

Mobilizing the Underrepresented: Electoral Systems and Gender Inequality in Political Participation

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Abstract: To study the political mobilization of underrepresented groups, this article examines the effect of electoral systems on gender equality in voting. Theoretically, I argue that replacing a plurality electoral system with proportional representation (PR) gives party elites greater incentives to mobilize women to vote in all but the most competitive districts under plurality rule. Yet, they need to tap into women's networks to succeed with such mobilizing efforts. Empirically, I isolate the causal effect of PR by studying an imposed shift from plurality to PR in Norwegian municipalities. Using a difference-in-differences design, I estimate that the move from plurality to PR substantially decreased gender inequality in voting. The effect is most pronounced in previously uncompetitive municipalities and where women's networks are present. This study thus demonstrates how the social environment conditions the effect of democratic institutions on the political participation of marginalized groups.

Verification Materials: The data and materials required to verify the computational reproducibility of the results, procedures, and analyses in this article are available on the *American Journal of Political Science* Dataverse within the Harvard Dataverse Network, at: <http://doi.org/10.7910/DVN/T0R1GE>.

What accounts for the electoral mobilization of underrepresented groups? Despite democracy's ideal of political equality, inequality in political participation is widespread. Lijphart (1997) calls it "democracy's unresolved dilemma." A case in point is the gender disparity in political participation. Women's enfranchisement was a watershed in democratic history (Teale 2018a). Yet, despite equality in the right to vote, equality in voting did not ensue. In Europe, North America, and Oceania, women were typically outnumbered by men at the voting booth in parliamentary elections, and in legislatures women held at maximum 3% of the seats during the pre–World War II period (Corder and Wolbrecht 2016; Duverger 1955; Tingsten 1937). Gender inequality in voting lasted well into the 1970s in most ad-

vanced democracies (Inglehart and Norris 2003; Norris 2002), and disparities in other forms of political participation, such as campaigning and representing political parties, continue to persist across the globe (Desposato and Norrander 2009; Kittilson and Schwindt-Bayer 2010, 2012; Quaranta and Dotti Sani 2018).

Contemporary scholars of democracy have proposed that adopting proportional representation (PR) electoral systems may spur the political participation of underrepresented groups, particularly by inducing political elites to appeal to previously unmobilized voters (e.g., Cox, Fiva, and Smith 2016; Lijphart 1997, 1999; Norris 2008; Powell 1986; for applications to gender, see Kittilson and Schwindt-Bayer 2010, 2012). Early twentieth-century activists likewise saw electoral systems as an important tool

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for facilitating women's mobilization at the ballot box. Still, although scholars have long argued that PR mobilizes underrepresented groups, existing works (1) do not present causal evidence on the effect—which means that we may falsely attribute to PR what could be a mobilizing effect of correlated social phenomena and institutions—and (2) do not carefully specify and investigate why and when we should see an effect of PR—which means that we have limited empirical knowledge about the mechanisms and conditions under which PR contributes to equality in voting.

By theorizing and investigating the impact of PR on gender equality in voting, this study contributes to the literature on both accounts. Theoretically, I draw on scholarship on turnout and on women's representation to spell out how and when PR may increase women's inclusion in voting, compared to plurality electoral systems. Women's previous disenfranchisement, as well as gender norms continuing to delineate electoral politics as a male-dominated domain, meant that women had less experience with politics and were less likely to turn out in the absence of mobilization (e.g., Hagemann et al. 2020). In a plurality system, gender inequality in voting is therefore likely to be large in districts with lopsided contests, where elites have few incentives to mobilize new voters, and small in districts with close races, where the incentives to mobilize are strong (Corder and Wolbrecht 2016). The introduction of PR consequently increases competitiveness in districts previously dominated by one party (Cox, Fiva, and Smith 2016) and gives party elites incentives to try to persuade the large pool of unmobilized women to vote. Despite such incentives, however, party elites may struggle to access female voters if women are marginalized from the public sphere. PR may therefore particularly reduce gender disparities in voting where elites can gain access to pools of potential female voters through preexisting women's networks. Beyond elites' mobilization efforts, the introduction of PR may also signal an opening of the political process to politically marginalized groups, including women (Kitilson and Schwindt-Bayer 2010, 2012). With a heightened sense of political efficacy, women may be more inclined to turn out to vote (Kim 2019). Moreover, as PR is often argued to increase female representation in the legislature (e.g., Paxton, Hughes, and Painter 2010), women's sense of efficacy and motivation for turning out to vote may be further encouraged by the presence of female candidates and representatives (e.g., Atkeson 2003). Based on these factors, the overall expectation is that PR decreases the gender disparity in voting.

In the empirical part of the study, I investigate the causal effect of switching to PR by examining electoral

participation in municipal elections in early twentieth-century Norway. Norway offers a unique opportunity to study the impact of PR on gendered electoral participation since it is the only country that both gave women the full right to vote *before* introducing a PR system and has voting records split by sex. The case also provides the opportunity to causally test the theoretical argument. Between the 1916 and 1919 elections, the Norwegian Parliament (Storting) required 296 of the 688 municipalities present in 1916 to change their electoral system from plurality to PR. The other municipalities were already employing PR in elections. As such, it is an unparalleled setting for understanding how electoral systems affect the political inclusion of women. I use a difference-in-differences design to estimate the effect of PR on women's inclusion in voting. The results reveal that substituting plurality with PR produces a substantial increase in the fraction of voters who are women. Before the reform, every fifth voter was female; after the reform, every third voter was female.

Moving beyond the overall effect, an exploration of the conditions for the PR effect indicates that especially the competition and women's network factors influence the impact of PR. In sum, the research provides the first causal test of the relationship between PR and gender equality in voting and contributes to spelling out conditions that link PR to the mobilization of underrepresented groups.

Gender, Voting, and Electoral Systems

Gender and Political Participation

Achieving equality in the right to vote did not equate to achieving equality in voting. Across Europe and Oceania, women's turnout in the early twentieth century consistently lagged that of men, typically by more than 10 percentage points, as Tingsten (1937) and Duverger (1955) document. Corder and Wolbrecht (2016) show that the same holds for the 10 American states they investigate after 1920. These differences persisted into the post-WWII period (Duverger 1955). For countries with turnout by gender since 1945—such as Finland, Germany, Japan, Iceland, New Zealand, Norway, and the United States—the gender gap in turnout did not close until the 1970s and 1980s (Norris 2002, 98; Pharr 1982, 25; Wolbrecht and Corder 2020).

