Public Goods Reduction And Voting Behaviour:
Evidence from Permanent School Closures in Germany

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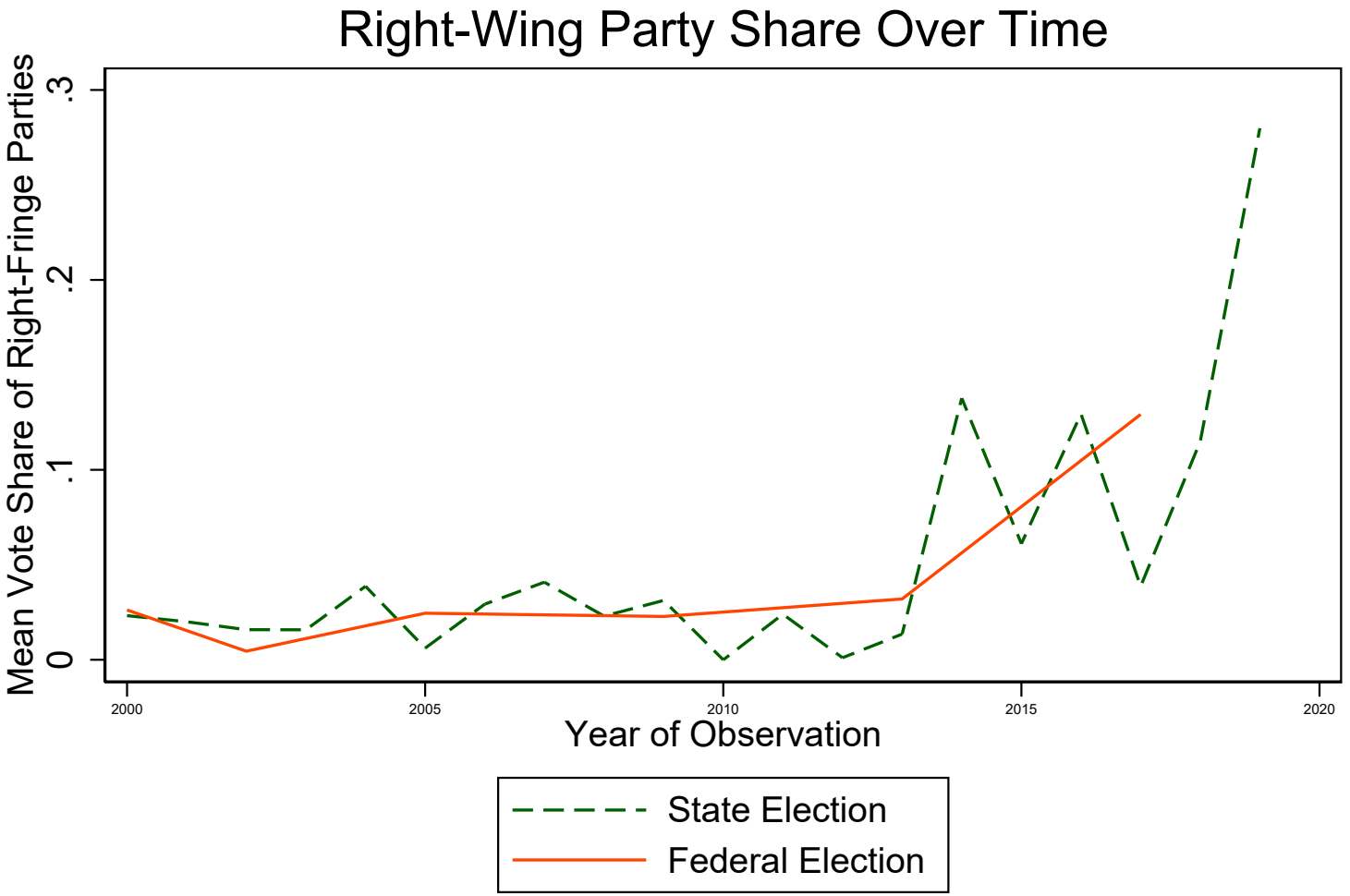
Topics

- Public Schooling and their local availability as multi-purpose infrastructure:
  - Not only education-purpose, but childcare function to enable parental labour market participation (Ma et al, 2020)
  - School infrastructure often shape the social and demographic environment of a neighbourhood (Downes and Zabel, 2002)
- Permanent School Closures (esp. Elementary and Grammar Schools) are therefore often cause for emotional debates:
  - Class sizes (influenced by school consolidations) are often important factors influencing the academic success of pupils (Berry and West, 2010)
  - Distances to the nearest school have an impact on pupils' academic performance and well-being (Damm et al, 2022)

Increasing Right-fringe Voter Shares



Note: Year-Wise Mean Vote Share of Direct-Vote (Erst-Stimme) for Right-Fringe Parties in Germany between 2000 and 2019. For the exact definitions of the parties, see the appendix.
Federal elections are held at the same time in all federal states in Germany, while the dates for state elections are determined by the respective federal states themselves.
The data on voting behaviour was provided by the respective state electoral administrators.

Several fields of research show the relevance of schools as infrastructure

- Effect of school closures on an individual level:
  - Students from schools not affected by a consolidation achieved better educational results than from larger schools (Berry and West, 2010)
  - Students affected by school closures had higher rates of absences and worse educational outcomes (Steinberg and MacDonald, 2018; Damm et al., 2022)
- Effect of school closures on regional and urban development:
  - Perm. school closures in Italy led to a decrease in population and personal income (Di Cataldo and Romani, 2023)
  - Perm school closures in Scotland led to a decrease in Crime Rates (Borbely et al., 2023)
  - Perm. school closures in East-Germany led to a decrease in unemployment and housing prices (Freier et al., 2021)
- While some effects of infrastructure and schools has been researched, there is relatively little research for the entirety of Germany (Bartl and Sackmann, 2014; Helbig and Nikolai, 2015)

- Our work contributes in three dimensions:
  1. Present an overview of the development of **permanent** school closures in Germany, esp. distinguishing between East and West Germany
  2. Analyse the effect of decreased school provision on voting behaviour, especially distinguishing between primary and grammar schools
  3. We show that above changes in voting behaviour stem from changes in demographics, perceived cultural deterioration and decreasing labour market opportunities
- Opposed to previous investigations, we present our findings for the entirety of Germany in a timespan of 2001-2019

Data

The panel data set used for the investigation consists of three main Data-Sets:

- Data on Economic Development
- Data on Voting Behaviour
- Data on School Closures

- Data on regional development can be obtained from the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR)
- Database "Indicators and maps for spatial and urban development" (INKAR) contains information on
  - Birth statistics / population statistics
  - Migration in/out of municipality
  - Levels of taxation and income from taxation
  - Crude labour market statistics (Unemployment Rate, No. of Employees)
  - Statistics on changes in territorial reforms (tracking for merges)
- Main years of observation: 2001 - 2020
- Unique Advantage: Low level of data-collection: Municipality - level!

Four levels of voting outcomes (only primary vote) (Falck et al., 2014):

1. Left-fringe Parties
2. Right-fringe Parties
3. Voter Turnout
4. Invalid Votes

All coded for the democratic levels:

1. Federal Elections (Bundestagswahlen)
2. State Elections (Landtagswahlen)
3. Local Elections (Kommunalwahlen)

All data on voting behaviour was provided by the corresponding 14 state election offices

- Data has been obtained by the Ministries of Education from all respective Federal States in Germany
- We received a list with the address and school type of all primary and secondary schools in Germany
- **Limitation:** We observe Elementary Schools, Secondary School ("Haupt- und Realschule") and Grammar School ("Gymnasium")
- Years of observation: 1992 (Imbalanced) - 2019
- By restructuring and tracking of all schools within a municipality over time, we can compute any school closure and school consolidations

Two additional restrictions:

1. Removal of all city states (Berlin, Hamburg, Bremen): Special status in both, voting systems and financial responsibility
2. Removal of municipalities with population < 100: Historical and demographic exceptions (e.g. Halligen, island communities)

Final data panel: 10547 distinct municipalities in the period 2001 - 2019

- Treatment Dummy:
  - Dummy first ever (permanent) school closure after in Municipality
  - $D_{First} = 1$ if Municipality experienced first closure, $D_{First} = 0$ otherwise
  - Interest about effect of "infrastructure void", therefore we do not consider school consolidations within neighboured schools (schools in the same street)
- Last school within a municipality permanently closes

  (SUTVA-Assumptions)
  - $D_{Last} = 1$ if last school in municipality closes, $D_{Last} = 0$ otherwise

Descriptives

Table: Descriptive Statistics - Municipality And Reforms

	mean	sd	max	min
Unique Municipality Identifier	8297513.62	4063412.75	16077052.00	1001000.00
State	8.02	4.06	16.00	1.00
Year of Obs.	2009.80	5.42	2019.00	2001.00
No. Territorial Reforms	0.30	1.48	29.00	0.00
No. Territorial Reforms County	0.27	0.68	3.00	0.00
Longitude Centre Municipality	9.99	2.05	14.99	5.92
Latitude Centre Municipality	50.85	1.97	55.02	47.37
Number Schools	2.89	6.78	159.00	0.00
No. Elem. Schools	1.67	3.57	80.00	0.00
No. Second. Schools	0.83	1.92	45.00	0.00
No. Grammar Schools	0.39	1.50	38.00	0.00
Observations	193167			

Table: Descriptive Statistics - Economic Development

	mean	sd	max	min
Perc. Long Term Unempl.	28.82	12.10	328.57	0.00
Share Remote Labour Force	83.05	14.63	118.73	0.00
Average Population Age	43.06	2.95	59.97	0.00
Net In Out Commuter	-270.01	584.76	854.29	-21900.00
No. Population	7468.66	30175.94	1484226.00	100.00
Male Population Share	1.00	0.08	7.65	0.30
Net Birth To Death Ratio	-2.15	6.08	87.88	-116.84
No. Terretorial Reforms Since 2000	0.02	0.35	22.00	0.00
No. Unempl. Per 1000 inhab.	3.31	2.49	23.01	0.12
No. Population Aged 50-75	32.17	4.77	57.85	0.00
N	193167			

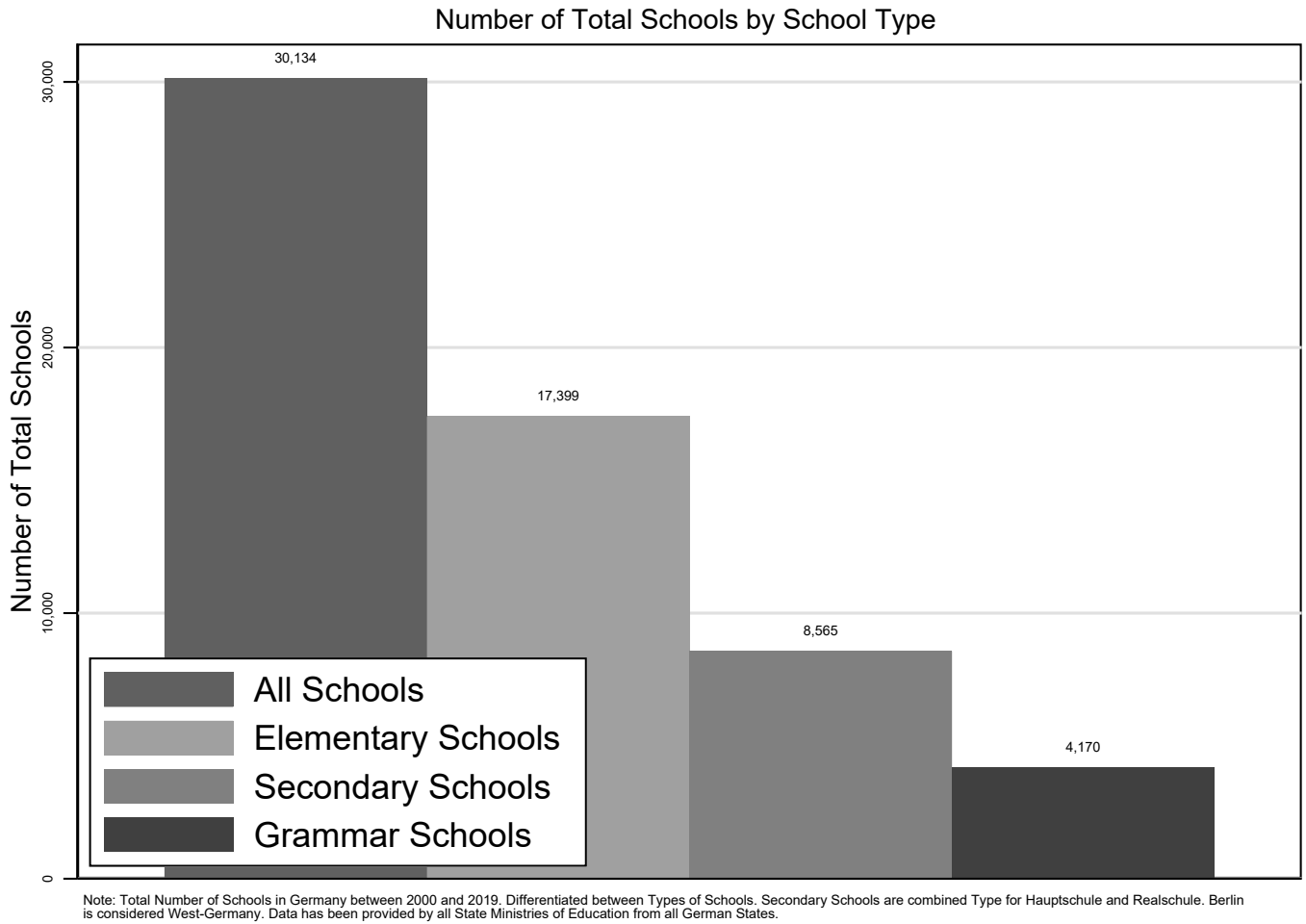
Table: Descriptive Statistics - School Characteristics

	mean	sd	max	min
Unique School Identifier	10982.05	10783.87	30220.00	0.00
Distance School To Centre	1.22	1.41	12.18	0.00
Year of Closure Elem. School	271.82	686.90	2018.00	0.00
Year of Closure Second. School	334.23	748.06	2018.00	0.00
Year of Closure Grammar School	50.33	313.97	2018.00	0.00
Year of School Closure	512.35	875.37	2018.00	0.00
Yr Only Elem. School Closure	73.50	377.09	2018.00	0.00
Yr Only Second. School Closure	196.49	596.70	2018.00	0.00
Yr Only Grammar School Closure	19.55	197.19	2018.00	0.00
Yr Only School Closure	73.23	376.41	2018.00	0.00
Dummy Municipality has no School	0.34	0.47	1.00	0.00
Dummy Elem. School Closure	0.09	0.28	1.00	0.00
Dummy Second. School Closure	0.10	0.30	1.00	0.00
Dummy Second. School Closure	0.01	0.12	1.00	0.00
Dummy School Closure	0.16	0.37	1.00	0.00
Dummy Only Elem. School Closed	0.02	0.15	1.00	0.00
Dummy Only Second. School Closed	0.06	0.24	1.00	0.00
Dummy Only Grammar School Closed	0.01	0.08	1.00	0.00
Dummy Only School Closed	0.02	0.15	1.00	0.00
Observations	193167			

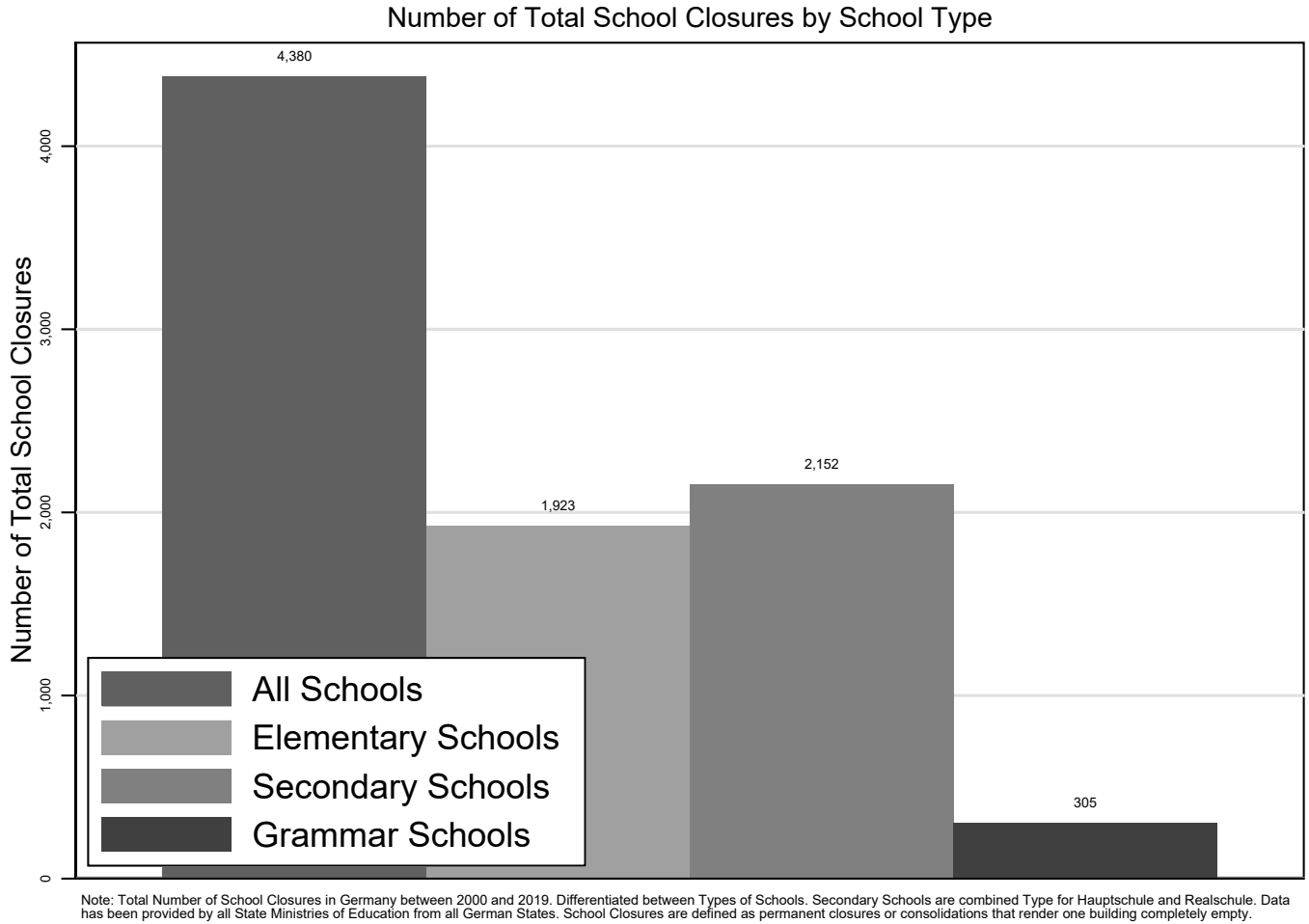
Table: Descriptive Statistics - Voting Behaviour (All Elections)

	mean	sd	max	min
Vote Turnout Federal Elec.	0.69	0.12	1.00	0.00
Invalid Votes in %. Federal Elec.	0.02	0.01	0.16	0.00
Left-fringe Parties in %. Federal Elec.	0.07	0.08	0.54	0.00
Right-fringe Parties in %. Federal Elec.	0.04	0.06	0.47	0.00
N	50764			
Vote Turnout State Elec.	0.55	0.22	0.96	0.00
Invalid Votes in %. State Elec.	0.02	0.02	0.19	0.00
Left-fringe Parties in %. State Elec.	0.06	0.08	0.50	0.00
Right-fringe Parties in %. State Elec.	0.05	0.07	0.59	0.00
N	41066			
Vote Turnout Communal Elec.	0.50	0.24	1.00	0.00
Invalid Votes in %. Communal Elec.	0.04	0.04	0.61	0.00
Left-fringe Parties in %. Communal Elec.	0.03	0.07	0.61	0.00
Right-fringe Parties in %. Communal Elec.	0.01	0.04	0.41	0.00
N	37210			

