The Role of Party Affiliation, Lobbying and Electoral Incentives in Decentralized U.S. State Support of the Environment

Lucia Pacca[1], Daniele Curzi[2], Gordon Rausser[3], and Alessandro Olper[4]

[1]University of California, San Francisco, USA

[2]University of Milan, Italy

[3]University of California, Berkeley, USA

[2,4]LICOS – Centre for Institution and Economic Performance, Catholic University of Leuven, Belgium

Abstract

This article investigates the influence of lobbying, electoral incentives, and U.S. state governors' party affiliation on environmental expenditures. A theoretical framework is presented, emphasizing the potential impact of lobbying from interest groups on environmental policies. The major causal link for environmental expenditures depends on the governor's political preferences. Implementing a Regression Discontinuity Design (RDD), we identify and estimate the causal effect of state governors on the level of environmental expenditures. We test whether governors tend to deviate from their own political preferences when facing pressures from polluting lobbies and electoral incentives from environmental organizations. The empirical results reveal that, when Democratic governors are in charge, environmental expenditures are, on average, higher. However, in oil-abundant states, and/or in States where polluting industries are economically important, Democratic politicians tend to allocate fewer resources to environmental preservation, suggesting that political pressure from lobbying groups matters.

Keywords: Lobbying; Environmental Policies; United States; Political Parties; Regression Discontinuity; Elections

1 Introduction

Given the withdrawal of the U.S. federal government from the Paris Climate Accord and the current governance structure of the federal Environmental Protection Agency, the role of decentralized state governments' support of the environment has become increasingly important. Indeed, governors have a substantial degree of autonomy in deciding the portion of a state's budget allocated to the conservation of natural resources. Given their central role, governors are subject to political pressures from alternative, self-interested sources. Specifically, they are subject to lobbying from corporate groups, which are usually interested in lowering the level of environmental regulations. On the other hand, the sensitivity of voters towards environmental issues has been increasing as a consequence of the intensification of the worldwide debate on climate change and the effect of emissions and other types of pollution (see, for example, Herrnstadt and Muehlegger (2014)). Generally, environmental organizations invest in organizing and expanding "green" voters, bringing environmental issues to the attention of politicians and acting largely through public persuasion and demonstrations.

The political economy determinants of environmental policies have been extensively studied by theoretical and empirical literature (see Oates and Portney (2003) for a survey). However, given the complexity of the policy formation process, most of the studies analyze single determinants of environmental regulations rather than considering how different factors interact. Within the literature about the political economy of environmental policies, the paper by List and Sturm (2006) is of particular interest. Their work focuses on the impact of electoral incentives on state governments' environmental policies, showing that governors, when facing reelection, are conditioned by the preferences of their state's voters. In particular, in "green" states (where citizens have higher sensitivity towards the environment), even a "brown" governor, whose ideology is closer to industrialists, could decide to implement environmentalist policies with the objective of attracting voters. The model by Yu (2005), in addition to analyzing effects of voter preferences, focuses also on the effects of lobbying from interest groups. Yu (2005) shows that governments set the optimal environmental policy in response to political pressures from interest groups - industrialists and environmentalists - as well as preferences of the median voter.

In our model, we integrate the seminal papers by List and Sturm (2006) and Yu (2005) and incorporate new data to examine U.S. state governors' support of the environment. As with earlier work, we draw a sharp distinction between electoral incentives versus lobbying incentives in the policy formation process orchestrated by the preferences of the "center" of the governance structure in each state. In our framework, industrialist lobbies exert significant political pressure on governors with weaker envi-

ronmental sensitivity, while the converse holds for environmentalist lobbies. In this paper, we explore governors' preferences according to their party affiliation, hypothesizing that Democrats are more environmentally friendly than Republicans. Environmental support, or the results of the policy formation process, is measured in terms of environmental expenditures. The impact of party affiliation on US environmental policy has been already studied by other papers, with mixed evidence. For example, Fredriksson et al. (2011) found that in the area of environmental policy, governors appear to be primarily office motivated and not ideologically or partisanship driven. Conversely, Beland and Boucher (2015), found that Democratic candidates contribute to lowering pollution emissions, while Kim and Urpelainen (2017) showed how pro-environmental votes by senators and House Representatives increase substantially under Democrat rather than Republican elected candidates. Our contribution shares with Fredriksson et al. (2011) the use of the outcome variable (U.S. states' environmental expenditures instead of emissions or federal votes), and adds to existing evidence by modeling the interaction between party affiliation, political pressures from polluting groups and electoral incentives.

