Environmentally Responsible Demand: Irresponsible Lobbying

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- No sign of path dependency: No evidence for cleaner firms (sales, knowledge stock) using lobbying less or innovating cleaner.
- Exclusive dependence on clean products and clean innovation pivotal—adding Tesla: pronounced increase in clean innovation and strong decline in pro-environmental lobbying.

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An Index of Environmental Willingness to Act

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Our Index of Willingness to Act and Survey Data

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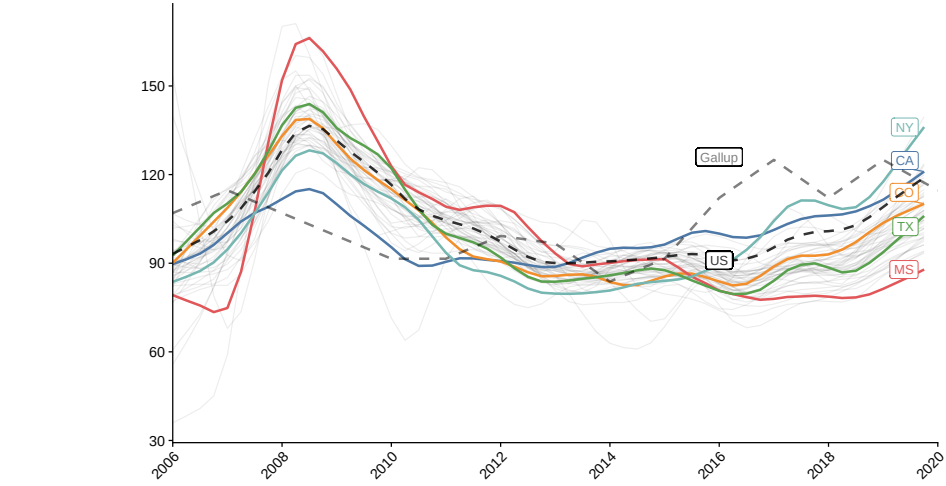
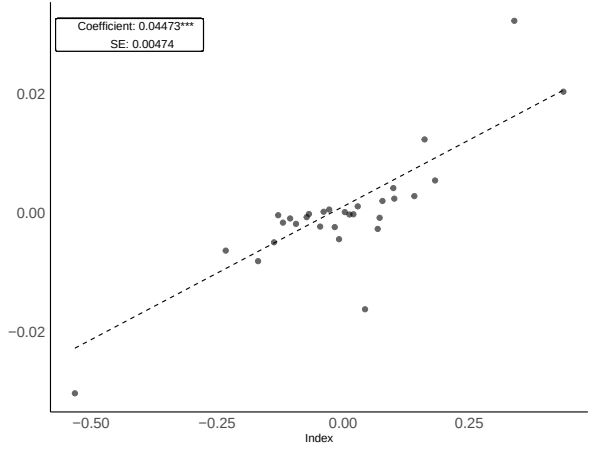


Gallup Index: *Share of people answering to the question "How worried are you by climate change?" with the strongest answer, that is "a great deal".*

State level comparison

Our Index and Electric Vehicle Consumption



Note: Binned scatter plot depicting the relation of the share of electric vehicles in new registrations on the index of willingness to act (demeaned). One bin represents 1% of the sample. The y-axis shows the demeaned share of electric vehicles in new registrations. Regression line results from fitting a fixed-effects model with state and year-quarter fixed effects. State-level population weights are applied.

- A unit deviation in the index raises the share of electric vehicle registrations by 1.3%. (relative to the weighted average across state means).

Our Index and Electric Vehicle Charging and Solar Energy Consumption

	(1)	(2)	(3)	(4)
	Probability to spend on Solar energy or EV			
$\log(\text{Index})_{(6 monthlag)}$	0.097***	0.026**	0.026**	0.031***
	(0.003)	(0.012)	(0.012)	(0.012)
Age			0.0002***	0.0002***
			($1.358e^{-5}$)	($1.358e^{-5}$)
Eq. monthly Income in k$				0.0032***
FE: year-month		X	X	X
FE: state		X	X	X
N:	178,262	178,262	178,262	177,590

Note: Data comes from the BLS's Consumer Expenditure Survey (CEX). Household sample weights are applied. Years: 2017-2019.

