Is Place-Based Green Industrial Policy Effective? Evidence from the Inflation Reduction Act

Joep Keuzenkamp Jacopo Mazza Bob Rijkers Katherine Stapleton

June 12, 2026

Agenda

Motivation: Spatial Development Has Been Uneven

- 'Left behind' places: economic and population decline (Austin et al., 2018; Case & Deaton, 2015; Rodríguez-Pose et al., 2021)
  - High unemployment, substance abuse, and deaths of despair

Motivation: Spatial Development Has Been Uneven

- 'Left behind' places: economic and population decline (Austin et al., 2018; Case & Deaton, 2015; Rodríguez-Pose et al., 2021)
  - High unemployment, substance abuse, and deaths of despair
- Skeptical of climate change and susceptible to populism (Dijkstra et al., 2020; Goodwin & Heath, 2016; Rodríguez-Pose et al., 2021)
  - Higher support for Trump, Brexit, and anti-EU parties
  - Lower support for climate policies and green parties

Motivation: Spatial Development Has Been Uneven

- 'Left behind' places: economic and population decline (Austin et al., 2018; Case & Deaton, 2015; Rodríguez-Pose et al., 2021)
  - High unemployment, substance abuse, and deaths of despair
- Skeptical of climate change and susceptible to populism (Dijkstra et al., 2020; Goodwin & Heath, 2016; Rodríguez-Pose et al., 2021)
  - Higher support for Trump, Brexit, and anti-EU parties
  - Lower support for climate policies and green parties
- Growing attention for place-based policies to redress spatial inequality and fighting political discontent
  - New Economic Geography-inspired policies favoring 'superstar' cities no longer suffice (Austin et al., 2018; MacKinnon et al., 2022).
  - Place-based policies could help fight political discontent (Aiginger & Rodrik, 2020; Bartik, 2020; Juhász & Lane, 2024; Rodrik & Sabel, 2020)

Motivation: Place-Based Industrial Policy

- Energy transition could aggravate these long-term geographic divergences (Rodríguez-Pose & Bartalucci, 2024).
  - The Inflation Reduction Act is the "most ambitious investment in combating the climate crisis in world history" (White House, 2022).
- IRA targets "Energy Communities" to prevent this and revert historical developments.
  - "These incentives [Energy Communities] are going to make clean energy jobs, good-paying union jobs and ensure the benefits of clean energy economy reach communities left behind." (White House, 2023)

Research Questions

1. How much does the targeting of Energy Communities impact investment and job demand in the solar and wind energy sectors?

2. Does targeting Energy Communities result in increased support for policies that mitigate climate change including electoral outcomes?

Agenda

The Investment/Production Tax Credits

The IRA incentivizes clean energy generation through tax credits:

- The ITC is a tax credit granted to energy companies based on the construction cost of the power plant.
- The PTC is a tax credit granted to energy companies based on the energy generated with a power plant.
- Companies choose between ITC and PTC.
- Several bonus tax credits are available of which we study the Energy Community Bonus.

Rates of ITC/PTC

Project Size	Base Incentive	Energy Community Bonus	Domestic Content Bonus	Total Possible
< 1 MW	30% or \$27.50/MWh	10% or \$2.75/MWh	10% or \$2.75/MWh	50% or \$33.00/MWh
> 1 MW	6% or \$5.50/MWh	2% or \$0.55/MWh	2% or \$0.55/MWh	10% or \$6.60/MWh
> 1 MW that meets the prevailing wage and apprenticeship requirements	30% or \$27.50/MWh	10% or \$2.75/MWh	10% or \$2.75/MWh	50% or \$33.00/MWh

Table: Rates of the ITC in percentages of the investment amount and PTC in dollars per MWh of power generated (Office of Energy Efficiency & Renewable Energy, 2024).

Energy Communities

Energy Communities are defined as:

