Environmental Enforcement during Legislative Vacancies: Insights from Clean Air Act Inspections

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Abstract

We explore whether local politicians influence Clean Air Act (CAA) inspection behavior in the United States. We exploit the exogeneity of legislative vacancies from local congressional representatives to identify the causal effects of the absence of legislators on CAA inspection probability and numbers for electricity-generating power plants. Assuming these vacancies have the potential to temporarily relieve bureaucrats from local political pressure, we find that vacancies from Republican representatives significantly increase both the probability and count of inspections by 10.5 percentage points and 76.8%, respectively, compared to non-Republican vacancies. The effects are stronger when former Republican representatives served on any of the influential committees, were from a state with a Republican governor, and from a non-attainment areas. Our findings contribute to the understanding of whether and how political actors influence bureaucratic behavior with regard to regulatory enforcement outcomes, providing valuable insights for policymakers and regulators seeking to enhance the effectiveness of environmental regulations.

Keywords: congressional control of the bureaucracy, regulatory enforcement, legislative vacancy
JEL Codes: D7, Q5

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1 Introduction

While legislators as politicians make a regulatory law, bureaucrats enforce the law at street level. During the enforcement process, the discretion the bureaucrats have would make themselves susceptible to potential meddling from various interest groups attempting to maximize their benefits and minimize costs from the law. Politicians might be one of the groups seeking to influence law enforcement to fulfill their political objectives and satisfy their constituents, while bureaucrats may not be interested in their political agendas. Do bureaucrats respond to local political pressure?

We answer the following question: When Republican (or Democratic) Congressional representatives leave their office, does a power plant in their jurisdictions experience increasing (or decreasing) Clean Air Act (CAA) inspections? Given that the CAA is often perceived as potentially hindering economic development for the sake of environmental protection and public health, a business-friendly representative might prefer lenient inspections while an environmentalist might want stricter practices. If regulatory bureaucrats adjust their inspection behavior to meet the demand from incumbent representatives, the absence of the representatives may allow the bureaucrats to temporarily relieve their concern about political influence, which may result in changes in their inspection behavior. The significant divide on environmental issues between the Republican and Democratic parties in the United States allows us to explore whether political affiliations of leaving Congressional members determine the CAA inspection behavior.

Our research contributes to the understanding of Congressional controls of bureaucracy by empirically testing the causal effects of local political pressures on state and local authorities' enforcement behavior. While numerous studies suggest potential channels through which Congress controls bureaucracy, including oversight, budget, and administrative laws, the research with a causal framework to empirically test Congressional controls of bureaucracy is limited (Innes and Mitra, 2015; Short, 2021). Besides, most of the previous literature focuses on federal agencies' rule-making and enforcement behavior, and we focus on state and local agencies' enforcement behavior. While Innes and Mitra (2015) use close election results with a regression discontinuity design and find Republican winning representatives suppress the CAA inspections, we extend their analysis by adding heterogeneous effects, distinguishing state and local authorities from the EPA, and generalizing to the entire states in the United States. We incorporate the role of House

committees, non-attainment status, and the Governor's political party line in our analysis, and we focus on state and local authorities since they are the primary regulators of the CAA inspections. Since we do not rely on election outcomes, we can also investigate the effects not only in states with close elections but also in states where one party is dominant.

Lastly, we first introduce legislative vacancy as an indicator of the temporary absence of political pressure. Since legislative vacancy usually takes place due to resignation and death, it provides researchers with the exogenous absence of political pressure. Since legislative vacancy data is available at day-level, researchers can use it for their day-, monthly-, and year-level analysis as well. While close election outcomes allow researchers to empirically test the causal effects of political party affiliation of politicians on various outcomes, legislative vacancy can be used as an alternative option to close election when the analysis with close election is not available nor appropriate.

To establish a causal impact of political pressure on the CAA inspections, we exploit the occurrence of vacant seats in the House of Representatives resulting from resignations or deaths. These legislative vacancies create a temporary absence of a Congressional representative until the seat is filled by the next representative through general or special elections. As these vacancies are least likely to be influenced by factors determining inspections, it provides a plausibly exogenous absence of political pressure from local representatives in jurisdictions. We built a monthly power-plant level panel dataset between 2001 and 2021 in the United States. By investigating whether there is a substantial change in inspections on power plants during legislative vacancies, we can obtain empirical evidence on whether the regulatory bureaucracy responds to political pressure. Given partisan polarization on environmental concerns, we adopt the conventional perspective that Republicans tend to adopt a pro-business stance, while non-Republicans —mostly Democrats— are generally in pro-environmental positions. To be specific, we examine whether vacancies from Republican representatives increase the probability and number of CAA inspections, compared to non-Democratic vacancies.

We find that legislative vacancies from Republican representatives significantly increase the probability of inspections on power plants by 10.5 percentage points and the inspection frequency by 76.8% compared to non-Republican vacancies. The results suggest that political party lines and vacancies play a role in shaping regulatory enforcement outcomes, which reconfirms the previous findings by Innes and Mitra (2015). Besides, as Weingast and Moran (1983) point out Congressional

committee system is one of the main channels through which politicians can influence regulatory behavior, we further explore the influence of House committee assignments. We suggest that politicians serving on committees that are influential to budget, rules, and the environment exert stronger political pressure on regulators while there is no significant evidence that non-members of such influential committees have control over regulators. Moreover, we also find that the effects of Republican vacancies are strengthened in certain political and regulatory contexts, such as Republican governorship and non-attainment areas, in which Republican representatives are more likely to obtain cooperation from state governments and to be involved in regulatory inspections.

As a robustness check, instead of political party affiliation, we use the League of Conservation Voters Scorecard (LCV Scores), which presents individual political preferences on environmental issues by observing the voting of Congressional members. We find that the vacancies from anti-environmentalists lead to an increase in the probability and number of inspections, while pro-environmental members' absence leads to a decrease in them.