- 1% increase in the index 6 month earlier, raises the probability to spend on solar energy or electric vehicle charging by 1.3% relative to the observed share of 0.02.
- Income increase by 100$ per month p.c. $\Rightarrow$ 1.3% increase in probability.

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Empirical Strategy

- Shift-share instrumental variable approach:

$$\Delta y_{it} = \lambda_t + \alpha_i + \beta \Delta ENV_{it}^{GT} + \gamma X_{it} + \varepsilon_{it}, \quad \text{with } \Delta y_{i,t} = \log(y_{i,t}) - \log(y_{i,t-8}).$$

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- ΔENV_{it}^{GT}: change in consumers' willingness to act relevant to firm i between period t and $t-8$ constructed as weighted sum over states, l:

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- Environmental preferences correlated with unobservables relevant to firm behaviour $\Rightarrow$ use instrument: Identification

$$Z_{it} = \sum_{l \in L} s_{ilt-8} (Fire\ Exposure_{lt} - Fire\ Exposure_{lt-8}).$$

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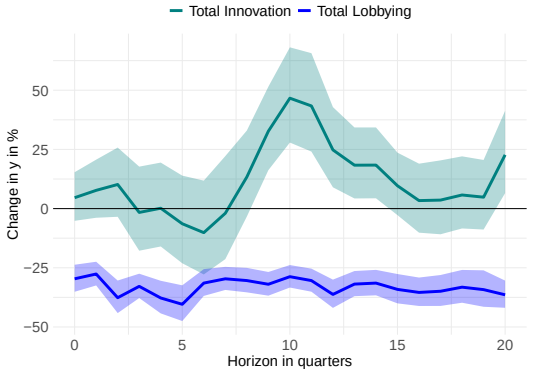
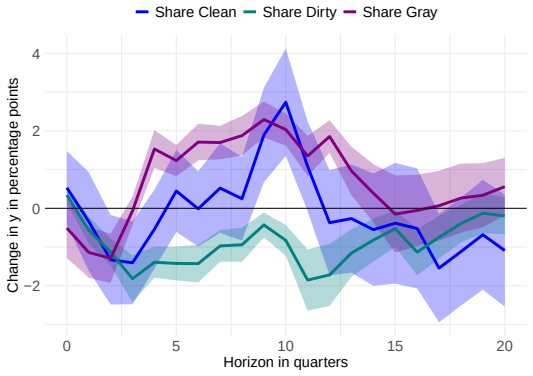
Effects on lobbying and innovation



- An increase in environmental willingness to act leads to a shift away from lobbying to research investment.

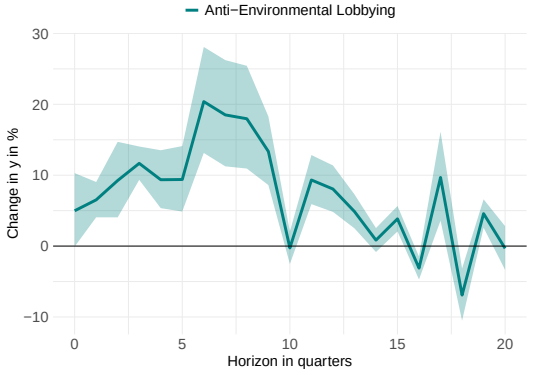
LP Model | Baseline Results

Decomposition of Innovation



- Persistent reduction in the share of dirty innovation growth. Rebound only after ≈ 4 years.
- Medium-term rise mainly in gray and technologies. Isolated spike in clean technologies.

Decomposition of Environmental Lobbying



- The average firm increases anti-environmental lobbying.

Conclusion

Policy Uncertainty

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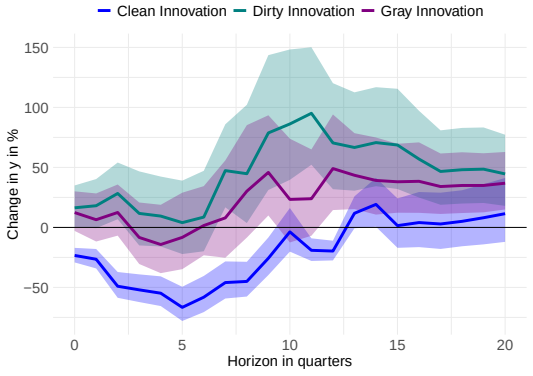

- Policy uncertainty keeps the share of dirty innovation high and suppresses the rise in clean innovation.
- Gray innovation as less politically risky alternative to clean.