Visualizations

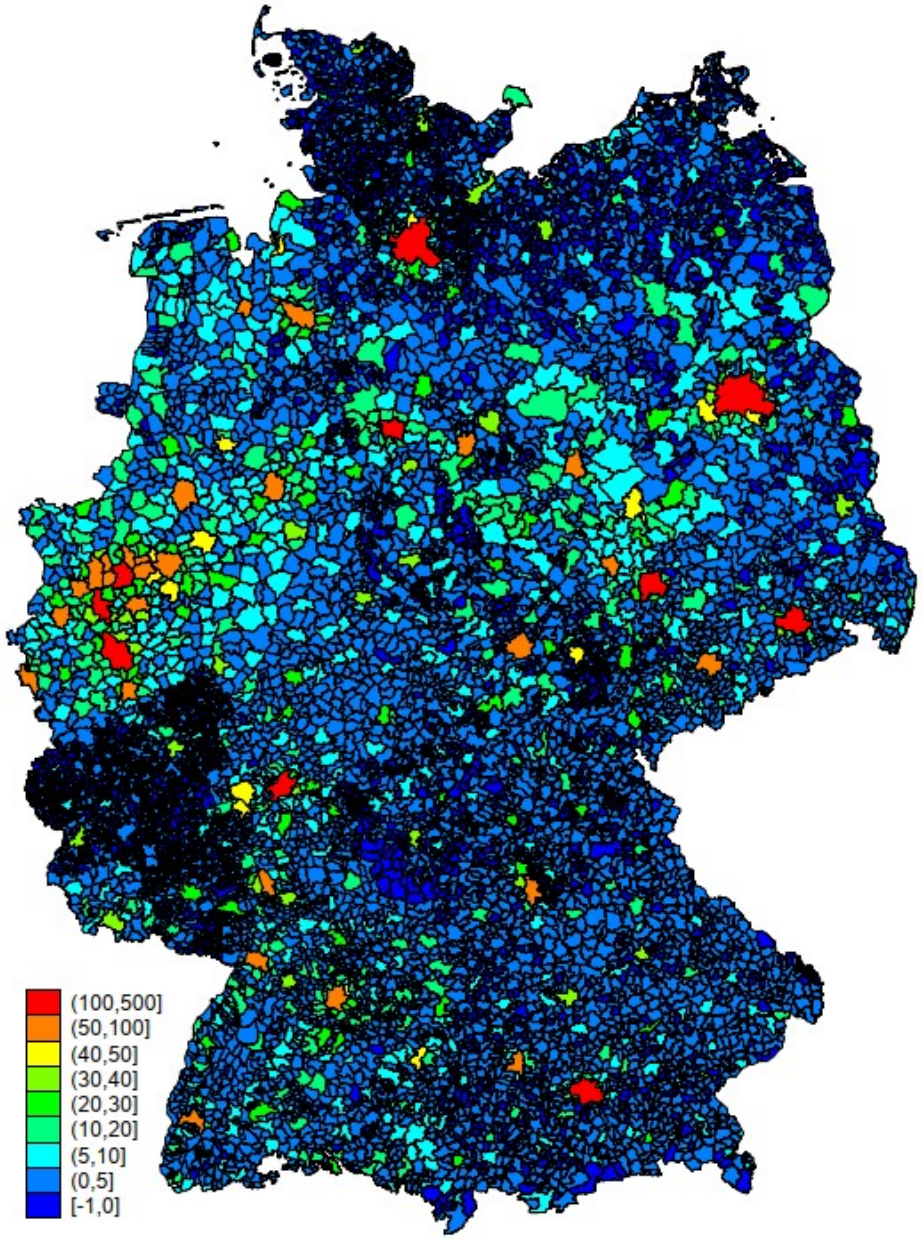


Type East West



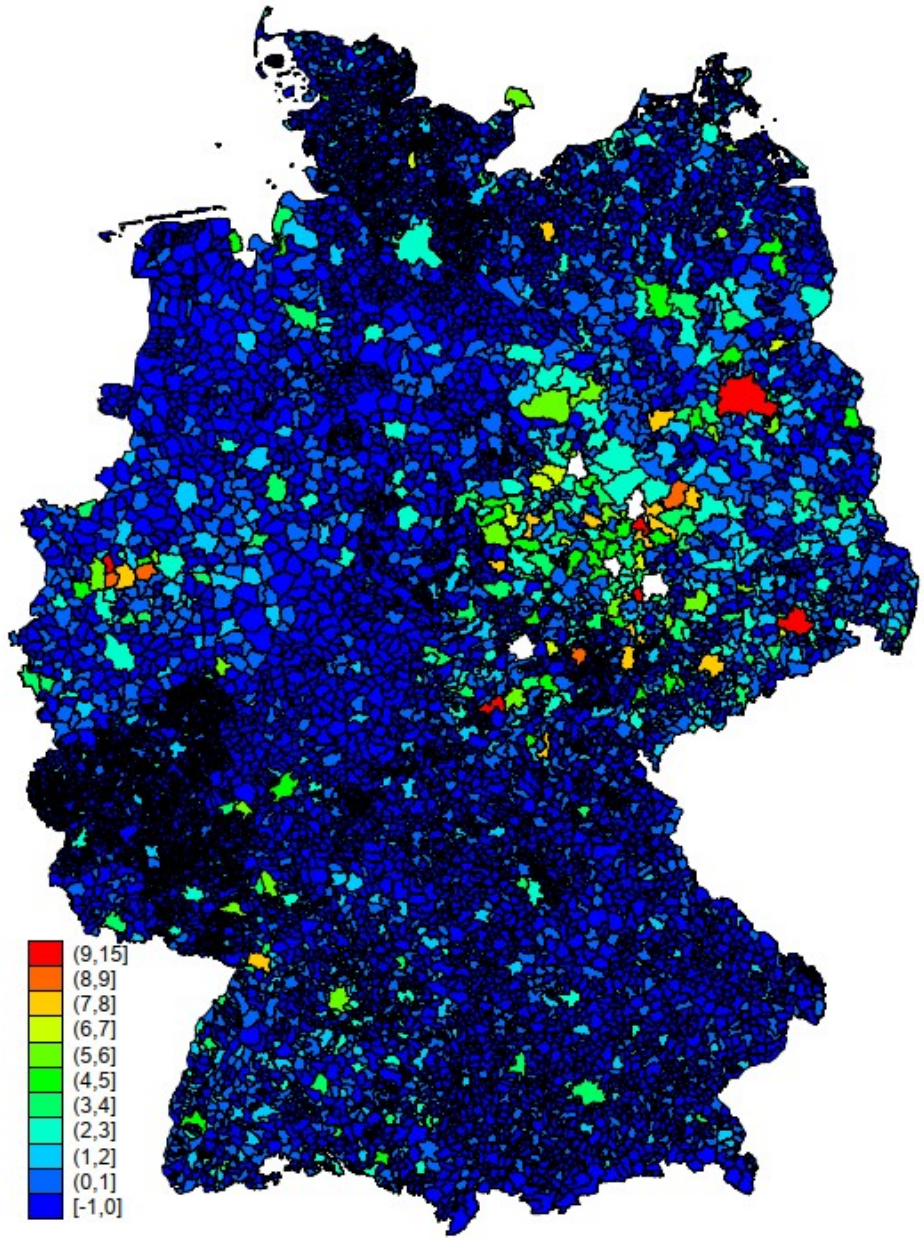
Closure East West

Total Numbers of Schools in Germany by Municipality



Note: Total Numbers of Schools In Germany by Municipality between 2000 and 2019. These Numbers also Include Closed Schools.
Data has been provided by all State Ministries of Education from all German States.

Total Numbers of School Closures in Germany by Municipality since 2000



Note: Total Numbers of Schools In Germany by Municipality between 2000 and 2019. These Numbers also Include Closed Schools.
Data has been provided by all State Ministries of Education from all German States.

Identification Strategy

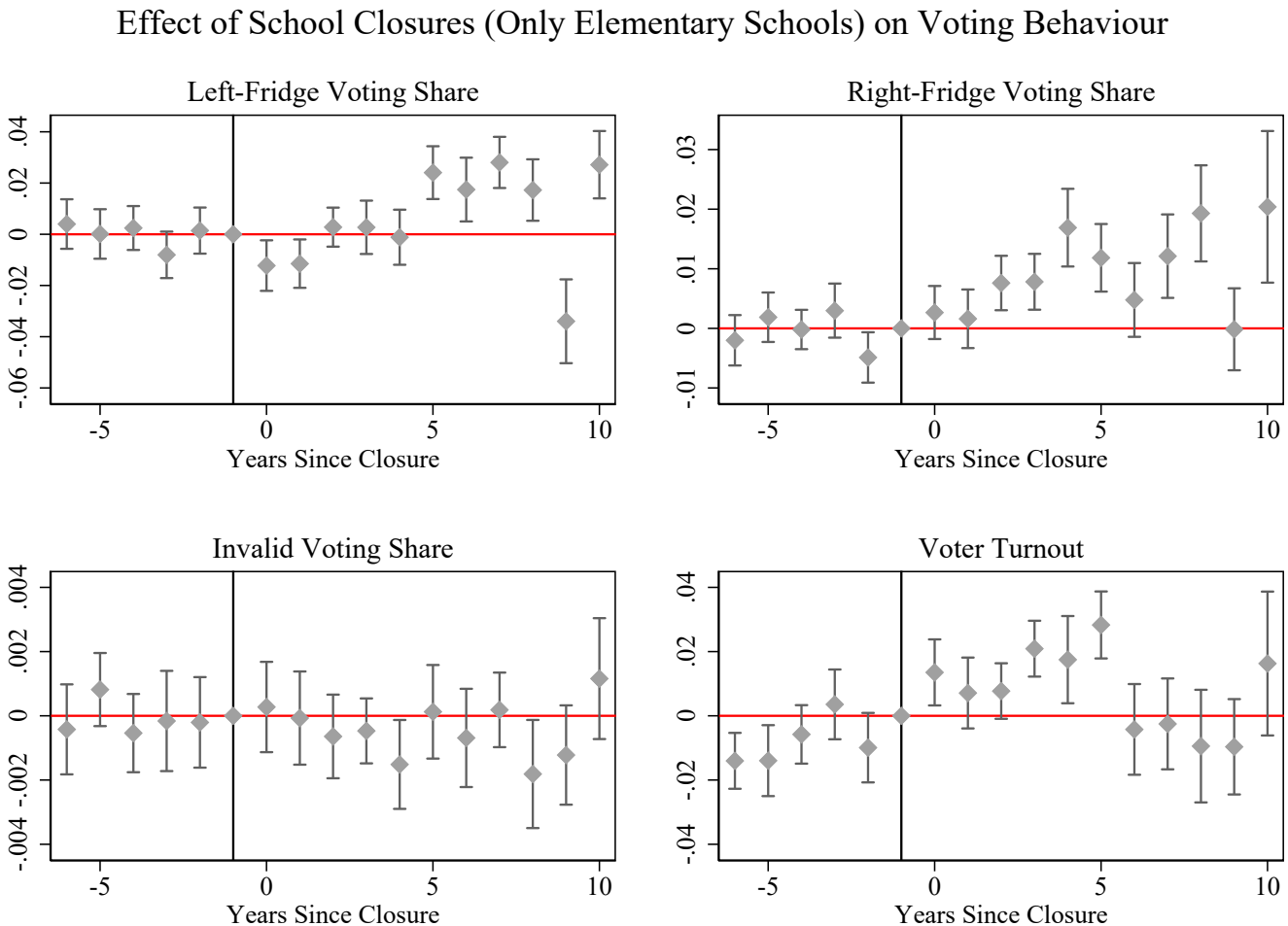
Our baseline analysis applies an event study estimation:

$$y_{mt} = \alpha + \sum_{j=2}^{J} \beta_j (\text{Lag } j)_{mt} + \sum_{k=1}^{K} \gamma_k (\text{Lead } k)_{mt} + \mu_m + \lambda_t + X'_{mt}\Gamma + \epsilon_{mt} \tag{1}$$

- y_{st} is the outcome of interest in period t in municipality m
- μ_m and λ_t are municipality and time fixed effects, X'_{mt} is an covariate vector and ϵ_{mt} an error term
- Lag j and Lead k are binary variables indicating when/if municipality m first experienced a school closure $D_{First} > 0$

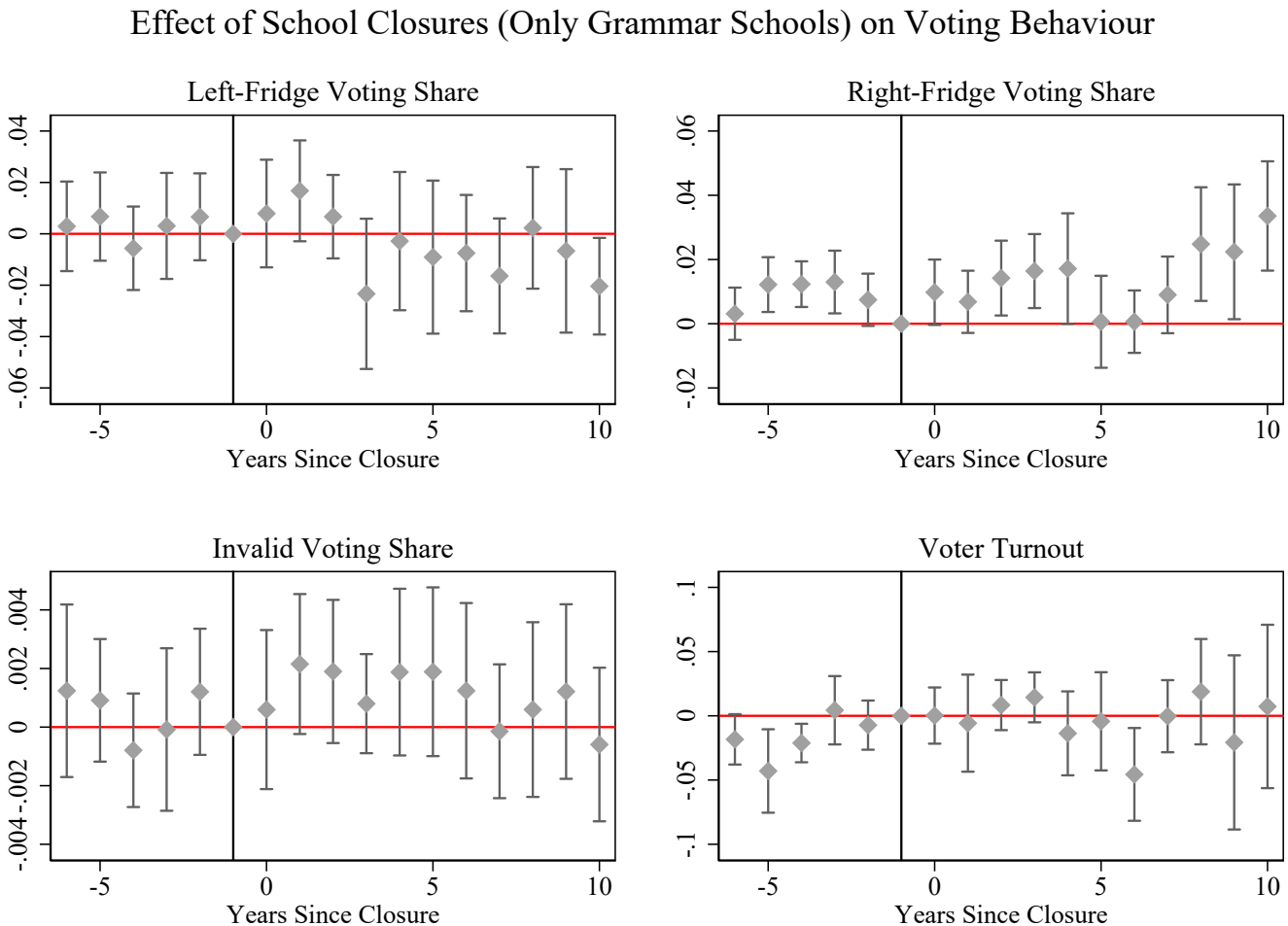
Results Event Study Estimation

Event Study: Federal Elections, Elementary Schools



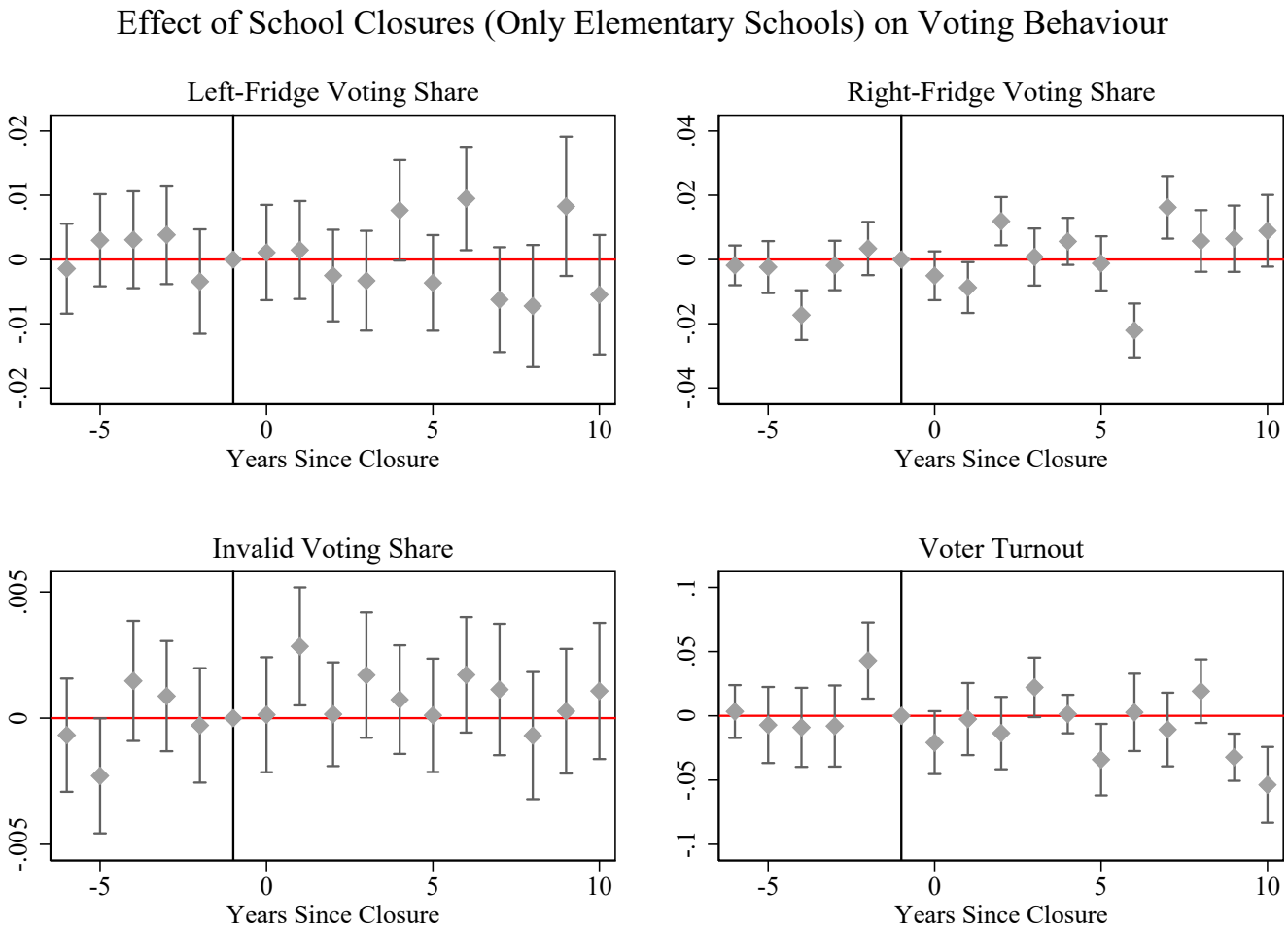
Estimation Results for voting behaviour on federal-level on elementary school closures. The figure depicts point estimates and 95% confidence intervals. Estimations computed without additional control variables.