While congressional representatives can leverage their oversight, legislative, and budgetary powers to affect bureaucratic behavior (Kagan, 1994; Weingast and Moran, 1983; McCubbins et al., 1987), the primary responsibility of the CAA inspections is delegated to state and local governments, which are supervised by state and local legislature rather than Congress. Thus, congressional representatives' political influence on state and local authorities may not be as strong as on federal agencies; however, potential channels through which Congressional representatives control the local CAA inspections still exist: Federal EPA grants and informal contact.

First, given that a considerable portion of the state and local environmental budgets rely on federal EPA grants (Blundell et al., 2021) if the EPA responds to Congressional political pressure, it might increase or reduce the grant allocated to certain issues or regions to align with the political preferences. Due to the change of Federal grant, state and local agencies would have to change their CAA inspections by optimizing their inspection decisions given limited resources. Furthermore, Congressional representatives may informally reach out to the state and local authorities, including not only inspecting agents but also departmental leadership, to obtain information regarding environmental issues and CAA enforcement in their jurisdictions. Even if Congressional members do not directly contact the state and local bureaucracies, they could also appreciate or complain about what the state and local bureaucracies are doing, which may also pressure bureau-

cracies.

The rest of the paper is organized as follows. Section 2 provides an overview of theoretical and empirical backgrounds, including Congressional controls of bureaucracy, CAA inspections, and legislative vacancies. Section 3 presents the hypotheses to be investigated in the analysis. While Section 4 presents the data sources used in the analysis, Section 5 explains how a causal impact of political pressure is identified using legislative vacancy and political party affiliation of Congressional members. In Section 6, we present the regression results of political party lines and legislative vacancies on inspection behavior. Section 7 concludes the paper.

2 Background

2.1 Congressional Control of Bureaucracy

Congressional members desire to achieve their political agendas with lawmaking. They would pass, amend, and rescind laws in ways that might help them get re-elected by their constituents. The law passed by Congress is usually broad and does not contain specific details to be applied in practice, and Congress delegates authorities of making specific rules and enforcing them to bureaucratic experts—usually federal agencies in the United States—at ground level (Shipan, 2004; Potoski, 2002; Yackee, 2019).

The delegation of law enforcement from legislators to bureaucrats generates asymmetric information between both parties. In the principal–agent model of law enforcement between politicians and bureaucrats, both parties aim to choose strategies that maximize their respective payoffs (Weingast and Moran, 1983; Moe, 1984; Potoski, 2002). Although law enforcement is no longer within the purview of legislators, it would still be of interest for legislators since how the law is enforced is essential to achieve the goal of the law they passed (Shimshack, 2014). Legislators might want to induce the bureaucrats to enforce the law in alignment with their political preference (Boland and Godsell, 2021). The bureaucrats, however, may deviate from legislators' preferences by putting more emphasis on their knowledge, personal values, and careers over political factors.

Legislators have adopted multiple tools to control bureaucrats. First, legislators can pass a law that limits the discretion of the bureaucrats (Fowler and Kettler, 2021; Boland and Godsell, 2021; McCubbins et al., 1987; West and Raso, 2013). The Administrative Procedure Act (APA), for

instance, requires agencies to publicly inform their proposed rules and receive feedback from the public, including regulated interest groups, for a certain period (McCubbins et al., 1987; Yackee, 2019; Shapiro and Moran, 2016). The APA allows interest groups to alert congressional representatives to their concerns about the proposed rules (McCubbins et al., 1987; Wagner et al., 2011). Second, the legislators can reallocate the budget to favor the bureaucrats that align with their political preferences (Weingast and Moran, 1983). Third, they can also request oversight hearing from the bureaucrats to support the behavior of congruent bureaucrats or direct them deviating from their preferences to change their behavior (MacDonald and McGrath, 2016; McGrath, 2013). Even informal inquiries and contact from legislators to agencies can be considered as part of oversight (Lowande, 2018). The oversight would also allow congressional representatives to have more information about agencies, which mitigates asymmetric information between Congress and bureaucrats (MacDonald and McGrath, 2016). Last, they can also appoint higher position staff in the bureaucratic agents, and the politically appointed leadership would lead the agency in the way that favors the legislators (Kagan, 1994).

The bureaucrats would also respond to legislators' preferences (Kagan, 1994; Short, 2021). Given that they are often supposed to enforce the laws that may be politically controversial (Yackee, 2019), the bureaucrats tend to account for their surrounding political environment, such as whether a regulated entity is involved in urgent national projects that are important for politicians in their jurisdictions (Kagan, 1994). Consequently, they would be hesitant to put themselves in conflicts with the politicians.

2.2 Clean Air Act Inspections

The CAA has been one of the most exemplary environmental laws since it was passed by Congress in 1970. The EPA was authorized to promulgate specific standards and rules to comply with the CAA. The standards and rules also require the EPA to inspect regulated facilities regularly. The inspection consists of regular—typically annual inspections—and irregular ones when there is a reported violation.

The primary responsibility of the CAA inspections is delegated to state and local government from the EPA (Shimshack, 2014). States submit their state implementation plan and get permission from the EPA. States assume the authorities with the expectation that they know better about

regulated facilities within their jurisdiction than the EPA and provide flexibility (Woods, 2022). The decentralized responsibilities might allow states to favor industries with lax regulations in their jurisdictions or to have stricter policies than federal standards (Chang et al., 2014). Each state government has the responsibility of inspecting regulated facilities and imposing penalties upon detection of violations. The EPA can revoke the delegated enforcement responsibility from local and state governments if there are insufficient efforts to enforce the law appropriately (Shimshack, 2014) although the primary responsibility has never been revoked due to its political impacts (Fowler and Kettler, 2021).