Policy Uncertainty Index

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- Policy uncertainty mutes the shift to clean innovation.

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Lobbying Disclosure Act of 1995

"The term ***'lobbying contact' [or activity]*** *means any oral or written communication to a covered executive branch official or a covered legislative branch official that is made on behalf of a client with regard to i) the formulation, modification, or adoption of Federal legislation, ii) Federal rule, regulation, Executive order, or any other program, policy, or position of the United States Government, iii) the administration or execution of a Federal program or policy, iv) the nomination or confirmation of a person for a position subject to confirmation by the Senate."*

Back

Literature

Competition, innovation, and lobbying: Firms innovate to escape competitive pressures (Aghion et al. 2005; Aghion et al. 2009). Empirical validation from the trade literature (Bloom et al. 2016; Brandt et al., 2017; Hombert and Matray, 2018; Autor et al., 2020).

Lobbying can be an alternative to innovation (Akcigit et al. 2022; Bombardini et al. 2023).

→ Analysis of the effect of a demand shock: anti-environmental lobbying as an alternative. No sign of path dependency, instead clean sales seem important.

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→ Household environmental concerns *foster* anti-environmental lobbying.

Literature

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Individual social responsibility: Bénabou and Tirole, 2010; Bartling et al., 2005; Falk et al., 2021. Obstacles for social responsibility to impact the allocation of resources (Vona and Patriarca, 2011; Dobkowitz, 2022; Vermeir and Verbeke, 2006; Meis-Harris et al., 2021).

→ Focus on firm responses: the option to lobby against environmental regulation make green consumer preferences *hamper* a green transition as firms reduce clean innovation.

Firm Summary Statistics: Averages over time

Group	Clean Patents	Dirty Patents	Grey Patents	Lobbying (k$)	US Market Share in %
BMW	10.71	2.52	3.02	131.45	2.32
Daimler	5.12	0.92	2.29	438.45	2.09
FCA	4.46	1.15	1.90	1271.57	11.61
Ford	63.58	25.17	47.96	1786.18	15.03
Geely Automobile Hld.	3.19	0.88	1.83	334.69	0.52
General Motors	47.40	15.48	30.56	2773.49	19.61
Honda	41.50	16.02	11.35	769.56	9.82
Hyundai Kia Automotive Group	79.77	15.35	26.31	437.90	7.01
Isuzu	0.42	0.59	3.76		0.03
Mazda Motors Gr.	2.00	2.46	9.15	35.57	1.85
Renault-Nissan-Mitsubishi	33.79	6.35	12.58	1115.96	8.46
Subaru Gr.	4.00	0.38	1.00	2.50	2.45
Suzuki	3.69	2.28	0.79		0.38
Tata Gr.	4.56	0.68	1.26	127.92	0.45
Tesla	3.21			161.07	0.10
Toyota Group	116.10	19.15	43.31	1577.17	15.00
Volkswagen	21.77	3.46	6.67	381.64	3.34

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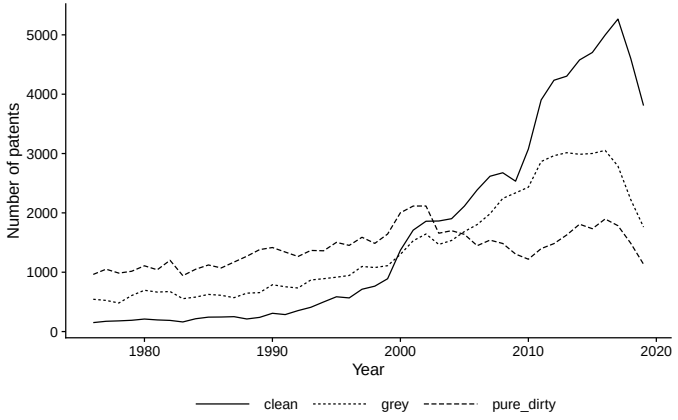
Evolution of Patents by Type



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Natural Disasters: *NASA's FIRMS*

