Supplemental Appendix:

Gender and the Impact of Proportional Representation: A Comment on the Peripheral Voting Thesis

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Contents

A. Comparison of Dependent Variable Measures

Cox, Fiva, and Smith (2016) measure turnout by the number of valid votes ("approved votes") divided by the eligible electorate. Because valid vote totals could not be discerned by gender, I use the number of total votes cast by each group divided by group-eligibility to measure men's and women's turnout. Gender-separated eligibility and turnout data are available from Cox, Fiva and Smith's (2016) replication files, and the Storting constituency level data.

This section replicates all of Cox et al.'s figures and tables using their dependent variable of district level turnout (at the level of the pre-reform SMD boundaries) which they measure as the ratio of approved votes to eligible voters. Alongside the replication is a comparison of the alternative measure of the dependent variable which uses the ratio of cast votes to eligible voters. As can be seen in all the figures and tables, the raw data and the results are nearly identical across the two measures.

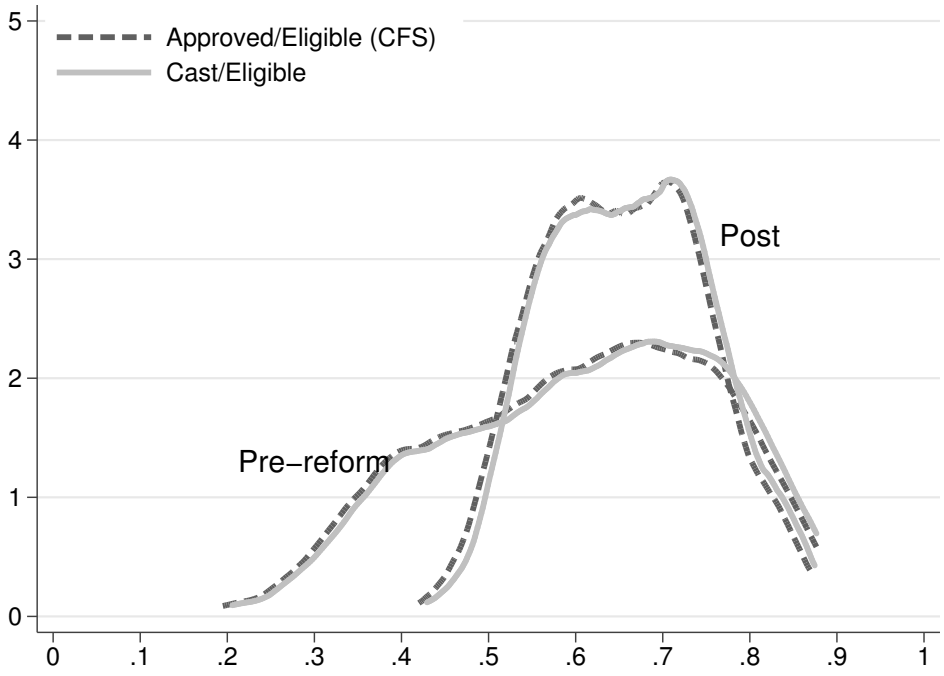

Figure A.1: Replication of Cox et al.'s (2016) figure 2, density plot of turnout at the SMD district level in the pre-reform period 1909-1918 and the post-reform period 1921-1927. The dark grey lines is Cox et al.'s measure of turnout as approved votes/ eligible measured at SMD district levels. The light grey line shows the same for the new DV measure of cast votes over eligible voters.