There is a long-standing literature aiming to explain these differences in women's and men's voting participation. Contemporary activists and later research particu-

larly highlighted socialization and gender norms hostile to participation. A prominent attitude communicated to women was that political participation was, by nature, a male activity (Andersen 1996; Corder and Wolbrecht 2016; Hagemann et al. 2020). After enfranchisement in the United States, for instance, nearly 10% of female nonvoters in Chicago cited disbelief in voting or the husband's opposition as grounds for why they did not vote (Corder and Wolbrecht 2016; Merriam and Gosnell 1924, 14). Thus, according to this view, women's lower rates of participation were due to gender norms of the time, and women's having been socialized into believing that politics is a man's game (e.g., Campbell et al. 1960).

Although attitudes hostile to women's inclusion in politics lingered on, participation nonetheless varied substantially among individual women. Later research has therefore emphasized the impact of women's and men's different positions and roles in society on political participation. First, this perspective has argued that women's disproportionate household work and childcare responsibilities left little time for political participation, especially when combined with paid work (e.g., Welch 1977; but see Fox and Lawless 2014). Second, and relatedly, a number of studies document the importance of gender differences in educational resources and occupational experiences for political participation (e.g., Burns, Schlozman, and Verba 2001). For instance, with more absence from the labor market and the public sphere, women were less likely to be exposed to political discussions, which affects participation levels. This angle consequently highlights the lack of exposure to and experience with politics as a key reason for gender inequality in voting.

As the classic studies by Tingsten (1937), Duverger (1955), and Rokkan (1970) remind us, however, women's voting rates were a function not only of individual-level factors and social norms but also of the sociopolitical context. They particularly emphasize how the gender voting gap tends to be wider in less economically and educationally developed rural areas. More recent research highlights institutional and organizational features as key for explaining gender disparities in voting, including voting laws (Corder and Wolbrecht 2016), the presence of direct democracy (Kim 2019), and mobilization efforts of women's movements (e.g., Andersen 1996; Carpenter et al. 2018; Morgan-Collins 2020; Schuyler 2008). Corder and Wolbrecht (2016), for instance, find that both previous pro-suffrage activity and more liberal electoral laws (e.g., reducing poll taxes and residence requirements and dropping literacy tests and residence requirements) increase women's presence at the voting booth. Kim (2019) demonstrates how direct democracy increased women's

sense of political efficacy and spurred the participation of early women voters. In other words, these studies suggest that women's voting behavior was responsive to changes in the surrounding political and socioeconomic contexts. None of these studies, however, look at the effect of electoral systems on women's inclusion in voting.

Electoral Systems and Voting

A voluminous literature has examined the consequences of PR on overall turnout (e.g., Cox, Fiva, and Smith 2016; Eggers 2015; for reviews, see Cox 2015; Cancela and Geys 2016) and women's descriptive representation in parliament (e.g., Paxton, Hughes, and Painter 2010; for a review, see Wängnerud 2009)—typically finding that both are higher under PR than under plurality systems.

The impact of electoral systems on other forms of gender inequality in political participation, most notably in the act of voting, has received far less attention, with two important exceptions. First, Tingsten (1937, 15) mentions in passing that after the introduction of PR in Norway, “electoral participation [in national elections] increases both for men and women, somewhat more for the latter, particularly in the country.” Second, Kittilson and Schwindt-Bayer (2010, 2012) argue that because PR systems are more competitive and signal more inclusiveness of diverse interests and voices in the electoral process, women are more likely to participate in politics in PR than plurality systems.¹ These studies, however, neither present causal evidence on the effect nor test or specify under what conditions a shift to PR increases gender equality in voting.

Proportional Representation and Gender Equality in Voting

In this study, I propose that there are several factors affecting to what extent a switch from a plurality to a PR system increases gender equality in voting.

Electoral Competition

A number of studies assert that party competition is higher under PR and that party elites—that is, party leaders and top candidates—have an incentive to mobi-

¹They investigate the correlation between PR and women's political engagement in cross-sectional survey data across 31 countries in the 2000s.

lize more broadly in PR than plurality systems, as every vote contributes to the party's seat share in the legislature (e.g., Kittilson and Schwindt-Bayer 2012; Lijphart 1999; Powell 1986, 21). Such a conception, however, underplays the incentives for electoral competition in plurality systems (Cox, Fiva, and Smith 2016). To be sure, in single-member districts using plurality rule, a candidate who knows that her or his seat is safe will not have incentives to mobilize further, as it will not provide any additional benefits, only costs (Cox 1999, 395). Yet, if the race is close, the winner-takes-all logic of plurality elections means that both candidates have strong reasons for continuing the mobilization race, with a resulting higher level of turnout (Tingsten 1937, 223–25). The consequence is that the incentive for elites to mobilize after a switch to PR will be higher in districts that were uncompetitive under the plurality system and lower in districts that were highly competitive. Whether average turnout increases with a transition to PR accordingly depends on the share of districts that are competitive under the plurality system. As this tends to be a minority of districts, the introduction of PR typically increases overall turnout (Cox 2015; Cox, Fiva, and Smith 2016; Eggers 2015; Herrera, Morelli, and Palfrey 2014).

To understand how this electoral logic applies to gender inequality in voting, we need to take into account the historical marginalization of women from electoral politics. Despite women's increasing involvement in political activism and the labor market at the turn of the century, the long disenfranchisement of women, the lingering gender norms that demarcated electoral politics as a male domain, and the stark gender differences in access to educational and occupational opportunities meant that women were still less likely to be exposed to and learn about politics (Andersen 1996; Burns, Schlozman, and Verba 2001; Corder and Wolbrecht 2016; Hagemann et al. 2020, chap. 4). In the *absence* of exposure to competing elites' mobilization efforts, women consequently had a lower propensity to vote than men. The information and persuasion provided by the campaigns of political elites may thus have had larger positive effects on women's decision to vote, as they had less prior political exposure and experience (Kleppner 1982, 643; Sneideringer 2003; for evidence, see Corder and Wolbrecht 2016; Pons and Liegry 2019).²

Women's lower baseline propensity to vote has consequences for the effect of electoral system reform on gender equality in voting. In *plurality* districts where the electoral contest is *lopsided*, women are likely to remain marginalized, as mobilizing new voters provides few re-

wards for candidates. In districts where the electoral contest is *close*, however, candidates will try to get to new voters and thus tap into the predominantly female pool of unmobilized voters. Under plurality, the inclusion of women in voting will thus vary considerably between districts. Corder and Wolbrecht (2016), for instance, show how the gender turnout gap was smaller in competitive U.S. states than in states where either Democrats or Republicans dominated. Accordingly, the *introduction of PR* induces more competition for women's votes in previously uncompetitive districts. With every vote now counting, contending party elites will appeal to unmobilized women to get them to vote for them.³ Overall, if a large share of districts is uncompetitive under plurality, then switching to PR will result in an overall increase in gender equality in voting.

