

Online Appendix for ‘How Gap Measures Determine Results: The Case of
Proportional Systems and the Gender Mobilization Gap.’

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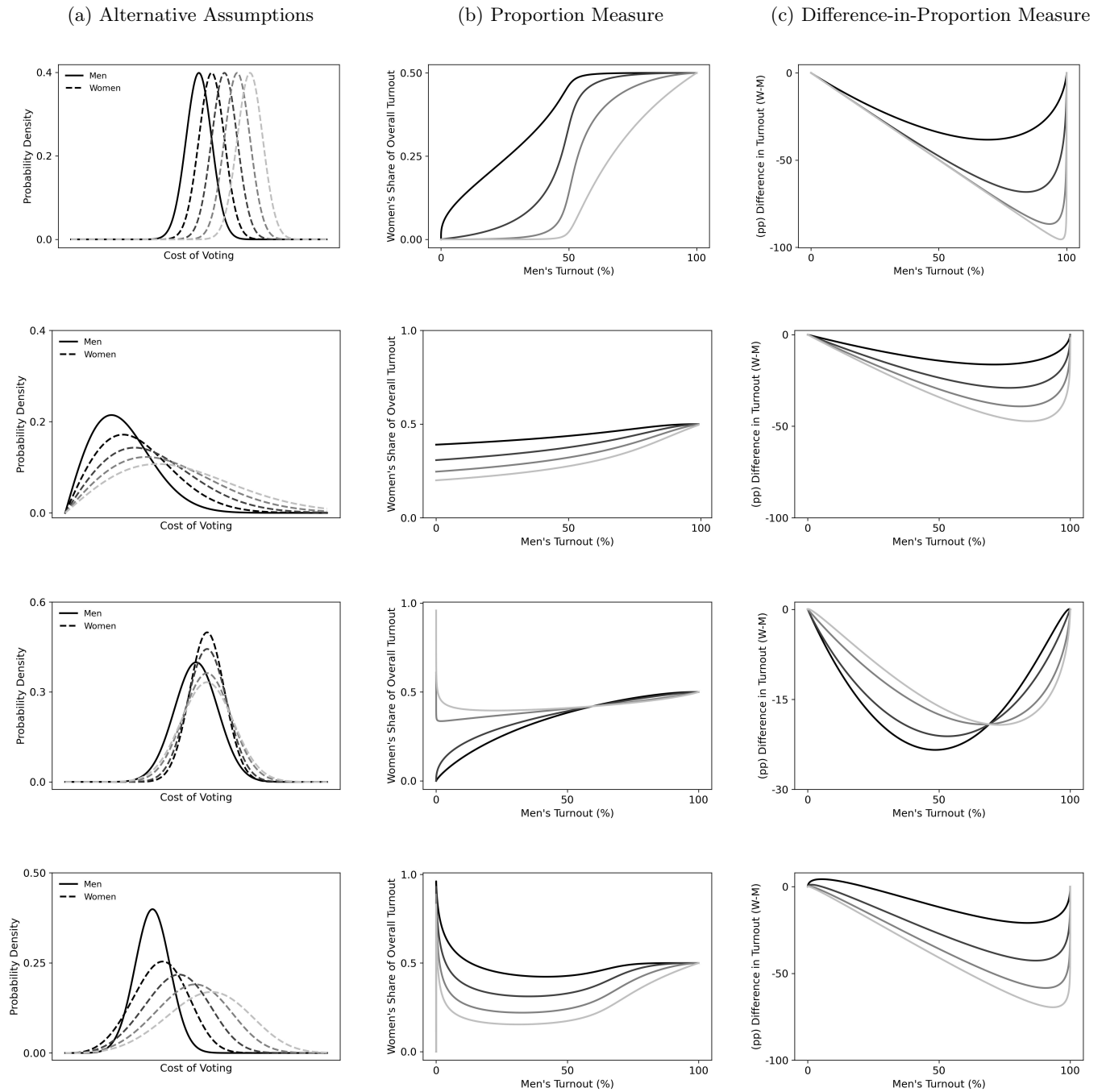
Alternative Assumptions

Appendix Figure A1 relaxes some of the assumptions outlined in the main text. The figure shows that the assumptions about the distribution of women's and men's propensity to vote shape (i) the 'tipping point' at which difference-in-proportion measure starts to increase (or sometimes decrease) and (ii) whether the proportion measure increases with men's turnout (or sometimes decreases or is non-monotonic).

This exercise demonstrates that whilst the 'tipping point' can be very high, this tends to happen when the cost curves are very far apart. Similarly, whilst the proportion measure may indicate limited sensitivity to men's turnout, or even have a U-shaped relationship with men's turnout, this also tends to happen when the cost curves are very far apart (assuming away a modern gender gap where women's share of turnout decreases from 1 to 0.5). That is, if women's propensity to vote is *extremely* lower than men's, then it is possible that the two measures return opposite predictions (also) when men's turnout is high.

Whilst I cannot directly test the assumptions, most of the alternative predictions are not consistent with what I observe empirically in Appendix Figure A2. Importantly, most of the alternative assumptions are harder to justify theoretically. Women's propensity to vote is rarely observed to be extremely lower than men's, as other characteristics, such as socio-economic status, typically have stronger effects on turnout than sex.

