

# Local Favoritism in At-large Proportional Representation Systems\*

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## Online Appendix

Supplementary material to the main article in *The Journal of Public Economics*

### Abstract

The material in appendices A, B, C and D is related to the analysis of the allocation of investment funding shown in section 4 of the paper. Appendix A contains descriptive statistics and various sensitivity checks. In Appendix B, we explore in more detail the sensitivity of the main results when limiting the sample to elections won by a certain margin. In Appendix C, we use an alternative dependent variable. We find that political alignment has a positive and significant effect on the amount of new bridges completed a few years after the election is held. Appendix D shows estimates in different years of the electoral cycle. The material in Appendix E concerns the analysis of voting behavior in section 5.1 and Appendix F supplements the analysis of political careers in section 5.2.

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## Appendix A: Supplementary Material, Chapter 3-4

Table A.1: Descriptive Statistics by Party List

<i>Party List</i>	Region level		Local level	
	<i>Seatshare</i>	<i>Governor</i>	<i>Council Rep.</i>	<i>Voteshare</i>
Socialist Left Party (SV)	0.071	0.000	0.139	0.061
Labor Party (DNA)	0.347	0.403	0.601	0.334
Centre Party (SP)	0.116	0.203	0.227	0.170
Christian Democratic Party (KrF)	0.100	0.131	0.201	0.112
Liberal Party (V)	0.048	0.000	0.098	0.047
Conservative Party (H)	0.201	0.263	0.353	0.166
Progress Party (FrP)	0.085	0.000	0.154	0.072
Various Lists Left	0.008	0.000	0.016	0.011
Various Lists Right	0.013	0.000	0.028	0.013
Various List Other	0.012	0.000	0.018	0.012

*Note: Descriptives based on election data from 1975-2007.*

Table A.2: The effect of political alignment on funding per capita. Dummy outcome variables

	(1)	(2)	(3)	(4)
	100 NOK	100 NOK	1000 NOK	1000 NOK
Aligned representative	0.00 (0.08)	0.11 (0.10)	0.21** (0.09)	0.24** (0.09)
Left Majority	-0.08 (0.12)	-0.18* (0.11)	-0.12*** (0.04)	-0.17*** (0.06)
Rep. from Left	0.02 (0.10)	-0.02 (0.09)	-0.06 (0.04)	-0.09* (0.05)
Rep. from Right1	0.07 (0.04)	0.10* (0.06)	-0.08 (0.08)	-0.03 (0.07)
Rep. from Right2	0.07 (0.10)	0.06 (0.09)	-0.04 (0.04)	0.01 (0.05)
Rep. from Right3	0.05 (0.09)	-0.04 (0.08)	-0.06 (0.05)	-0.09* (0.05)
$p$ -value (Aligned rep.)	0.95	0.39	0.10	0.05
Observations	3658	3658	3658	3658
Mean of outcome var.	0.51	0.51	0.10	0.10
Municipality fixed effects	No	Yes	No	Yes
Time fixed effects	Yes	Yes	Yes	Yes
Polynomial order	3	3	3	3

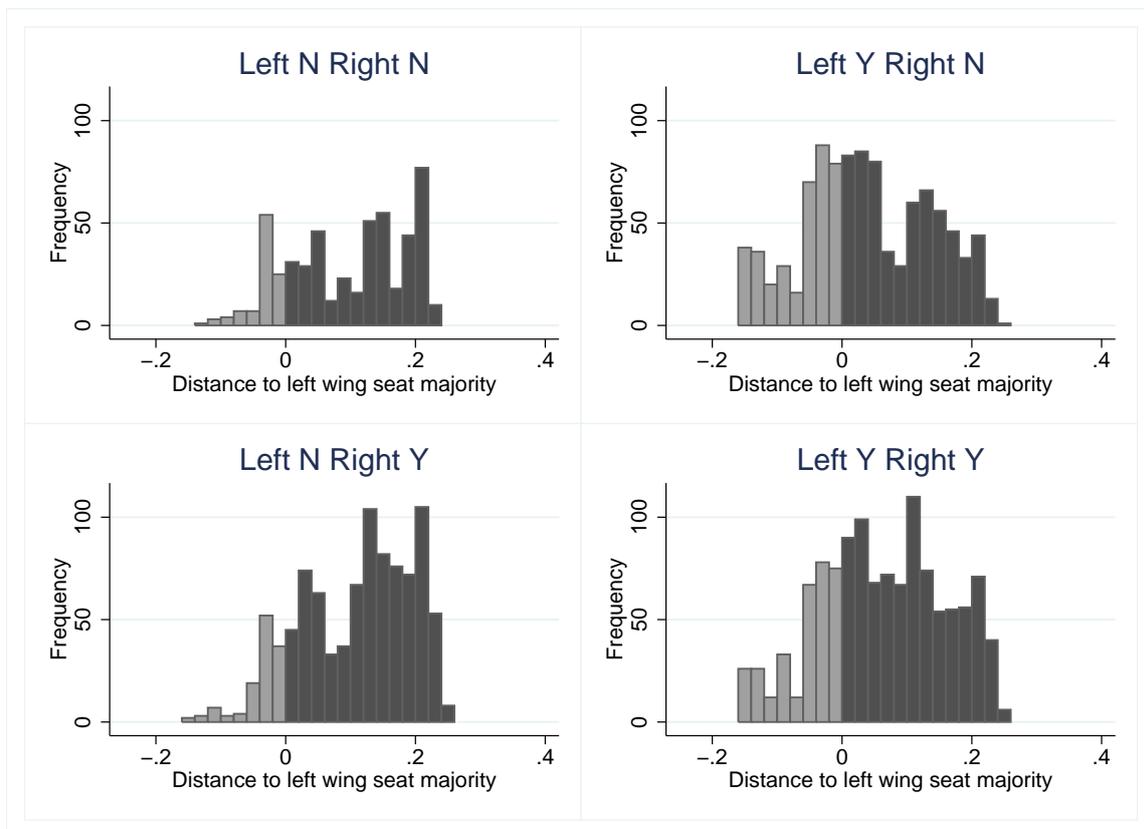
*Note: The model estimated is equation (3) in section 4.2. The dependent variables are dummies indicating whether the municipality receives at least 100 NOK or at least 1000 NOK in per capita funding (per election period). The  $p$ -value of the effect of having an aligned representative is based on the wild bootstrap approach by Cameron, Gelbach, and Miller (2008). Standard errors and corresponding significance stars are based on a cluster-robust covariance matrix, with clustering on the region level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .*

Table A.3: The effect of political alignment on funding per capita. Controlling for aligned local mayor

