamental</i>	<i>apportionment</i>	<i>House of Lords</i>	<i>principles, class</i>	<i>suffrage qualifications</i>	<i>chancellor</i>	<i>misc. principles</i>	<i>consequences</i>	<i>process</i>	<i>technical</i>
hon gentleman chancellor exchequ hous friend learn veri gentlemen express	borough counti town represent popul repres constitu propos larg seat	bill govern reform lord measur hous question nobl support speech	class countri power constitu polit major argument repres hous constitut	rate person pay act bill occupi household landlord paid franchis	hous subject veri opinion sir friend any question time consider	principl question bill hous propos franchis govern any countri measur	vote elect person any corrupt voter candid expens briberi system	claus committe amend govern motion word propos wish move notic	franchis counti univers vote class propos voter propteri valu land

afterwards); and miscellaneous rhetorical category broadly containing the principles by which reform is debated (topic 7). We present a complete listing and discussion of the interpretation of topics in the supporting information.

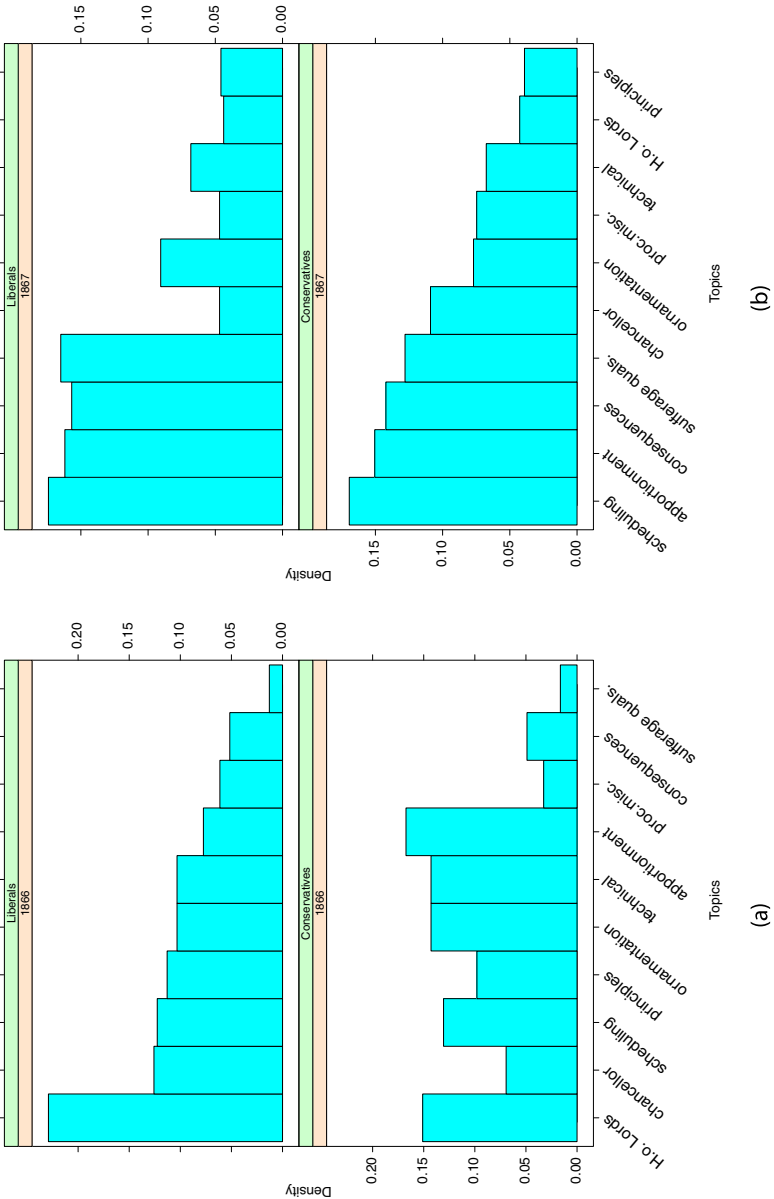
We compare the composition of debate for each party in 1866 (when Liberals were in power) to 1867 (when Conservatives were in power). Figure 5 shows the histogram of modal topics by party for each year. For the presentation in Figure 5, we assign each speech to its most prevalent (or modal) topic. In Figure 5(a), topics (arranged on the x-axis) are ordered by their popularity among Liberals, the party of government in 1866; topics in Figure 5(b) are arranged by popularity among Conservatives, in power in 1867. The emphasis on topics of reform differs between parties as well as between periods of party control.<sup>38</sup>

Under the Liberal government in 1866, Liberals and Conservatives discussed and emphasized different aspects of reform. The Liberals focused on general principles and the technical aspects of reform (though they appear primarily concerned with the activities of the House of Lords and the historical precedent of reform) while Conservatives were more focused on reform in terms of apportionment of seats. The difference between Liberal and Conservative speeches made about reform in 1866 can be seen visually as the difference between the top and bottom histograms in Figure 5(a). In terms of substantive debate in 1866, Liberal speeches decreasingly focused on the *principals*, *technical*, and *apportionment* aspects, while for Conservatives in 1866 the reverse is true. The presence of numerous dimensions of debate, we argue, made collective decision making increasingly difficult in the context of the Reform Bill of 1866. By 1867, however, both parties were discussing similar aspects of reform. Comparing the top and bottom panes of Figure 5(b) shows more similarity in the content of speeches given by Liberal and Conservative MPs on the topic of reform. By 1867, the debate is focused on *apportionment*, *consequences of reform*, and *suffrage qualifications*.<sup>39</sup>

We note that the categories that see the fewest modal speeches in 1867 include the *technical*, *principles*, and *House of Lords* categories. A single event is illustrative of how Disraeli was able to quash the considerable discussion over these topics. Throughout the reform debate, there was considerable disagreement over the requirements for suffrage. Both the details and the principles were hotly contested as to the character and the wealth of those individuals to be allowed to vote. As detailed by McLean (2001, Chap. 3), Disraeli ceded the liberal position on this question by simply accepting a “breathtaking” amendment that established a broad suffrage qualification. He did so “[i]n a thin house, which Gladstone had left for dinner” (2001, 68). In the Lords, Conservative

FIGURE 5

Histogram of Modal Topics by Speech: Left Figure (a) Shows the Distribution of Modal Topics of Speeches Made by Liberal (Top Panel) and Conservative (Bottom Panel) Members in 1866, Arranged by Popularity Among Liberal MPs; Right Figure (b) Shows Composition of Speeches Made by Liberal and Conservative MPs in 1867 (Top and Bottom Panes, Respectively), Organized According to Popularity of Topics Among Conservative MPs in 1867



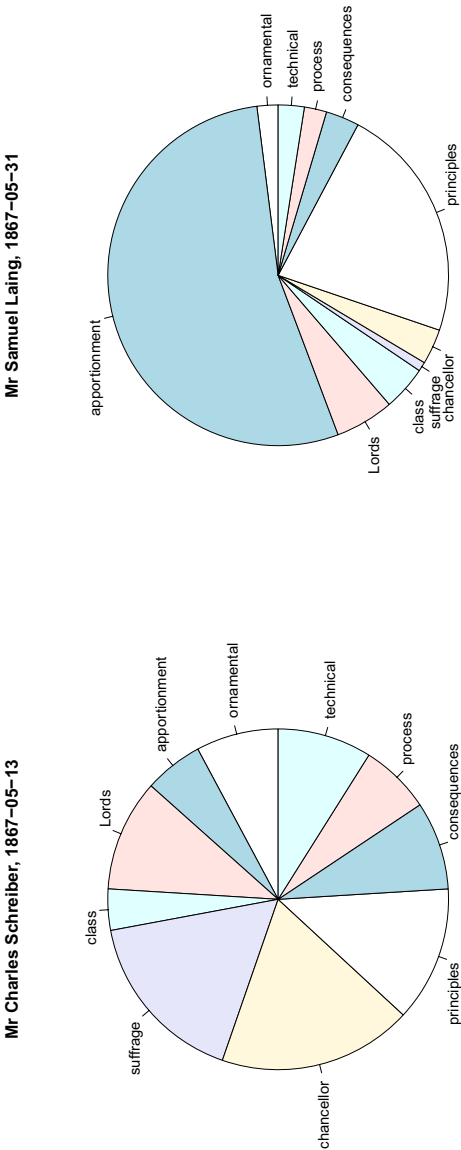
Derby “persuaded a majority of voting peers to vote against their material interests and pass the bill” (69). Thus, engaging in a surprising parliamentary maneuver, Disraeli was able to eliminate much of the cause for discussion of technical details of rating individuals or validating property holdings and the theoretical principles behind it. There was also, perhaps, more faith in the abilities of a Conservative Prime Minister in the House of Lords than there had been in 1866 when Russell led the Liberals in the House of Lords after Palmerston’s death.