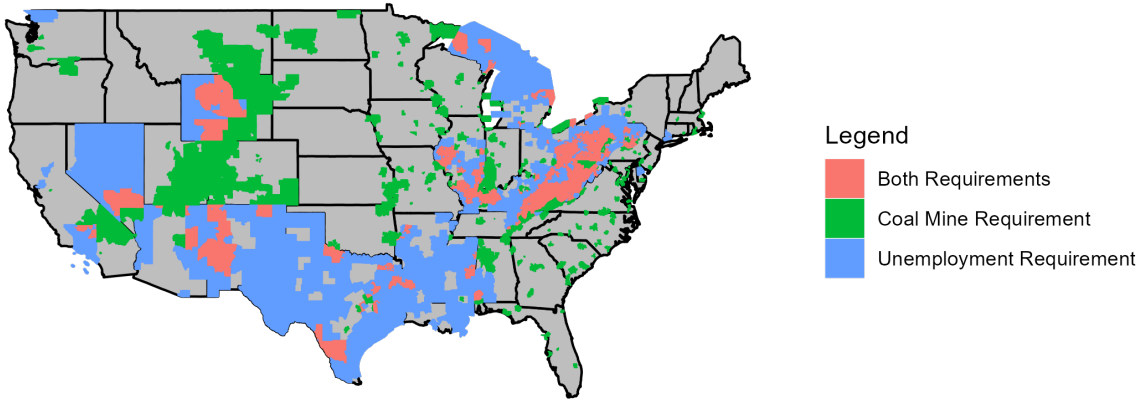
1. A "brownfield site" (as defined in certain subparagraphs of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA))

2. A "metropolitan statistical area" or "non-metropolitan statistical area" that has (or had at any time after 2009)
   - 0.17% or greater direct employment or 25% or greater local tax revenues related to the extraction, processing, transport, or storage of coal, oil, or natural gas; and
   - has an unemployment rate at or above the national average unemployment rate for the previous year

3. A census tract (or directly adjoining census tract)
   - in which a coal mine has closed after 1999; or
   - in which a coal-fired electric generating unit has been retired after 2009

Energy Communities - Cohort 1

Cohort 2 | Cohort 3 | Summary Stats (Table 1)



Agenda

Estimation Strategy

- We estimate DiD using EC-designated areas as treated units and non-EC designated areas as control units:
  1. Investment and labor demand are quarterly data: units experience non-absorbing treatment, we employ De Chaisemartin and D'Haultfoeuille (2024).
  2. Electoral data has only one post-period, we employ TWFE.
- We cluster standard errors at the area-level (census tract or county).

Agenda

Investment Data

- The Clean Investment Monitor estimates all investments eligible for tax credits under the IRA since 2018.

- Our preferred specification employs a binary variable tracking any investment:

$$investment_{cjt} = \begin{cases} 0 & \text{if } investment_{cjt} = 0 \\ 1 & \text{if } investment_{cjt} > 0 \end{cases}$$

- where $c \in (solar, wind)$ is the technology, j is the census tract, and t is the quarter.

▸ Descriptive Trends (Figure 1)

Labor Demand Data

- Lightcast provides all online job postings between 2015-2024. We use the European Patent Office (EPO) technology categories to create keyword lists for querying job descriptions.

- We measure technology-specific job vacancies as a percentage of total job vacancies in a given county and quarter.

▸ Descriptive Trends (Figure 1)

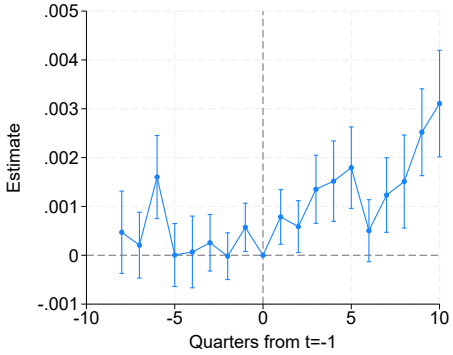
Electoral Data

- The MIT Election Lab provides county-level presidential election outcomes.
- We measure the Republican vote share as the two-party vote share.

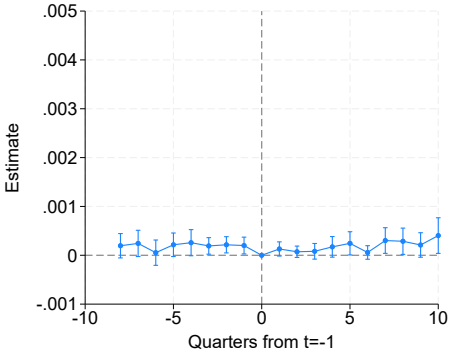
▸ Descriptive Trends (Figure 1)