- Satellite data of wildfires by the NASA.
- Exposure: *Fire Exposure*$_{lt}$ of state l, in time t to all wildfires in the US f:

$$FireExposure_{lt} = \begin{cases} \log\left(\sum_f \frac{\text{intensity}_{ft} \times \text{surface}_{ft}}{\text{distance}_{flt}^3}\right), & \text{if distance} \leq 1000\,\text{km} \\ 0, & \text{otherwise} \end{cases} \quad (1)$$

  - intensity: fire's radiative power
  - surface: size of fire
  - distance: distance between the fire and the state

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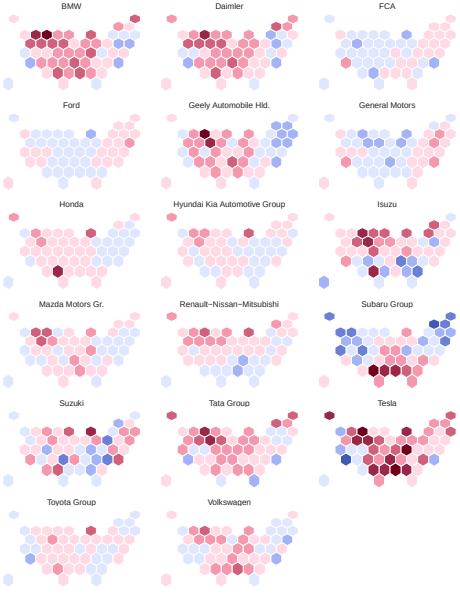
Market Shares by Firm



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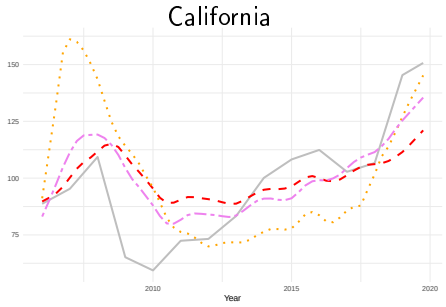
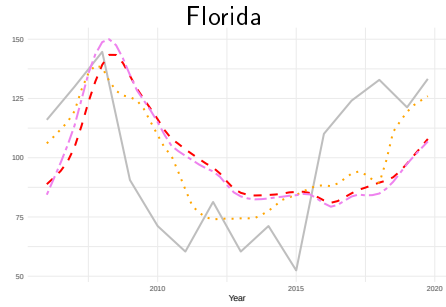
Comparison to Gallup Survey on State Level





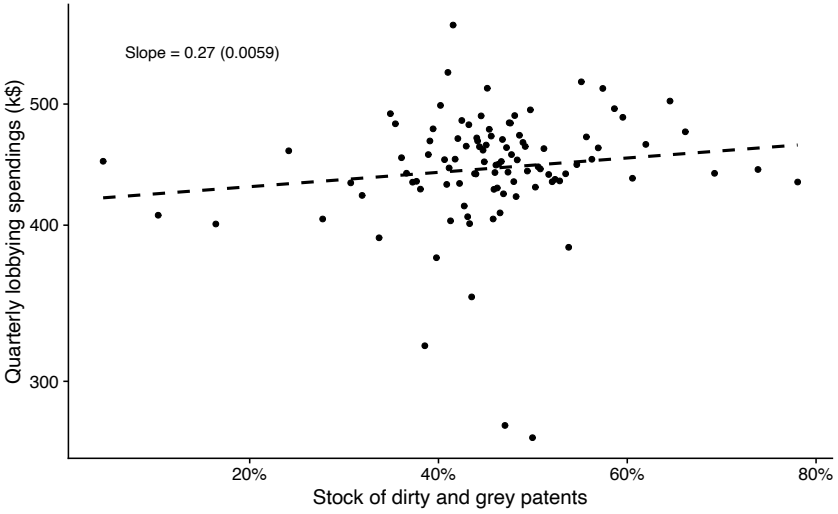
Gallup: Sample Share Worried about Climate Change 'A Great Deal'

Google Trends: Willingness to Act

Google Trends: General Environmental Interest

Google Trends: Mixed

Dirty Innovation and Lobbying



SSIV Research Design: Identification

Consistency of the estimator follows from Borusyak, Hull and Jaravel (2022).

