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Impressum:

CESifo Working Papers

ISSN 2364-1428 (electronic version)

Publisher and distributor: Munich Society for the Promotion of Economic Research - CESifo GmbH

The international platform of Ludwigs-Maximilians University's Center for Economic Studies and the ifo Institute

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Abstract

Electoral reform creates new strategic coordination incentives for voters, but these effects are difficult to isolate. We identify how the reform of the Norwegian electoral system in 1919, when single-member districts (SMDs) were replaced with multi-member proportional representation (PR), shaped voter behavior. Our dataset allows us to measure vote-shares of parties in the pre-reform SMDs and in the same geographic units in the post-reform multi-member districts. The electoral reform had an immediate effect on the fragmentation of the party system in Norway, due in part to strategic party entry. We find, though, that another main effect of the reform was that many voters switched between existing parties, particularly between the Liberals and Conservatives, as the incentives for these voters to coordinate against Labor were removed by the introduction of PR. This has implications for how we understand electoral reform, particularly in the early part of the 20th century.

JEL-Codes: D720.

Keywords: electoral reform, proportional representation, voter behavior.

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October 9, 2018

We are grateful to Gary Cox, Ben Geys, Leif Helland, Bjorn Hoyland, Dan Smith, Heather Stoll, and seminar participants at LSE, the Carlos III University of Madrid, the Hebrew University of Jerusalem, and the University of Oslo for helpful comments and suggestions.

1 Introduction

Since the pioneering work of Duverger (1954), political science has built up a substantial body of work explaining how electoral systems determine aggregate political outcomes. Theoretical work has posited a number of mechanisms linking electoral rules to individual level behavior and then to the number of parties in a country, mainly via changing strategic coordination incentives of voters and elites (Blais and Carty 1991; Cox 1997). We also have an extensive set of empirical studies that aim to test these propositions at an aggregate level, for example by looking at the number of parties that receive votes in a national election (e.g., Rae 1967; Taagepera and Shugart 1989; Lijphart 1999; Carey and Hix 2011). But clearly identifying the effects of electoral system on aggregate voting patterns is fraught with challenges. Cross-country comparisons, between countries with different electoral systems, can identify some general regularities and correlations. But, because so many factors vary between countries in addition to the electoral rules, these patterns cannot be interpreted causally. Responding to this constraint, laboratory studies have tried to isolate the causal effect of electoral rules on voting behavior and strategic coordination (St-Vincent, Blais and Pilet 2016; Hix, Hortala-Vallve and Riambau-Armet 2017).

Between the aggregate-level observational studies and the micro-level experimental studies there is new body of research that looks at real-world election outcomes at a low level of aggregation. The aim of this new research is to get closer to identifying the causal mechanisms at work when electoral systems change than is usually possible with national-level data, while claiming a higher level of external validity than can usually be inferred from laboratory experiments. For example, Fujiwara (2011) and Bordignon, Nannicini and Tabellini (2016) exploit regression discontinuity designs in the assignment of single-ballot and dual-ballot plurality systems in the context of Brazilian and Italian municipal elections, respectively. Fujiwara (2011) finds that a change from single-ballot plurality rule to dual-ballot reduced the vote share of the top two candidates, to the benefit of

the third placed candidate, consistent with strategic voting. Bordignon, Nannicini and Tabellini (2016), in contrast, find no evidence of strategic voting, but strong responses by political elites (strategic entry). Pons and Tricaud (2018) similarly exploit the discontinuity generated by the qualification rule for the second round in French elections. They find that the presence of a third candidate in the second round disproportionately harms the candidate ideologically closest to this candidate, suggesting that voters tend to vote expressively rather than strategically. Other examples of this new body of research include Blais et al. (2011) and Fiva and Folke (2016), who make comparisons of actual and counterfactual seat allocation outcomes to isolate the consequences of electoral system change.

Our paper builds on this new generation of research, by studying how a major electoral system reform affected voter coordination. We use a new panel data set of stable *subnational* geographic units covering the *nation-wide* adoption of PR in Norway in 1919 (Cox, Fiva and Smith 2016). This dataset allows us to measure vote-shares of parties at a low level of aggregation: in the pre-reform SMDs (under the initial majoritarian system), and in the same geographic units within the larger multi-member districts (MMDs) (under the new proportional system). With data for multiple elections before and after PR reform we can investigate whether secular trends threaten the validity of our research design.

Norway is an almost unique environment for investigating electoral system change. The franchise had been extended some years before 1919: with full suffrage extended to all men in 1898 and all women in 1913. Also, even before the adoption of PR, Norway was a stable multiparty system, and the parties that existing before the reform all existed after the reform.

Duverger (1954, p.252) and others have pointed out that the adoption of PR in Norway led to an increase in the number of parties. Indeed, we show that the introduction of PR led to a step-change increase in the effective number of parties of about one; mainly do to the strategic entry of a new party (The Farmers Party, formally established in 1920).

This change in the number of parties happened immediately after the election, rather than developing over several elections. This is a new empirical finding, and challenges the view that the effects of electoral system reforms take a long time to play out (Renwick 2018).

What is more theoretically interesting, though, is how the electoral system reform shaped the strategic behavior of voters. Our research design uses election outcomes in the same geographic districts in all elections between 1909 and 1927, to isolate the impact of the electoral reform on voting behavior at the lowest level of aggregation. With this design we believe we can isolate strategic coordination between *existing parties*. Following the standard theoretical understanding of strategic coordination, we expect the lower incentive to vote strategically under PR to lead to more votes for parties that were not competitive in 1918. We find precisely this dynamic, particularly for the Conservatives and Liberals, where voters changed how they coordinated between these two parties. In ‘safe’ Conservative districts in 1918, Conservatives votes fell and Liberal votes rose in 1921, while in safe Liberal districts in 1918, Liberal votes fell and Conservative votes rose in 1921. In short, in 1921 supporters of these two parties could vote sincerely for their most-preferred party rather than voting strategically for the other ‘bourgeois’ party in 1918, in a coordinated effort to keep Labor out. We also look at the performance of the top-two (frontrunner) candidates before and after the reform, and find that pre-reform frontrunners lost five to ten percentage points of their vote shares in 1921. In a series of placebo tests, looking at the changes between elections between 1909 and 1927, we show that these effects are only observable between 1918 and 1921, and are hence attributable to the electoral reform.

In the next section we discuss the political context of the electoral reform. We then analyze the effect of the reform on the number of parties elected in each district before turning to the effect of the reform on strategic switching of voters between the three main party blocs that existed before and after the reform.

2 Electoral context

After the dissolution of the union with Sweden (1905), elections to the Norwegian Parliament (*Storting*) were decided by a two-round runoff system. The system worked as follows. In the first round, a candidate was elected if he received an absolute majority of votes cast in the district. If no candidate received an absolute majority in the first round, a second round was held within a few weeks. In the second round, candidates could enter even if they had not run in the first round.¹

The first formal political parties were established two decades before the dissolution with Sweden: the Liberals (*Venstre*) and the Conservatives (*Høyre*) in 1884, and the Labor Party (*Arbeiderpartiet*) in 1887. However, up until the 1909 election, the party system was in a state of flux (Helland and Saglie 2003). From the 1909 election onwards, three party ‘blocs’ dominated: the Labor Party; the Liberals and the Labor Democrats (*Arbeiderdemokratene*; est. 1906); and the Conservatives and the Progressive Liberals (*Frisinnede Venstre*; est. 1909). Various other minor parties and organizations also fielded candidates in the runoff period, including the Norwegian Agrarian Association (*Norsk Landmandsforbund*; later *Norges Bondelag*; established in 1896).

In the first decades of the 20th century, class antagonisms were acute and the labor movement was hostile to the bourgeois society (Helland and Saglie 2003). The Labor Party program of 1909 explicitly rejected electoral alliances:

‘Electoral alliances with other parties or men outside the Labor Party shall not directly or by tacit agreement take place either at the first round or in the run-off.’