Agenda

Solar Investment Increases, Wind Does Not



(a) Solar



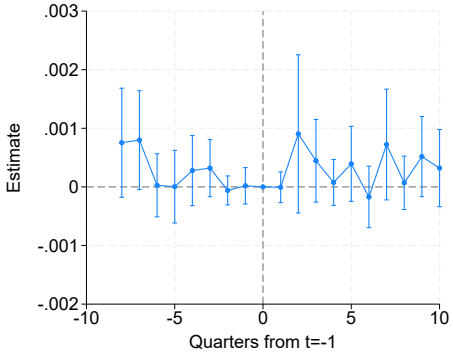
(b) Wind

Investment Results

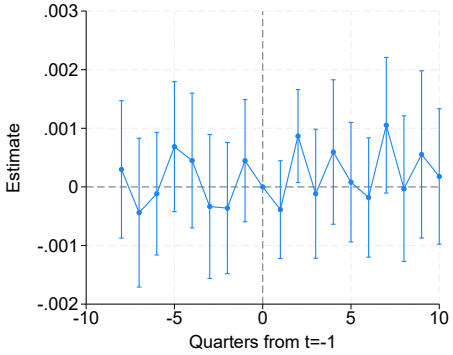
- Likelihood of receiving solar investment increases by 0.14 percentage points, which represents a 144% increase.

▸ Investment Levels (USD) ▸ Matching Robustness ▸ Spillover Analysis

Solar Labor Demand Is Weakly Increased



(a) Solar Labor Demand



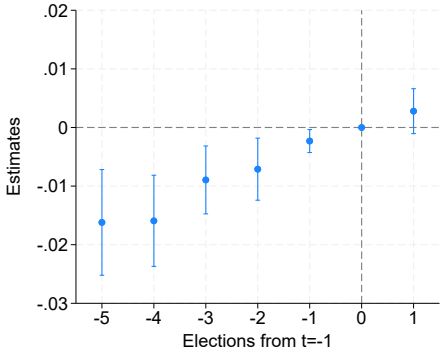
(b) Wind Labor Demand

Labor Demand Results

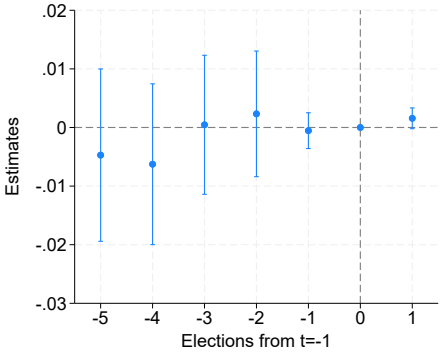
- Solar labor demand rises by 0.033 percentage point, which represents a 29% increase.

▸ Total Employment (Fig. 2c) ▸ Solar Inv. → Labor Demand ▸ Matching Robustness ▸ Spillover Analysis

Republican Voteshare is Unaffected



(a) Total Sample



(b) Rust Belt

House Elections | Senate Elections | Climate Attitudes

Agenda

Conclusion

- Place-based green industrial policy can effectively steer investment to target areas. Back-of-the-Envelope calculations show favorable CO2-abatement cost.
  - Necessary given fossil presence hampers regional green specialization (Santoalha & Boschma, 2021).

- Solar industry is not the ideal target industry, given its high capital intensity. Back-of-the-Envelope calculations show unfavorable cost per job vacancy.
  - Smart specialization policies should be designed specifically for regions, not uniform (Balland et al., 2019).

- Economic improvements are likely too small to affect political opinion.

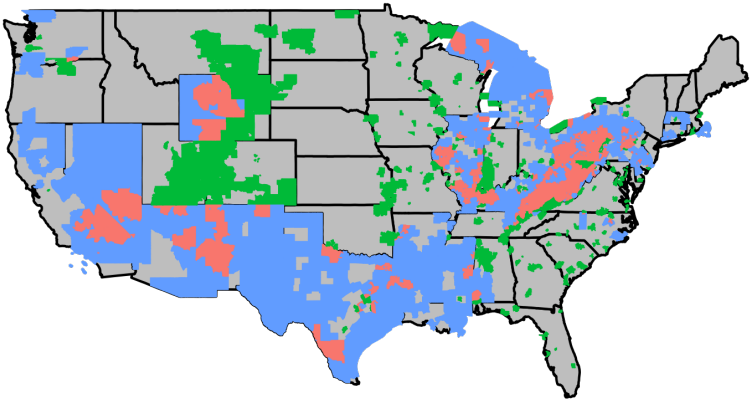
▸ CO_2 Abatement Cost ▸ Cost per Job Vacancy

Appendix

Additional figures, robustness checks, and cost calculations

Energy Communities – 2024 (March–June)

