Legislative Capacity and Regulatory Compliance: Evidence from the Opioid Epidemic

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The Opioid Epidemic

- Has claimed over 700,000 American lives since 1999.
- Is the leading cause of death among American men aged 25-44.
- Has been tremendously understudied in political science
    - We found 721 potential matches in Google Scholar for “political science” and “opioid overdose” but 164,000 for “political science” and “COVID-19.”

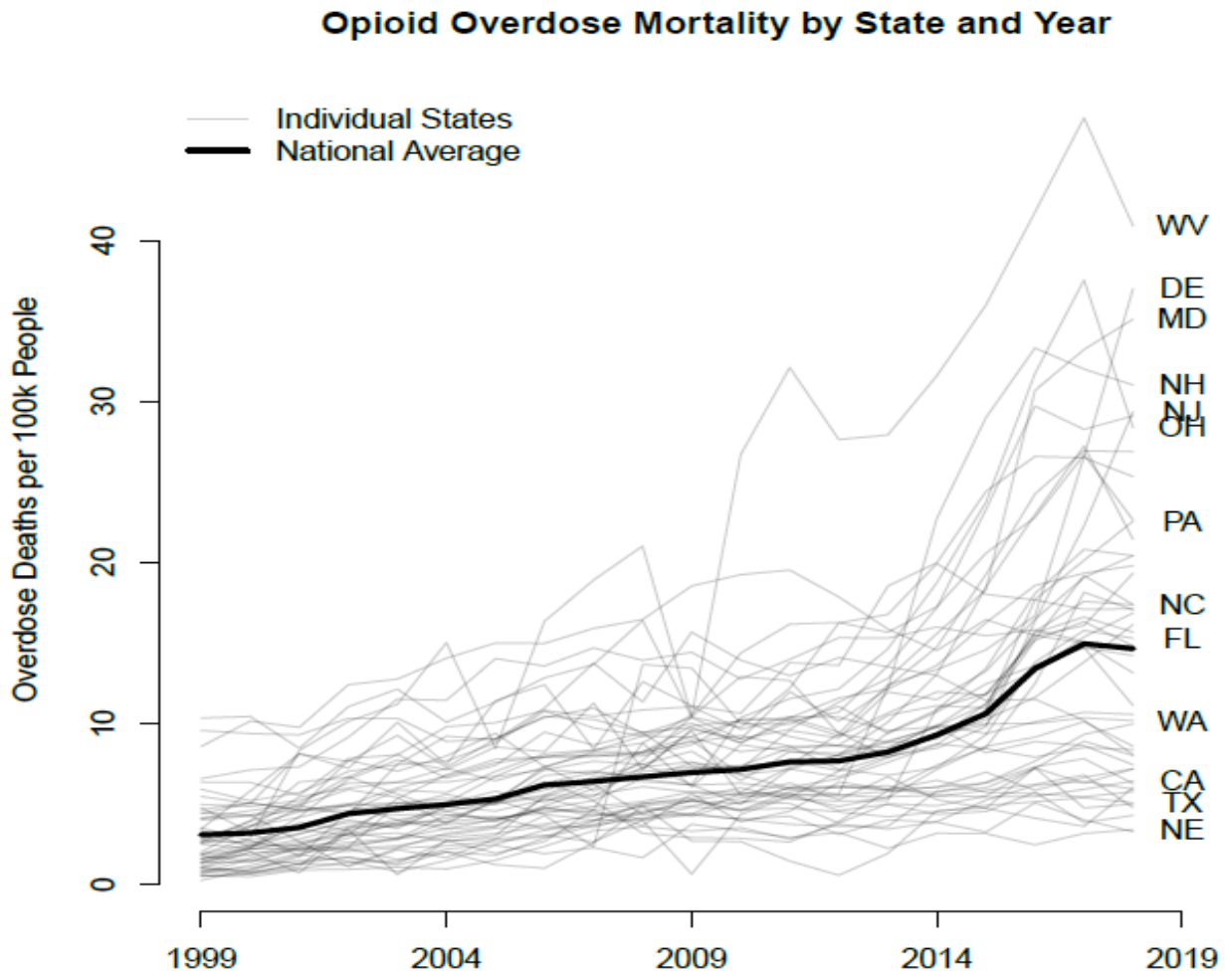
The Opioid Epidemic

- While the federal government approves opioid pain relievers, the 50 states—and specifically legislatures working in concert with medical and pharmaceutical boards maintain their own distribution regimes.

- We can exploit variation in opioid overdose deaths across states to evaluate whether institutional variation across state governments impacted opioid overdose fatalities.

    - An implication is that certain governmental structural choices could influence death from the opioid epidemic. Political structure matters!

State Variation in Opioid Overdose Deaths



Enter Legislative Capacity

- A concept capturing the amount of resources that legislators possess to do their jobs.

- Typically consists of staff size or expenditures, legislator compensation, and length of legislative session (Squire 2017; Bowen and Greene 2014) and varies across states.

	Staff	Days	Salary
California	22	210	$150,000
New Hampshire	1/3	20	$100

Our Argument

- State legislatures can influence opioid overdoses through policy design and regulatory scrutiny/oversight.

- Policy design =
  - Fewer loopholes for regulated (doctors and pharmacists).
  - Less discretion for regulators (state medical and pharmaceutical boards).
  - Policy innovation.

- Regulatory scrutiny =
  - Boards give greater effort due to possibility of greater legislative oversight.

- Increased legislative capacity reduces opioid overdoses through better policy design and greater potential scrutiny of regulators.

Analytical Strategy

- We evaluate the link between state legislative capacity and opioid overdose deaths in 5 ways:

- 1—A *preliminary* analysis linking legislative capacity to increased adoption of opioid mitigation policy.

- 2—Another *preliminary* analysis linking legislative capacity to the distribution of opioid pills.

- 3—Our *core* analysis linking legislative capacity to opioid overdose deaths.