Women's Social Networks

Still, the argument of the effect of PR assumes that elites can readily *reach* the potential new voters, which may not be the case. With regard to women, the strong norms against their participation in the public sphere may have made unmobilized women particularly hard to reach with campaign efforts (Corder and Wolbrecht 2016). Both theory and evidence suggest that social networks—that is, informal groupings of citizens—are effective tools for reaching voters and increasing turnout (e.g., Rosenstone and Hansen 1993). Mobilization is accordingly less costly and more easily achieved where party elites can tap into preexisting networks, such as networks formed during petitioning activity or schooling (Hagemann et al. 2020; Teele 2018b). Accordingly, social networks help political elites get out the vote in ways that spark what Cox (2015, 51–52) calls “secondary mobilization.” It means that elites mobilize some voters directly, who in turn mobilize others in their networks (see also Rosenstone and Hansen 1993, 27–30).⁴ Thus, as one moves from a plurality to a PR system, in which the returns to mobilization are greater in previously uncompetitive districts, women's networks are crucial vehicles for enabling polit-

³Given the cross-class nature of gender, all parties are likely to appeal to women, but to different groups of women based especially on class and religion (for historical evidence, see Hagemann et al. 2020, 399–409; Sneideringer 2003). Additionally, parties that stood with women in their fight for voting rights may enjoy a higher standing among many women and be more likely to succeed with their mobilization campaigns.

⁴Rainey (2015) finds that *direct* contact with voters is higher under plurality than PR. This result, however, does not take into account secondary (indirect) mobilization under PR or that PR districts are usually more sizable and populous, which makes direct mobilization less viable (Smith 2018, 197).

²Marginalization from the public sphere may also imply that unmobilized women are harder to reach, as I return to below.

ical elites to mobilize more women to vote.⁵ The effect of PR on gender equality in voting is therefore hypothesized to be conditioned by the presence of preexisting women's networks.

Sense of Efficacy and Role Model Effects

Even if a shift to PR induces little change in electoral competition and elites' incentives to mobilize, the introduction of PR may nonetheless increase gender equality in voting by heightening women's sense of political efficacy. Marginalized citizens are more likely to vote and engage politically when political institutions are perceived to be open to representation and influence from a broad set of interests in society (e.g., Kim 2019). Women may hence be more responsive than men to a PR reform, as it signals that women's voices are more likely to be heard (Kittilson and Schwindt-Bayer 2010, 2012).

A related logic runs through the election of female representatives. A large literature argues that the introduction of PR leads to more women entering parliament. One key mechanism is that greater party control over nomination procedures means that they can more easily put underrepresented groups on the ballot (Duverger 1955; Lijphart 1999). The percentage of female representatives therefore tends to be higher in PR than in plurality systems (Paxton, Hughes, and Painter 2010). Next, a growing number of studies find that the presence of female candidates and representatives subsequently increases a sense of efficacy and political participation among women (e.g., Atkeson 2003). Additionally, female candidates may seek to directly mobilize female voters, as they could have better knowledge of how to convince women to vote than male candidates. Consequently, PR is predicted to induce mobilization of women to vote indirectly through the presence of women on ballots and in elected positions (Kittilson and Schwindt-Bayer 2012).

Taken as a whole, these different factors lead to the expectation that a change in electoral systems from plurality to PR will cause an increase in gender equality at the ballot box by leading more women to vote.

⁵This may also apply to *formal* organizations. Formal organizations may, however, also seek to independently mobilize women to vote (see, e.g., Morgan-Collins 2020). If they do so regardless of the level of electoral competition, then their presence will not strengthen the effect of PR.

Electoral Reform in Early Twentieth-Century Norway

To test for the impact of PR on gender disparity in electoral turnout, I turn to a large-scale, subnational electoral system reform in early twentieth-century Norway. Norway is an ideal case for the empirical analysis because in all countries but Norway and Ireland, PR was either introduced *before* or adopted at the *same time* as women got the right to vote (see supporting information [SI] Figure A.1, p. 3).⁶ The co-occurrence of PR and suffrage reforms—as, for instance, in Denmark and Germany—makes it difficult to separate the effects of the two. Moreover, countries such as Sweden and the Netherlands introduced PR before they enfranchised women, which means that we cannot use these cases to investigate the switch from plurality to PR on women's inclusion in voting. In Norway, women with a household income above a certain threshold, about 40% of voting-age women, got the right to vote in municipal elections in 1901 and in national elections in 1907. Starting with the municipal elections in 1910 and the national election in 1915, women could vote on a par with men. PR, on the other hand, was not introduced until 1919.

The 1919 PR reform meant that about half of Norwegian municipalities were required by the Norwegian parliament to switch from plurality to PR before the 1919 election, as I will detail in the next subsections. A unique advantage is thus that I can isolate the causal impact of PR from suffrage reforms, while at the same time holding cross-country differences constant. Although I examine Norwegian reform, the findings should be applicable to a broad set of cases (as I return to in the section “Generalizability”).

From Plurality to PR

Until 1896, representatives to municipal councils were elected in multimember districts with plurality voting.⁷ That is, in an election to a council with M seats, the voters wrote the names of the M candidates they wanted elected to the council on the ballot. The M candidates receiving the most votes were elected. Individual candidates were at the center of municipal politics; parties seldom played a role in these elections (Rokkan 1970).

⁶Voting records, however, are not split by sex in Ireland.

⁷The great majority of municipalities consisted of one district. Throughout the pre-WWII period, the median size of the municipal council was 16 representatives.

In 1896, the Storting opened up the possibility for municipalities to change their electoral system to PR if a certain number of voters signed a petition requesting the change.⁸ In the form of PR system that the municipalities were allowed to switch to, voters voted for lists of candidates, and the law required the use of the Hagenbach–Bischoff system, a largest remainder method, to transform votes into seats. In these PR elections, both parties and voters were allowed to express their preferences for certain candidates. First, the party could decide to enter a candidate's name up to three times on the party list. Second, the voter could enter a candidate's name either once or twice.⁹ In total, a candidate could thus receive five votes on a list: three from the party and two from the voter.¹⁰ Although voters consequently, to some extent, could influence which candidates were elected, seats in the municipal council were distributed according to the total number of votes received by each list. The electoral system available to municipalities was thus a typical open-list PR system. In sum, whereas *individual candidates* dominated the plurality elections, the PR elections fostered a contest between *collective lists* (Carey and Shugart 1995).