Back

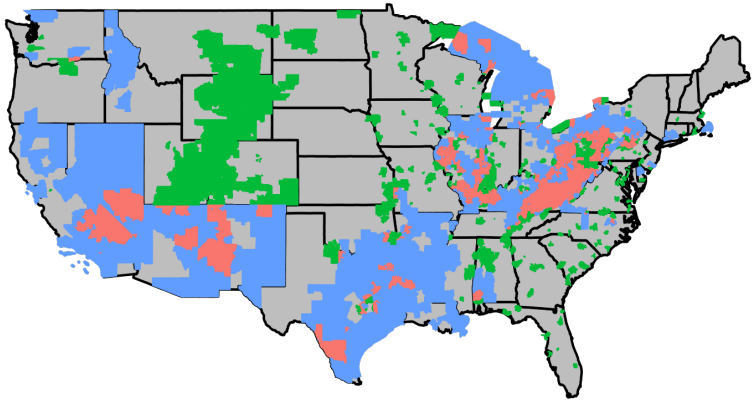


Legend

- Both Requirements
- Coal Mine Requirement
- Unemployment Requirement

Energy Communities – 2024 (July–December)

Back



Legend

- Both Requirements
- Coal Mine Requirement
- Unemployment Requirement

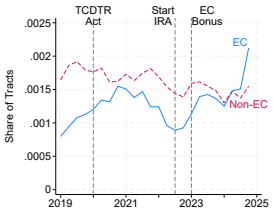
Table 1 – Descriptive Statistics: ECs vs. Non-ECs

Back

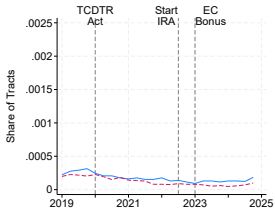
	Non-ECs	Cohort 1 EC	Cohort 2 EC	Cohort 3 EC
Panel A: Census tracts				
Area (km^2)	81,876 (407,347)	274,113 (2,962,130)***	189,367 (2,370,380)***	188,273 (2,393,816)***
Total population	3,934 (1,712)	3,699 (1,663)***	3,817 (1,674)***	3,936 (1,737)
Total capacity (MW)	215.7 (497.0)	381.9 (611.4)***	327.8 (573.3)***	340.5 (589.2)***
Natural gas (MW)	87.9 (284.5)	169.4 (388.1)***	144.8 (358.2)***	141.9 (354.1)***
Coal (MW)	37.6 (236.3)	146.4 (447.4)***	120.0 (416.4)***	129.8 (432.5)***
Solar (MW)	5.1 (24.9)	1.1 (6.0)***	1.3 (5.7)***	1.2 (6.6)***
Observations	52,904	17,424	27,432	27,036
Panel B: Counties				
Solar potential	4.1 (0.3)	4.0 (0.4)***	4.1 (0.5)***	4.0 (0.4)***
Some college (%)	30.9 (5.3)	30.1 (5.1)***	30.2 (5.2)***	30.3 (5.0)***
Bachelor (%)	25.8 (10.4)	22.5 (9.8)***	23.0 (10.0)***	23.0 (10.0)***
High school (%)	32.6 (7.4)	35.1 (7.8)***	34.7 (7.8)***	34.8 (7.9)***
Rural–urban code	4.8 (3.0)	5.4 (2.8)***	5.2 (2.9)***	5.2 (2.9)***
Poverty rate (%)	13.4 (5.1)	15.9 (5.8)***	15.6 (5.8)***	15.6 (5.8)***
Unemployment rate (%)	3.3 (1.3)	4.1 (1.3)***	4.1 (1.3)***	4.1 (1.3)***
GDP pc ($k)	48.0 (41.9)	53.4 (90.5)**	53.1 (86.9)**	47.8 (54.4)
GDP nat. res. & mining pc	5.8 (33.5)	12.1 (75.9)***	11.3 (73.0)**	5.9 (25.1)
Observations	2,095	1,361	1,483	1,442

Figure 1 – Descriptive Trends: Investment, Employment, and Voting

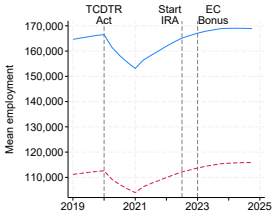
Back



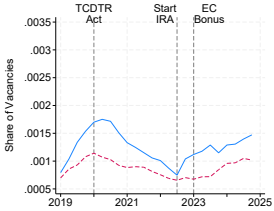
(a) Binary Solar Inv.



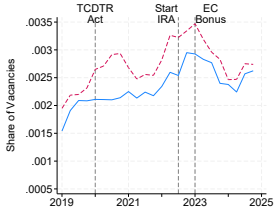
(b) Binary Wind Inv.



