Smokestacks and the Swamp

Emilio Bisetti
HKUST

Stefan Lewellen
Penn State

Arko Sarkar
HKUST

Xiao Zhao
HKUST

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Political Ideology and Firm Behavior

- How do politicians' ideologies affect firms' operating decisions?
  - We know that *firms'* political ideologies affect their decisions (Hutton et al., 2014, 2015; Di Giulia and Kostovetsky, 2014; Fos et al., 2021)
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Political Ideology and Firm Behavior

- How do politicians' ideologies affect firms' operating decisions?

Rep. Neal Dunn
(R–Panama City)

Rep. Al Lawson
(D–Tallahassee)

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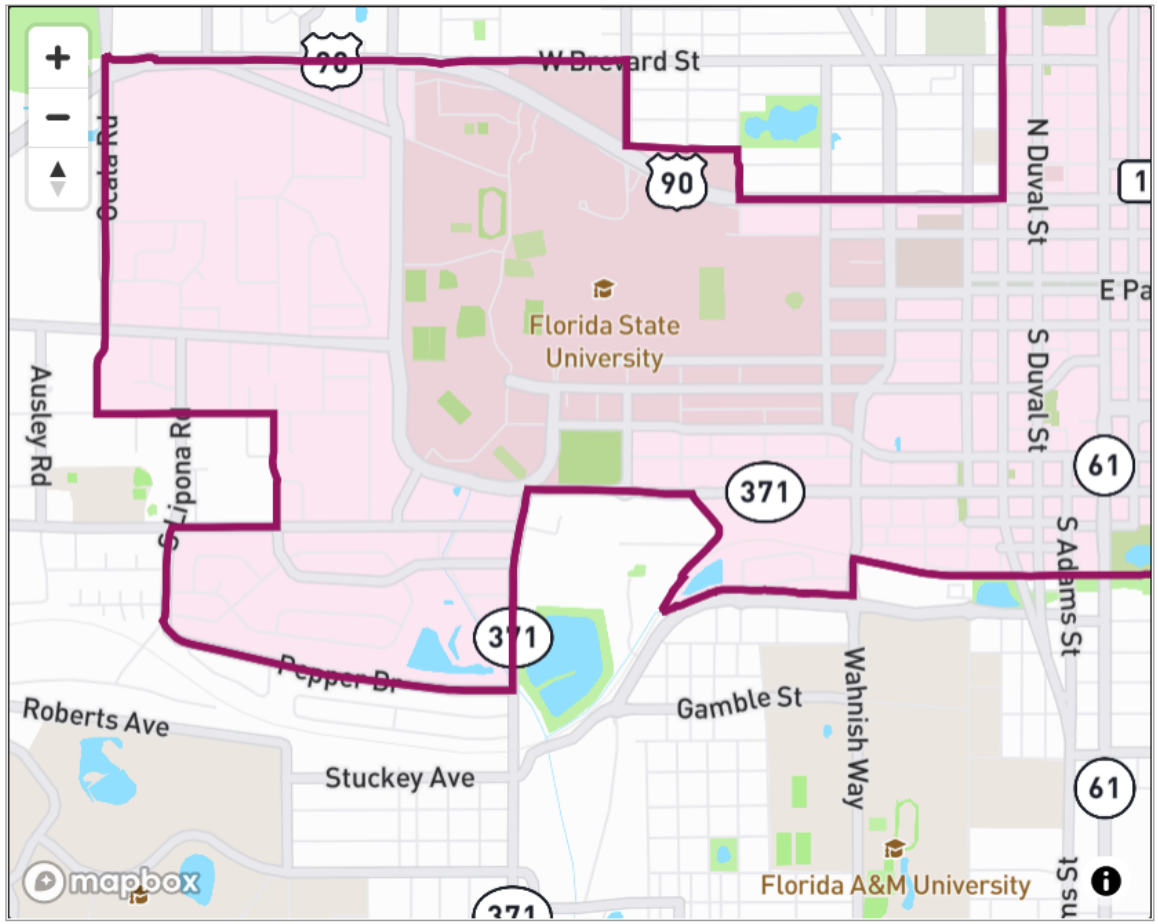

Political Ideology and Firm Behavior

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  1. Can't use legislation
  2. Difficult to measure effect of political speech on firms
  3. Politicians are not chosen randomly
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What we do

- **Examine impact of close U.S. Congressional elections on firm emissions and production**
  - We use close elections as a shock to political ideology
  - Emissions represent a measurable firm action
  - Regression discontinuity (RD) design
  - Real effects: changes in pollution-related health problems
  - Also examine inspections and enforcement data from EPA/states

- **As proxy for political ideology, we use the *political party* of the winning candidate**
  - Virtually 100% of LCV-endorsed politicians are Democrats
    - Al Lawson: LCV 2020 score of 100%; lifetime score of 87%
    - Neal Dunn: LCV 2020 score of 5%; lifetime score of 4%
  - Numerous tests support ideological channel

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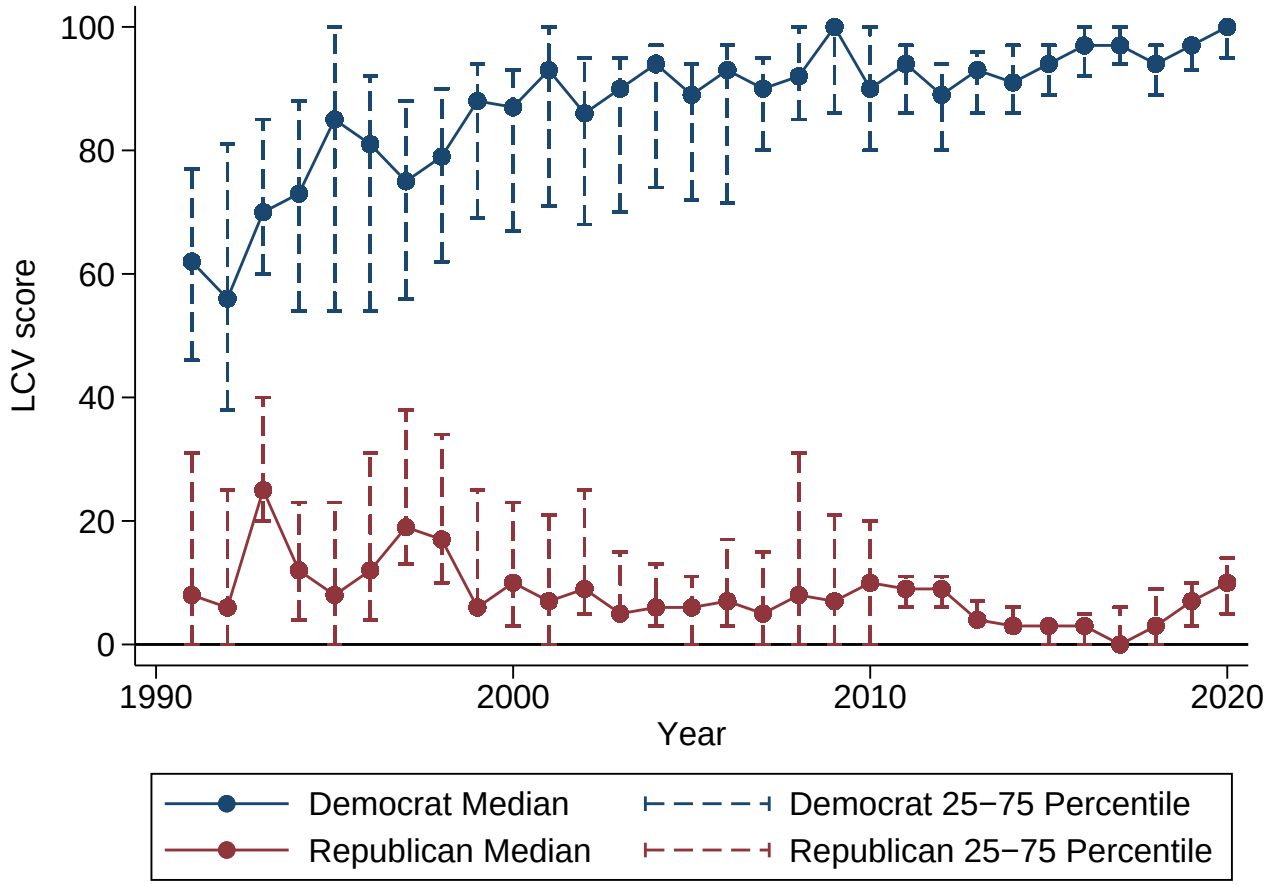
LCV scores for Democrats vs. Republicans over time