Event Study: Federal Elections, Grammar Schools



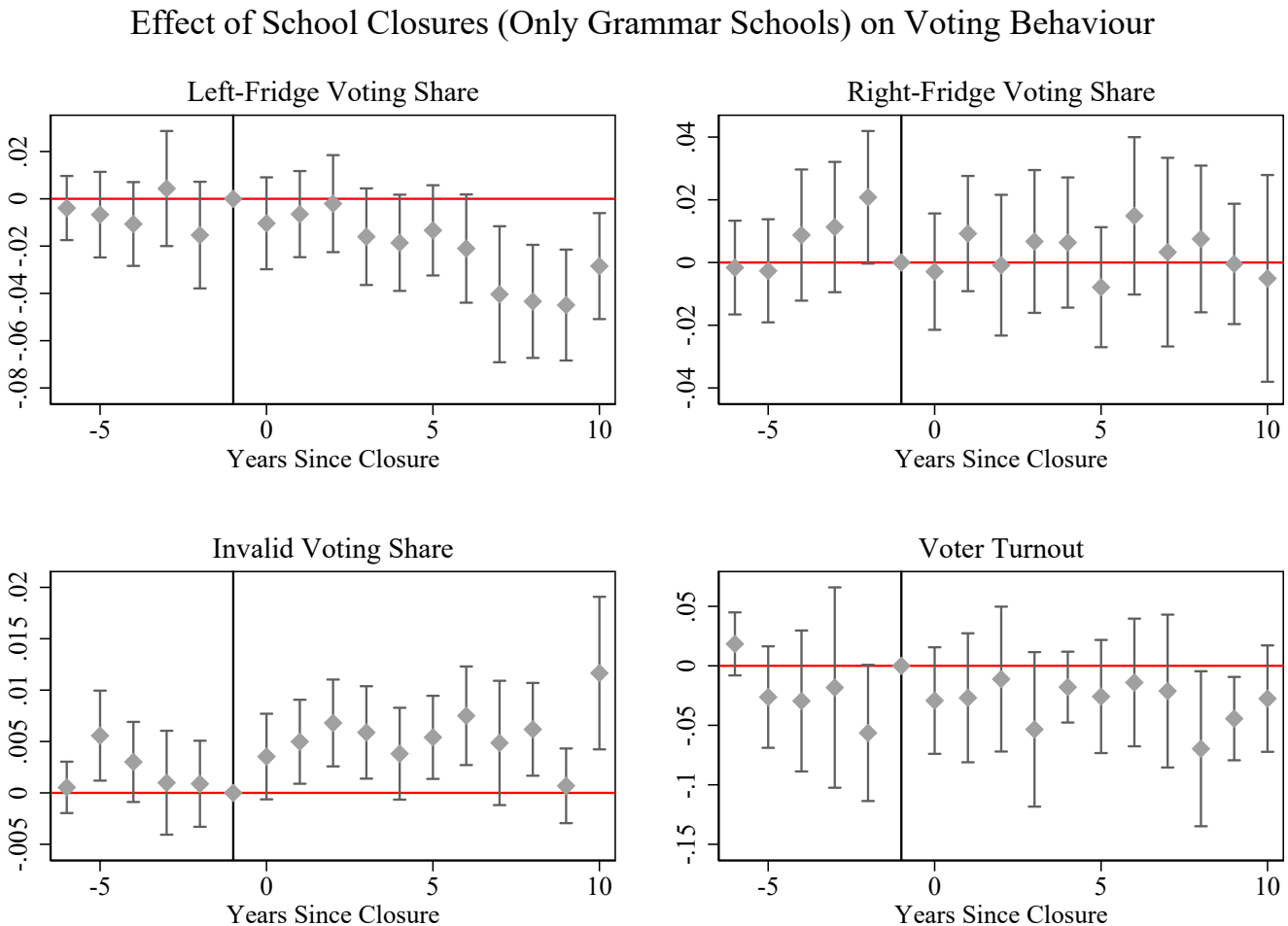
Estimation Results for voting behaviour on federal-level on grammar school closures. The figure depicts point estimates and 95% confidence intervals. Estimations computed without additional control variables. Standard errors are clustered on a municipality level.

Event Study: State Elections, Elementary Schools



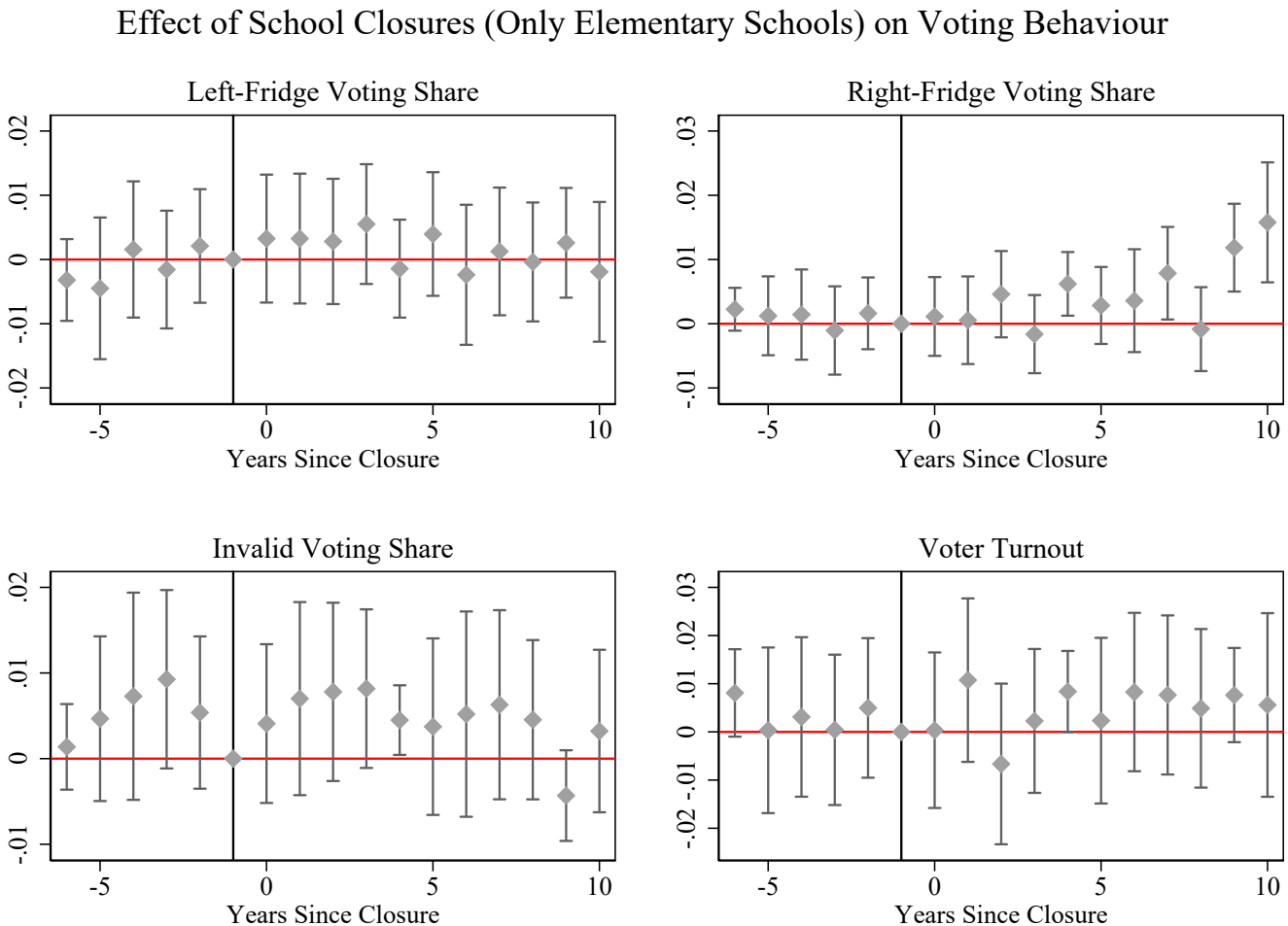
Estimation Results for voting behaviour on state-level on elementary school closures. The figure depicts point estimates and 95% confidence intervals. Estimations computed without additional control variables. Standard errors are clustered on a municipality level.

Event Study: State Elections, Grammar Schools



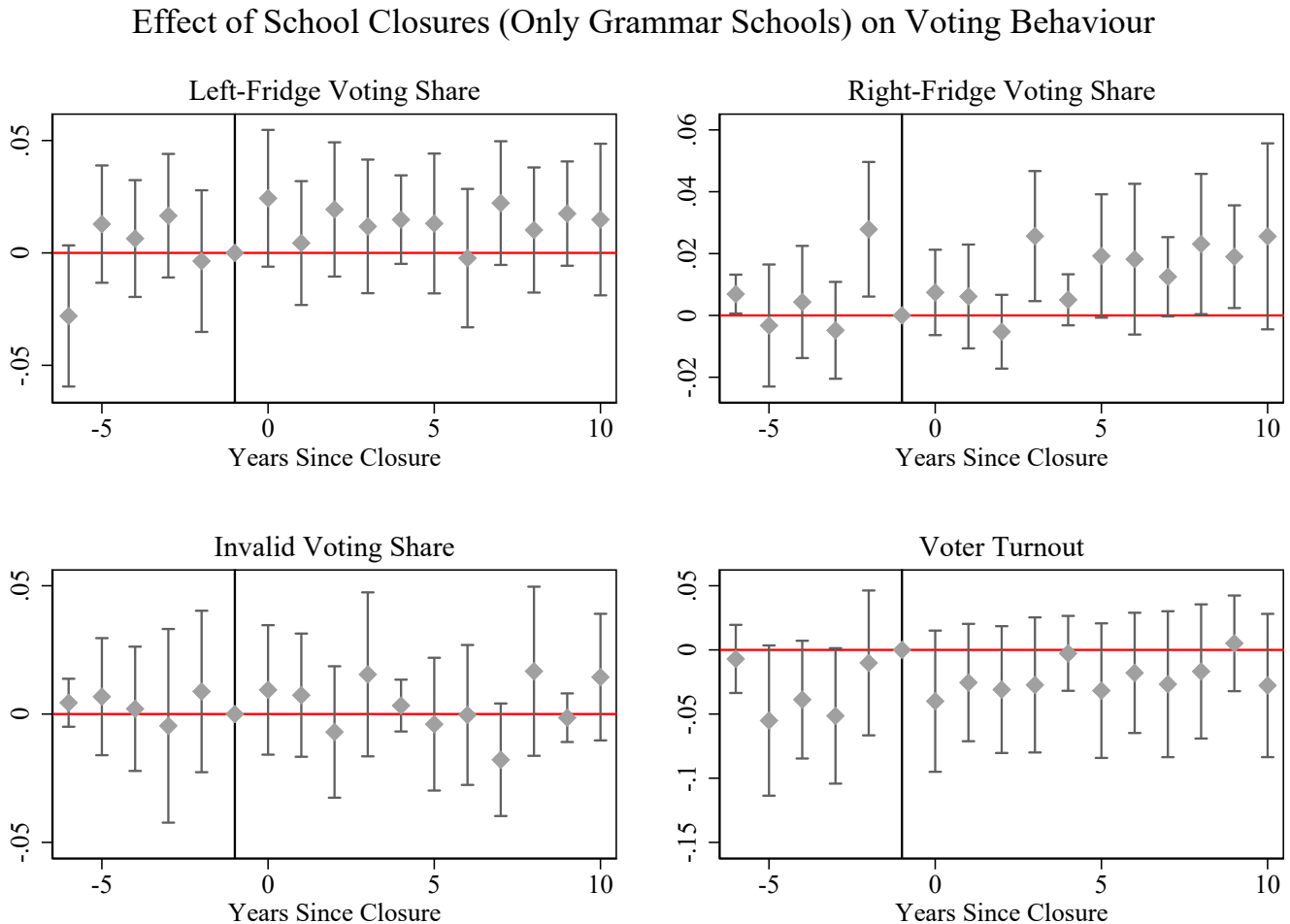
Estimation Results for voting behaviour on federal-level on grammar school closures. The figure depicts point estimates and 95% confidence intervals. Estimations computed without additional control variables. Standard errors are clustered on a municipality level.

Event Study: Communal Elections, Elementary Schools



Estimation Results for voting behaviour on communal-level on elementary school closures. The figure depicts point estimates and 95% confidence intervals. Estimations computed without additional control variables. Standard errors are clustered on a municipality level.

Event Study: Communal Elections, Grammar Schools



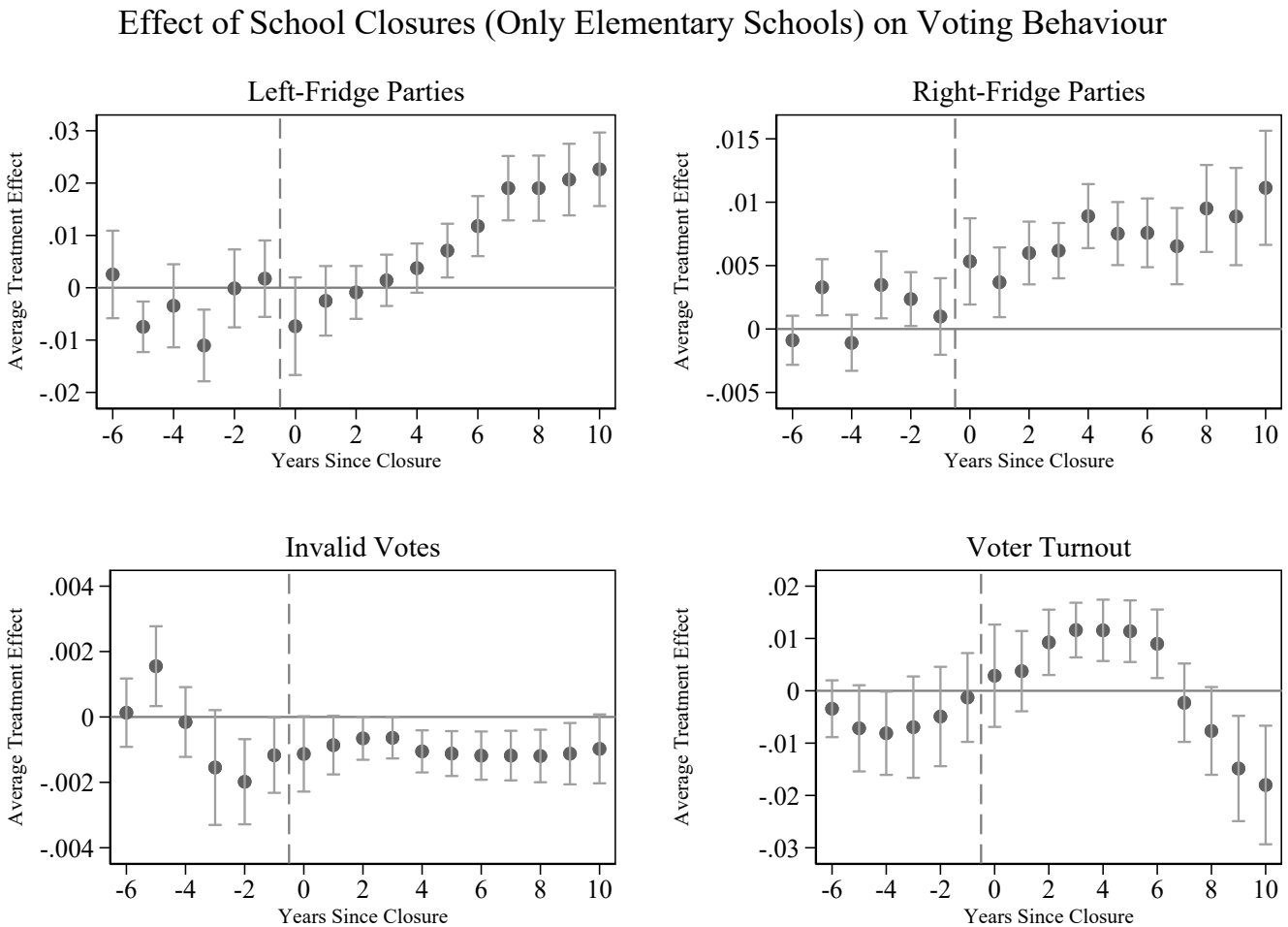
Estimation Results for voting behaviour on communal-level on grammar school closures. The figure depicts point estimates and 95% confidence intervals. Estimations computed without additional control variables. Standard errors are clustered on a municipality level.

Additional Robustness Checks

Even tough parallel trend assumptions necessary for a event study design (mostly) hold, literature suggest additional robustness test to ensure SUTVA:

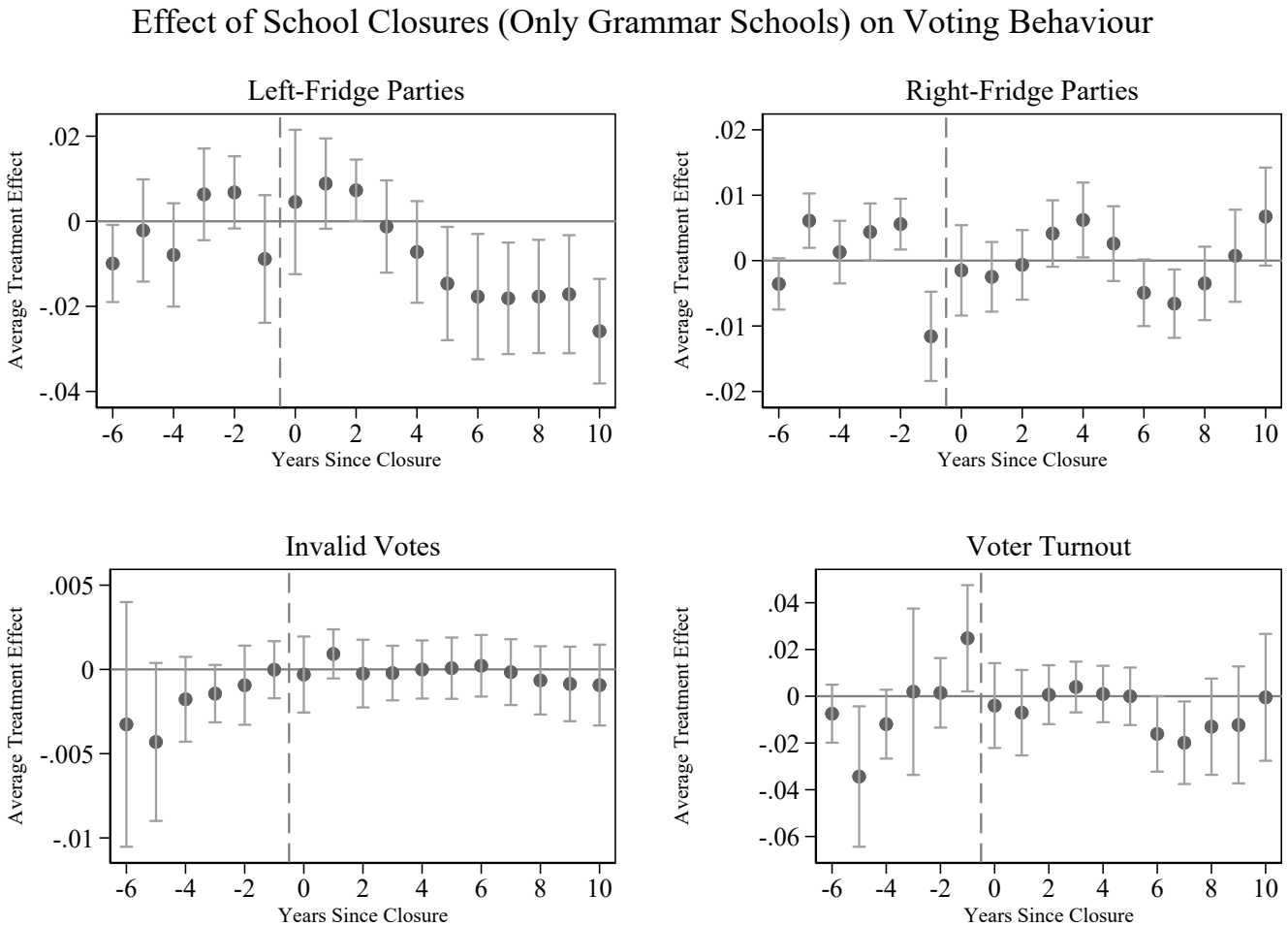
- Restricting sample to only not-yet treated, ensuring comparability between treated units (Freier et al., 2021)
- Employing a matched TWFE/matched DiD estimation using Mahalanobis nearest neighbor matching procedure to find suitable control municipalities. This includes removing neighbouring municipalities to exclude spillover effects. (Blesse and Diegmann, 2022)