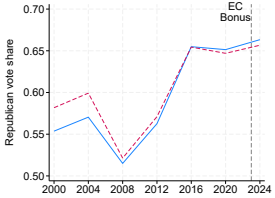
(c) Total Employment



(d) Solar Vacancies

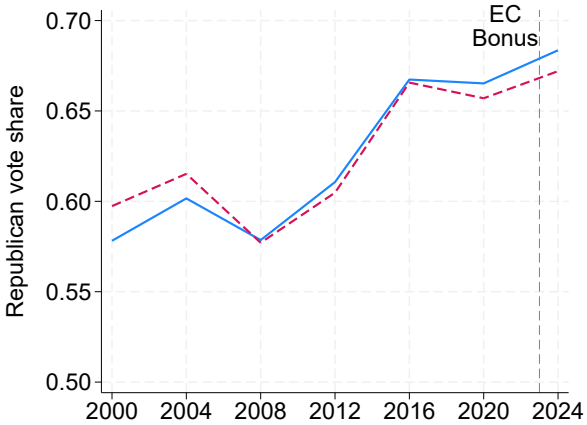


(e) Wind Vacancies



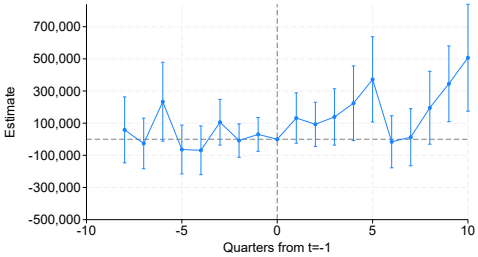
(f) Rep. Vote Share (RB)

Evolution of Republican Vote Shares

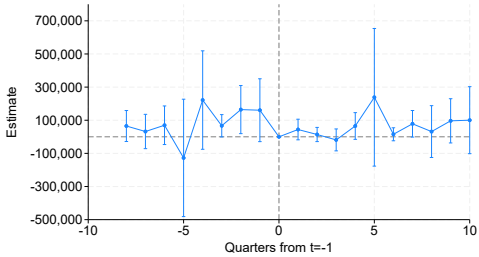


County-level Republican presidential vote shares, ECs vs. non-ECs. Dashed line: IRA passage (2022 Q3).

Investment Levels (USD)



(a) Solar



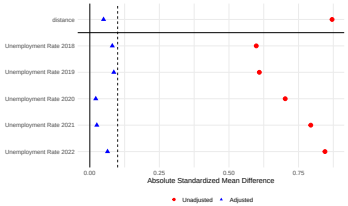
(b) Wind

EC Bonus AVSQ: solar \$185,217*** per quarter; wind \$57,215** per quarter.