The regulatory agents retain discretion when they enforce the law due to technical complexity in the industry and the regulations cannot cover every detail so the agents should determine the violation at their discretion (Shimshack, 2014). Once a violation is detected, various levels of enforcement can be imposed on violators depending on the severity of violations: warning letters, notice of violations, citations, and litigation. The power plants in the United States are required to self-monitor their emissions under an acid rain program and the emissions are automatically reported to the authorities. The regulators confirm the accuracy of this self-reporting data. The intensity of inspection can range from simple visual inspections to reviewing operations and sampling

The ideological divergence between Congress and agency might create an incentive for congressional people to attempt to control bureaucrats (McGrath, 2013). A number of empirical studies that have explored congressional controls of bureaucracy exploit the political party affiliation of politicians (Short, 2021). Political party lines would indicate political ideological differences in various issues, including environment (Fowler and Kettler, 2021; Dunlap and McCright, 2008). Republican congressional representatives are associated with lenient law enforcement by the EPA (Innes and Mitra, 2015; Scholz et al., 1991; Kleit et al., 1998; Helland, 1998), Federal Trade Commission (Weingast and Moran, 1983), International Trade Commission (De Vault, 2002), Food and Drug Administration (Shipan, 2004). The congressional attempts to control agencies also influence the personal attitude of agency staff, including willingness to stay in the agency and the effort levels to build expertise (Richardson, 2019), and job satisfaction (Marvel and McGrath, 2016). State legislature also infleunces state policy (Potoski, 2002)

(Gray and Shimshack, 2011).

3 Hypotheses

As previous studies suggest that Republican representatives tend to suppress the CAA inspections (Innes and Mitra, 2015) and adoption of pollution abatement technology (Raff et al., 2022) in their jurisdictions, we anticipate that a legislative vacancy from a Republican representative lead to a higher probability of inspection during the vacancy period. Conversely, if the vacancy is from a non-Republican representative, a lower probability of inspections would be expected. This expectation suggests that when the representative is present in the office, they take control over the regulators, who subsequently alter their inspection behaviors in the opposite direction during legislative vacancies. This leads to the following first hypothesis:

Hypothesis 1: Republican vacancies increase the probability of and the number of the CAA inspections.

Besides, we hypothesize that the House committee membership plays a role as a channel through which regulators face political pressure from Congressional representatives. Congressional committees can create incentives for regulators to align with their political preferences, using their legitimate rights such as oversight and budget allocation (Weingast and Moran, 1983; Kleit et al., 1998; Shipan, 2004). Thus, we expect that the influence of Republican vacancies on inspections will be pronounced if the former representative was a member of any influential committees. We assume the committees that cover budget, rules, and environment as committees that are influential to the CAA inspections.[1]

Hypothesis 2: The impact of Republican vacancies becomes stronger when the former representative served on any of the influential committees.

Republican governorship is reported to reduce facility-level air pollution abatement technology adoption (Raff et al., 2022) and ambient air quality (Beland and Boucher, 2015). We investigate whether the effects of Republican vacancies are more noticeable under Republican governors compared to non-Republican governors. Furthermore, non-attainment areas, which fail to comply with National Ambient Air Quality Standards (NAAQS)[2], would face more regulatory inspections (Gray

[1]The influential committees include Appropriations, Budget, Oversight and Accountability, Rules, Energy and Commerce, and Transportation and Infrastructure.

[2]The EPA designates non-attainment areas if the concentration of criteria pollutants, including particulate matter, sulfur dioxide, and nitrogen dioxide, exceeds the threshold level. States are required to submit a State Implementation Plan (SIP) to improve the air quality in non-attainment areas.

and Deily, 1996) and attention from politicians compared to attainment areas. For instance, Raff et al. (2022) find that the effects of the Republican governor on air pollution abatement spending and adoption are higher in non-attainment areas than in attainment areas. We expect that the effects of Republican vacancies will be higher in non-attainment areas than in attainment areas.

Hypothesis 3: The effects of legislative vacancies on inspections will be different depending on the governor's political party affiliation and non-attainment status.

4 Data

We use the Clean Air Markets Program Data (CAMPD) from the EPA, covering the period from 2001 to 2021, to access detailed monthly data on electricity-generating power plants. This dataset includes information on air pollutant emissions and geographical locations of the plants. The CAMPD is constructed to collect data for Clean Air Markets, including the Acid Rain Program and Cross-State Air Pollution Program. Additionally, we gather enforcement data from the Integrated Compliance Information System for Air (ICIS-Air), which contains various inspection and enforcement activities such as inspection counts and the identification of high-priority violations (HPV). Risk-Screening Environmental Indicators (RSEI) scores are also provided by the EPA.

We match the congressional district to each power plant based on the year and the plant's geographical coordinates based on Cartographic Boundary Files provided by the U.S. Census Bureau. We gather information on congressional vacancies from the US House of Representatives: History, Art & Archives, which provides details such as the date of the vacancy, the reason for the vacancy, and the subsequent successor. On average, a congressional seat remains vacant for approximately 3.7 months (See Figure A.2.1 for the distribution of vacancy periods) and more than half of the reason for the vacancy is resignation (See Figure A.2.2). The vacancies from resignation consist of various reasons, including appointment to or running for federal and state positions, private firms, and being involved with crime and scandal (See Figure A.2.3).

Additionally, we use data from the Center for Effective Lawmaking, which provides comprehensive information on individual House and Senate members, including their political party affiliation, congressional district, whether they belong to the majority party, the number of terms served, and their seniority. We also obtain the 107th-115th House committee assignment data from Stewart

and Woon (2017) and 116th and 117th data from the Clerk of the House of Representatives.

For socio-economic control variables, GDP and population data are obtained from the Bureau of Economic Analysis. The unemployment rate is collected from the Department of Agriculture Economic Research Service. We collect data on the political party affiliation of governors from the National Governors Association website. Non-attainment areas status data are collected from the EPA, and a facility is classified as being non-attainment areas if it is located in a county where at least one of the following criteria pollutants are in non-attainment status: ozone, carbon monoxide, lead, nitrogen dioxide, particulate matter, and sulfur dioxide. The League of Conservation Voters website is scraped to retrieve annual LCV scores for every congressional representative, which is used for the robustness of our analysis.