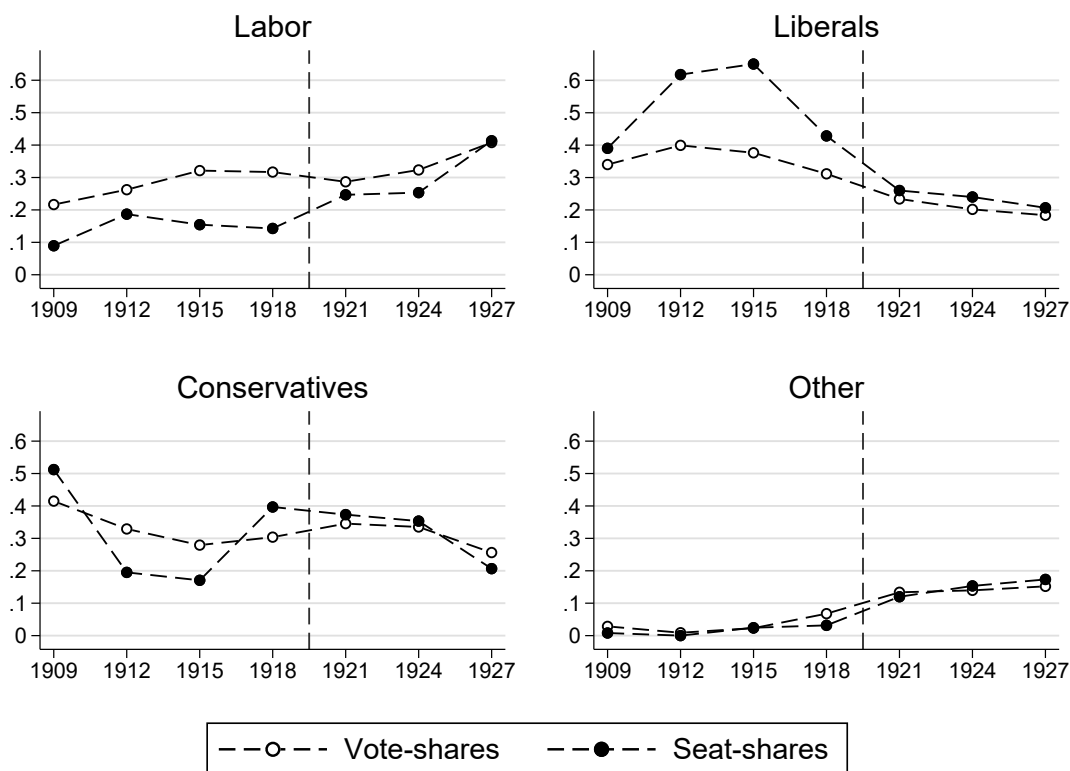
With the expansion of the franchise, support for the Labor Party substantially increased.² Figure 1 shows the vote-shares (white) and seat-shares (black) for the three

¹Fiva and Smith (2017) describe the run-off system in more detail.

²In Norway, male suffrage was implemented in 1898 (for citizens aged 25 years and above). Female suffrage was gradually extended during the first decade of the 20th century, first in 1907 to women who owned property and had a certain level of income. Universal suffrage was finally implemented in 1913.

dominant and a residual ‘other’ category over the 1909-1927 period. The two-round run-off system lead to a systematic underrepresentation of the Labor Party. This came mostly to the advantage of the Liberals, who formed a single-party government from 1913 to 1920.

Figure 1: Vote-shares and seat-shares across blocs



Note: The figure shows national vote-shares (white) and seat-shares (black) for the four political blocs over the 1909 to 1927 period. The introduction of PR is marked with the dashed vertical line. The Social Democratic Labor Party of Norway, which ran in the 1921 and 1924 elections, and the Communist Party, which entered the political arena in 1924, are included in the Labor Party bloc. In the pre-reform period, vote-shares based on the first round are reported.

The Liberal Party mainly represented rural interests against the interests of the urban Conservative establishment. The Liberals were also social reformers, though, introducing early welfare state reforms when in government, which extended their appeal to lower income rural voters after universal suffrage. Nonetheless, the Liberals shared strategic interests with the Conservatives, in a common ‘bourgeois bloc’ against the growing sup-

port for Labor amongst the industrial working class (Valen and Rokkan 1974). This position of the Liberals, between the other two parties but closer to the Conservatives, is confirmed in roll-call votes in the Storting in the 1919-1921 election period. A left-right split (where the majority of Conservative MPs voted against the majority of Labor MPs) existed in 130 out of 163 plenary roll-call votes in this period. In 81 of these votes (62%), the majority of Liberal MPs sided with the majority of Conservative MPs, while in the other 49 votes (38%) the majority of Liberal MPs sided with the majority of Labor MPs.³

In July 1917, parliament appointed a commission to consider changes in the electoral system. This commission presented its reform proposals in April 1919. Finally, in November 1919, MPs voted on five alternative reform proposals. A system of closed-list PR in MMDs obtained the necessary 2/3 majority (Cox, Fiva and Smith 2018). The new electoral system, effective from the 1921 election, grouped old SMDs into 29 MMDs with a magnitude varying from 3 to 8 seats. The total number of seats in the Storting increased from 126 to 150. The seat allocation method chosen was the D'Hondt formula, which tends to be favorable to large parties in smaller-magnitude districts.

The conventional wisdom holds that the adoption of PR in many European democracies in the early 1900s came about as a strategic effort by bourgeois parties to preserve political power (Rokkan 1970; Boix 1999).⁴ Figure 1 casts some doubt on the validity of this seat-maximization account. While the Liberals dominated in parliament under the run-off system, they received only about a quarter of the seats after the adoption of PR. A similar pattern is observed elsewhere in Europe where PR was adopted. Rodden (2009, p. 2) points out that the Rokkan-Boix argument 'has always had an uncomfortable relationship with certain facts. Above all, as a bulwark against the left, proportional representation can only be viewed as a colossal failure.'

Cox, Fiva and Smith (2018) focus instead on how PR affected party leaders' control over nominations, thereby enabling them to discipline their followers and build more

³These descriptives are based on roll-call votes excluding absentees (15,862 MP-vote observations).

⁴In the case of Norway, Rokkan (1970, p. 158) argued that for Liberal MPs *"the decisive motive was clearly not a sense of equalitarian justice but the fear of rapid decline with further Labor advances across the majority threshold"*.

cohesive parties. They find support for this party-building theory using roll-call voting data from Norway. Party leaders were more likely to vote in favor of PR adoption than rank-and-file members, even controlling for the parties' expected seat payoffs and the district-level socialist electoral threat facing individual legislators.

After the introduction of PR, the Norwegian Agrarian Association decided to form the Farmers Party (*Bondepartiet*; later *Senterpartiet*) at the June 1920 national congress of the association; in other words only six months after the electoral reform bill had passed through parliament.⁵ In 1918, the association fielded candidates in approximately 20% of the single-member districts and won 3 seats. In the 1921 election, after the introduction of PR and the formal establishment of the Farmers Party, they presented lists of candidates in about 80% of the multi-member districts and won 17 seats.

There was also a change within the Labor bloc. Following the 1917 Russian Revolution and the establishment of the Communist International in 1919, the Labor bloc in Norway split between supporters of Communist revolution and supporters of a parliamentary road to Socialism. Initially, the Norwegian Labor Party joined the Communist International, which led to the formation of the Social Democratic Labor Party (NSA) in 1921, as a breakaway on the right of the party.⁶ These changes within the Labor bloc were driven more by external events than electoral reform in Norway. Nonetheless, without the electoral reform, it is unlikely that the NSA and DNA would both have stood candidates throughout the country.

⁵Key players in the organization believed the electoral rules cleared the way for the establishment of a political party (Aasland 1974, p. 230-231). Johan E. Mellbye, a former Conservative cabinet member and the first leader of the Farmers' party, put it this way in a 1921 speech: "The new electoral rules was very important... we have seen — in particular in the last two year — how the key idea of parliamentarism with two parties, where one party should criticize and control the other, no longer applies. We do not have two, but five or six parties." (Aasland 1974, p. 230-231, paraphrased from Norwegian).

⁶Later, when the DNA withdrew from the Communist International in 1923, the Norwegian Communist Party (NKP) formed on the left of the DNA and remained a member of the International. Following this new split and the fact that the DNA had abandoned the Communist International, the DNA re-merged with the NSA.

3 Aggregate effects of electoral reform

Following Cox, Fiva and Smith (2016) we construct a balanced panel data set of 91 ‘SMDs’ covering the period 1909-1927, i.e. 637 observations.⁷

Following Duverger and others, we expect the introduction of PR in Norway to lead to a fragmentation of the party system. What we try to do empirically is disentangle how much of this fragmentation is driven by party entry as opposed to strategic voter coordination. We first look at the changes at the level of the party system as a whole, by comparing the effective number of parties at the SMD level in all the elections before the reform (1909, 1912, 1915, and 1918) and the first three elections after the reform (1921, 1924, and 1927). We also look at how the effect of the electoral system change varied by post-reform district magnitude. We expect more party entry and more voter coordination (less strategic desertion) in higher district magnitudes because the (effective) thresholds of representation fell with district magnitude.