Not Yet Treated: Closure on Federal Election Results - Elementary Schools



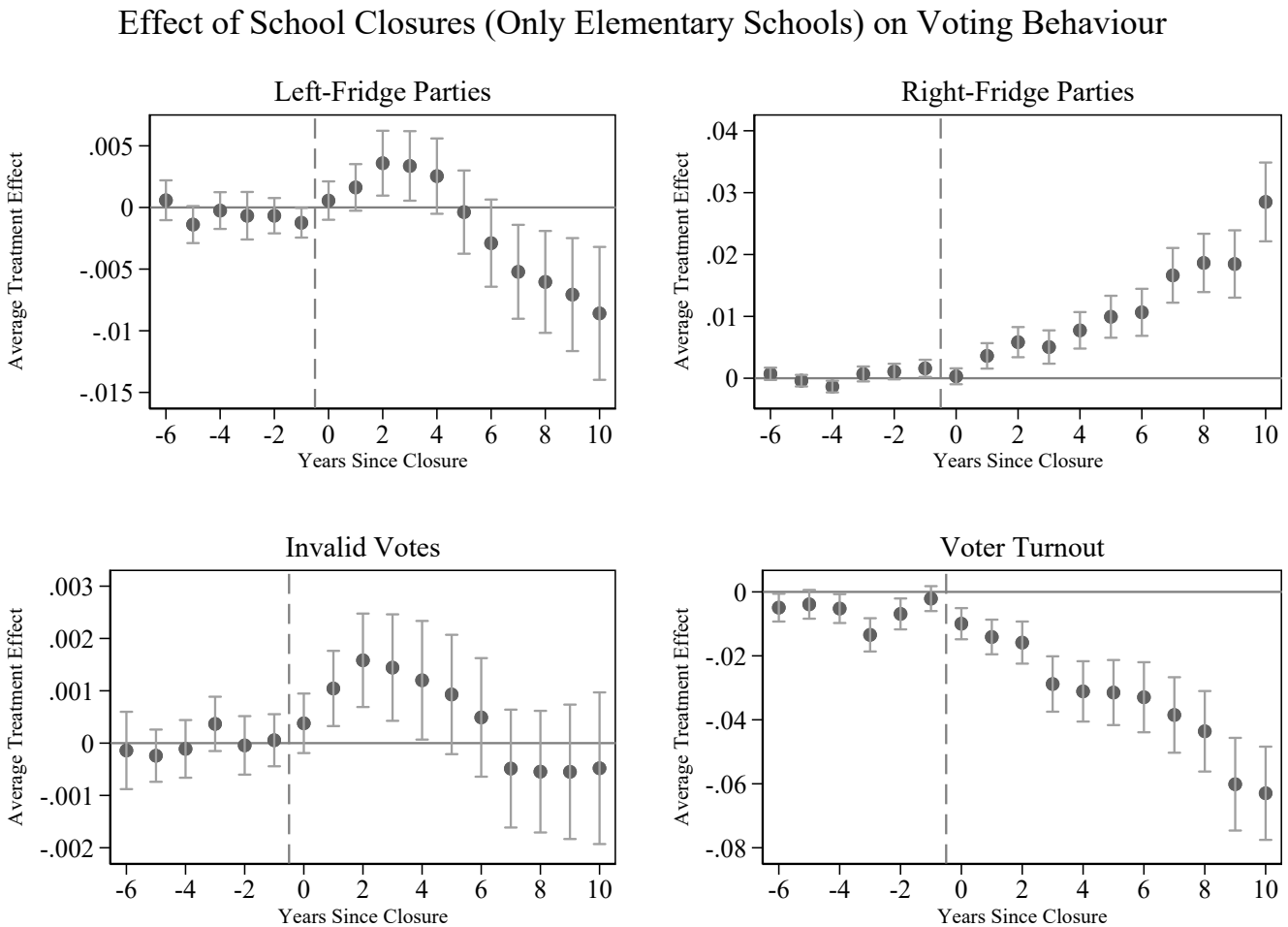
Estimation Results for voting behaviour on federal-level on grammar school closures. The figure depicts weighted point estimates and 95% confidence intervals. Estimations computed without additional control variables. Only not-yet treated sample has been utilized.

Not Yet Treated: Closure on State Election Results - Grammar Schools



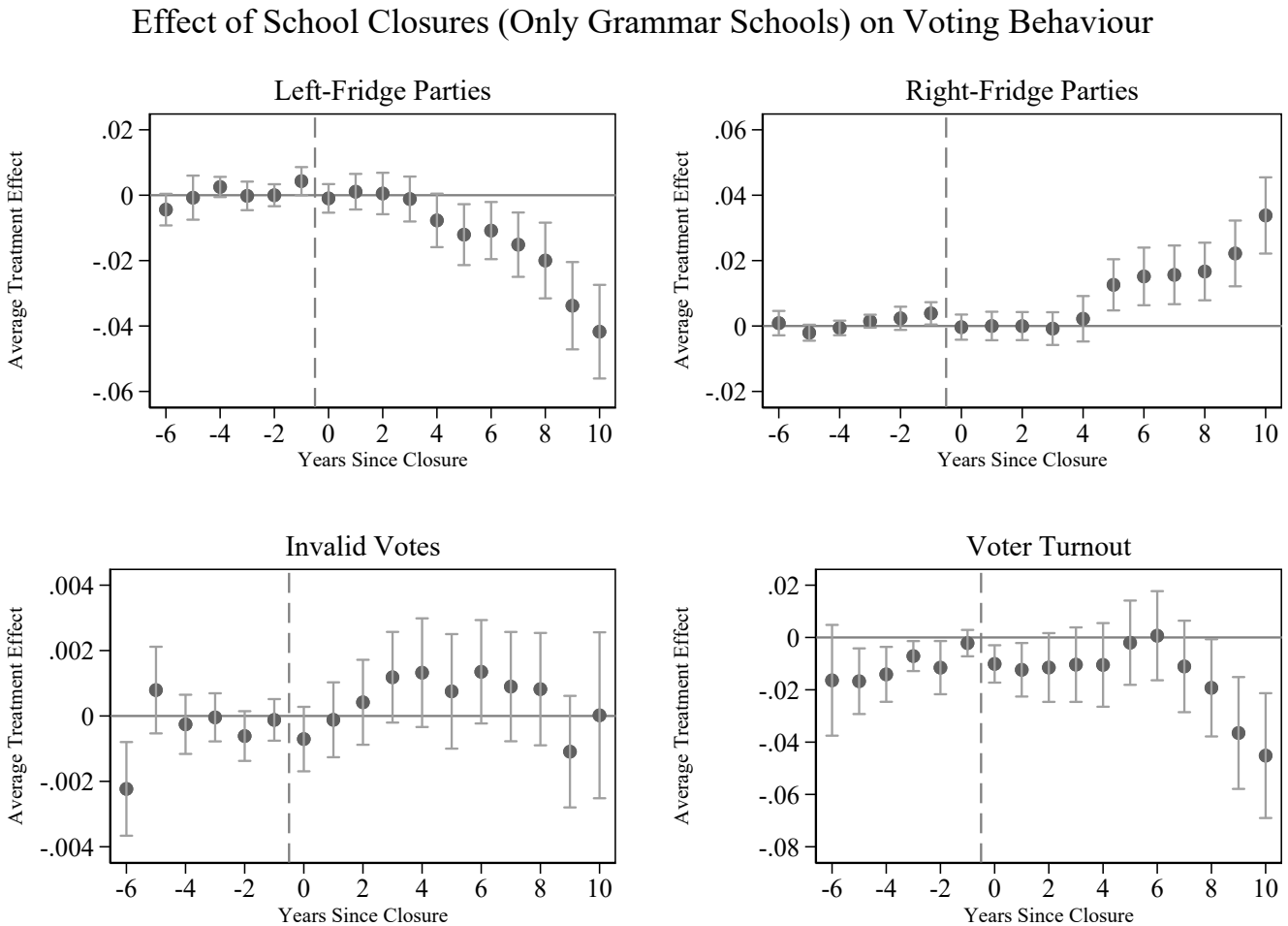
Estimation Results for voting behaviour on federal-level on grammar school closures. The figure depicts weighted point estimates and 95% confidence intervals. Estimations computed without additional control variables. Only not-yet treated sample has been utilized.

Not Yet Treated: Closure on State Election Results - Elementary Schools



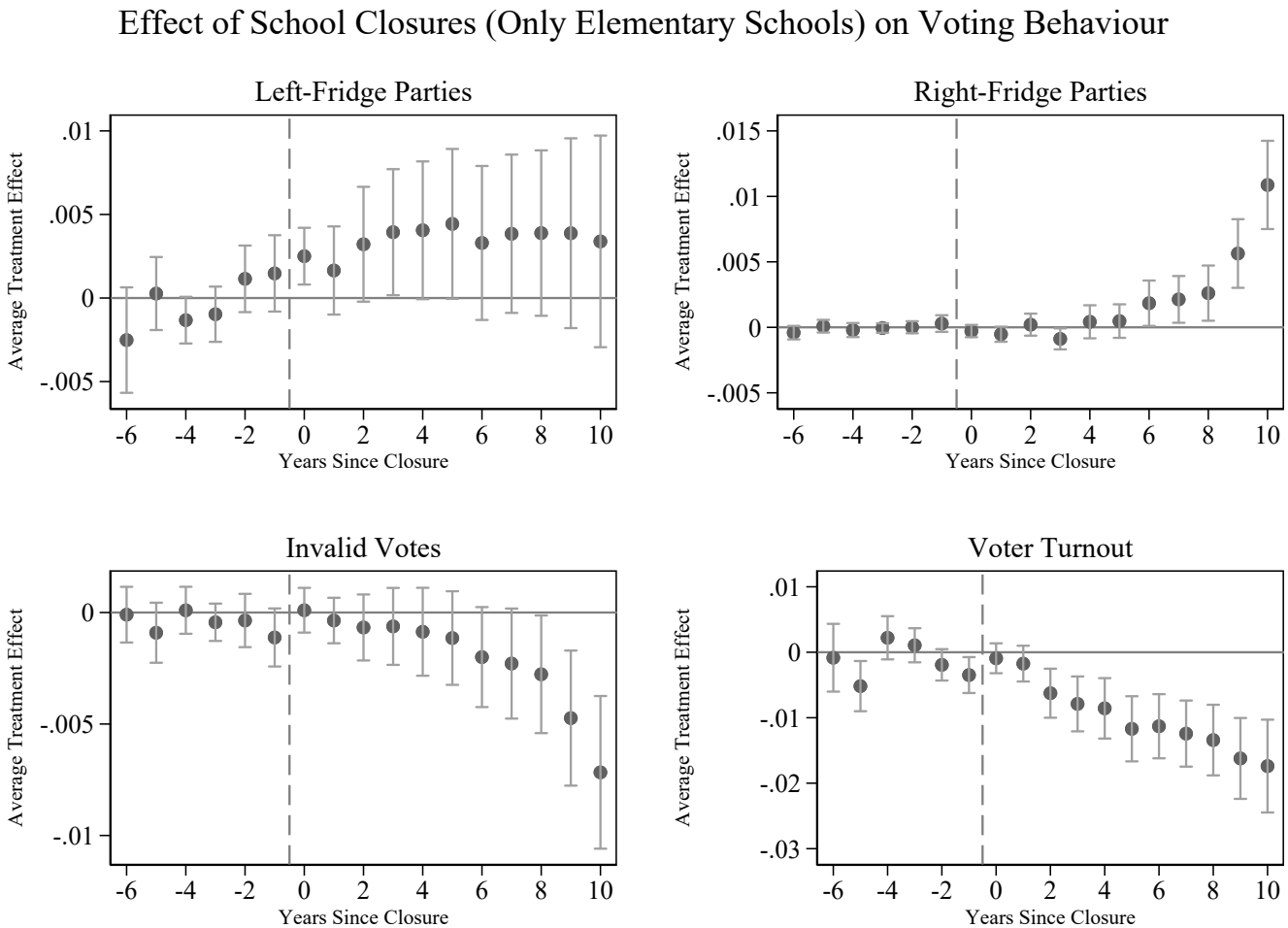
Estimation Results for voting behaviour on state-level on elementary school closures. The figure depicts weighted point estimates and 95% confidence intervals. Estimations computed without additional control variables. Only not-yet treated sample has been utilized.

Not Yet Treated: Closure on State Election Results - Grammar Schools



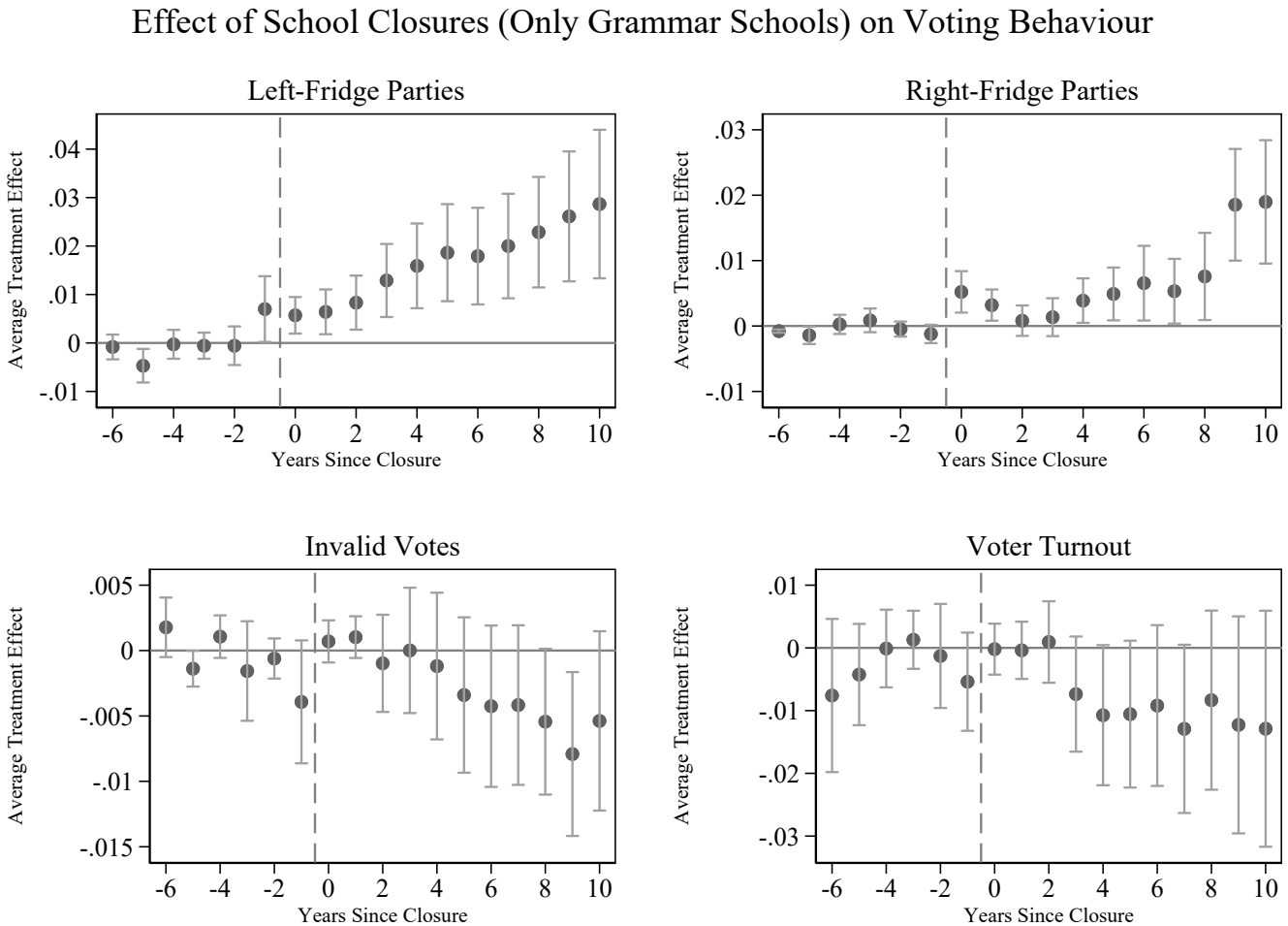
Estimation Results for voting behaviour on state-level on grammar school closures. The figure depicts weighted point estimates and 95% confidence intervals. Estimations computed without additional control variables. Only not-yet treated sample has been utilized.

Not Yet Treated: Closure on Communal Election Results - Elementary Schools



Estimation Results for voting behaviour on communal-level on elementary school closures. The figure depicts weighted point estimates and 95% confidence intervals. Estimations computed without additional control variables. Only not-yet treated sample has been utilized.

Event Study: Closure on Communal Election Results - Grammar Schools



Estimation Results for voting behaviour on communal-level on grammar school closures. The figure depicts weighted point estimates and 95% confidence intervals. Estimations computed without additional control variables. Only not-yet treated sample has been utilized.

Estimations: Elementary School Closures

Last Closure

	(1) TWFE b/se	(2) TWFE b/se	(3) Event-Study b/se	(4) Event-Study b/se	(5) Not Yet b/se	(6) Not Yet b/se	(7) Matched DiD b/se
Federal Election							
Left-fringe Voter Share	0.0046***	0.0052***	0.0072	0.0035	0.0038***	0.0037*	0.0048**
	(0.0015)	(0.0015)	(0.0056)	(0.0058)	(0.0011)	(0.0021)	(0.0022)
Right-fringe Voter Share	0.0085***	0.0033***	0.1127***	0.0660***	0.0086***	0.0117***	0.0125***
	(0.0013)	(0.001)	(0.0063)	(0.0061)	(0.0009)	(0.0027)	(0.0031)
Invalid Votes	0,0001	0,0001	0.0018*	0.0029***	0.0012***	0.0014**	0.0015**
	(0.0002)	(0.0002)	(0.0009)	(0.0009)	(0.0003)	(0.0006)	(0.0007)
Vote Turnout	0,0157***	0,0142***	0.0833***	0.0857***	0.0045**	0.0220***	0.0241***
	(0.0022)	(0.0021)	(0.0062)	(0.0065)	(0.0022)	(0.0026)	(0.0027)
State Election							
Left-fringe Voter Share	-0,0017	-0,002	0.0049	0.0050	-0.0041***	0.0043	0.0054
	(0,0013)	(0,0013)	(0.0089)	(0.0085)	(0.0015)	(0.0041)	(0.0044)
Right-fringe Voter Share	0,0038***	0,0037***	0.0231***	0.0222***	0.0191***	0.0040	0.0051**
	(0,0014)	(0,0013)	(0.0086)	(0.0083)	(0.0014)	(0.0041)	(0.0043)
Invalid Votes	0,0012***	0,0010***	0.0011	0.0006	0.0003	0.0002	0.0004
	(0,0004)	(0,0004)	(0.0017)	(0.0017)	(0.0004)	(0.001)	(0.0011)
Vote Turnout	-0,0134***	-0,0132***	0.0189*	0.0207**	-0.0378***	0.0067	0.0083
	(-0,0038)	(-0,0038)	(0.0105)	(0.0104)	(0.0042)	(0.0078)	(0.0080)
Communal Election							
Left-fringe Voter Share	0,0016	0,0026*	-0.0107*	0.0019	0.0025	0.0050	0.0063
	(0,0014)	(0,0014)	(0.0059)	(0.0060)	(0.0023)	(0.0046)	(0.0048)
Right-fringe Voter Share	0,0014	-0,0012	0.0665***	0.0294***	0.0037***	-0.0021	0.0019
	(0,0012)	(0,0011)	(0.0073)	(0.0072)	(0.0007)	(0.0027)	(0.0029)
Invalid Votes	0,0003	0,0009	-0.0042	0.0093***	-0.0030***	0.0089***	0.0097***
	(0,0008)	(0,0008)	(0.0032)	(0.0034)	(0.0010)	(0.0031)	(0.0033)
Vote Turnout	0,0019	0,001	0.0477***	0.0336***	-0.0108***	0.0042	0.0053
	(0,0021)	(0,0021)	(0.0067)	(0.0068)	(0.0020)	(0.0050)	(0.0052)
Add. Controlls	No	Yes	No	Yes	No	Yes	No
Distinct Obs	10539	10539	10539	10539	1386	1386	2722

Columns refer to different and rows refer to different outcome variables. All standard errors are clustered on the municipality level. *** Sign. at 1 perc. level. ** Sign. at 5 perc level. * Sign. at 10 perc level.