Figure A1: Predicting Sensitivity of Measures to Electoral Context with Alternative Assumptions



Notes: Column (a) presents alternative assumptions about the distribution of women's and men's cost of voting; Columns (b) and (c) predict gender gap in mobilization using assumptions in column (a) for women's share of overall turnout and difference in turnout (W-M) respectively.

Variable Definitions

Table A1: Variable Description

Key Variables

Women's Turnout	The number of votes cast by women divided by the number of women eligible to vote. In elections with single member districts, this refers to a decisive (final) round.
Men's Turnout	The number of votes cast by men divided by the number of men eligible to vote. In elections with single member districts, this refers to a decisive (final) round.
Difference in Turnout	Percentage point difference between women's and men's turnout (see Table 1 in the paper). In elections with single member districts, this refers to a decisive (final) round.
Women's Share Among Voters	The number of votes cast by women divided by the number of votes cast by women and men (see Table 1 in the paper). In elections with single member districts, this refers to a decisive (final) round. In order to ease comparability with the difference in turnout measure, I convert the proportion to percentages.

Control Variables

Urban	Indicates urban localities. Coded as 1 if a locality is a 'city' in the 1920 census, and 0 otherwise.
Factory Jobs	% of women and men above 15 years of age who are employed in factories in the 1920 census.
Intellectual Jobs	% of women and men above 15 years of age who are employed in intellectual jobs, as defined in the 1920 census (civil administration, defense, religion, health, teaching, science, arts, charities).
Married Women	% of married women among women above 15 years of age in the 1920 census.

Summary Statistics

Table A2: Summary Statistics for Key Variables in Treated Samples

	N	Min	Max	Avg. (S.D.)		N	Min	Max	Avg. (S.D.)
<i>Local Election, Pre-Reform 1916</i>					<i>Parliamentary Election, Pre-Reform 1918</i>				
Women's Turnout	278	0	92.3	15.3 (16.3)	Women's Turnout	92	10.2	92.1	49.3 (19.5)
Men's Turnout	278	9.7	91.0	44 (17.1)	Men's Turnout	92	38.6	90.9	70.5 (12.3)
Difference in Turnout	278	-72.3	18.3	-28.7 (13.4)	Difference in Turnout	92	-53.7	11.87	-21.2 (11.1)
Women's Share Among Voters	278	0	58.1	21.8 (13.4)	Women's Share Among Voters	92	20.3	55.8	41.7 (8.4)
<i>Local Election, Post-Reform 1919</i>					<i>Parliamentary Election, Post-Reform 1921</i>				
Women's Turnout	278	0	88.9	28.6 (18.4)	Women's Turnout	92	36.7	84.8	57.4 (11.6)
Men's Turnout	278	16.8	98.3	55.1 (15.8)	Men's Turnout	92	59.7	92.1	75.4 (6.7)
Difference in Turnout	278	-57.7	10.7	-26.5 (11.9)	Difference in Turnout	92	-36.3	-3.7	-18.1 (7.2)
Women's Share Among Voters	278	0	61.6	32.7 (11.4)	Women's Share Among Voters	92	35.1	57.5	45.0 (4.9)
<i>Local Election, 1919-1916</i>					<i>Parliamentary Election, 1921-1918</i>				
Δ Women's Turnout	278	-47.5	66.8	13.3 (16.1)	Δ Women's Turnout	92	-12.6	43.6	8.1 (11.6)
Δ Men's Turnout	278	-42.6	54.2	11.1 (16.1)	Δ Men's Turnout	92	-14.3	31.1	4.9 (9.0)
Δ Difference in Turnout	278	-30.2	45.8	2.2 (11.6)	Δ Difference in Turnout	92	-16.6	25.3	3.1 (7.4)
Δ Women's Share Among Voters	278	-26.6	47.8	10.8 (11.5)	Δ Women's Share Among Voters	92	-4.9	23.5	3.2 (5.6)

Notes: Data from treated samples. In local elections, this refers to the last election before PR (1916) and the first election after (1919) in municipalities that were affected by the PR reform during this period. In parliamentary elections, this refers to the last election before PR (1918) and the first election after (1921). Variable description in Appendix Table A1. Redistricted municipalities between 1916 and 1919 and redistricted pre-reform districts between 1915-1921 in parliamentary elections are excluded. This allows comparability of localities before and after PR implementation and of treated and control samples. All samples in this table are treated. Control sample in local elections refers to municipalities that implemented PR before 1916. Control sample in parliamentary elections refers to election cycle prior to the nationwide reform (1915-1918).