We can further examine the differences in the nature of debate by investigating the concentration of topics in speeches. Topic models estimate not only the aspects of the whole reform debate but also the composition of each speech. A single speech may be diffuse, addressing many aspects of reform, or concentrated on one or a few aspects. By way of example, Figure 6 presents two speeches. The estimated composition of each speech is shown in Figure 6. On the left is a diffuse speech made by Charles Schreiber in reply to a committee progress report on May 13, 1867 (*Hansard* Series 3, vol 187 cc462). Schreiber rises to launch a “kitchen sink” attack on the lodger franchise, which would grant suffrage to those who paid no rates only rents at £10 yearly. Schreiber complains that, in debating over the amount of rent, the House had “accepted . . . a principle, independent of amount, which has been stated . . . [as] ‘that the discharge of a public duty should confer the enjoyment of public privilege’.” Schreiber then goes on to question both the technical details of the levels of suffrage (“What duty does a lodger discharge? . . . [W]hat principle is there in £10 or £15 which would withstand the first assault on the amount?”); warns against the the moral wisdom of it (“And if some day manhood suffrage enters by the door of the lodger franchise, I shall remember with satisfaction that I, for one, did my best to close that door against it.”); and discusses the effect on the political composition of the House of Commons (e.g., “I think their introduction would have a Conservative effect on the constituencies.”).

By contrast, Samuel Laing’s speech in response to committee progress on May 31, 1867 is focused on the apportionment of seats that would accompany a reform (*Hansard* Series 3, vol 187 cc 1388). The speech is dense with details and focuses on the gains and losses made by a number of parliamentary boroughs as a result of including a population threshold of 10,000 for returning more than one MP to the House of Commons. To a lesser extent, it focuses on the principles behind the decision (e.g., “It was impossible not to feel that while our system of representation was not to be based entirely on mere arithmetical computations, it ought, approximately at least, to represent the population, the property, and the intelligence of the country.”). There is very little discussion of suffrage



FIGURE 6  
The Topical Composition of Two Speeches. Estimated Proportion of Each Topic is Shown for Each Speech. In One, (Left) the Estimated Proportion of Each Topic is Relatively Diffuse. In the Other (Right), the Speech is More Focused on Apportionment and Principles of the Reform Debate



qualifications or the precedent behind the decision. It is a discussion of the details of a new apportionment scheme (e.g., “In order to apply the same principle to counties he proposed to give three Members to each county or division with a population exceeding 150,000. This would require twenty-six seats. Thus twenty-five seats would be given to the boroughs and the London University, and twenty-six to the counties, making a total of fifty-one. . .”). Laing’s concentrated dissertation on a new apportionment principle stands in contrast to Schreiber’s diffuse attack on the ideas behind the lodger franchise. We refer interested readers to consider each of the speeches in their entirety for a more complete comparison.

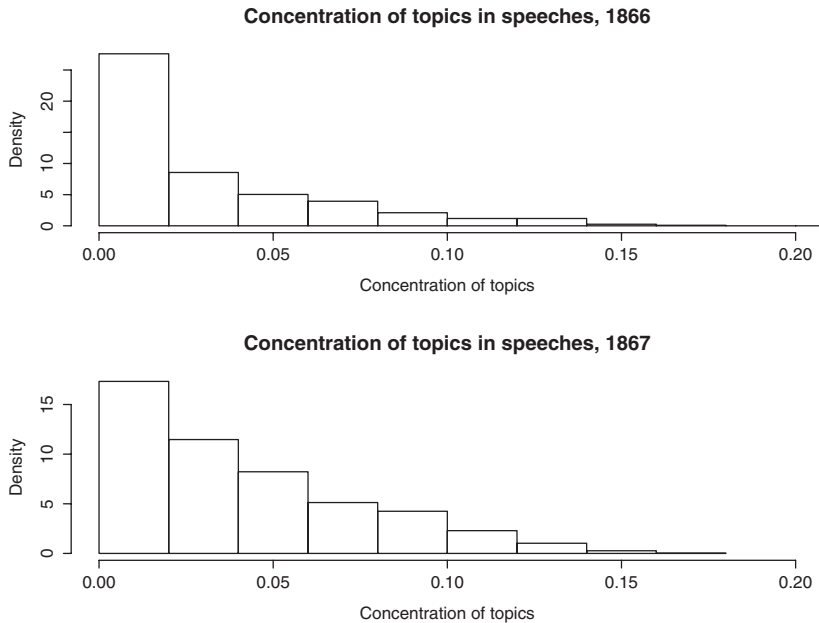
To examine the concentration of all speeches in each session, we calculate the Herfindahl-Hirschman index (HHI) of each speech based on estimated topic proportions. Speeches with a high HHI are about fewer aspects of reform like Laing’s speech in the right panel of Figure 6. Speeches with a low HHI are diffuse and focused on many aspects like Schreiber’s speech in the left panel of Figure 6.

Differences in the concentration of topics in all reform speeches for 1866 and 1867 are shown in Figure 7. In the top panel, the concentration of topics is shown for all speeches made on the Liberal reform bill of 1866, while the bottom panel shows the concentration of speeches on the Conservative reform bill of 1867. The extent to which speeches in 1867 are more concentrated than speeches in 1866 is reflected in the skew of histograms in Figure 7. As can be seen in Figure 7, the tail of the distribution in the bottom panel is thicker than the tail of the top panel, which is evidence that in 1867, speeches were more concentrated on aspects of reform than in 1866. This difference is statistically significant at the 1% level based on a Kolmogorov-Smirnov test. In the debate in 1867, the speeches were systematically more focused than in 1866. This change comes about with no major personnel or institutional change in the Commons.

Lastly, we formalize partisan and temporal differences observed in Figure 5 by examining the *rhetorical cohesion* of each party—that is, how similar the set of speeches made by Liberals are to speeches made by Conservatives. We assess the similarity of two speeches by how closely they frame reform—the estimated topic-composition of two speeches. We measure how close speeches are using the entropy-based Hellinger distance of two speeches.<sup>40</sup> It has a minimum of 0 if two speeches are (probabilistically) about the same topics and a maximum of 1 if speeches share no topics in common.<sup>41</sup> The Hellinger distance is one commonly used measure that assesses how similar two speeches are in terms of their content.<sup>42</sup> As mentioned earlier, the estimated topics are not *positions* in

FIGURE 7

Frequency of the Herfindahl-Hirschman Index of All Speeches Given in 1866 (Top) and 1867 (Bottom). Speeches Made in 1867 Discussed Fewer Topics and Were More Focused, Thematically Than Those in 1866 as Seen in the Thicker Tail of the Bottom Panel



the reform debate, but rather *aspects* of reform. Hence, two speeches are similar not because the speakers necessarily agree on a position but because they discuss reform in common terms. To examine the cohesion of reform debates, we calculate the average Hellinger distance between all Liberal and Conservative speeches in 1866 and in 1867. The results are presented in Table 2.

Each statistic provides information about the legislative cohesion within the parties under each government. For example, the average distance among all speeches given by Liberal MPs in 1866 is .264 (the top-left cell of Table 2). Of particular interest is the change in cohesion by party and by year. Rhetorical cohesion is significantly different between 1866 and 1867 at any reasonable level of significance for both parties (using a t-test for difference in means). Hence, the substantive conclusion we draw is that both Liberals and Conservatives discussed reform in a more similar manner in 1867 than in 1866.<sup>43</sup>

TABLE 2  
Average Distance Among Speeches Given by Same Party in Same Year,  
in 1866 and 1867 Using the Hellinger Distance

	1866	1867
Liberals	.264	.238
Conservatives	.258	.231

TABLE 3  
Average Distance from all Speeches Given by Liberals (Conservatives)  
to Speeches made by Party Leader (Gladstone for Liberals, Disraeli  
for Conservatives) in 1866 and 1867 Using the Hellinger Distance

	1866	1867
Liberals	.207	.176
Conservatives	.200	.166

Alternatively, comparing the average distance from speeches to party leaders provides another measure of rhetorical cohesion of a party. Instead of calculating the average distance among all speeches made by Liberal members, we calculate the average distance from all speeches made by Gladstone in 1866 to all speeches made by Liberal MPs (excluding Gladstone), and likewise for Conservatives and Disraeli. The results are qualitatively similar as can be seen in Table 3. In sum, both Liberal and Conservative speeches become more cohesive in 1867.