In summary, we construct a comprehensive monthly panel dataset spanning between 2001 and 2021. This dataset integrates power plant-level monthly data, surrounding political information, and inspection activities conducted by state authorities. Table A.1.1 and Table A.1.2 represent the descriptive statistics segmented by vacancy status and political party affiliation, respectively.

5 Econometrics

We investigate whether electricity-generating power plants experience different CAA inspections depending on the presence of legislators in their congressional districts between 2001 and 2020 in the United States. In particular, we focus on the causal impacts of the political party affiliation of legislators on the probability and number of inspections since political party affiliations often represent distinct environmental priorities and preferences toward environmental protection. In recent decades, the political stance on environmental issues has become increasingly polarized along political party lines, and political party affiliation of legislators reveals their political preferences on environmental activities with Republicans favoring lax regulations and Democrats supporting stricter enforcement (Dunlap and McCright, 2008; Beland and Boucher, 2015). This significant divide in the attitude toward environmental protection has also occurred in the public (McCright et al., 2014). However, a simple comparison of the CAA inspection based on the political party of the representatives may generate biased estimates due to the potential existence of sample selection and omitted variables. For instance, areas that tend to support Republican representatives may

prefer less stringent state or local regulations across other various sectors and fewer incentives for environmental protection, both of which can also impact compliance and inspection behavior.

To identify the causal impact of a legislator's political party affiliation on CAA inspection, we utilize the fact that the seat for a Congressional representative is often vacant for a couple of months due to resignation, death, and so on. We assume these vacancies are plausibly exogenous since they are unlikely to be affected by factors that determine the CAA inspections. By investigating the behavior of regulators during these vacancy periods, we can obtain insights into the potential influence of political pressure from legislators on regulatory actions. If regulators are under political pressure at ground level (Innes and Mitra, 2015), the absence of a Congressional representative would create an environment where regulators may work with a certain degree of independence from such political pressure.

To test the above hypotheses, we estimate the following equation:

$$Y_{iymc} = \beta_0 + \beta_1 VACANT_{iymc} + \beta_2 REP_{iymc} + \beta_3 VACANT{*}REP_{iymc} + \beta_4 X_{iym} + \eta_i + \gamma_y + \epsilon_{iym} \quad (1)$$

where Y_{iymc} represents outcome variables, including inspection dummy and the number of inspections on facility i in year y and month m in congressional district c. $VACANT_{iymc}$is a dummy variable that indicates whether a House representative seat is vacant or not in a congressional district, and REP_{iymc} is 1 if the representative in congressional district c is Republican, otherwise 0. X_{iym} denotes time-varying control variables. η_i and γ_y indicate facility- and year-fixed effects. ϵ_{iym} represents the error term.

To mitigate omitted variable bias, we include several control variables related to facility, politician, and region. We also cluster standard errors at the congressional district level[3]. Given that the number of inspections is a count variable and includes many zeros, we employ the Poisson pseudo-likelihood regression developed by Correia et al. (2020). All estimations include facility- and year-fixed effects to account for facility heterogeneity that is constant over time and common shocks that are constant across facilities but vary over time. In addition to the two-way fixed effects, we include time-varying facility characteristics, including Risk-Screening Environmental Indicators

[3]Since Congressional district lines are redrawn every 10 years to reflect the population change, we assume the Congressional districts before and after redrawing are different from each other.

(RSEI) scores[4] scores and SO_2 emission level and rate as the level of emissions can influence the environmental regulatory enforcement (Earnhart, 2004). We also control high priority violations (HPV)[5] as previous violations would influence the inspection behavior (Eckert and Eckert, 2010; Kleit et al., 1998).

Furthermore, we account for various politician characteristics to control for political power, such as committee assignment, and Legislative Effectiveness Scores (LES)[6], seniority, and a majority party indicator. Additionally, the regional characteristics can influence the level of enforcement (Earnhart, 2004). We include GDP, unemployment rate, and population to control basic regional features. We also control the political party lines of governors and the Senates. Lastly, non-attainment status is also included as the control variable to capture the current regulatory situation that may affect inspection (Gray and Deily, 1996).

6 Results

6.1 Main Analysis

The main regression results for equation (1) are presented in Table 1. While legislative vacancies themselves do not significantly affect the probability of inspections (column 1), if we interact vacancy with political party affiliation, the vacancies from Republican representatives significantly increase the probability of inspection by 10.5 percentage points compared to vacancies caused by non-Republican (column 2). Conversely, when non-Republicans leave their office, there is a significant decline in the probability of inspection by 4.7 percentage points at the 10% level. In columns 3 and 4, the number of inspections is used as an outcome variable. While we do not find significant evidence that vacancy itself increases the number of inspections (column 3). Republican vacancies increase the number of CAA inspections by 76.8%. Overall, these findings highlight that Republican vacancies increase inspections, while the impact of non-Republican vacancies on inspections presents the opposite direction—declining inspections.

[4] A RSEI score is a weighted toxic pollutant release that accounts for both affected population and chemical toxicity weight based on toxic releases inventory (TRI).

[5] The EPA announces HPV list that contains facilities that violate the CAA significantly. The regulators are supposed to enforce the law against the facilities in the HPV list in a timely manner.

[6] LES is developed by the Center for Effective Lawmaking (CEL) to reflect a legislator's lawmaking effectiveness. It is based on 15 indicators, including whether a member's bill is introduced, received any action in committee, and passed in Congress.