Our analysis on environmental expenditures across the various U.S. states covers the sample period 1980-2014. In addition to investigating the impact of a governor's party on environmental expenditures, we test whether a governor's behavior is affected by political contributions from polluting industries or environmental groups, both of whom allocate resources to lobbying and/or persuasive actions to voting citizens. This is empirically done by interacting governors' political parties with measures of the presence of polluting industries and environmental organizations in each state. Our analysis allows us to examine whether states' governors tend to deviate from their preferences when they are subjected to strong lobbying pressures, electoral incentives, or both. To address the endogeneity issue of governors' parties, we implement a Regression Discontinuity Design. This framework emphasizes elections where the margin of victory between Democratic and Republican candidates was very close to zero. Our modeling structure exploits quasi-random variation in winners and seeks to identify a causal effect.

Based on the data utilized and on our theoretical political-economic framework, the empirical results reveal that Democratic governors receive, on average, fewer contributions from polluting sectors than Republicans, an effect that is particularly strong in the last two decades, suggesting more polarization between Democrats and Republicans in recent years for environmental expenditures. Moreover, and interestingly, we find that, when a state is governed by a Democratic candidate, the portion of the budget spent on the environment tends to be higher with respect to years when the governor is a Republican. However, the effect is highly heterogeneous across states. In particular,

the larger the oil reserves of a given state or the relevance of the polluting industry, the more Democratic governors will deviate from their party's preferences, allocating fewer resources to the preservation of the environment and the enforcement of environmental regulations.

Our analysis integrates the major political economic forces of electoral incentives, self-interested lobbying, and the governor's political party as the potential determinants of individual state environmental policies. Our presentation unfolds with a review of the critical literature related to our analysis in Section 2. In Section 3, we illustrate the theoretical framework of our political economic analysis of environmental policies. Section 4 presents the data employed. Our identification strategy and the empirical results are contained in Sections 5 and 6, respectively. In Section 7, we present robustness tests and an evaluation of our identification strategy. Finally, Section 8 provides some concluding remarks.

2 Relevant Literature

Two seminal papers inform our political economic theoretical framework. The first is the excellent paper by List and Sturm (2006) that examines the role of electoral incentives on U.S. environmental expenditures. The emphasis is on whether politicians, who are concerned about elections, tend to shape policies to attract the most possible votes also when a secondary policy issue, such as environmental policy, is concerned.[1] There is skepticism about the importance of secondary policy issues for elections, a key factor behind the widespread use of lobby models. Secondary policy issues are defined as those issues that substantially affect only small groups in society. Typical examples are environmental policy, gun control, foreign aid, or trade policy List and Sturm (2006). They instead investigated the hypothesis according to which in "green" states, where citizens have high sensitivities to the environment, will even a "brown" governor, whose ideology is more aligned with industrialists, decide to implement environmental policies with the objective of attracting voters? In essence, a "brown" governor will have an ideology more aligned to the industrialist but will still enact environmentalist policies to attract support from environmentalist interest groups. List and Sturm (2006) discover evidence confirming their hypothesis, finding that the level of environmental expenditure differs between years in which a governor can be reelected and years in which a governor is term-limited. However, missing from the List and Sturm (2006) formulation are the lobbying efforts of self-interested polluting firms, which are structured to counter the actions of electoral incentives that are potentially influenced by environmental interest

[1]See Anesi and De Donder (2011) for a recent political economy model of (a secondary) environmental policy.

groups.

The second seminal paper incorporates the lobbying efforts of both industrialized and environmental interest groups. In this insightful theoretical framework by Yu (2005), not yet empirically tested, the governmental policy process in setting environmental expenditures is influenced by two types of interest groups: polluting industries and environmental organizations. While the first group acts mainly through direct lobbying such as monetary donations to politicians, the latter group is more efficient at carrying out indirect lobbying designed to influence electoral incentives that are linked to the preferences of the median voter. Yu (2005) structures his formulation in three stages: In the first stage, lobbyists act through indirect actions, sending messages to citizens to influence their preferences. Since political candidates take into account the policy preferred by the median voter, whose beliefs are influenced by messages, interest groups indirectly affect the decisions of the elected officials. Direct lobbying takes place in the second stage to influence government policy. Finally, in the third stage, the government chooses its preferred policy, taking into account both contributions from lobbying and preferences of the median voter. Missing from the Yu (2005) formulation is the critical role of political preferences and party affiliation.