- *Conditional quasi-random shock assignment:* Quasi-random assignment of shocks within clusters (determined by controls) $\Rightarrow$ shocks can vary systematically across clusters (e.g. states) but not within. Shock balance test

- *Many uncorrelated shock residuals:* law of large numbers equivalent

  (1) Shocks are not to be concentrated in few observations $\Rightarrow$ number of shocks grows with the sample

  Inverse of the Herfindahl Index of weights > 700 (the higher, the smaller the concentration of shocks) Shocks Shares

  (2) Shock *residuals* are uncorrelated.

- *Relevance Condition:* The instrument has power Montiel-Pflueger First-Stage F

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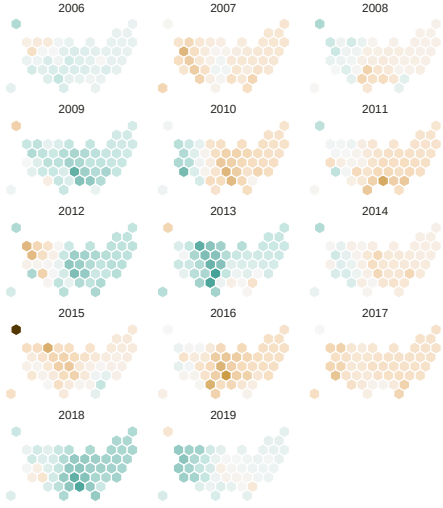
Fire Exposure by State



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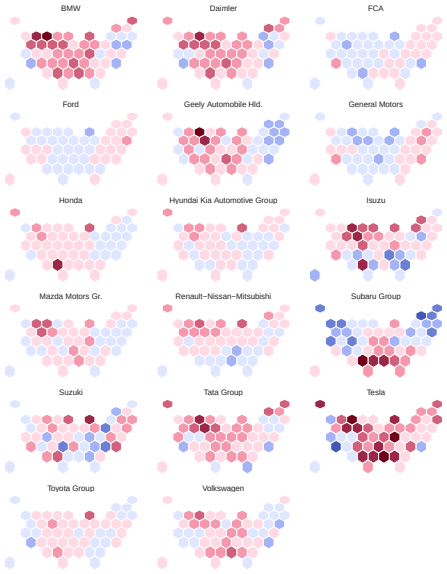
Firm Market Shares



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Summary Statistics of Shocks and Shares

	Mean	Std. dev.	p5	p95
$\Delta FIRE_{lt}$	−0.05	0.01	−0.02	0.03
$\Delta FIRE_{lt}$ (w. period FE)	0.00	0.01	−0.01	0.01

Panel A: Shocks Summary Statistics

	Mean	Max
$1/HHI$	736.17	736.17
s_{lt} (pct)	0.05	0.42
Treatment Groups	50.00	50.00

Panel B: Shares Summary Statistics

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Shock Balance Tests at the State-Level

Balance variable	Coef.	SE
# Registrations	-0.004	(0.003)
# Clean registrations	-0.000	(0.001)
Share of republican votes	-0.007	(0.006)
Share pop. commuting by personal car	0.002	(0.004)
Share pop. commuting by public transportation	-0.001	(0.003)
Share pop. commuting by bicycle	0.004	(0.007)
Share pop. working remotely	-0.042	(0.042)
# New EV charging stations	0.026***	(0.003)
Share of active pop.	0.002	(0.003)
Share of young pop.	0.009*	(0.005)
Share of urban pop.	-0.001	(0.007)
Income per capita	0.003	(0.000)

# of state-period: 2000

$$FireExposure_{lt} - FireExposure_{lt-8} = \alpha + \beta PredetVar_{lt-8} + \varepsilon_{lt}$$

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Shock Balance Tests at the Firm-Level

Balance variable	Coef.	SE
Log total lobbying expenditures	0.315	(0.222)
Log environmental lobbying expenditures	-0.126	(0.182)
Log knowledge stock clean technologies	-0.147	(0.114)
Log knowledge stock dirty technologies	0.020	(0.049)
Log knowledge stock gray technologies	-0.077	(0.079)
Log (1+# clean patents)	-0.108	(0.154)
Log (1+# dirty patents)	-0.523	(0.427)
Log (1+# gray patents)	0.197	(0.206)
Log (1+# clean patents) - log (1+# dirty patents)	0.124	(0.221)