Table 1: The effects of legislative vacancy on inspection probability and count

	Inspection (=1)		Inspection (Count)	
	(1)	(2)	(3)	(4)
Vacant (=1)	0.007	-0.015	-0.124	-0.130
	(0.008)	(0.015)	(0.100)	(0.190)
Republican (=1)		0.000		0.097
		(0.005)		(0.097)
Vacant x Republican		0.031*		0.015
		(0.018)		(0.225)
SO2 emissions (short tons)	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
CO2 emissions (1,000 short tons)	0.000**	0.000**	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
High Priority Violation Status (=1)	0.006	0.006	-0.008	-0.012
	(0.005)	(0.005)	(0.110)	(0.108)
Legislative Effectiveness Scores	-0.001	-0.001	-0.015	-0.015
	(0.001)	(0.001)	(0.009)	(0.009)
Number of terms served	-0.000	-0.000	-0.008	-0.008
	(0.000)	(0.000)	(0.006)	(0.006)
Majority party member (=1)	0.002	0.002	0.008	0.002
	(0.003)	(0.003)	(0.044)	(0.046)
Influential Committee (=1)	-0.006*	-0.006*	-0.073	-0.077
	(0.004)	(0.004)	(0.058)	(0.059)
Served in state legislature (=1)	-0.006*	-0.006*	-0.155***	-0.169***
	(0.003)	(0.003)	(0.048)	(0.049)
Unemployment rate	-0.003***	-0.003***	-0.091***	-0.089***
	(0.001)	(0.001)	(0.024)	(0.023)
GDP per capita (US$)	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Republican Governor (=1)	-0.007**	-0.007**	-0.067	-0.073
	(0.003)	(0.003)	(0.047)	(0.045)
Republican Senate ratio	0.008	0.008	0.044	0.040
	(0.007)	(0.007)	(0.098)	(0.097)
Non-attainment areas (=1)	-0.008	-0.008	-0.182*	-0.182*
	(0.007)	(0.007)	(0.100)	(0.101)
Constant	0.143***	0.143***	0.046	-0.010
	(0.010)	(0.010)	(0.202)	(0.207)
Observations	291,460	291,460	233,402	233,402
Facility FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
Adjusted R^2	0.214	0.214		

Note: This table presents the results of regressions of CAA inspections on the interaction of legislative vacancy and political party affiliation. Columns (1) and (2) show the results from the linear probability model. Poisson pseudo-likelihood regressions are employed for columns (3) and (4) to account for the count variable. The mean inspection probability and count in congressional districts with incumbent non-Republicans are 0.19 and 0.33, respectively. Standard errors are clustered at the congressional district level. * p<0.10, ** p<0.05, *** p<0.01.

Table 2 illustrates the effects of Republican representative vacancies on the inspection probability by House committee assignment. If the former representative is Republican and served on any of the influential committees, the probability of the inspection increases by 17.2 percentage points (column 1), which is higher than the average increase of 10.5 percentage points presented in column 2 of Table 1. This finding indicates that the political pressure from Republicans reducing inspections becomes stronger when the former representative is involved in the influential committees. The column 2 also presents that Republican vacancies increase the number of inspections by 192.7% compared to Democratic vacancies. If the member does not belong to any of the influential committees, there is no significant evidence that legislative vacancies affect the inspection probability (column 3) and numbers (column 4). Our finding confirms Weingast and Moran (1983)'s suggestion that the Congressional committee is one of the channels through which politicians control regulators.

Table 2: The effects on probability and number of inspections by House committee assignment

	Influential Committees		Other Committees	
	(1) Inspection (=1)	(2) Inspection (Count)	(3) Inspection (=1)	(4) Inspection (Count)
Vacant	-0.071**	-0.542**	-0.012	-0.531**
	(0.029)	(0.250)	(0.041)	(0.237)
Republican (=1)	0.008	0.110	0.010	0.181
	(0.009)	(0.106)	(0.016)	(0.219)
Vacant x Republican	0.172***	1.074***	-0.011	0.199
	(0.039)	(0.349)	(0.052)	(0.443)
Constant	0.198***	0.044	0.231***	1.116*
	(0.027)	(0.347)	(0.035)	(0.614)
Observations	66,783	62,320	37,375	35,016
Facility FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
Adjusted R^2	0.233		0.223	

Note: This table presents the results of regressions of CAA inspection dummy and numbers on the interaction of legislative vacancy and political party affiliation by House committee assignment. The "influential committees" include Appropriations, Budget, Oversight and Accountability, Rules, Energy and Commerce, and Transportation and Infrastructure. The "other committees" (column 3 and 4) refers to the remaining committees, excluding the influential Committees. The mean inspection probabilities in congressional districts with incumbent non-Republicans are 18.8% and 19.4% for influential committees and other committees, respectively. The mean inspection counts in congressional districts with incumbent non-Republicans are 0.32 and 0.34 for influential committees and other committees, respectively. Standard errors are clustered at the congressional district level. * p<0.10, ** p<0.05, *** p<0.01.

In columns 1 and 2 of Table 3, the effects of Republican vacancies on the probability of inspections vary depending on the governor's political party affiliation. The political influence of Republican representatives becomes stronger under Republican gubernatorial states. However, we find no significant evidence of similar effects for non-Republican governorship. Specifically, under the Republican governorship, the effect of Republican vacancies on the inspection probability is 14.1 percentage points (column 1), while under the non-Republican governorship, the effect is reduced to 2 percentage points and insignificant (column 2). Furthermore, columns 3 and 4 show that the effects of Republican vacancies are stronger in non-attainment areas (19.4 percentage points) than in attainment areas (4.8 percentage points and insignificant). The stronger effects observed in Republican governorship and non-attainment areas are also consistent in the regression of the number of inspections (Table A.1.3).