Our proposed integration of the two seminal papers, List and Sturm (2006) and Yu (2005), in the context of environmental policies is very much aligned with the general conceptual framework advanced for governmental policies by Besley and Coate (2001). These authors argue that the citizen-candidate model of representative democracy must be combined with the menu-auction model of lobbying advanced by Grossman and Helpman (1994). In their formulation, Besley and Coate (2001) argue that interest group political pressure and electoral competition should be considered jointly whenever examining the governmental policy-making process. These two forces, in their formulation, interact to determine the actual policy-making process. Here too, however, the party affiliation of political leaders is not emphasized.

In the context of environmental policies, our work is also related to a strand of literature studying the political economy determinants of environmental regulations. Much of this research is summarized in Oates and Portney (2003), who provide a review of both theoretical and empirical approaches to the evaluation of environmental policy-making. This body of research shows that interest groups influence environmental regulations, but also that voters' preferences and social benefits play an important role.

The role of interest groups has been extensively studied in the context of environmental policies. Ackerman and Hassler (1981), for example, highlight the role that "dirty" industries, in particular the coal sector, had in the structure of the Clean Air Act in the United States. More recently, Fredriksson (1997) builds a model showing how interest groups shape pollution taxes. His theoretical framework suggests that the

political equilibrium tax rate on pollution differs from the Pigouvian rate. This finding can be partly explained by the fact that a government faces lobbying pressures from both environmentalists and industrialists, who can form lobbying groups that offer incentives to the government in return for a particular policy selection. The work of Aidt (1998) argues that political competition is an important source for the internalization of economic externalities. Indeed, some lobby groups adjust their economic objectives to reflect environmental concerns, which translates into a Pigouvian adjustment of policies set by the government. Both Fredriksson (1997) and Aidt (1998) draw from the literature on the political economy of trade policies, formalized in Hillman (1982), and Grossman and Helpman (1994). In these models, a government sets policies maximizing a function that includes both social welfare and political contributions from interest groups.

Our paper is also related to a body of literature on the influence of electoral incentives on environmental policies. These works draw from the median voter theory by Downs (1957), who argues that policy decisions made by elected representatives converge towards the preferences of voters. An application of the median voter model to environmental policies is presented by McAusland (2003), who focuses on the links among inequality, openness to trade, and environmental regulations. However, more recent political economy literature tries to bridge models that emphasize office motivated candidate, as in the median voter model of Downs (1957), with models that instead emphasized policy motivated candidates, as the probabilistic voting model of Wittman (1983). As discussed in Persson and Tabellini (2000), these different assumptions represented an important limitation of the political economy literature. A recent attempt to account for this issue is present in the contribution of Callander (2008), who developed a model of electoral competition where the two candidates may either be office or policy motivated. The model incorporates both campaign and post-election behavior of candidates. Both types of candidates are fully strategic in this framework, and because voters prefer policy motivated candidates, then office motivated ones try to mimic the behavior of their opponents. One key result of the model is that the competitive interaction among candidates with different motivations affects the incentive of all candidates, predicting either convergence or divergence in policy outcomes. A similar model that emphasized the "character" of policy motivated candidates has been proposed by Kartik and McAfee (2007). Fredriksson et al. (2011) tested these hypotheses in the domain of environmental policy with the aim of better understanding the extent to which elected politicians are primarily motivated by holding office, thus choosing environmental policies accordingly, or by the chance to implement their preferred environmental policies, i.e., more ideologically driven. They implemented a Regression Discontinuity Design (RDD) using the List and Sturm (2006) data, by studying the differences in environ-

mental spending growth rate across both re-electable and lame duck governors, from the two main political parties (Democratic vs. Republican). Main findings support the idea that in the area of environmental policy, governors appear to be primarily office motivated and not ideologically or partisanship driven. However, they also showed that lame duck governors behave quite heterogeneously, with democratic governors setting lower growth rates in environmental expenditure than Republican ones. Finally, Perez-Sebastian and Raveh (2019) recently investigated both theoretically and empirically the extent to which the abundance of natural resources affect legislators' voting behaviour over federal tax policies. Main findings showed that representatives of resource-rich congressional districts are more supportive of federal tax increases, an effect driven by the relatively inelastic response of resource-rich economies to changes in federal taxes.