- 4—A *core* analysis revealing the absence of a link between legislative capacity and other deaths of despair.

- 5—A *core case study* comparing Ohio and Pennsylvania.

1—Preliminary Analysis of Legislative Capacity and Opioid Policy Adoption

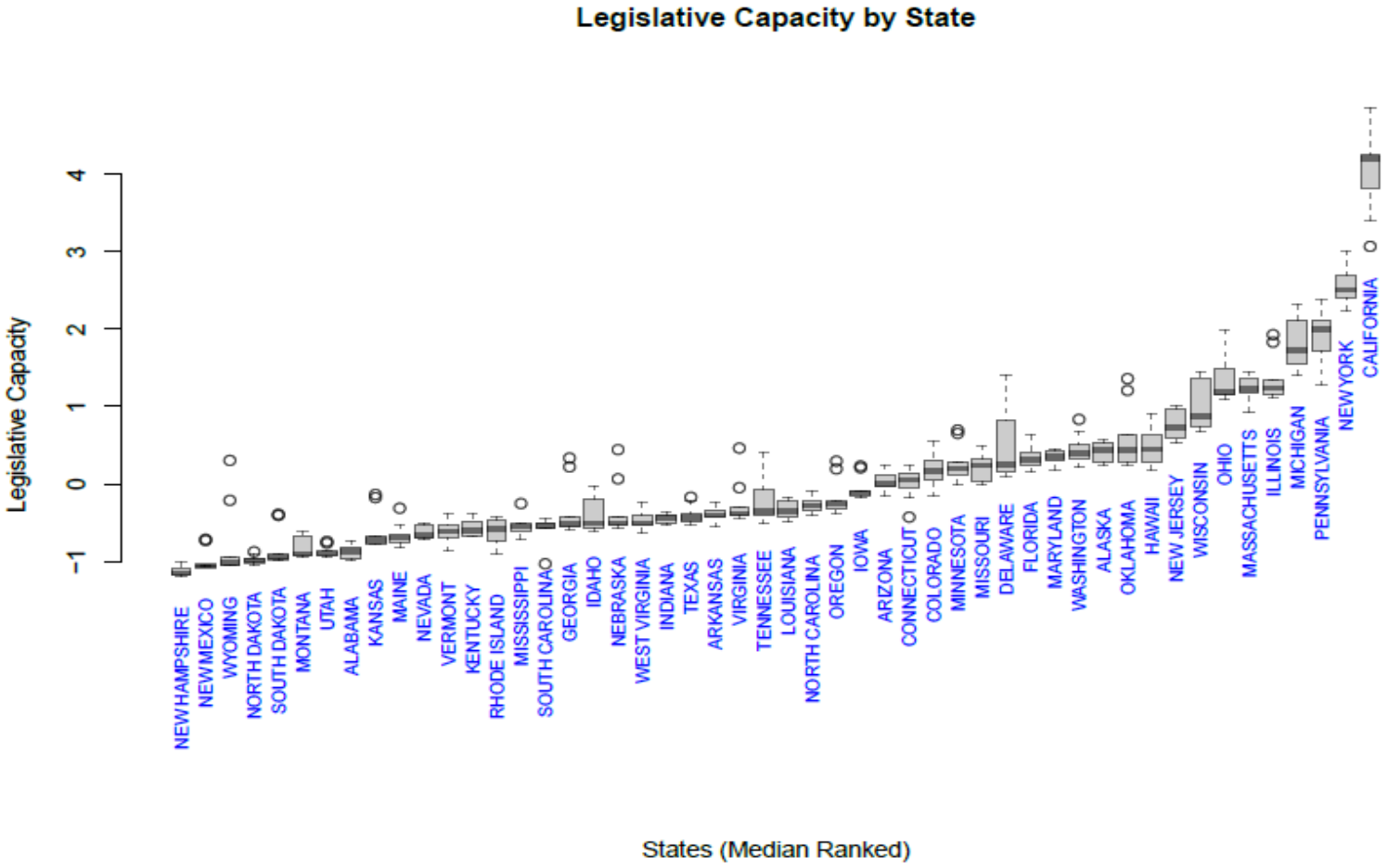
- Does state legislative capacity influence the adoption of opioid mitigation policy?

- Look at state-level adoption of four kinds of opioid mitigation policies:
  - Prescription drug monitoring system creation (Paulozzi, Kilbourne, and Desai 2011).
  - ID required for certain drugs (Shover et al 2019).
  - Samaritan laws protecting people calling for help during overdoses (Lee et al 2021).
  - Liberalized access to naloxone (Doleac and Mukherjee 2022).

- Look between 1999-2018.

- Legislative capacity measured using staff expenditures per legislator, real legislator salary, and session length scaled into a single variable along lines of Quinn (2004) and using Bowen and Greene (2014) components.
  - Measure well suited for dynamics and doesn't have missingness of Squire scores.

