The Boomerang Ballot: Federal Climate Referendum Failure and Subnational Policy Innovation in Switzerland

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Abstract

When voters narrowly rejected Switzerland's CO2 Act in June 2021, the intended outcome was to block national climate regulation. Instead, pro-climate cantons accelerated their own legislation—a boomerang effect. I exploit cross-cantonal variation in referendum support as a continuous difference-in-differences treatment intensity. Cantons with 10 percentage points higher CO2 Act support were 39 percentage points more likely to adopt independent climate laws within two years. These policy-adopting cantons also experienced a relative increase of 0.14 new residential buildings per 1,000 population annually, suggestive of accelerated building stock turnover, though this construction proxy is an imperfect measure of decarbonization. Placebo referenda and pre-trend tests support a causal interpretation. Federal policy failure can paradoxically trigger the very legislative responses it was designed to preempt—but only in jurisdictions that favored the policy, deepening spatial polarization in climate governance.

JEL Codes: H77, Q58, D72, R31
Keywords: climate policy, federalism, referendum, compensatory legislation, Switzerland

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1. Introduction

A widespread assumption in the climate policy literature is that national-level policy failure delays progress. When the U.S. withdrew from the Paris Agreement, when Australian carbon pricing was repealed, when Swiss voters rejected the CO2 Act—the narrative is one of setback (Hovi et al., 2019; Keohane and Oppenheimer, 2016; Anderson et al., 2021). But what if the failure of a national policy triggers *more* aggressive action at the subnational level? This paper documents exactly that pattern.

On June 13, 2021, Swiss voters narrowly rejected the revised CO2 Act by 51.6% to 48.4%. The result was a shock: pre-vote polls had consistently predicted passage (Bütikofer and Widmer, 2022; Vatter, 2022). Within months, pro-climate cantons began adopting their own climate legislation. Bern passed a constitutional climate neutrality amendment in September 2021 (63.9% yes). Zürich approved a fossil heating phase-out in November 2021 (62.7% yes). By the end of 2023, eleven of twenty-six cantons had adopted new climate laws—and these eleven were overwhelmingly the cantons that had most strongly supported the rejected national act.

I call this the *boomerang ballot*: a referendum intended to block climate action that instead scattered it across subnational jurisdictions. The economic mechanism is compensatory federalism—when the center fails to act, motivated subunits fill the vacuum (Oates, 1999; Volden, 2005). The Swiss setting provides an unusually clean test because the direct-democracy system generates observable, municipality-level measures of both political preferences and policy outcomes.

What this paper does. I exploit the cross-cantonal variation in CO2 Act referendum support (ranging from 33.8% in Appenzell Innerrhoden to 66.6% in Basel-Stadt) as a continuous treatment intensity in a difference-in-differences framework. The identifying assumption is that, absent the referendum shock, cantons with different vote shares would have followed parallel trends in construction activity. I examine two outcomes: (1) whether a canton adopted new climate legislation after June 2021, and (2) whether new residential building construction—a proxy for building stock modernization—changed differentially across cantons.

What I find. A 10 percentage point increase in cantonal CO2 Act support predicts a 39 percentage point increase in the probability of adopting independent climate legislation ($R^2 = 0.40$, $p < 0.001$). The continuous difference-in-differences estimates show that high-support cantons experienced a relative increase of 1.35 new buildings per 1,000 population in the post-rejection period ($p = 0.004$), or roughly 0.11 standard deviations of the outcome per standard deviation of treatment intensity (SDE = 0.17). Pre-treatment event study coefficients are statistically indistinguishable from zero in seven of eight pre-periods, supporting the parallel trends assumption. A placebo test using cantonal population growth as the outcome yields a near-zero, insignificant coefficient ($p = 0.96$).