	(1)	(2)	(3)	(4)	(5)
	2SLS	2SLS	2SLS	2SLS	OLS
Aligned representative	590.63*** (215.70)	647.71** (260.07)	640.03** (283.59)	628.67** (315.37)	77.96* (44.34)
Aligned local mayor	-102.10* (52.74)	-78.95 (53.88)	-105.26* (56.58)	-75.39 (51.84)	-7.88 (44.19)
Left Majority	-80.49 (85.09)	-160.90 (106.85)	-142.18 (137.44)	-265.77 (175.96)	
Rep. from Left	-212.01* (117.62)	-198.95 (143.13)	-155.94 (128.27)	-120.36 (146.50)	3.41 (41.34)
Rep. from Right1	-242.72 (190.08)	-60.78 (152.45)	-335.97 (227.83)	-125.18 (179.78)	12.52 (26.05)
Rep. from Right2	-134.77* (75.15)	-68.44 (158.26)	-150.81 (121.83)	-4.75 (182.17)	-20.86 (32.32)
Rep. from Right3	-28.97 (137.90)	18.72 (141.84)	-115.93 (197.84)	-89.03 (164.10)	-11.65 (53.37)
<i>p</i> -value (Aligned rep.)	0.03	0.05	0.08	0.12	0.07
Observations	3658	3658	3658	3658	3658
Mean of outcome var.	409.06	409.06	409.06	409.06	409.06
Municipality fixed effects	No	Yes	No	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Governor party dummies	No	No	No	No	Yes
Polynomial order	2	2	3	3	-

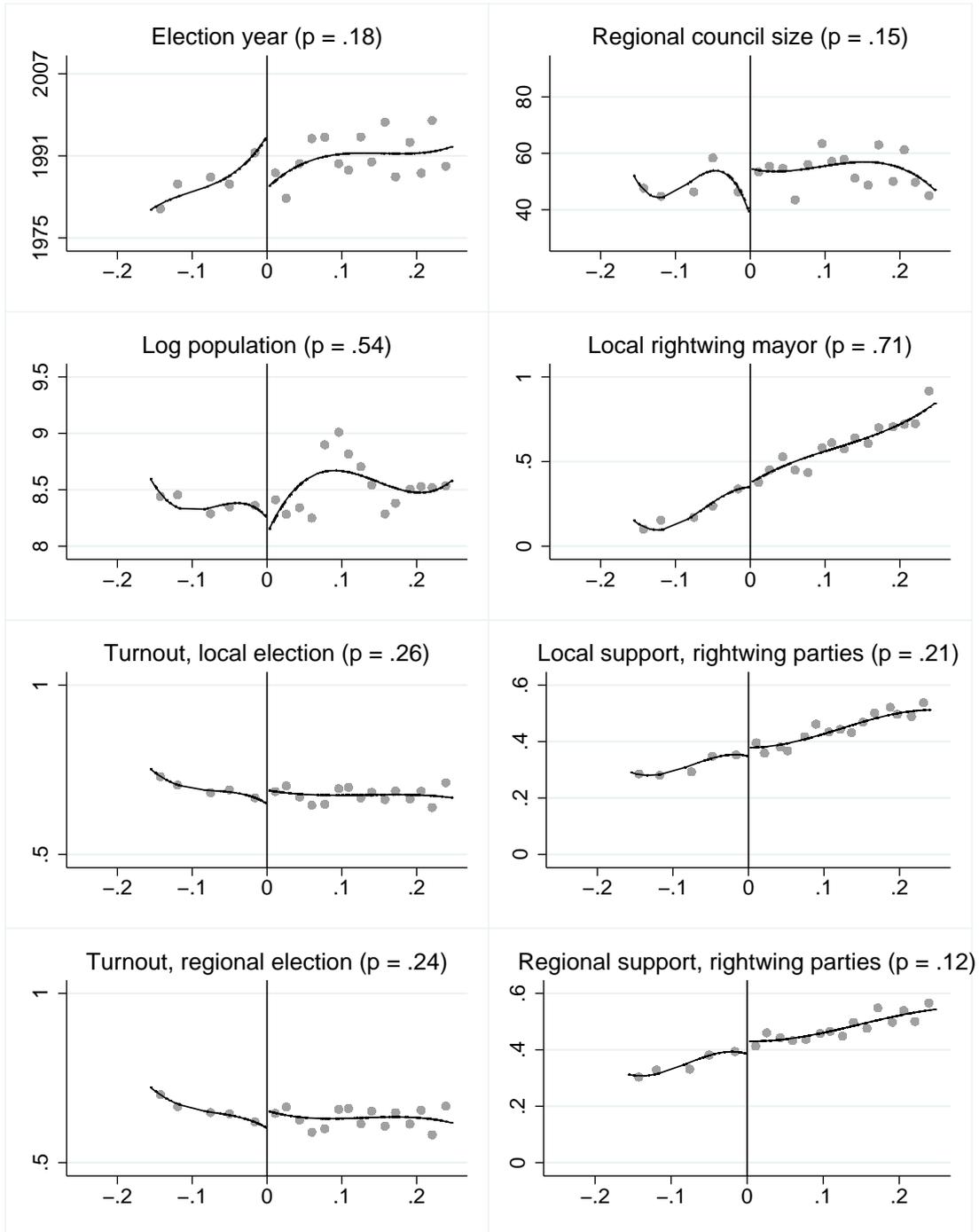
*Note: The model estimated is equation (3) in section 4.2. The dependent variable is per capita funding (in NOK per election period). Standard errors and corresponding significance stars are based on a cluster-robust covariance matrix, with clustering on the region level \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .*

Figure A.1: Frequency of observations by win margin of the rightwing bloc, split by local representation in the regional council (N=No representatives, Y=At least one representative)