We find that when we compare Liberals to Conservatives, Liberals vote together less often (Figure 1), discuss reform in terms less similar to each other (Table 2) and less similar to their respective party leaders (Table 3). Taken together, this provides evidence that the debate over reform became more concentrated when the Conservatives took control. We also find evidence for asymmetric party unity. Both in terms of voting and rhetoric, Conservatives were more cohesive than Liberals. Overall, there is greater commonality among aspects of reform discussed by speakers in 1867 when Conservatives constituted the government. Party and year are predictive of how reform speeches are framed. Liberals switch from discussing reform in an unfocused manner in 1866 to discussing reform in terms of suffrage qualifications

and apportionment in 1867 (Figure 2). How does party affect legislative behavior? Our analysis suggests that, in the case of the Second Reform Act, framing of the debate, facilitated by control of the agenda plays a role.

### Conclusion

The passage of the Second Reform Act ushered in the age of democratic politics in the United Kingdom. The circumstances of its passage provides an opportunity to analyze mechanisms of electoral reform. We examine these processes by analyzing two types of legislative behavior, voting and debating in the U.K. House of Commons in 1866 and 1867. Our analysis of the reform divisions sheds light on the influences on parliamentary voting in an era of developing parliamentary parties. This analysis suggests that constituency was relatively unimportant when it came to divisions.<sup>44</sup> Thus, we find little support that these interests were activated between the first and second bill. Rather, party, as tenuous as it is, was influential during both periods. Yet this is not an explanation for ultimate passage since reform fails under a majority and passes under a minority government. To better understand how party influenced passage, we examined parliamentary debates and found stark changes in the size and scope of the debates over reform from 1866 to 1867. Using quantitative textual analysis, we showed a reduction in the aspects of debate between the two periods and argue that this was influential in determining passage.

Under the failed Reform Bill of 1866, the parliamentary debate was marked by a broad discussion of numerous topics with little overlap between the Liberals and Conservatives. Under the successful Reform Bill of 1867, Conservatives were more unified than the Liberals in the aspects of reform that they debated. There was also considerable overlap between Conservatives and Liberals. Substantively, we see that in 1866 much of the discussion focused on the the business of governance, apportionment of seats, and the technical details of the bill. In 1867, the discussion focused more narrowly on the consequences of reform and suffrage qualifications. As other scholars have documented, decision making becomes easier when the agenda is more focused. We find evidence that this applies to the passage of the Second Reform Act.

What transformed the agenda allowing Disraeli's Commons to pass the Second Reform Act? Several mechanisms are possible. These include external events such as riots in the summer of 1866; greater party discipline among Conservatives;<sup>45</sup> or the progress made in the

debates of 1866. We cautiously point to the role of leadership in shaping the nature of the debate. In a separate analysis, McLean (2001, Chap. 3) reaches similar conclusions arguing that Disraeli's political skill—or heresthetic ability—helps explain events. Even members of Disraeli's own cabinet characterized his methods as deceitful in leading his party to take “the leap in the dark” on reform.<sup>46</sup> This emphasis on the role of leadership is also made by Stephens and Brady, which argues that legislative cohesion was a function of “skill of party leadership” (1976, 491) in the 1880s House of Commons.<sup>47</sup> On account of weak party institutions, Gladstone and Disraeli lacked the control of the Commons that their successors would experience. In that age of developing political parties, it was perhaps the case that carefully structuring the nature of the debate around a topic allowed Disraeli (and other leaders finding themselves with weak legislative coalitions) to pass bills not necessarily preferred by a majority of the legislature. Future research should investigate similar patterns in other weak party legislatures both historically and at present.

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## NOTES

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1. Scotland and Ireland were subsequently reformed in separate acts in 1868.
2. For example, national party associations did not exist; the National Union of Conservative and Constitutional Associations was founded in 1868 and the National Liberal Federation was established in 1877.
3. In the United Kingdom, members' debates and speeches have been recorded in *Hansard* since the beginning of the nineteenth century.
4. The influence of party and constituency is a question of general interest to scholars of legislative behavior (e.g., Ansolabehere, Snyder, and Stewart 2001b; Mayhew

1974; Miller and Stokes 1963; Rohde 1991) and one extensively examined in the context of the Victorian House of Commons (e.g., Aydelotte 1963; Cox 1987; McLean and Bustani 1999; Schonhardt-Bailey 2003; Stephens and Brady 1976).

5. There were minor changes in membership owing to death and replacement by other means.

6. Numerous quantitative studies of the Congress of the United States have also examined the role of party and constituency in determining legislative behavior (e.g., Miller and Stokes 1963). These studies often find that both exert significant influence over roll-call voting though the relative influence may wax and wane over time. For instance, Ansolabehere, Snyder, and Stewart (2001b) uses preelection surveys of members of the U.S. Congress to examine how personal preference, constituency preferences, and party influence roll-call voting. Their findings show that party indeed exerts a substantial effect on roll-call votes especially when the votes are procedural or particularly close. In an analysis from 1874 to 1996, Ansolabehere, Snyder, and Stewart (2001a) finds that party exercises substantial influence well beyond that of district preference with respect to the behavior of Congressional candidates.

7. As we address later in the article, there are a number of ways to conceptualize constituency pressure for reform, and we employ a number of measures to do so.

8. The exceptions are MPs who died or resigned their office.

9. As Himmelfarb points out: "Although the Conservatives lost the election of 1868, they won those of 1874 and afterwards more than held their own—and this at a time when industrialization, democratization, trade-unionism, social reforms, and the like might have been expected to throw the balance in favor of the Liberals" (1966, 136–37). Additionally, just because the Conservatives lost the election 1868, it does not prove that the Second Reform Act was not an attempt to help them win it.

10. See Gash (1974, Chap. 15) for an overview of the roles of clubs in parliamentary political life.

11. In the extreme, collective decision making when there is only one dimension of conflict is "easy" when voters' preferences are single-peaked (Black 1958) and "chaotic" when there is more than one dimension of conflict (McKelvey 1976; Schofield 1978). Feld, Grofman, and Miller (1988) provide bounds on the "difficulty" of collective choice as the dimensionality of conflict changes.

12. A similar argument is made in Baumgartner et al. (2009, Chap. 3).

13. It is important to note the limitation of this (and any) roll-call analysis. Many of the most important aspects of bills pass via voice vote or without a vote at all. This is true, for example, of the final vote on the Second Reform Act. It is also true of the Hodgkinson Amendment, which liberalized the proposed franchise by eliminating the practice of compounding, a major obstacle to mass suffrage. The episode through which this Liberal amendment was deftly accepted by Disraeli is detailed in McLean (2001, Chap. 3). This episode is just one illustration of the importance of narrative history based on archival sources such as personal letters to understand political processes. We proceed with this caution in mind.

14. The differences between these two men are well documented. See, for example, Trevelyan (1913) and McLean (2001, Chap. 3).

15. A chi-squared test on the contingency table of Mill's votes and Lowe's votes confirms that there is no association between the voting of these two MPs.



16. Ideal points are estimated using a one-dimensional Bayesian IRT model of Clinton, Jackman, and Rivers (2004), implemented in the “pscl” package Jackman (2012). The model is identified by fixing the positions of MPs Lowe and Mill in 1866 and 1867. Estimates from different years are made comparable by assuming that Lowe and Mill’s ideal points did not change from 1866 to 1867. These are only identifying assumptions. Posterior means shown are based on 10,000 MCMC iterations (thinning every 100 iterations), after a burn-in of 5,000 iterations.

17. Interpretation of the estimated latent traits in Figure 2 is less important than the lack of difference in MPs’ estimated position between 1866 and 1867. The identifying assumptions serve to make these estimates comparable over time.

18. MP partisanship is obtained from several registers that are available for the period (*Dod’s Parliamentary Companion* 1865; Mair 1867).

19. We obtain this information from Cook (1999).

20. In other analyses, we have also operationalized malapportionment based on total population instead of the total number of electors in the constituency. While there are theoretical reasons to prefer one or the other, the empirical findings are substantively the same.

21. The notion of fair and equal representation might be contingent on the historical context and likely varied among individual MPs. For example, many held that not all adults were considered equally worthy of participating in political life nor being represented (e.g., women, illiterates, working class, etc.). For our main measure of malapportionment, we use the number of electors—those allowed to vote—rather than the total population of district. In the analysis, we employ other measures of the extent to which a district would be affected by reform as robustness checks.

22. In other analyses, we operationalize this as raw measure of constituency populations, values which are highly correlated with both population change and malapportionment. The results are substantively the same as those that we present.

23. See Reeves (2008) and Daunton (2001) for more details on this measure.

24. In the supporting information, we include a number of robustness checks on this model. First, we include other constituency-level measures such as number of working-class voters in the constituency (available only for boroughs) and number of renters residing in different categories of rental dwellings. The substantive findings are also robust to alternative malapportionment scores based on population instead of electors and formulating demand for public goods and total population of constituency instead of population change.