Our paper shares with Fredriksson et al. (2011) the RDD analysis of the effect of governors' party affiliation on environmental policy, though with a different focus. Specifically, our main concern, other than the role of party affiliation and electoral incentives, is to study the extent to which political contributions from lobbies change governors' behavior by affecting choices about the level of environmental expenditure. From this point of view, if anything, our analysis complements the one of Fredriksson et al. (2011), by developing a theoretical model that also considers the important role of lobby activities, and empirically testing its main predictions. Our paper is also related to the recent findings of Kim and Urpelainen (2017) who studied the origin of partisan polarization around environmental policy in American politics at the federal level. Specifically, they tried to disentangle the extent to which such polarization reflects voter preferences (as in List and Sturm, 2006), as opposed to disagreements between partisan elites. They showed that the causal effect of electing a Democrat instead of a Republican in close elections on pro-environmental voting is large and cannot be attributed to the median voter's preferences. They also showed that the Democrat–Republican gap is widest when fossil fuel interests make contributions exclusively to Republicans and when state-level public opinion is polarized. Broadly speaking, our results at State (instead of federal) level are not in contradiction with their findings. Finally, we share with Perez-Sebastian and Raveh (2019) a similar variable related to oil reserves (here at State level), used to obtain a plausible exogenous proxy for the interest of polluting industries.

On a range of different state government policies, other literature has been published on how politicians from different parties (Republicans vs. Democrats) implement non-environmental economic policies in the United States. Reed (2006) finds that the legislators' parties influence tax burdens; when states' legislatures are controlled by Democrats, taxes are, on average, higher. Tax policies are also studied by Fredriksson et al. (2013), who use a Regression Discontinuity Design (RDD) to account for the endo-

geneity associated with a governor's party affiliation. Their work finds that Democratic governors raise income taxes more than their Republican counterparts, but this difference only holds when governors can be reelected (namely, when they do not face term limits). Lee et al. (2004) use an RDD for congressional elections, showing that party affiliation significantly matters for congressional voting behavior. The same identification strategy is also used by Beland (2015), who evaluates labor policies, finding that Democratic governors tend to implement policies aimed at reducing the income and labor participation gap between black and white workers. Beland and Oloomi (2017) find that Democratic governors allocate a larger share of their budget to the healthcare and education sector with respect to Republican ones. Finally, the RDD is also exploited by Beland and Boucher (2015) to investigate the impact of governors' party affiliation on air pollution, which turns out to be lower under Democratic governors.

Our paper, similarly to the above literature, adopts the RDD model to causally estimate the impact of political parties (Republican vs. Democratic) on a policy variable. Our work adds value to the existing literature by focusing on environmental expenditures, by modeling the interaction between governor's party affiliation, and lobbying expenditure. Empirically, we first study how party affiliation of governors affects the campaign contributions they receive from polluting industry groups, and second, how government affiliation, lobbying contribution and electoral incentives affect environmental expenditure.

3 Theoretical Framework

Our theoretical framework relies on Yu (2005), whose model, based on the political economy frameworks by Grossman and Helpman (1994) and Rausser et al. (2011), investigates the political economy determinants of electoral incentives and lobbying on environmental policy. In addition to the determinants identified by Yu (2005), we include governors' political preferences as determinants influencing environmental policy. As previously noted, our policy variable of interest is the level of environmental expenditures. Within a state, the governor, located at the center of governance structuring, is the core actor of policy making. His or her role is crucial for determining environmental expenditures, which are aimed at preserving parks, forests, and other natural resources as well as regulating industries' polluting activities. Environmental expenditures will affect, in turn, the level of emissions:

$$e = Z(g) \tag{1}$$

where the level of emissions is indicated by e, the level of expenditures by g and Z is a decreasing function of g.

As in Yu (2005), the production function $F(L, K)$ is characterized by constant returns to scale (CRS). Emission abatement, expressed as $A(e)$, leads to a decrease in produced units of good x:

$$X = [1 - A(e)]F(L, K) \tag{2}$$

where X is net output of good x with pollution abatement, and the cost of environmental regulations is represented by the term $A(e)$. $A(e)$ is decreasing in emissions, with $A(e)' < 0$. As a consequence, given the definition of emissions in (1), we find by the chain rule that $dA/dg > 0$.