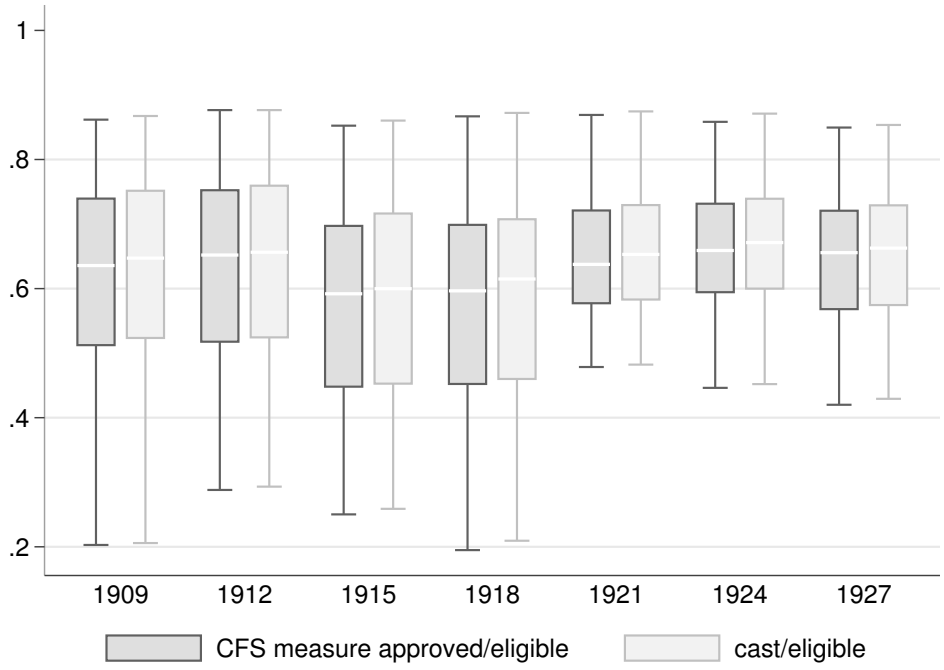

Figure A.2: Replication of Cox et al.'s (2016) figure 3, box and whiskers plots showing the average and interquartile range of turnout across Norwegian elections 1909-1927. The dark grey plot is Cox et al.'s measure of turnout as approved votes/ eligible measured at SMD district levels. The light grey plot shows the same for the new DV measure of cast votes over eligible voters.

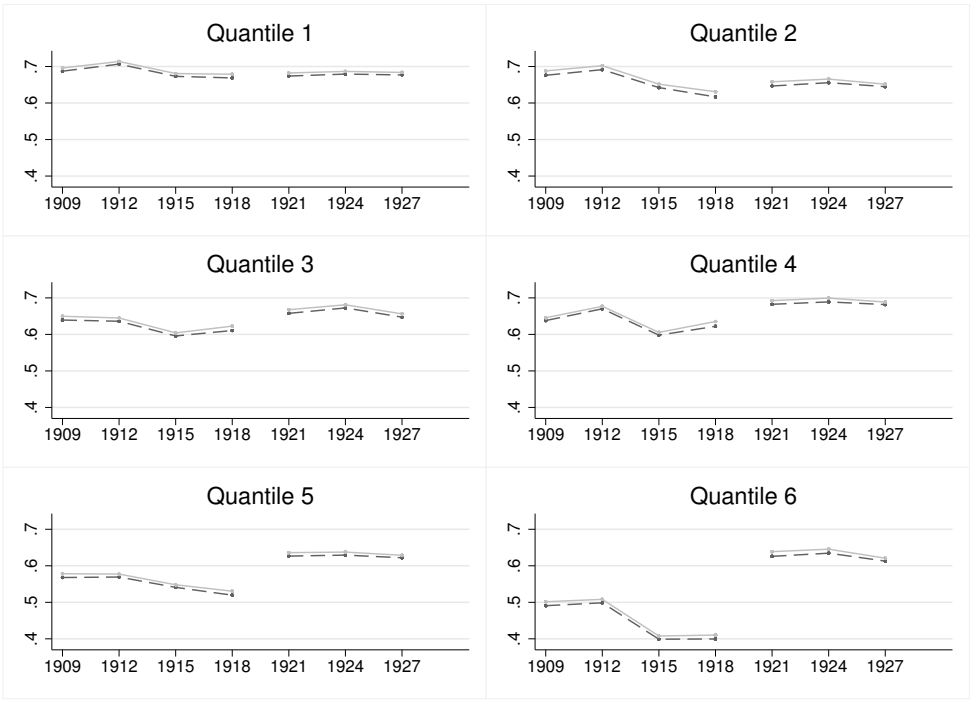

Figure A.3: Average Voter Turnout 1909-1927, split into sextiles by districts' average margin in the 1909-1918 elections. Using pre-reform district structure this figure shows how turnout changed before and after reform in districts that were the most competitive before the reform (Quantile 1) through those that were least competitive before the reform (Quantile 6). The darker line is CFS's measure of turnout, the light grey line is the new measure of turnout.