Supplementary Results

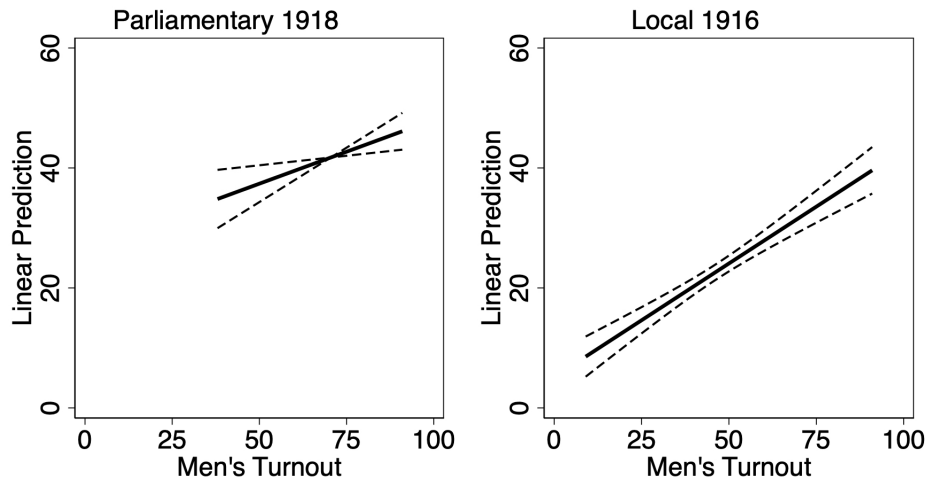
Table A3: The Effect of Men's Turnout on Gender Mobilization Gap

Dependent Variable:	Proportion Measure (1-2)		Difference-in-Proportion Measure (3-4)	
	Local 1916	Parl. 1918	Local 1916	Parl. 1918
<i>Model</i>	(1)	(2)	(3)	(4)
Men's turnout	0.379** (0.042)	0.213** (0.072)	-1.321** (0.216)	-1.183 (0.83)
Men's turnout sq.			0.011** (0.003)	0.009 (0.007)
% Factory Jobs	-0.321 (0.282)	0.525** (0.115)	-0.452* (0.227)	0.722** (0.179)
% Intellectual Jobs	3.62** (1.277)	0.172 (0.529)	4.332** (1.506)	0.393 (0.878)
% Married Women	0.107 (0.149)	-0.429* (0.193)	0.358* (0.144)	-0.014 (0.36)
Urban	17.632** (4.89)	4.925 [‡] (2.531)	14.3** (5.361)	7.799 (4.604)
PR District FEs		Yes		Yes
R-sq	0.328	0.835	0.389	0.799
N	278	92	278	92

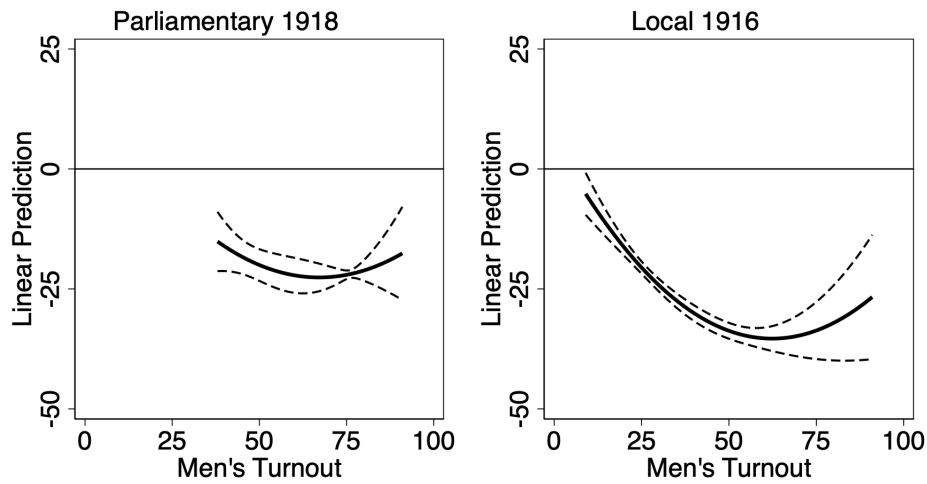
Notes: Data from pre-reform years and samples. In local elections, this refers to the last election before the introduction of PR (1916) in municipalities that implement PR in the next (1919) election. In parliamentary elections, this refers to the last election before the introduction of PR (1918) in all districts; DV is the proportion measure (women's share among voters) and the difference-in-proportions measure (difference in turnout) of gender gap in mobilization, as defined in Table 1 in the paper; OLS estimates; all models include a constant; ** < 1%; * < 5%; [‡]<10%; models in local election use robust standard errors; models in parliamentary election include PR district FEs and cluster standard errors at PR-district level; Wild bootstrap (calculated with BOOTTEST command in Stata, using recommended Rademacher weights, null imposed and 999 replications) returns comparable p-values for men's turnout in models using PR district fixed effects (p<0.01 in Model 2; not significant at conventional levels in Model 4); unit of observation is a municipality in models using local election and a pre-reform district in models using parliamentary election; variable description in Appendix Table A1; sample description in Appendix Table A2; adjusted means plotted in Appendix Figure A2.