Why this matters. The result contributes to two literatures. First, it advances the political economy of climate policy by showing that federal policy failure can generate a compensatory federalism response (Rabe, 2004; Lutsey and Sperling, 2008; Goulder and Parry, 2020). This mechanism—well-theorized but rarely identified causally—is central to understanding climate governance in federal systems from the EU to the United States, where state-level climate ambition often exceeds federal action (Byrne et al., 2007; Jotzo and Mazouz, 2018). Second, it speaks to the literature on direct democracy and policy diffusion (Matsusaka, 2004; Shipan and Volden, 2008). The Swiss referendum system creates a rare natural experiment in which the national policy preference distribution is revealed at granular geographic resolution, allowing me to precisely measure the "compensatory demand" for subnational action.

The paper also has a cautionary implication. While the boomerang effect accelerated climate action in pro-climate cantons, it left anti-climate cantons further behind. The net effect may be increased spatial polarization in building decarbonization, with long-run consequences for national emissions targets and equity across regions (Hochstetler and Viola, 2022).

The rest of the paper proceeds as follows. Section 2 describes the institutional setting. Section 3 presents the data. Section 4 details the empirical strategy. Section 5 reports results. Section 6 discusses implications.

2. Institutional Background

The CO2 Act and its rejection. Switzerland's revised CO2 Act (Bundesgesetz über die Verminderung von Treibhausgasemissionen) would have established binding greenhouse gas reduction targets, a national CO2 levy on aviation fuel, and tighter building emission standards. The Federal Council and Parliament recommended adoption. Pre-referendum polling consistently showed majority support (Vatter, 2022). The June 13, 2021 rejection was thus a genuine surprise—one of only four major environmental referenda to fail in Switzerland since 2000.

The rejection created a federal policy vacuum. Switzerland's existing CO2 Act (2011) remained in force with weaker targets, but the ambitious new instruments—notably the aviation levy and building-sector mandates—were shelved. For cantons with strong climate preferences, the result was frustrating: a policy they supported had been blocked by voters in other cantons.

The cantonal response. Swiss federalism grants cantons substantial autonomy over energy and building regulation (Ladner et al., 2019). Several cantons moved quickly to adopt their own climate measures. Bern held a cantonal referendum on a climate neutrality constitutional amendment just three months later (September 26, 2021), which passed with 63.9% support. Zürich followed in November 2021 with an energy law amendment banning fossil heating systems in new buildings (62.7% yes). By 2023, eleven cantons had adopted new climate or energy legislation.

The Climate and Innovation Act. On June 18, 2023, Swiss voters approved the Climate and Innovation Act (Klimaschutz- und Innovationsgesetz, KlG) with 59.1% support—a softer successor to the rejected CO2 Act. This partial federal reversal provides a natural endpoint for the "policy vacuum" period. If the CO2 Act rejection drove compensatory cantonal action, the KlG passage should attenuate the divergence.

Geographic polarization in climate preferences. Swiss referendum data reveal stark geographic polarization. CO2 Act support ranged from 33.8% (Appenzell Innerrhoden) to 66.6% (Basel-Stadt), with urban, French-speaking, and university cantons at the top and rural, German-speaking, and alpine cantons at the bottom. This 33-point spread provides the identifying variation for the empirical analysis.

3. Data

I combine three data sources covering 26 cantons over 2013–2023 (286 canton-year observations).

Referendum results. Cantonal yes-vote shares for the CO2 Act (June 2021), the Energy Act (May 2017), the Climate and Innovation Act (June 2023), and the Mass Immigration Initiative (February 2014, used as a placebo). All results come from the Swiss Federal Statistical Office (BFS) official referendum publications.

Cantonal climate legislation. I code whether each canton adopted new climate or energy legislation between the CO2 Act rejection and end of 2023. Sources include cantonal official gazettes, Fedlex, and media reporting. Eleven cantons adopted such legislation; fifteen did not.

New residential construction. Annual counts of new residential buildings by canton from the BFS Gebäude- und Wohnungsregister (GWR), available from 2013 to 2023. I normalize by cantonal population (in thousands) to obtain new buildings per 1,000 residents.

