

Public Transportation Investments and the Rise of the Labor Movement

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Abstract

This paper

- Examines the determinants of the rise of the labor movement in 19th-century Germany.
- Uses train station openings as labor market shocks.
- Provides causal evidence on the effect of railroad expansion on political participation and election outcomes using rich historical data.

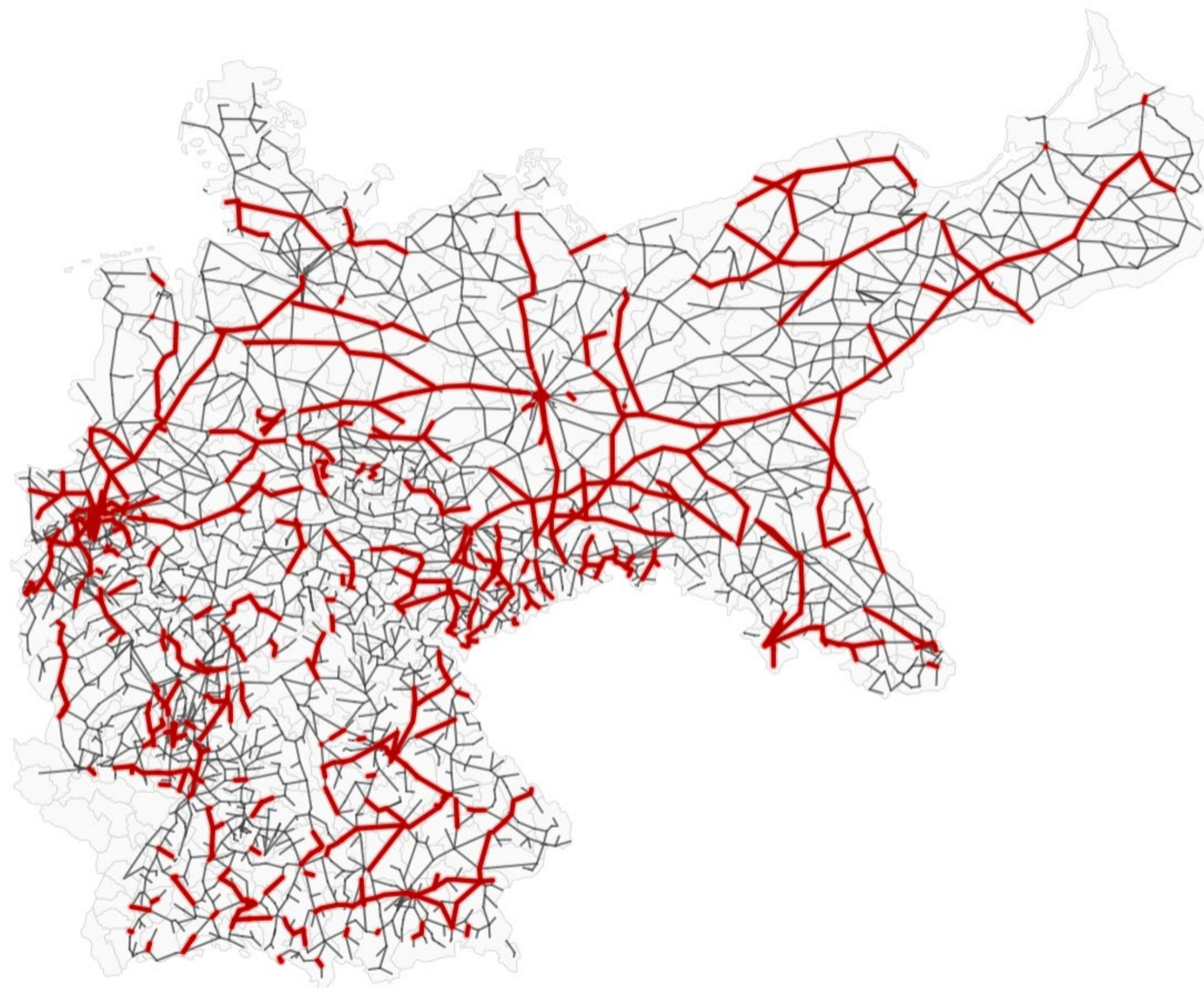
Identification Strategy

- We address endogeneity using three complementary approaches: TWFE, straight-line IV, and control function approach

Data and Findings

- Constituencies with rail access show significantly higher Socialist Party vote shares over the period 1871-1912.
- Population growth is identified as a potential transmission channel.
- Larger effects are observed in constituencies with unions and strikes.