Estimations: Grammar School Closures

Last Closure

	(1) TWFE b/se	(2) TWFE b/se	(3) Event-Study b/se	(4) Event-Study b/se	(5) Not Yet b/se	(6) Not Yet b/se	(7) Matched DiD b/se
Federal Election							
Left-fringe Voter Share	-0,0079***	-0,0072***	-0.0614***	-0.0582***	-0.0136***	-0.0101***	-0.0143***
	(0,0026)	(0,0027)	(0.0181)	(0.0182)	(0.0038)	(0.0038)	(0.0041)
Right-fringe Voter Share	0,0076***	0,0013	0.1125***	0.0616*	0.0094***	0.0004	0.0067*
	(0,0026)	(0,0021)	(0.0312)	(0.0315)	(0.0021)	(0.0043)	(0.0036)
Invalid Votes	0,0009**	0,0008*	0.0068*	0.0072*	-0.0004	0.0035***	0.0022**
	(0,0004)	(0,0004)	(0.0041)	(0.0040)	(0.0011)	(0.0009)	(0.0010)
Vote Turnout	0,0139***	0,0075	0.1071***	0.0955***	0.0086	0.0223***	0.0095*
	(0,00051)	(0,00051)	(0.0158)	(0.0169)	(0.0058)	(0.0063)	(0.0049)
State Election							
Left-fringe Voter Share	-0,0139***	-0,0152***	-0.0929**	-0.0890***	-0.0185***	-0.0343***	-0.0257***
	(0,0034)	(0,0033)	(0.0166)	(0.0158)	(0.0039)	(0.0131)	(0.0069)
Right-fringe Voter Share	-0,0027	-0,0025	0.0215	0.0146	0.0175***	-0,0017	0.0041
	(0,0032)	(0,0031)	(0.0159)	(0.0143)	(0.0026)	(0.0072)	(0.0048)
Invalid Votes	0,0032***	0,0027***	0.0070***	0.0058**	0.0004	0.0011	0.0019*
	(0,0006)	(0,0006)	(0.0023)	(0.0023)	(0.0007)	(0.0017)	(0.0010)
Vote Turnout	-0,0109*	-0,0110*	0.0332*	0.0405**	-0.0204***	-0.0086	-0.0142*
	(0,0062)	(0,0062)	(0.0187)	(0.0185)	(0.0067)	(0.0108)	(0.0075)
Communal Election							
Left-fringe Voter Share	0,0097***	0,0102***	-0.0329*	-0.0214	0.0174***	0.0184	0.0168***
	(0,0036)	(0,0036)	(0.0171)	(0.0170)	(0.0048)	(0.0125)	(0.0054)
Right-fringe Voter Share	0,0036	0,0034	0.1499***	0.1165***	0.0096***	-0.0012	0.0052
	(0,0031)	(0,0025)	(0.0157)	(0.0150)	(0.0020)	(0.0059)	(0.0037)
Invalid Votes	0,0017	0,0004	0.0016	0.0104**	-0.0041*	0.0044	0.0029
	(0,0021)	(0,0019)	(0.0049)	(0.0052)	(0.0024)	(0.0041)	(0.0025)
Vote Turnout	0,0047	0,005	0.1032***	0.0909***	-0.0076	-0.0039	-0.0017
	(0,0048)	(0,0049)	(0.0210)	(0.0213)	(0.0049)	(0.0180)	(0.0061)
Add. Controls	No	Yes	No	Yes	No	Yes	No
Distinct Obs.	10539	10539	10539	10539	255	255	510

Columns refer to different and rows refer to different outcome variables. All standard errors are clustered on the municipality level. *** Sign. at 1% level. ** Sign. at 5% level. * Sign. at 10% level.

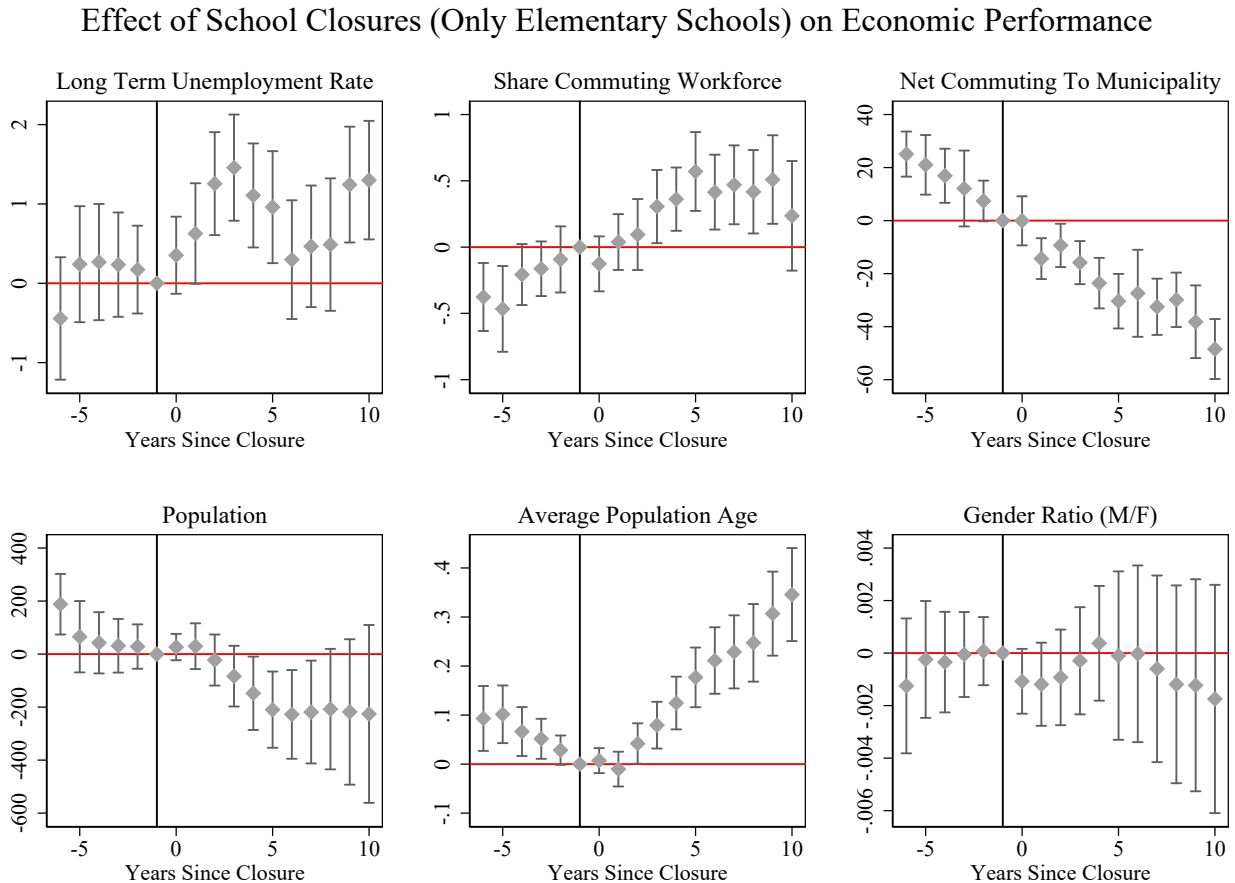
Mechanism

- Changes in voting behaviour (esp. rise in right-fringe voter shares and vote turnout) due to school closures might be caused by two main channels:
  1. Changes in demographics (e.g. Change in overall voters, not voting behaviour)
  2. Perceived cultural deterioration (Political fatigue, "Those Above") due to decreasedcultural and labour market opportunities

- Change in demographics, not voting behaviour?
  - Literature emphasize schools as a regional pull-factor as part of critical infrastructure and driver of housing prices (Freier et al., 2021)
  - Parents of pupils often self-select into areas with good schools, increasing housing demand and therefore affecting prices (Downes and Zabel, 2002)
  - Consequentially, parents might also move away from areas if schools are permanently closed to re-locate to the alternative school, decreasing population and housing price
  - Other individuals with different preferences (e.g. cheap housing vs. close schools) might move into municipality instead

- Perceived cultural deterioration and labour market?
  - Empty/closed schools often a signaling for neglect and cause for a rise in crimes ("Broken Windows Theory") (Wilson and Kelling, 1982)
  - Feeling of neglect and economic disadvantage may lead to a rising voter share of right or left-fringe parties (Ochnser and Roesel, 2020) and more extreme actions in the long term (Preuß, 2020)
  - Election results from extreme parties could act as a deterrent to skilled personnel and prevent skilled migration
  - Additional outmigration of younger families might force firms to re-allocate as well due to a shock in labour market supply, possibly increasing unemployment (Freier et al., 2021)

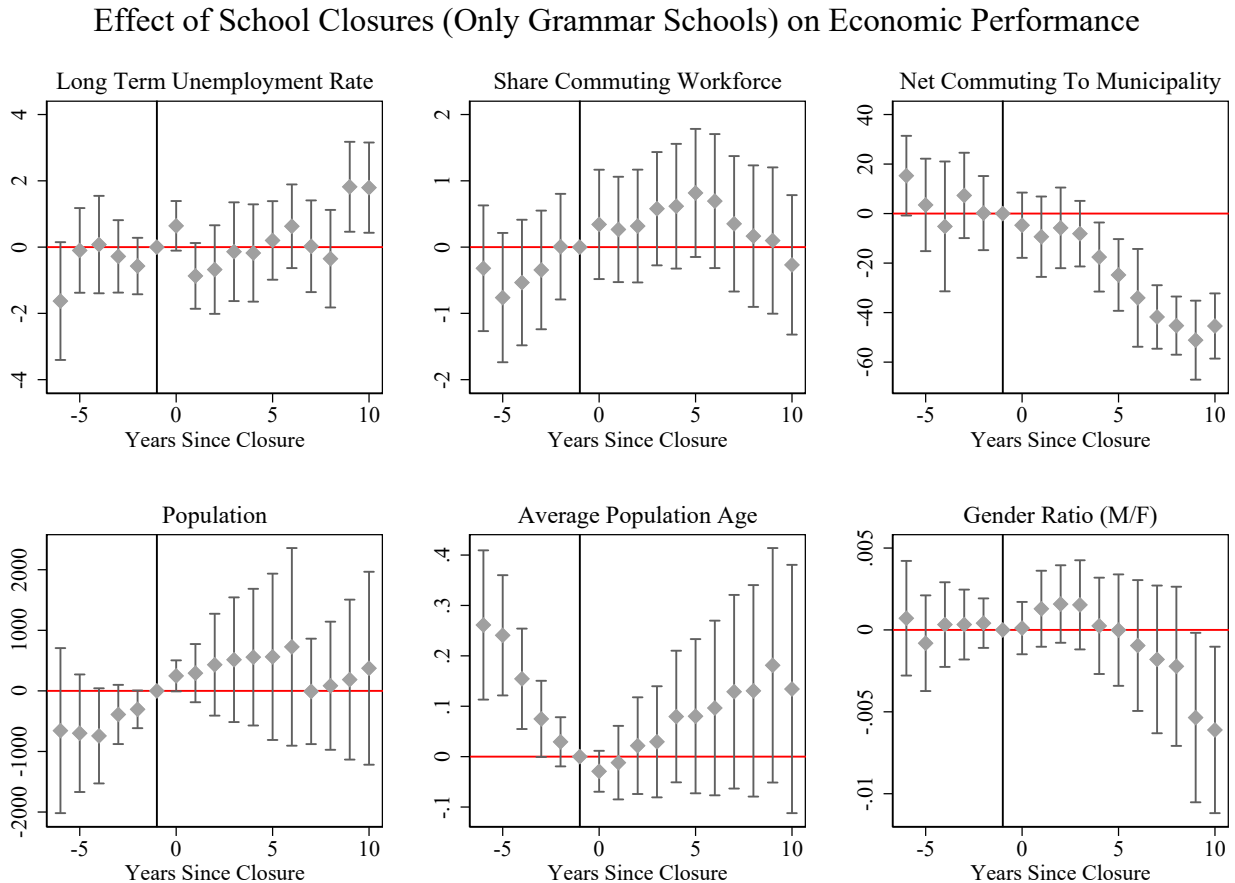
Event Study: Mechanisms, Elementary Schools



Not Yet Elementary School

Estimation results for mechanism on grammar school closures. The figure depicts weighted point estimates and 95% confidence intervals. Estimations computed without additional control variables. Only not-yet treated sample has been utilized.

Event Study: Mechanisms, Grammar Schools



Not Yet Grammar School

Estimation results for mechanism on grammar school closures. The figure depicts weighted point estimates and 95% confidence intervals. Estimations computed without additional control variables. Only not-yet treated sample has been utilized.

Estimations: Elementary School Closures

Last Closure

	(1) TWFE b/se	(2) TWFE b/se	(3) Event-Study b/se	(4) Event-Study b/se	(5) Not Yet b/se	(6) Not Yet b/se	(7) Matched DiD b/se
Long Term Unemployment	1.0588***	1.2213***	2.4351***	4.6422***	1.1152***	0.5717	0.6889**
	(0.2133)	(0.2116)	(0.6247)	(0.6414)	(0.2851)	(0.4567)	(0.3011)
Share Labour Abroad	0.5927***	0.5479***	0.8700**	1.1205***	0.1018	0.2644	0.1875
	(0.1232)	(0.1212)	(0.3395)	(0.3678)	(0.1350)	(0.4815)	(0.1983)
Net Commuter	-36.8402***	-33.1043***	-57.1609***	-29.8600***	-27.1770***	-29.3501***	-28.5000***
	(3.9937)	(3.9402)	(7.2302)	(9.2418)	(3.5472)	(8.7068)	(3.7621)
Population	-180.6751**	-174.1143**	-441.7068	-294.9119	-133.1948	410.9427	-112.6032
	(81.8320)	(81.5312)	(522.5765)	(512.6308)	(100.9889)	(459.2260)	(93.8721)
Average Population Age	0.0607*	0.0962***	0.5907***	0.5377***	0.2393***	-0.1235	0.1754**
	(0.0333)	(0.0221)	(0.0977)	(0.0766)	(0.0328)	(0.0787)	(0.0405)
Gender Ratio	-0.0005	-0.0007	-0.0075**	-0.0093**	-0.0009	0.0006	-0.0012
	(0.0012)	(0.0012)	(0.0035)	(0.0039)	(0.0013)	(0.0027)	(0.0014)
Add. Controlls	No	Yes	No	Yes	No	Yes	No
Distinct	10545	10545	10545	10545	1386	1386	2772

Columns refer to different and rows refer to different outcome variables. All standard errors are clustered on the municipality level. *** Sign. at 1 perc. level. ** Sign. at 5 perc level. * Sign. at 10 perc level.

Estimations: Grammar School Closures

Last Closure

	(1) TWFE b/se	(2) TWFE b/se	(3) Event-Study b/se	(4) Event-Study b/se	(5) Not Yet b/se	(6) Not Yet b/se	(7) Matched DiD b/se
Long Term Unemployment	1,0494***	1,3676***	1.4197	3.5858*	0.2980	0.5717	0.6543*
	(0.2133)	(0.2116)	(2.1445)	(2.1515)	(0.5110)	(0.4567)	(0.3221)
Share Labour Abroad	0,9619***	0,7069***	1.2797	2.2019**	0.1731	0.2644	0.2185
	(0,2652)	(0,2571)	(0.9387)	(0.9028)	(0.4733)	(0.4815)	(0.3087)
Net Commuter	-34,5528***	-20,8852***	-48.0217***	-12.6280	-28.2199***	-29.3501***	-26.9854***
	(3,2304)	(3,4506)	(9.1058)	(11.9793)	(6.8899)	(8.7068)	(4.4432)
Population	1146.64	1117.83	6451.6149	6494.4613	240.0642	410.9427	192.7821
	(918.3938)	(904.7419)	(7014.1936)	(6961.4163)	(462.4111)	(459.2260)	(438.5261)
Average Population Age	0.2139**	0.0984	0.1875	0.7824***	0.1360	0.1235	0.1097
	(0,0965)	(0,0604)	(0.5189)	(0.2770)	(0.0843)	(0.0787)	(0.0672)
Gender Ratio	-0.0022	-0.0035**	-0.0088	-0.0140**	-0.0023	0.0006	-0.0014
	(0,0017)	(0,0017)	(0.0061)	(0.0060)	(0.0017)	(0.0027)	(0.0016)
Add. Controlls	No	Yes	No	Yes	No	Yes	No
Distinct	10545	10545	10545	10545	255	255	510

Columns refer to different estimation methods and rows refer to different outcome variables. All standard errors are clustered on the municipality level. *** Sign. at 1 perc. level. ** Sign. at 5 perc level. * Sign. at 10 perc level.