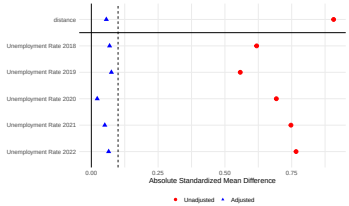
Back

Matching (Unemployment Rates) – Balance Checks

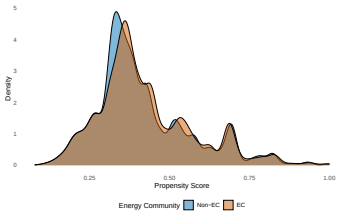
Back



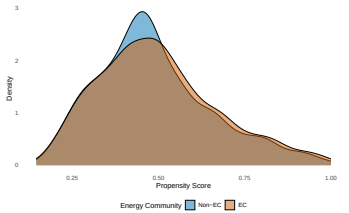
(a) Love Plot: Investment



(b) Love Plot: Labor Demand



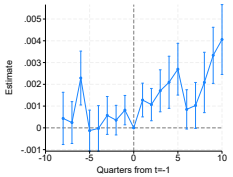
(c) PS Density: Investment



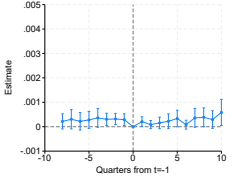
(d) PS Density: Labor Demand

Matching (Unemployment Rates) – Event Study Results

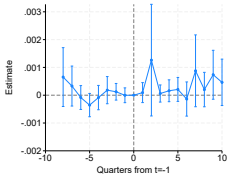
Back



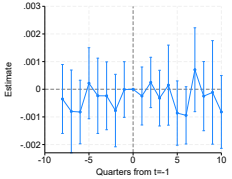
(a) Solar Investment



(b) Wind Investment



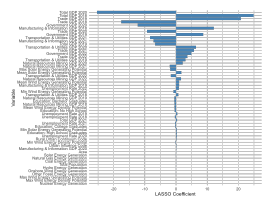
(c) Solar Labor Demand



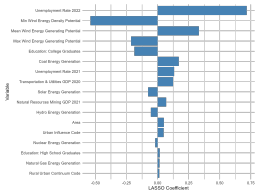
(d) Wind Labor Demand

Matching (LASSO Variables) – Balance Checks

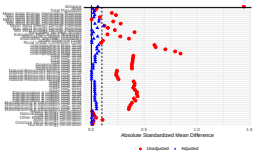
Back



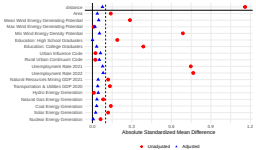
(a) LASSO: Investment



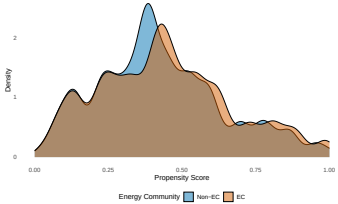
(b) LASSO: Labor Demand



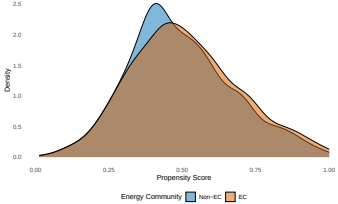
(c) Love Plot: Investment



(d) Love Plot: Labor Demand



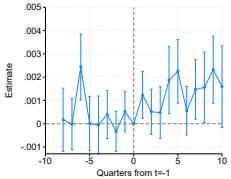
(e) PS Density: Investment



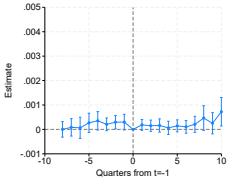
(f) PS Density: Labor Demand

Matching (LASSO Variables) – Event Study Results

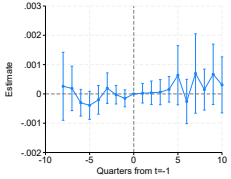
Back



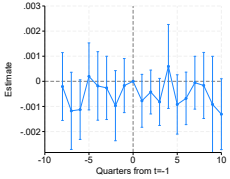
(a) Solar Investment



(b) Wind Investment



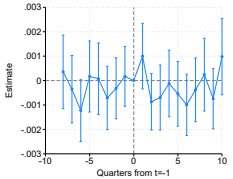
(c) Solar Labor Demand



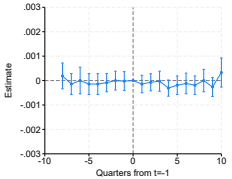
(d) Wind Labor Demand

Spillover Effects

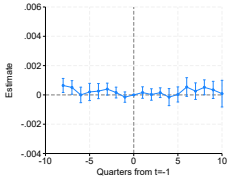
Back



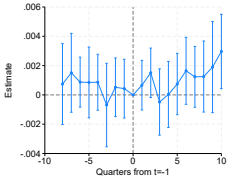
(a) Solar Investment



(b) Wind Investment

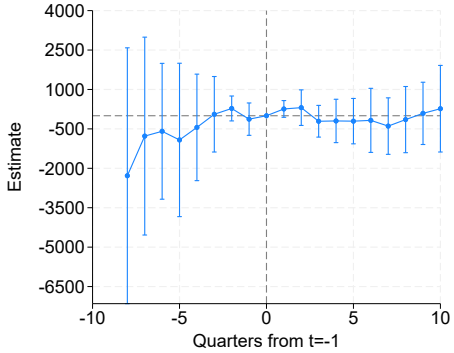


(c) Solar Labor Demand



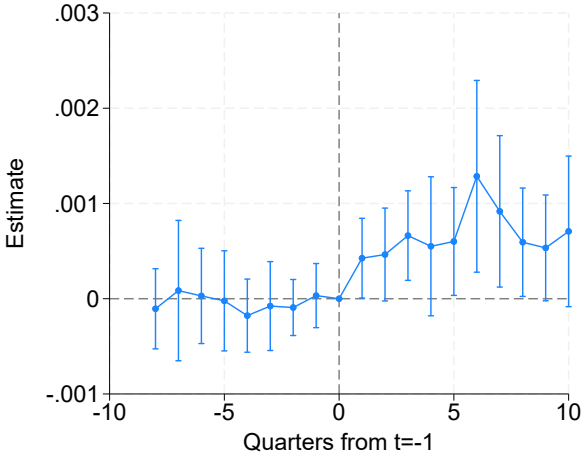
(d) Wind Labor Demand

Figure 2c – Total Employment (Event Study)



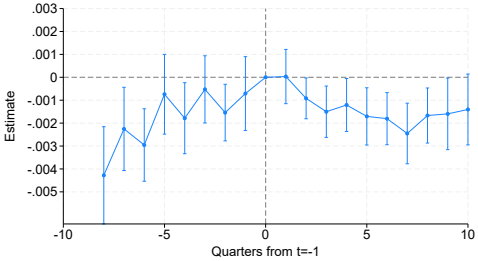
Effect of EC bonus on aggregate county-level employment (QCEW). No significant effect detected, consistent with the low labor intensity of utility-scale solar and the small share of renewables in total employment. AVSQ estimated using De Chaisemartin and D'Haultfoeuille (2024); SEs clustered at county level.