Figure A2: Plotting Adjusted Means of Gender Gap by Men's Turnout

(a) DV: Proportion Measure

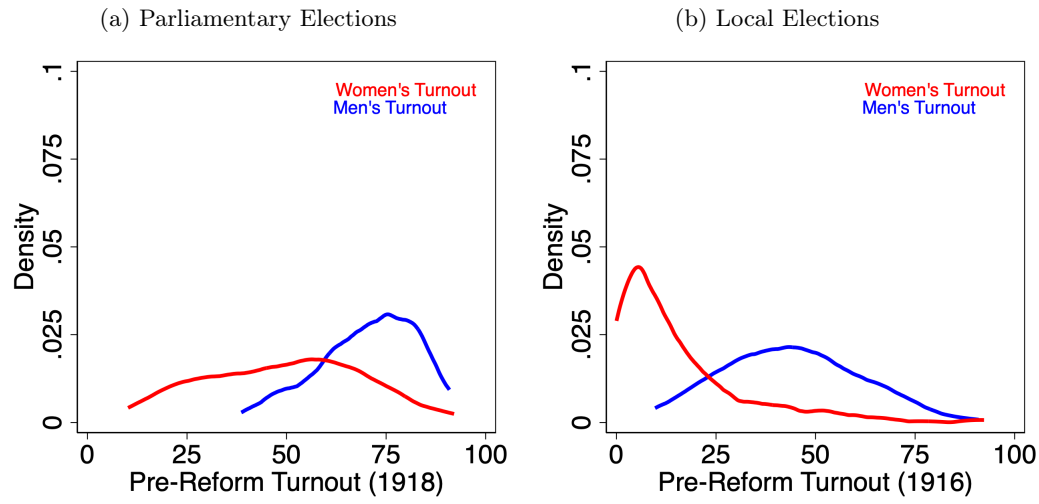


(b) DV: Difference-in-Proportions Measure



Notes: Full models in Appendix Table A3; 95% CIs. DV is the proportion measure (women's share among voters) and the difference-in-proportion measure (difference in turnout) of gender gap in mobilization, as defined in Table 1 in the paper.

Figure A3: Kernel Densities of Turnout by Sex in Pre-Reform Years



Notes: Sub-figure a) plots kernel density of women's (red) and men's (blue) turnout in the last election year before the introduction of PR in 1918. Sub-figure b) plots kernel density of women's (red) and men's (blue) turnout in the last election before PR in municipalities that implemented PR for the first time in 1919 elections. Variable description in Appendix Table A1; Sample description in Appendix Table A2.

Table A4: The Effect of Pre-Reform Men’s Turnout on Change in Gender Mobilization Gap Before and After PR

Dependent Variable:	Change in Proportion		Change in Difference-in	
	Measure (1-2)		-Proportion Measure (3-4)	
Election Type:	Local	Parl.	Local	Parl.
Sample:	1916-1919	1918-1921	1916-1919	1918-1921
Model	(1)	(2)	(3)	(4)
Pre-Reform Men’s Turnout	-0.18** (0.042)	-0.158* (0.069)	0.884** (0.192)	0.658 (0.688)
Pre-Reform Men’s Turnout sq.			-0.006* (0.002)	-0.004 (0.005)
% Factory Jobs	0.557** (0.2)	-0.21 [‡] (0.108)	0.342 (0.208)	-0.374 [‡] (0.193)
% Intellectual Jobs	0.028 (1.478)	0.328 (0.229)	-1.6 (1.275)	0.584 [‡] (0.336)
% Married Women	-0.268 [‡] (0.141)	0.044 (0.155)	-0.004 (0.131)	0.022 (0.263)
Urban	-18.07** (6.231)	-0.476 (1.258)	-1.491 (4.171)	-2.371 (2.719)
PR District FEs		Yes		Yes
R-sq	0.131	0.692	0.282	0.63
N	278	92	278	92

Notes: Data from treated samples. In local elections, this refers to the last election before PR (1916) and the first election after (1919) in municipalities that were affected by the PR reform during this period. In parliamentary elections, this refers to the last election before PR (1918) and the first election after (1921); DV is the proportion measure (women’s share among voters) and the difference-in-proportion measure (difference in turnout) of gender gap in mobilization, as defined in Table 1 in the paper; OLS estimates; all models include a constant; ** < 1%; * < 5%; [‡]<10%; models using local election use robust standard errors; models using parliamentary election include PR district FEs and cluster standard errors at PR district level; Wild bootstrap (calculated with BOOTTEST command in Stata, using recommended Rademacher weights, null imposed and 999 replications) returns comparable p-values for men’s turnout in models using PR district fixed effects (p<0.05 in Model 2; not significant at conventional levels in Model 4); unit of observation is a municipality in models using local election and a pre-reform district in models using parliamentary election; redistricted localities between relevant elections excluded in both samples; variable description in Appendix Table A1; sample description in Appendix Table A2.

Table A5: The Effect of PR on Gap Measures with Robustness and Pre-Treatment Placebos (Difference-in-Differences)

Sample: Dependent Variable:	Balanced 1916-1919 (1-2)		Balanced 1913-1919 (3-6)				Balanced 1910-28 (7-8)	
	Prop.	Diff.-in-P.	Prop.	Diff.-in-P.	Prop.	Diff.-in-P.	Prop.	Diff.-in-P.
<i>Model</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post 1919	1.721** (0.439)	1.224* (0.618)	1.766** (0.452)	1.129 [‡] (0.643)				
PR 1919	-16.574** (0.88)	-5.554** (0.923)	-16.834** (0.912)	-5.791** (0.968)				
Post * PR 1919	9.137** (1.212)	0.953 (1.202)	9.529** (1.167)	1.296 (1.26)				
Post 1916 (Plac.)					2.088** (0.541)	3.095* (0.694)		
PR 1916 (Plac.)					-14.133** (0.928)	-6.044** (0.963)		
Post * PR 1916 (Plac.)					-2.27 [‡] (1.259)	0.723 (1.31)		
PR Reform (1919)							0.09** (0.007)	0.962 (0.749)
% Factory Jobs	0.146** (0.038)	0.152** (0.048)	0.154** (0.039)	0.151** (0.051)	0.165** (0.041)	0.1521** (0.052)		
% Intellectual Jobs	1.086** (0.268)	1.604** (0.318)	1.041** (0.27)	1.572** (0.326)	1.168** (0.308)	1.696** (0.385)		
% Married Women	-0.098 (0.068)	0.467** (0.073)	-0.103 (0.073)	0.479** (0.079)	0.026 (0.076)	0.562** (0.082)		
Urban	8.192** (1.209)	10.091** (1.297)	8.351** (1.242)	10.194** (1.341)	11.562** (1.193)	13.811** (1.491)		
Controls (Skorge)							Yes	Yes
Munic. FEs							Yes	Yes
Year FEs							Yes	Yes
R-sq	0.488	0.261	0.494	0.26	0.512	0.318	0.793	0.654
N	1,314	1,314	1,236	1,236	1,236	1,236	3,983	3,983