What we find

1. Firm pollution decisions vary based on political party of their U.S. representative
   - Pollution significantly lower in districts represented by a closely-elected Democrat
     - (Very) large magnitudes
     - No differences in production
   - Firms reallocate pollution between their facilities based on the party affiliation of politicians
2. Mechanism (suggestive)
   - Inspections and enforcement by environmental agencies increase when district is represented by a Democrat
3. Real effects
   - Pollution-related illnesses are lower in areas around plants when district is represented by a Democrat

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Literature

- Political economy
  - Konisky and Woods (2003), Monogan et al. (2017), Lipscomb and Mobarak (2018)
- Environmental economics
  - Helland and Whitford (2003), Neumayer (2003), Fredriksson et al. (2005)
- Finance
  - Firm pollution: Akey and Appel (2020), Hsu, Li, and Tsou (2020), Shive and Forster (2020)
  - Politicians influencing regulators: Mehta et al. (2020), Mehta and Zhao (2020), Akey et al. (2021)
  - Firms' political ideologies: Kim et al. (2013), Di Giulia and Kostovetsky (2014), Hutton et al. (2014, 2015), Unsal et al. (2016), Elnahas and Kim (2017), Fos et al. (2021)
- Strategy and Organizational Behavior
  - Briscoe and Joshi (2017), Gupta and Wowak (2017), Gupta et al. (2017), Park et al. (2020), Gupta et al. (2021)

Background: Theory

- Why would a firm change its behavior because of the ideology of its U.S. representative?
- Assumption: firm managers maximize value
- A handful of possible channels:
  - Political favor-trading
  - Political interference (e.g. pushing for more/less enforcement)
  - Catering to voting blocs
  - Information content of elections
  - Omitted variables (credit/procurement/employment, etc.)
- Our results are most consistent with political interference through enforcement
  - Changes in expected enforcement intensity cause firms to re-optimize pollution decisions

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Data

- We focus on the U.S. House of Representatives from 1991 to 2016
  - 435 districts divided among states every 10 years based on population
  - Biennial election cycle (even-numbered years)
- Main data sources
  - TRI: Toxic Release Inventory (770 chemicals in 33 categories)
    - Emissions at the facility-year-chemical level
  - ECHO: Enforcement and Compliance History Online
  - Federal Election Commission: Candidate data, election results
  - Lewis et al. (2013): Congressional district shapefiles
- Other data sources
  - Health data: Center for Medicare and Medicaid Services (CMS)
    - Hospital level data on utilization and payments

Regression discontinuity design

Our main tests employ a **regression discontinuity (RD) design**

- Ferreira and Gyourko (2009), Akey (2015), Do et al. (2012), etc.

Our RD tests take two forms:

1. Local linear OLS regressions
   - The sample is restricted to elections with a margin of 5% or less.

$$\begin{aligned} Y_{i(jd)ct} = \beta_1 \text{Democrat Win}_{dt} + \theta f(\text{Win Margin}_{dt}) \\ + \delta \text{Democrat Win}_{dt} \times f(\text{Win Margin}_{dt}) + \beta^c + \epsilon_{it} \ . \end{aligned}$$

2. Nonparametric polynomial specifications
   - Calonico et al. (2014) and Cattaneo et al. (2019): construct nonparametric RD tests with an optimally-selected bandwidth

$$Y_{i(jd)t} = \beta_1 \text{Democrat Win}_{dt} + \theta g(\text{Win Margin}_{dt}) + \epsilon_{it}$$

Baseline results: RD tests on Emissions

- Main prediction: Lower pollution after a Democrat wins close election.

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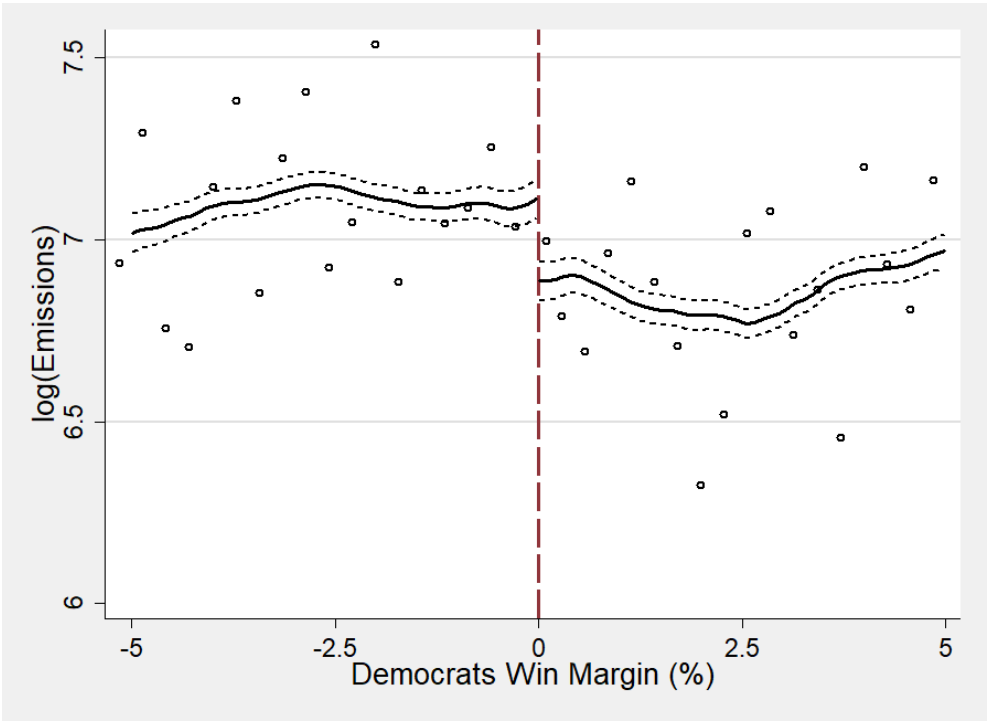