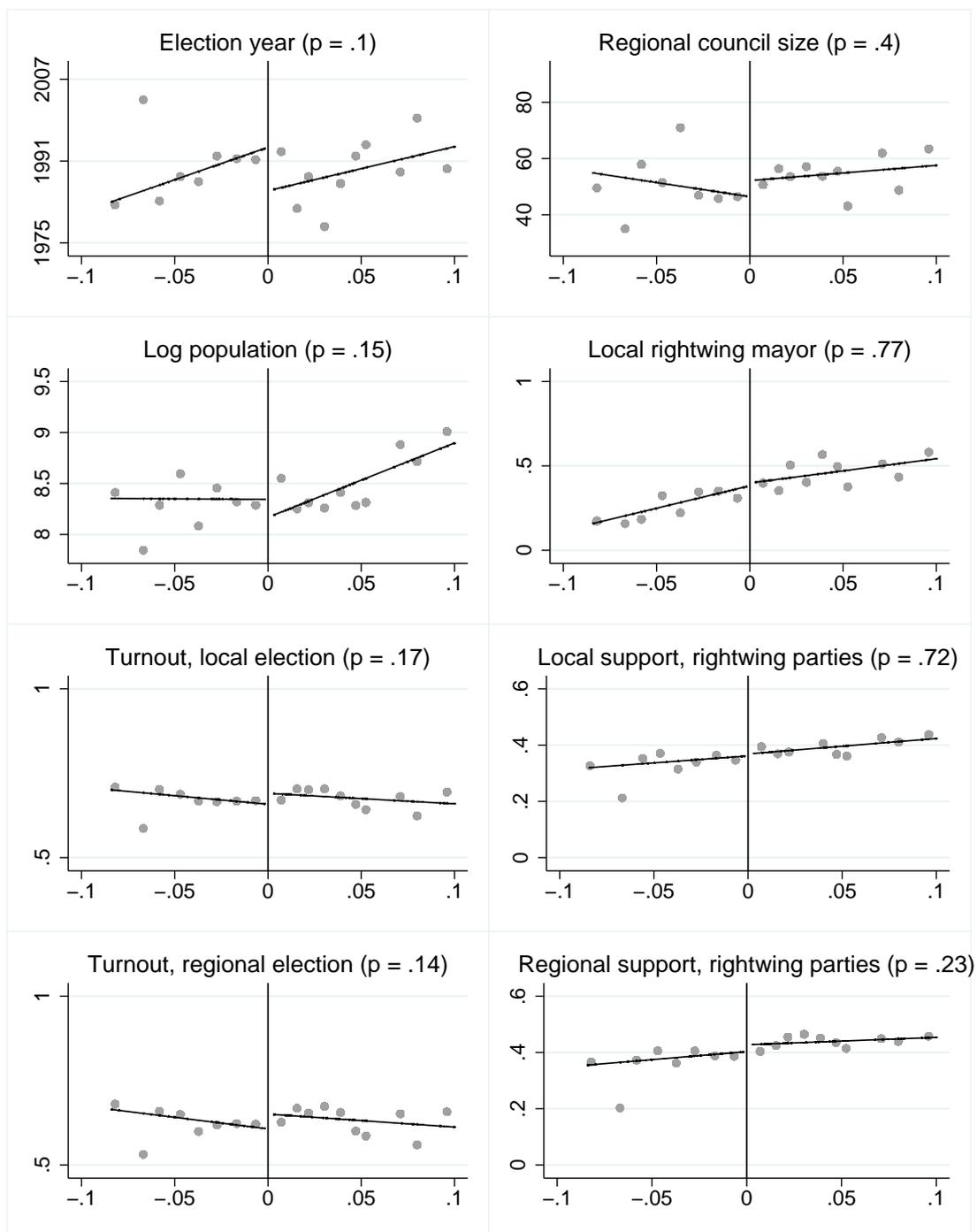
*Note: The figure shows the frequency of observations by the win margin of the rightwing bloc in the regional election. The figure is split by four categories describing if and how a municipality is represented in the regional council (n=3658). The width of the intervals are two percentage points.*

Figure A.2: Balance tests: Covariates by distance to seat majority change



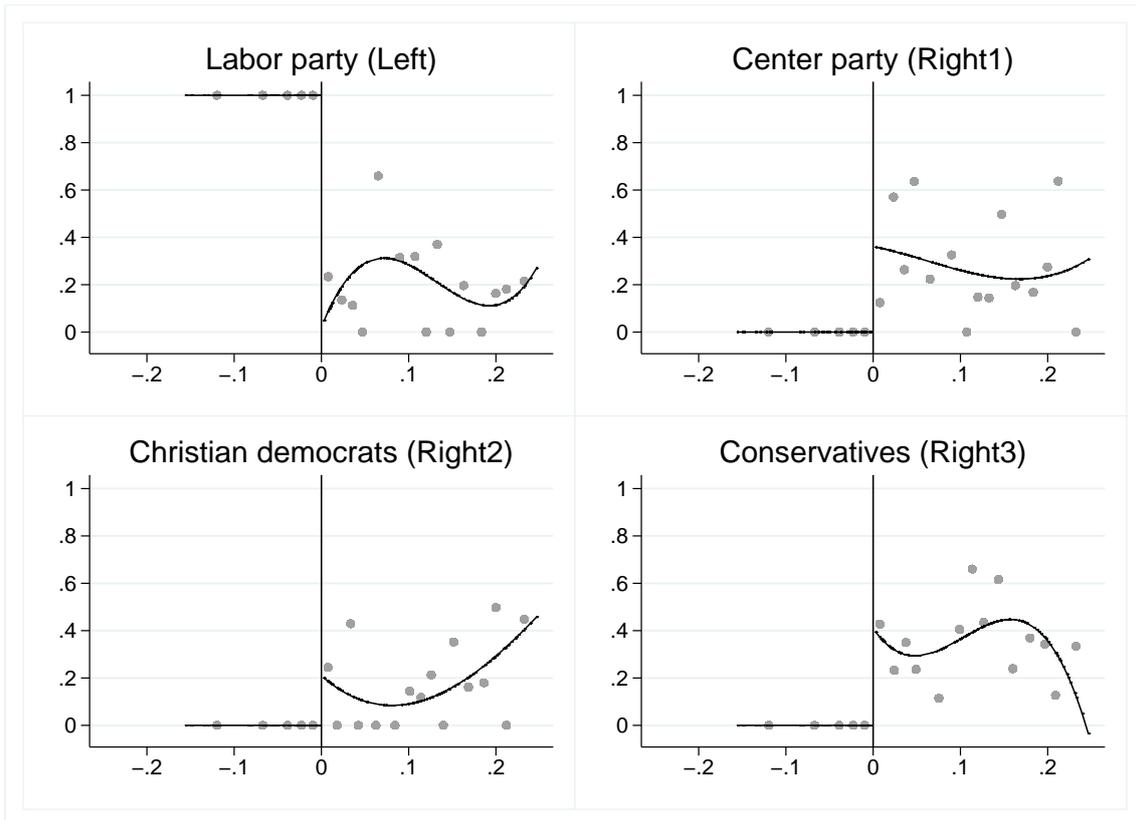
Note: The figure shows the relation between each variable and the win margin of the rightwing bloc in the regional election.  $p$ -values in parentheses indicate the statistical significance of the jump at the cutoff (win margin = 0). All panels are based on the full bandwidth and a cubic control function. The 20 bins in each plot contain approximately the same number of observations. Separate regression lines are estimated to the left and right of the discontinuity using the actual municipality-election period observations ( $n=3658$ ). The figure is produced with the `-rdplot-` module in STATA.

Figure A.3: Balance tests: Covariates by distance to seat majority change. Bandwidth +/- 10 percentage points and linear control function



Note: The figure shows the relation between each variable and the win margin of the rightwing bloc in the regional election.  $p$ -values in parentheses indicate the statistical significance of the jump at the cutoff (win margin = 0). All panels are based on a +/-10 percent bandwidth and a linear control function. The 20 bins in each plot contain approximately the same number of observations. Separate regression lines are estimated to the left and right of the discontinuity using the actual municipality-election period observations ( $n=1861$ ). The figure is produced with the `-rdplot-` module in STATA.

Figure A.4: Governor's party by distance to seat majority change



Note: The figure shows the relation between the party identity of the governor by the distance to the seat majority change. The figure gives the fraction of observations within bins with a governor from the Labor Party (DNA, upper left corner), Center Party (SP, upper right corner), Conservatives (H, bottom left corner), and Christian Democrats (KRF, bottom right corner). All panels are based on the full bandwidth and a cubic control function. The 20 bins in each plot contain approximately the same number of observations. Separate regression lines are estimated to the left and right of the discontinuity using the underlying data ( $n=3658$ ). The figure is produced with the `-rdplot-` module in STATA.