Notes: DV is the proportion measure (women’s share among voters) or difference-in-proportion measure (difference in turnout) as defined in Table 1 in the paper; OLS estimates; robust standard errors; all models include a constant; ** < 1%; * < 5%; [‡]<10%; variable description in Appendix Table A1, sample description in Appendix Table A2. Municipalities that changed boundaries between relevant elections are dropped, as are municipalities that adopted PR between 1913 and 1916 in the balanced panel 1913-1919; Models 1-2 use a balanced panel 1916-1919; Models 3-4 check robustness to a balanced panel 1913-1919; Models 5-6 run pre-treatment placebos on a balanced panel 1913-1919. Models 7-8 adopt all coding decisions as in Skorge (2023, Table 1, Model 4) using original women’s share among voters and (new) difference in turnout.

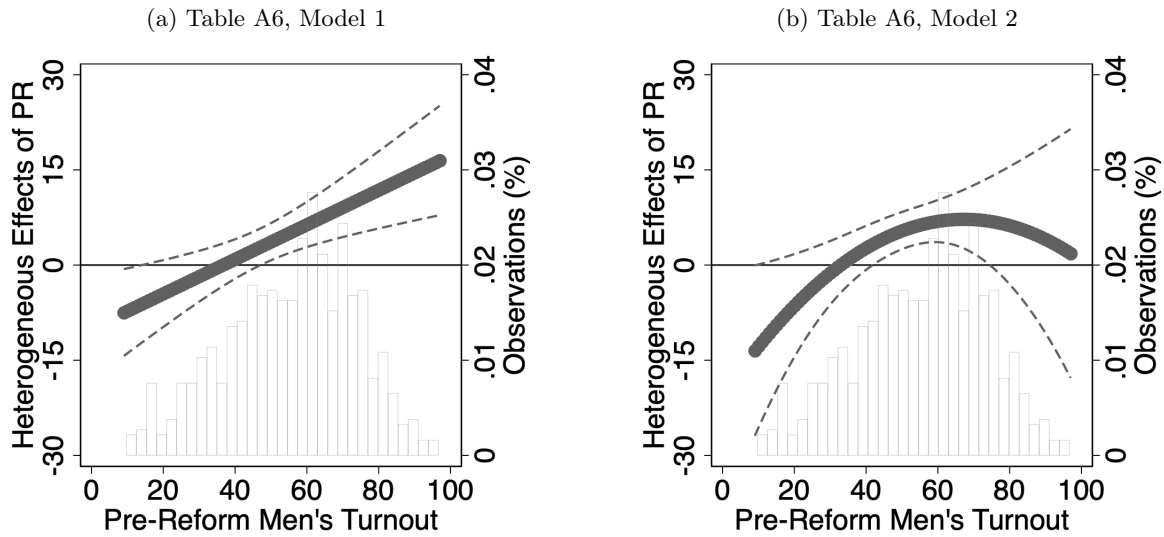
This analysis complements Skorge (2023), who estimates the causal effect of PR on the proportion measure between 1910-1928 in local elections (see Model 7). In Models 1-6 above, I focus on the 1916-1919 period, which increases N from 569 to 657. Despite the differences in sample size and model specifications, the estimates of interest using women’s share among voters (x100) are similar - 9.0 in Model 7 (as in Skorge 2023, Table 1, Model 4) and 9.1-9.5 in this analysis (Models 1&3).

Table A6: The Heterogeneous Effect of PR in Local Elections on Difference-in-Proportions Measure by Pre-Reform Men's Turnout, 1916-1919 (Difference-in-Differences)

Sample: Dependent Variable: <i>Model</i>	Balanced 1916-1919 Difference-in-Proportions	
	(1)	(2)
Post 1919	-2.299 (3.084)	-3.392 (8.324)
PR 1919	8.712** (2.941)	6.914 (6.161)
Post * PR 1919	-9.929* (4.176)	-20.384* (9.795)
Men's Turnout 1916	-0.008 (0.032)	-0.769** (0.165)
Post 1919 * Men's Turn. 1916	0.055 (0.047)	0.093 (0.274)
PR 1919 * Men's Turn. 1916	-0.329** (0.064)	-0.613* (0.271)
Post 1919 * PR 1919 * Men's Turn. 1916	0.272** (0.083)	0.822* (0.383)
Men's Turn. 1916 * Men's Turn. 1916		0.006** (0.001)
Post 1919 * Men's Turn. 1916 * Men's Turn. 1916		-0.0003 (0.002)
PR 1919 * Men's Turn. 1916 * Men's Turn. 1916		0.005 [†] (0.003)
Post 1919 * PR 1919 * Men's Turn. 1916 * Men's Turn. 1916		-0.006 (0.004)
% Factory Jobs	0.143** (0.047)	0.14** (0.046)
% Intellectual Jobs	1.636** (0.321)	1.43** (0.309)
% Married Women	0.44** (0.073)	0.441** (0.068)
Urban	9.728** (1.297)	9.747** (1.314)
R-sq	0.312	0.35
N	1,314	1,314