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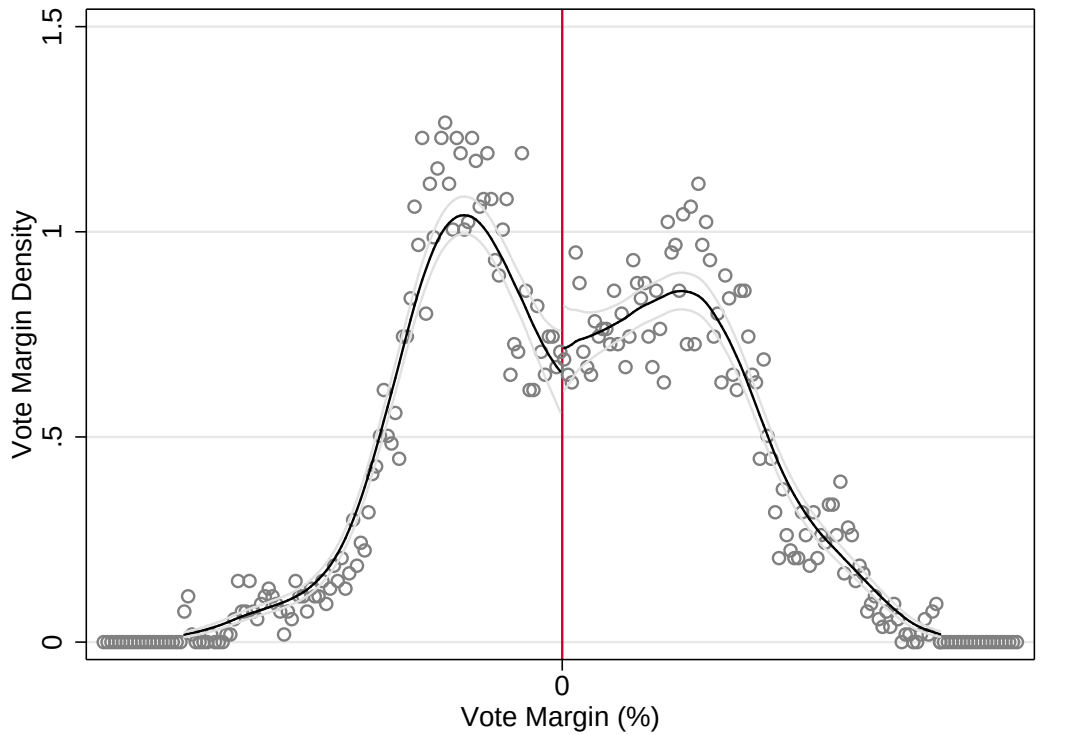
Baseline results: RD tests on Emissions

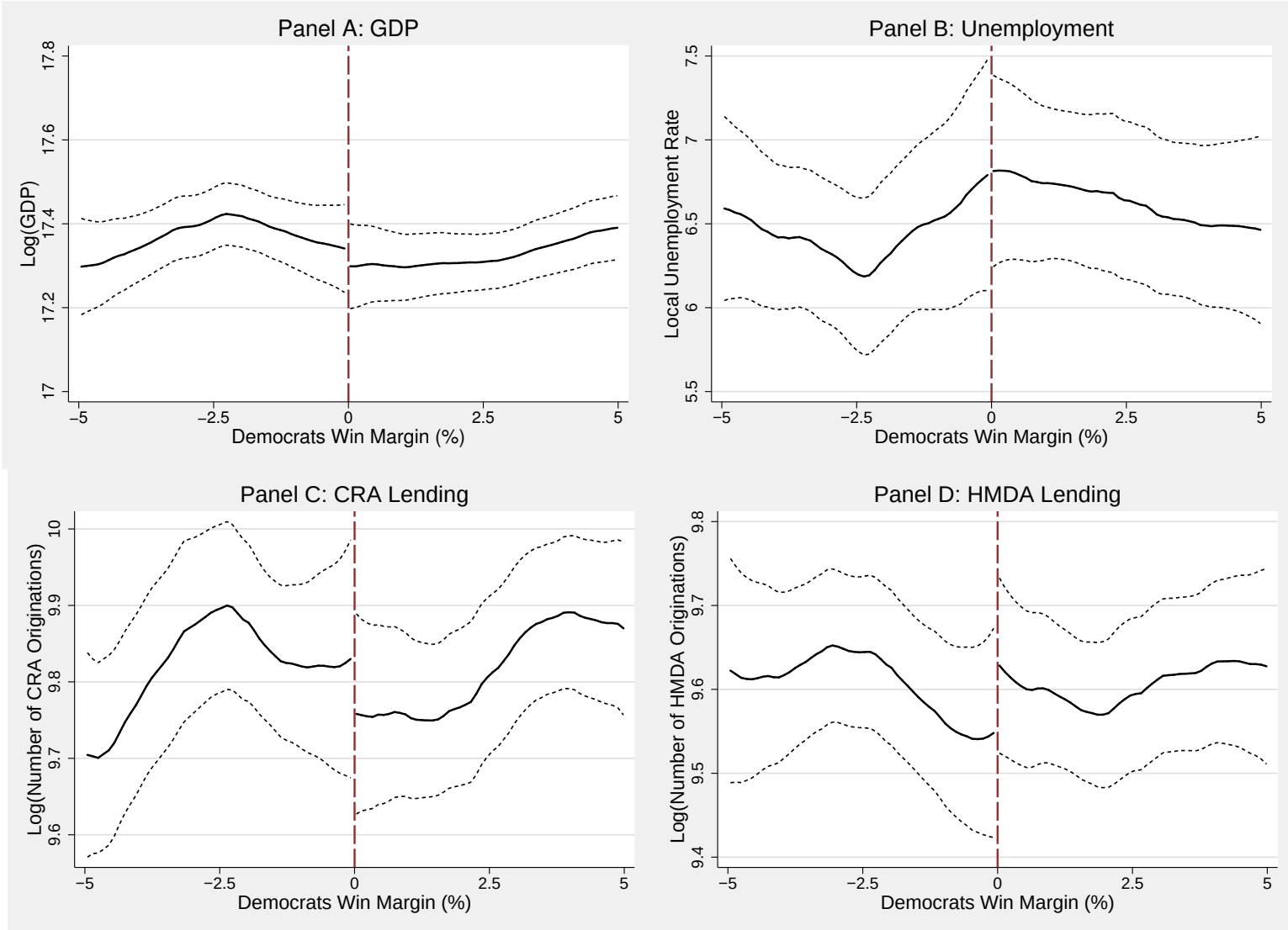
	Dep. Variable: log(Emissions)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Democrat Win	-0.213**	-0.397**	-0.305***	-0.355***	-0.349***	-0.353***	-0.355***
	(0.08)	(0.16)	(0.12)	(0.03)	(0.03)	(0.04)	(0.04)
Method	Local OLS	Local OLS	Local OLS	NP	NP	NP	NP
Polynomial	Zero	Linear	Linear	Linear	Linear	Quadratic	Quadratic
Kernel	–	–	–	Tri.	Epa.	Tri.	Epa.
Chemical FE	No	No	Yes	–	–	–	–
Observations	94,140	94,140	94,111	1,329,508	1,329,508	1,329,508	1,329,508