# of firm-period: 924

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Local Projection Specification

$$\Delta y_{i,t+h} = \lambda_t^h + \alpha_i^h + \beta_{i,t}^h \Delta ENV_{i,t}^{GT} + \gamma^h X_{i,t} + \epsilon_{i,t+h} \qquad h = 0, ..., H.$$

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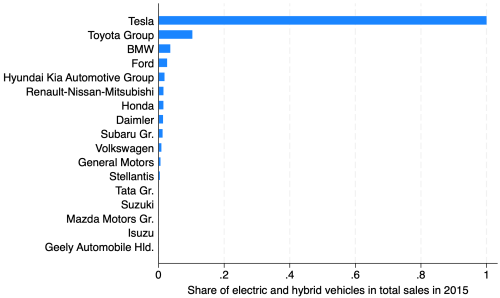
Baseline Results

	OLS				IV			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta_8 ln(lobby)$ *Lobbying (Environment Topics)*								
$\Delta_8 ENV^{GT}$	1.39	1.12	0.79	0.68	8.28***	8.08***	7.48***	7.43***
	(1.39)	(1.17)	(1.25)	(1.30)	(2.35)	(2.51)	(2.73)	(2.74)
$\Delta_8 ln(lobby)$ *(Total)*								
$\Delta_8 ENV^{GT}$	-9.85***	-11.47***	-11.89***	-11.65***	-30.30***	-31.62***	-34.90***	-35.34***
	(2.65)	(3.19)	(3.52)	(3.64)	(3.86)	(4.26)	(4.90)	(4.95)
Δ_8 *ln(Clean Knowledge Capital)*								
$\Delta_8 ENV^{GT}$	-1.40	-1.98	-1.84	-2.07	-11.61***	-12.26***	-13.20***	-13.46***
	(1.95)	(2.15)	(2.18)	(2.10)	(2.01)	(2.19)	(2.79)	(2.69)
Δ_8 *ln(Dirty Knowledge Capital)*								
$\Delta_8 ENV^{GT}$	-61.36***	-59.70***	-59.39***	-60.10***	-44.94***	-44.24***	-41.43***	-41.34***
	(20.40)	(19.82)	(19.58)	(20.10)	(13.83)	(13.77)	(13.05)	(13.11)
Δ_8 *ln(Gray Knowledge Capital)*								
$\Delta_8 ENV^{GT}$	-11.58**	-10.19**	-9.48*	-10.10**	-10.40	-9.88	-7.92	-7.73
	(5.41)	(5.00)	(4.93)	(4.82)	(9.10)	(9.02)	(9.31)	(9.32)
FE: year-quarter	X	X	X	X	X	X	X	X
FE: state-quarter	X	X	X	X	X	X	X	X
Firm Trend	X	X	X	X	X	X	X	X
Lagged Firm Controls	X	X	X	X	X	X	X	X
Lagged Demographic Controls		X	X	X		X	X	X
Lagged Transportation Controls			X	X			X	X
Lagged Political Controls				X				X
N (states - periods)	1970	1970	1970	1970	1970	1970	1970	1970
Montiel-Pflueger first-Stage F					218	207	114	114

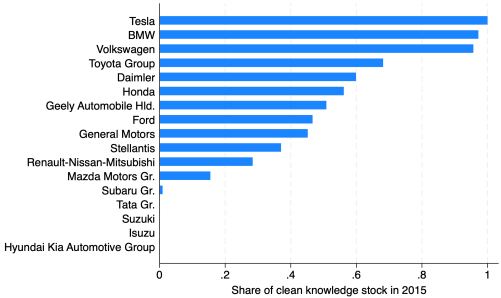
back identification back results

Tesla is special

Share of clean revenues 2015



Share of clean knowledge stock 2015



- Tesla differs in terms of sales and only firm without non-clean knowledge stock.