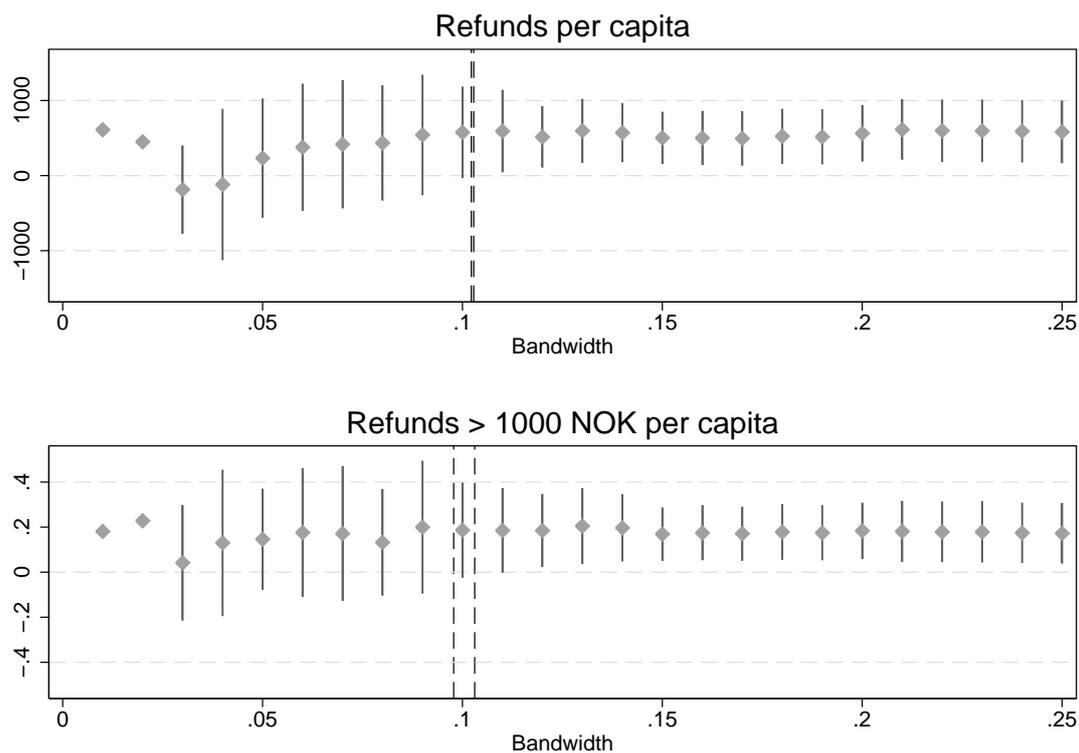
## Appendix B: Varying the bandwidth

In our baseline analysis, we include all observations regardless of the win margin. To check the stability of our results, we investigate to what extent our estimates change when we exclude observations far from the threshold where the majority bloc changes. Figure B.1 shows the results of this exercise using both the continuous outcome variable (upper panel) and the dummy for funding above 1000 NOK per capita (lower panel). The figure provides point estimates and corresponding 95 % confidence intervals across bandwidths from 1 to 25 percentage points for the specification with a second order polynomial and no municipality fixed effects. Since all observations fall within a 25 percentage point bandwidth, the rightmost estimate reported in the upper panel of Figure B.1 corresponds to specification (1) in Table 4.

The results are similar for all bandwidths larger or equal to plus/minus 9 percentage points. For narrower bandwidths the estimates are less stable and have larger confidence intervals, but are mostly positive. The lack of precision for narrower bandwidths could be due to the fact that the specification with a second order polynomial and interactions is relatively demanding. When only including a linear polynomial, we get similar results also for narrower bandwidths (plus/minus 4-8 percentage points). As seen in Figure B.2, the results from this specification are, however, less stable when we extend the bandwidth.

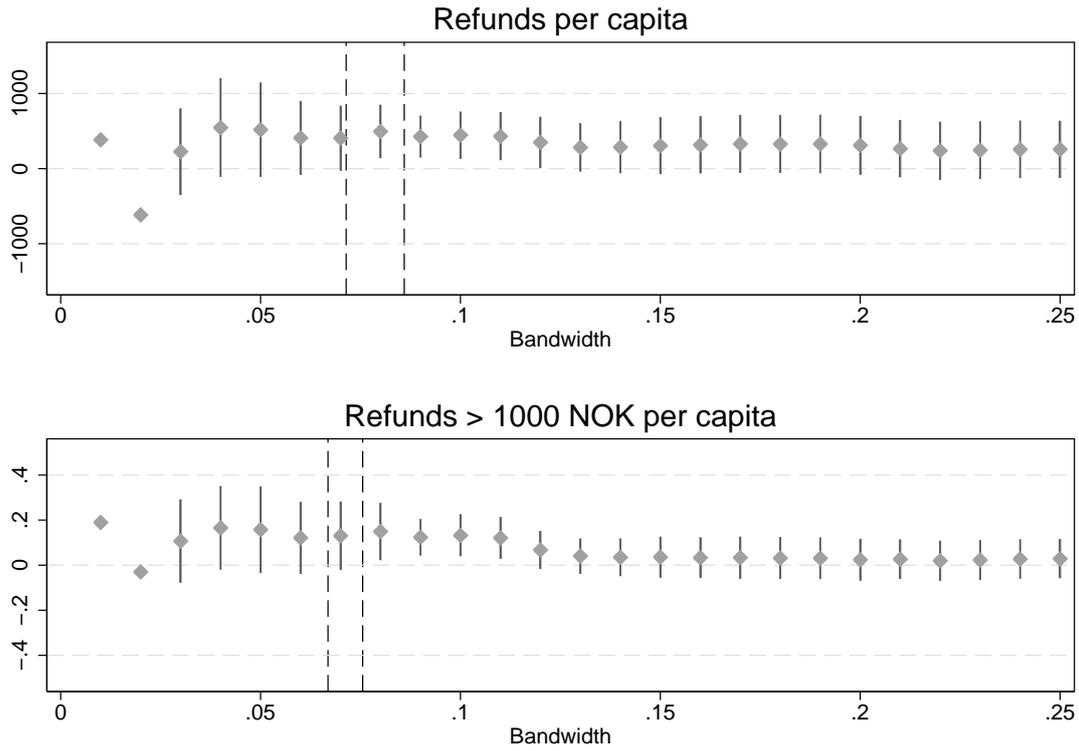
Standard errors are clustered by region. We do not show confidence intervals for bandwidth +/- 1 and +/- 2 percentage points, since in this case we have a very small number of clusters (less than 10) and the confidence intervals that we get are unreasonably narrow. As shown using the wild bootstrap approach in section 4, precision could be somewhat overestimated also for larger bandwidths.

Figure B.1: Changing the bandwidth, specification with quadratic control function



*Note: The model estimated is equation (2) in section 4.2. The dependent variable in the upper panel is per capita funding (in NOK per election period). The dependent variable in the lower panel is an indicator variable turned on if per capita funding (in NOK per election period) is larger than 1000. Bars represent 95 percent confidence intervals. The vertical dashed lines represent the Imbens and Kalyanaraman (2012) optimal bandwidths based on the sharp regression discontinuity designs in section 4.1. The leftmost line is based on the sample of municipalities with leftwing representative(s) only. The rightmost line is based on the sample of municipalities with rightwing representative(s) only. Municipality fixed effects not included. Standard errors are clustered by region.*

Figure B.2: Changing the bandwidth, specification with linear control function



Note: The model estimated is equation (2) in section 4.2. The dependent variable in the upper panel is per capita funding (in NOK per election period). The dependent variable in the lower panel is an indicator variable turned on if per capita funding (in NOK per election period) is larger than 1000. Bars represent 95 percent confidence intervals. The vertical dashed lines represent the Imbens and Kalyanaraman (2012) optimal bandwidths based on the sharp regression discontinuity designs in section 4.1. The leftmost line is based on the sample of municipalities with rightwing representative(s) only. The rightmost line is based on the sample of municipalities with leftwing representative(s) only. Municipality fixed effects not included. Standard errors are clustered by region.