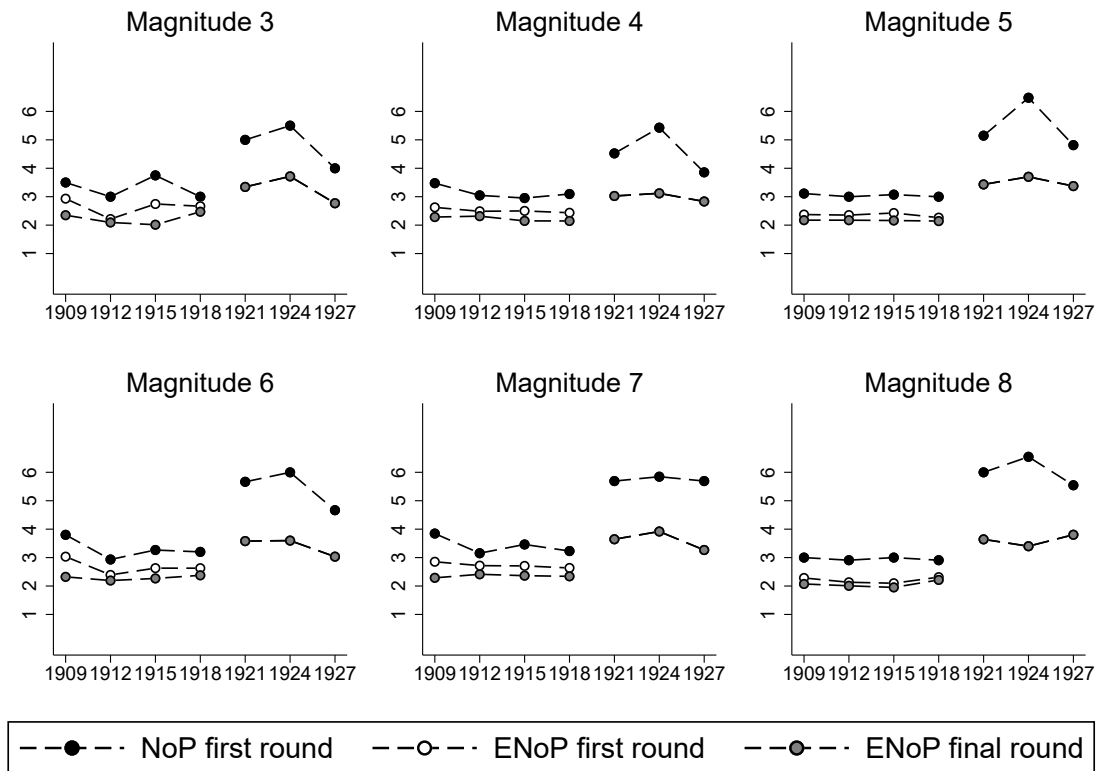
Figure 2 shows that the absolute number of parties (NoP) increased, on average, by about two parties (from three to five) following the electoral reform. Furthermore, the increase in NoP tended to be larger in higher-magnitude post-reform districts than in smaller-magnitude post-reform districts. The increase in NoP was primarily driven by the entry of the Farmers Party and the split in the Labor Party (see Appendix Figure A.1).

Figure 2 also documents a step-change increase in the ‘effective’ number of parties (ENoP) - which is an index developed by Laakso and Taagepera (1979) that takes into account the electoral size of the parties.⁸ In Figure 2 we report average index values

⁷In the last pre-reform election, 126 SMDs existed. Because post-reform data only exist at the municipality level, we are forced to drop SMDs that were located *within* the largest municipalities (19 SMDs). We also drop SMDs that experience boundary changes in the 1909-1918 period (13 SMDs) and SMDs that were not nested within a post-reform MMD (3 SMDs). This leaves us with 91 SMDs. The maps in Appendix Figure A.2 show pre-reform SMD boundaries and post-reform MMD boundaries. Appendix Table A.1 compares our estimation sample to the 126 SMDs existing in the last election before the electoral reform. Naturally, after dropping the largest cities, the fraction of urban districts is lower than the 1/3 stipulated by the electoral law, but otherwise our data set is quite representative.

⁸The ENoP index accounts for both the number of parties represented and their relative strengths and is given by $ENoP = \frac{1}{\sum_{i=1}^n VoteShare_i^2}$, where $VoteShare_i$ is the vote-share of the i -th party. It is

Figure 2: The (effective) number of parties before and after PR



Note: The figure shows the average number of (effective) parties in each election by post-reform district magnitude. Two-round elections were used from 1909-1918, and proportional representation from 1921-1927. In the pre-reform period, we report the effective number of parties based on both first (white) and final (gray) round vote-shares. The data set is based on the pre-reform district structure.

for both the pre-reform first (white) and final (gray) rounds.⁹ This step-change in the effective number of parties is significant, as changes to electoral systems usually take a long time to play out at the level of party system, in terms of new parties or voters switching between parties. These results suggest that the fragmentation of the party system was immediate in Norway in the 1921 election.

In Table 1 we analyze how the effective number of parties (ENoP) changed at the pre-reform SMD level with the introduction of PR, using regression analysis on the stable panel data (1909-1927). Since the number of post-reform districts is relatively few, we provide standard errors that are clustered at the pre-reform (91 clusters) and post-reform level (22 clusters), respectively. Panel A shows ENoP using first round vote-shares, while panel B shows ENoP using final round vote-shares. On average, the effective number of parties increased by about 0.9, using first round vote-shares (panel A, column 1). The estimated reform effect is somewhat larger (an increase of 1.2 parties) when looking at final round vote-shares (panel B, column 1). The difference between these two figures is explained by the electoral coordination that took place between the first and second rounds in the pre-reform period (Fiva and Smith 2017). To separate party entry from voter coordination we control for the parties that competed in each election in each SMD. We successively add controls for the district-level entry of the Farmers Party (column 2), the Social Democratic Labor Party (column 3), and the Communist Party (column 4). The estimated reform effect falls as we add these controls. When we add a full set of party fixed effects, the effect is no longer statistically significantly different from zero (column 5).

These results hence suggest that a large proportion of the increase in the ENoP index was due to the entry of new parties, as expected. Nevertheless, even when controlling for the entry of the three main new parties (the Farmers Party, Social Democratic Labor

widely used for describing party systems at the national level (see, for example, Lijphart 1999).

⁹Appendix Figure A.3 plots (first round) ENoP against (first round) NoP for each (pre-reform) district, both pre- and post-reform. This figure shows that the vast majority of districts experienced an increase in NoP from 1918 to 1921. Only in 2 out of 91 areas did NoP not change. ENoP also increased for most districts. However, in already fragmented districts, new entrants were not always successful in securing votes (see bottom panels of Appendix Figure A.3).

Table 1: Aggregate level analysis of how electoral reform impacts ENoP

Panel A: First round					
	(1)	(2)	(3)	(4)	(5)
PR	0.896 (0.067) [0.114]	0.517 (0.097) [0.137]	0.357 (0.104) [0.158]	0.264 (0.110) [0.169]	0.054 (0.085) [0.124]
Farmers' Party		0.548 (0.102) [0.153]	0.557 (0.103) [0.154]	0.564 (0.102) [0.153]	0.700 (0.079) [0.106]
Soc. Dem. Labor Party			0.250 (0.071) [0.105]	0.276 (0.074) [0.114]	0.266 (0.069) [0.114]
Communist Party				0.129 (0.055) [0.072]	0.188 (0.052) [0.074]
<i>N</i>	637	637	637	637	637
<i>R</i> ²	0.446	0.492	0.506	0.510	0.676
SMD fixed effects	Yes	Yes	Yes	Yes	Yes
Party fixed effects	No	No	No	No	Yes
Panel B: Final round					
	(1)	(2)	(3)	(4)	(5)
PR	1.172 (0.061) [0.102]	0.809 (0.084) [0.115]	0.638 (0.091) [0.136]	0.548 (0.097) [0.150]	0.177 (0.082) [0.128]
Farmers' Party		0.524 (0.087) [0.128]	0.534 (0.087) [0.128]	0.540 (0.087) [0.128]	0.669 (0.071) [0.091]
Soc. Dem. Labor Party			0.266 (0.071) [0.106]	0.291 (0.074) [0.114]	0.256 (0.069) [0.116]
Communist Party				0.126 (0.051) [0.068]	0.194 (0.051) [0.073]
<i>N</i>	637	637	637	637	637
<i>R</i> ²	0.621	0.655	0.668	0.671	0.754
SMD fixed effects	Yes	Yes	Yes	Yes	Yes
Party fixed effects	No	No	No	No	Yes

Note: The dependent variable is the effective number of parties (ENoP) measured at the pre-reform district structure. Two-round elections were used from 1909-1918, and proportional representation from 1921-1927. In panel A, we measure ENoP using first round vote-shares. In panel B, we measure ENoP using final round vote-shares. Cluster-robust standard errors based on the pre-reform district level in parentheses (91 clusters). Cluster-robust standard errors based on the post-reform district level in brackets (22 clusters).

Party, and Communist Party), there was a non-trivial increase in ENoP, of 0.3 using first round vote-shares and 0.5 using final round vote-shares. This suggests that some proportion of the increased fragmentation of the votes in 1921 relative to 1918 was due to changing voting patterns between the three main pre-reform parties (Conservatives, Liberals, and Labor).¹⁰ We investigate this in the next section.

In short, the adoption of PR led to an immediate increased fragmentation of the party system in Norway, and this was mainly due to the Farmers Party deciding to stand candidates in more districts. However, these results leave open the question of whether voters responded to the new electoral rules by switching their votes between pre-reform parties. The lack of any clear relationship between PR and ENoP when flexibly controlling for party entry (column 5 in Table 1) suggest that voters were unresponsive. Yet, we consider these estimates to be lower bounds on how far PR affected voter behavior. These are lower bounds because not only do parties act strategically to decide whether to form *overall*, they also target their resources strategically, by deciding to stand in districts where they have the highest opportunity of winning seats.

4 Voter coordination between existing blocs

To isolate strategic switching between existing parties we restrict the panel data set to ‘SMDs’ where the three dominating blocs participated in all election years; 42 out of 91 SMDs fulfill this criterion.¹¹ This essentially limits the sample to SMDs where all party blocs ran every year *before* the reform.¹² Restricting the sample in this way is useful because it allows us to isolate shifts in the distribution of votes between these party blocs, while holding the number of blocs participating constant.