A rising share of municipalities switched to PR. In the first election allowing municipalities to replace plurality with PR, held in 1898, 21% of the municipalities used PR, increasing to 22% in 1901, 33% in 1907, and 38% in 1913. By the 1916 election, which was the last before the Storting required all municipal elections to be held by using PR, 54% of the municipalities employed the proportional system.¹¹ Regressing an indicator variable for PR on a set of covariates for a cross-section of municipalities in 1916 reveals that municipalities with PR typically had more employment in industry and services and less employment in shipping (compared to agriculture), larger populations, a lower female-to-male population ratio, a larger percentage of the population on poor relief, and more gender equality in voting.¹²

⁸One-fifth of eligible voters were required in municipalities with < 5,000 voters in rural areas and < 8,000 in towns. With $\geq 5,000$ eligible voters, 1,000 voters were required in rural areas and 1,600 in towns.

⁹If entered twice, then the voter had to cross out another candidate.

¹⁰Preference voting was not restricted to a particular list.

¹¹SI Figure B.1 (p. 4) displays a map of the electoral system used in each municipality.

¹²SI Table C.1 (p. 5) shows the full regression results.

The 1919 PR Reform

Two PR reforms were passed in the Storting in 1919, one for municipal elections in July and one for parliamentary elections in December. The rationale behind the municipal reform was to secure broader interest representation in local government (Stortingstidende 1919). The Storting legislated that, starting with the municipal election in the fall of 1919, the 46% of municipalities still using the plurality rule were required by law to switch to the same PR system as the rest of the municipalities.¹³ The only exception to the use of PR was if none or only one party list stood for election, in which case elections were held using the plurality rule. It was only the case in a small number of sparsely populated municipalities in the countryside. The shift from plurality to PR affected neither the size of the municipal councils nor district magnitudes.

The Effect of PR on Gender Inequality in Voting

Beyond offering an exceptional opportunity to study the causal effects of a PR reform, the Norwegian case is also suitable for analysis due to its detailed electoral data. Official election reports compiled by Statistics Norway after each election provide voting statistics broken down by sex for each of the municipalities starting in 1898. These exceptional data make it possible to investigate the effect of electoral institutions on gender inequalities in voting in a more comprehensive way than many previous studies, which have had to rely on contemporary surveys and data for national elections or a limited number of sub-national regions (see, e.g., Corder and Wolbrecht 2016; Kittilson and Schwindt-Bayer 2012; Tingsten 1937).

Research Design

To examine whether the shift from plurality to PR had a positive impact on women's percentage of the vote, I use a difference-in-differences (DiD) design. In this study, the crux of the design is to compare (1) the change in gender disparities in electoral participation before and after the 1919 reform in the reformed municipalities with (2) the equivalent change in the municipalities that did not alter their electoral system (i.e., the municipalities that had introduced PR before 1913). To identify a causal

¹³The first *national* election held under PR took place in 1921.

effect of the reform, the key assumption is that, in the absence of the reform, the trends in electoral participation would have been similar in the reformed and the unreformed municipalities (the parallel trends assumption). Given this assumption, the DiD will estimate the average causal impact of the PR reform for the treated municipalities. In this study, the control group already had (voluntarily) introduced PR. The parallel trends assumption thus implies that the previous introduction of PR in the control group did not set these municipalities off on a *trend* that is different from the trend in the municipalities subject to the 1919 reform (the treatment group). This is also the dynamic we would expect based on the theoretical argument: Vote-maximizing parties and their elites react quickly to the incentives of the new electoral system to avoid losing out to other parties (see also Andersen 1996, 19; Cox, Fiva, and Smith 2016).¹⁴ The *shift* in party elites' mobilization efforts will accordingly occur between the last election with plurality rule and the first election with PR, before stabilizing at a new (higher) level. Although the parallel trends assumption is directly untestable, I provide evidence below that the trends in gender inequality in electoral participation for the control and 1919-treated municipalities match up prior to the 1919 reform.

I use a regression model with fixed effects for municipalities and years to estimate the DiD:

$$Y_{mt} = \eta_m + \delta_t + \gamma \times PR_{mt} + \varepsilon_{mt} \quad (1)$$

Subscripts m and t denote municipality and election year, respectively. The term δ_t is the election fixed effects, which account for election-period common shocks, and η_m is the municipality fixed effects, which means that I estimate within-municipality effects and control for time-invariant, unobserved variables. The treatment, PR_{mt} , is an indicator variable. For elections held using PR the value is 1, and for elections held using plurality the value is 0. In other words, the municipalities in which PR was in place during the entire period (the control group) take the value of 1 for all election years. For the municipalities that were forced to switch to PR in the 1919 election (the treatment group), they take the value of 0 for the 1910–16 elections and the value of 1 for the 1919–28 elections.¹⁵ The model is estimated by ordinary least

¹⁴Sneeringer (2003, 42) analogously portrays how party elites “faced . . . the necessity of winning women voters” during Weimar Germany's first election under PR and female suffrage in 1919. As she observes: “All political parties—including those that had opposed female suffrage—had to confront women as political actors for the first time. Recognizing women's numerical power, they vigorously set out to win their vote.”

¹⁵There were 688 municipalities in 1916. The municipalities that moved from plurality to PR between 1913 and 1916 (58 municipi-

squares, with standard errors clustered by municipality to account for serial correlation within clusters.

The outcome, Y , is gender equality in electoral participation. I use the number of votes cast by women divided by the total number of votes in a given election as the dependent variable (henceforth “fraction female voters”). The fraction allows us to look at whether the switch to PR increases gender equality in voting. This is important since a large literature demonstrates that elected politicians are responsive to the composition of the *voting* population, not the population as a whole (e.g., Bechtel, Hangartner, and Schmid 2016). Still, since the number of women and men eligible to vote may not always be the same due to, for instance, population composition, I also measure gender equality in electoral participation as the turnout among women divided by the turnout among men (the female-to-male turnout ratio), where turnout is defined as number of votes cast divided by the number of eligible voters. Moreover, to show that the results are driven by changes in women's (and not men's) electoral participation, I also measure the dependent variable as women's turnout. The main results for these two alternative dependent variables are highly similar to the main results (see SI Appendix F, p. 9).