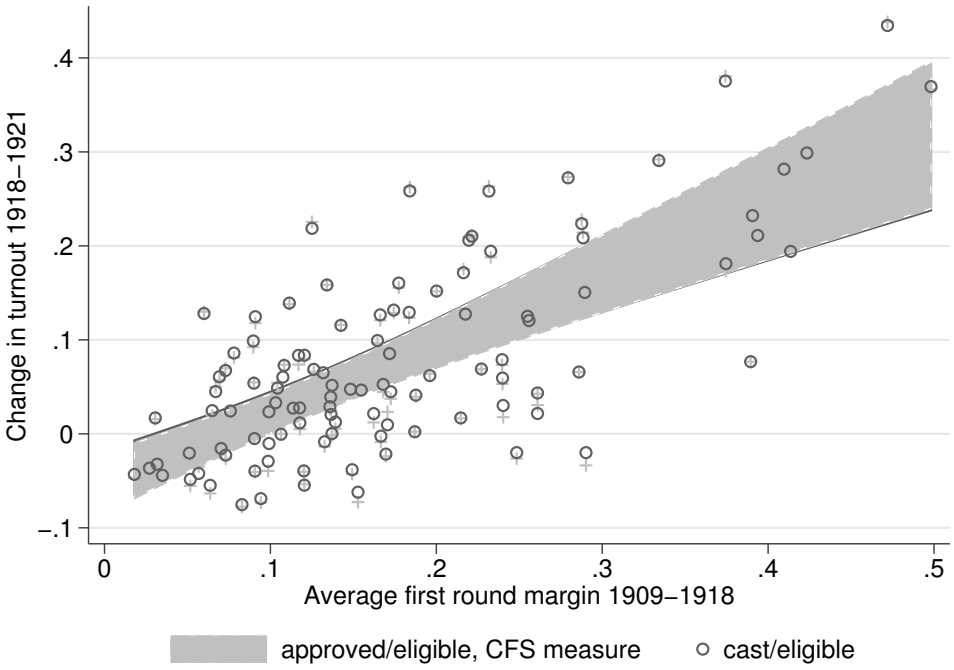

Figure A.4: Replication of Cox et al.'s figure 7 with both measures of turnout.

Table A.1: Replication of Cox et al.'s Table 2. The first column replicates their main results using their measure of turnout, approved votes/ eligible voters. The second column is the new measure of cast ballots/eligible voters. The pattern follows.

	(1) CFS b/se	(2) New b/se	(3) CFS b/se	(4) New b/se	(5) CFS b/se	(6) New b/se	(7) CFS b/se	(8) New b/se	(9) CFS b/se	(10) New b/se
Margin of Victory	0.730	0.743	0.370	0.353	0.738	0.752			0.655	0.669
	(0.074)	(0.076)	(0.223)	(0.227)	(0.074)	(0.075)			(0.072)	(0.075)
Margin squared			0.789	0.854						
			(0.472)	(0.477)						
Minimum Distance Runner Up					-0.447	-0.415				
					(0.495)	(0.524)				
Change in Margin							-0.731	-0.744		
							(0.071)	(0.072)		
Constant	-0.049	-0.053	-0.019	-0.020	-0.040	-0.045	-0.031	-0.034		
	(0.012)	(0.013)	(0.020)	(0.020)	(0.019)	(0.020)	(0.010)	(0.011)		
Observations	107	107	107	107	104	104	104	104	107	107
R^2	0.526	0.524	0.536	0.536	0.543	0.541	0.542	0.540	0.861	0.854