25. While “debates” have a discursive nature that “speeches” do not necessarily have, we use the two words interchangeably. In the nineteenth-century House of Commons, parliamentary speeches were seen as genuine opportunities to sway undecided MPs.

26. Exceptions occur only in knife-edge circumstances (Plott 1967).

27. Entries in *Hansard* are recorded by topic. We select all speeches listed in *Hansard* associated with the topic of reform in 1866 and 1867.

28. A natural concern is that of selection, or who gives speeches. While ministers are overrepresented as speakers, the corpus of speeches is more evenly represented. For a further discussion, see the online supporting information.

29. For example, words like “fish” and “fishing” share a common stem, “fish.”

30. We use  $D$  to be both a set of all documents as well as its cardinality, similarly for  $V$ .

31. Other examples of hierarchical Bayesian modeling of speech include Grimmer (2010) and Monroe, Colaresi, and Quinn (2008).

32. The model is presented more formally in the online supporting information.

33. Introductions to topic modeling and generative models can be found in Blei (2012) and Steyvers and Griffiths (2007).

34. The potential for a single speech to contain more than one theme is formally captured by using *admixture models*, in which units are a combination of latent components. The topic models used here are examples of admixture models.

35. We fit the same model using variational EM algorithm (Blei, Ng, and Jordan 2003; Grimmer 2009), as well as a more general model, the Correlated Topic Model which allows for correlation between topics (LDA assumes topics are conditionally independent).

36. Turning again to the “Newark problem” of polysemy, each word is more or less likely to appear in each given topic. We present the 10 most probable words per topic in Table 1. In the case of the word “Newark”, it is the 3296th, 3313th, 3652nd, 3966th, 3142nd, 3411st, 3348th, 3371st, 112th, and 3339th most common word in topics 1–10, respectively. Hence, while the word may be used in many contexts, it appears that in our corpus of reform debates, it is used most often when discussing procedural matters, such as amendments.

37. The two MPs whose speeches contain the most topic-4 content are John Stuart Mill and Robert Lowe, the former a radical advocating, among other things, women’s suffrage, the latter a vocal anti-Reform Liberal and a leader of the Adullamites. The dominance of these two ideologues jibes with our interpretation of this topic as the moral and principled aspects of reform.

38. Topic models assume the data-generating process is such that each speech can be “about” multiple topics and further that a topic is simply a distribution over words. Figure 5 shows the modal topic of each speech by party-year. So, while all our estimation and calculations are done using the full estimated topical distribution at the document (and speaker) level, Figure 5 only shows one aspect of that document-level topical distribution, namely the mode. This is purely for visual presentation in Figure 5 only: the analysis that follows incorporates the full estimated topical content of speeches.

39. Additionally, in the online supporting information, we specifically consider the role of the Adullamites, conservative Liberals who opposed reform and attributed to the failure of the Reform Bill of 1866.

40. The Hellinger distance measure is commonly used in the information-retrieval literature. Blei and Lafferty (2009) uses this method to compute the similarity of scientific articles. Since the posterior distribution of speeches may alternatively be thought of as a composition of topics rather than a probability distribution over topics, many other compositional metrics may also be employed to calculate how similar two documents are. For example, Grimmer (2010) employs the metric defined in Billheimer, Guttorp, and Fagan (2001).

41. If two speeches  $d, d'$  have posterior topic distributions  $\hat{\theta}_d$  and  $\hat{\theta}_{d'}$  over  $K$  topics, then the Hellinger distance between the two is given by  $\frac{1}{2} \sum_{k=1}^K \left( \sqrt{\hat{\theta}_{d,k}} - \sqrt{\hat{\theta}_{d',k}} \right)^2$ .

42. One criticism of this measure of similarity is that MPs, especially minsters, specialize and that the content of their speeches divides along areas of expertise. However, because we analyze just the corpus of parliamentary speeches made on the topic of reform, and because specialization likely affects both parties in similar magnitude, this criticism is likely not a significant issue in the subsequent analysis.

43. As a further test, we calculate and compare the Hellinger distance between all speeches made by Conservatives in 1866 and speeches made by Liberals in 1866 (with a mean of .266) to the Hellinger distance between all speeches made by Conservatives in 1867 and speeches made by Liberals in 1867 (mean .265). While the distance between Liberals and Conservatives is less in 1867 than in 1866, it is not statistically different at any reasonable level of significance, using a two-sided t-test.

44. This is to say that the constituency factors we account for did not predict voting behavior. Those variables were population, population change, and other measures of how reform would affect a constituency. These factors had no substantial affect on an MP's voting behavior, *ceteris paribus*.

45. For evidence of greater party unity among the Conservatives, see Hanham (1959).

46. Viscount Cranborne, after studying closely statistics used by Disraeli to argue for his 1867 bill, tells a colleague: "[I am] . . . firmly convinced now that Disraeli has played us false, that he is attempting to hustle us into his measure, that Lord Derby is in his hands and that the present form which the question has now assumed has been long planned by him" (as recorded in Lord Carnarvon's diary, 21 Feb 1867) (Roberts 2006, 89).

47. This point is similar to the one made in Cooper and Brady (1981).

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### Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Figure 1. Coefficients for constituency type (borough or county) crossed with region (England, Wales, Scotland, Ireland) (top panels) for all divisions on reform. Solid circles represent votes taken in 1866, open circles votes in 1867

Figure 2. Coefficients of ministerial status (top panel; 1 for minister, 0 else) and logged taxes per capita (bottom) for all votes on reform. Solid circles represent votes taken in 1866, open circles votes in 1867

Figure 3. Coefficients of party (top left) and percent working class (top right) population change (bottom) for all MPs from borough constituencies. Solid circles represent votes taken in 1866, open circles votes in 1867

Figure 4. Coefficients of party (top panel) and population change (1851–1861) (bottom) for all MPs from county constituencies. Solid circles represent votes taken in 1866, open circles votes in 1867

Figure 5. Estimated coefficients of occupiers and owner-occupiers of tenements with gross rateable value assessed at various levels for all MPs from county constituencies. Solid circles represent votes taken in 1866, open circles votes in 1867

Table 1. Hierarchical logistic analysis regressing a binary variable indicating if an MP gave any speeches about reform on: the total taxes raised in MP's constituency; party; change in constituency population (from 1851–1861); a binary variable indicating if the MP was a minister or not and; random constituency-type intercepts. Intraclass correlation is indistinguishable from zero (not shown)

Table 2. Frequency of speakers by position in the House. Thirty-one out of 44 ministers (roughly 88%) gave speeches on reform, while only 41% of non-ministers gave speeches

Figure 6. Held out perplexity based on 80% training, 20% test of LDA with different number of topics

Figure 7. Histogram of modal topics by speech: upper left shows the distribution of modal topics of speeches made by Liberals, "Adulamites" and Conservatives in 1866 and 1867

# *Supporting information for “Taking the Leap: Voting, Rhetoric, and the Determinants of Electoral Reform”*

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February 5, 2014

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# 1 Analysis of divisions

## 1.1 Effect of control variables, main text

In the manuscript, we plot the main coefficients of interest for party and constituency-level demand for reform. The following figures plot the other variables described in the paper. Figures 1 and 2 plot the coefficients for region, taxes collected (constituency-level) and ministerial status (MP-level) based on the model described in the text.