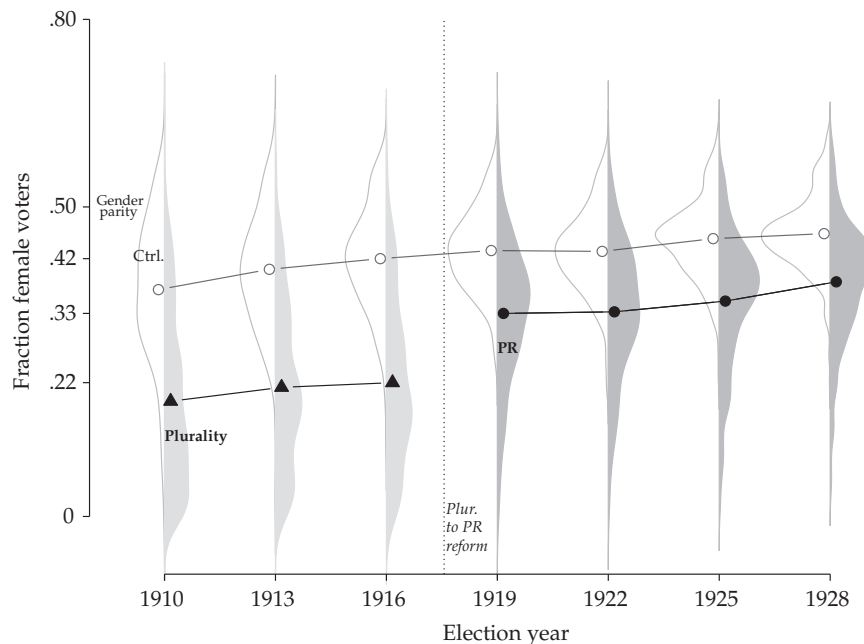
In some of the model specifications, I also include a vector of time-varying covariates to account for possible confounding trends across municipalities. In particular, we might worry that changes in the female or male electoral demographics—such as potential shifts in the number of female or male eligible voters due to emigration, World War I, and the Spanish flu epidemic¹⁶—correlate with both the 1919 reform and the outcome. As covariates, I therefore include log eligible voters, log population, log population density, women's percentage of the eligible voters, women's percentage of the population, and the log number of representatives in the municipal council.

Similarly, changes in the municipalities' industrial structure may also act as a confounder because this period featured industrialization and a growing working class. Using census data, I compute the percentage of

papities) and municipalities that either did not exist throughout the 1910–28 period (37) or have missing data on covariates for one or more election years (24) are excluded from the analysis. In SI Appendix E (p. 7), I show that the main results presented below are highly similar when including these municipalities and also when restricting the sample to municipalities whose area remained unchanged. Type of electoral system is unavailable for the 1910 election. For this year, I assign the municipalities in the analysis the system they had in 1913.

¹⁶Norway was neutral under WWI; yet, the war affected the local economy, particularly through food shortages and a booming shipping sector.

FIGURE 1 Means and Densities of Women's Percentage of the Votes Cast by Treatment Group and Election Year



Note: Filled points and densities denote the municipalities forced to switch to PR in 1919 (treatment group); outlined ones denote the municipalities with PR throughout the period (control group)

the employed in four exclusive and exhaustive occupational categories—industry, agriculture, services, and shipping—and include all but one (agriculture) in the analysis. In October 1919, there was also a national referendum on whether to uphold the prohibition of alcoholic beverages in Norway, which had been in place since 1916. Some research (e.g., Nilson 1977) suggests that women were mobilized where the Nonconformist (Dissenting) religious societies and the temperance campaign were on the rise, which again could be correlated with the PR reform and women's votes. I therefore include the percentage of the population belonging to Nonconformist religious societies. Finally, to account for unobserved local trends in confounders, some model specifications also include linear (and quadratic) municipal-specific time trends.

Empirical Results

To illustrate the empirical strategy, Figure 1 plots means and the densities of the fraction female voters for (1) the municipalities that switch from plurality to PR in 1919 (filled points and densities) and (2) the municipalities that switched to PR before 1913 (outlined points and densities). The figure shows that gender inequality in vot-

ing was stark after women were given equal voting rights before the 1910 election. In 1910, for instance, women cast on average 19% of the votes in the municipalities using plurality elections and 37% in the municipalities using PR. Turning to the main results, the effect of the PR reform is clearly visible in the figure. In 1919, there is a 0.11-point increase, from 0.22 to 0.33, in the fraction female voters for the municipalities that were affected by the reform. For the municipalities that used PR throughout the period, the previous trend continues uninterrupted, with a 0.01-point increase between 1916 and 1919, from 0.42 to 0.43. The DiD estimate for 1919 suggested by this graph is thus 0.10 points. After 1919, the trends for both sets of municipalities again continue more or less in parallel.¹⁷

Next, Table 1 displays the results from estimating the DiD regression model in Equation (1). Echoing the graphical analysis, Model 1 indicates that the passage from plurality to PR in 1919 is estimated to have increased the fraction female voters by an average of 0.096 points for the reformed municipalities, compared to the counterfactual in which the reform did not occur. In

¹⁷The remaining difference between these two sets of municipalities after 1919 is likely to be a result of time-invariant differences between them.

TABLE 1 OLS Regression Results Reporting the Estimated Effect of PR on Gender Equality in Voting, 1910–28

	Fraction Female Voters					
	(1)	(2)	(3)	(4)	(5)	(6)
PR reform (1919)	0.096 (0.007)	0.092 (0.007)	0.093 (0.008)	0.090 (0.007)	0.086 (0.010)	0.096 (0.013)
Municipal fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Covariates		D	O	D + O	D + O	D + O
Specific trends					Yes	Yes
Specific trends squared						Yes
Observations	3,983	3,983	3,983	3,983	3,983	3,983
Municipal panels	569	569	569	569	569	569
R-squared	0.787	0.792	0.789	0.793	0.875	0.914
Adj. R-squared	0.752	0.757	0.753	0.758	0.824	0.849
Mean $\bar{Y}_{\text{treated}, t \geq 1919}$	0.346	0.346	0.346	0.346	0.346	0.346
Effect in % Δ (s.e.)	38 (3)	36 (3)	37 (3)	35 (3)	33 (4)	38 (5)

Note: Standard errors clustered by municipality are in parentheses. Trends are municipality specific. The electoral demographic covariates (denoted by “D”) are population (log), the female fraction of the population, eligible voters (log), the female fraction of eligible voters, and representatives in the municipal council (log). The other covariates (“O”) are percentage of the population in nonconformist (Dissenting) religious societies and variables for the percentage of the working population in each of the employment categories industry, shipping, services, and agriculture (with agriculture as the omitted category). The effect size is the percentage increase from the counterfactual outcome: $\hat{\gamma}_{pr} / (\bar{Y}_{\text{treated}, t \geq 1919} - \hat{\gamma}_{pr}) \times 100$, where $\hat{\gamma}_{pr}$ is the estimated PR coefficient and $\bar{Y}_{\text{treated}, t \geq 1919}$ is the mean outcome in year ≥ 1919 for the treated municipalities.

terms of the percent increase from the counterfactual, this amounts to a substantial 38% (s.e. = 3) increase in the fraction female voters.¹⁸ Including the rich set of covariates in Models 2–4 does not alter these conclusions, as it only slightly decreases the size of the PR coefficient. The same holds for the linear and quadratic municipality-specific trends in Models 5 and 6.