Appendix B. Demonstration of Change in Competition before and after PR

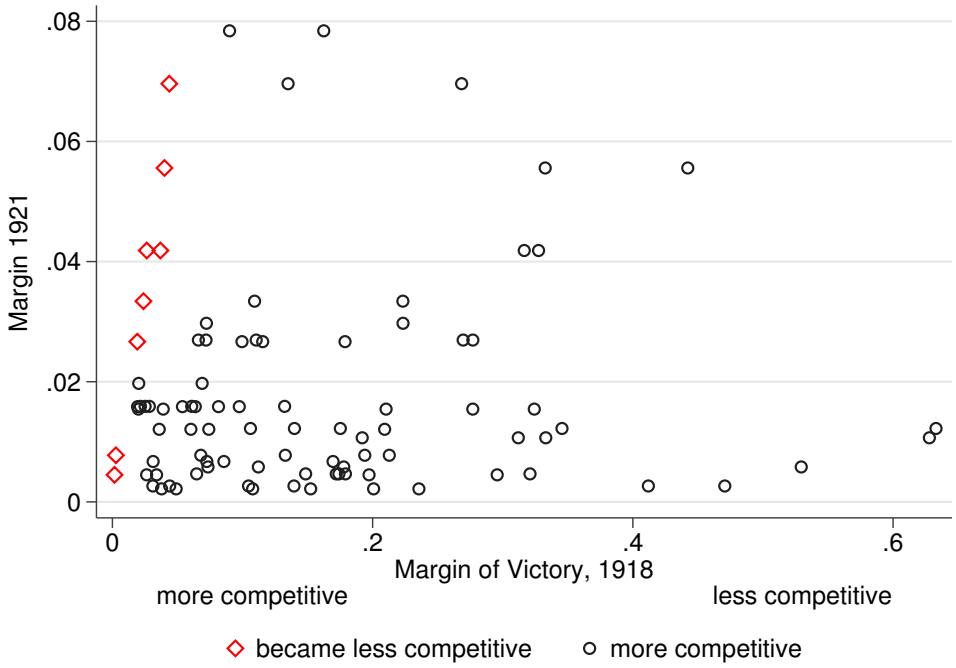

Figure A.5: Changes in competition immediately surrounding 1919 PR reform. Using the pre-PR district structure, the x-axis shows the 1918 final-round margin, and the y-axis shows the margin of the last-allocated PR seat in 1921. Eight districts became less competitive after PR (marked in red, these were among the most competitive in 1918), while 84 became more competitive.

Appendix C. Supplemental Analyses of Relationship between Turnout and Competition

The following figures and tables provide support for the argument that the gender gap in turnout fell faster in districts that were previously less competitive (figure A.6), and that this change was not related to party entry (figure A.7 and A.2). Table A.2 presents regressions of the change in men's and women's turnout separately for different measures of competition using heteroskedasticity robust standard errors (nearly identical patterns of statistical significance emerge if standard errors are clustered at the level of the PR district or if they are bootstrapped across PR districts). Changes in competition should be correlated with change in turnout, more so for women, if our argument is correct. A change in competition induced by change in the number of parties provides an alternative, though related, explanation. Finally, there are a few placebo tests that show that the change in competition is not related to post-PR realizations of competition.

Table A.2 examines how gender-based turnout changed with a change in a district's rank in competition; change in number of parties in the districts; the average margin of victory before PR (which should be related to the change as competition increases in the previously less competitive districts); the rank of a district across the distribution of competition in 1921 (which, occurring after the reform, should not impact the change in turnout); and the margin of the last seat in 1921 which should also not affect the change in turnout if the magnitude of the margin is not conditional on the change in competition.

C.1 Raw data showing difference-in-means of change in gender gap across pre-PR competition