Table 3: The Effects on Probability of Inspection (Governor's Party and Non-attainment Areas)

	Governor's Party		Non-attainment County	
	(1) Republican	(2) Non-Republican	(3) Non-attainment	(4) Attainment
Vacant	-0.066*	0.005	-0.065***	-0.008
	(0.039)	(0.034)	(0.019)	(0.046)
Republican (=1)	0.029**	-0.014	-0.006	0.017
	(0.015)	(0.010)	(0.012)	(0.012)
Vacant x Republican	0.141***	0.020	0.194***	0.048
	(0.051)	(0.044)	(0.055)	(0.053)
Observations	59,262	44,894	32,912	71,246
Facility FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
Adjusted R^2	0.178	0.272	0.269	0.189

Note: This table presents the results of regressions of CAA inspections on the interaction of legislative vacancy and political party affiliation by governor's political party lines and non-attainment status. The respective mean inspection probability in congressional districts with incumbent non-Republicans are 0.16, 0.22, 0.24, 0.16. Standard errors are clustered at the congressional district level. * p<0.10, ** p<0.05, *** p<0.01.

6.2 Robustness checks

LCV Scores: As a proxy for environmental preference instead of relying on political party affiliation, we use the National Environmental Scorecard published by League of Conservation Voters (LCV scores) (Cragg et al., 2013)[7]. As expected, the political stance regarding environmental protection aligns along political party lines (Figure A.3.1). We run the regression of legislative vacancies on inspections by the LCV scores. The vacancies from Congressional members with lower than 30 scores (i.e., anti-environmentalist) increase the inspection probability by 5.2 percentage points (column 1), while we do find significant effects on the number of inspections. The vacancies from Congressional representatives with above 70 scores (i.e., pro-environmentalist) have no significant effects on the probability of inspections (column 3) but decrease the inspection counts by 36.3% (column 4).

7 Conclusions

The purpose of this paper is to present empirical findings that demonstrate the existence of Congressional pressure on CAA regulators. Using legislative vacancies as a quasi-natural experiment, we propose that Republican representatives' vacancies lead to a significant increase in both the probability and number of inspections significantly compared to vacancies caused by Democrats. We further examine whether the level of political party control varies depending on the surrounding environment such as House committee assignment, the political affiliation of state governors, and non-attainment status. Our analysis shows that the political pressure from Republicans is particularly notable when the representative is a member of an influential committee, has a Republican governor and works in non-attainment areas.

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[7]The LCV scores indicate the level of support that individual legislators have for environmental bills, reflecting their political preference towards environmental protection. The scores range from 0 to 100, with a higher percentage indicating a pro-environmental stance. For instance, 30 means a legislator votes "yes" to approximately 30% of the environmental protection bills proposed in the House.

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A Appendix

A.1 Main Analysis

Table A.1.1: Descriptive Statistics by Legislative Vacancy

	Vacant=1 (a)	Vacant=0 (b)	Difference (a-b)
Inspection (=1)	0.12	0.12	0.00
	(0.01)	(0.00)	(0.01)
Inspection count	0.16	0.20	-0.04
	(0.02)	(0.00)	(0.04)
Republican (=1)	0.72	0.59	0.13***
	(0.01)	(0.00)	(0.01)
SO2 emissions (short tons)	240.16	381.44	-141.28***
	(30.41)	(2.25)	(36.26)
CO2 emissions (1,000 short tons)	121.00	158.68	-37.69***
	(7.12)	(0.53)	(8.55)
High Priority Violation Status (=1)	0.10	0.09	0.01
	(0.01)	(0.00)	(0.01)
Legislative Effectiveness Scores	0.47	1.00	-0.53***
	(0.02)	(0.00)	(0.04)
Number of terms served	7.14	5.18	1.96***
	(0.13)	(0.01)	(0.12)
Majority party member (=1)	0.53	0.57	-0.04***
	(0.01)	(0.00)	(0.01)
Influential Committee (=1)	0.56	0.63	-0.07***
	(0.01)	(0.00)	(0.01)
Served in state legislature (=1)	0.47	0.48	-0.01
	(0.01)	(0.00)	(0.01)
Unemployment rate	6.85	6.33	0.53***
	(0.09)	(0.00)	(0.08)
GDP per capita (US$)	54,256.63	49,817.37	4,439.27***
	(2,243.78)	(66.44)	(1,076.51)
Republican Governor (=1)	0.57	0.57	-0.01
	(0.01)	(0.00)	(0.01)
Republican Senate ratio	0.50	0.51	-0.01
	(0.01)	(0.00)	(0.01)
Non-attainment areas (=1)	0.43	0.36	0.06***
	(0.01)	(0.00)	(0.01)

Note: This table represents the descriptive statistics by legislative vacancy. * p<0.10, ** p<0.05, *** p<0.01.

Table A.1.2: Descriptive Statistics by Political Party Affiliation

	Republican (a)	Democrat (b)	Difference (a-b)
Inspection (=1)	0.12	0.13	-0.01***
	(0.00)	(0.00)	(0.00)
Inspection count	0.20	0.20	-0.00
	(0.00)	(0.00)	(0.00)
Vacant (=1)	0.00	0.00	0.00***
	(0.00)	(0.00)	(0.00)
SO2 emissions (short tons)	395.22	359.96	35.26***
	(2.96)	(3.45)	(4.58)
CO2 emissions (1,000 short tons)	174.39	135.38	39.01***
	(0.74)	(0.73)	(1.08)
High Priority Violation Status (=1)	0.09	0.10	-0.01***
	(0.00)	(0.00)	(0.00)
Legislative Effectiveness Scores	1.06	0.91	0.15***
	(0.00)	(0.00)	(0.00)
Number of terms served	4.58	6.07	-1.49***
	(0.01)	(0.01)	(0.02)
Majority party member (=1)	0.69	0.39	0.30***
	(0.00)	(0.00)	(0.00)
Influential Committee (=1)	0.64	0.61	0.03***
	(0.00)	(0.00)	(0.00)
Served in state legislature (=1)	0.50	0.45	0.05***
	(0.00)	(0.00)	(0.00)
Unemployment rate	6.06	6.72	-0.66***
	(0.01)	(0.01)	(0.01)
GDP per capita (US$)	49,112.82	50,888.91	-1,776.09***
	(98.90)	(78.07)	(135.87)
Republican Governor (=1)	0.63	0.49	0.14***
	(0.00)	(0.00)	(0.00)
Republican Senate ratio	0.60	0.37	0.23***
	(0.00)	(0.00)	(0.00)
Non-attainment areas (=1)	0.26	0.52	-0.26***
	(0.00)	(0.00)	(0.00)

Note: This table represents the descriptive statistics by political party affiliation. * p<0.10, ** p<0.05, *** p<0.01.