- Two different RD methods produce similar results

Robustness: McCrary (2008) test

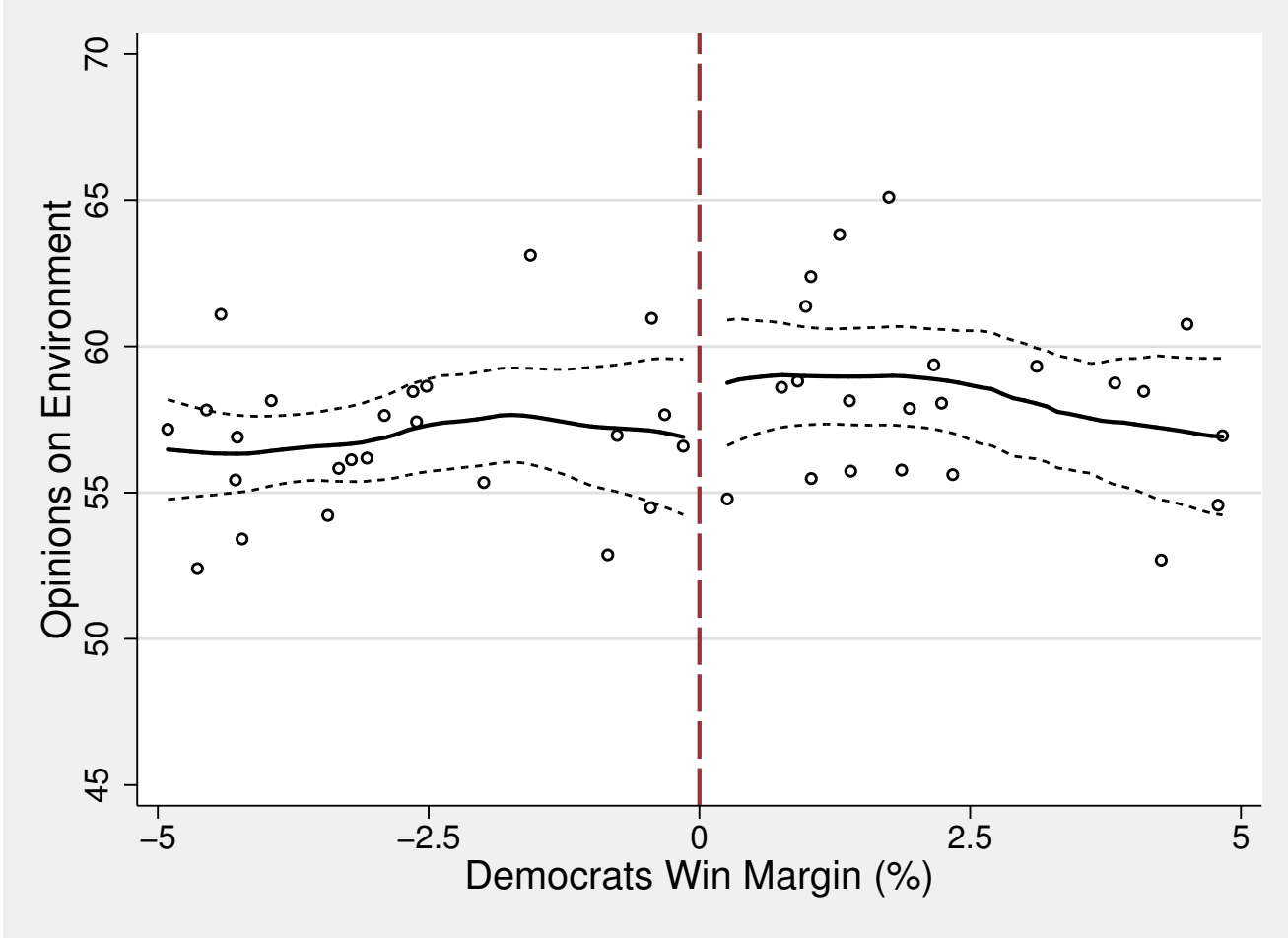


Robustness: Covariate balance

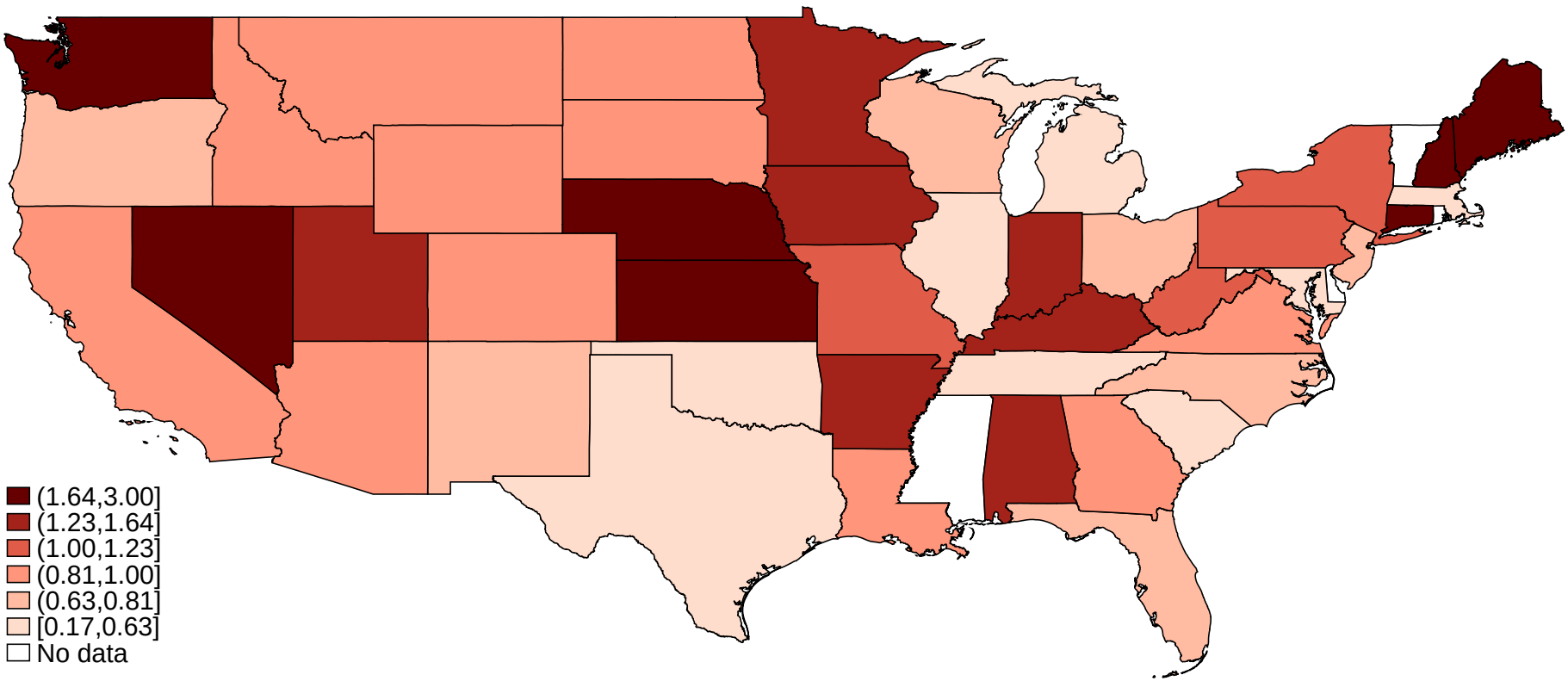


Robustness: Public opinion about the environment

- Data from Yale Climate Opinion Maps, 2020



Robustness: Close election propensity



Robustness: RD tests on residuals

- First, regress emissions on district and state × chemical × year FE (columns 1-2) or firm × chemical × year FE (columns 3-4)
- Then perform RD on residuals
  - Similar to Lowes and Montero (2020)

	Dep. Variable: log(Emissions) Residuals			
	(1)	(2)	(3)	(4)
Democrat Win	-0.145**	-0.031*	-0.034	-0.052***
	(0.07)	(0.02)	(0.07)	(0.02)
Method	Local OLS	NP	Local OLS	NP
Polynomial	Linear	Linear	Linear	Linear
Kernel	–	Tri.	–	Tri.
Chemical FE	Yes	–	Yes	–
Observations	90,555	1,281,479	57,320	811,995