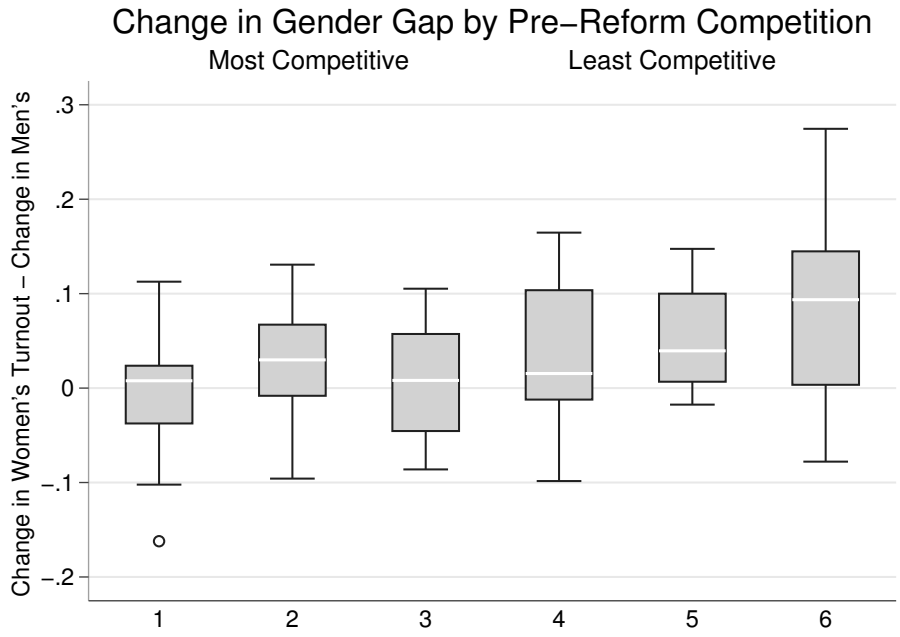

Figure A.6: Change in women's turnout minus change in men's turnout from the 1918 and 1921 elections, plotted by the pre-reform margin of victory. Q1 were the most competitive before, Q6 the least competitive. The one-sided p-value for the difference-in-means between Q1 and Q6 is 0.0067.

Figure A.6 subtracts the change in men's turnout from 1918 to 1921 from the change in women's turnout in this same period. In the most competitive environments pre-reform (Q1) on average women's turnout rose by less than men's, but the median is at zero. In Q6, the districts that were the least competitive pre-reform (which likely faced a more competitive environment after the reform), women's turnout rose faster than men's in almost 75 percent of the districts, but for about 25 percent of districts, women's turnout rose more slowly than men's (when the "whisker" dips below the 0 line).

To evaluate whether women's turnout grew faster than men's in the previously less competitive districts, I conducted a one-sided t-test for the difference of means between the sixth and first quantiles. The p-value is 0.0067, indicating that we can reject the null hypothesis

that the relative rise in women's turnout was faster in Q1 than in Q6.

Raw data presenting difference-of-means for change in gender gap by party entry post-PR