Individuals, who have identical preferences over private goods, are characterized by the following utility function:

$$U_i = x_0 + u(x) - D_i(eX) \tag{3}$$

where x_0 is consumption of the numeraire good and $u(x)$ is the utility coming from consumption of good x. $D_i(eX)$ is the negative externality coming from pollution, where eX is the total amount of pollution associated with the production of good X [2]. The disutility of pollution is defined as $D_i(eX) = \mu_i d(eX)$, where μ_i is individual i's subjective belief. An individual with high μ_i will be more sensitive to environmental issues than an individual with low μ_i. The indirect utility function of individual i is obtained as follows:

$$V_i(Y_i, e) = s(e) + Y_i - \mu_i d(e) \tag{4}$$

where Y_i is income and $s(e)$ is consumer surplus of consuming good x, which is increasing in e, since the price of the good is decreasing in e ($dp/de < 0$). If each individual provides one unit of labour, and we normalize the wage rate to one, then the level of emission for individual i will be given by:

$$e_i = \arg\max_e \{V_i = s(e) + 1 - \mu_i d(e)\} \tag{5}$$

In this formulation, society is composed of three different groups: the general public (represented by the median voter), environmentalists and industrialists. We designate the median voter as p, environmentalists as E and industrialists as I. We define the policy preferred by the median voter as e_p, and its subjective belief as μ_p. μ_p is assumed to be the same for all the public, and relatively small in magnitude. Environmentalists have a stronger subjective belief $\mu_E > \mu_p$. This group will prefer a lower level of emissions than the median voter ($e_E < e_p$) and, as a consequence, a higher level of environmental expenditures ($g_E > g_p$). The third group of people, industrialists, own

[2] As in Yu (2005), we assume that tastes over private goods are separable from the public good/bad (i.e. pollution)

the specific factor and will thus have the following optimal level of emissions:

$$V_I = \arg\max_e \left\{ s(e) + 1 + \frac{\pi(p(e), e)}{N_I} - \mu_I d(e) \right\} \tag{6}$$

where π is profit earned by the industrialists N_I. The level of emissions preferred by this third group, e_I, is higher than e_p. Both industrialists and environmentalists are organized as special interest groups, which lobby the governor.

When setting the level of environmental expenditures, the governor is driven by several forces:

$$G_j = b_{Ej} C_E(e_j) + b_{Ij} C_I(e_j) - a_j M(e_j - e_p) \tag{7}$$

where G_j is the objective function of governor j; C represents contributions from interest groups (I, industrialist, and E, environmentalist); and M is political cost, defined as a U-shaped function, and the last term in parentheses represents the deviation from the median voter's preferred level of pollution e_p.[3] Finally, a_j is the weight given to political cost by governor j. If j is the governor of a "green" state (borrowing the definition presented by List and Sturm (2006)), where citizens are more concerned about the environment, then e_p will be higher. Accordingly, the political cost to the governor will depend on whether a state is "green" or "brown".

Governors mediate between the interests of environmentalist vs. industrialists groups, and the policies preferred by the median voters. Moreover, we include governor's preferences in the objective function in a similar fashion to Rausser et al. (2011). Ideology is captured by the governor specific parameters b_I and b_E, which represent the relative power of the two interest groups in their attempts to influence environmental policy. If governor j is very much ideologically driven towards the environment, then he or she will be more sensitive to lobbying from the environmentalist interest group and less sensitive to lobbying from the industrialist interest group ($b_{Ej} > b_{Ij}$). Conversely, if the governor is ideologically closer to industrialist group, then b_{Ij} will be higher than b_{Ej}. In our framework, these parameters change depending on governor's affiliation party. More specifically, we hypothesize that Democratic governors have a higher b_E and a lower b_I, while the opposite holds for Republican governors. As explained by Rausser et al. (2011), lobbies are more effective at influencing governors whose ideology is aligned with their interests for two reasons. First, if the governor has a strong ideological commitment towards a certain cause, then he or she will be more ready to sacrifice general welfare in order to pursue that specific interest. Second, lobbying

[3] As pointed out by Yu (2005), e_p can be influenced by persuasion actions conducted by environmentalist groups. The relevant role of environmentalist groups in persuading the public has been recently evident within the debate on fracking. For example, an article by Obach (2015), which analyzes social movement against fracking, finds that, only in the State of New York, there were 159 environmental organizations mobilizing on this issue.

members will be more willing to act collectively (as opposed to free riding) when they know that there is a governor who is ideologically aligned with the group, which will reinforce the lobby's power over the center.
From (1), we can re-express (7) as follows:

$$G_j = b_{Ej}C_{Ej}(Z(g_j)) + b_{Ij}C_{Ij}(Z(g_j)) - a_jM(Z(g_j) - e_p) \tag{8}$$