Legislative Capacity



1—Preliminary Analysis of Legislative Capacity and Opioid Policy Adoption

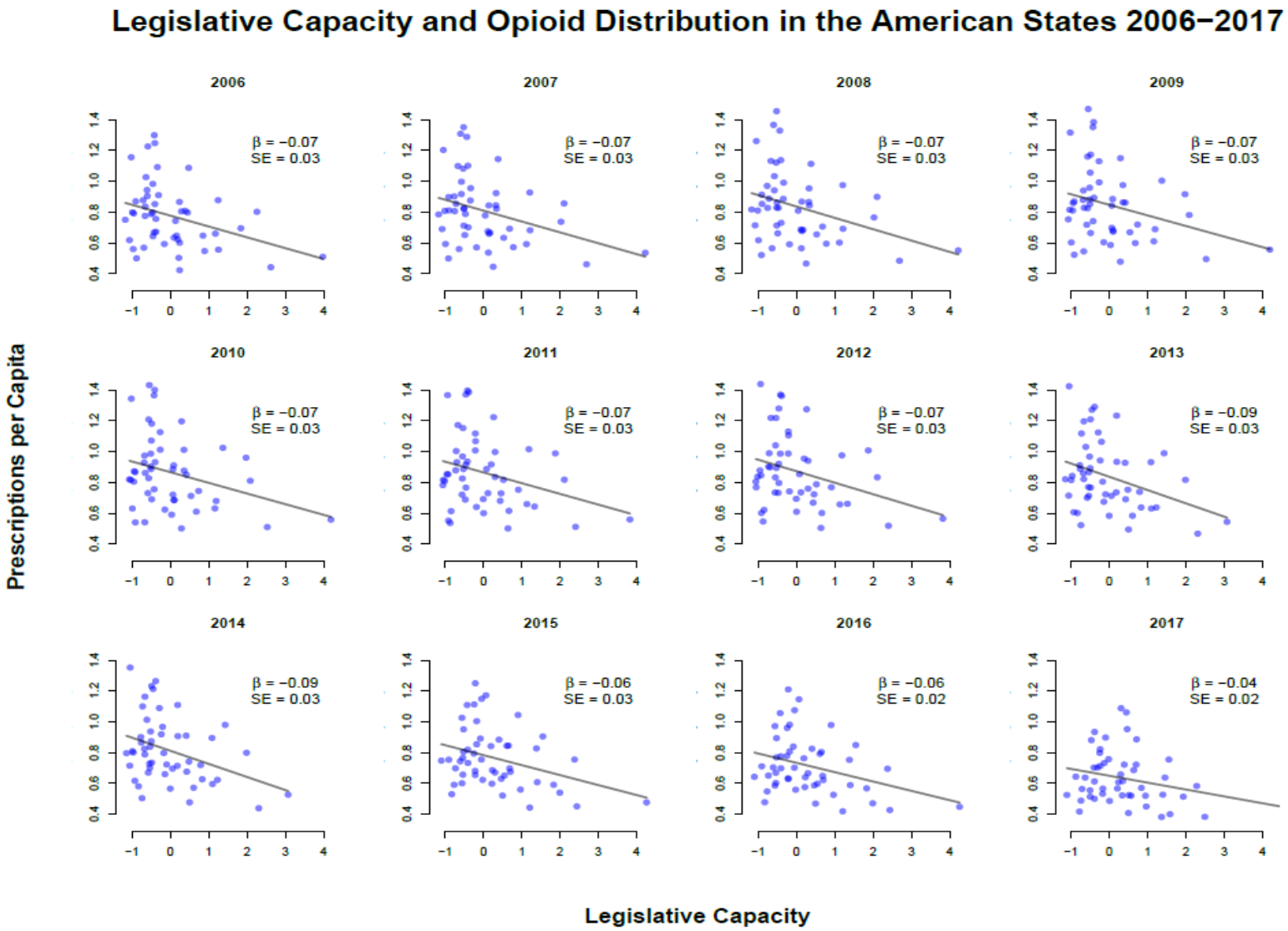
	Rx Database	Rx ID	Samaritan	Naloxone	Sum of all
Legislative Capacity	−0.01	0.04**	0.03**	0.07**	0.13**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Cubic spline	✓	✓	✓	✓	✓
R^2	0.60	0.16	0.52	0.64	0.69
Num. obs.	1000	1000	1000	1000	1000

*$p < 0.05$

2—Preliminary Analysis of Legislative Capacity and Opioid Distribution

- Does legislative capacity influence distribution of opioid medications?
- Number of OPR prescriptions filled per capita in each state, 2006-2017.
- Data has limitations:
  - 92% of retail prescriptions covered.
  - Buprenorphine, methadone dispensed through treatment programs, and opioid-based cold and cough medications not included.
  - We only have the number of prescriptions and ***not*** dosages.
  - There is much we do not know about the aggregate causes of opioid prescribing due to proprietary data being withheld from social scientists, leading to simple modeling.

2—Preliminary Analysis of Legislative Capacity and Opioid Distribution



3—Core Analysis of Legislative Capacity on Opioid Overdose Deaths

- We look at opioid overdose deaths per 100,000 residents.
- Data from CDC WONDER database.
- Two dimensions of how legislative capacity impacts overdose death:
  - The influence of legislative capacity itself.
  - An interactive influence of legislative capacity on medical and pharmaceutical board agents.
- In addition to the legislative capacity variable, we also include counts (per 100,000 residents) of state medical and pharmaceutical board agents.
- We use two-way fixed effects (state and year) OLS regression.