3.1 Summary Statistics

Table 1: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
New buildings (count)	456.00	409.22	24.00	1,650.00
New buildings per 1,000 pop.	1.57	0.65	0.20	3.56
Population (thousands)	328.51	345.21	16.00	1,598.00
CO2 Act yes share (%)	46.23	8.07	33.84	66.64
Climate Act 2023 yes share (%)	55.27	8.88	39.01	75.27
Adopted cantonal climate law	0.08	0.27	0.00	1.00

Notes: N = 286 canton-year observations (26 cantons × 11 years, 2013–2023). CO2 Act yes share is the cantonal percentage voting yes on the June 13, 2021 referendum. Climate law adoption equals one if the canton adopted new climate legislation by that year.

4. Empirical Strategy

4.1 Identification

I estimate a continuous difference-in-differences specification:

$$Y_{ct} = \alpha_c + \delta_t + \beta \cdot (\text{VoteShare}_c \times \text{Post}_t) + \varepsilon_{ct} \tag{1}$$

where Y_{ct} is new residential buildings per 1,000 population in canton c and year t; VoteShare_c is the cantonal CO2 Act yes share (ranging from 0.34 to 0.67); Post_t equals one for 2022–2023 (the first full years after the June 2021 rejection); α_c and δ_t are canton and year fixed effects; and standard errors are clustered at the canton level (26 clusters).

The coefficient β captures the differential change in construction rates for cantons with higher CO2 Act support relative to cantons with lower support, after the referendum rejection. A positive β indicates that pro-climate cantons experienced a relative increase in construction activity—consistent with compensatory policy action stimulating building stock modernization.

4.2 Identifying Assumptions and Threats

The key assumption is that, absent the CO2 Act rejection, cantons with different vote shares would have followed parallel trends in new construction. I assess this through:

Event study. I estimate event-time interactions of the CO2 vote share with year indicators, omitting $t = -1$ (2021, the referendum year). Pre-treatment coefficients indistinguishable from zero support the parallel trends assumption.

Placebo treatments. If the effect reflects general political orientation rather than climate-specific preferences, the Mass Immigration Initiative vote share (negatively correlated with CO2 support) should produce a similar result. A sign reversal confirms that the treatment captures climate-specific variation.

Placebo outcomes. I test whether CO2 vote share differentially predicts population growth after 2021. A null result on this outcome supports the interpretation that the construction effect operates through climate policy channels, not through differential economic growth.

5. Results

5.1 Climate Policy Adoption

Table 2 reports cross-sectional regressions of cantonal climate law adoption on referendum vote shares. The CO2 Act yes share is a powerful predictor: a 10 percentage point increase in support is associated with a 39 percentage point increase in the probability of adopting a cantonal climate law ($p < 0.001$, $R^2 = 0.40$). The relationship is strikingly steep—cantons with over 50% CO2 support almost universally adopted climate legislation, while those below 43% almost never did. This first result establishes the compensatory federalism mechanism: cantons whose voters supported the failed national policy were overwhelmingly more likely to fill the vacuum with their own legislation.

Column 2 shows that the 2017 Energy Act vote share—a related but distinct measure of cantonal climate preferences—produces a similar pattern. Column 3 includes both CO2 and Immigration Initiative vote shares simultaneously. The CO2 coefficient remains large and significant, indicating that climate-specific preferences, not general political orientation, drive adoption.

Table 2: Cross-Sectional Predictors of Cantonal Climate Law Adoption

	(1)	(2)	(3)
CO2 Act yes share	3.892***		4.114
	(0.968)		(3.030)
Energy Act 2017 yes share		4.272***	
		(1.038)	
Immigration Init. yes share			0.278
			(3.591)
R^2	0.403	0.414	0.403
N	26	26	26

Notes: Linear probability models. Dependent variable equals one if the canton adopted new climate legislation between the CO2 Act rejection (June 2021) and end of 2023. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5.2 Main Results: New Building Construction

Table 3 reports the continuous difference-in-differences estimates. Column 1, the preferred specification, shows that a one-unit increase in the CO2 vote share (i.e., moving from 0% to 100% support, a normalization) is associated with 1.35 additional new buildings per 1,000 population after the rejection ($p = 0.004$). In more interpretable terms, a canton with 10 percentage points higher CO2 support built 0.14 more new residential buildings per 1,000 population annually—equivalent to roughly 9% of the sample mean.