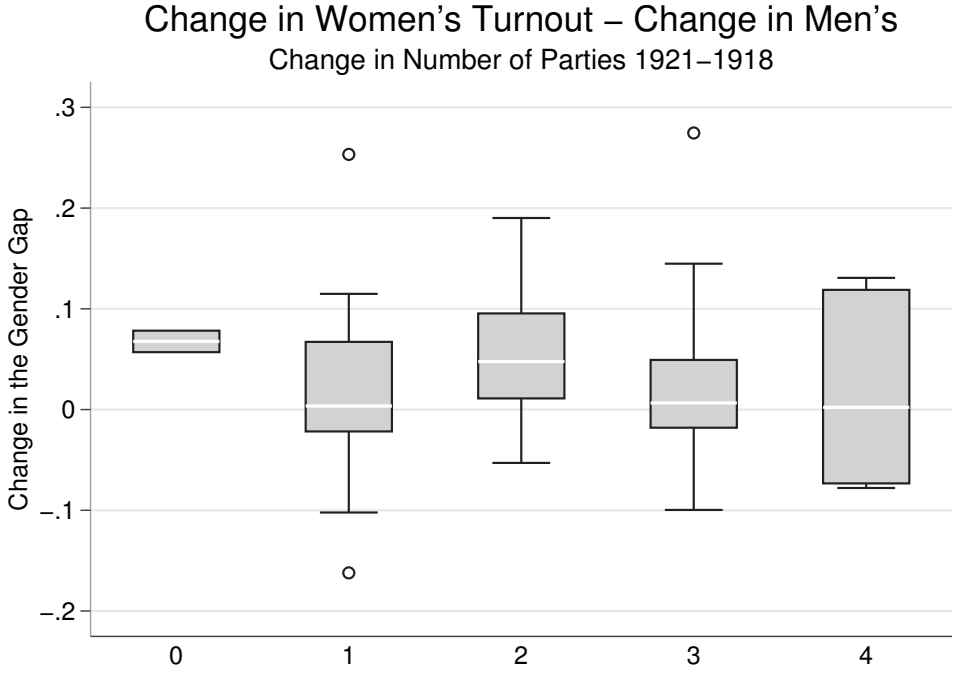

Figure A.7: Changes in the gender gap based on the change in the number of parties surrounding the 1919 reform. Using the pre-PR district structure, y-axis shows change in rate of turnout between men and women, while the categorical axis shows the change in the number of parties competing. For the pre-PR period, this is the number of parties in the first round. The p-value for the difference of means in the change in the gender gap between districts with 0 change and which saw 4 parties enter is not significant.

Regressions of Men's and Women's Turnout with Different Measures of Competition

Table A.2: Linear Regressions of the change in women's (W) and change in men's (M) turnout on various measures of competition, with robust standard errors.

	(1) W b/se	(2) M b/se	(3) W b/se	(4) M b/se	(5) W b/se	(6) M b/se	(7) W b/se	(8) M b/se	(9) W b/se	(10) M b/se
Change in Rank	0.138	0.099								
	(0.021)	(0.022)								
Average Margin Pre-PR			74.544	54.073						
			(10.572)	(8.163)						
Change Number of Parties					0.521	0.898				
					(1.140)	(0.877)				
Rank of Competition 1921							0.064	0.057		
							(0.044)	(0.036)		
Margin of last seat 1921									-79.395	-75.969
									(61.822)	(60.224)
Constant	8.527	5.303	-4.134	-3.880	7.138	3.155	5.426	2.583	9.746	6.528
	(1.051)	(0.833)	(1.629)	(1.412)	(2.794)	(1.889)	(2.436)	(1.913)	(1.662)	(1.377)
Observations	92	92	92	92	92	92	92	92	92	92
R^2	0.244	0.207	0.398	0.346	0.002	0.009	0.022	0.028	0.016	0.025

Dependent Variable is the Percentage point change in turnout for either women or men. Scaled for legibility.

Heteroskedasticty robust standard errors. Results are very similar when SEs are bootstrapped.

Appendix D. Sample Selection Questions when Pre-reform District Structure could not be Matched

PR reform occurred in Norway in 1920. In this period Norway had 700 municipalities. These map to SMDs and SMDs map into PR districts, but not perfectly. From 1909-1915 there were 123 SMDs, in 1918 3 additional districts were established. In the Post Reform period, the number of districts was reduced from 126 to 29. Cox et al. (2016) constructed a panel dataset from 1909-27 based on pre-reform district structure, attempting to disaggregate the 29 PR districts into the pre-reform district structure. This only works so long as municipalities retained the same borders and were not split across several PR districts. Additionally, it only worked if a single municipality did not house multiple SMDs.

Typically, SMDs encompassed multiple small municipalities, but the largest towns often housed large municipalities that encompassed multiple SMDS including -- Oslo (5 districts,), Drammen (2), Kristiansand (2) Stavanger (2), Bergen (4), Trondheim (4) (p.1245). Because municipality electoral results could not be disaggregated across the SMDs, these districts are excluded.

The important question is whether the exclusion of these large cities will bias our results. I offer two pieces of evidence suggesting that it will not. First, figure A.8 shows that the excluded, urban municipalities were high-turnout areas for both men and women, where turnout looked similar to other included SMDs. This implies that the SMDs inside these large cities would have been in the high competition, high turnout, low gender gap sextiles presented in figure A.3. Since most of the change in the gender gap came from the low competition, lower turnout districts in quantile 6, inclusion would likely not alter the composition of districts that saw the most change. Second, there is no reason to believe that competition would have altered very dramatically in these urban districts, as the distribution of competition in the excluded districts mirrors the distribution of other districts after reform (see figure A.9).