3—Core Analysis of Legislative Capacity and Opioid Overdose Deaths—*Controls*

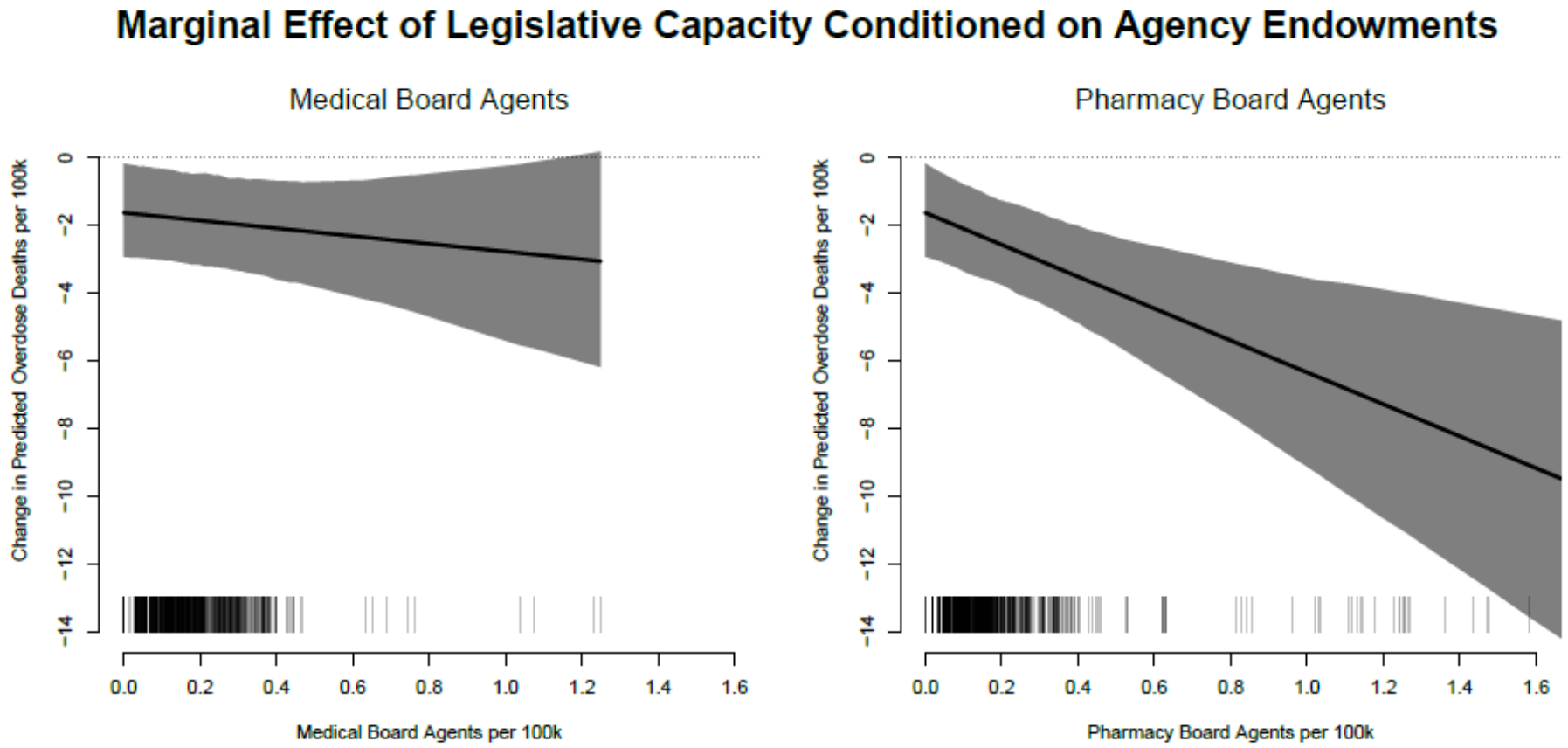
Democratic legislature	NCSL	indicator
Democratic governor	NCSL	indicator
Income	Census	per capita
Racial diversity	Census	race group populationsHerfindahl
Unemployment	Bureau of Labor Statistics	state-year average
Health care spending	Pierson (2015)	dollars per capita
Economic mobility	Chetty et al. (2017)	birth cohort mean
Medical marijuana	Shover et al. (2019)	indicator
Recreational marijuana	Shover et al. (2019)	indicator
Pain clinic monitoring	Shover et al. (2019)	indicator
Prescription monitoring	Shover et al. (2019)	indicator
ID for prescription	Shover et al. (2019)	indicator
Doctor campaign giving	Bonica (2016)	percentage total giving
Pharmacist campaign giving	Bonica (2016)	percentage total giving
Term limits enacted	NCSL	indicator
Term limits in effect	NCSL	indicator

3—Core Analysis of Legislative Capacity and Opioid Overdose Deaths—*Results*

	Opioid mortality (focal outcome)			
Covariate	Model 1	Model 2	Model 3	Model 4
Legislative Capacity	−3.76*	−2.60*	−2.35*	−1.60*
	(0.62)	(0.61)	(0.71)	(0.70)
Medical Board Agents	−5.03*	−3.92*	−5.92*	−4.36*
	(1.23)	(1.19)	(1.36)	(1.34)
Pharmacy Board Agents	−2.53	−0.49	−2.01	−0.15
	(1.50)	(1.52)	(1.49)	(1.52)
Legislative Capacity × Medical Agents			−2.25	−1.16
			(1.36)	(1.33)
Legislative Capacity × Pharmacy Agents			−6.02*	−4.67*
			(1.58)	(1.54)
State FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Controls		✓		✓
R^2	0.74	0.77	0.75	0.77
N	1000	1000	1000	1000

*$p < 0.05$, two-tailed

3—Core Analysis of Legislative Capacity and Opioid Overdose Deaths—*Results*



3—Core Analysis of Legislative Capacity and Opioid Overdose Deaths—*Results*

- If every state experienced an increase in legislative capacity of 1 and if agent numbers were held constant at observed levels, opioid overdose deaths would decrease by 2.66 per 100,000 residents.
    - Based on 2018 data, this would mean a reduction of **8,750** deaths, or a reduction of **18.2%**.
    - A shift of 1 would entail Utah having similar resources as Arizona.
        - Utah in 2013-2014 had a session length of 61.77 days, staff expenses per legislator of $259,900, and a legislator salary of $21,915. Arizona at the same time had a session length of 179.63 days, staff expenses per legislator of $507,760, and a legislator salary of $44,571.
    - Even smaller shifts would produce benefits (not even accounting for increases in agent numbers).