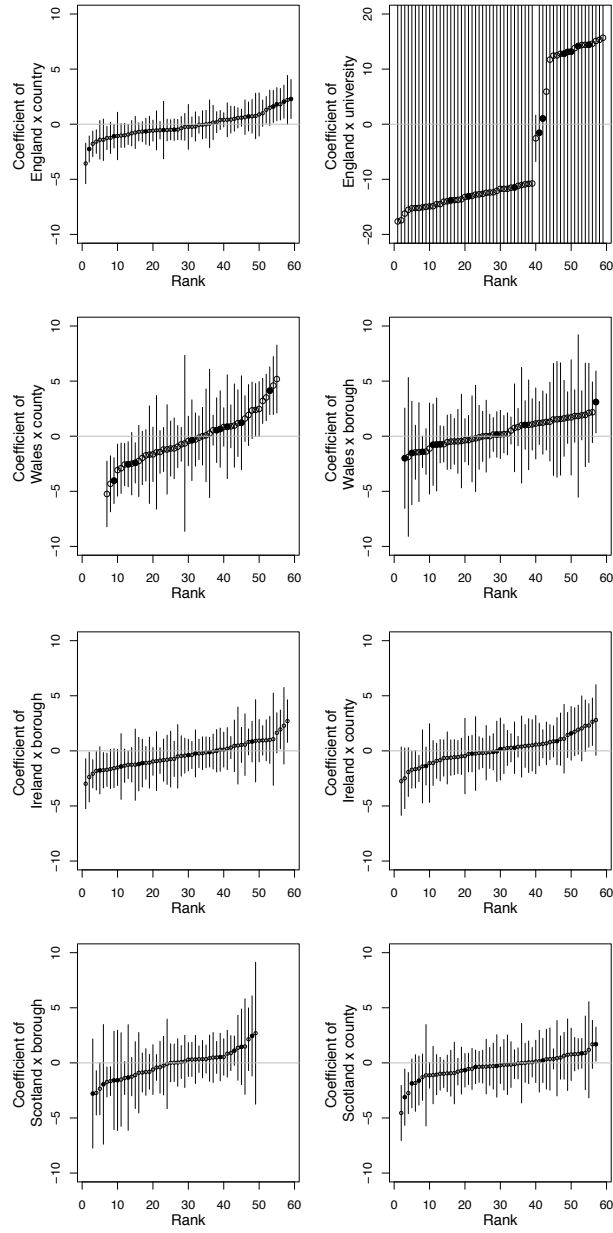


Figure 1: Coefficients for constituency type (borough or county) crossed with region (England, Wales, Scotland, Ireland) (top panels) for all divisions on reform. Solid circles represent votes taken in 1866, open circles votes in 1867.

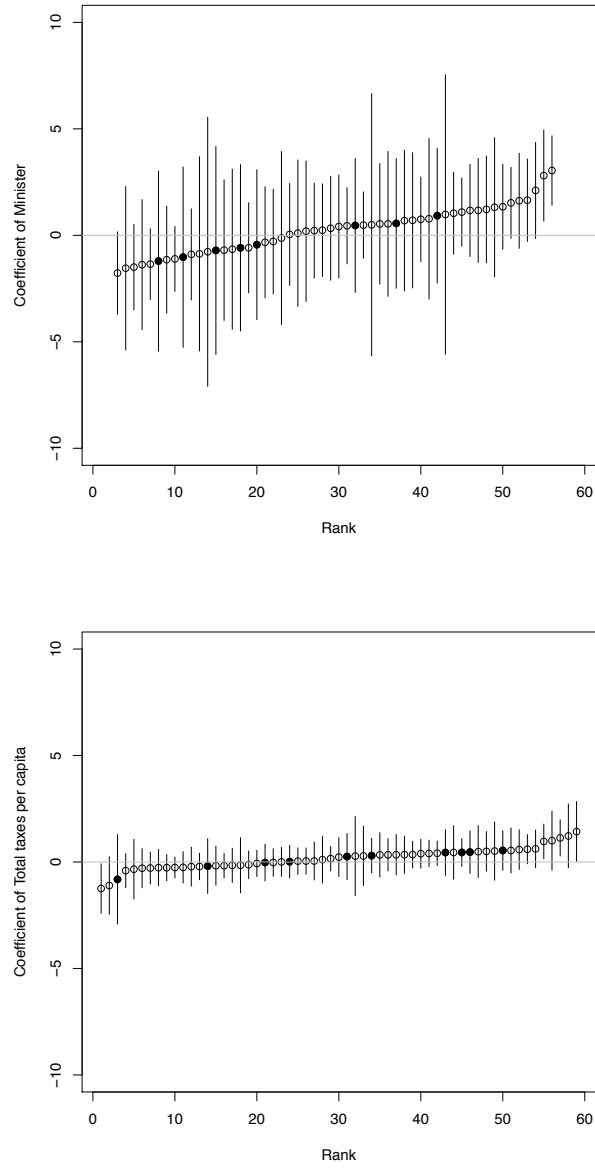


Figure 2: Coefficients of ministerial status (top panel; 1 for minister, 0 else) and logged taxes per capita (bottom) for all votes on reform. Solid circles represent votes taken in 1866, open circles votes in 1867.

## 1.2 Alternate measure of effect of reform on constituency

In this section, the analysis presented in the main text is repeated excluding malapportionment and instead using alternative measures of the potential impact of reform. Rather than use malapportionment of a constituency as a measure of the potential gain from reform, we use the approximate numbers of persons living in each English and Welsh borough and county that would likely be enfranchised by reform. This data is drawn from the reports the House commissioned in 1866, obtained from the *Parliamentary Papers*.<sup>1</sup>

One of the reports includes a measure of “working class” residents for borough constituencies (P.P. 1866 (169) 2). This allows us to include that figure as a percentage of the electorate in 1865 (variable `pctVtrsWork`). This statistic is unavailable for counties; however, one report does list the number of male occupiers with gross estimated rental at various amounts. Specifically, the report includes the number of male occupiers of land or tenements with a gross estimated rental between £14 and £20 , between £20 and £50 , and above £50, which include as percentage of the constituency’s electorate in 1865 (variables `pctOccAssess14.20`, `pctOccAssess20.50`, `pctOccAssess50`) respectively). In addition, for county constituencies the number of *owner* occupiers are reported based on the same brackets as with the occupiers. In alternative specifications we include those variables as a percent of the electorate (variables `pctOwnoccAssess2.14`, `pctOwnoccAssess14.20`, `pctOwnoccAssess20.50`).

As in the main text, each reform division is regressed separately. The results are displayed in Figures 3-5. Because we must analyze boroughs and county constituencies separately, dramatically reducing our number of observations for each vote, several votes are completely determined and we exclude those from the analysis. To save the reader from clutter, only the main variables of interest are presented.

Conceptualizing constituency demand for reform in a number of different ways yields the same substantive results. While party remains a statistically significant predictor of reform in Figures 3 and 4, constituency characteristics are not influential factors in determining votes on reform. While we are still susceptible to omitted variable bias, numerous specifications of our model yield substantively similar results.

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<sup>1</sup>Specifically, we obtain the figures from: *Return of the total number of voters in every borough and city in England and Wales in which there was a contest at the last election; of the number of voters of the working class in such boroughs; of the number of voters of all the other classes collectively; and, of the number of voters who voted for any candidate at the last election; P.P. 1866 (169) and County electoral statistics; and occupiers and owners of property in counties. Returns relating to county electoral statistics, and occupiers and owners of property in counties; P.P. 1866 (335).*