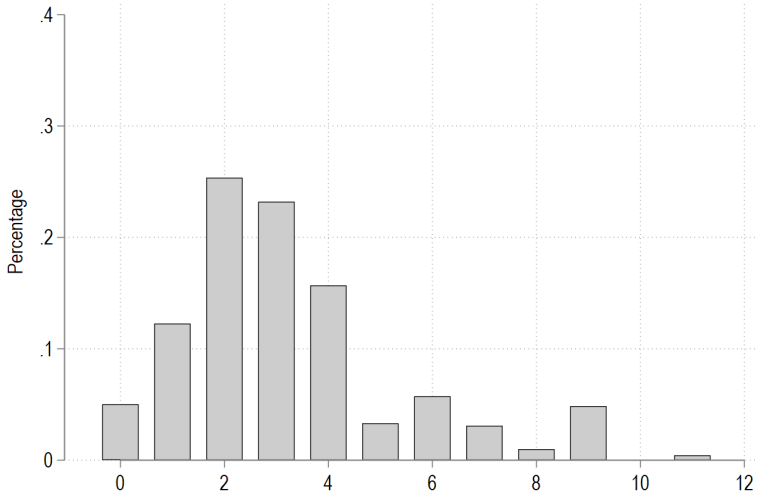
Table A.1.3: The Effects on Number of Inspection (Governor's Party and Nonattainment Areas)

	Governor's Party		Non-attainment County	
	(1) Republican	(2) Democrat	(3) Non-attainment	(4) Attainment
Vacant	-0.467	-0.155	-0.495**	-0.254
	(0.621)	(0.121)	(0.220)	(0.218)
Republican (=1)	0.586***	-0.136**	-0.099	0.318**
	(0.169)	(0.068)	(0.079)	(0.159)
Vacant x Republican	0.936	0.139	0.883***	0.492
	(0.687)	(0.176)	(0.322)	(0.340)
Observations	57,843	43,878	32,035	69,726
Controls	Y	Y	Y	Y
Facility FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y

Note: This table presents the results of regressions of CAA inspections on legislative vacancy. Poisson pseudo-likelihood regression is employed to account for the count variable. Standard errors are clustered at the congressional district level. * p<0.10, ** p<0.05, *** p<0.01.