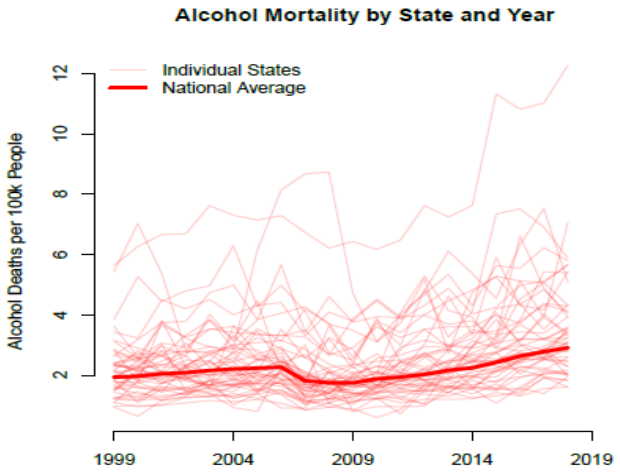
4—Core Analysis of Legislative Capacity and Opioid Overdose Deaths

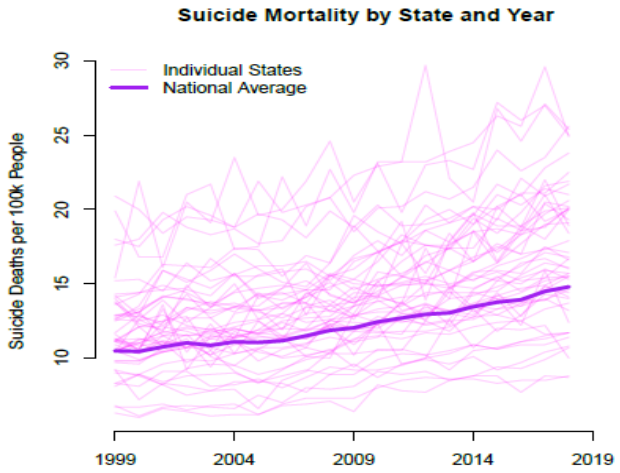
- How do we know that our pathway—legislative capacity leading to better policy design and especially more regulatory compliance—is germane?

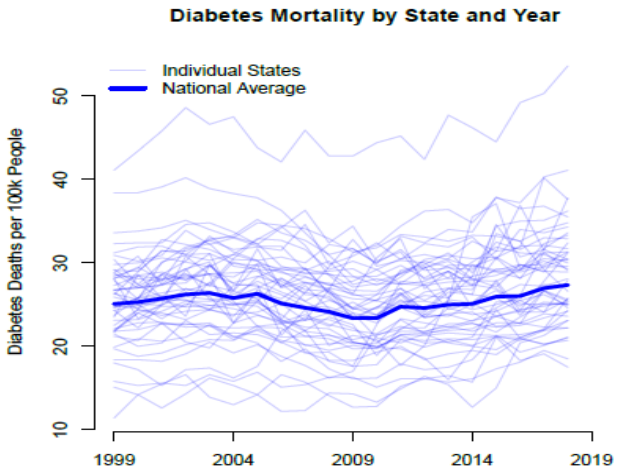
- We can compare the influence of legislative capacity on other dimensions of the death of despair—alcohol, suicide, and diabetes mortality—to see if our result is simply due to more governmental attention on deaths of despair.

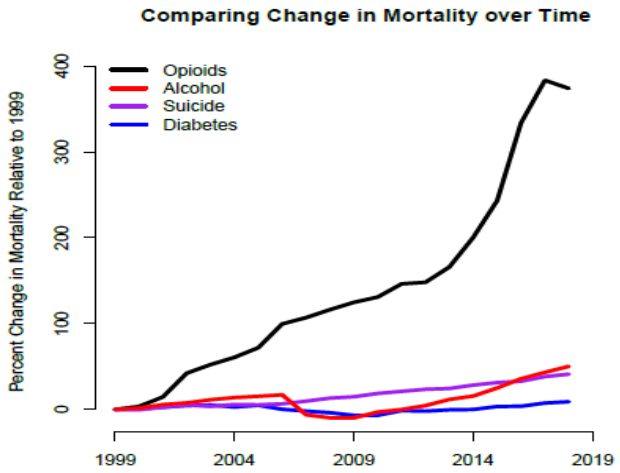
- If legislative capacity negatively influences alcohol, suicide, and diabetes mortality, then our argument—and especially the part dealing with stringent regulation of OPRs—would be suspect.

4—Core Analysis of Legislative Capacity and Opioid Overdose Deaths









4—Core Analysis of Legislative Capacity and Non-Opioid Deaths—*Results*

	Placebo outcomes		
Covariate	Alcohol	Suicide	Diabetes
Legislative Capacity	−0.04	0.06	0.39
	(0.13)	(0.21)	(0.51)
Medical Board Agents	0.48	0.55	0.75
	(0.25)	(0.41)	(0.99)
Pharmacy Board Agents	−0.25	0.74	2.93*
	(0.29)	(0.46)	(1.12)
Legislative Capacity × Medical Agents	−0.18	0.95*	−1.27
	(0.25)	(0.41)	(0.98)
Legislative Capacity × Pharmacy Agents	−0.29	−0.26	−1.34
	(0.29)	(0.47)	(1.13)
State FE	✓	✓	✓
Year FE	✓	✓	✓
Controls	✓	✓	✓
R^2	0.83	0.95	0.85
N	1000	1000	1000