¹⁰Appendix Table A.2 investigates the relationship between the district magnitude of the new multi-member districts and the change in the effective number of parties standing at the single-member district level. In line with the graphical evidence from Figure 2, we observe larger reform effects in higher-magnitude districts. However, when flexibly controlling for party entry, there is no clear pattern.

¹¹In this estimation sample, the effective number of parties is 2.59, while it is 2.35 in the aggregate (Appendix Table A.1).

¹²There are 43 SMDs where all party blocs competed in every pre-reform election. With one exception (*Opland fylke* district in 1927), these are all contested by the main party blocs post-reform.

In this analysis, we are interested in how the electoral system reform affected the relative vote-shares of the three main parties. For example, if voters coordinated between the Liberals and Conservatives before the reform, we should expect Liberal votes to go down in places where they were stronger than the Conservatives and up where they were weaker than the Conservatives. To identify these effects we define the *pre-reform advantage* of party i over party j to be $\frac{VS^i - VS^j}{VS^i + VS^j}$, where VS denotes party vote-shares. Because of what we know about the political positions of the three main party blocs - where the Conservatives are on the right, Labor are on the left, and the Liberals are between the other two blocs but much closer to the Conservatives - we expect the electoral system reform to have a bigger effect on vote-trading between the Liberal and Conservative blocs than between the Liberal and Labor blocs, and limited vote-trading between the Labor and Conservative blocs.

As discussed, the ‘bourgeois’ parties (the Conservatives and Liberals) shared common interests against the rising electoral support for Labor. Before PR, these two blocs had incentives to coordinate to defeat Labor candidates. As a result, in districts where the Liberals were not competitive, Liberal voters should strategically have supported Conservatives, and vice versa. Then, with the introduction of PR, and the lower electoral thresholds that resulted, these coordination incentives were reduced. As a result, Liberal voters who had previously voted Conservative could now support the Liberals, while Conservative voters who had previously supported the Liberals could now support the Conservatives, without these choices affecting the overall electoral fortunes of these two parties relative to Labor.

This is exactly what specification (1) and (3) from Table 2 show. We illustrate this key result in panel (1) and (3) of Figure 3. Overall, the vote-share of the Liberals fell between 1918 and 1921, as some of their voters switched to the Farmers Party, which had decided to stand candidates in most districts. The Farmers and the Liberal were now both competing for rural interests. However, in districts where the Conservatives were well ahead of the Liberals in 1918, such as in District A, the Liberal vote rose in

1921 (relative to the average), while in districts where the Liberals were well ahead of Conservatives in 1918, such as in District B, the Liberal vote fell in 1921.¹³

Column (1) of Table 2 shows that 52% of the variation in ΔVS^{LIB} is explained by variation in the pre-reform Liberal advantage. A one standard deviation increase in the pre-reform Liberal advantage over the Conservatives (0.51) is associated with an eight percentage point reduction in the Liberal vote-share. Such a fall in the Liberal vote-share appears to have benefited the Conservatives and the Farmers party in about equal proportions (column (3) and (4)), while leaving Labor vote-shares roughly unaltered (column (2)).

In columns (5)-(8) of Table 2 we analyze how the Liberal advantage over Labor correlates with vote-share changes pre- and post-reform. Again, we see that a large Liberal advantage is associated with a fall in the Liberal vote-share, but it seems that these votes were captured by the newly established Farmers party, and not the Labor bloc.

In columns (9)-(12) of Table 2 we analyze how the Labor advantage over Conservatives correlates with vote-share changes pre- and post-reform. Here, the results shows that Labor tended to lose votes the stronger their (pre-reform) advantage over the Conservatives was (column 10), while the opposite is true for the Conservatives (column 11). Puzzlingly, we find that the Liberals tended to lose out when *Labor* had an advantage over the Conservatives (column 9). This unexpected correlation may be driven by the fact that in districts where Labor had an advantage over the Conservatives, then typically a similar advantage existed for the Liberals over the Conservatives.¹⁴

¹³District A in Figure 3 is *Nordland city district*. Appendix Figure A.4 displays 1918 vote counts for this district. It seems plausible that before the reform, many Liberal voters in this district strategically supported the Conservative candidate to keep Labor out. After the introduction of PR, the incentive to vote strategically was weakened, and support for the Liberal party was expected to increase in this district (relative to the average), which is exactly what we find. District B in Figure 3 is *Nordland 2nd rural district*. Appendix Figure A.5 displays 1918 vote counts for this district. Here, in the pre-reform period, Conservative voters had an incentive to vote strategically for the Liberal candidate to keep Labor out, and the Conservative vote-share was expected to increase in 1921, which is again what we find.

¹⁴The correlation between the two indices are 0.50. We have experimented with simultaneously including all three indices of pre-reform advantages in our regression framework, but due to the high degree of multicollinearity, the results are not meaningful.

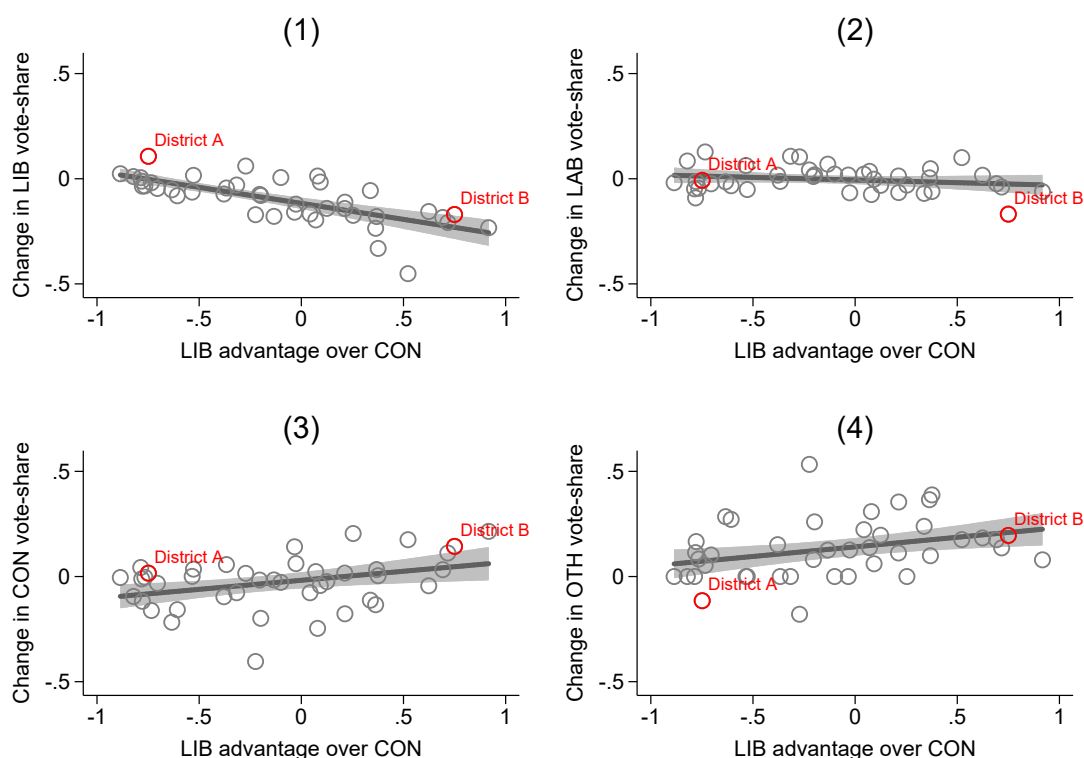
Table 2: Vote-trading between blocs between 1918 and 1921

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	$\Delta V_{S^{LIB}}$	$\Delta V_{S^{LAB}}$	$\Delta V_{S^{CON}}$	$\Delta V_{S^{OTH}}$	$\Delta V_{S^{LIB}}$	$\Delta V_{S^{LAB}}$	$\Delta V_{S^{CON}}$	$\Delta V_{S^{OTH}}$	$\Delta V_{S^{LIB}}$	$\Delta V_{S^{LAB}}$	$\Delta V_{S^{CON}}$	$\Delta V_{S^{OTH}}$
Pre-reform $\frac{V_{S^{LIB}} - V_{S^{CON}}}{V_{S^{LIB}} + V_{S^{CON}}}$	-0.152 (0.022) [0.019]	-0.025 (0.021) [0.015]	0.086 (0.031) [0.034]	0.091 (0.032) [0.031]								
Pre-reform $\frac{V_{S^{LIB}} - V_{S^{LAB}}}{V_{S^{LIB}} + V_{S^{LAB}}}$					-0.132 (0.033) [0.036]	0.007 (0.019) [0.019]	0.025 (0.033) [0.036]	0.100 (0.037) [0.040]				
Pre-reform $\frac{V_{S^{LAB}} - V_{S^{CON}}}{V_{S^{LAB}} + V_{S^{CON}}}$									-0.105 (0.029) [0.030]	-0.066 (0.022) [0.021]	0.149 (0.033) [0.035]	0.022 (0.043) [0.044]
Constant	-0.117 (0.013) [0.015]	-0.006 (0.010) [0.006]	-0.018 (0.019) [0.022]	0.141 (0.021) [0.023]	-0.113 (0.016) [0.018]	-0.003 (0.010) [0.007]	-0.025 (0.020) [0.023]	0.140 (0.021) [0.023]	-0.103 (0.015) [0.015]	-0.005 (0.009) [0.007]	-0.023 (0.017) [0.021]	0.131 (0.022) [0.024]
N	42	42	42	42	42	42	42	42	42	42	42	42
R^2	0.517	0.045	0.126	0.110	0.310	0.003	0.008	0.105	0.121	0.151	0.183	0.003

Note: The dependent variables are percentage point change in the vote-share from 1918 to 1921 for the bloc given in the header. The sample is restricted to ‘SMDs’ where the three dominating blocs are participating in all election years ($N=42$). In the pre-reform period we use first round vote-shares. Heteroscedasticity-robust standard errors in parentheses. Cluster-robust standard errors based on the post-reform district level in brackets (18 clusters).