## Appendix C: Effect on Completed Road Investments

Our dependent variable in chapter 4 captures projects which are funded by the regional government and carried out (partly or completely) by the local government. As an alternative measure of locally targeted regional investments, we use data on completed road constructions on regional roads in the municipality. This data is extracted from the BRUTUS database of the National Public Roads Administration, which contains characteristics and the *opening year* of all bridges (including pedestrian bridges) on public roads in Norway.

Since most regional roads have a moderate standard, the amount of new bridges on such roads mainly captures spending on the largest road investment projects. For such projects, there will be some time lag between the decision to invest and the completion of the project. Also, political representation during the planning stage could be important. We therefore consider the possible effect of alignment on completed road constructions for all possible time lags from zero to eight years after the election. We also include negative lags as placebos.

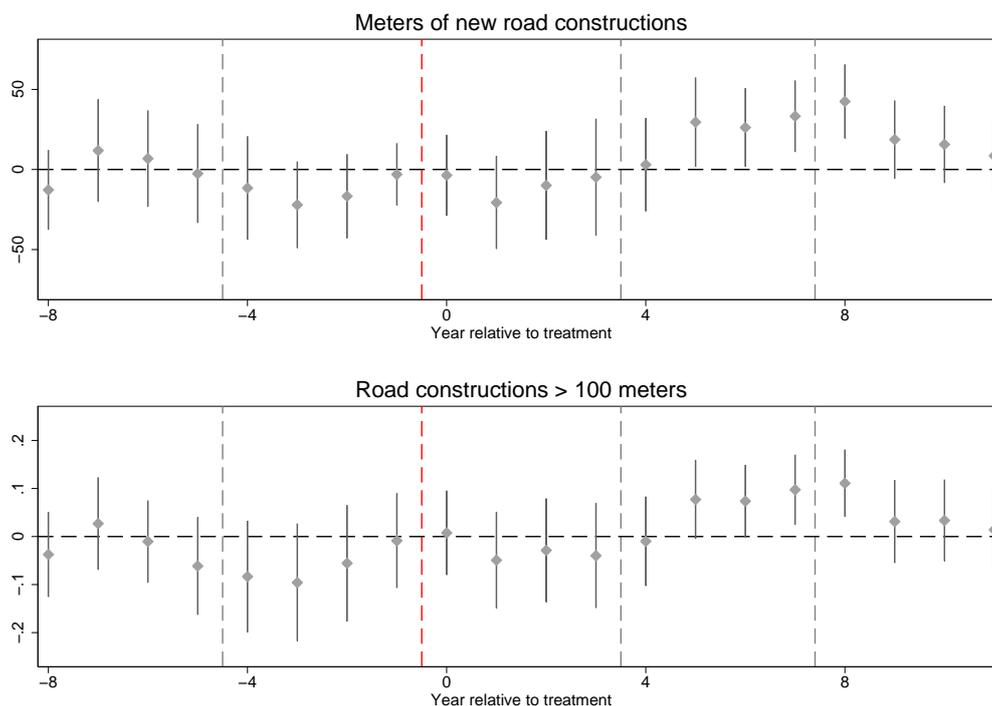
To increase precision, we use four-year averages of meters of new bridges. Hence, constructions in year zero are those completed during years 0-3 (i.e. within the current election period). Constructions in year 4 are those completed during years 4-7.

Figure C.1 shows the results using both the meters of new road constructions and a dummy for more than 100 meters of new constructions as dependent variables. For both outcomes, there appears to be a positive effect of political alignment between five and eight years after the election. For all other positive and negative lags, there are no significant effects.

These results indicate that having an aligned representative in the regional council matters for the geographic allocation of regional road investments, but with substantial time lag. This results should be interpreted with some caution, since data on bridges imperfectly measure road investments. We have also considered other alternative measures,

like whether the municipality has a local upper secondary school or maternity ward. As reported in the working paper version of our paper, estimated effects go in the expected direction, but none of the estimates are statistically significant at conventional levels (Fiva and Halse, 2015). Precision is generally low, reflecting that opening and closures of schools and maternity wards are rare events.

Figure C.1: The effect of political alignment on completed constructions on regional roads in council members' hometowns



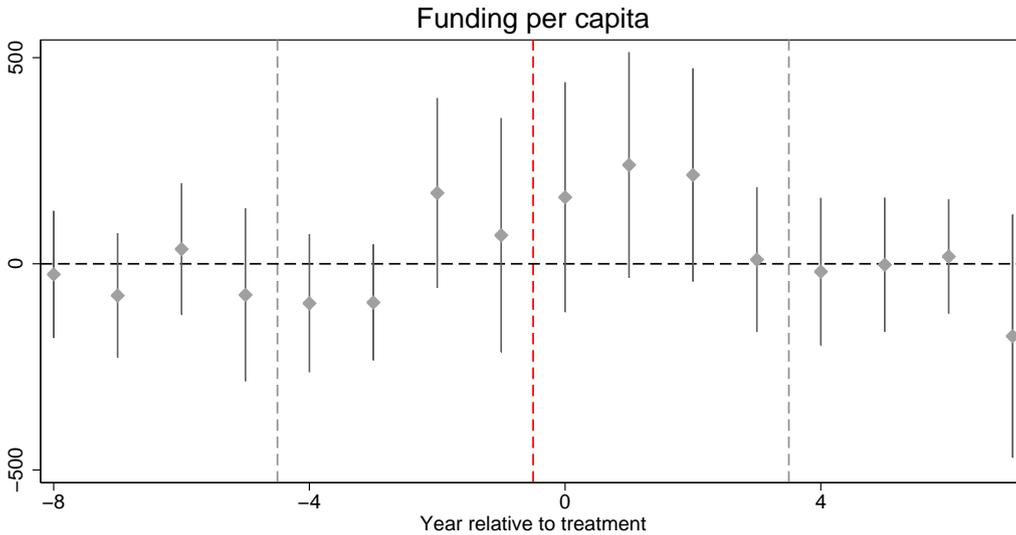
*Note: Each unit on the horizontal axis corresponds to one election period (four years). The dependent variable is meters of new bridges on regional roads within the municipality, summed over four years from time  $k$  to time  $k + 0.75$ . Reported are estimates for  $\delta^{j,k}$  from equation (2) where  $Y_{it}$  is replaced with  $Y_{it+k}$  for  $k = -2, \dots, -0.25, 0, 0.25, \dots, 2.75$ . The sample consists of municipalities which existed in 2014 with the same municipality identifier. Municipality fixed effects not included. Bars represent 95 percent confidence intervals. Standard errors are clustered by region.*

## Appendix D: Analysis on Yearly Data

Since the political explanatory variables only vary over elections, we have used election periods as the unit of observations in the analysis in the paper. Policy outcomes are aggregated over each four year election period, which also reduces noise in the dependent variable. However, we have also analyzed the effect of political alignment on investment funding in each year of the election period. Figure D.1 shows the results. The pattern is the same as when we use data aggregated on election periods, but precision is lower. None of the estimated effects are statistically significant at conventional levels.