*$p < 0.05$, two-tailed

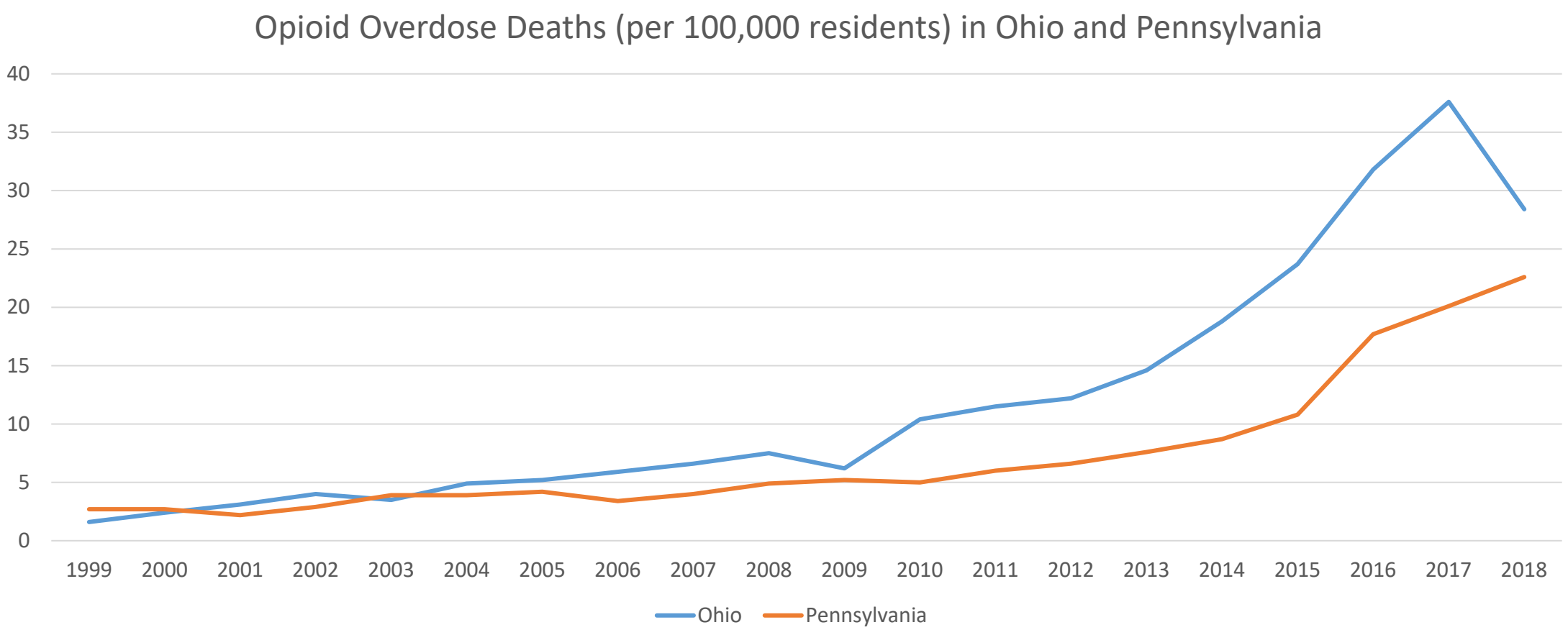
4—Core Analysis of Legislative Capacity and Non-Opioid Deaths—*Takeaways*

- Null relationship for diabetes (95% is Type 2)
  - Result probably not due to healthier states choosing higher legislative capacity.
- Null relationship for alcohol.
- Null relationship for suicide.

5—Core Analysis of Legislative Capacity and Opioid Overdose Deaths—*Case Study*

OHIO	PENNSYLVANIA
11,536,504 people	12,702,379 people
81% white	81% white
91% high school educated	91% high school educated
10% disabled under 65	10% disabled under 65
66% owner occupied housing	69% owner occupied housing
13% poverty rate	11% poverty rate

5—Core Analysis of Legislative Capacity and Opioid Overdose Deaths—*Case Study*



5—Core Analysis of Legislative Capacity and Opioid Overdose Deaths—*Case Study*

	OHIO	PENNSYLVANIA
Legislative Capacity	1.21	1.98
Opioid Policy on Prescription Amount Limit	Regulators can set opioid prescription amount limit up to 90 days worth.	Opioid prescription amount limit set by statute at 7 days worth.
Opioid Policy on Drug Monitoring System Usage	Regulators determine whether providers should consult drug monitoring system based on physician advice. Pain management clinics exempted.	Providers must consult drug monitoring system.
Board Reporting Requirement	No requirement of required reporting to Ohio House and Senate.	Board of Medicine must file two reports about enforcement each year to two different committees in the Pennsylvania House and Senate.

Conclusion

- Investment in legislative capacity produces less opioid overdose death.
- Regulators are responsive to legislative capacity.
- Combatting issues like opioid epidemic should also focus on political/institutional factors that facilitate problem solving.

Thank You!

A1—Tabular Results of Opioid Distribution

Covariate	Model 1	Model 2	Model 3	Model 4
Legislative Capacity	−0.07**	−0.04**	−0.11**	−0.06**
	(0.01)	(0.01)	(0.02)	(0.01)
Medical Board Agents	−0.17**	−0.13**	−0.12*	−0.10*
	(0.05)	(0.04)	(0.05)	(0.04)
Pharmacy Board Agents	−0.31**	−0.09**	−0.44**	−0.24**
	(0.04)	(0.03)	(0.05)	(0.04)
Legislative Capacity × Medical Agents			−0.02	−0.02
			(0.05)	(0.04)
Legislative Capacity × Pharmacy Agents			0.30**	0.22**
			(0.06)	(0.05)
Year FE	✓	✓	✓	✓
Controls		✓		✓
R^2	0.32	0.67	0.35	0.65
Num. obs.	650	650	650	650

*$p < 0.05$

A2—Full Results of Opioid Overdose Deaths

Covariate	Opioid mortality Model 1	Model 2	Model 3	Model 4
Legislative Capacity	−3.77***	−2.57***	−2.12***	−1.42**
	(0.62)	(0.61)	(0.71)	(0.70)
Medical Board Agents	−4.73***	−3.90***	−6.10***	−4.77***
	(1.19)	(1.15)	(1.37)	(1.34)
Pharmacy Board Agents	−1.96	0.02	−2.04	−0.13
	(1.54)	(1.55)	(1.52)	(1.55)
Legislative Capacity × Medical Agents			−2.71**	−1.73
			(1.36)	(1.33)
Legislative Capacity × Pharmacy Agents			−7.56***	−5.63***
			(1.79)	(1.76)
Democratic Legislature		−0.19		−0.27
		(0.47)		(0.47)
Democratic Governor		0.41		0.45
		(0.34)		(0.34)
Unified Democratic Control		−0.64		−0.53
		(0.50)		(0.50)
Income		−0.00		−0.00
		(0.00)		(0.00)
Racial Diversity		−5.52***		−5.27**
		(2.10)		(2.09)
Unemployment		0.01		0.02
		(0.15)		(0.15)
Health Spending		−0.00		−0.00
		(0.00)		(0.00)
Economic Mobility		−34.82***		−32.47***
		(7.11)		(7.11)
Medical Marijuana		3.21***		3.09***
		(0.44)		(0.44)
Recreational Marijuana		−1.79**		−1.77**
		(0.76)		(0.76)
Doctor Campaign Giving		−0.08		−0.07
		(0.07)		(0.07)
Pharmacist Campaign Giving		2.47		2.25
		(1.52)		(1.52)
Term limits enacted		0.91		0.94
		(0.86)		(0.85)
Term limits in effect		−0.78		−0.84
		(0.65)		(0.64)
State FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
R^2	0.74	0.77	0.75	0.77
Num. obs.	1000	1000	1000	1000