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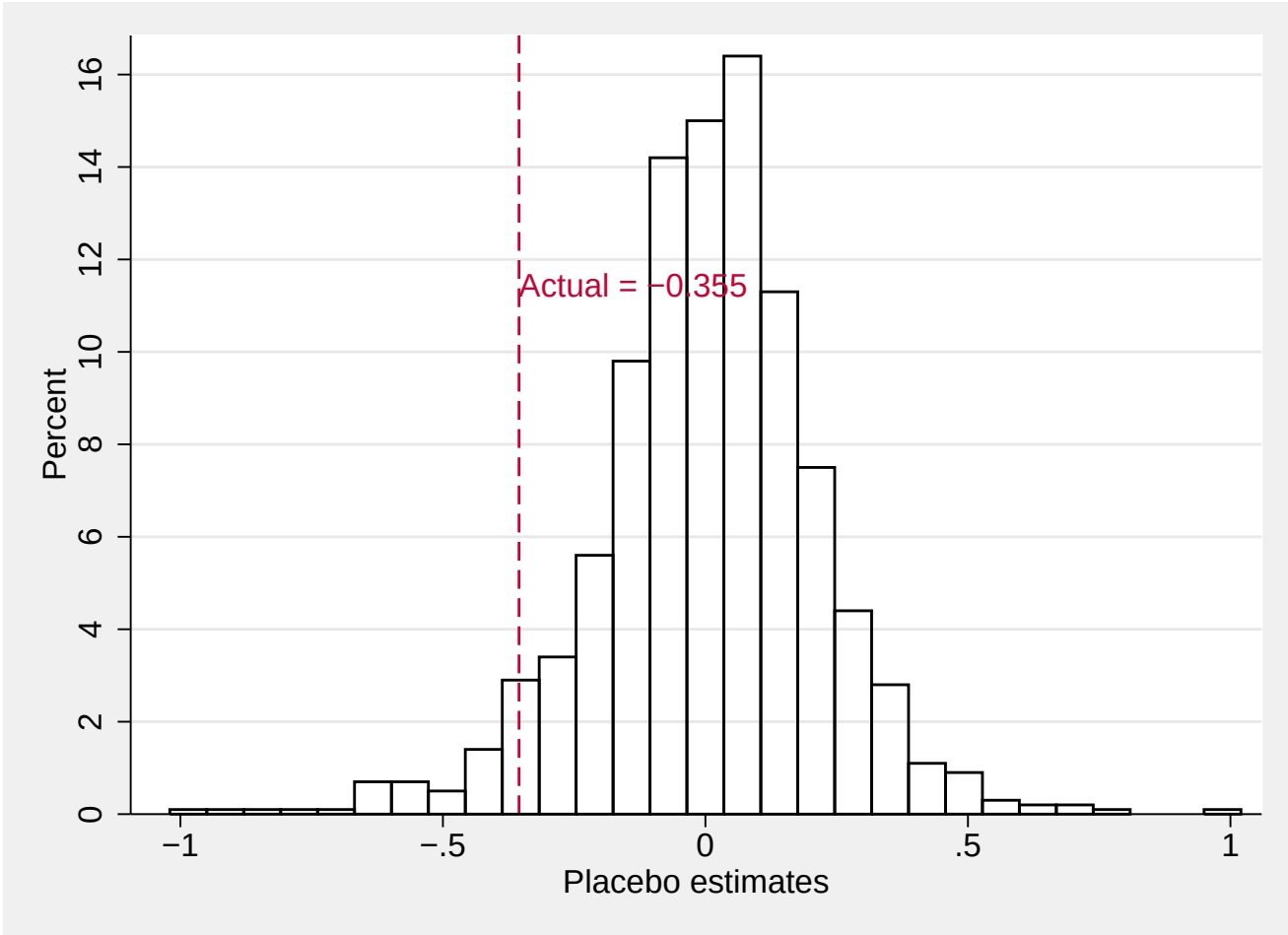
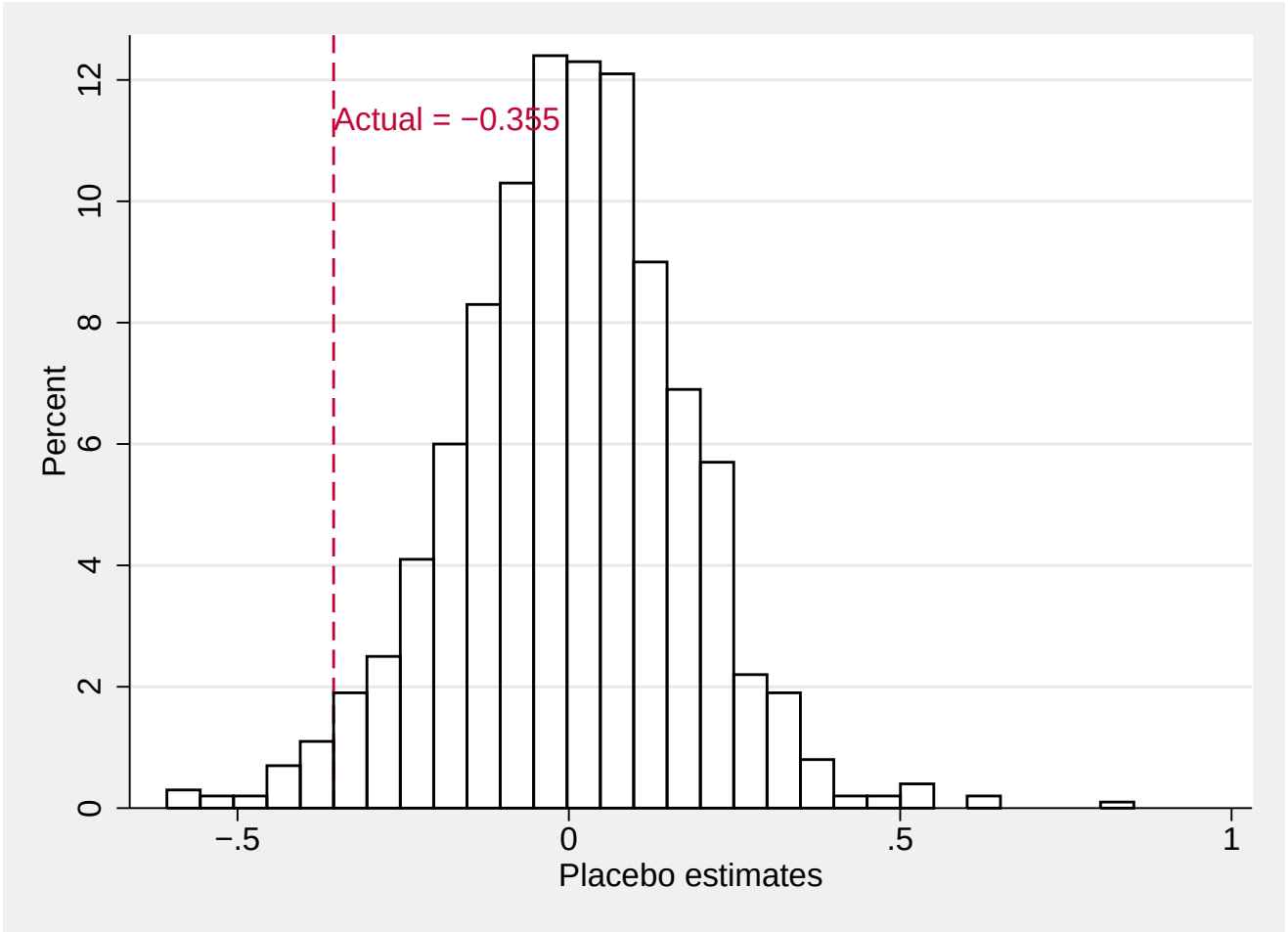
Robustness: Placebo tests (randomized vote margin)



Robustness: Placebo tests (randomized political party)



Robustness: Is effect coming from higher production?

