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Polluting politics

Louis-Philippe Beland [a,*], Vincent Boucher [b]

[a] Louisiana State University, 2307 Business Education Complex, Baton Rouge, LA, 70803, United States

[b] Département d'Économique, Université Laval, CIRPÉE and CREATE, 1025 av. des Sciences-Humaines, Quebec City (Qc), G1V 0A6, Canada

HIGHLIGHTS

- We investigate the impact of Democratic vs Republican governors on Pollution.
- We use a regression discontinuity design and air quality data from EPA.
- We focus on the following air pollutants: CO, Ozone, NO2, SO2 and Particulate matter.
- We find lower pollution under Democratic governors.

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ABSTRACT

This paper estimates the causal impact of Democratic vs Republican governors on pollution. Using a regression discontinuity design, gubernatorial election data, and air quality data from US Environmental Protection Agency (EPA), we find that air pollution is lower under Democratic governors.

1. Introduction

It is estimated that more than 25 million Americans, including 7 million children, suffer from asthma, a number which has been steadily increasing since 2000 (Akinbami et al., 2012). One important contributor to this increase is exposure to air pollution. There is indeed a large body of literature on the negative impacts of air pollution on health (e.g. Greenstone (2004), Chay and Greenstone (2005), Dominici et al. (2014)). Although air pollution is strictly regulated in the United States[1] we observe substantial variability across states. Such variation is likely influenced by the states' political environment. In particular, the identity of the party in power is likely to have a significant influence, as it has been shown to affect economic activity, policies, spending, and the labor market (e.g. Besley and Case (1995, 2003), Leigh (2008), Beland (2015) and Beland and Oloomi (2015)). Party affiliation is then likely to contribute to the realized levels of air pollution.

In this paper, we estimate the causal impact of Democratic vs. Republican governors on the states' levels of five major air pollutants: carbon monoxide (CO), ground-level ozone (Ozone), nitrogen dioxide (NO2), particulate matter (Particulates) and sulfur dioxide (SO2).[2] We find that the concentrations of NO2, Ozone and Particulates are significantly lower under Democratic governors.

* Corresponding author.
E-mail addresses: lbeland@lsu.edu (L.-P. Beland), vincent.boucher@ecn.ulaval.ca (V. Boucher).

[1] For instance, under the Clean Air Act, see http://www2.epa.gov/clean-air-act-overview for details.

[2] Our paper is contributing to the literature linking politics and the environmental policies. Fredriksson and Wollscheid (2010) find that party discipline, strength, and political instability are strong determinants of policy outcomes, while (List and Sturm, 2006) argues that policies are largely influenced by lobbying and finds a strong link between electoral incentives and environmental policies. Innes and Mitra (2015) find that new Republican representatives significantly depress inspection rates in the year following their election.

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Table 1
RDD estimates: several specifications.
Source: Airdata (EPA).

Model	Concentration of	CO (1)	NO2 (2)	Ozone (3)	Particulates (4)	SO2 (5)
1st order	Dem. Gov	−0.0057	−0.1367***	−0.0014***	−0.0394*	−0.0604
		(0.0211)	(0.0522)	(0.0005)	(0.0231)	(0.0479)
2nd order	Dem. Gov	−0.0315	−0.1359**	−0.0022***	−0.0715**	−0.0952
		(0.0268)	(0.0664)	(0.0006)	(0.0283)	(0.0624)
3rd order	Dem. Gov	−0.0224	−0.2663***	−0.0023***	−0.1026***	−0.0952
		(0.0308)	(0.0762)	(0.0007)	(0.0366)	(0.0624)
Local-Linear -IK Bandwidth	Dem. Gov	−0.1358**	−0.2269***	0.0022**	−0.0664*	−0.2368*
		(0.0547)	(0.0660)	(0.0010)	(0.0394)	(0.1380)

Notes: State average concentrations for each year: CO2 (ppm), NO2 (ppb), Ozone (ppm), Particulates ($\mu g/m^3$), SO2 (ppb). Standard errors are clustered at the state level.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

Interestingly, we find that changes in the levels mostly happen *below* EPA standards. Our analysis suggests that party affiliation has a significant impact on air pollution. Our results support political difference between political parties and reject median voter theorem.