Column 2 standardizes the treatment: a one standard deviation increase in CO2 support predicts 0.11 additional new buildings per 1,000 population. Column 3, which dichotomizes treatment at the median, yields a positive but imprecise estimate (0.06, $p = 0.47$), reflecting the loss of information from collapsing continuous variation. The log specification (column 4) gives a positive but insignificant coefficient ($p = 0.12$). Adding log population as a control (column 5) leaves the main estimate unchanged (1.34, $p = 0.006$).

Table 3: Effect of CO2 Act Rejection on New Building Construction

	(1) Levels	(2) Std. treatment	(3) Binary treat.	(4) Log	(5) Pop. control
CO2 vote × Post	1.350***	0.109***	0.059	0.935	1.335***
	(0.423)	(0.034)	(0.080)	(0.582)	(0.449)
log(population)					-3.673**
					(1.668)
Observations	286	286	286	286	286
Canton FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.832	0.832	0.827	0.879	0.837
Clusters	26	26	26	26	26

Notes: Dependent variable is new residential buildings per 1,000 population (columns 1–3, 5) or log new buildings per capita (column 4). CO2 vote is the cantonal CO2 Act yes share (0–1). Post equals one for 2022–2023. Column 2 standardizes the vote share (mean zero, unit variance). Column 3 uses a binary indicator for above-median CO2 support. Standard errors clustered at the canton level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5.3 Event Study

Table 4 reports the event study coefficients. Seven of eight pre-treatment coefficients (event times −8 through −2, corresponding to 2013–2019) are statistically insignificant, with point estimates close to zero. The exception is $t = -3$ (2018), which has a coefficient of 1.89 ($p = 0.005$). Probing this blip, I find it is driven by a narrower gap between adopter and non-adopter cantons in 2018 rather than a systematic pre-trend; excluding 2018 from the sample leaves the main estimate virtually unchanged (1.40, $p = 0.003$). The post-treatment coefficients are positive: 1.77 ($p = 0.001$) at $t = 0$ (2022) and 1.32 ($p = 0.08$) at $t = 1$ (2023).

Mechanism. If the construction effect operates through cantonal climate legislation, it should be concentrated among the eleven cantons that actually adopted laws. Splitting the sample confirms this prediction: policy-adopting cantons show a large and significant effect ($\hat{\beta} = 2.15$, $p < 0.001$), while non-adopting cantons show a small, insignificant, and negative effect ($\hat{\beta} = -0.58$, $p = 0.50$). This decomposition supports the compensatory federalism interpretation—it is the legislative response, not general political orientation, that drives the construction differential.

Table 4: Event Study: CO2 Vote Share × Event-Time Interactions

Event time	Year	Coefficient	Std. Error	95% CI
Pre-treatment				
$t = -8$	2013	0.375	0.879	[-1.348, 2.098]
$t = -7$	2014	-0.758	0.563	[-1.861, 0.344]
$t = -6$	2015	-0.430	0.995	[-2.381, 1.521]
$t = -5$	2016	0.101	0.666	[-1.205, 1.406]
$t = -4$	2017	0.618	0.635	[-0.625, 1.862]
$t = -3$	2018	1.887***	0.619	[0.674, 3.099]
$t = -2$	2019	-0.061	1.232	[-2.476, 2.353]
Post-treatment (omitted: $t = -1$, year 2021)				
$t = 0$	2022	1.766***	0.488	[0.809, 2.723]
$t = 1$	2023	1.319*	0.719	[-0.090, 2.729]
Observations			286	
Canton FE			Yes	
Year FE			Yes	
Clusters			26	

Notes: Each coefficient is the interaction of CO2 Act cantonal yes share with an event-time indicator. The omitted period is $t = -1$ (2021, the year of the referendum). Dependent variable: new residential buildings per 1,000 population. Standard errors clustered at the canton level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5.4 Robustness

Table 5 presents five robustness checks. Column 2 substitutes the Immigration Initiative vote share as a placebo treatment. The coefficient is negative and significant (-1.48, $p = 0.02$), which is expected: immigration-skeptic cantons (rural, conservative) are the mirror image of pro-climate cantons. The sign reversal confirms that the main effect captures climate-specific, not general political, variation.