- Pollution *per unit* of production falls significantly

	log(Cumulative Emissions/Production)	
	(1)	(2)
Democrat Win	-0.102*	-0.073***
	(0.06)	(0.02)
Method	Local OLS	NP
Polynomial	Linear	Linear
Kernel	–	Tri.
Chemical FE	Yes	–
Observations	84,304	1,178,094

- Buntaine, Greenstone, He, Liu, Wang, and Zhang (2021) use abatement electricity data to show that firms dial up/down abatement devices to control pollution without affecting production

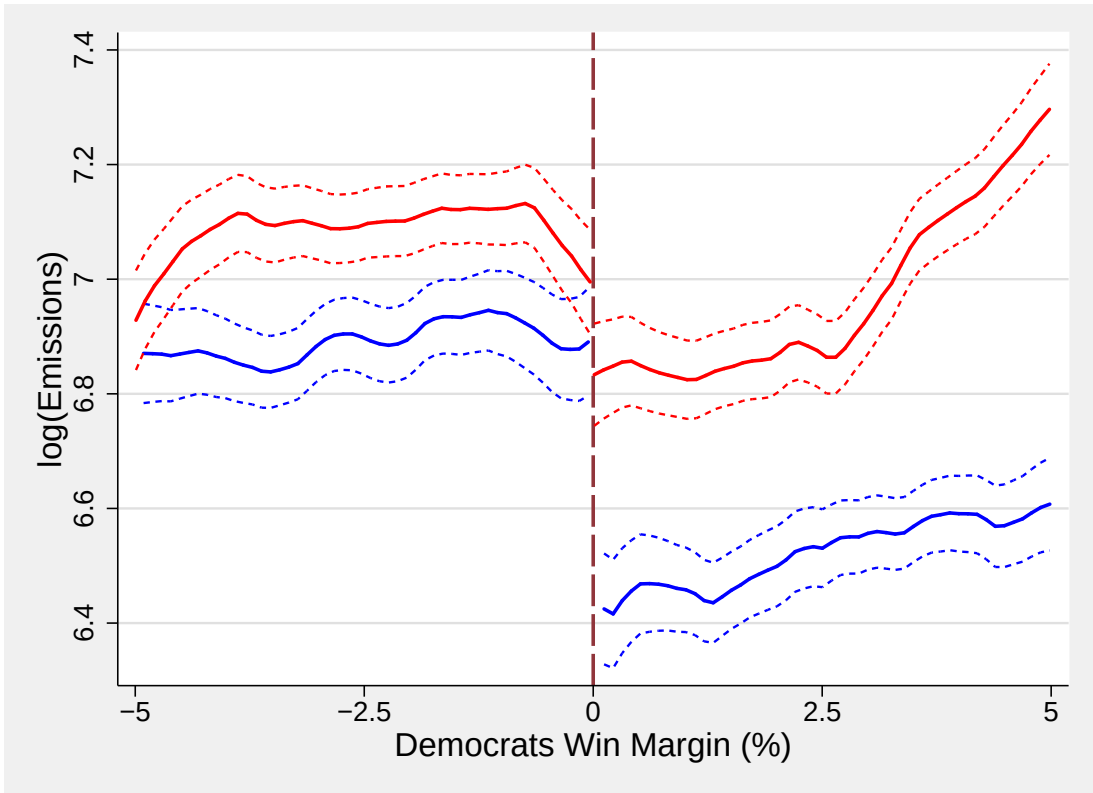
Robustness: Is effect coming from higher production?

- Production level does not change after close Democrat win

	log(Cumulative Production)	
	(1)	(2)
Democrat Win	0.000	0.010
	(0.02)	(0.01)
Method	Local OLS	NP
Polynomial	Linear	Linear
Kernel	–	Tri.
Chemical FE	46,618	630,875

Robustness: Are governors driving the effect?

- We would expect results to be stronger under Democratic governors, but they should also exist under Republican governors



Ideology: Theory

- Goal: identify effect of politicians' ideology on firm outcomes
- We use political parties *as a proxy for* ideology
  - Interparty variation >>> Intraparty variation

- Determinants of ideology
  - Personal beliefs
  - Electoral/career incentives
  - Median voter model: policies targeted at median voter
    - Large pollution changes despite no differences in public opinion
  - Lobby/voting bloc model: policies aimed at specific voting blocs
    - Large pollution changes despite no obvious voting bloc changes

- Question: Are political parties reasonable proxies for politicians' personal ideologies?

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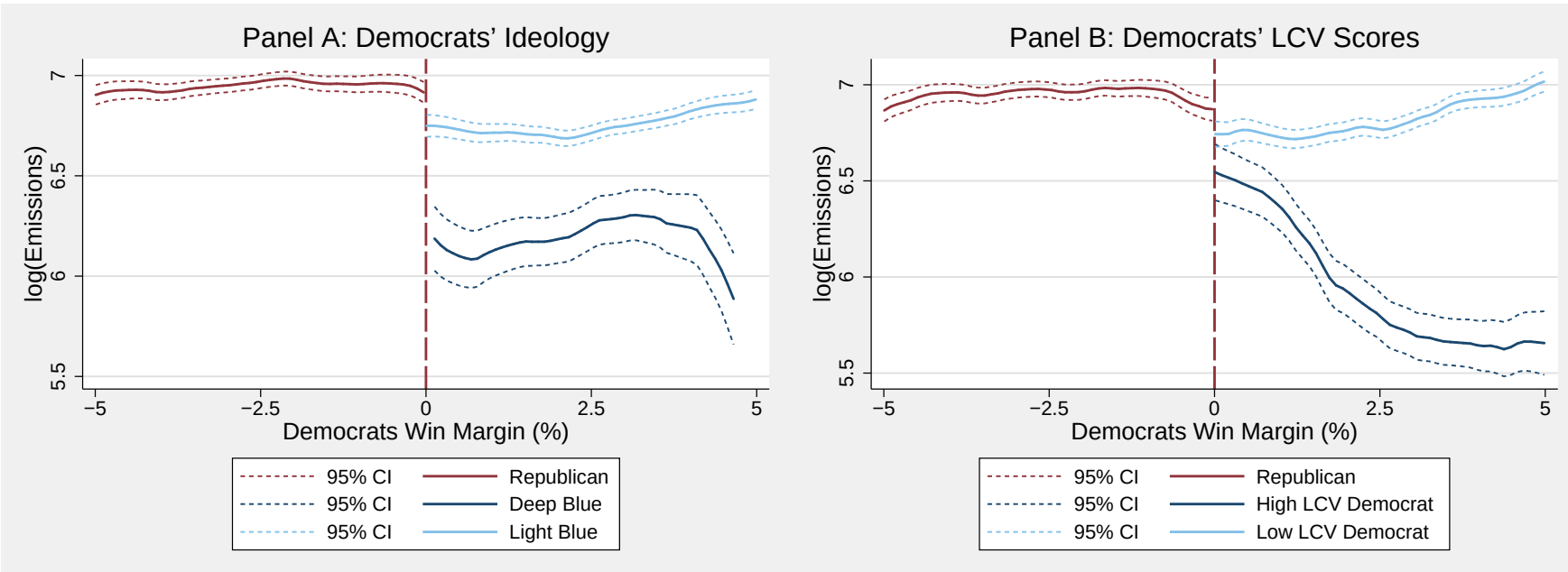
Ideology: *Within-party* ideology differences

- We would expect results to be stronger for liberal versus moderate Democrats



Ideology: Switchers

- Define Switchers
  - A district switches from being represented by a Democrat to being represented by a Republican (and vice versa)

R-D switchers

D-R switchers

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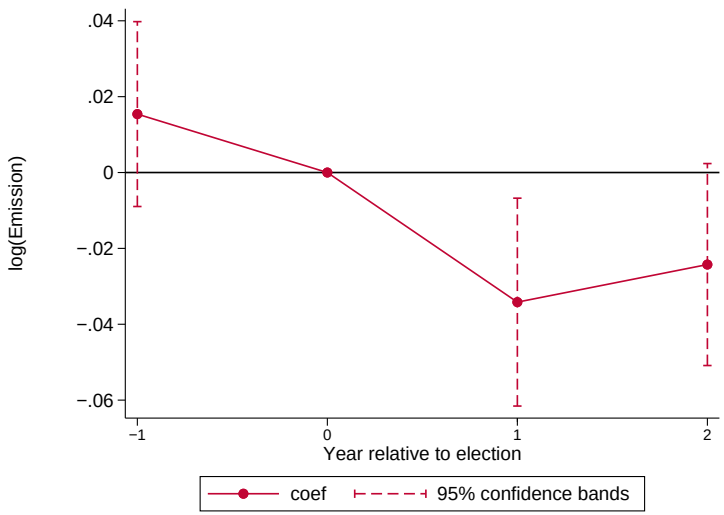