Threats to Inference

A causal interpretation of the estimates in Table 1 rests on the assumption of parallel trends. Indirect evidence lends credence to the plausibility of the assumption in this study. The two lines in Figure 1 follow the same trend prior to the reform and also continue along the same path after the reform, which suggests that the trends are parallel.¹⁹ We can also reestimate Equation (1) with leads of the 1919 PR treatment. The leads give a placebo test of the PR reform; if the estimate is causal, then the

1919 reform should have little impact in 1913 or 1916. The results of this test show that the lead coefficients are close to zero, with a 1913 coefficient of -0.01 (s.e. = 0.01 , $p = .204$) and a 1916 coefficient of -0.01 (s.e. = 0.01 , $p = .223$; see SI Table G.1, p. 10).²⁰ There are hence no indications of violations of the assumption.

Another threat to the DiD design is that the treatment effect is not driven by changes in the electoral system, but rather other events occurring in the 1916–19 period, such as WWI, which induced female labor force participation (Greenwald 1990). Correspondingly, it might have spurred women’s engagement in politics across Norwegian municipalities. As female electoral participation was already higher in the municipalities that introduced PR prior to 1919, a ceiling effect—and not PR—could consequently explain the effect for the municipalities that had to introduce PR in 1919. To address these concerns, I investigate whether the municipalities that switched to PR between the 1913 and 1916 elections also experienced an increase in gender equality in voting, using the municipalities that retained plurality rule as the control group. SI Appendix I (p. 12) provides the details and shows that PR increased the fraction female voters by

¹⁸See Table 1’s last two rows and note for details on the calculation.

¹⁹Figure 1 uses municipalities that switched to PR before 1913 as the control group. Using only municipalities that introduced PR as early as 1898 or 1901 leads to similar conclusions (see SI Figure H.1, p. 11).

²⁰In addition, Callaway and Sant’Anna’s (2020) pretest of the parallel trends suggests that I cannot reject the assumption ($p = .981$).

0.06 points (s.e. = 0.018, $p = .002$). The results are clearly in line with the main findings.

Together, the pieces of evidence from the 1919 electoral reform and the 1913–16 switches to PR give precise evidence in favor of the hypothesis that moving from a multimember plurality to an open-list PR system reduces gender inequality in voting. The reform was thus instrumental to begin translating gender equality in the right to vote into de facto gender equality at the ballot box.

Potential Conditions and Mechanisms

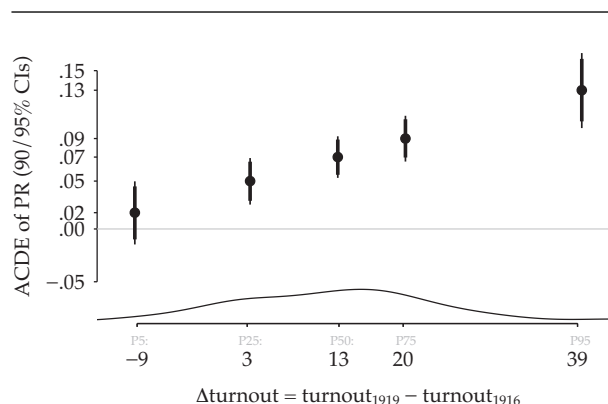
What drives the effect of PR on gender equality in voting? The theoretical discussion above specified three sets of factors that could affect the extent to which PR influences women's inclusion in voting: (1) electoral competition, (2) women's networks, and (3) PR's positive effect on women's sense of efficacy and representation in legislatures.

Electoral Competition. If the effect of PR is due to the mobilization efforts of party elites and candidates, the impact should vary according to the change in municipalities' competitiveness with the shift from plurality to PR rule. To measure competitiveness, I use the change in overall turnout, as party vote shares are unavailable for the whole period.²¹ Although party vote shares would allow for a calculation of the closeness of the electoral race, Cancela and Geys's (2016, 267) meta-analysis of 105 studies concludes that "strong support exists for a positive relation between the competitiveness of the election and the share of voters turning out on Election day" (see also Cox 2015, 50). In SI Appendix J (p. 14), I similarly document that the switch to PR in national elections in Norway, where vote share data are available, increased electoral competitiveness.²² The change in overall turnout between the 1916 and 1919 municipal elections thus captures the change in competitiveness produced by the shift from plurality to PR. Below, I analyze how the effect of PR on the change in the fraction female voters

²¹The original election forms contained party vote and seat shares. Sadly, a fire at Statistics Norway later turned the forms to ash.

²²Specifically, I show that overall turnout and the standard win-margin measure of competitiveness are tightly correlated and that the change in competitiveness induced by PR is correlated with a change in overall turnout. Furthermore, I demonstrate that the results I present below regarding the modifying effect of competition also hold for the PR reform at the national level. Finally, I document that the switch to PR in 1919 at the municipal level led to a positive change in overall turnout and that this shift is more pronounced the lower the level of pre-reform turnout.

FIGURE 2 ACDE of PR on the Change in Fraction Female Voters, as a Function of the Change in Overall Turnout



Note: Average controlled direct effect (ACDE) of PR on the change in the fraction female voters between 1916 and 1919, as a function of the change in overall turnout. Thin and thick segments give 90% and 95% confidence intervals, respectively (from bootstrap with 10,000 resamples). The density plots the moderator's distribution. Estimated using sequential-g on changes between the 1916 and 1919 elections (all covariates from Table 1 included)

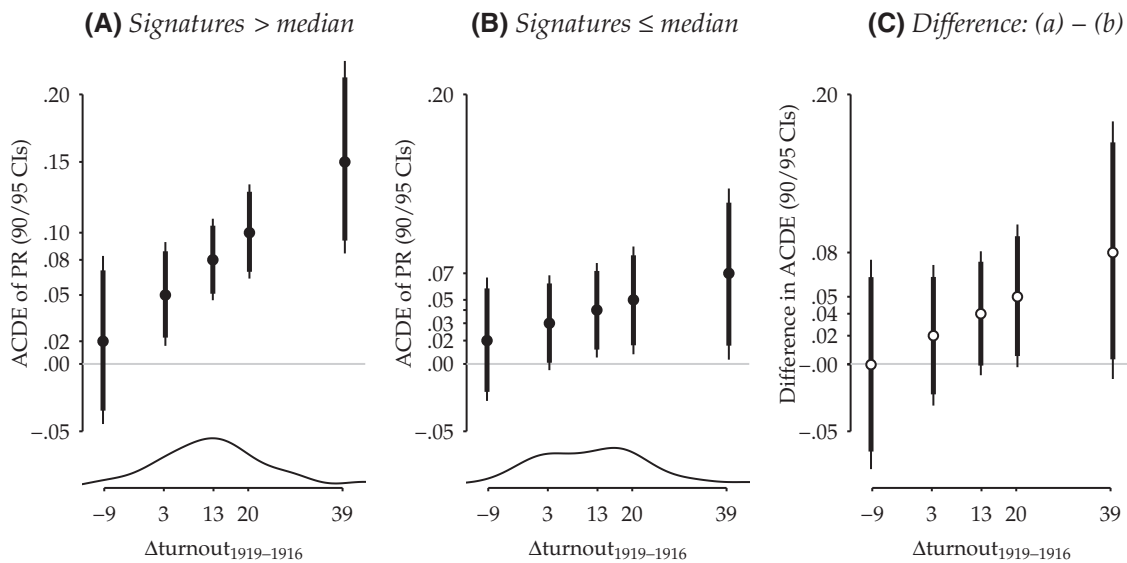
varies with the *change in overall turnout* between the 1916 and the 1919 election.²³

