



Picture: Unsplash

Price signals influence solar adoption more strongly in regions with less sunlight

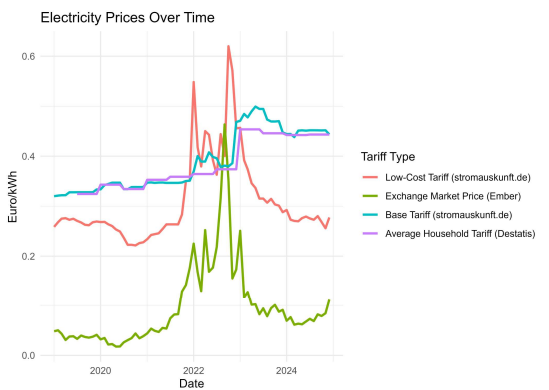
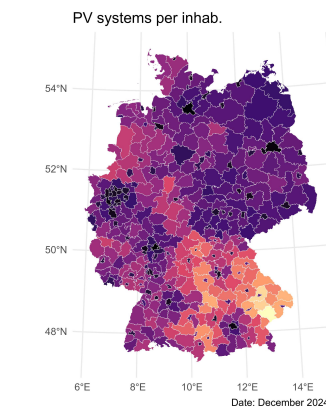
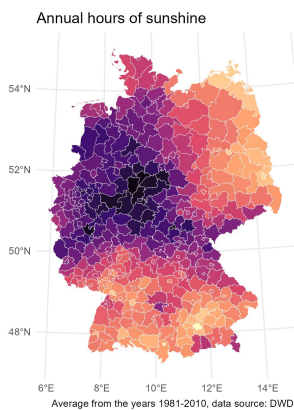
Why is this important:

- Germany aims to cover 80% of its electricity consumption from renewables by 2030 (BMWK 2023)
- Whether or not to install solar panels, is a household decision
- To create efficient incentives, it is important to understand what motivates people to install solar panels
- Previous studies show that higher electricity prices generally increase PV adoption (Falk 2025, Kiso 2022)
- But we do not know yet, how regions respond differently

Methods and Design:

- I combine municipality-level data for Germany (2019–2024) on new solar installations, electricity prices, and sunshine duration
- Control variables for household income, population density and age distribution
- Main specification: interaction between electricity prices × sunshine duration
- Objective: test whether regional sunshine duration moderates the effect of rising electricity prices on PV adoption

Background:

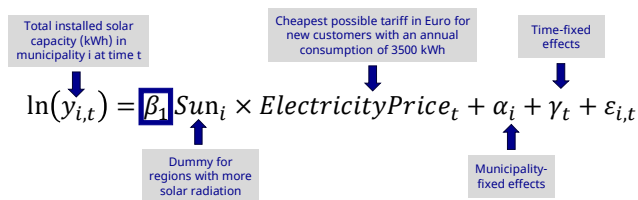


The 400 counties in Germany receive varying amounts of annual hours of sunshine. The county Suhl receives only 1430 hours of sunshine on average per year, while the city of Munich enjoys 1760 hours.

Solar Panels are distributed heterogeneously across Germany with a majority of panels being located in southern Germany.

In mid of 2021, spot market prices for electricity have increased sharply, also leading to higher prices for households.

Main Results:



	(1)	(2)
Electricity Price x Radiation Dummy	-0.099952***	-0.086787***
Num. Obs.	791856	791280
R2	0.989	0.989
R2 Within	0.036	0.045

(1) = specification as shown above
 (2) = with socioeconomic controls

How to interpret:

- A 10-cent increase in electricity prices leads to roughly a 1% smaller increase in installed PV capacity in high-sunshine-radiation municipalities compared to low-sunshine-radiation ones

Robustness:

- **Excluding Balkonkraftwerke:** Removing balcony PV systems leaves the interaction coefficient essentially unchanged
- **Alternative electricity price data:** Different price sources and CPI-deflated prices produce consistent results
- **Alternative sunshine-radiation measure:** Using annual sunshine hours instead of radiation yields the same negative moderation effect

Sources
 Bundesministerium für Wirtschaft und Klimaschutz (BMWK) (2023). "Ziele für den Ausbau der erneuerbaren Energien: Anteil von 80 % erneuerbarem Strom bis 2030". In: Erneuerbare Energien in Zahlen – Jahresbericht 2023. Berlin: BMWK.
 Falk, Martin Thomas and Eva Hagsten (2025). "The impact of rising electricity prices on demand for photovoltaic solar systems". In: Energy Economics 147, p. 108583. DOI: 10.1016/j.eneco.2025.108583.
 Kiso, Takahiko, H. Ron Chan, and Yosuke Arino (2022). "Contrasting effects of electricity prices on retrofit and new-build installations of solar PV: Fukushima as a natural experiment". In: Journal of Environmental Economics and Management 115, p. 102685. DOI: 10.1016/j.jeem.2022.102685.