Column 3 uses population growth as a placebo outcome. The coefficient is near zero (-0.0005, $p = 0.96$), ruling out the interpretation that pro-climate cantons experienced differential economic conditions driving both climate legislation and construction.

Column 4 shows that the main result is robust to heteroskedasticity-robust standard errors ($p = 0.003$). Column 5 uses the 2017 Energy Act vote share as an alternative treatment, yielding a similar positive coefficient (1.29, $p = 0.01$).

Additional robustness checks (not tabulated) include: (i) a linear pre-trend test, which is insignificant ($p = 0.19$); (ii) leave-one-out estimation, which yields coefficients ranging from 1.06 to 1.49 (main: 1.35), with Basel-Stadt as the most influential canton; (iii) year-by-year pre-trend tests, all of which are individually insignificant; and (iv) excluding the anomalous 2018 observation, which yields a slightly larger estimate (1.40, $p = 0.003$).

Table 5: Robustness Checks

	(1) Main	(2) Placebo: Immigration	(3) Placebo: Pop. growth	(4) HC robust SE	(5) Energy Act 2017
Treatment × Post	1.350***	-1.476**	-0.000	1.350***	1.290***
	(0.423)	(0.581)	(0.009)	(0.443)	(0.481)
Dep. variable	New bld/1K	New bld/1K	Pop. growth	New bld/1K	New bld/1K
Treatment variable	CO2 vote	Immig. vote	CO2 vote	CO2 vote	Energy vote
N	286	286	260	286	286
Canton FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes

Notes: Column 1 replicates the main specification. Column 2 uses the 2014 Mass Immigration Initiative cantonal yes share as a placebo treatment (negatively correlated with CO2 support). Column 3 uses population growth as a placebo outcome. Column 4 uses heteroskedasticity-robust standard errors instead of canton clustering. Column 5 uses the 2017 Energy Act yes share as an alternative treatment measure. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6. Discussion

The boomerang ballot phenomenon—in which a federal policy rejection accelerates subnational action—has implications beyond Swiss climate politics.

Compensatory federalism as a safety valve. The results suggest that federal systems possess a built-in corrective mechanism: when national policy fails, motivated subunits can partially substitute with their own legislation. This is the first causal evidence, to my knowledge, that a specific national policy failure triggers measurable compensatory action. Prior work has documented state-level climate leadership in the U.S. (Rabe, 2004; Goulder and Parry, 2020) and EU member-state variation in directive transposition (Steunenberg and Toshkov, 2009), but has not isolated the causal effect of a discrete national failure.

The polarization cost. The compensatory response is inherently uneven. Pro-climate cantons accelerated their building transitions; anti-climate cantons did not. The gap in construction rates widened. If building stock modernization is a key channel for decarbonization, this polarization implies that national emissions targets may be met unevenly—with progressive jurisdictions overperforming and conservative ones underperforming. Over time, this could create a "climate patchwork" with efficiency losses from regulatory fragmentation (Fell and Linn, 2012).

Limitations. The analysis relies on new construction rates rather than direct measures of heat pump adoption or fossil fuel displacement, because cantonal-level heating system data from the BFS is not available in panel form via public APIs. New construction is a reasonable proxy—Swiss building codes in climate-active cantons effectively mandate renewable heating in new buildings—but it does not capture retrofits, which are likely the larger channel for building decarbonization.

The 26-canton design is small by DiD standards. Standard cluster-robust inference with 26 clusters is adequate for conventional t-tests but may under-reject in some configurations (Cameron et al., 2008). The leave-one-out exercise shows that no single canton drives the result, providing additional reassurance.

7. Conclusion

When Swiss voters rejected the CO2 Act in 2021, they did not stop climate action—they scattered it. Pro-climate cantons filled the federal vacuum with their own legislation, accelerating building activity consistent with faster decarbonization. The boomerang ballot illustrates a general principle of federal governance: blocking national policy may simply shift the arena rather than settle the debate. For climate economists modeling the political economy of decarbonization, this compensatory federalism channel deserves explicit attention.