The problem with including the change in turnout as a regressor and an interaction in the empirical model is that it may induce posttreatment bias in the estimate of PR on the fraction female voters. Moreover, as Acharya, Blackwell, and Sen (2016) demonstrate, we cannot know the direction of the bias. To deal with posttreatment bias, I employ the sequential g-estimator, which gives the average controlled direct effect (ACDE) of PR net of PR's effect on the change in overall turnout (see Acharya, Blackwell, and Sen 2016). What makes the estimator particularly suited to test the electoral competition hypothesis is that it allows us to estimate the interaction between PR and competitiveness. That is, we can study how the direct effect of PR varies as we fix the change in turnout (the mediator) at various values for all municipalities in the population (see SI Appendix K, p. 21, for estimation details).

Figure 2 displays the results. The figure shows the effect of PR when we fix the overall change in turnout at its 5th, 25th, 50th, 75th, and 95th percentile in the sample. Bearing out the electoral competition hypothesis, the ef-

²³Alternatively, I could measure competitiveness by using the *level* of turnout during the last pre-reform election under plurality rule and examine how it conditions the effect of PR on the fraction female voters. SI Appendix L (p. 22) shows that this yields similar substantive results.

FIGURE 3 ACDE of PR on the Change in Fraction Female Voters, as a Function of the Change in Overall Turnout and by Mobilization Level



Note: Average controlled direct effect (ACDE) of PR on the change in the fraction female voters between 1916 and 1919, as a function of the change in overall turnout, for municipalities with different levels of mobilization for the 1905 petition. Thin and thick segments give 90% and 95% confidence intervals, respectively (from bootstrap with 30,000 resamples). The densities plot the moderator's distribution. Estimated using sequential-g on changes between the 1916 and 1919 elections (all covariates from Table 1 included)

fect of PR on reducing gender inequality in voting is substantially larger when the positive change in competition (measured by turnout) is largest.

Women's Networks. Next, I explore whether the impact of PR is larger where there are preexisting networks of women. When political elites have greater incentives to mobilize under PR, they will be able to get out the vote more easily if they can tap into women's networks. To create a measure of women's networks, I utilize the fact that, in 1905, the suffrage movement mobilized nearly 280,000 women across the country to sign an independence petition in support for the (men-only) referendum on whether Norway should secede from Sweden. To collect signatures, they relied on local chapters of the women's movement and other similar networks (Agerholt 1937, 219). Using the original 9,329 sheets of handwritten signatures, as well as information on the sheets' municipality of origin from the Norwegian Parliamentary Archives, I create a novel data set containing the number of signatures per municipality.²⁴ I then calculate the percentage of women who signed the petition with the help of census data. The petition measure serves as a proxy for the presence and strength of women's movements and networks in a given municipality.

To gauge whether the impact of PR varies with the presence of women's organized networks, Figure 3 repeats the electoral competition analysis above but splits the sample into municipalities that score above the median value for the 1905 petition variable (Panel A) and that score equal to or below the median value (Panel B). In Panel A, the effect of PR rises more steeply than in Panel B, where the effect of PR is more invariant to changes in competition. For instance, when the change in overall turnout is set to its median value, 13, the effect is about twice as large for the above-median subset, with a difference of 0.04 points (see Panel C). These results lend indicative support to the hypothesis that party elites—when faced with increased mobilization incentives with a switch to PR—are more successful with mobilizing women when they can tap into preexisting women's networks.²⁵

²⁴SI Appendix N (p. 24) provides further details.

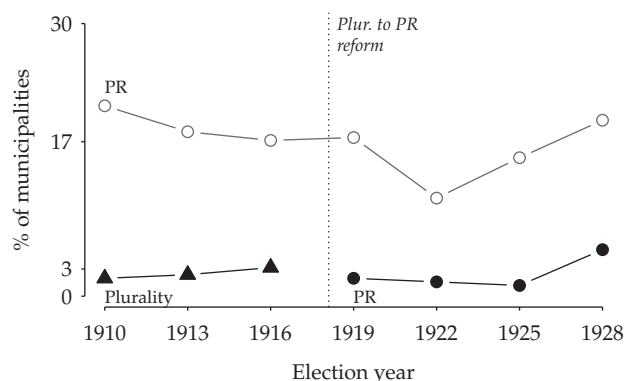
²⁵Given the lack of data on party vote shares for municipal elections, I cannot directly examine whether pro-suffrage parties—in Norway, the Liberals and the Social Democrats—were more successful in mobilizing women with the introduction of PR. Using data on national elections, SI Appendix M (p. 23) shows that there is some weak support for this hypothesis.

Sense of Efficacy and Role Model Effects. The effect of PR may also partly be driven by PR strengthening women's belief that they can influence politics, and thereby make them more likely to vote. While difficult to test systematically, archival sources suggest that women, or at least women's organizations and their supporters, saw PR as more inclusive. Hagbard Berner—a former MP and mayor, and a leading proponent of women's rights—argued that women's electoral participation had been (negatively) affected by “single-member districts, [where] party maneuvers, electoral alliances, ‘machine politics,’ and parochial interests have had their arena.” Berner went on to argue that “with large electoral districts and proportional elections, the prospects would be higher for a fair and improved election result” (Berner 1919, 185). During the debates over electoral systems in 1919, the Norwegian Association for Women's Rights wrote directly to the Storting to express that if parliament kept the plurality system, “there would be little or no opportunity for women to be represented in the Storting.” They asserted that “women, who alone make up half of the country's voters, stand unanimously behind multi-member districts with proportional representation” (Stortingstidende 1919, 2350). Proponents of women's rights hence saw PR as more conducive to women's political influence and participation.