2. Data

The main data on air pollution come from the US EPA AirData from 1975 to 2013. We use information on yearly average concentrations in a given state for five major pollutants: CO, Ozone, NO2, Particulates, and SO2. The five pollutants are covered by the Clean Air Act and are targeted by the EPA for their negative impacts on health, on the environment, as well as on properties. Of those pollutants, Ozone and Particulates have the strongest impacts on health and can lead to, or exacerbate respiratory problems, especially for people with asthma.[3] NO2 contributes to the formation of Ozone and Particulates. SO2 also contributes to the formation of Particulates.[4] Concentration levels represent averages across the states' monitoring stations. Using the National Ambient Air Quality Standards, we also report the yearly exceedance levels.[5] We use two main sources for the election data: ICPSR 7757 (before 1990) and *Atlas of US Presidential Elections* (for 1990–2013).

3. Methodology

We capture the causal impact of the party allegiance of governors on air quality using a regression discontinuity design (RDD), following Lee (2001, 2008). The RDD allows us to remove potential endogeneity of elections resulting from unmeasured characteristics of states and candidates. Our main specification uses parametric regression discontinuity. We estimate:

$$Y_{st} = \beta_0 + \beta_1 D_{st} + F(MDV_{st}) + X_{st} + \gamma_s + \nu_t + \epsilon_{st}. \quad (1)$$

Y_{st} represents the air quality measure of interest mentioned above. The main coefficient of interest is β_1. D_{st} is a dummy variable that takes a value of one if a Democratic governor is in power in state s during year t. Following Gelman and Imbens (2014), the party effect, β_1, is estimated by controlling for the margin of victory using a second-order polynomial of the margin of victory: $F(MDV_{st})$. We also present alternate polynomials and local-linear regression, using optimal bandwidth choice by Imbens and Kalyanaraman (2012). MDV_{st} refers to the margin of victory in the most recent gubernatorial election prior to year t in state s. The margin of victory is defined as the proportion of votes cast for the winner minus the proportion of votes cast for the candidate who finished second. The value is positive if the Democratic candidate won and negative otherwise. γ_s and ν_t capture state and year fixed effects, respectively. X_{st} refers to time-varying state characteristics. Standard errors are clustered at the state level to account for potential serial correlation.

4. Results

4.1. Main results

As it is customary in RDD analysis, Fig. 1 explores the discontinuity at 0% when a Democratic governor barely wins over a Republican. Fig. 1 suggests that concentration levels are lower under Democratic governors. Table 1 presents RDD estimates for outcome variables: concentrations of CO, Ozone, NO2, Particulates, and SO2 using different polynomials. Our favorite specification is row 2: second-order polynomials. The tables report only the coefficient of interest: β_1, which captures the impact of the Democratic governor. Row 2 of Table 1 shows that Democratic governors significantly reduce concentrations for NO2, Ozone and Particulates. Coefficients for CO and SO2 also suggest that Democratic governors reduce concentrations, although the results are not statistically significant.[6] Table 1 also shows that results are robust regardless of the order of the polynomials used and to using local linear RDD. Table A.3 investigates whether the concentrations of the substances are higher than recommended by the EPA. Table A.3 shows that under Democratic governors, it is less likely that ozone emission will exceed the limits. There is no significant difference for CO and particulate; and NO2 and SO2 never goes above the recommended limit.

4.2. Robustness and heterogeneity

Panel A of Table 2 investigates the heterogeneity of the impact and robustness of the results. Table 2 shows results are qualitatively the same if we control for several characteristics of states and

[3] See www.epa.gov/air/urbanair/ for details.

[4] See http://www2.epa.gov/clean-air-act-overview and (Lippmann, 2000), chapters 2 and 20, for details. We consider particulate matter from 0 to 10 μm (PM10 Total 0–10 μm STP).

[5] We use primary standards, see http://www.epa.gov/air/criteria.html for a precise description of those standards. Tables A.1 and A.2 presents summary statistics.

[6] Recall that Ozone and Particulates are considered to have the most harmful impact on health. Yet, another feature of those pollutants is that they are not directly emitted as a result of human activities, but are the result of the interactions between many pollutants and chemicals (including NO2 and SO2).