Solar Investment → Solar Labor Demand

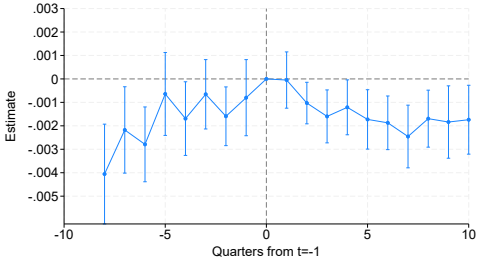


Receiving a solar investment increases solar labor demand significantly. AVSQ $\hat{\delta} = 0.001^{***}$.

Brown (Fossil Fuel) Labor Demand



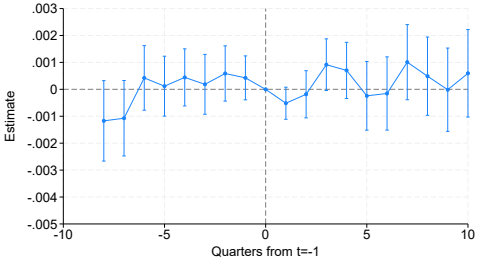
(a) Total Sample



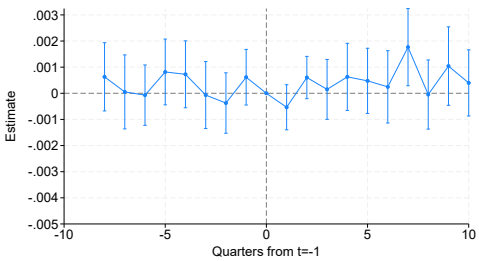
(b) Matched Sample

No significant effect on the share of NAICS-21 (mining/oil & gas) job vacancies.

Construction Employment & Renewables Labor Demand



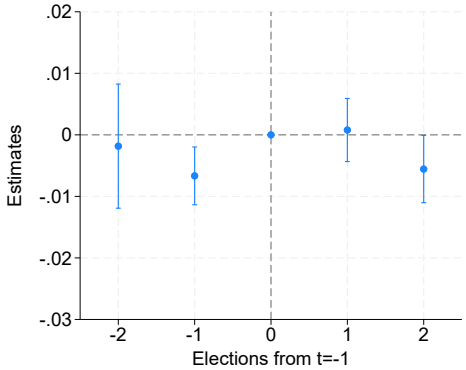
(a) Construction Employment (QCEW)



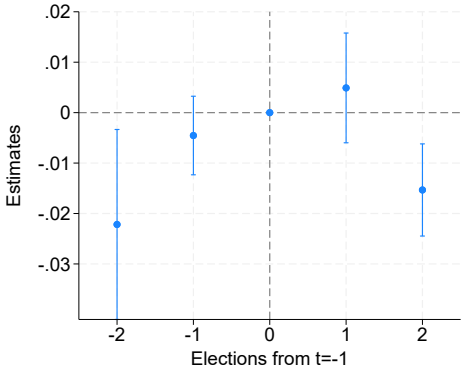
(b) Renewables (Y02E10) Labor Demand

Y02E10 = CPC code for renewable energy generation technologies.

House Elections – Republican Vote Share



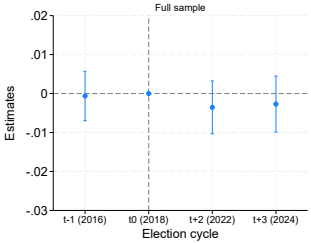
(a) Full Sample



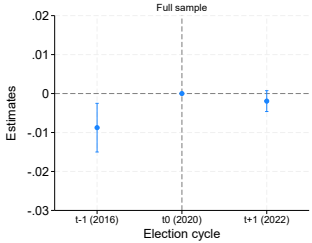
(b) Rust Belt

TWFE DiD. No significant effect on Republican House vote shares.