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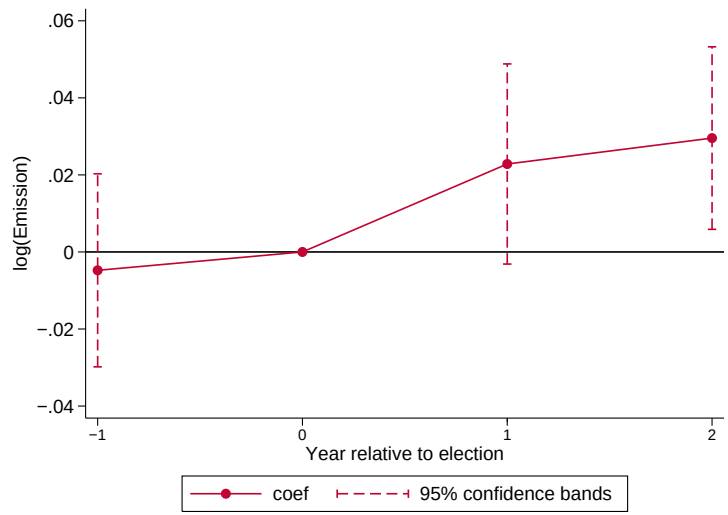

D-R switchers

Ideology: Switchers

	log(Emissions): R-D Switchers		log(Emissions): D-R Switchers	
	(1)	(2)	(3)	(4)
Switchers × Post Election	-0.059***		0.029***	
	(0.01)		(0.01)	
Switchers × Election Year -1		0.008		-0.005
		(0.01)		(0.01)
Switchers × Election Year +1		-0.061***		0.023*
		(0.01)		(0.01)
Switchers × Election Year +2		-0.049***		0.030**
		(0.01)		(0.01)
Low-Order Terms	Yes	Yes	Yes	Yes
District × Election Year FE	Yes	Yes	Yes	Yes
Facility × Chemical FE	Yes	Yes	Yes	Yes
Observations	1,516,595	1,516,595	1,407,224	1,407,224

- Relative emissions at facilities in R-D district decline by approximately 6% and relative emissions at facilities in D-R district rise by approximately 3%.

Ideology: Political power interactions

- Political power is a necessary condition for our channel
- Holding power fixed, should see strongest effects for *more ideological* politicians
  - Less environmental engagement → less likely to intervene

	Dep. Variable: log(Emissions)		
	(1)	(2)	(3)
Democrat Win	-0.026**	-0.020*	-0.020*
	(0.01)	(0.01)	(0.01)
Democrat × Chair	0.039	0.017	0.016
	(0.04)	(0.04)	(0.04)
Ideological × Democrat × Chair	-0.143**	-0.168**	-0.222***
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Firm × Chemical × Year FE	Yes	Yes	Yes
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State × Year × Chemical FE	No	No	Yes
Observations	761,731	761,731	718,698

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Firm Reallocation: Cross-sectional OLS

- Do firms reallocate pollution across plants due to party affiliation of representatives?

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	(1)	(2)	(3)	(4)	(5)
Democrat Win	-0.058***	-0.044***	-0.026*	-0.020**	-0.025**
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Linear Interaction	No	No	No	No	Yes
District FE	Yes	Yes	No	No	No
Year FE	Yes	No	No	No	No
Firm × Year FE	No	Yes	No	No	No
District × Chemical FE	No	No	Yes	No	No
Firm × Chemical × Year FE	No	No	Yes	Yes	Yes
Facility × Chemical FE	No	No	No	Yes	Yes
Observations	1,329,508	1,293,847	796,544	782,632	782,632

- Suggestive of within-firm reallocation of pollution
- Also rules out channels such as firms' political beliefs

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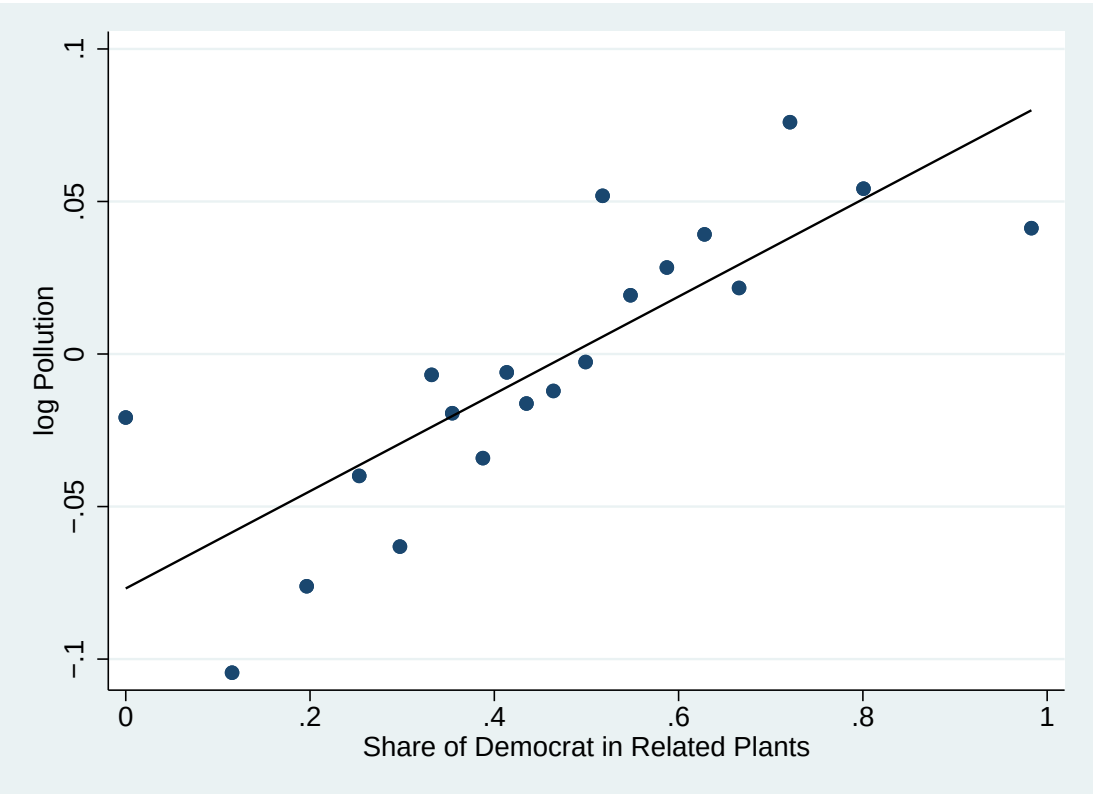
Firm Reallocation: Bertrand-Mullainathan-style strategy

- Define *Other Facilities' Democrat Share*
  - The extent to which the firm's other plants are represented by Democrats.

- Plants pollute more if other plants owned by the same firm have a high Democrat share.

Firm Reallocation: Bertrand-Mullainathan-style strategy

- Define *Other Facilities' Democrat Share*
  - The extent to which the firm's other plants are represented by Democrats.



- Plants pollute more if other plants owned by the same firm have a high Democrat share.

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	log(Pollution) (1)	log(Pollution) (2)	log(Pollution) (3)	log(Pollution) (4)
Other Facilities' Democrat Share	0.028**	0.063***		
	(0.013)	(0.015)		
Local Democrat	-0.018*		-0.017*	
	(0.011)		(0.010)	
High Democrat Share			0.015**	0.027***
			(0.007)	(0.008)
Chemical × Year	Yes	No	Yes	No
Facility × Chemical	Yes	Yes	Yes	Yes
District × Chemical × Year	No	Yes	No	Yes
Adj.-R^2	0.890	0.922	0.890	0.922
Obs.	1,128,556	897,686	1,128,556	897,686

- Even after completely absorbing time-varying factors at the local district level (column 2 and 4), pollution is higher at the local facility by as much as 3-6% when the firm's other facilities are represented by Democrats.