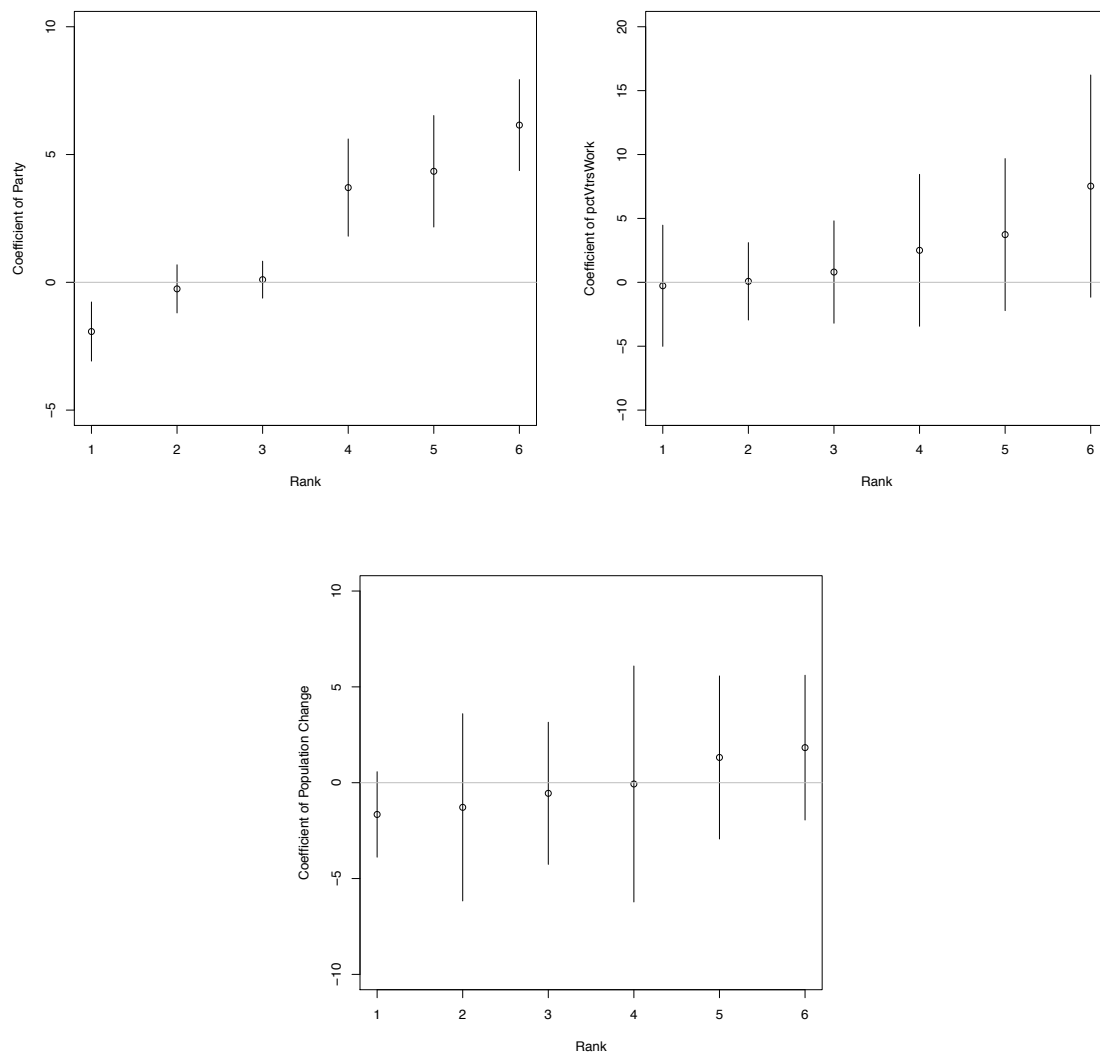


Figure 3: Coefficients of party (top left) and percent working class (top right) population change (bottom) for all MPs from borough constituencies. Solid circles represent votes taken in 1866, open circles votes in 1867.

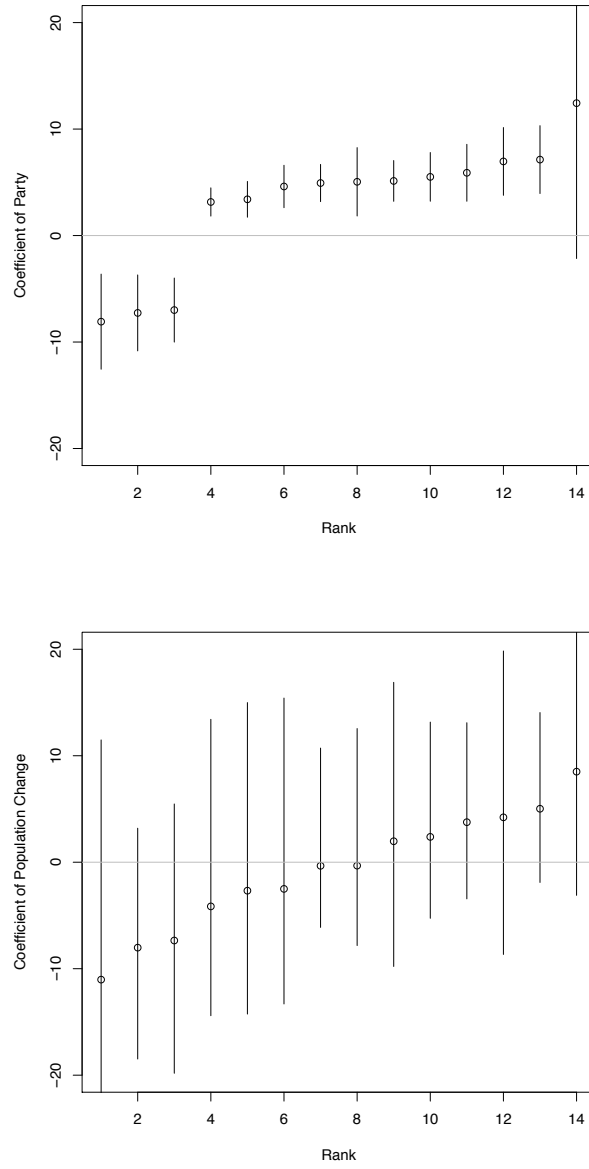


Figure 4: Coefficients of party (top panel) and population change (1851-1861) (bottom) for all MPs from county constituencies. Solid circles represent votes taken in 1866, open circles votes in 1867.

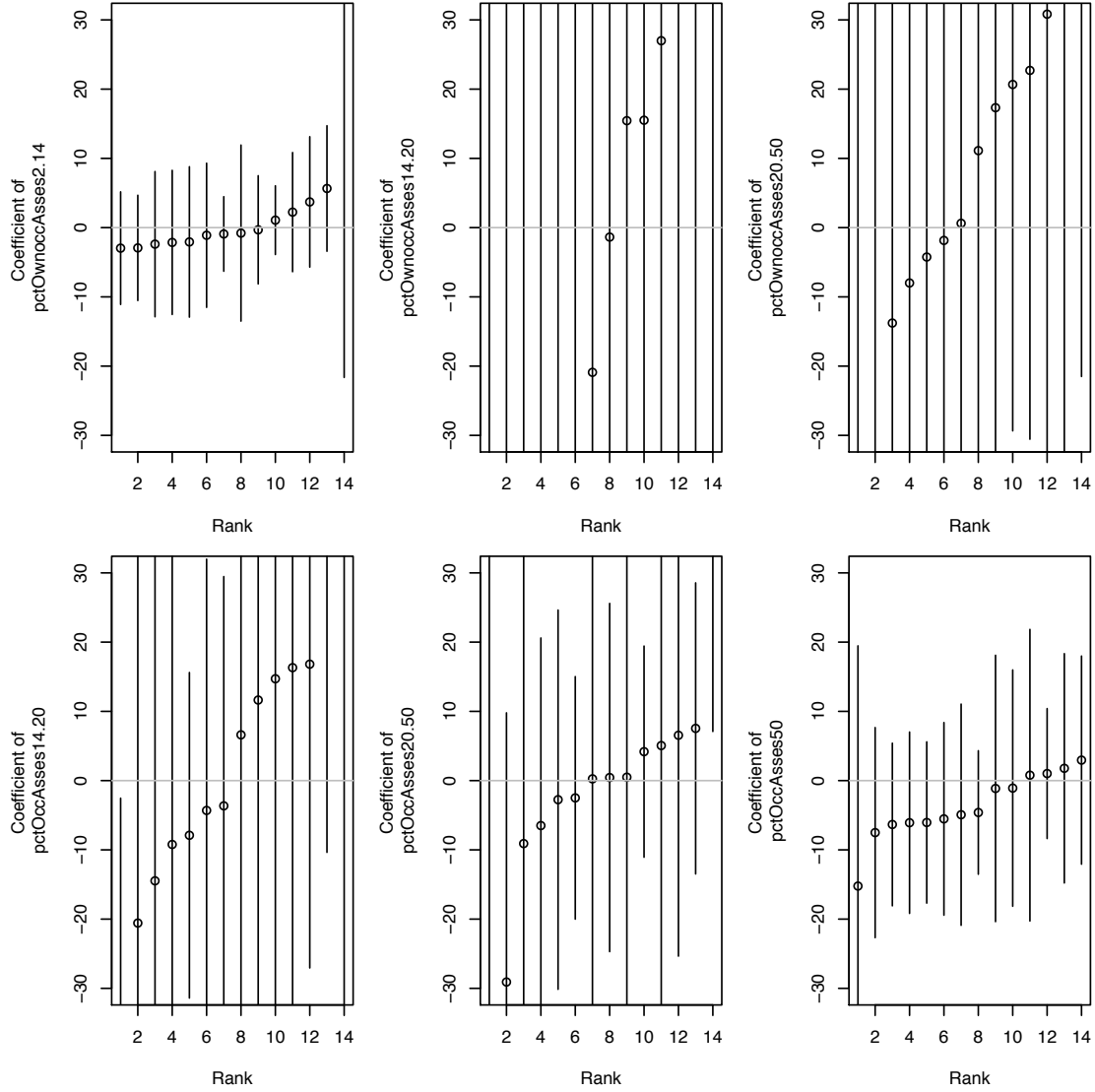


Figure 5: Estimated coefficients of occupiers and owner-occupiers of tenements with gross rateable value assessed at various levels for all MPs from county constituencies. Solid circles represent votes taken in 1866, open circles votes in 1867.

## 2 Presence of Reform Speech

Before investigating the framing and dimensions of the reform debate, we examine which MPs choose to speak on the issue of reform. Not all MPs participated in debates, and so we first investigate the characteristics of MPs who chose to address reform in the House of Commons. Table 1 shows the results of a multi-level logistic regression, the dependent variable being 1 if a member gave at least one speech (with more than 10 words) about electoral reform in 1866-1867. Noting that members from similar geographic constituencies might have correlated interests, we allow random intercepts by the type of constituency with designations for English, Scottish, Welsh, or Irish and borough, county, or university seats.