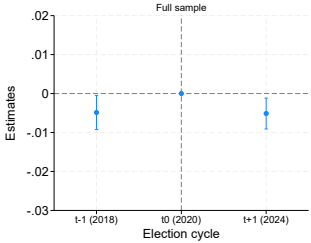
Senate Elections – Republican Vote Share



(a) Group 1: Full



(b) Group 2: Full

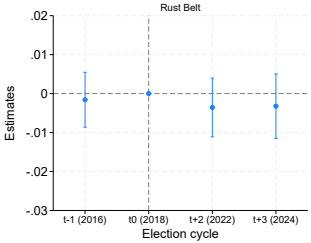


(c) Group 3: Full

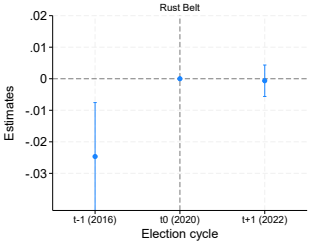
Senate elections have staggered cycles. Three voting-sequence groups estimated separately. No significant effects.

Back

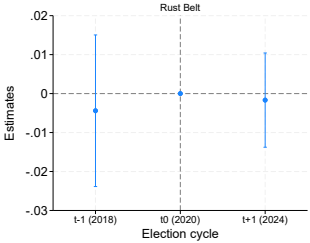
Senate Elections – Republican Vote Share (Rust Belt)



(a) Group 1: Rust Belt

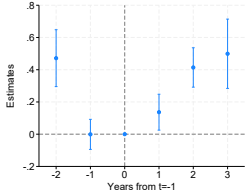


(b) Group 2: Rust Belt

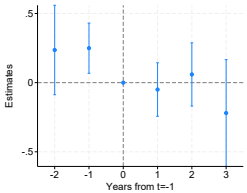


(c) Group 3: Rust Belt

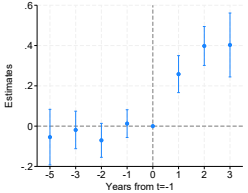
EC Bonus and Climate Attitudes (TWFE Event Studies)



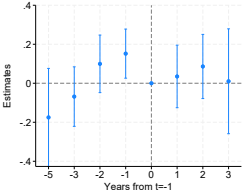
(a) Do more on GW



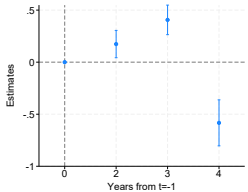
(b) Do more (RB)



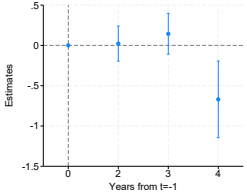
(c) Regulate CO_2



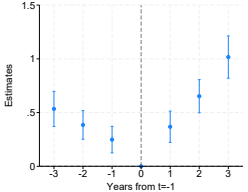
(d) Regulate (RB)



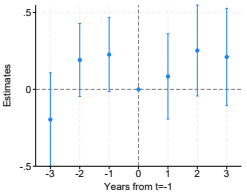
(e) GW views matter



(f) GW views (RB)



(g) Carbon tax



(h) Carbon tax (RB)

CO_2 Abatement Cost

Method: Avg. 127 MW plant, 20-year lifetime, \$145M CAPEX, CO_2 intensity 0.701 tCO_2/MWh. Adjusted for inframarginal investments (marginal share: 144/244).

Scenario	15% CF	22.5% CF	30% CF
CAPEX per MWh (USD)	43.57	29.05	21.79
CAPEX per tCO_2 (USD)	62.16	41.44	31.08
Gov. exp. EC bonus per tCO_2	**10.53**	**7.02**	**5.27**
Gov. exp. EC+ITC per tCO_2	**42.13**	**28.08**	**21.06**

- All estimates **well below** EPA social cost of carbon (\$190/tCO_2).
- Well below EV subsidies (\$399–795/tCO_2) and residential solar (\$1,036/tCO_2).

Back

Cost per Job Vacancy

- 46,343 solar vacancies in ECs (2023–24); EC bonus $\Rightarrow$ 29% increase $\Rightarrow$ **10,418 additional vacancies**.
- Total CAPEX: $28.7 billion across all EC plants.

	EC bonus only	**ITC + EC**
Fiscal outlay	$2.872 b	$11.488 b
Additional vacancies	10,418	10,418
Cost per vacancy	**$275,669**	**$1,102,676**

- Higher than place-based policy benchmarks (UK RSA: $4k–27k; Japan: $16k–40k).
- Reflects the capital intensity of utility-scale solar and dual goal of the policy.

Back