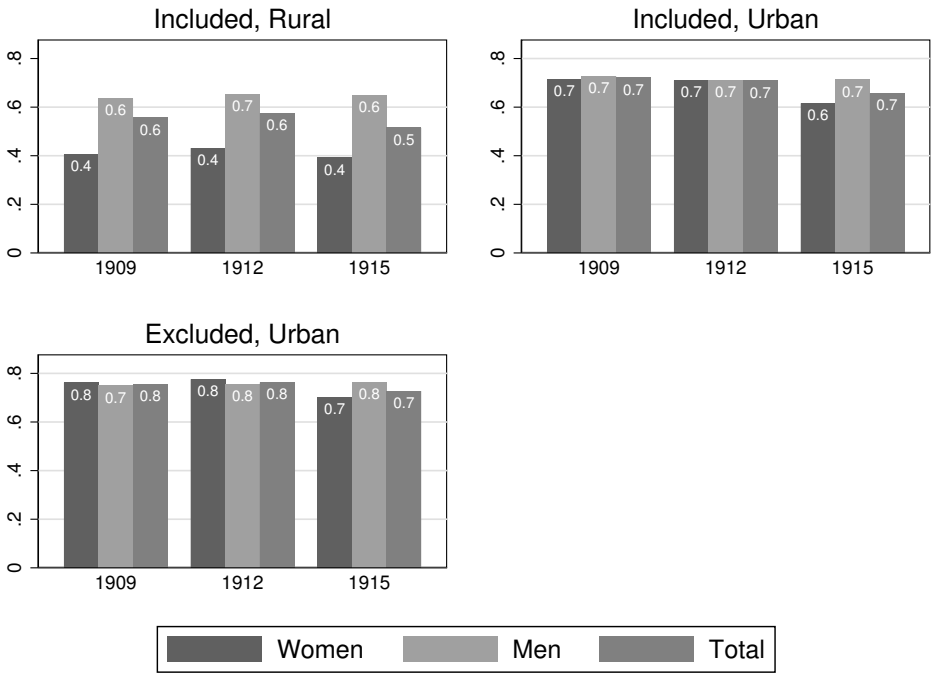

Figure A.8: Turnout of Women and Men in Included Urban Areas Mirrors Turnout in Excluded Urban Areas (Oslo).

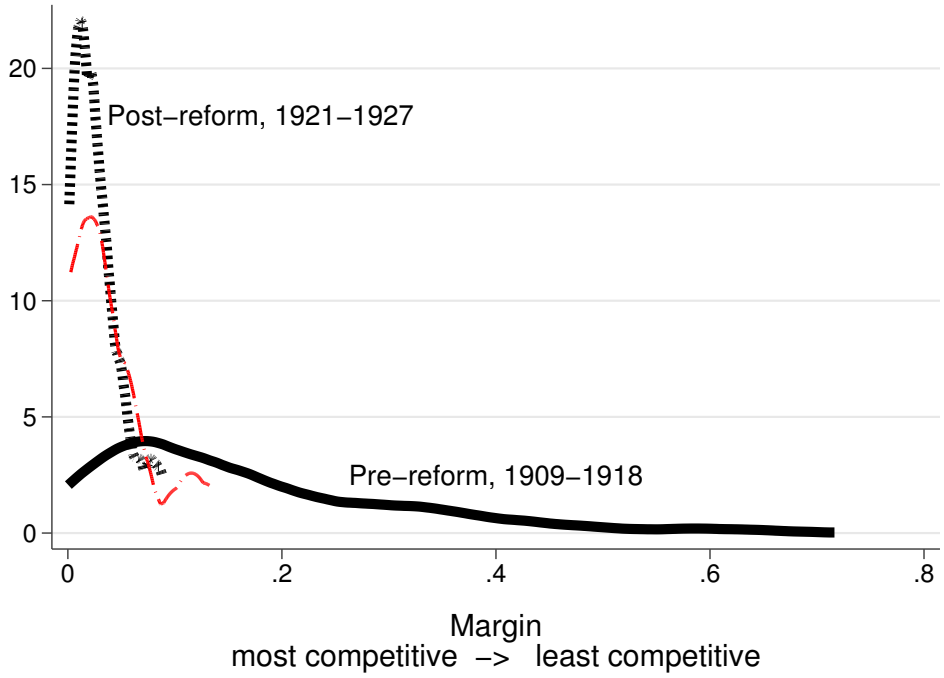

Figure A.9: The change in competitiveness in PR- districts not included in our analysis (red line) mirrors the change in competitiveness in districts that are included post reform.