*$p < 0.05$, two-tailed test

A3—Full Results of Placebo Deaths

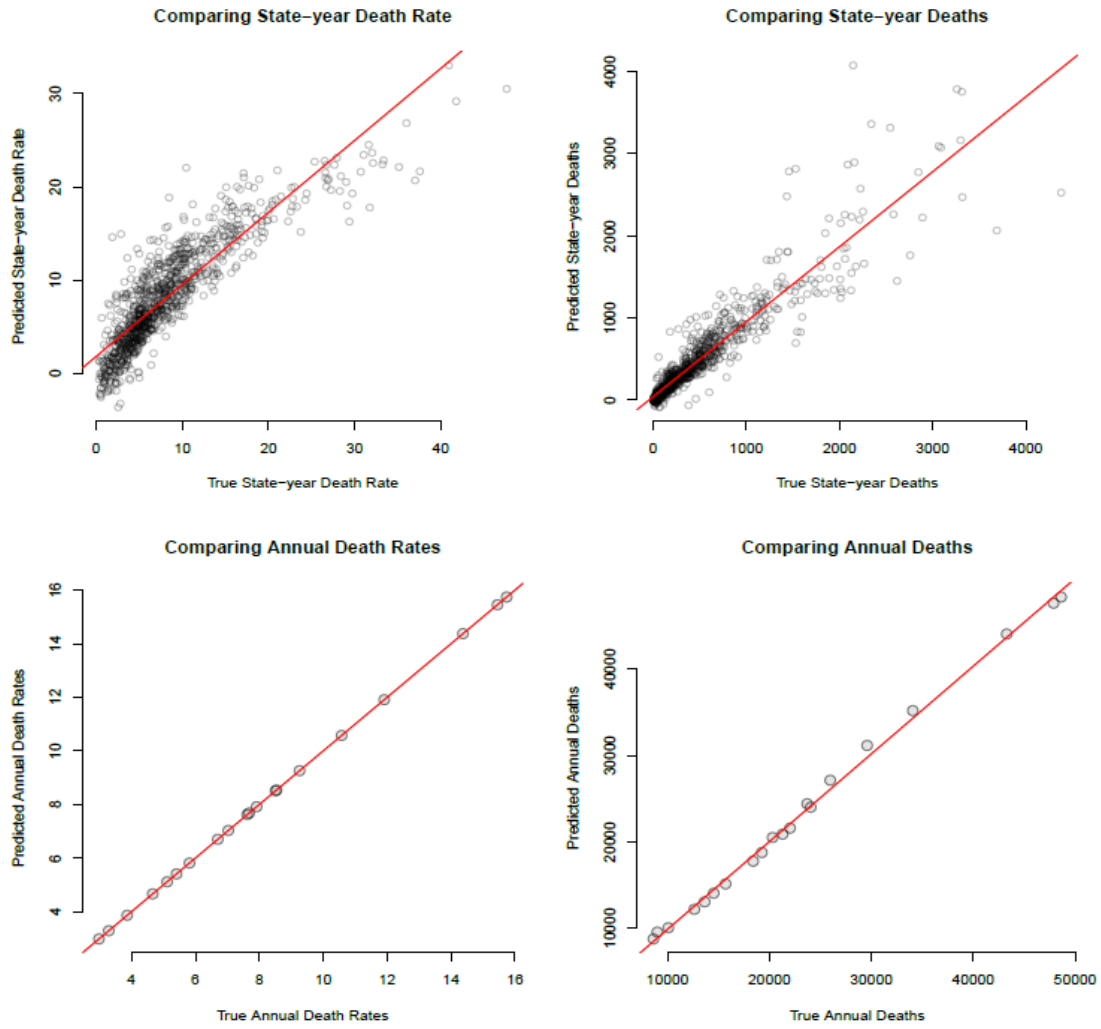
Covariate	Alcohol	Suicide	Diabetes
Legislative Capacity	−0.07	0.07	0.42
	(0.13)	(0.21)	(0.51)
Medical Board Agents	0.31	0.66	0.88
	(0.25)	(0.41)	(0.98)
Pharmacy Board Agents	−0.19	0.82*	3.62***
	(0.29)	(0.47)	(1.14)
Legislative Capacity × Medical Agents	0.08	0.75*	−1.57
	(0.25)	(0.41)	(0.98)
Legislative Capacity × Pharmacy Agents	−0.21	−0.06	−1.06
	(0.33)	(0.54)	(1.29)
Democratic Legislature	0.27***	−0.06	−0.45
	(0.09)	(0.14)	(0.35)
Democratic Governor	0.07	−0.01	−0.49**
	(0.06)	(0.10)	(0.25)
Unified Democratic Control	−0.12	−0.05	0.79**
	(0.09)	(0.15)	(0.37)
Income	0.00***	0.00	−0.00**
	(0.00)	(0.00)	(0.00)
Racial Diversity	−2.77***	−8.83***	−4.08***
	(0.40)	(0.64)	(1.54)
Unemployment	0.13***	0.18***	0.11
	(0.03)	(0.05)	(0.11)
Health Spending	0.00	0.00	−0.00*
	(0.00)	(0.00)	(0.00)
Economic Mobility	0.42	−6.37***	−11.72**
	(1.35)	(2.17)	(5.22)
Medical Marijuana	0.23***	0.04	−0.17
	(0.08)	(0.14)	(0.32)
Recreational Marijuana	0.07	0.64***	1.38**
	(0.14)	(0.23)	(0.56)
Doctor Campaign Giving	−0.01	−0.06***	0.00
	(0.01)	(0.02)	(0.05)
Pharmacist Campaign Giving	−0.32	1.05**	−4.52***
	(0.29)	(0.46)	(1.11)
Term limits enacted	0.12	−1.12***	0.82
	(0.16)	(0.26)	(0.63)
Term limits in effect	0.30**	0.13	−0.10
	(0.12)	(0.20)	(0.47)
State FE	✓	✓	✓
Year FE	✓	✓	✓
R^2	0.83	0.95	0.85
Num. obs.	1000	1000	1000