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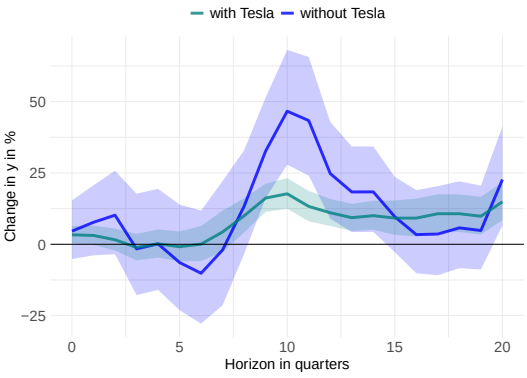
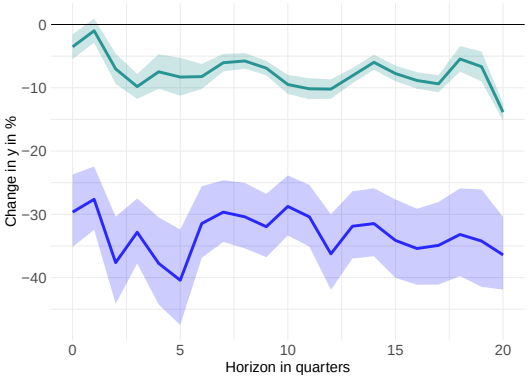
Adding Tesla

Innovation



Lobbying



- Main adjustment strategy remains: innovate more, lobby less.
- Permanent increase in innovation growth.

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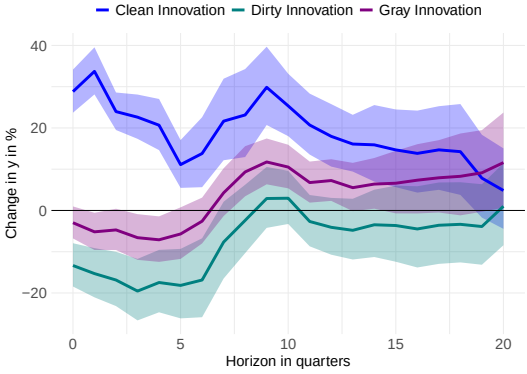
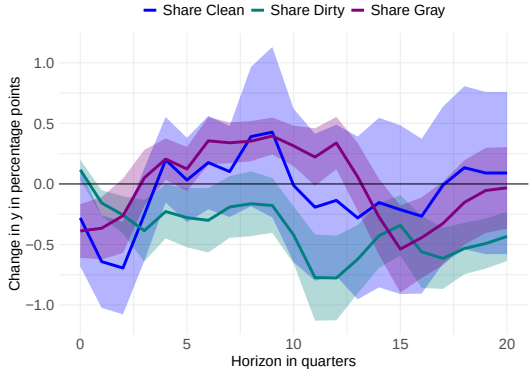
Decomposition of Innovation





- Initial pronounced reduction in dirty innovation growth. Likewise, yet extended, decline in clean innovation growth.
- Medium-term rise in innovation growth driven by growth of gray technologies.

Policy Uncertainty: Measure

"We aim to capture uncertainty about ***who will make economic policy decisions, what economic policy actions will be undertaken and when****, and the economic effects of policy actions (or inaction)—including uncertainties related to the economic ramifications of "noneconomic" policy matters, for example, military actions. Our measures capture both near-term concerns (e.g., when will the Fed adjust its policy rate) and longer term concerns (e.g., how to fund entitlement programs), as reflected in newspaper articles."*

Baker, Bloom, and Davis (2016)

- Based on newspaper coverage of policy-related economic uncertainty; disagreement between economic forecasters; and tax code provisions set to expire.

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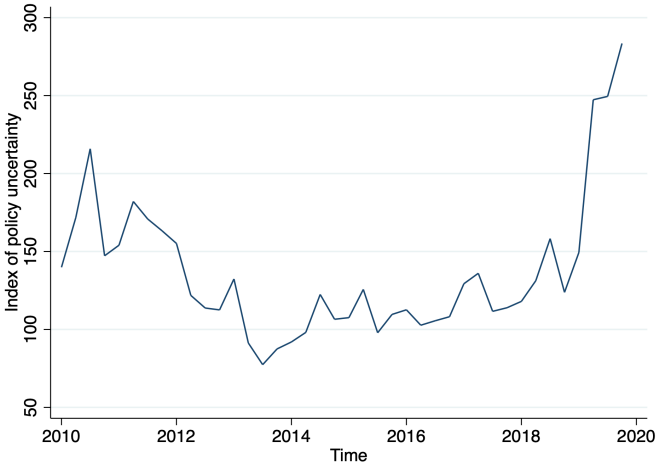
Policy Uncertainty: Index



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