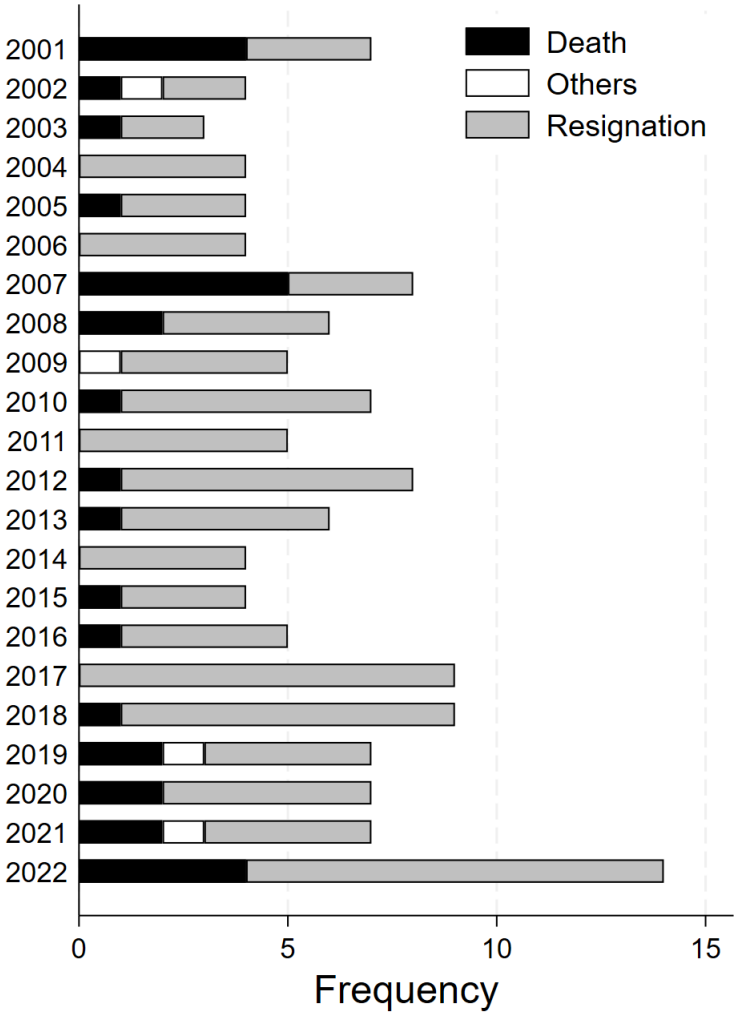
A.2 Legislative Vacancy

Figure A.2.1: Distribution of Vacancy Period



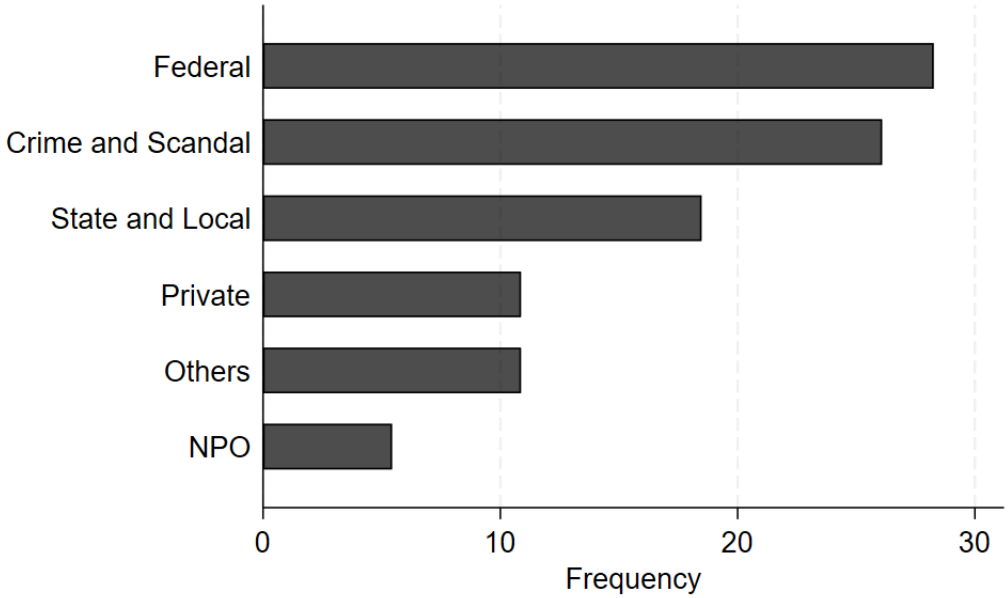
Note: This figure illustrates the distribution of vacancy period (unit: month).

Figure A.2.2: Frequency of legislative vacancy by year and reason



Note: This figure illustrates the frequency of legislative vacancy and distribution of vacancy reasons from 2001 to 2022. The "Others" include a lack of a certificate of election, expulsion, an election scandal, and not taking a seat.

Figure A.2.3: Frequency of legislative vacancy from resignation

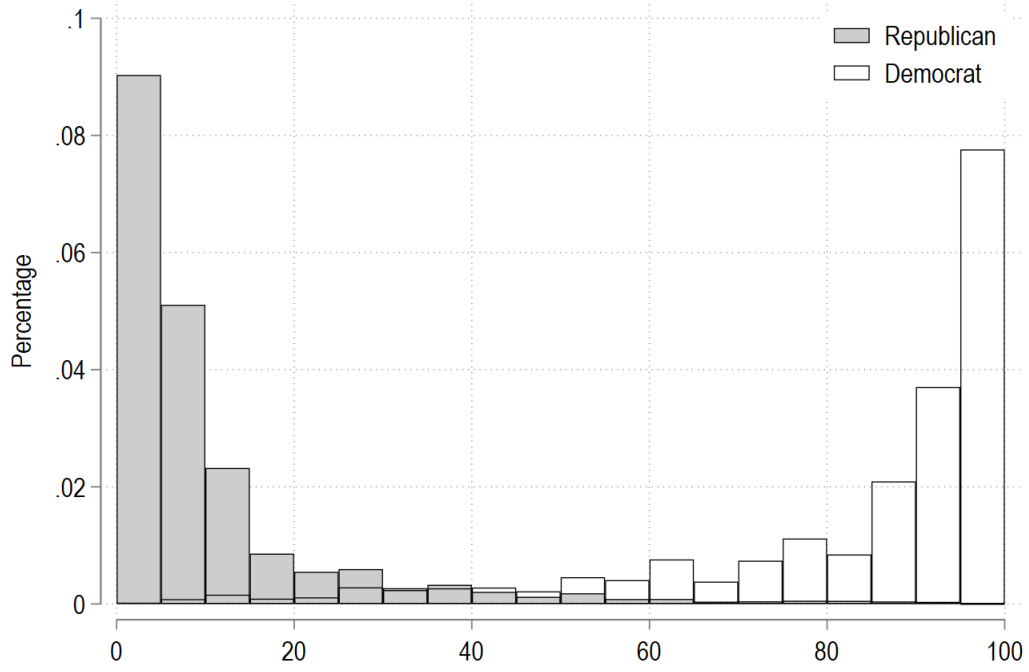


Note: This figure illustrates the frequency of legislative vacancy caused by resignation. The "Federal" includes appointment to or running for federal executive, judiciary, and legislative positions. The "Crime and Scandal" includes any crimes and scandals in which a representative is involved, who are not necessarily to be found guilty. The "State and Local" includes appointment to or running for state and local executive, judiciary, and legislative positions. The "Private" includes any private organization, which includes an investment bank and lobbying firm. The "NPO" refers to non-profit organizations, which includes interest group organizations. The "Others" includes unknown and personal family and health issues.

A.3 Robustness Checks

A.3.1 LCV Scores

Figure A.3.1: Distribution of LCV Scores by Party Affiliation



Note: This figure illustrates the distribution of LCV scores by political party affiliation. The horizontal axis represents the ratio of supporting environmental bills in the House. The higher number implies more pro-environmental voting.

Table A.3.1: The Effects of Vacancy on Inspection by LCV Scores

	LCV scores< 30		LCV scores> 70	
	(1) Inspection (=1)	(2) Inspection (Count)	(3) Inspection (=1)	(4) Inspection (Count)
Vacant	0.052*	0.253	-0.014	-0.451**
	(0.026)	(0.264)	(0.021)	(0.177)
Constant	0.204***	0.589	0.308***	0.630*
	(0.028)	(0.447)	(0.032)	(0.360)
Observations	54,352	51,427	37,819	35,051
Facility FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Month FE	Y	Y	Y	Y
Adjusted R^2	0.202		0.258	

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: The LCV scores represent the percentage of supporting environmental laws. A higher score denotes a stronger pro-environment stance. For column 2 and 4, Poisson pseudo-likelihood regression is employed to account for the count variable. Standard errors are clustered at the congressional district level. * p<0.10, ** p<0.05, *** p<0.01.