Conclusion

Conclusions

- Heterogeneous effects of school closures and school type on voting behaviour:
  - Robust increase in right-fringe voter share by 0.86 (0.03) - 1.17 (2.31) % for federal elections (state elections)
  - Robust decrease in left-fringe voter share by 0.79 (1.39) - 5.82 (1.85) % for federal elections (state elections)
  - Right (left) -fringe results are mainly driven by elementary (grammar) school closures
- Investigations about mechanisms show a decreasing rate of in-commuting, while population does not change but long term unemployment and population age rise, suggesting both, a change in demographics as well as a change in labour market opportunities

Thank You For Your Attention

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- Several challenges within federal states school system led to an increasing pressure for school reforms e.g.:
  - Decreasing positions in international educational rankings (e.g. PISA)
  - Education often linked to social/parental background
  - Demographic changes and emigration in rural areas
  - Rising cost and complexity for municipalities to maintain schools as infrastructures

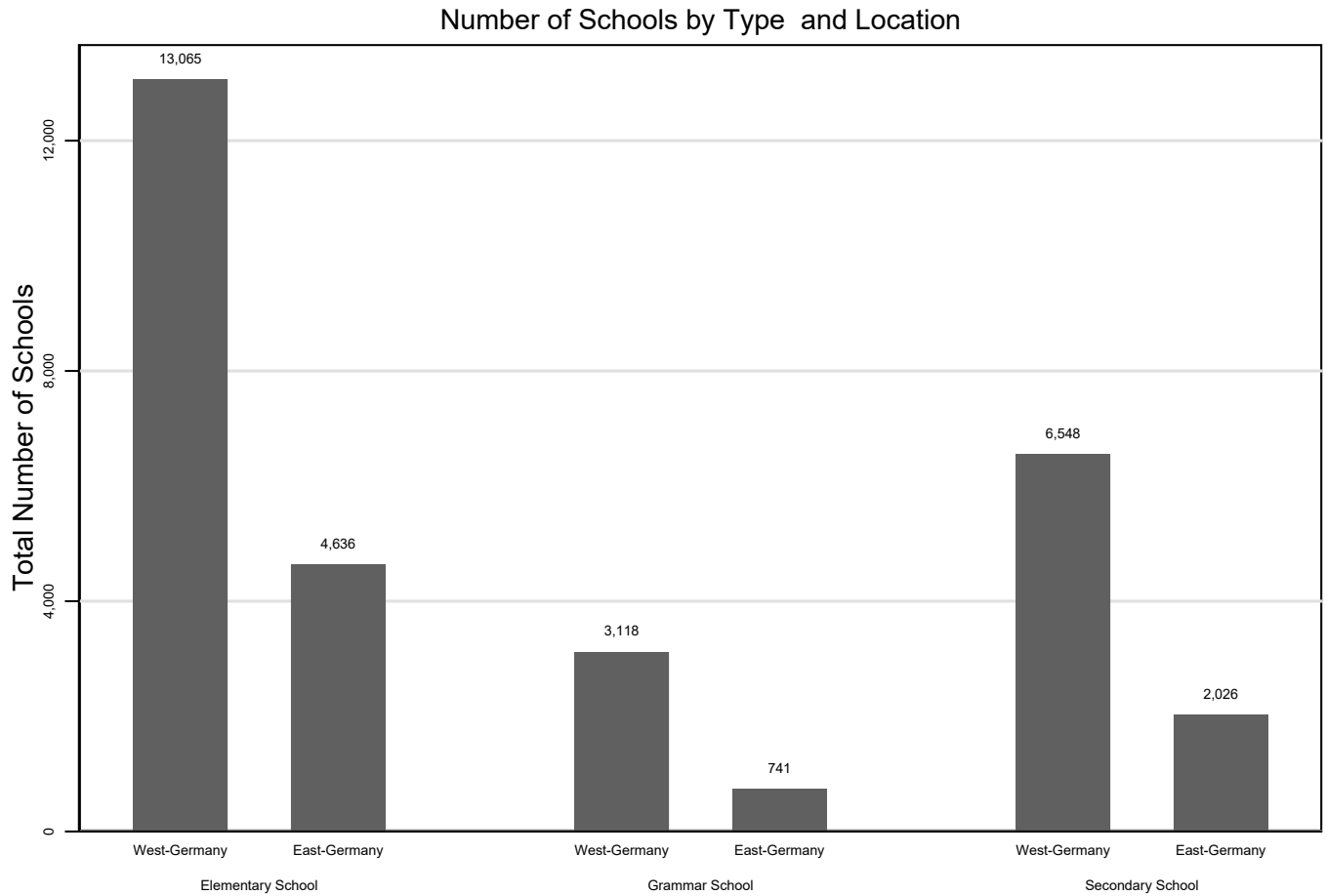
- To tackle aforementioned challenges, several federal states in Germany introduced structural schooling reforms with the intention to merge smaller, less efficient (Student-To-Teacher-Ratio) and dilapidated schools into centralized schools with several (or combined) educational paths
- In this process, existing schools were often dissolved and integrated into existing/newly founded schools
- Reforms were introduced top-down by the respective federal states and therefore led to unexpected school closures outside the control of the municipalities
- This paper analyses the effect of such school closures observed after such structural school reform on voting behaviour

Overview Structural School Reforms

State	Year	Reform Outcome
Schleswig-Holstein	2007	Gemeinschaftsschule Regionalschule
Lower Saxony	2011	Oberschule
North Rhine-Westphalia	2010	Gemeinschaftsschule
Hesse	2010	Mittelstufenschule
Rhineland-Palatinate	2008	Gemeinschaftsschule Realschule+
Baden-Württemberg	2010	Gemeinschaftsschule
Saarland	2012	Gemeinschaftsschule
Brandenburg	2004	Oberschule
Mecklenburg-Western Pomerania	2004	Regionale Schule
Saxony	2009	Oberschule
Saxony-Anhalt	2012	Gemeinschaftsschule
Thuringia	2010	Gemeinschaftsschule

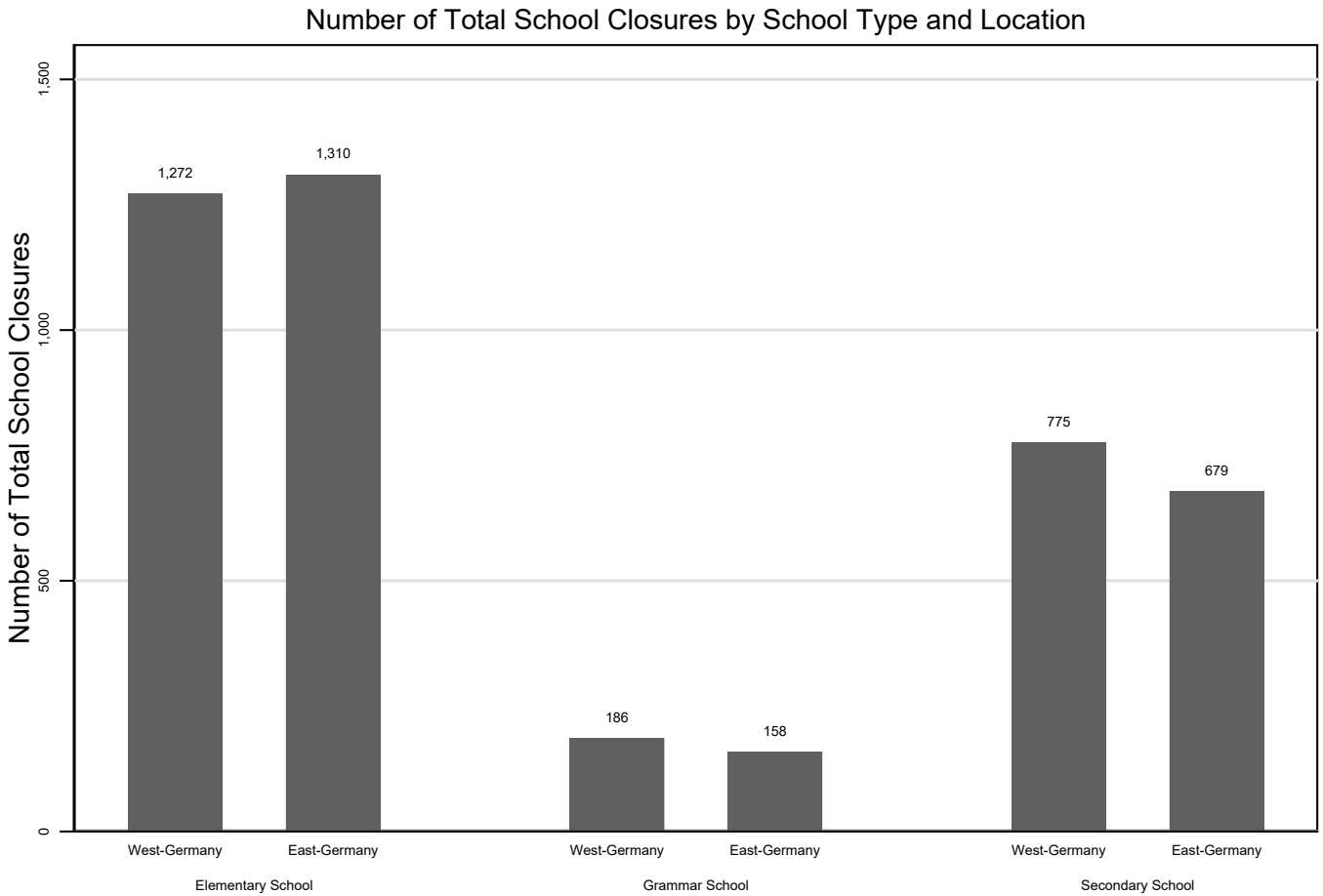
Left- fringe Parties	DKP, KPD, MLPD, RSB, DS, APD, PDS, DIELINKE, PSG, DL
Right- fringe Parties	AfD,NPD, NOF, NL, BFB, DVU, ProDM, MDP, DIERECHTE, FDVP, BGD, ODAD, IPD, DP, DK, DEUTSCHLAND

Table: Overview Left- Right- Classification.



Note: Total Number of Schools in Germany between 2000 and 2019. Differentiated between Types of Schools and between East- and West-Germany.Secondary Schools are combined Type for Hauptschule and Realschule. Berlin is considered West-Germany. Data has been provided by all State Ministries of Education from all German States.

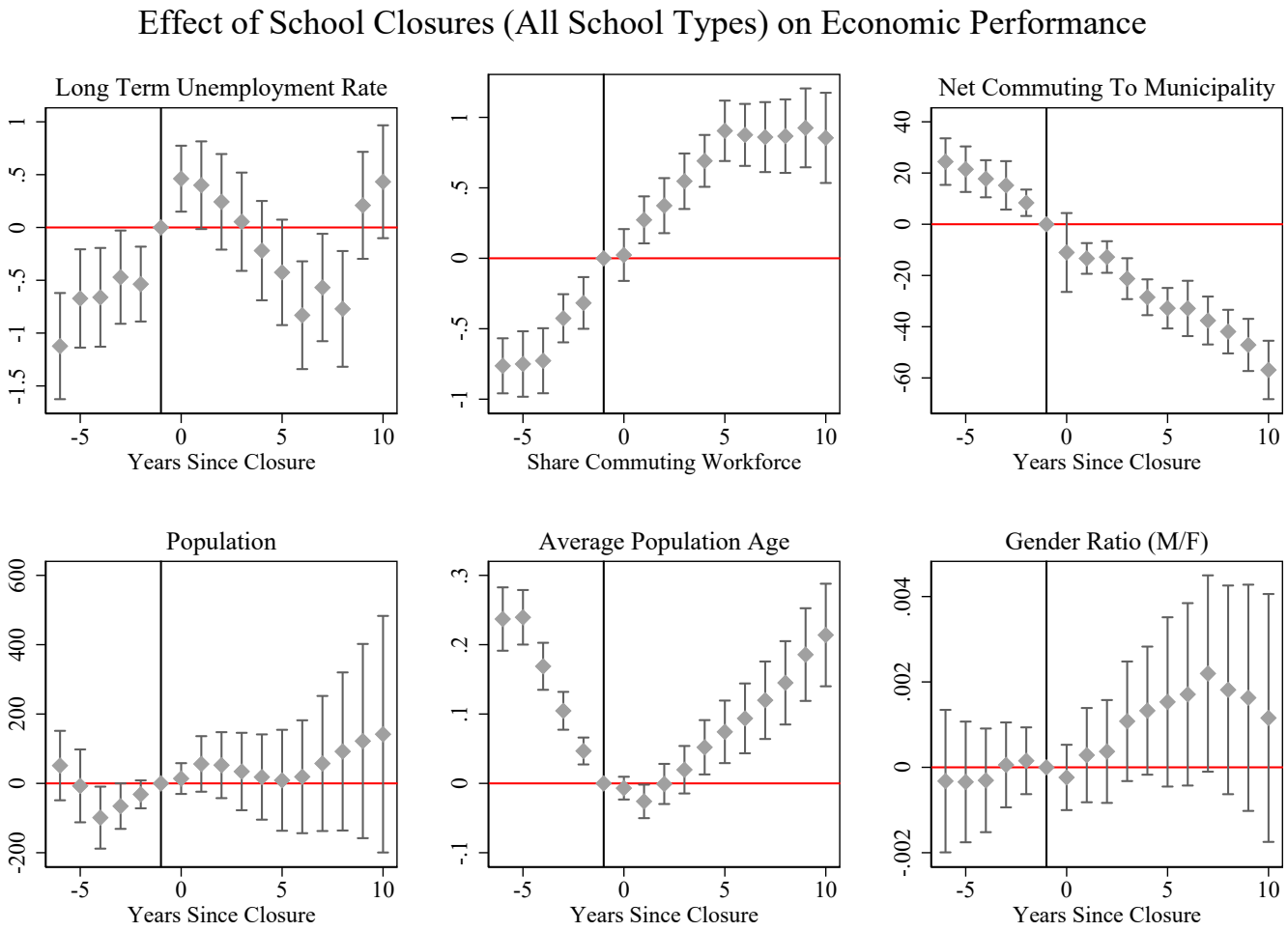
Back



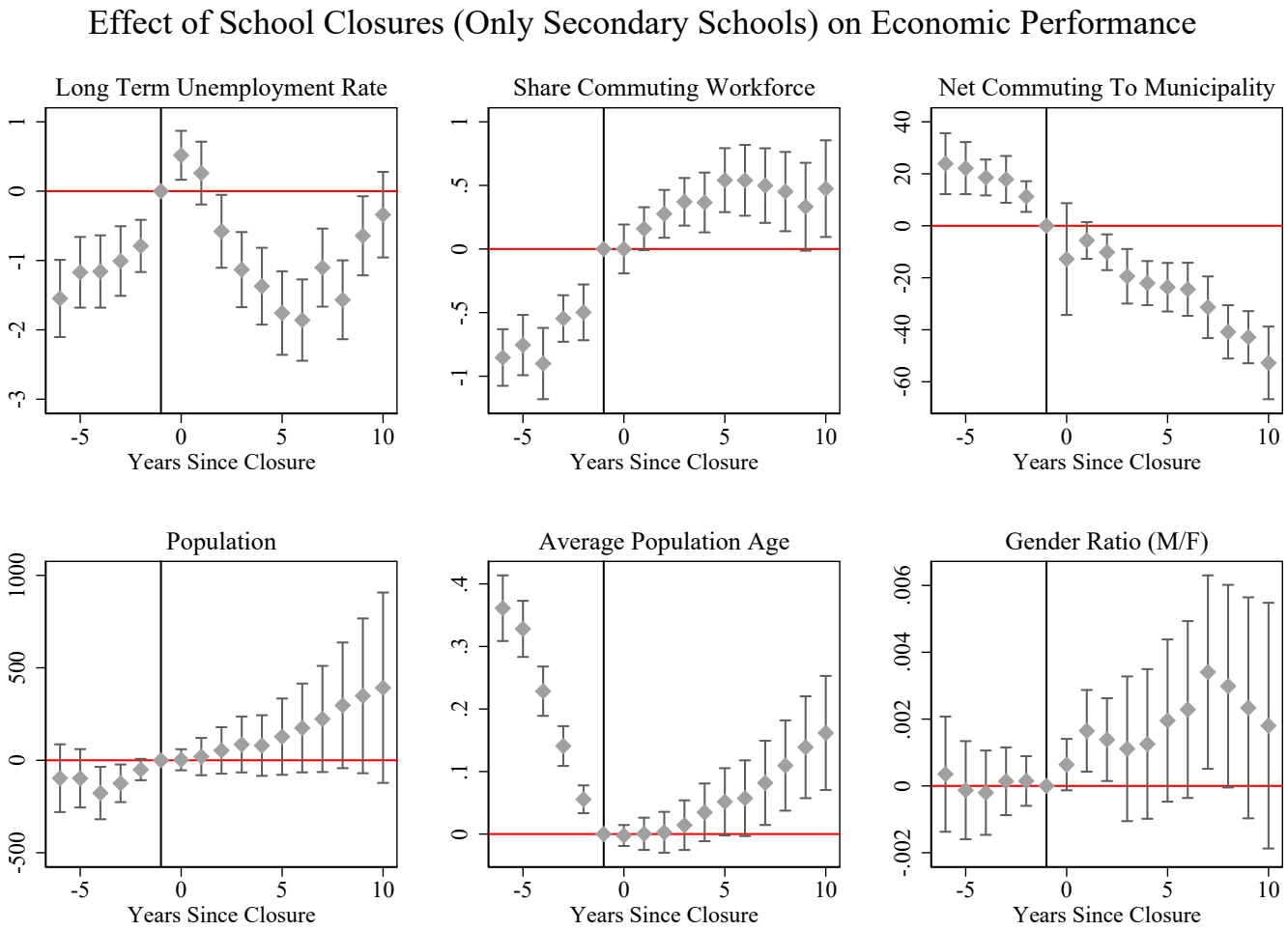
Note: Total Number of School Closures in Germany between 2000 and 2019. Differentiated between Types of Schools. Secondary Schools are combined Type for Hauptschule and Realschule. Data has been provided by all State Ministries of Education from all German States. School Closures are defined as permanent closures or consolidations that render one building completely empty.

Back

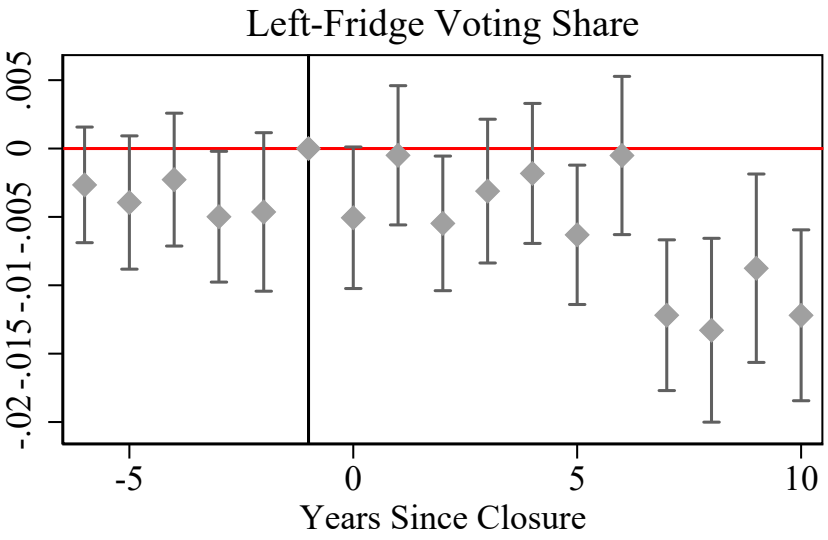
School Closure on Mechanism: All Schools

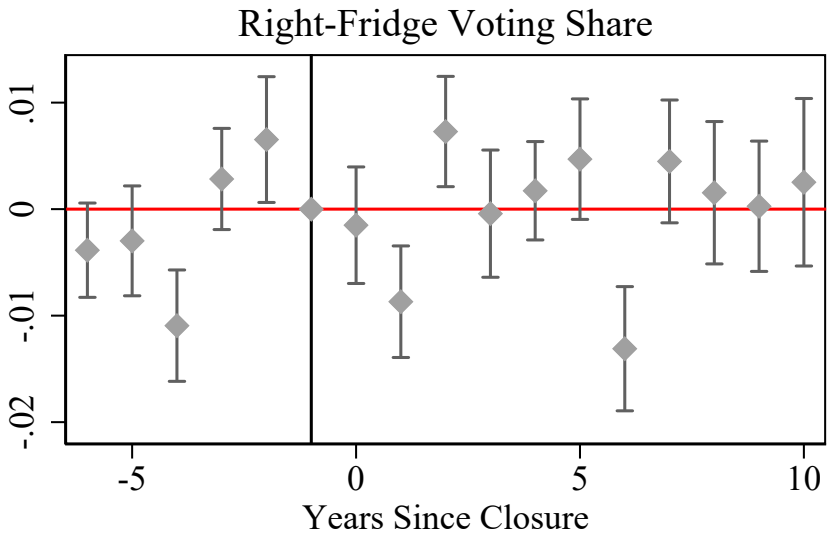


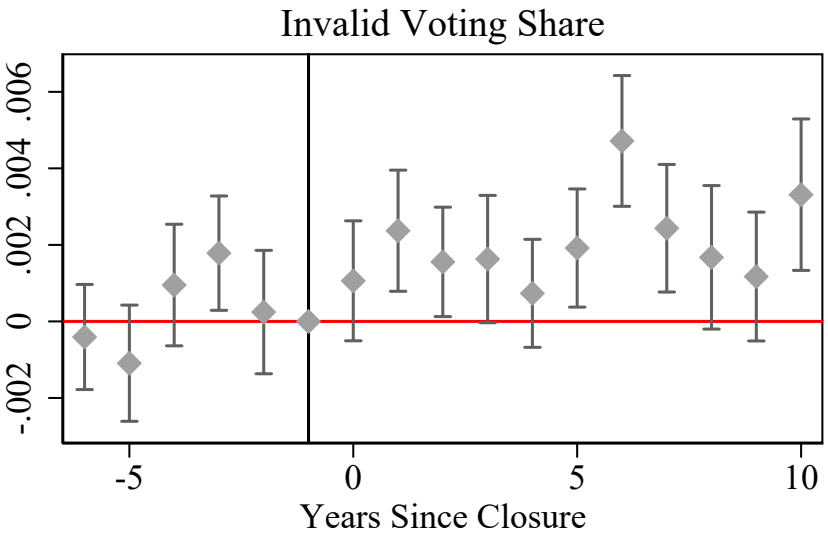
School Closure on Mechanism: Secondary Schools