Chart 1. German Train Network, expansion between 1870 and 1879



Endogeneity & Empirical Strategy

Endogeneity Concerns: A) Reverse Causality and B) Omitted Variables

- A) Railroads may drive or reflect economic and political conditions.
- B) Geography or historical factors may affect both rail access (RA_{it}) and the outcome variables.

Addressing Endogeneity

1) Two-Way Fixed Effects (TWFE)

$$y_{it} = \beta_0 + \beta_1 RA_{it} + \delta_i + \gamma_t + \varepsilon_{it}$$

- Constituency δ_i and time γ_t fixed effects.
- Outcomes: vote shares (for four political camps: Socialists/SPD, Conservatives, Catholics/Center, Liberals), turnout, population.

2) Straight-Line IV (Hornung, 2015)

- Instrument: Dummy for being on the shortest route between major cities (i.e., on a straight line corridor).
- Rationale: Smaller cities on the corridor more likely to gain rail access for geographic reasons.

3) Simulation Approach (Borusyak & Hull, 2023)

- Uses future line locations to simulate rail access.
- Adds simulated access ($\widetilde{RA}_{it}$) as control for nonrandom exposure.

Distributed Lag / Event Study (Schmidheiny & Sieglösch, 2023)

- Enables assessment of the timing and dynamics of effects.
- Allows for continuous treatment and tests for pre-trends.

Table 1. Key regression results

	Parties				Turnout (5)	log Pop (6)
	SPD (1)	Liberal (2)	Center (3)	Germ. Cons. (4)		
<i>Panel A: Fixed effects regressions</i>						
$RA_{i,t}$	0.0018** (0.0007)	−0.0018 (0.0012)	−0.0013** (0.0006)	0.0012 (0.0009)	0.0003* (0.0002)	0.0066*** (0.0019)
R ²	0.5821	0.1602	0.0708	0.0313	0.6413	0.4987
Obs	4792	4792	4767	4785	4795	4795
<i>Panel B: SLI approach</i>						
$RA_{i,t}$	0.0165** (0.0070)	−0.0033 (0.0125)	−0.0043 (0.0058)	−0.0002 (0.0096)	0.0029* (0.0018)	0.0028 (0.0093)
F-stat (1st stage)	88.21	88.21	88.20	88.93	86.60	86.60
Obs	4779	4779	4754	4773	4782	4782
<i>Panel C: Simulation approach</i>						
$RA_{i,t}$	0.0016** (0.0008)	−0.0013 (0.0012)	−0.0015** (0.0007)	0.0012 (0.0009)	0.0002 (0.0002)	0.0060*** (0.0019)
$\widetilde{RA}_{i,t}$	−0.0056 (0.0034)	0.0132** (0.0052)	−0.0062* (0.0035)	0.0012 (0.0046)	−0.0018** (0.0007)	−0.0140** (0.0061)
R ²	0.5827	0.1614	0.0717	0.0313	0.6420	0.5004
Obs	4792	4792	4767	4785	4795	4795
Constituency FE	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓

Robust standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Results

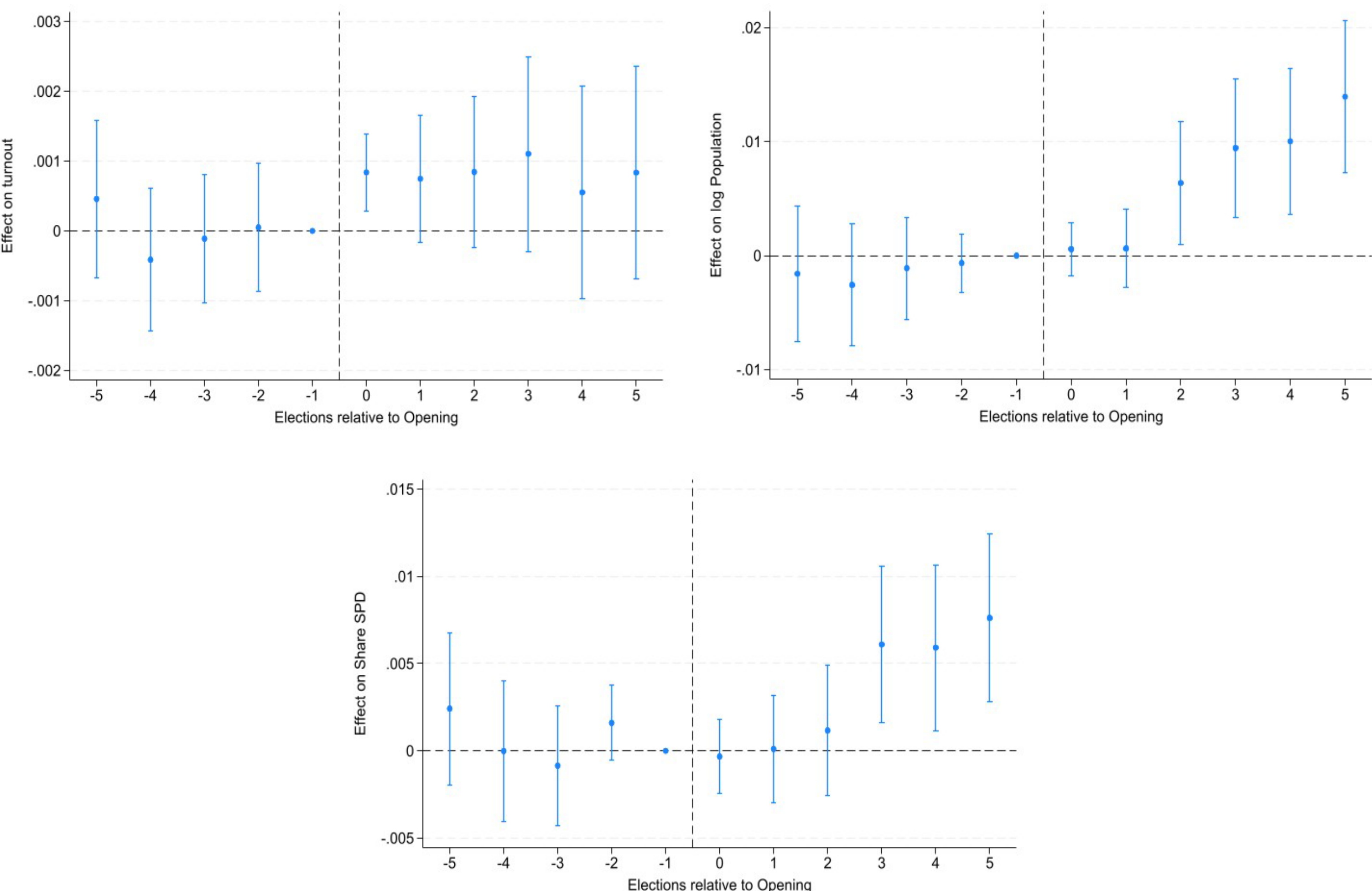
Main results

- Railroad access increases Socialist Party vote shares (Table 1, Column 1).
- One additional station $\rightarrow$ +0.18 p.p. in Socialist vote share (Panel A).
- Effect remains significant when instrumenting with a straight-line corridor dummy or adding simulated rail access (Panels B & C).
- Negative effect for the vote share of the Center Party (Column 3).
- Positive effects on turnout and population (Columns 5-6).
- Event study (Figure 2): no pre-trends, immediate rise in turnout, population effect after 2 periods, Socialist vote effect after 3 periods.

Further Results

- Adding population as a control suggests it is a transmission channel.
- Heterogeneity analysis*: Stronger effects where unions were present or strikes occurred (supports working-class empowerment mechanism).
- Roll-call vote analysis*: Railway expansion also shaped votes on trade- and insurance-related bills.

Chart 2. Event Study Results



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References

- Hornung, E. (2015) Railroads and Growth in Prussia. *Journal of the European Economic Association* 13(4): 699–736.
- Borusyak, K. and Hull, P. (2023) Nonrandom Exposure to Exogenous Shocks. *Econometrica* 91(6): 2155–2185.
- Schmidheiny, K. and Sieglösch, S. (2023) On event studies and distributed-lags in two-way fixed effects models: Identification, equivalence, and generalization. *Journal of Applied Econometrics* 38(5): 695–713.