Carozzi and Repetto (2016) find that the amount of hometown town bias in Italy evolves over the term, being large in the years just after legislative elections and disappearing toward the end of the term, when politicians are most focused on being re-elected in Parliament. There is a similar pattern in our data, but precision is low, preventing any firm conclusions.

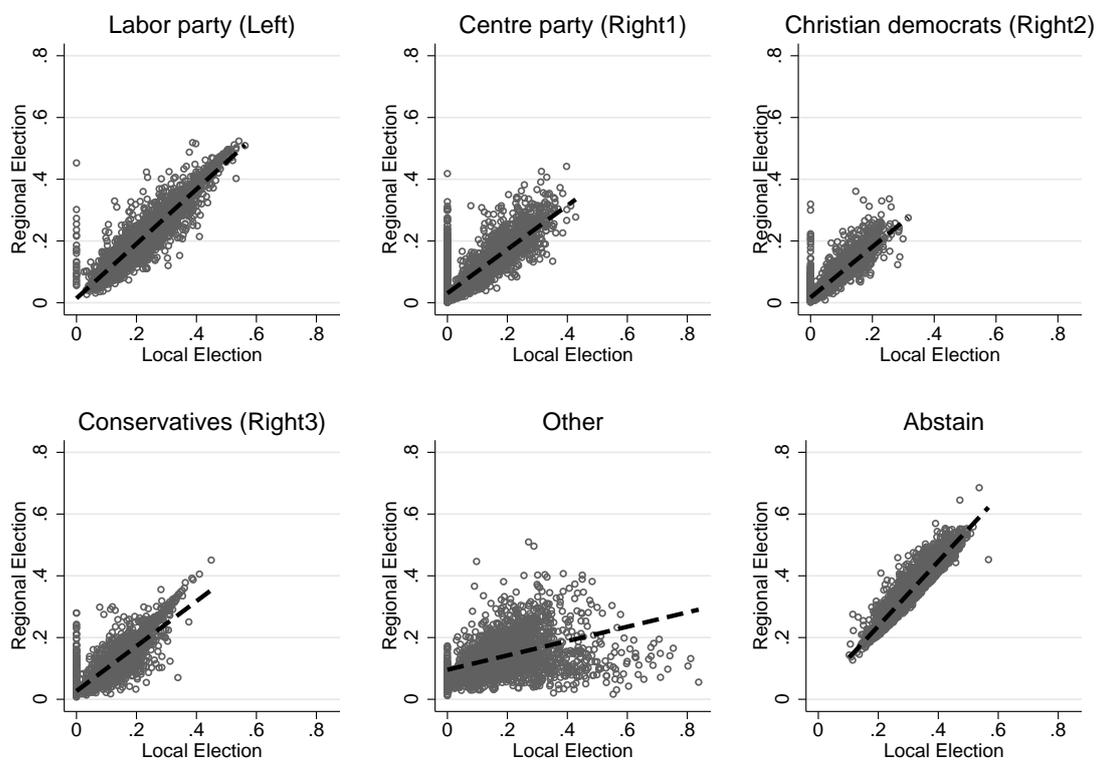
Figure D.1: The effect of political alignment on funding in different years of the election period



*Note: The model estimated is equation (3) in section 4.2. The dependent variable is per capita funding (in NOK per year). Reported are estimates for  $\delta^{j,k}$  from equation (2) where  $Y_{it}$  is replaced with  $Y_{it+k}$  for  $k = -8, \dots, -1, 0, 1, \dots, 7$  and  $k = 0$  indicates the first year after the election. Municipality fixed effects not included. Bars represent 95 percent confidence intervals. Standard errors are clustered by region.*

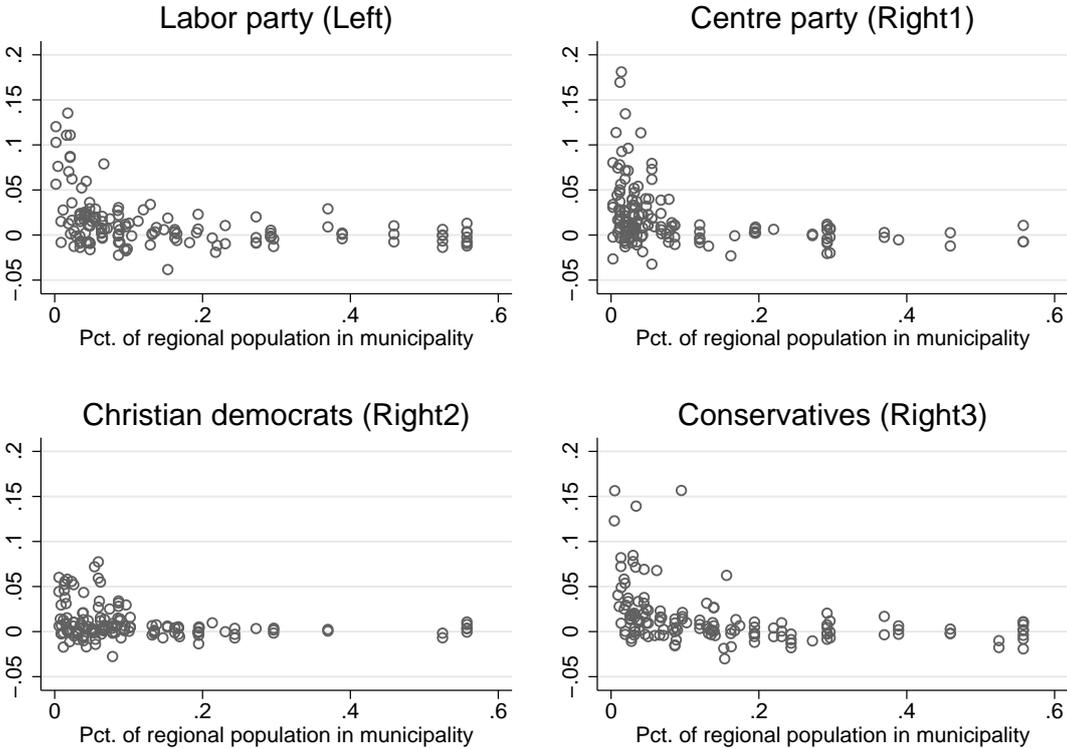
# Appendix E: Supplementary Material, Chapter 5.1

Figure E.1: Parties' share of votes in local and regional elections



*Note: The figures show electoral support for party  $y$  at the regional election against electoral support for party  $y$  at the local election, where  $y \in \{Left, Right1, Right2, Right3, Other, Abstain\}$ . The dashed lines are based on linear regressions.*