More rigorously, I can examine whether PR increased gender equality in voting through a positive effect on women's representation in municipal councils, which again may have inspired more women to vote. The official election reports provide the number of female and male representatives elected to the municipal councils. To see whether the reform had any effect on female representation, I calculate the proportion of municipalities that had at least one female representative in the municipal legislature separately for the municipalities subject to the 1919 reform and the comparison group. In the latter, 17% had female legislators in both 1916 and 1919. In the 1919 reform group, 3% had at least one woman in the council in 1916 and 2% in 1919, which is illustrated in Figure 4. These results, which show no effect of PR on female representation, pertain to *elected* representatives and thus cannot detect, for example, whether female *candidates* mobilized women but still failed to be elected themselves.²⁶

²⁶The findings also concern the effect of PR and do not exclude general role model effects of *women's representation* on the mobilization of female voters. Indeed, in the full sample of municipalities in the 1910–28 elections, there is a significant and positive correlation between the (lagged) change in the percentage female representatives and the change in the fraction female voters (see SI Table O.1, p. 25).

FIGURE 4 Percentage of Municipalities with at Least One Woman in the Municipal Council by Treatment Group



Generalizability

Given that the plurality–PR distinction is a central dimension of electoral systems in democracies across the world, the theoretical argument and empirical results presented in this study of Norwegian municipalities should be applicable to other countries and time periods. The results indicate that a PR reform is likely to reduce gender inequality in voting in settings where many plurality electoral districts are uncompetitive and where there are viable women's networks.

There are, however, several objections that could point to an overestimation of the PR effect and make the findings less generalizable. First, the estimated impact of PR is based on a treatment effect for Norwegian municipalities that were more likely to be rural and less populous than the municipalities that had already switched to PR. These factors may indirectly increase the strength of the results because gender norms in rural areas are likely to be more traditional, which produces a wider gender disparity in political participation. Still, these are not distinguishing features of the Norwegian case but rather traits that Norway shared with other countries at the time, and with a number of countries today. Compared to, for example, other Western countries in the early twentieth century, the percentage of the Norwegian population employed in agriculture and living in rural areas was about average (see SI Figure P.1, p. 26). As such, these features should not restrict the validity of the findings to the Norwegian case.

Another possibility is that—since many municipalities already had introduced PR—party elites already had extensive knowledge about how to mobilize women when the 1919 reform was applied. If this is the case, then

the results in this study may overestimate the effect of PR on gender equality in voting. Although such effects are difficult to rule out, the study's finding that the impact of PR is more pronounced where party elites could tap into preexisting women's networks at least suggests that prior knowledge of the workings of PR was in itself insufficient to achieve a large mobilization of women.

Another way to examine the generalizability of the findings is to test whether there is a correlation across countries between electoral systems and gender equality in voting, both historically and today. Regarding historical democracies, a simple analysis of the 11 countries for which we have turnout split by sex in the period after women's enfranchisement shows that countries with PR systems on average have substantially higher levels of gender equality in turnout than countries with plurality systems (see SI Figure Q.1, p. 27). Regarding contemporary democracies, an analysis of the association between electoral systems and gender equality in voting—where I use survey data for 55 countries worldwide between 1996 and 2016—indicates that whereas countries with PR systems are very close to gender equality in voting, countries with plurality are further away from achieving such equality (see SI Figure Q.2, p. 28). Of course, neither of these analyses warrant strong causal claims about the effect of PR; still, they suggest that the main results of this study travel far beyond the Norwegian case.

Conclusions

Inequality in political participation, despite equality in political rights, is a persistent plight in democratic societies. It is therefore paramount to investigate how underrepresented groups can be mobilized to vote. In this regard, the effects of political institutions—electoral systems, quotas, party organizations, and voting laws—have long been of interest to scholars of women's and minorities' inclusion in politics. Despite this interest, however, we lack an understanding of and causal evidence for how electoral systems affect gender inequality in voting participation. I argue that replacing plurality rule with PR compels political elites in previously uncompetitive districts to widen their electoral appeal in order to mobilize women, who were politically underrepresented at the voting booth in the early twentieth century.

Empirical analyses of electoral institutions on political inclusion of underrepresented groups are, however, often bedeviled by endogeneity concerns, such as separating the effect of the institution from the political

process that brought it about. Using a forced shift to PR in half of the Norwegian municipalities in 1919 is therefore a particularly valuable research strategy. By building a data set covering more than 600 municipalities over seven elections between 1910 and 1928, I find that, on average, the switch from plurality to PR in 1919 leads to a substantial reduction in gender inequality in voting and that the effect is more marked in municipalities where PR led to a larger shift in electoral competition. This study consequently provides the first causal evidence that switching from a plurality to a PR system increases equality in electoral participation along one central dimension, namely, gender. As such, these results add to the literature proposing that PR encourages the mobilization of underrepresented groups.

The theoretical argument may also apply to other underrepresented groups since a move from plurality to PR gives elites greater incentives to mobilize not only women but also other potential voters. That said, whereas women make up approximately half of the eligible voters, other underrepresented groups (e.g., religious and ethnic groups) typically constitute a minority of eligible voters. The electoral impetus for their mobilization is thus weaker than for women, which means that the impact of PR documented for women is likely to form an upper bound of the expected effect for marginalized minority groups. The argument and results nevertheless suggest that a switch to PR could reduce voting disparities between majority and minority groups.

Another insight from this study is the merits of re-searching how democratic institutions' impact on voting disparities is profoundly conditioned by the social environment in which such reforms occur. With a change from plurality to PR, I argue that elites are most likely to succeed with mobilizing women to vote when they can draw on preexisting women's networks. In the empirical examination of conditions for a positive effect of PR on gender equality in voting, I find that the impact is particularly powerful where it is coupled with women's social networks. Future studies should further explore how the presence of networks among marginalized citizens modifies the impact of electoral institutions on inequalities in voting.

Gender inequality in political participation is often portrayed as "sticky" and subject to change mainly through intergenerational replacement. The results of this study give cause for a more optimistic appraisal, suggesting that institutions can, quite rapidly, increase gender equality in electoral participation.

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Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Appendix A: Introduction of proportional representation and women's suffrage

Appendix B: Map of electoral system usage across Norwegian municipalities in 1916

Appendix C: Correlates of having proportional representation in 1916

Appendix D: Variable sources

Appendix E: Varying the sample: including additional municipalities

Appendix F: Alternative measures of the dependent variable

Appendix G: Main results with t+1 and t+2 leads of PR

Appendix H: Parallel trends with more restrictive control group

Appendix I: Addressing concerns about simultaneous events

Appendix J: Using overall turnout gauge electoral competition

Appendix K: Details on the sequential g-estimation

Appendix L: Alternative analysis of the competitiveness mediator

Appendix M: The role of parties

Appendix N: Measure of women's networks

Appendix O: Role models

Appendix P: Comparing Norway to other Western countries in 1919.

Appendix Q: Cross-national associations between proportional representation and gender equality in voting