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	-1.38	0.39	-3.58	0.00
Total taxes (per capita logged)	0.53	0.19	2.82	0.00
Party(Liberal = 1)	0.18	0.17	1.06	0.29
Change in Population	-0.43	0.56	-0.76	0.45
Malapportionment	0.22	0.09	2.40	0.02
Minister	1.27	0.36	3.51	0.00

Table 1: Hierarchical logistic analysis regressing a binary variable indicating if an MP gave any speeches about reform on: the total taxes raised in MP’s constituency; party; change in constituency population (from 1851-1861); a binary variable indicating if the MP was a minister or not and; random constituency-type intercepts. Intraclass correlation is indistinguishable from zero (not shown).

In Table 1, independent variables include the total taxes collected from an MP’s constituency, a binary variable indicating if an MP was a member of the Liberal party, the constituency-level change in population from 1851 to 1861, the log level of malapportionment of constituency (measured in the same way as described in the previous analysis in this paper), and an indicator if the MP was a minister in the government or not. Table 1 shows that rather than party or population growth, the position of an MP in the House is a significant predictor of if an MP talked on the matter of reform or not. Ministers talk about reform more than non-members, and there appears to be no effect of party on whether or not an MP discusses reform. Ministers likely give more speeches than non-ministers on many issues for both procedural and practical reasons. Many administrative activities are dealt with by ministers, who by virtue of office and privilege command more time in the Commons whose speech is more closely scrutinized. The analysis also suggests that those most influenced by reform were also more likely to address the chamber to discuss reform. Those MPs from constituencies that were more malapportioned or paying high levels of taxes were more likely to speak than their colleagues.

As shown in Table 2, ministers are over-represented as speakers. Although ministers are over-represented as *speakers*, ministerial *speeches* are not: when considering the total corpus, speeches given by ministers amount to only (30%) of all speeches made about reform (734 out of 2381).<sup>2</sup>

<sup>2</sup>The ministerial status of the speakers of 264 speeches could not be established and hence we are left with 2645 – 264 = 2381 speeches for which we can identify the position of the speaker in the House.



	not a minister	minister
no speeches	390	13
at least one speech	278	31

Table 2: Frequency of speakers by position in the House. Thirty-one out of 44 ministers (roughly 88% ) gave speeches on reform, while only 41% of non-ministers gave speeches.

### 3 Topic Models

For an overview of topic models, see Blei and Lafferty (2009a) and the original Latent Dirichlet Allocation (LDA) and Correlated Topic Models (CTM) articles: Blei, Ng, and Jordan (2003) and Blei and Lafferty (2006). In short, topic models model documents as probabilistic distribution arising from mixtures of different latent categories. Formally, corpus  $D$  is a collection of documents (speeches)  $d$ , that consist of some set of words  $\{w_1, w_2, \dots, w_{n_d}\}$ , the length of which is Poisson distributed with parameter  $\psi$ :

$$n_d \sim \text{Pois}(\psi),$$

for all documents  $d$ . The frequency of words in document  $d$ , given it's length,  $n_d$ , is governed by probabilistic mixtures of  $K$  different latent topics, a topic being a distribution over a vocabulary  $V$ . Topic  $k$  is then a distribution over  $V$

$$\beta_k \sim \text{Dir}(\eta)$$

in the case of LDA or  $\beta_k$  drawn from an exponentiated, normalized multivariate normal in the case of CTM.

Let  $\theta_d$  be the topical composition of document  $d$ . Then

$$\theta_d \sim \text{Dir}(\alpha)$$

is a point on the  $K$ -simplex.

Documents are assumed to arise from the following generative process:

For each of the  $n_d$  words,  $w$ , in document  $d$ , choose the topic assignment of word  $w$  by

$$z_{d,w} \sim \text{Mult}(\theta_d).$$

and finally the occurrence of word  $w$  in document  $d$  by  $w \sim \text{Multinomial}(\beta_{z_{d,w}})$ .

Fitting a topic model amounts to “reversing” the above process, with hyper-parameters  $\psi$ ,  $\eta$  and  $\alpha$ .

## 4 Pre-processing and Estimation

We omit speeches with fewer than 10 words. Pains were taken to identify the speaker, but missing titles, common names, as well as titles such as “a Hon. Member” provide no or ambiguous information about the identify of a speaker and hence were omitted from the analysis. We were able to identify the speaker of about 81% of all speeches.

We used the Porter algorithm ? for stemming. For the analyses presented here we use only the top 10,000 words when all words are sorted by average tf-idf.

Once a particular model is adopted, there are various methods for estimating model parameters. We compare two such methods: variational expectation maximization (VEM) and a MCMC using a Gibbs sampler Griffiths (2004); Phan, Nguyen, and Horiguchi (2008)

Gibbs sampling for LDA models are done using the procedure in Phan, Nguyen, and Horiguchi (2008), priors come from advice offered in Griffiths (2004). Model fitting was done using the R: package “topicmodels” (Grüen and Hornik, 2010).

### Model Selection

The paper presents the results from a 10-topic Latent Dirichlet Allocation, using Gibbs sampling for the estimation stage. Held-out perplexity for LDA models using 4-25 topics is shown in Figure 6. For each number of topics,  $k$  (shown on the  $x$ -axis), held-out perplexity is calculated by randomly selecting 80% of all speeches, fitting a  $k$ -topic LDA model (using Gibbs sampling, posterior inference based on subsequent 1000 iterations after burn-in period); the perplexity of the remaining (“held-out”) 20% of speeches is calculated and recorded. Letting  $\hat{q}_k$  be the resulting probability distributions from fitting a  $k$ -topic LDA model using 80% of the data, held-out perplexity of data  $X = \{d_1, d_2, \dots, d_c\}$  is defined by  $2^{H(\hat{q}_k, X)}$  with

$$H(\hat{q}_k, X) = - \sum_{w \in V} n_d^{(w)} \log_2 \hat{q}_k(d)$$

where  $n_d^{(w)}$  is the empirical frequency of word  $w$  in document  $d$ ,  $V$  is the vocabulary, and  $\hat{q}_k(d)$  is the probability of document  $d$ , given the estimated  $k$ -topic LDA model. This process is repeated 50 times for each  $k$ . The average held-out perplexity as well as 95% confidence interval is plotted for various values of  $k$  in Figure 6. Note that lowers values of perplexity indicate better fit.

We fit all three for a variety of topics, and chose 10 topics for ease of interpretation. Choice of 10 topics is based on both statistical evidence as well as *ex post* inspection of estimated topics. Statistically, the LDA models perform similarly well using 8 to over 20 topics (based on held-out perplexity). That is, an LDA model using 10 topics “fits” the data (speeches) about as well as LDA models using similar number of topics. Substantively, we present the results from a 10 topic model for ease of interpretation and presentation: 10 topics are easily recognizable as substantive dimensions in the reform debates. Qualitatively similar results result from qualitatively similar models, however.