Figure E.2: Tendency to vote for hometown candidate by population size



*Note: The figures show residuals in candidates' hometowns as a function of municipalities' share of the regional population. The residuals are based on Equation (3) when  $\sum_P \mu_P N o 1_{it}^P$  is excluded.*

Table E.1: Analysis of municipalities with below median population size

	(1)	(2)	(3)	(4)	(5)	(6)
	Left	Right1	Right2	Right3	Other	Abstain
Local top cand., Left	0.073*** (0.020)	-0.005 (0.009)	-0.010** (0.003)	-0.009* (0.005)	-0.023** (0.009)	-0.010* (0.005)
Local top cand., Right1	-0.024*** (0.006)	0.055*** (0.009)	-0.009** (0.003)	-0.011** (0.004)	-0.004 (0.003)	-0.009*** (0.003)
Local top cand., Right2	-0.004 (0.005)	-0.011 (0.007)	0.028*** (0.006)	-0.001 (0.003)	-0.008 (0.010)	-0.008* (0.004)
Local top cand., Right3	-0.011 (0.008)	-0.011** (0.005)	-0.005 (0.008)	0.060*** (0.019)	-0.034** (0.013)	-0.007 (0.005)
VoteLocal	0.491*** (0.040)	0.294*** (0.030)	0.302*** (0.036)	0.296*** (0.037)	0.108*** (0.015)	0.874*** (0.023)
R-squared	0.70	0.54	0.58	0.65	0.51	0.92
Observations	1916	1916	1916	1916	1916	1916
Mean of outcome var.	0.21	0.13	0.08	0.09	0.13	0.36
Municipality fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

*Note:* For specification (1) to (5), the dependent variable is the electoral support of the relevant party given in the table heading. For specification (6), the dependent variable is the fraction of abstainers. Municipalities with below median population sizes in 1995 are included. Standard errors clustered at the region level in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

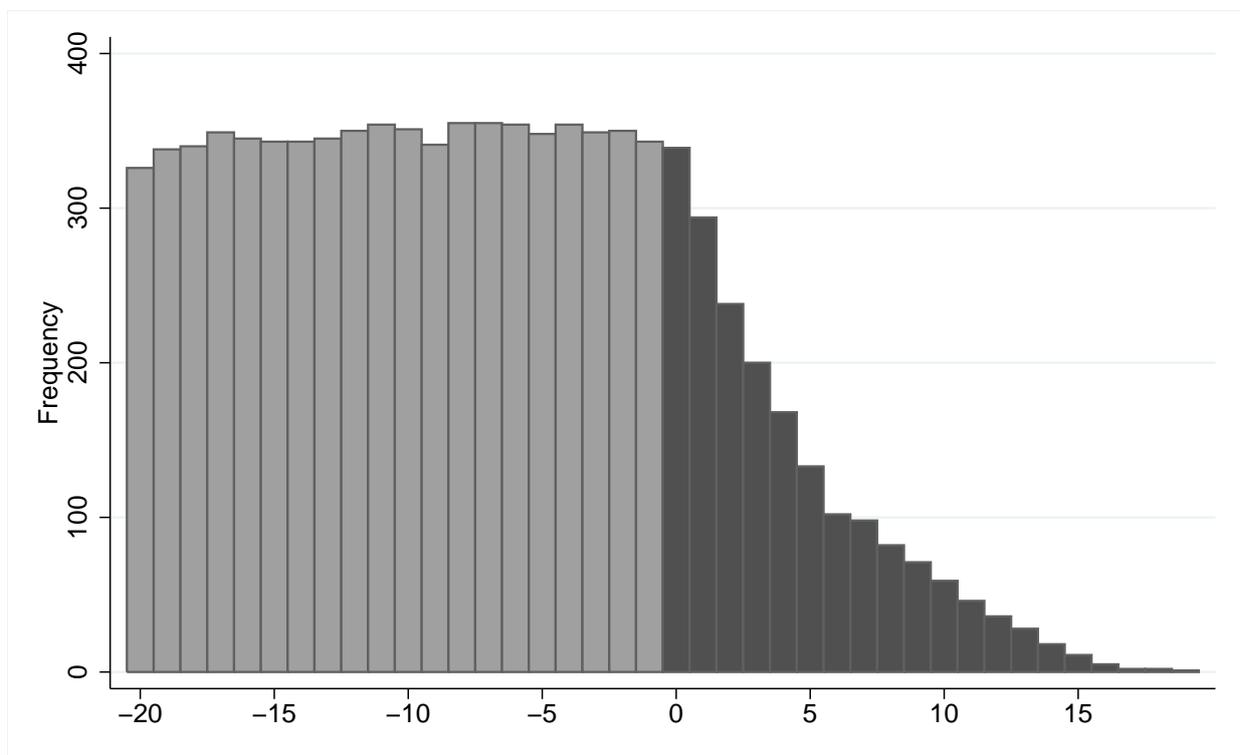
Table E.2: Analysis of municipalities with above median population size

	(1)	(2)	(3)	(4)	(5)	(6)
	Left	Right1	Right2	Right3	Other	Abstain
Local top cand., Left	0.009*** (0.002)	-0.001 (0.001)	-0.002 (0.001)	-0.005* (0.002)	0.003 (0.004)	-0.005*** (0.001)
Local top cand., Right1	0.001 (0.003)	0.018*** (0.006)	-0.003* (0.002)	-0.000 (0.002)	-0.010*** (0.003)	-0.006*** (0.002)
Local top cand., Right2	-0.001 (0.002)	-0.005*** (0.001)	0.010*** (0.003)	-0.005** (0.002)	0.001 (0.003)	0.001 (0.002)
Local top cand., Right3	-0.004** (0.002)	-0.001 (0.001)	-0.002 (0.001)	0.015*** (0.004)	-0.003 (0.003)	-0.003*** (0.001)
VoteLocal	0.725*** (0.023)	0.504*** (0.040)	0.571*** (0.045)	0.551*** (0.047)	0.356*** (0.035)	0.948*** (0.028)
R-squared	0.91	0.59	0.74	0.78	0.55	0.96
Observations	1695	1695	1695	1695	1695	1695
Mean of outcome var.	0.22	0.08	0.07	0.12	0.14	0.37
Municipality fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

*Note: For specification (1) to (5), the dependent variable is the electoral support of the relevant party given in the Table heading. For specification (6), the dependent variable is the fraction of abstainers. Municipalities with above median population sizes in 1995 are included. Standard errors clustered at the region level in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .*