Appendix E. Does the Gender Gap Fall because of Labour Radicalization?

The Labour and Socialist parties were gaining support in this period, thus I ask whether the change in women's turnout in previously uncompetitive districts may have been due to the mobilization efforts by the party. I probe this issue by looking at the composition of preferences in "sextile 6", the districts that were previously less competitive under majoritarian rules. I focus on these districts because it is here that the work of closing the gender gap happens. The two graphs that follow suggest, first, that there is not a strong linear correlation between improvements in the Labour party's fortunes and increases in women's turnout (figure A.10). In figure A.11), using local polynomial smoothing to examine the correlation between changes in support at the district level (x-axis) and change in women's turnout (y-axis), if anything it seems there may be a negative correlation between increased support for Labour and women's turnout. The number of cases are small, and these are ecological correlations, and should therefore be interpreted with caution.

Figure A.10: In previously uncompetitive districts, women's turnout rose by more in districts where the Socialist/Labour vote share fell by less.

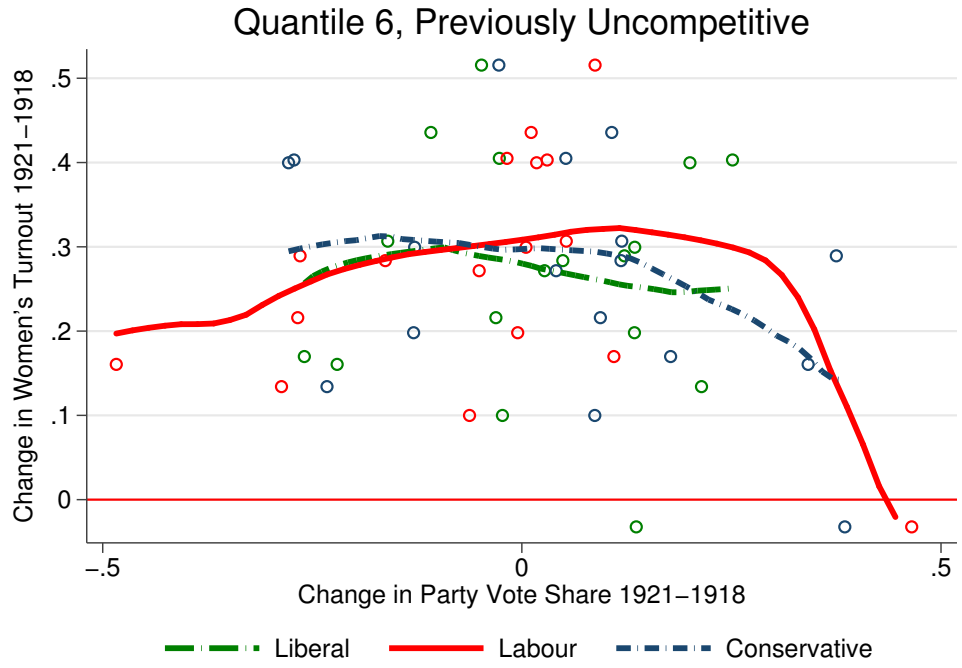

Figure A.11: In previously uncompetitive districts, women's turnout does not change with strong correlation in a change in party vote share for the Labour party.

References

Cox, Gary, Jon Fiva, and Daniel Smith. 2016. "The contraction effect: How proportional representation affects mobilization and turnout." *Journal of Politics* 78(4): 1249-1263.

Teele, Dawn, 2022. "Gender and the Impact of Proportional Representation: A Comment on the Peripheral Voting Thesis." *American Political Science Review.*

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