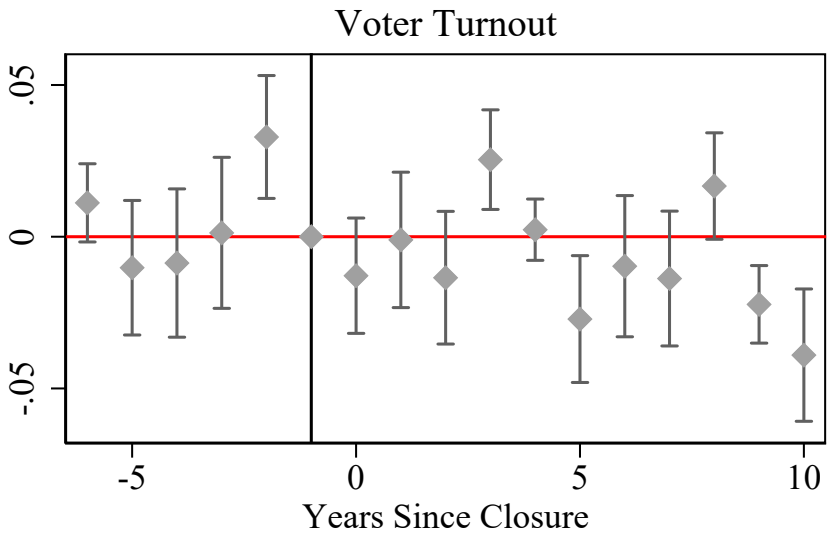


Effect of School Closures (All School Types) on Voting Behaviour

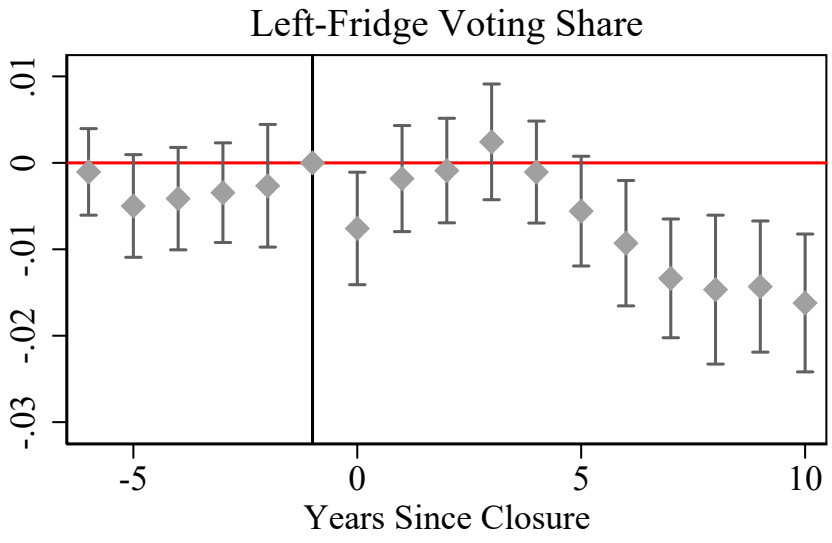


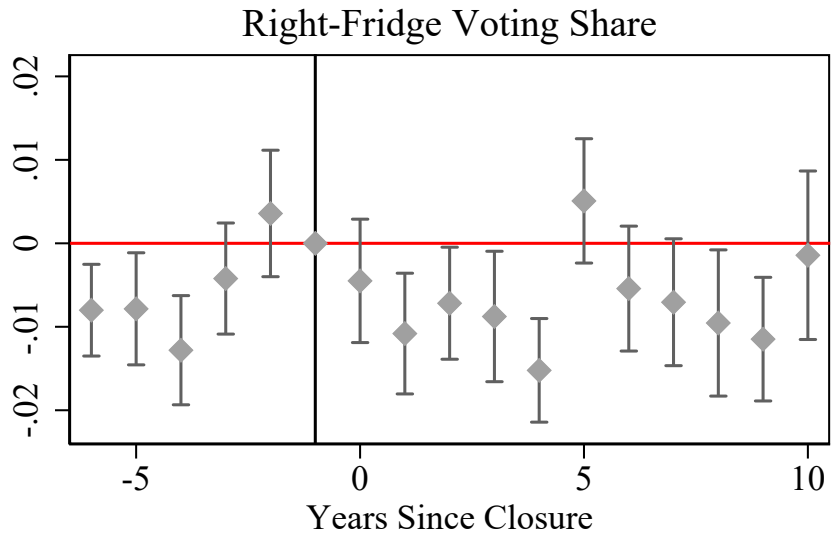


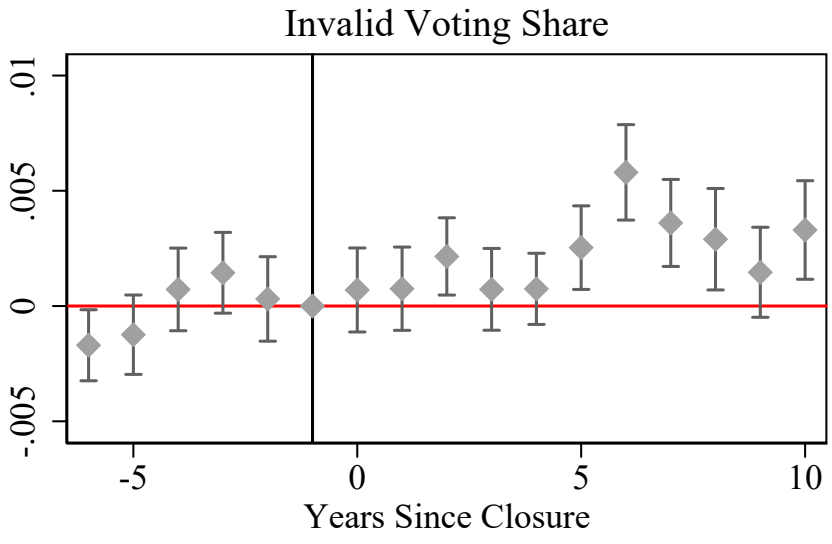


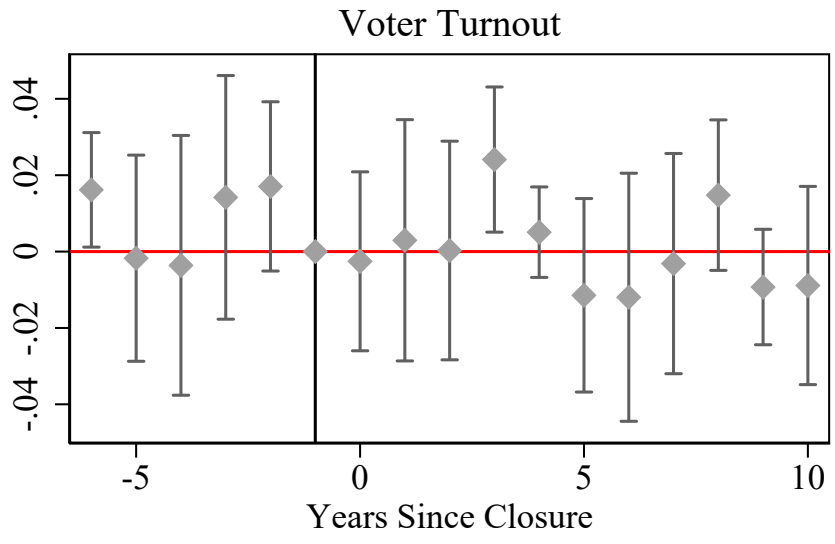


Effect of School Closures (Only Secondary Schools) on Voting Behaviour

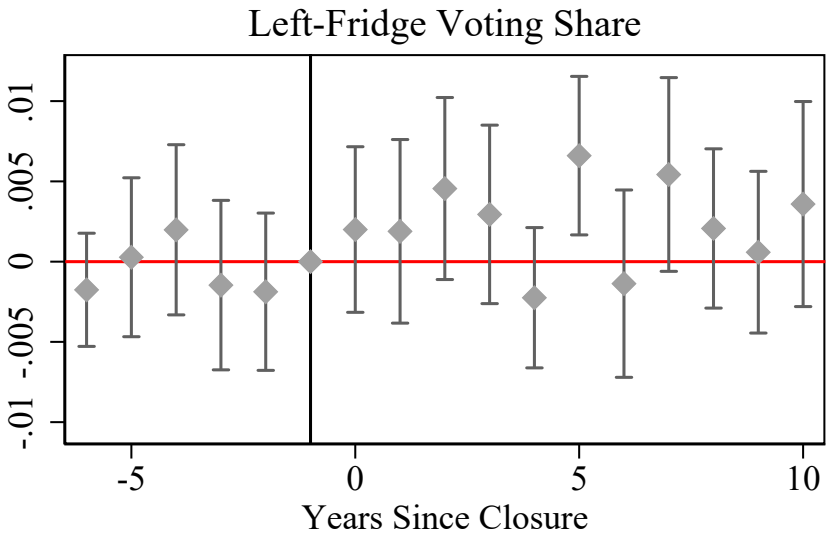


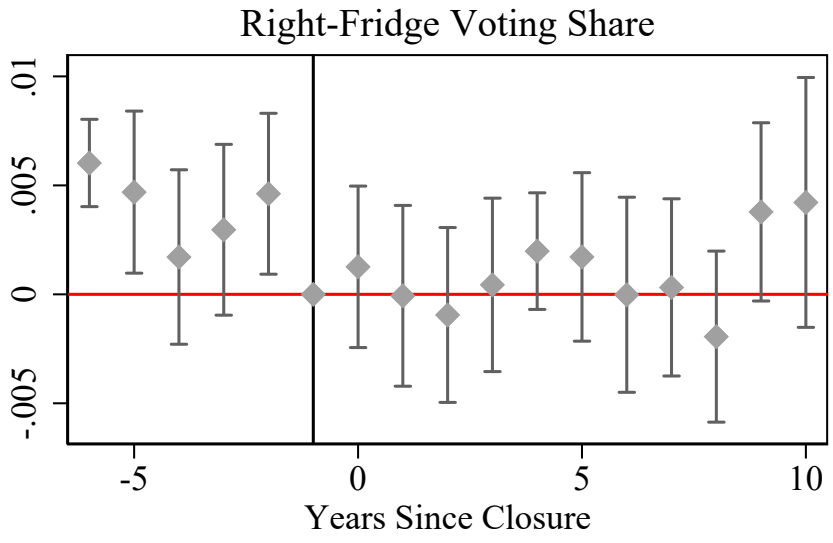


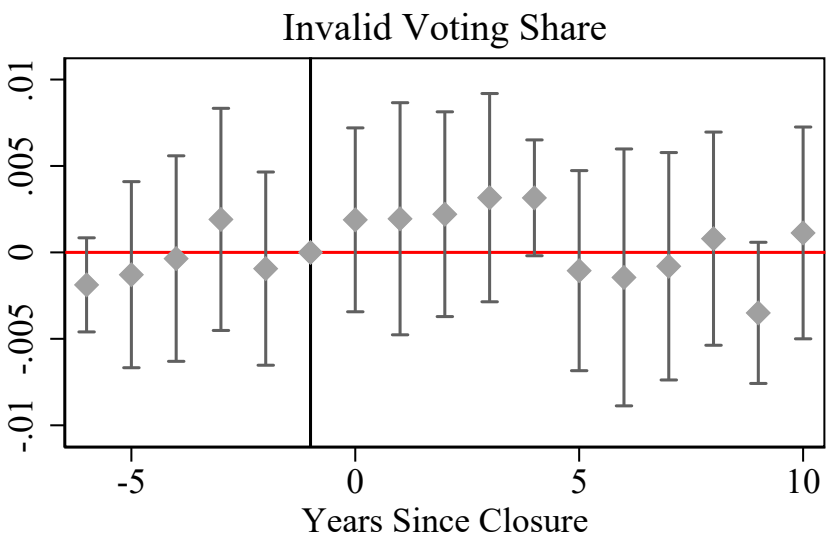


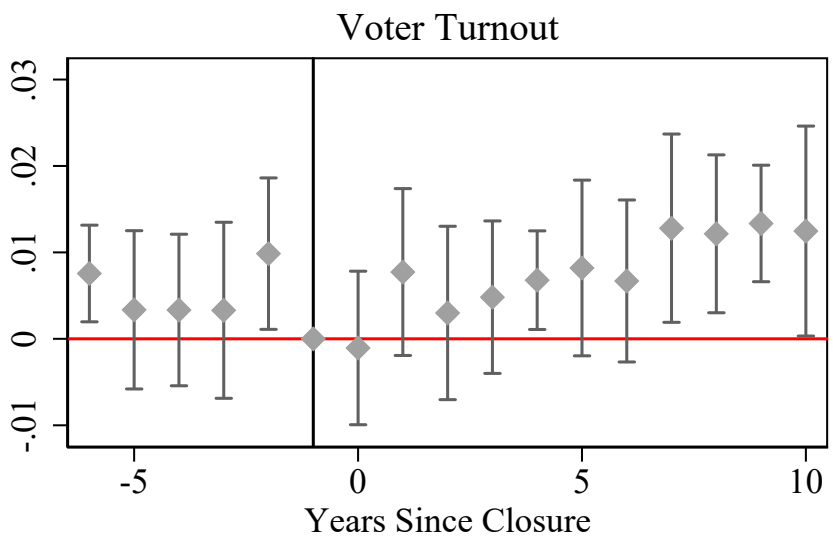


Effect of School Closures (All School Types) on Voting Behaviour

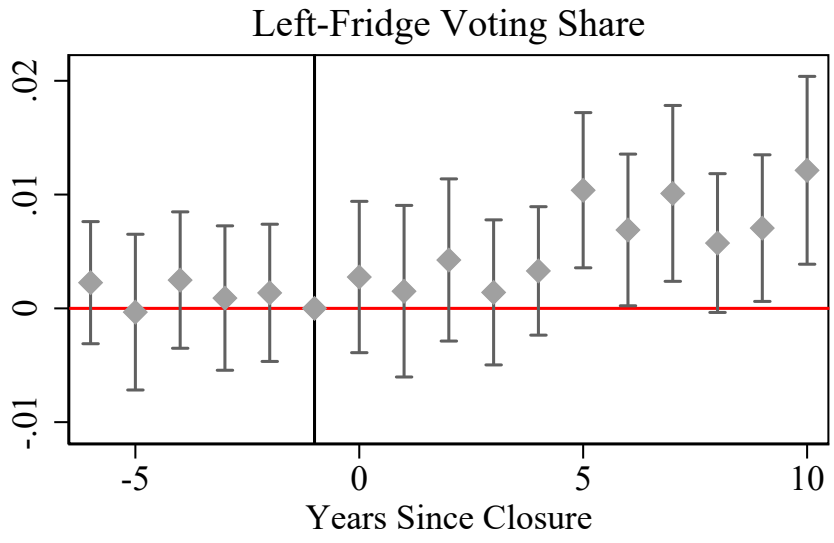


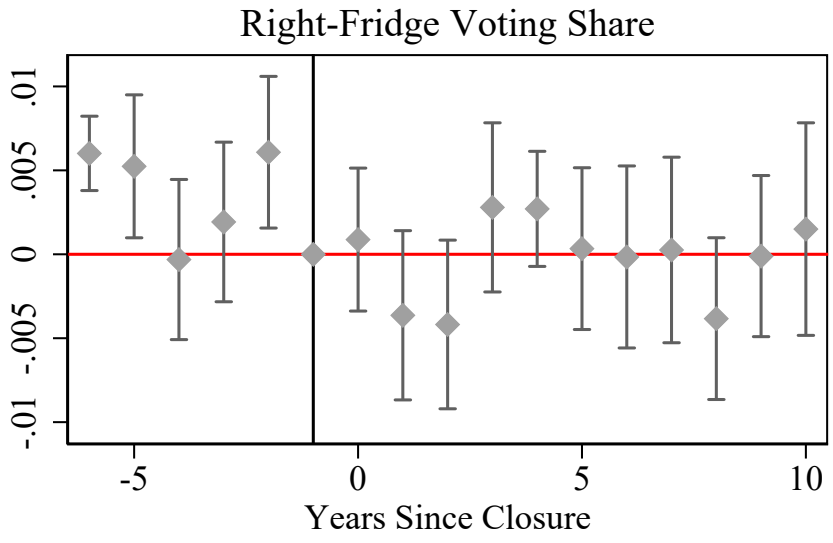


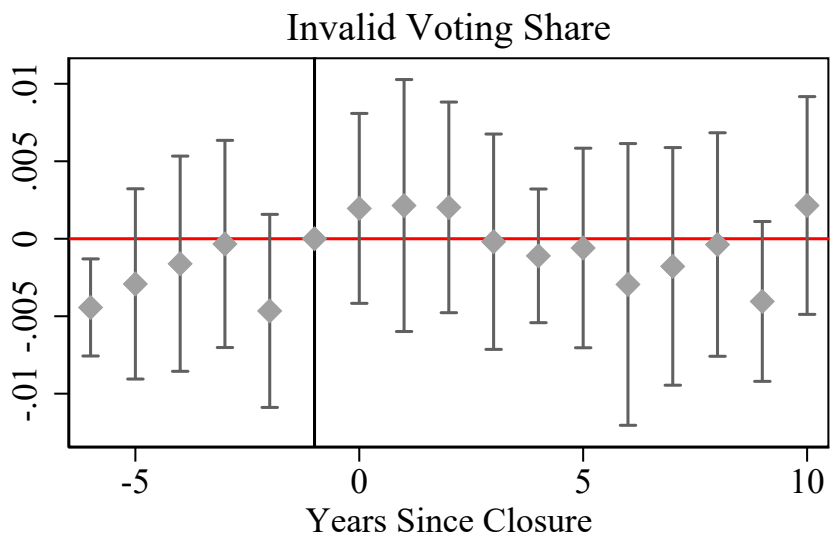


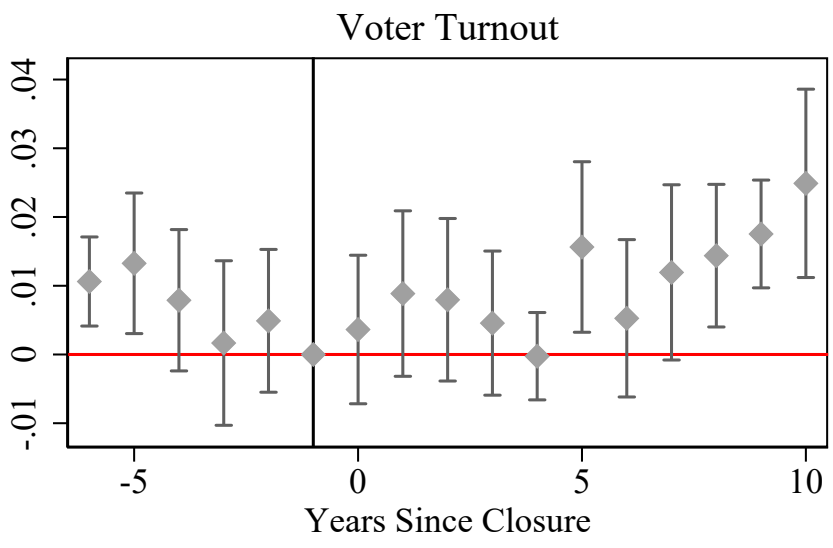


Effect of School Closures (Only Secondary Schools) on Voting Behaviour

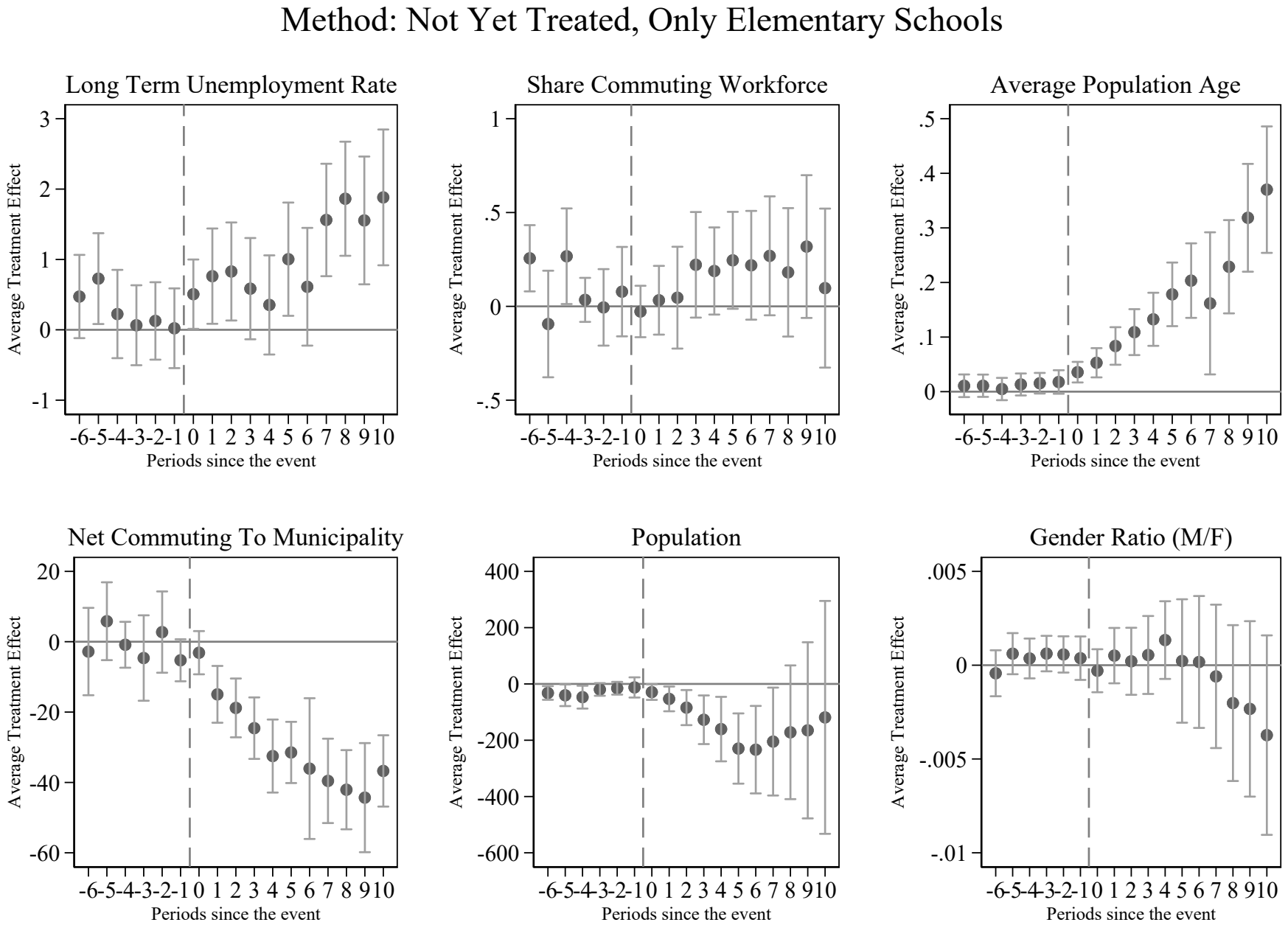






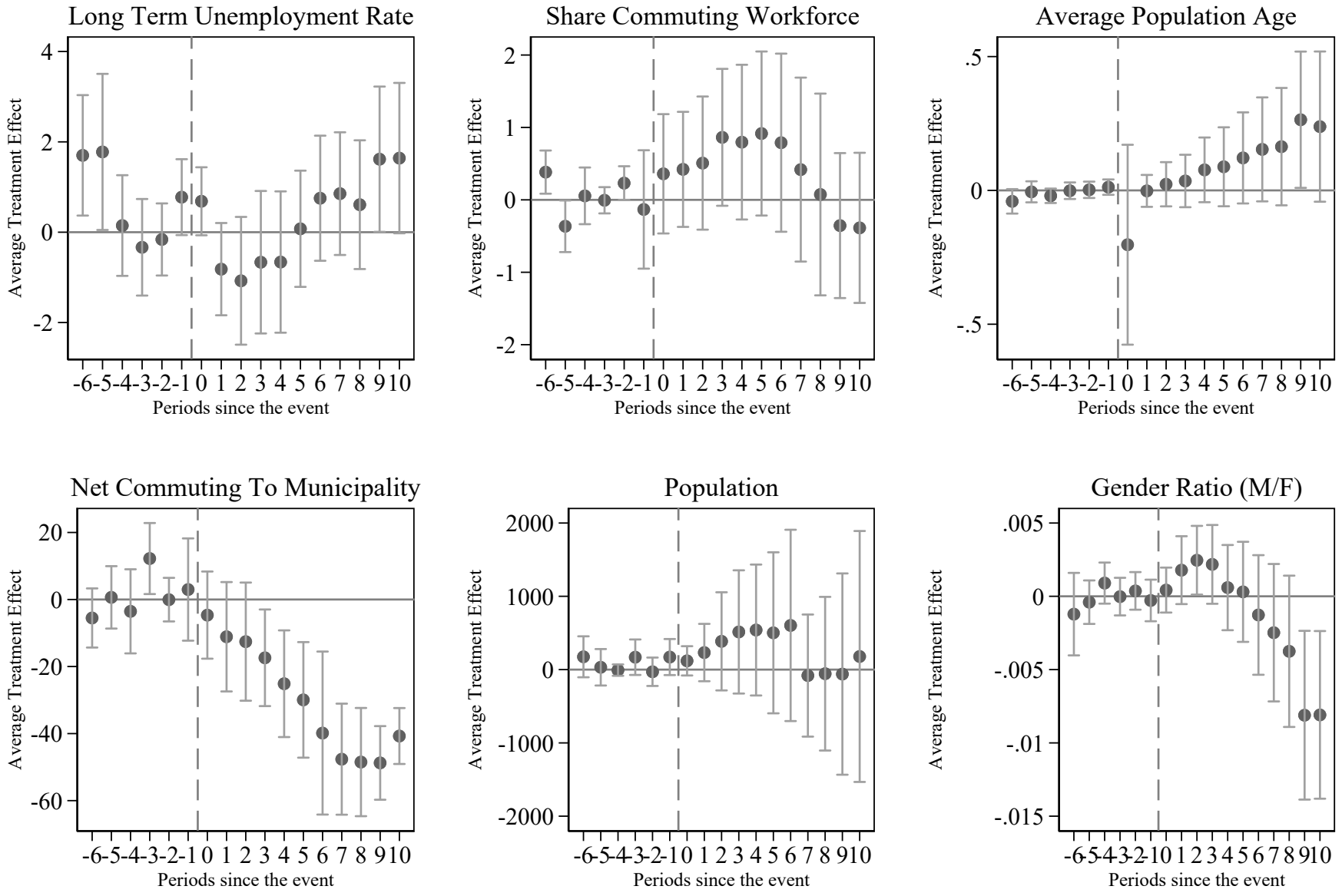


Not Yet Treated: Mechanisms, Elementary Schools



Not Yet Treated: Mechanisms, Grammar Schools

Method: Not Yet Treated, Only Grammar Schools



	(1) Closure Elem. School b/se/p	(2) Closure Grammar School b/se/p
Number of Terretorial Changes Over Time	-0.001	-0.003*
	(0.002)	(0.001)
	0.748	0.049
No Unemployed Per 1000 inhabitants	-0.008***	-0.003***
	(0.001)	(0.001)
	0.000	0.000
Total Death or Birth. Birth - Death.	-0.000	0.000
	(0.000)	(0.000)
	0.188	0.878
Population Aged 55-75	-0.002***	-0.002***
	(0.000)	(0.000)
	0.000	0.000
F_Test	18.358	19.664
P-Value	0.000	0.000
Municipal.	193165	193165

Estimations: Elementary School Closures - Last School Closes

BACK

	(1) TWFE b/se	(2) TWFE b/se	(3) Event-Study b/se	(4) Event-Study b/se	(5) Not Yet b/se	(6) Not Yet b/se	(7) Matched DiD b/se
Federal Election							
Left-fringe Voter Share	0.0048***	0.0054***	-0.0074	-0.0034	-0.0039***	0.0038*	0.0048**
	(0.0015)	(0.0015)	(0.0057)	(0.0057)	(0.0011)	(0.0021)	(0.0022)
Right-fringe Voter Share	0.0087***	0.0034***	0.1150***	0.0679***	0.0088***	0.0120***	0.0125***
	(0.0013)	(0.0010)	(0.0063)	(0.0062)	(0.0009)	(0.0027)	(0.0031)
Invalid Votes	-0.0001	-0.0001	0.0019*	0.0030***	-0.0013***	0.0015**	0.0015**
	(0.0002)	(0.0002)	(0.0009)	(0.0009)	(0.0003)	(0.0006)	(0.0007)
Vote Turnout	0.0161***	0.0145***	0.0855***	0.0881***	0.0044**	0.0225***	0.0241***
	(0.0022)	(0.0021)	(0.0063)	(0.0065)	(0.0022)	(0.0026)	(0.0027)
State Election							
Left-fringe Voter Share	-0.0018	-0.0019	0.0050	0.0048	-0.0043***	0.0044	0.0054
	(0.0013)	(0.0013)	(0.0088)	(0.0086)	(0.0015)	(0.0041)	(0.0044)
Right-fringe Voter Share	0.0039***	0.0038***	0.0238***	0.0228***	0.0195***	0.0039	0.0052**
	(0.0014)	(0.0013)	(0.0086)	(0.0084)	(0.0014)	(0.0041)	(0.0043)
Invalid Votes	0.0013***	0.0010***	0.0010	0.0006	0.0003	0.0002	0.0004
	(0.0004)	(0.0004)	(0.0017)	(0.0017)	(0.0004)	(0.0010)	(0.0011)
Vote Turnout	-0.0137***	-0.0135***	0.0192*	0.0204**	-0.0389***	0.0065	0.0083
	(0.0038)	(0.0038)	(0.0106)	(0.0103)	(0.0042)	(0.0078)	(0.0080)
Communal Election							
Left-fringe Voter Share	0.0015	0.0027*	-0.0110*	0.0018	0.0026	0.0051	0.0063
	(0.0014)	(0.0014)	(0.0060)	(0.0061)	(0.0023)	(0.0046)	(0.0048)
Right-fringe Voter Share	0.0015	-0.0012	0.0682***	0.0303***	0.0038***	-0.0022	0.0019
	(0.0012)	(0.0011)	(0.0074)	(0.0072)	(0.0007)	(0.0027)	(0.0029)
Invalid Votes	0.0003	0.0009	-0.0043	0.0095***	-0.0031***	0.0090***	0.0097***
	(0.0008)	(0.0008)	(0.0032)	(0.0034)	(0.0010)	(0.0031)	(0.0033)
Vote Turnout	0.0019	0.0011	0.0489***	0.0343***	-0.0110***	0.0043	0.0053
	(0.0021)	(0.0021)	(0.0067)	(0.0068)	(0.0020)	(0.0050)	(0.0052)
Add. Controlls	No	Yes	No	Yes	No	Yes	No
Distinct Obs	10539	10539	10539	10539	1386	1386	2772

Columns refer to different and rows refer to different outcome variables. All standard errors are clustered on the municipality level. *** Sign. at 1 perc. level. ** Sign. at 5 perc level. * Sign. at 10 perc level.

Estimations: Grammar School Closures - Last School Closes

BACK

	(1) TWFE b/se	(2) TWFE b/se	(3) Event-Study b/se	(4) Event-Study b/se	(5) Not Yet b/se	(6) Not Yet b/se	(7) Matched DiD b/se
Federal Election							
Left-fringe Voter Share	-0,0081***	-0,0074***	-0.0629***	-0.0598***	-0.0139***	-0.0103***	-0.0146***
	(0,0027)	(0,0028)	(0.0185)	(0.0186)	(0.0039)	(0.0039)	(0.0042)
Right-fringe Voter Share	0,0078***	-0,0012	0.1138***	0.0601*	0.0096***	0.0004	0.0065*
	(0,0027)	(0,0022)	(0.0319)	(0.0321)	(0.0022)	(0.0044)	(0.0036)
Invalid Votes	0,0009**	0,0008*	0.0066*	0.0074*	-0.0004	0.0036***	0.0023**