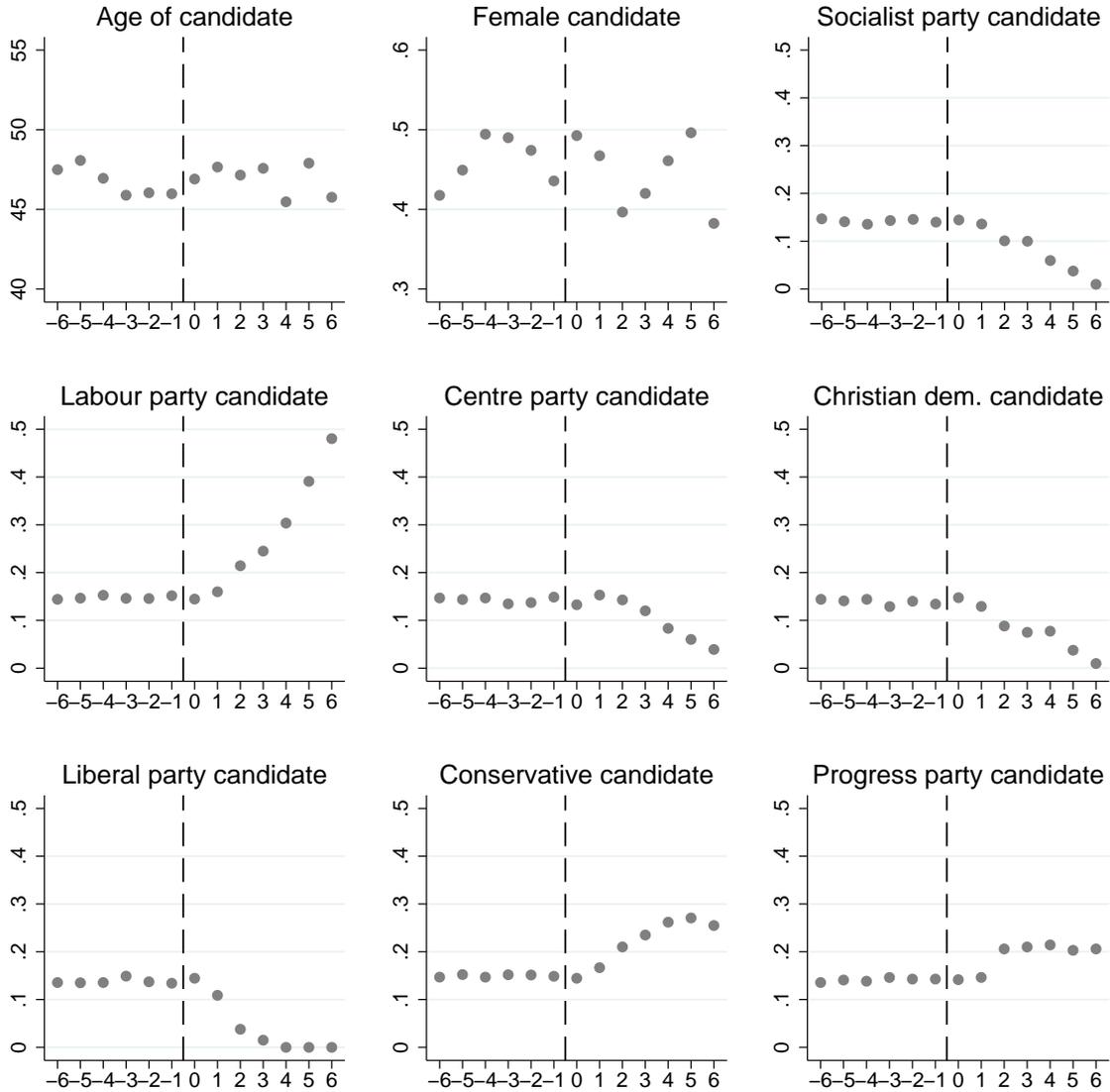
## Appendix F: Supplementary Material, Chapter 5.2

Figure F.1: Frequency of candidates by rank distance from marginally elected



*Note: Sample consists of candidates running for regional elections in 2003, 2007 and 2011 for a party which won at least one seat. Candidates with unknown hometown status are not included. Along the horizontal axes we plot the difference between a candidate's rank position on the party list and the number of elected candidates from that party list. Frequencies for candidates ranked more than 20 positions away from winning a seat are not shown ( $N=8,866$ ).*

Figure F.2: Covariates by rank distance from marginally elected



*Note: Sample restricted to candidates running in the 2003, 2007 and 2011 regional elections for party lists winning at least one seat. Candidates with unknown hometown status are not included. Along the horizontal axes we plot the difference between a candidate's rank position on the party list and the number of elected candidates from that party list. We only show covariates for candidates ranked six or fewer positions away from the last candidate elected ( $N=3,572$ ). The dashed vertical line indicates the transition from candidates losing to candidates winning a seat.*

Table F.1: Covariates and career outcomes, marginal winners and marginal losers in regional elections

	Winners (means)	Losers (means)	<i>p</i> -value
Age	46.90	45.98	0.39
Female	0.49	0.44	0.14
Socialist party candidate	0.14	0.14	0.86
Labour party candidate	0.14	0.15	0.80
Centre party candidate	0.13	0.15	0.55
Christian dem. candidate	0.15	0.13	0.62
Liberal party candidate	0.14	0.13	0.69
Conservative candidate	0.14	0.15	0.88
Progress party candidate	0.14	0.14	0.96
Regional council member, $t - 4$	0.25	0.20	0.21
Regional council member, $t$	1.00	0.00	.
Regional council member, $t + 4$	0.29	0.17	0.00
Local top candidate, $t - 4$	0.28	0.22	0.14
Local top candidate, $t$	0.26	0.21	0.13
Local top candidate, $t + 4$	0.19	0.20	0.70
Parliament candidate, $t - 2$	0.35	0.30	0.21
Parliament candidate, $t + 2$	0.44	0.35	0.03
Parliament candidate, $t + 6$	0.28	0.19	0.02
Observations	339	343	

*Note: Sample restricted to marginal candidates running in the 2003, 2007 and 2011 regional elections for party lists winning at least one seat. Candidates with unknown hometown status are not included. ‘Winners’ are candidates who are ranked just high enough on the party list to win a seat and ‘Losers’ are candidates ranked one position too low. Local level outcomes for candidates who represent a party which does not run at the local level are not included. Local level outcomes at  $t - 4$  are not included for regional council members elected in 2003, and national level outcomes at  $t + 6$  are not available for those elected in 2011.*

Table F.2: Career outcomes, individual members of the regional councils

	All (means)	New elects (means)	Incumbents (means)
Regional council member, $t - 4$	0.42	0.00	1.00
Regional council member, $t$	1.00	1.00	1.00
Regional council member, $t + 4$	0.41	0.40	0.44
Local council member, $t - 4$	0.48	0.49	0.46
Local council member, $t$	0.44	0.48	0.38
Local council member, $t + 4$	0.32	0.33	0.31
Local top candidate, $t - 4$	0.19	0.18	0.20
Local top candidate, $t$	0.17	0.17	0.18
Local top candidate, $t + 4$	0.14	0.14	0.15
Parliament candidate, $t - 2$	0.32	0.26	0.41
Parliament candidate, $t + 2$	0.34	0.35	0.33
Parliament candidate, $t + 6$	0.24	0.23	0.24
Parliament member, $t - 2$	0.00	0.00	0.00
Parliament member, $t + 2$	0.03	0.02	0.04
Parliament member, $t + 6$	0.04	0.04	0.05
Observations	1933	1131	802

*Note: Sample consists of members of the regional councils elected in 2003, 2007 and 2011. Council members with unknown hometown status are not included. Local level outcomes for candidates who represent a party which does not run at the local level are not included. Local level outcomes at  $t - 4$  are not included for regional council members elected in 2003, and national level outcomes at  $t + 6$  are not available for those elected in 2011.*

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