As a placebo test, we look at vote-share changes as a function of the (lagged) Liberal advantage over Conservatives in non-reform years. Figure 4 shows these results along with the actual reform analysis. We observe that the reform year (1921) stands out when compared to the non-reform years. In non-reform years there is no clear systematic pattern between the (lagged) Liberal advantage over Conservatives and the vote-shares of these blocs.¹⁵

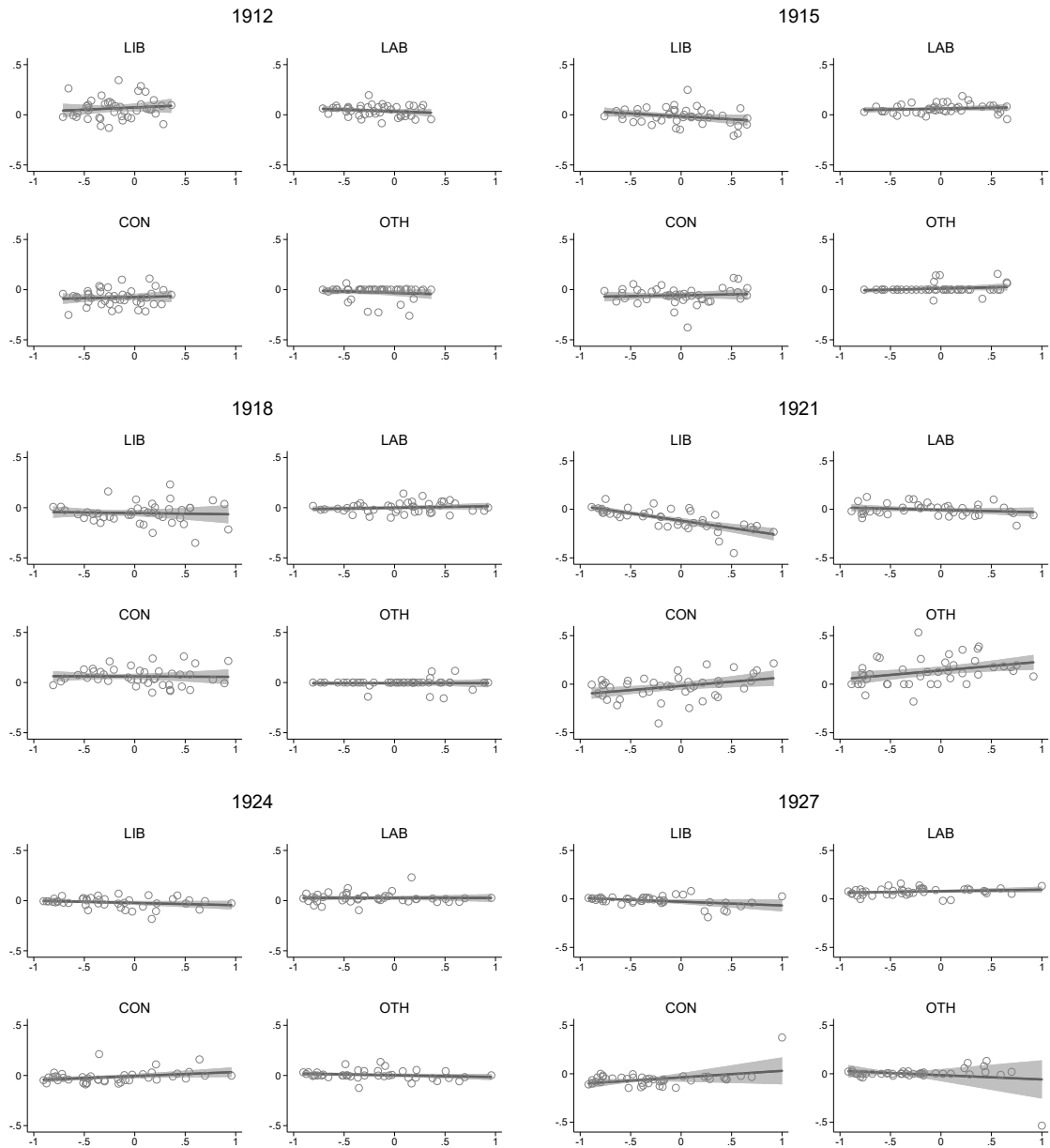
Figure 3: Vote-trading between blocs between 1918 and 1921



Note: The scatterplots and fitted lines correspond to specification (1), (2), (3), and (4) of Table 2. The y-axes measure the percentage point change in vote-share for the four different blocs between 1918 and 1921. The x-axes measure the Liberal advantage over the Conservatives in 1918. In the pre-reform period we use first round vote-shares. The sample is restricted to ‘SMDs’ where the three dominating blocs are participating in all election years. Shaded areas represent 95% confidence intervals based on robust standard errors. We highlight two example districts: Nordland city district (District A) and Nordland county 2nd district (District B).

¹⁵Appendix Figure A.6 and A.7 provides placebo checks corresponding to specification (5)-(8) and (9)-(12) of Table 2, respectively.

Figure 4: Comparing vote-trading in reform and non-reform years: Liberal advantage over Conservatives

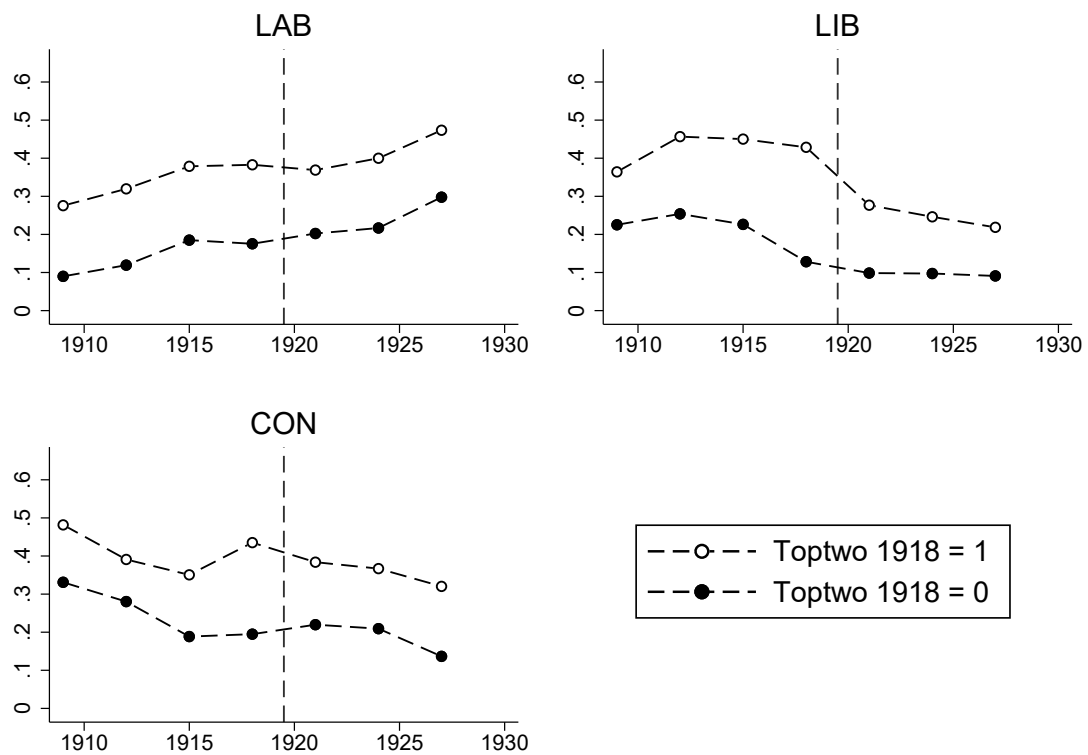


Note: The scatterplots and fitted lines correspond to specification (1), (2), (3), and (4) of Table 2. The y-axes measure the percentage point change in vote-share from year $t-3$ to year t for the bloc given in the title of the sub-panel. The x-axes measure the Liberal advantage over the Conservatives in year $t-3$. In the pre-reform period we use first round vote-shares. The sample is restricted to ‘SMDs’ where the three dominating blocs are participating in all election years. Shaded areas represent 95% confidence intervals based on robust standard errors.

To further contextualize our results, we plot in Figure 5 voter support for the three dominant political blocs, split by a bloc's 'top-two status' in the 1918 election. For all three blocs, we observe that voter support fell when the bloc had one of the top-two candidates in a district pre-reform, while it was quite stable when the bloc did not have a candidate in the top-two. Table 3 shows that these effects are statistically significant for all blocs (Panel A), and robust to adding a control for whether the Farmers party was participating in a district (Panel B).¹⁶ The effect is most pronounced for the Liberals, where voter support fell from above 40% to below 30% when the Liberals were one of the top-two candidates pre-reform. This is consistent with the findings from Table 2. Again, these patterns suggest that the introduction of PR mainly affected the switching of votes between the two bourgeois parties.