Notes: DV is a difference-in-proportion measure (difference in turnout) as defined in Table 1 in the paper; OLS estimates; robust standard errors; all models include a constant; ** < 1%; * < 5%; [†]<10%; variable description in Appendix Table A1. Municipalities that changed boundaries between 1916-1919 are dropped.

Figure A4: Plotting the Heterogeneous Effect of PR in Local Elections on Difference-in-Proportion Measure by Pre-Reform Men's Turnout, 1916-1919 (Difference-in-Differences)



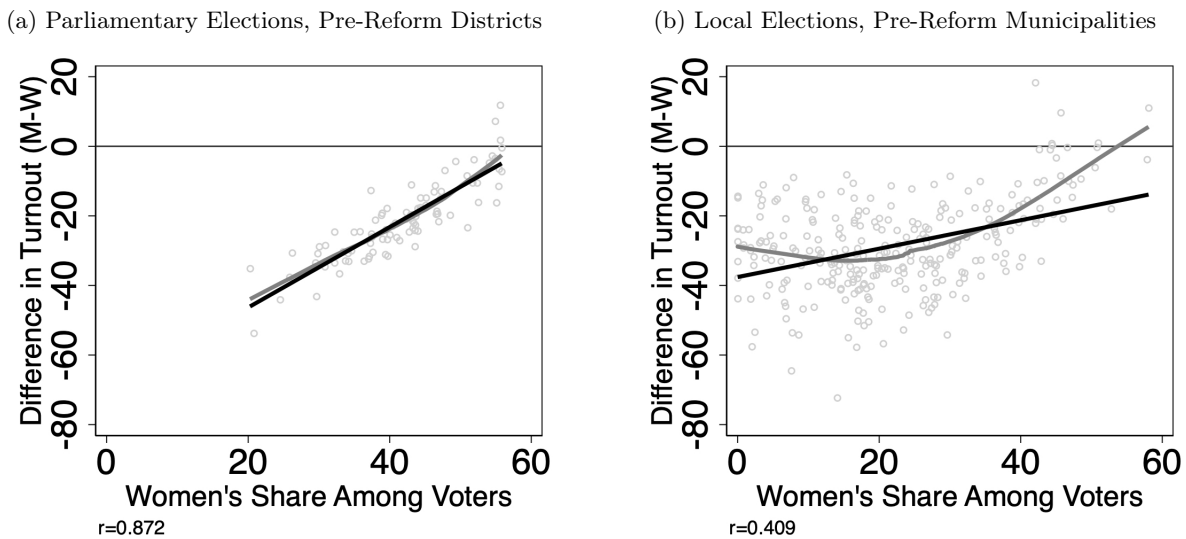
Notes: The heterogeneous effects of the difference-in-difference estimator of PR by pre-reform men's turnout as estimated in Appendix Table A6; DV is a difference-in-proportion measure as defined in Table 1 in the paper; 95% CIs.

Discriminant Validation of Measures

One way to examine whether two measures relate to a distinct systematized concepts is to examine a correlation with one another. If the two measures are weakly (or not at all) correlated, they can be understood as two valid ways to measure a different systematized concept.

The Appendix Figure A5 demonstrates that whilst the two measures of gender mobilization gap used in the PR-gap debate are strongly correlated in pre-reform parliamentary elections ($r=0.872$), the correlation is somewhat weaker in pre-reform local elections ($r=0.409$). Importantly, applying a Lowess fit reveals that much of the positive correlation is limited to localities with high scores of the proportion measure. When women's share among voters is low (that is when men's turnout is also likely to be low), the gender turnout gap can be either wide or narrow, resulting in no correlation between the two measures in that context. The lack of correlation between the two measures in this context provides discriminant validation to each measure as relating to a distinct systematized concept (Adcock and Collier 2001).

Figure A5: Plotting Difference-in-Proportion Measure Against Proportion Measure in Pre-Reform Samples



Notes: Linear (black) and Lowess (gray) fit with 95% CIs; Listwise correlation coefficients (r) displayed beneath each graph; unit of analysis is a pre-reform municipality in local elections (1916) and pre-reform district in parliamentary elections (1918); variable description in Appendix Table A1; sample description in Appendix Table A2.