*$p < 0.05$, two-tailed test

A4—Descriptive Statistics for Control Variables

Covariate	Min	Median	Mean	Max	SD
Democratic legislature	0.00	0.00	0.37	1.00	0.48
Democratic governor	0.00	0.00	0.42	1.00	0.49
Income	34916.00	58874.00	59763.00	86345.00	9347.67
Racial diversity	1.05	1.65	1.77	3.29	0.50
Unemployment	2.30	5.08	5.51	13.61	1.97
Health care spending	40.72	160.72	188.01	711.41	105.45
Economic mobility	0.39	0.60	0.60	0.77	0.06
Medical marijuana	0.00	0.00	0.28	1.00	0.45
Recreational marijuana	0.00	0.00	0.03	1.00	0.17
Pain clinic monitoring	0.00	0.00	0.08	1.00	0.27
Prescription monitoring	0.00	0.00	0.45	1.00	0.50
ID for prescription	0.00	0.00	0.40	1.00	0.49
Doctor campaign giving	0.00	0.01	0.01	0.24	0.02
Pharmacist campaign giving	0.00	0.00	0.00	0.01	0.00
Term limits enacted	0.00	0.00	0.32	1.00	0.47
Term limits in effect	0.00	0.00	0.25	1.00	0.43

A5—Model Performance



A6—Different Approaches to Time Trends

Covariate	Main text	Universal trend	State trends	Lagged DV
Legislative Capacity	−2.12***	−1.25*	−2.24***	−0.02
	(0.71)	(0.69)	(0.60)	(0.39)
Medical Agents	−6.10***	−6.00***	−3.51***	−2.28***
	(1.37)	(1.37)	(1.04)	(0.76)
Pharmacy Agents	−2.04	−1.88	1.36	−2.00**
	(1.52)	(1.54)	(1.93)	(0.86)
Legislative Capacity × Medical Agents	−2.71**	−2.79**	−2.62***	−1.46*
	(1.36)	(1.36)	(0.99)	(0.75)
Legislative Capacity × Pharmacy Agents	−7.56***	−7.77***	−2.82*	−2.04**
	(1.79)	(1.81)	(1.61)	(0.98)
State FE	✓	✓	✓	✓
Year FE	✓		✓	✓
N	1000	1000	1000	950
R^2	0.75	0.74	0.89	0.88

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

A7—Main Results Including All Interventions

Covariate	Model 1	Model 2	Model 3	Model 4
Legislative Capacity	−3.67***	−2.46***	−2.18***	−1.49**
	(0.62)	(0.61)	(0.71)	(0.69)
Medical Board Agents	−4.44***	−3.57***	−5.89***	−4.60***
	(1.19)	(1.15)	(1.38)	(1.34)
Pharmacy Board Agents	−2.02	−0.01	−2.13	−0.15
	(1.55)	(1.55)	(1.54)	(1.54)
Legislative Capacity × Medical Agents			−2.75**	−1.95
			(1.35)	(1.32)
Legislative Capacity × Pharmacy Agents			−6.70***	−4.40**
			(1.79)	(1.75)
Naloxone liberalization	−0.02	0.16	−0.05	0.12
	(0.52)	(0.50)	(0.51)	(0.49)
Pain management clinic oversight	2.09***	2.73***	1.93***	2.62***
	(0.53)	(0.54)	(0.52)	(0.54)
Prescription monitoring system	−0.61	−0.82**	−0.52	−0.76*
	(0.41)	(0.40)	(0.41)	(0.39)
May require ID for prescription	0.48	0.36	0.38	0.29
	(0.41)	(0.40)	(0.40)	(0.40)
State FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
Controls		✓		✓
R^2	0.75	0.78	0.75	0.78
N	1000	1000	1000	1000

***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

A8—Examples of State Legislative-Board Interaction

STATE	STIPULATIONS
Vermont / 2013 / H522	• Creates prescription and monitoring database and requires state issued ID for prescription pickup. • Vermont House and Senate held 35 committee meetings over bill. • Legislature compels testimony from Commissioner of Public Health 8x and Executive Officer of Vermont Board of Pharmacy 3x.
North Carolina / 2014 / Joint Legislative Program Evaluation Committee Report	• Identifies “doctor shopping” and “loose pharmacists” as problematic and calls for strict instruction of medical and pharmacy boards by legislature.
California / 2016 and 2020 / Board of Pharmacy Report to Legislature	• Board required to report to legislature and identify areas in need of legislation. • One 2020 recommendation involves holding pharmacy chains instead of individual pharmacists for violations.
Arkansas / 2021 / SB 750	• Expires membership of Arkansas medical board. • Increases size of Arkansas medical board. • Stipulates a role for Senate and House leaders in selecting board members.

A9—Examples of Previous Work on Legislative Capacity-Regulatory Oversight

- Boehmke and Shipan (2015): legislative capacity increases responsiveness in nursing home inspections.
- Drolc and Kaiser (2020): legislative capacity increases responsiveness in social security application processing.
- Cook and Fortunato (2022): legislative capacity increases police department transparency.
- Lillvis and McGrath (2017): legislative capacity increases medical board disciplinary action.