¹⁶Placebo analyses using non-reform election years do not produce similar effects (Appendix Table A.3.)

Figure 5: Vote-shares across blocs, split by top-two status 1918



Note: The figure shows the vote-shares across blocs, split by top-two status in 1918. In the pre-reform period we use first round vote-shares. The sample is restricted to 'SMDs' where the three dominating blocs are participating in all election years.

Table 3: Top-two reform analysis

Panel A: Baseline results			
	(1)	(2)	(3)
	Lab.	Lib.	Con.
Reform1921	0.027 (0.014) [0.015]	-0.030 (0.015) [0.012]	0.025 (0.035) [0.038]
Reform1921Xtop1918	-0.041 (0.018) [0.020]	-0.122 (0.026) [0.026]	-0.076 (0.041) [0.040]
N	84	84	84
R^2	0.094	0.638	0.128
SMD fixed effects	Yes	Yes	Yes
Panel B: Control for entry of Farmers' party			
	(1)	(2)	(3)
	Lab.	Lib.	Con.
Reform1921	0.044 (0.018) [0.018]	-0.001 (0.023) [0.017]	0.091 (0.047) [0.047]
Reform1921Xtop1918	-0.041 (0.018) [0.020]	-0.108 (0.024) [0.025]	-0.099 (0.039) [0.036]
Famers' Party running	-0.026 (0.018) [0.018]	-0.058 (0.027) [0.026]	-0.078 (0.040) [0.044]
N	84	84	84
R^2	0.138	0.672	0.211
SMD fixed effects	Yes	Yes	Yes

Note: The dependent variable is the vote-share of the party bloc in the table header. The sample is restricted to 'SMDs' where the three dominating blocs are participating in all election years. Heteroscedasticity-robust standard errors in parentheses. Cluster-robust standard errors based on the post-reform district level in brackets (18 clusters).

5 Conclusion

Existing theories suggest that moving from a majoritarian to a proportional electoral system should affect how voters strategically coordinate between parties. Whereas under a majoritarian system some voters have incentives to vote for their second or third most-preferred party, to prevent an even less-preferred party from winning a seat, under PR these same voters should now be able to vote for their most-preferred party if they expect it to be competitive in a district where the party was not previously competitive.

We find exactly this effect in Norway between 1918 and 1921. The introduction of PR led to an immediate increase in the effective number of parties, measured at the pre-reform SMD level, of approximately one. This shift was mainly due to the Farmers Party deciding to stand candidates in many more districts, knowing that it would have a much better chance of winning seats under PR than under the previous two-round system. Nevertheless, controlling for the number of parties standing before and after the introduction of PR, we also identified vote-switching between the three main party blocs. In particular, the introduction of PR meant that the incentives for Conservative and Liberal supporters to coordinate to ‘keep Labor out’ was reduced. This change in strategic incentives led to a reduction in support for the Conservatives in districts where they were well ahead of the Liberals before the reform, and a reduction in support for the Liberals in districts where they were well ahead of the Conservatives before the reform. What is perhaps surprising is how quickly this coordination took place, as we only observe these changes between 1918 and 1921, and then relatively static behavior after 1921.

The main advantage we have in our study over previous research using observational or laboratory data is that we are able to observe groups of voters at a low level of aggregation pre- and post-reform. Looking at the set of ‘SMDs’ where the parties and the number of parties were the same before and after the election allows us to observe how voters responded to the nation-wide electoral system reform. Our findings suggest that voters ‘in the real world’, as opposed to in a lab, do in fact respond to changing

strategic incentives in the way standard political science theory predicts: switching away from less-preferred parties to more-preferred parties that now had a chance of winning a seat.

Our results also reinforce the explanations of electoral reform in the early 20th century that focus on the strategic choices of the bourgeois parties against rising support for socialists (Rokkan 1970; Boix 1999). We find that voters for the Liberals were more likely to switch to the Conservatives than to Labor after the introduction of PR, which suggests that a ‘bourgeois’ bloc had existed prior to the reform, where Liberal and Conservative voters had coordinated to keep Labor out. Nevertheless, while the Liberals dominated in parliament under the run-off system, they received only about a quarter of the seats after the adoption of PR, as they lost seats to the Farmers Party and Labor Party. While the Liberals may have expected to lose seats to these parties, and supported a switch to PR to minimize their losses, what was probably surprising was how quickly the Farmers Party formed and decided to stand throughout the country and how quickly voters responded to the new strategic environment: switching from the Liberals to the Farmers Party and the Conservatives. An interesting question for future research is to check the extent to which the speed of voter adaptation is unique to the Norwegian case or is generalizable to other cases of transition to PR in the early 20th century.

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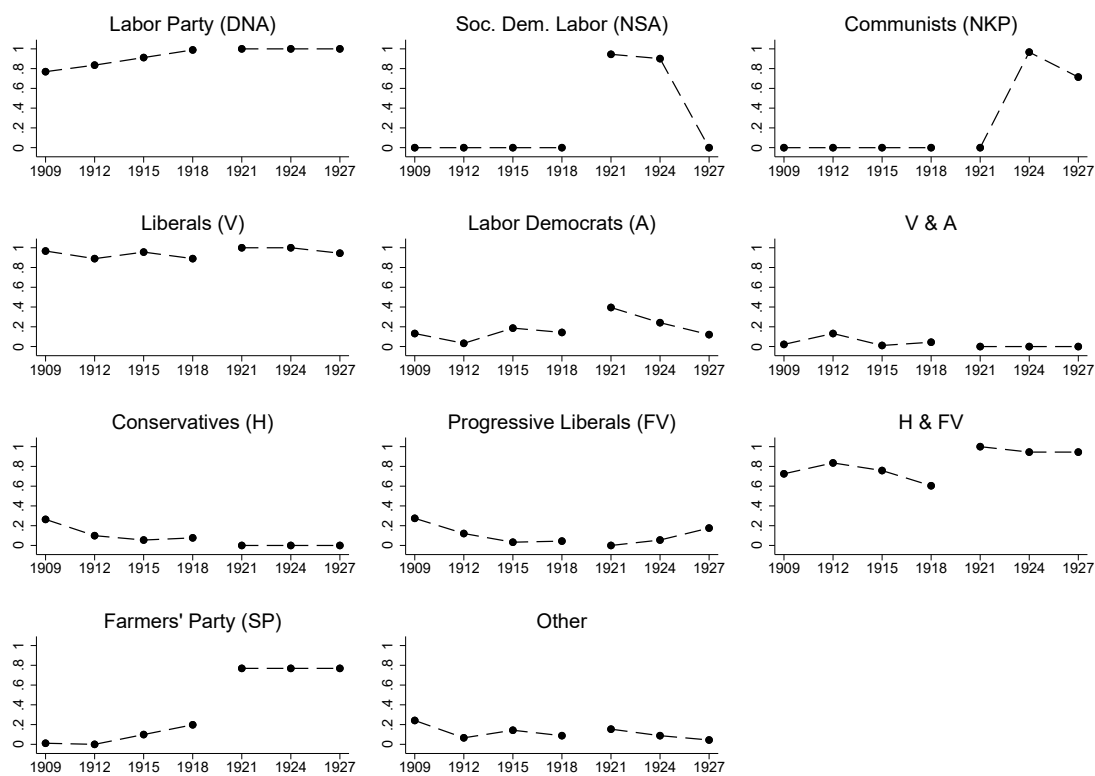
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Appendix