Alternative Measures

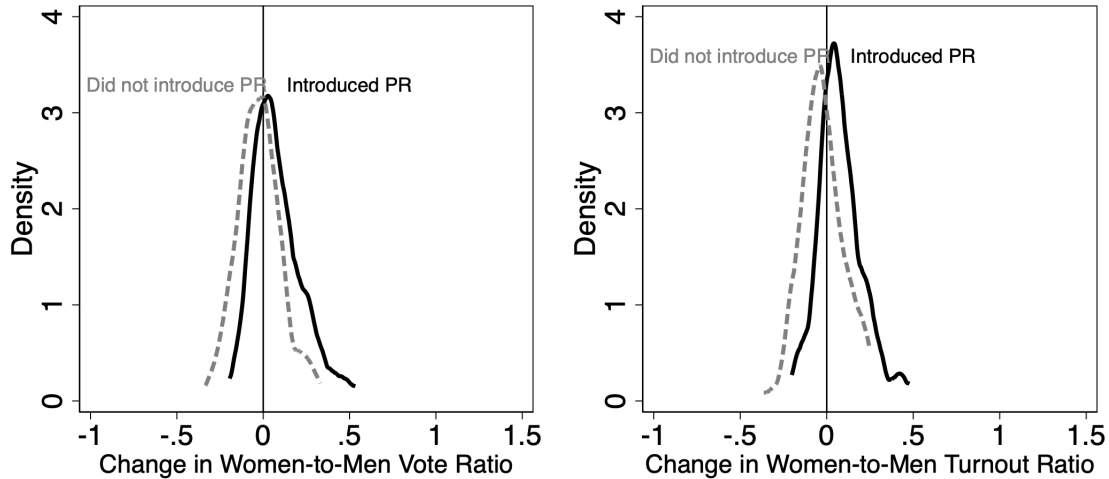
Beyond the PR-gap debate, scholars use other proportion measures. The most common measures used by scholars are defined in Appendix Table A7 below. In this section, I demonstrate that the key results presented in the paper are robust to using these alternative measures.

Table A7: Alternative Proportion Measures

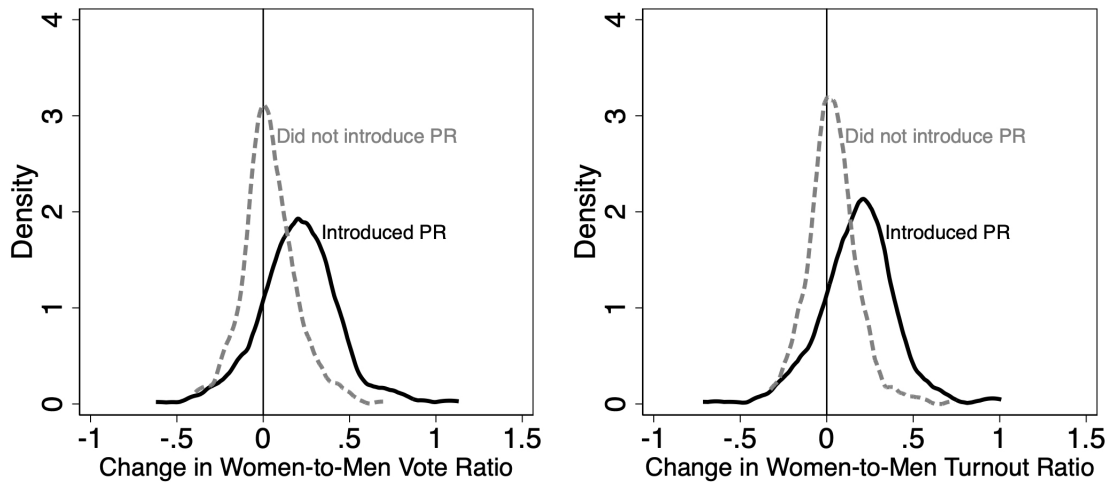
Type	Definition	Operalization	
Proportion	Women-to-Men Vote Ratio	Women's votes divided by men's votes	$\text{votes}_w / \text{votes}_m$
Proportion	Women-to-Men Turnout Ratio	Women's turnout divided by men's turnout	$[(\text{votes}_w / \text{eligibles}_w)] * 100 / [(\text{votes}_m / \text{eligibles}_m)] * 100$

Figure A6: Kernel Density of Change in Alternative Proportion Measures of Gender Mobilization Gap

(a) Parliamentary Elections



(b) Local Elections



Notes: Kernel densities of change in alternative proportion measures, as defined in Appendix Table A7. Sub-figure a) uses data from parliamentary elections; solid (dashed) line refers to treated election cycles 1918-1921 (control election cycle 1915-1918); unit of analysis is a pre-reform district. Sub-figure b) uses data from local elections in 1916-1919; solid (dashed) line refers to treated municipalities which introduced PR in 1919 (control municipalities that introduced PR prior to 1919); unit of analysis is a municipality; redistricted localities between relevant election years excluded.