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Mechanism: Theory

- Recall, a handful of possible channels:
  1. Political favor-trading
  2. Time-varying enforcement
  3. Catering to voting blocs
  4. Information content of elections
  5. Omitted variables (credit/procurement/employment, etc.)

- Existing tests find little support for 3, 4, and 5
  - Voting blocs: why would pollution change?
  - Information content: no differences in public opinion
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Mechanism: Theory

- Explaining the equilibrium drop in pollution
  - Why would profit-maximizing firms reduce pollution per unit of output just because their new representative is a Democrat?

- Potential tradeoff: abatement costs vs. pecuniary/non-pecuniary enforcement costs
  - To work, *some firms must "over"-pollute under R representatives*
  - Formal (fines, penalties) vs. informal (letter) enforcement
  - If Pr(inspection) under R representative $\approx \varepsilon$, E[benefits to over-pollution] > E[costs]
  - If Pr(inspection) $\uparrow$ under D representative, could be optimal to reduce pollution

- If true, we should observe greater inspections but similar formal enforcement actions in districts with just-elected Democrats

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Mechanism: Regulatory interference

- Federal environmental laws apply to all firms at the same time.
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Inspection

Enforcement

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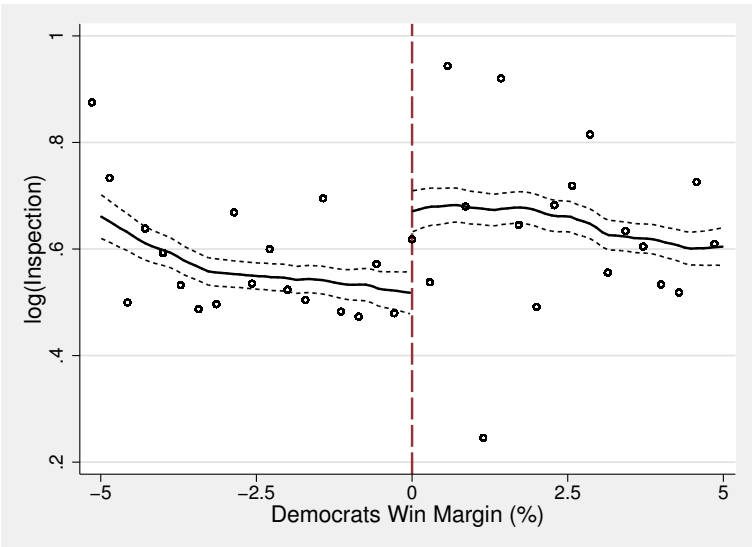

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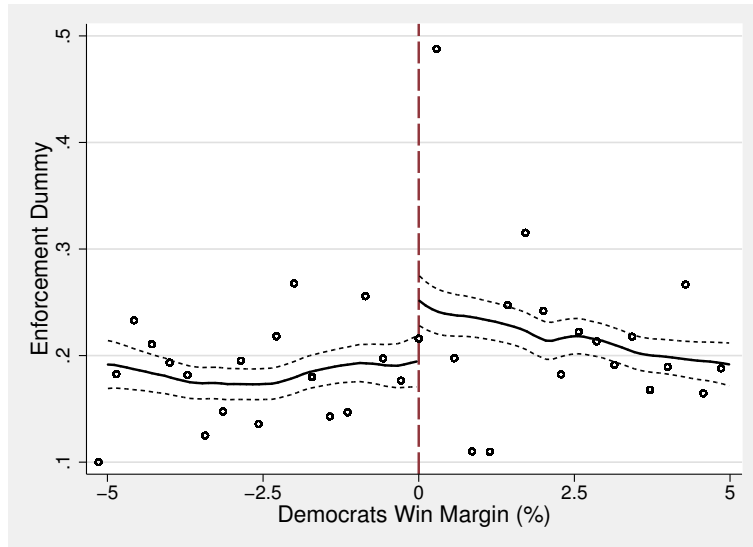

Enforcement

Mechanism: Inspections

	log(Inspections)		Inspection Dummy	
	(1)	(2)	(3)	(4)
Democrat Win	0.214***	0.177***	0.029	0.022***
	(0.07)	(0.02)	(0.03)	(0.01)
Method	Local OLS	NP	Local OLS	NP
Polynomial	Linear	Linear	Linear	Linear
Kernel	–	Tri.	–	Tri.
Observations	9,418	132,987	30,773	414,341

- Marginal wins by Democrats are associated with increased inspections along both the intensive and extensive margins.

Mechanism: Enforcement outcomes per inspection

	Enforcement Inspections		Informal Enf. Inspections		Formal Enf. Inspections		Penalties Inspections	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Democrat Win	0.050	0.055***	0.058**	0.055***	-0.005	0.009*	-47.603	28.617
	(0.04)	(0.01)	(0.03)	(0.01)	(0.02)	(0.00)	(61.21)	(23.84)
Method	Local OLS	NP	Local OLS	NP	Local OLS	NP	Local OLS	NP
Polynomial	Linear	Linear	Linear	Linear	Linear	Linear	Linear	Linear
Kernel	–	Tri.	–	Tri.	–	Tri.	–	Tri.
Observations	9,419	132,989	9,419	132,989	9,419	132,989	9,419	132,989

- Conditional on inspections, districts just won by Democrats are associated with an increase in informal but not formal enforcement.
- Consistent with firms updating pollution behavior so as not to breach emission limits after Democrat is elected
  - To-do: Exploit variation in penalties across chemical/pollution types

Real effects: Respiratory diseases

- What are the consequences of pollution differences due to political ideology?
  - To-do: Compustat
  - Examine changes in pollution-related health effects
  - We expect to see less respiratory-related hospital visits in areas with a high number of plants when Democrats are elected

	log(Number of Discharges)			log(Total Payments)		
	(1)	(2)	(3)	(4)	(5)	(6)
Democrat Win	0.014	0.007		0.101***	0.021	
	(0.02)	(0.02)		(0.02)	(0.02)	
High Num. Plants	0.325***	0.288***	0.188***	0.350***	0.301***	0.189***
	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.03)
Democrat Win × High Num. Plants	-0.082***	-0.071**	-0.066**	-0.126***	-0.075**	-0.073**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
ZIP FE	Yes	Yes	No	Yes	Yes	No
Census District FE	No	Yes	No	No	Yes	No
Year FE	Yes	Yes	No	Yes	Yes	No
District-Year FE	No	No	Yes	No	No	Yes
ZIP-District FE	No	No	Yes	No	No	Yes
R-Squared	0.187	0.239	0.273	0.207	0.264	0.299
Observations	60,351	60,349	60,336	60,351	60,349	60,336

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Real effects: Placebo test

- We expect no changes in health conditions that are unrelated to pollution
- Health conditions that are plausibly less related to pollution.
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	(0.02)	(0.04)		(0.03)	(0.04)	
High Num. Plants	0.212***	0.149***	0.112***	0.259***	0.167***	0.124***
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)
Democrat Win × High Num. Plants	0.035	0.060*	0.004	-0.041	0.053	0.004
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ZIP-District FE	No	No	Yes	No	No	Yes
MDC FE	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.216	0.249	0.275	0.431	0.469	0.493
Observations	28,276	28,273	28,227	28,276	28,273	28,227

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  - Yes!
- Close-election RD results:
  - Lower pollution in areas won by closely-elected Democrats
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