Figure A.1: Fraction of SMDs Contested by Party



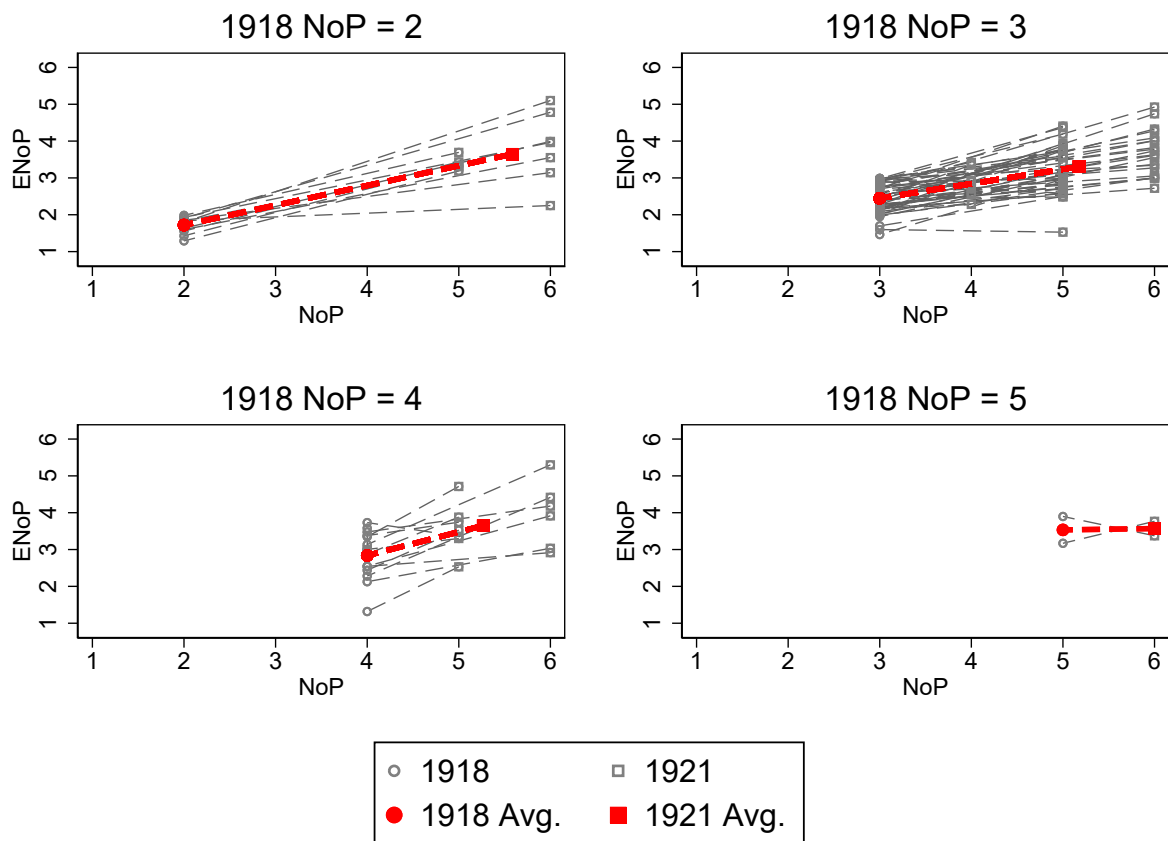
Note: The sample is restricted as in our baseline (see Appendix Table A.1).

Figure A.2: Pre-reform SMD and post-reform MMD boundaries



Note: This figure is adapted from Cox, Fiva and Smith (2016). The map on the left shows the pre-reform SMD boundaries in 1918 (126 SMDs); the map on the right shows the post-reform MMD boundaries in 1921 (29 MMDs).

Figure A.3: Effective number of parties plotted against number of parties, pre- and post-reform



Note: The figure plots (first round) $ENoP$ against (first round) NoP for each district, pre- and post-reform. The figure is split by pre-reform NoP (given in panel heading).

Figure A.4: Example of pre-reform vote counts: Nordland city district

	1ste valg			Omvalg (¹¹ / ₁₁)		
	Bodø	Narvik	Sum	Bodø	Narvik	Sum
Bodø og Narvik.						
(4 499 stemmeberettigede.)						
R e p r æ s e n t a n t :						
Owe, O. C. , apoteker, Bodø H & FV (FV)	826	523	1349	1105	809	1914
Jørstad, E. , redaktør, Bodø S	369	597	966	443	661	1104
Engen, L. , frk., fotograf, Bodø T (V)	269	57	326	-	-	-
Sund, H. R. O. , statsadvokat, Bodø V	77	117	194	-	-	-
Sprede (1ste valg 1 S, 1 V; omvalg 2 FV, 1 T)	-	2	2	1	2	3
	1541	1296	2837	1549	1472	3021

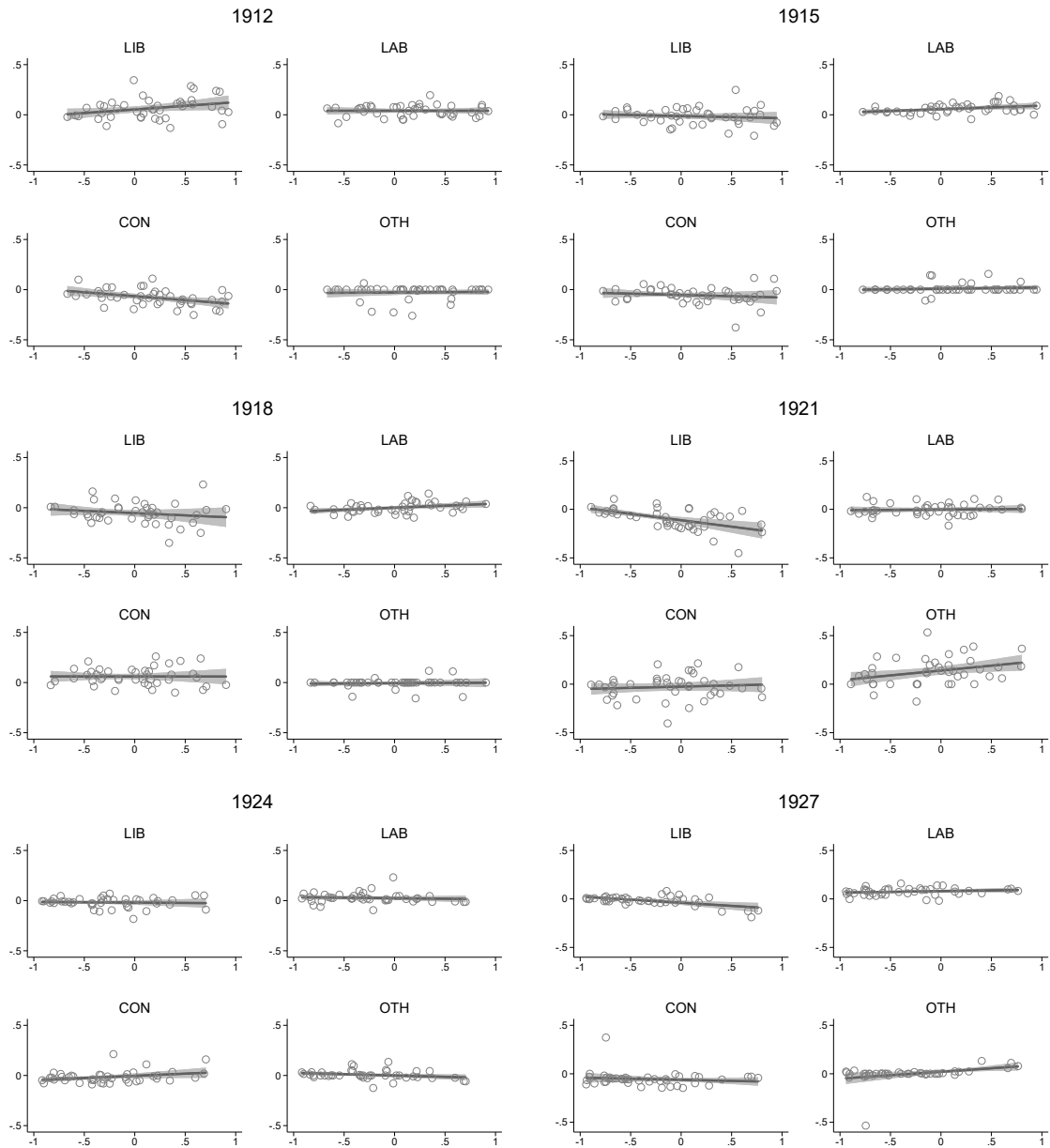
Note: Example comes from the 1918 election in Bodø and Narvik, the City District in Nordland County, which is labelled 'District A' in Figure 3. V = Liberals, S = Labor Party, H = Conservatives, FV = Progressive Liberals. The excerpt is from our original data source (Haffner and Wessel-Berg 1919).

Figure A.5: Example of pre-reform vote counts: Nordland county 2nd district

	Vefsn	Hatfjelldal	Dønnes	Nesna	Hemnes	Mo	Lureøy	Træna	Mosjøen	Sum
<i>2den kreds, Nordre Helgeland.</i>										
(11 998 stemmeberettigede.)										
Repræsentant, 1ste valg:										
Bolstad, P., lærer og gaardbruker, Hatfjelldal . . . S	397	128	31	200	389	825	25	8	278	2382
Kulstad, N. J. A. M., gaardbruker, Vefsn V	523	178	57	141	351	192	103	26	135	1796
Sand, J. W. A., kirkesanger, Dønnes V (L)	178	2	132	207	122	35	140	8	2	975
Ytteren, P. Pedersen, gaardbruker, Mo . H & FV (FV)	19	-	29	21	49	175	14	2	84	396
Spredte (1 L, 3 S, 48 V)	33	1	1	-	10	2	1	2	2	52
	1150	309	250	569	921	1229	283	46	501	5601
Omvalg:										
Kulstad V	930	248	180	401	678	363	243	77	191	3572
Bolstad S	507	170	66	207	475	1011	35	18	340	2983
Ytteren H & FV	27	1	20	7	28	131	11	2	90	326
Spredte (1 FV, 2 S, 36 V, 3 ukj.)	13	1	3	2	4	1	15	1	-	42
	1477	420	269	617	1185	1506	304	98	621	6923