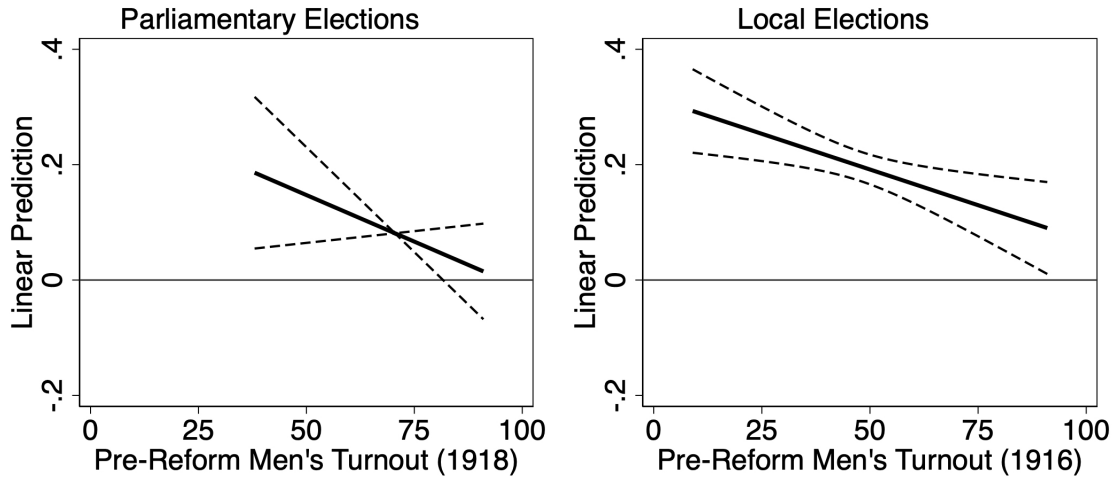
Table A8: The Effect of Pre-Reform Men’s Turnout on Change in Alternative Gap Measures Before and After PR

Dependent Variable:	Change in Vote Ratio		Change in Turnout Ratio	
	Local	Parl.	Local	Parl.
Election Type:				
Sample:	1916-1919	1918-1921	1916-1919	1918-1921
<i>Model</i>	(1)	(2)	(3)	(4)
Pre-Reform Men’s Turnout	-0.002** (0.001)	-0.003 (0.002)	-0.002* (0.001)	-0.003 [‡] (0.001)
% Factory Jobs	0.014** (0.005)	-0.006 (0.003)	0.011* (0.004)	-0.005 [‡] (0.003)
% Intellectual Jobs	-0.0057 (0.033)	0.011 (0.007)	0.001 (0.028)	0.014** (0.005)
% Married Women	-0.007* (0.003)	-0.000 (0.004)	-0.005 [‡] (0.003)	0.001 (0.004)
Urban	-0.361* (0.147)	-0.027 (0.033)	-0.28* (0.116)	-0.026 (0.037)
PR District FEs		Yes		Yes
R-sq	0.103	0.687	0.069	0.719
N	278	92	278	92

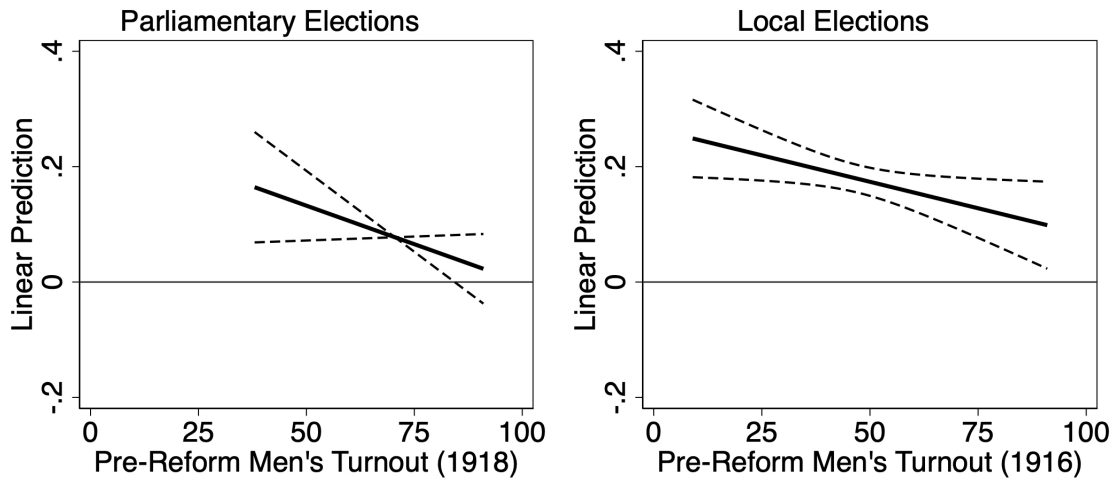
Notes: Data from treated samples. In local elections, this refers to the last election before PR (1916) and the first election after (1919) in municipalities that were affected by the PR reform during this period. In parliamentary elections, this refers to the last election before PR (1918) and the first election after (1921); DVs are the alternative proportion measure (vote ratio and turnout ratio) of gender gap in mobilization - as defined in Appendix Table A7; OLS estimates; all models include a constant; ** < 1%; * < 5%; [‡]<10%; models using local election use robust standard errors; models using parliamentary election include PR district FEs and cluster standard errors at PR district level; Wild bootstrap (calculated with BOOTTEST command in Stata, using recommended Rademacher weights, null imposed and 999 replications) returns comparable p-values for men’s turnout in models using PR district fixed effects (p=0.079 in Model 2; p=0.05 in Model 4); unit of observation is a municipality in models using local election and a pre-reform district in models using parliamentary election; redistricted localities between relevant elections excluded in both samples; variable description in Appendix Table A1; sample description in Appendix Table A2.

Figure A7: Plotting Adjusted Means of the Change in Alternative Gap Measures Before and After PR by Pre-Reform Men's Turnout.

(a) DV: Change in Women-to-Men Vote Ratio



(b) DV: Change in Women-to-Men Turnout Ratio



Notes: Full models in Appendix Table A8; 95% CIs.