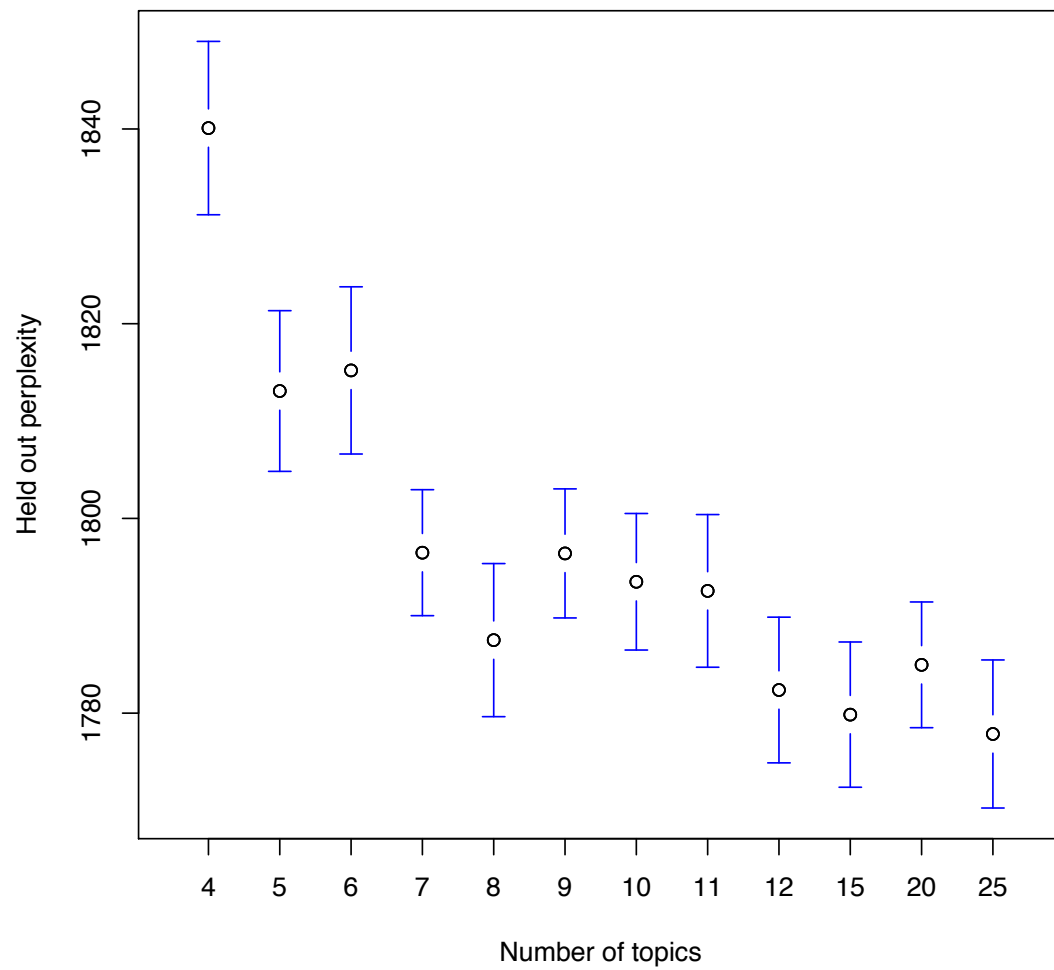


Figure 6: Held out perplexity based on 80% training , 20% test of LDA with different number of topics

## 5 Validation and Visualization

We visualize, explore and validate estimated topics in three ways: the most likely words given a topic; “turbo-topics” Blei and Lafferty (2009b) and; exemplar speeches - speeches that the most “topic  $k$  content”.

Visualizing:

Blei and Lafferty (2009b) present a novel way of visualizing topic by taking an fitted topic model and performing a series of permeation tests on the original corpus to find  $n$ -grams that are likely representative of a topic. The results follow.

TOPIC 1

hon; gentleman; chancellor of the exchequer ; friend ; gentleman had ; gentleman has ; heard ; favour of ; gentlemen ; friend the member for

TOPIC 2

borough ; borough franchise ; town ; england ; scotland ; scheme ; system ; return ; represent ; parliament ; plan

TOPIC 3

bill ; reform ; question ; lord ; parliament ; speech ; support ; reform bill ; time ; gentlemen ; object ; gentlemen opposite ; lord palmerston ; lord russell ; lord derby

TOPIC 4

class ; power ; argument ; birmingham ; result ; effect ; opinion ; look ; mere ; true ; found ; mind

TOPIC 5

rate ; bill ; pay ; act ; household suffrage ; landlord ; law ; paid ; payment of rates ; lodger franchise ; person ; poor ; rent

TOPIC 6 time ; subject ; opinion ; sir ; matter ; view ; friend ; public ; consider ; moment ; question ; regard to the

TOPIC 7

question ; bill ; matter ; line ; south lancashire ; fair ; object ; hope ; opinion ; adopt ; stand ; plan

TOPIC 8 vote ; system ; voter ; law ; person ; paper ; poll ; system of ; park ; corrupt ; prevent ; meet ; day ; held ; vote against ; corrupt practices

TOPIC 9

motion ; ireland ; wish to ; word ; hope ; commission ; irish ; move ; wish ; progress ; hope that ; bring ; effect

TOPIC 10

vote ; london ; durham ; test ; rental ; land ; effect ; ground ; admit ; class ; freemen ; found ; respect to ; oxford ; reason ; london university

In addition to manually inspecting topics (using the above visualization methods) we also compare models on using cross-validation. For each fitted model, we compute the probability of a hold out sample, one tenth of the corpus. It should be noted that there are several techniques to calculate predictive likelihoods, and disagreements about which method to employ (Wallach et al., 2009). We take the approach of Teh, Newman, and Welling (2007) and use  $p(w_d|D_{train}) \equiv p(w_d|\hat{\theta}_d, \hat{\beta})$ . That is, we calculate the probability of a word  $w$  in document  $d$  based on training data as approximately equal to the probability of word  $w$  in document  $d$  given the posterior estimates of beta for document  $d$ .

Hence, for each number of topics (2,4,6,8,10,12,14,16,18,30,40), we compare three fitted models (LDA fitted using VEM, LDA fitted using Gibbs and CTM fitted using VEM) using 10-fold cross validation. The results (available for the authors upon request) indicate a 10-topic LDA model fit

via Gibbs sampling is a reasonable tradeoff between model complexity, flexibility and computational tractability.

## 6 Adullamites

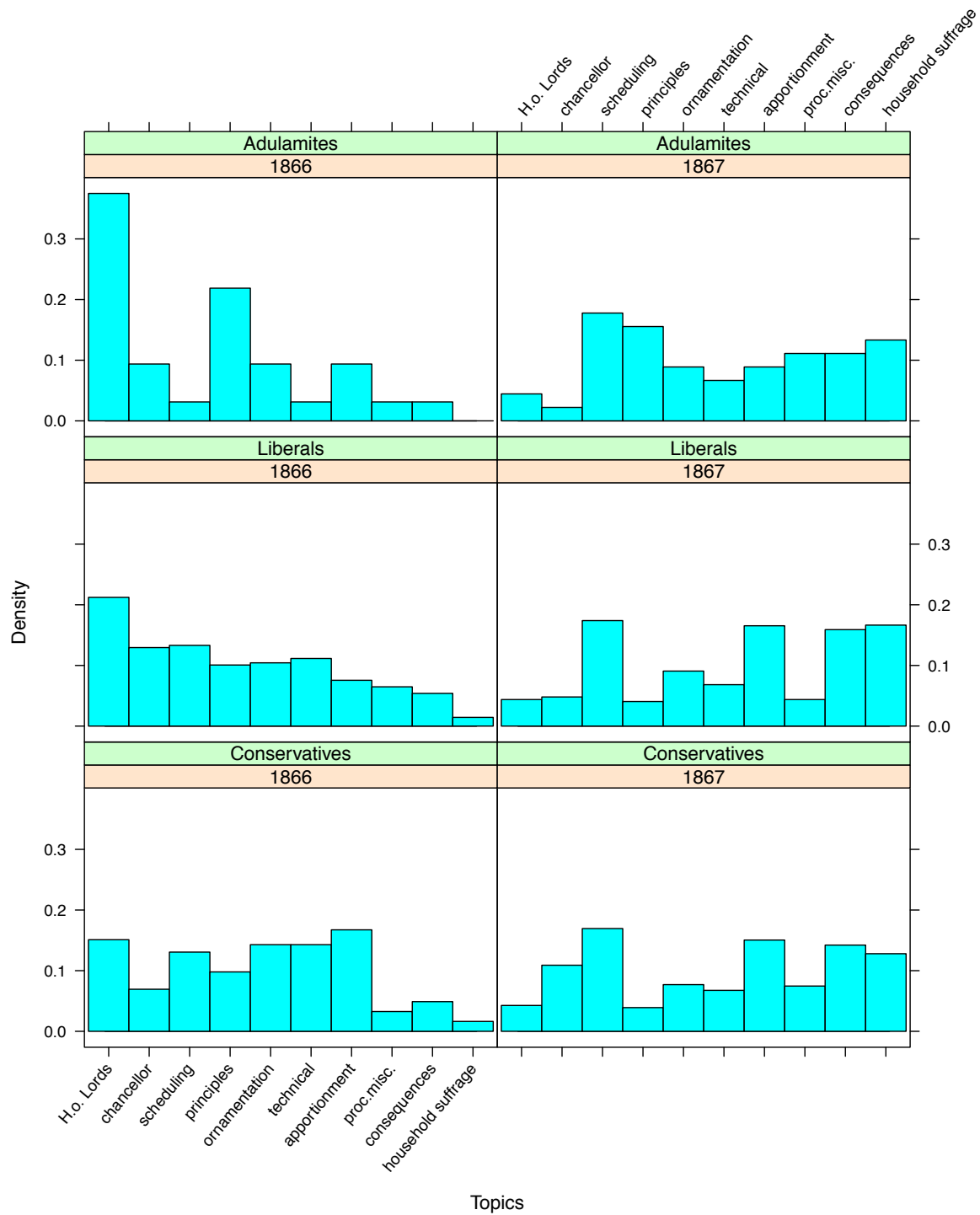


Figure 7: Histogram of modal topics by speech: upper left shows the distribution of modal topics of speeches made by Liberals, “Adulamites” and Conservatives in 1866 and 1867.

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