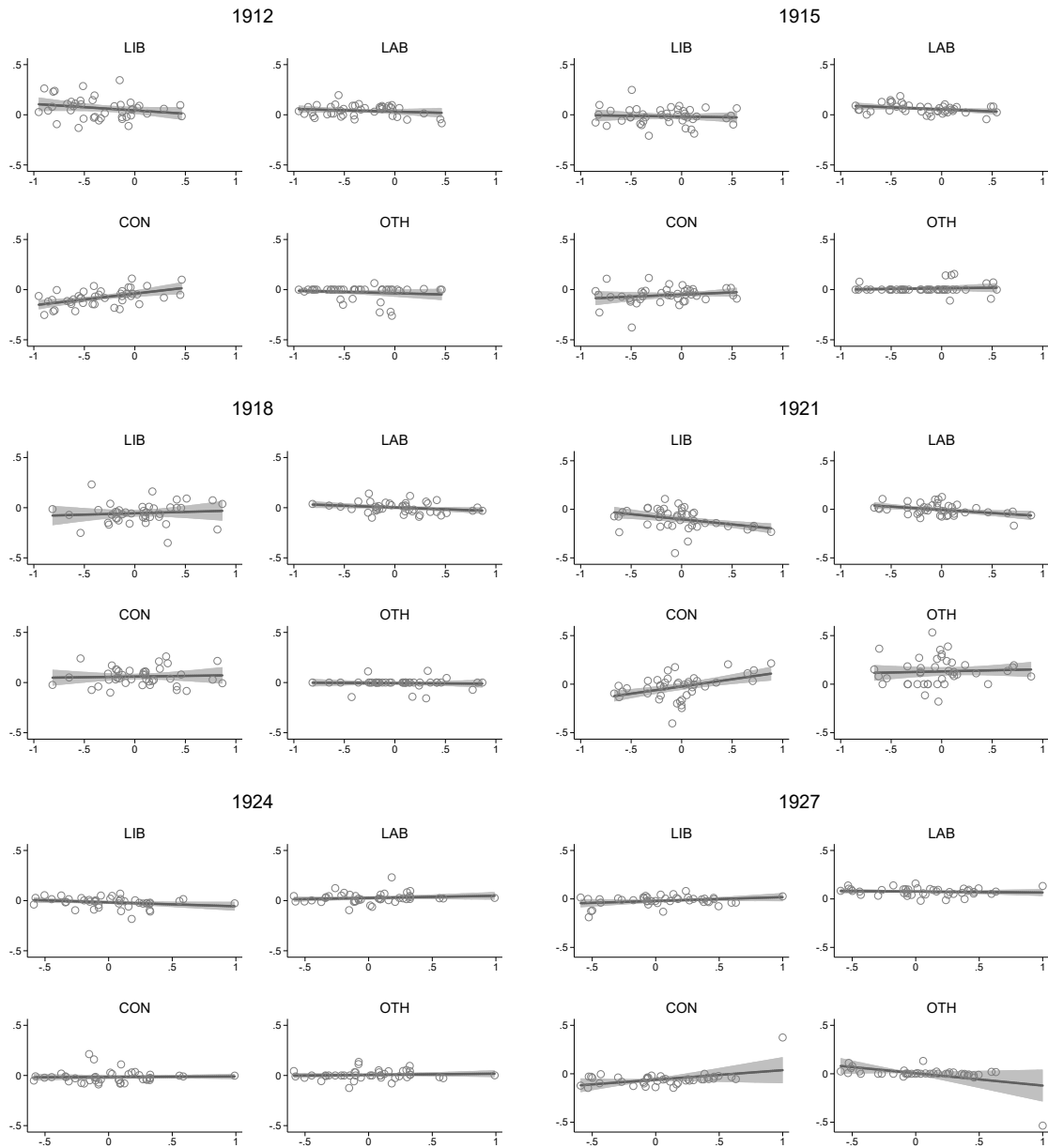
Note: Example comes from the 1918 election in Nordre Helgeland, the 2nd District in Nordland County, which is labelled 'District B' in Figure 3. V = Liberals, S = Labor Party, H = Conservatives, FV = Progressive Liberals. The excerpt is from our original data source (Haffner and Wessel-Berg 1919).

Figure A.6: Comparing vote-trading in reform and non-reform years: Liberal advantage over Labor



Note: The scatterplots and fitted lines correspond to specification (1), (2), (3), and (4) of Table 2. The y-axes measure the percentage point change in vote-share from year t-3 to year t for the bloc given in the title of the sub-panel. The x-axes measure the Liberal advantage over Labor in year t-3. In the pre-reform period we use first round vote-shares. The sample is restricted to ‘SMDs’ where the three dominating blocs are participating in all election years. Shaded areas represent 95% confidence intervals based on robust standard errors.

Figure A.7: Comparing vote-trading in reform and non-reform years: Labor advantage over Conservatives



Note: The scatterplots and fitted lines correspond to specification (1), (2), (3), and (4) of Table 2. The y-axes measure the percentage point change in vote-share from year $t-3$ to year t for the bloc given in the title of the sub-panel. The x-axes measure the Labor advantage over the Conservative in year $t-3$. In the pre-reform period we use first round vote-shares. The sample is restricted to ‘SMDs’ where the three dominating blocs are participating in all election years. Shaded areas represent 95% confidence intervals based on robust standard errors.

Table A.1: Description of estimation samples using data from the 1918 election

	(1)		(2)		(3)	
	All		Estimation sample 1		Estimation sample 2	
	Mean	SD	Mean	SD	Mean	SD
Urban district	0.33	(0.47)	0.21	(0.41)	0.31	(0.47)
Voteshare LAB	0.29	(0.16)	0.28	(0.14)	0.33	(0.12)
Voteshare LIB	0.37	(0.25)	0.40	(0.23)	0.30	(0.18)
Voteshare CON	0.27	(0.23)	0.25	(0.22)	0.36	(0.16)
Voteshare OTH	0.06	(0.13)	0.07	(0.14)	0.01	(0.04)
ENoP1	2.35	(0.54)	2.44	(0.54)	2.59	(0.43)
Second round	0.55	(0.50)	0.60	(0.49)	0.64	(0.48)
Post-reform magnitude	5.57	(1.42)	5.49	(1.42)	5.17	(1.34)
N	126		91		42	

Note: This table compares the estimation samples to the 126 SMDs existing in the last election before the electoral reform. In estimation sample 1, we drop SMDs that were located within the largest municipalities, SMDs that experienced boundary changes in the 1909-1918 period, and SMDs that were not nested within a post-reform MMD. Estimation sample 2 further restricts the sample to ‘SMDs’ where the three dominating blocs are participating in all election years.

Table A.2: Heterogenous effects of electoral reform by district magnitude

	(1)	(2)	(3)	(4)
	First	First	Final	Final
PR magnitude 3	0.638 (0.638)	0.393 (0.507)	1.045 (0.446)	0.467 (0.448)
PR magnitude 4	0.479 (0.192)	-0.048 (0.119)	0.768 (0.180)	0.068 (0.122)
PR magnitude 5	1.148 (0.193)	0.233 (0.119)	1.339 (0.196)	0.314 (0.119)
PR magnitude 6	0.734 (0.128)	-0.081 (0.129)	1.114 (0.079)	0.103 (0.136)
PR magnitude 7	0.882 (0.154)	-0.035 (0.137)	1.259 (0.170)	0.155 (0.148)
PR magnitude 8	1.409 (0.288)	0.259 (0.181)	1.554 (0.249)	0.346 (0.164)
N	637	637	637	637
R^2	0.500	0.686	0.651	0.759
SMD fixed effects	Yes	Yes	Yes	Yes
Party fixed effects	No	Yes	No	Yes

Note: The dependent variable is the effective number of parties (ENoP) measured at the pre-reform district structure. Two-round elections were used from 1909-1918, and proportional representation from 1921-1927. In specification (1) and (2), we measure ENoP using first round vote-shares. In specification (3) and (4), we measure ENoP using final round vote-shares. Cluster-robust standard errors based on the post-reform district level in parentheses (22 clusters).

Table A.3: Top-two placebo analysis

Panel A: 1918 Placebo reform			
	(1)	(2)	(3)
	Lab.	Lib.	Con.
Reform1918	0.023 (0.017)	-0.054 (0.023)	0.059 (0.029)
Reform1918Xtop1915	-0.031 (0.020)	-0.001 (0.030)	0.002 (0.035)
N	84	84	84
R^2	0.073	0.215	0.321
SMD fixed effects	Yes	Yes	Yes
Panel B: 1915 Placebo reform			
	(1)	(2)	(3)
	Lab.	Lib.	Con.
Reform1915	0.082 (0.012)	-0.018 (0.012)	-0.045 (0.020)
Reform1915Xtop1912	-0.041 (0.014)	0.003 (0.022)	-0.013 (0.027)
N	84	84	84
R^2	0.708	0.034	0.319
SMD fixed effects	Yes	Yes	Yes
Panel C: 1912 Placebo reform			
	(1)	(2)	(3)
	Lab.	Lib.	Con.
Reform1912	0.043 (0.014)	0.043 (0.030)	-0.026 (0.042)
Reform1912Xtop1909	-0.008 (0.020)	0.031 (0.034)	-0.060 (0.046)
N	84	84	84
R^2	0.355	0.290	0.514
SMD fixed effects	Yes	Yes	Yes

Note: The dependent variable is the vote-share of the party bloc in the table header. The sample is restricted to ‘SMDs’ where the three dominating blocs are participating in all election years. Cluster-robust standard errors based on the post-reform district level in parentheses (18 clusters).