	(0,0004)	(0,0004)	(0.0041)	(0.0041)	(0.0011)	(0.0009)	(0.0010)
Vote Turnout	0,0142***	0,0074	0.1085***	0.0968***	-0.0037	0.0229***	0.0097*
	(0,00052)	(0,00052)	(0.0161)	(0.0170)	(0.0059)	(0.0064)	(0.0049)
State Election							
Left-fringe Voter Share	-0,0141***	-0,0155***	-0.0952**	-0.0914***	-0.0189***	-0.0348***	-0.0263***
	(0,0035)	(0,0034)	(0.0170)	(0.0162)	(0.0040)	(0.0134)	(0.0070)
Right-fringe Voter Share	-0,0028	-0,0026	0.0219	0.0143	0.0179***	-0,0016	0.0042
	(0,0033)	(0,0032)	(0.0162)	(0.0145)	(0.0027)	(0.0073)	(0.0048)
Invalid Votes	0,0033***	0,0028***	0.0069***	0.0056**	0.0004	0.0011	0.0019*
	(0,0006)	(0,0006)	(0.0024)	(0.0024)	(0.0007)	(0.0018)	(0.0010)
Vote Turnout	-0,0111*	-0,0112*	0.0341*	0.0413**	-0.0208***	-0.0087	-0.0144*
	(0,0063)	(0,0063)	(0.0190)	(0.0189)	(0.0068)	(0.0109)	(0.0076)
Communal Election							
Left-fringe Voter Share	0,0099***	0,0105***	-0.0338*	-0.0210	0.0177***	0.0181	0.0171***
	(0,0037)	(0,0037)	(0.0175)	(0.0173)	(0.0049)	(0.0127)	(0.0055)
Right-fringe Voter Share	0,0035	0,0033	0.1521***	0.1179***	0.0098***	-0.0013	0.0053
	(0,0032)	(0,0026)	(0.0160)	(0.0153)	(0.0020)	(0.0060)	(0.0038)
Invalid Votes	0,0016	0,0004	0.0015	0.0106**	-0.0042*	0.0043	0.0029
	(0,0022)	(0,0020)	(0.0050)	(0.0053)	(0.0025)	(0.0042)	(0.0026)
Vote Turnout	0,0048	0,0051	0.1046***	0.0923***	-0.0077	-0.0040	-0.0018
	(0,0049)	(0,0050)	(0.0214)	(0.0216)	(0.0050)	(0.0182)	(0.0062)
Add. Controls	No	Yes	No	Yes	No	Yes	Yes
Distinct Obs.	10539	10539	10539	10539	255	255	510

Columns refer to different and rows refer to different outcome variables. All standard errors are clustered on the municipality level. *** Sign. at 1% level. ** Sign. at 5% level. * Sign. at 10% level.

Estimations: Elementary School Closures - Only School Closes

BACK

	(1) TWFE b/se	(2) TWFE b/se	(3) Event-Study b/se	(4) Event-Study b/se	(5) Not Yet b/se	(6) Not Yet b/se	(7) Matched DiD b/se
Long Term Unemployment	1.0886***	1.2543***	2.4848***	4.7391***	1.1421***	0.5824	0.6723**
	(0.2133)	(0.2116)	(0.6247)	(0.6414)	(0.2851)	(0.4567)	(0.3011)
Share Labour Abroad	0.6087***	0.5598***	-0.8914**	-1.1480***	0.0996	0.2705	0.1923
	(0.1232)	(0.1212)	(0.3395)	(0.3678)	(0.1350)	(0.4815)	(0.1983)
Net Commuter	-37.7755***	-34.0344***	-58.7553***	-30.4151***	-27.8922***	-30.0891***	-28.9245***
	(3.9937)	(3.9402)	(7.2302)	(9.2418)	(3.5472)	(8.7068)	(3.7621)
Population	-184.0533**	-172.0486**	-454.2759	-286.1841	-129.7521	416.0218	-110.9735
	(81.8320)	(81.5312)	(522.5765)	(512.6308)	(100.9889)	(459.2260)	(93.8721)
Average Population Age	0.0624*	0.0991***	0.6048***	0.5502***	0.2451***	-0.1212	0.1782**
	(0.0333)	(0.0221)	(0.0977)	(0.0766)	(0.0328)	(0.0787)	(0.0405)
Gender Ratio	-0.0006	-0.0008	-0.0077**	-0.0096**	-0.0009	0.0006	-0.0013
	(0.0012)	(0.0012)	(0.0035)	(0.0039)	(0.0013)	(0.0027)	(0.0014)
Add. Controlls	No	Yes	No	Yes	No	Yes	No
Distinct	10545	10545	10545	10545	1386	1386	2772

Columns refer to different estimation methods and rows refer to different outcome variables. All standard errors are clustered on the municipality level. *** Sign. at 1 perc. level. ** Sign. at 5 perc level. * Sign. at 10 perc level.

Estimations: Grammar School Closures: Last School Closes

BACK

	(1) TWFE b/se	(2) TWFE b/se	(3) Event-Study b/se	(4) Event-Study b/se	(5) Not Yet b/se	(6) Not Yet b/se	(7) Matched DiD b/se
Long Term Unemployment	1.0730***	1.3977***	1.4053	3.6595*	0.3058	0.5824	0.6672*
	(0.2133)	(0.2116)	(2.1445)	(2.1515)	(0.5110)	(0.4567)	(0.3221)
Share Labour Abroad	0.9907***	0.7261***	-1.3101	-2.1398**	0.1716	0.2568	0.2121
	(0,2652)	(0,2571)	(0.9387)	(0.9028)	(0.4733)	(0.4815)	(0.3087)
Net Commuter	-35.4984***	-21.5118***	-49.2692***	12.9128	-27.5743***	-30.1163***	-27.7342***
	(3,2304)	(3,4506)	(9.1058)	(11.9793)	(6.8899)	(8.7068)	(4.4432)
Population	1175.19	1095.49	6273.07	6676.30	243.24	421.11	195.64
	(918.3938)	(904.7419)	(7014.1936)	(6961.4163)	(462.4111)	(459.2260)	(438.5261)
Average Population Age	-0.2183**	0.1003	-0.1929	0.8031***	0.1377	-0.1259	0.1068
	(0,0965)	(0,0604)	(0.5189)	(0.2770)	(0.0843)	(0.0787)	(0.0672)
Gender Ratio	-0.0021	-0.0036**	-0.0090	-0.0144**	-0.0022	0.0006	-0.0015
	(0,0017)	(0,0017)	(0.0061)	(0.0060)	(0.0017)	(0.0027)	(0.0016)
Add. Controlls	No	Yes	No	Yes	No	Yes	No
Distinct	10545	10545	10545	10545	255	255	510

Columns refer to different estimation methods and rows refer to different outcome variables. All standard errors are clustered on the municipality level. *** Sign. at 1 perc. level. ** Sign. at 5 perc level. * Sign. at 10 perc level.