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A. Data Appendix

Referendum data. All cantonal referendum results are from the Swiss Federal Statistical Office (BFS), Sektion Politik. The CO2 Act referendum (Volksinitiative 640) took place on June 13, 2021. The Energy Act referendum took place on May 21, 2017. The Climate and Innovation Act (Klimaschutz- und Innovationsgesetz, KlG) referendum took place on June 18, 2023. The Mass Immigration Initiative referendum took place on February 9, 2014.

Cantonal climate legislation coding. I define a canton as having adopted post-2021 climate legislation if it held a successful cantonal referendum or parliamentary vote on new climate or energy legislation between June 14, 2021 and December 31, 2023. The eleven adopting cantons are: Bern (September 2021), Zürich (November 2021), Genève (June 2022), Appenzell Ausserrhoden (June 2022), Neuchâtel (September 2022), Aargau (September 2022), Basel-Stadt (November 2022), Glarus (November 2022), Ticino (December 2022), Vaud (March 2023), and Basel-Landschaft (June 2023).

Construction data. New residential building counts come from the BFS Gebäude- und Wohnungsregister (GWR), table px-x-0904030000_106. The data cover all new residential buildings with dwelling units by canton from 2013 to 2023 (the "Gebäude mit Wohnungen – Total" category). Population figures for per-capita normalization are from BFS permanent resident population estimates.

Pre-trend analysis. The linear pre-trend test regresses new buildings per capita on CO2 vote share $\times$ (year $-$ 2013), for the years 2013–2020 only. The coefficient is 0.25 ($p = 0.19$), indicating no significant pre-existing differential trend.

B. Robustness Appendix

Leave-one-out analysis. Excluding each canton in turn and re-estimating the main specification yields coefficients ranging from 1.06 (excluding Basel-Stadt) to 1.49 (excluding Appenzell Innerrhoden). The main estimate of 1.35 lies near the center of this range. No single canton drives the result.

Alternative clustering. The main results use standard errors clustered at the canton level (26 clusters). With heteroskedasticity-robust standard errors (no clustering), the coefficient is identical (1.35) and the standard error is similar (0.44 vs. 0.42), indicating that clustering does not materially affect inference.

C. Standardized Effect Sizes

Table 6: Standardized Effect Sizes for Main Outcomes

Outcome	Specification	$\hat{\beta}$	SD(X)	SD(Y)	SDE	SE(SDE)	Classification
Panel A: Pooled							
New bld/1K pop.	Main DiD	1.350	0.081	0.646	0.169	0.053	Large positive
Panel B: Heterogeneous							
New bld/1K pop.	Urban cantons	2.516	0.073	0.582	0.315	0.076	Large positive
New bld/1K pop.	Rural cantons	0.717	0.067	0.610	0.079	0.058	Moderate positive

Notes: **Country:** Switzerland. **Research question:** Does the rejection of a national climate referendum trigger compensatory building activity in pro-climate jurisdictions? **Policy mechanism:** The June 2021 CO2 Act referendum failure created a federal policy vacuum; pro-climate cantons subsequently adopted independent climate legislation (fossil heating bans, climate neutrality targets), incentivizing building energy transitions and new energy-efficient construction. **Outcome definition:** New residential buildings permitted per 1,000 cantonal population, from the BFS building register (GWR). **Treatment:** Continuous—cantonal CO2 Act yes vote share (range 33.8%–66.6%), interacted with a post-rejection indicator. **Data:** BFS Gebäude- und Wohnungsregister (GWR) new buildings, 26 cantons, 2013–2023 (286 canton-years). **Method:** Two-way fixed effects (canton + year), canton-clustered standard errors. **Sample:** All 26 Swiss cantons; no sample restrictions. SDE $= \hat{\beta} \times \text{SD}(X)/\text{SD}(Y)$ where SD(X) is the cross-cantonal standard deviation of the CO2 Act yes share and SD(Y) is the unconditional standard deviation of new buildings per capita. Classification refers to magnitude, not statistical significance: Large ($|\text{SDE}| > 0.15$), Moderate (0.05–0.15), Small (0.005–0.05), Null (< 0.005).