Thus, the equilibrium level of environmental expenditures will be given by:

$$g^\circ = \arg\max_g \{b_{Ej}C_{Ej}(Z(g_j)) + b_{Ij}C_{Ij}(Z(g_j)) - a_jM(Z(g_j) - e_p)\} \tag{9}$$

The equilibrium expenditures policy g° will be given by the following first order condition[4]:

$$b_{Ej}W'_E(Z(g^\circ)) + b_{Ij}W'_I(Z(g^\circ)) - a_jM'(Z(g^\circ) - e_p) = 0 \tag{10}$$

where the truthful contribution schedule is imposed, i.e. $C'_{\omega j} = W'_\omega$ for $\omega = E, I$. The derivatives of interest groups' welfare with respect to expenditures represents the economic "stake" of each group in environmental policy. The larger the marginal gain in welfare from the policy, the more the interest group contributes at the margin.

Note that if $|b_{Ej}W'_E| > |b_{Ij}W'_I|$, the environmentalist group will have a greater impact on policy than the industrialist group, and $Z(g^\circ) < e_p$, which implies that the preferred level of environmental expenditures will be higher than the one preferred by the median voter ($g^\circ > g_p$). Conversely, if $|b_{Ij}W'_I| > |b_{Ej}W'_E|$, the industrialist group will be more influential, and g° will be lower than g_p.

In contrast to Yu (2005), interest groups' political influence not only depends on their relative "stake" in environmental policy, but also on the magnitude of b_{Ij} and b_{Ej}, which are linked to the preferences of governor j. In other words, the same amount of contributions will affect an environmentalist governor less than a governor with neutral preferences towards the environment.
From our theoretical model, we can draw several hypotheses to be tested:

1. The level of political contributions from environmental groups C_E and industries C_I influence environmental expenditures. All else being equal, a governor who receives higher C_I will allocate lower expenditures to the environment, and a governor who receives higher C_E will set higher environmental expenditures.

[4]The first order condition in (10) comes from simplification of the following derivative, obtained by applying the chain rule:

$$b_{Ej}W'_E(Z(g^\circ)) * Z'(g^\circ) + b_{Ij}W'_I(Z(g^\circ)) * Z'(g^\circ) - a_jM'(Z(g^\circ) - e_p) * Z'(g^\circ) = 0$$

2. As shown by the interactions $C_E b_E$ and $C_I b_I$, the effectiveness of contributions depends on the ideology of the governor. All else being equal, a governor whose ideology is driven towards the environment ($b_E > b_I$) will choose a higher level of environmental expenditures than a governor who is closer to the industry ($b_I > b_E$).

3. Where the median voter prefers a lower level of pollution (lower e_p), the governor will choose a higher level of environmental expenditures, *ceteris paribus*.

4. In order to maximize their influence on environmental policy, interest groups will contribute the most to governors that have policy positions aligned with their own ideology, i.e. environmentalist groups will contribute to governors with higher b_E, and industrialist groups to governors with higher b_I

4 Data

4.1 Environmental Expenditures

As a measure of environmental expenditures, we use *per capita* environmental expenditures. This variable, employed by List and Sturm (2006), is taken from the annual Census publication *State Government Finances*, and is available in every year of our sample period (1980-2014). We aggregate in a single variable expenditures for "fish and game," "forests and parks," and "other natural resources." According to the definitions from *State Government Finances*, these expenditures include the portion of a state's budget which is allocated to the development and conservation of natural resources, as well as to the regulation of productive activities affecting the environment[5].

Analyzing the role of governors' parties on environmental expenditures is particularly relevant since state governments have a substantial degree of autonomy with respect to the federal government in deciding degree of environmental support[6]. Within

[5]More specifically, the *Census* defines expenditures on fish and game as expenditures for the "conservation, improvement, development, and propagation of fish and game resources; and the regulation and enforcement of fish and game laws and rules." Expenditures on forests are defined as expenditures for the "conservation, development, management, and protection of forests and forest resources; regulation and inspection of forest products and industries; and provision of assistance to private or local government owners of woodlands." Expenditures on parks are defined as "provision and support of recreational and cultural scientific facilities maintained for the benefit of residents and visitors." Finally, expenditures on other natural resources include the "conservation, promotion, and development of natural resources (soil, water, energy, minerals, etc.) and the regulation of industries which develop, utilize, or affect natural resources."

[6]For an in-depth analyisis on U.S. local governments' autonomy, see (see Wolman et al., 2008). The authors build an autonomy index and identify three important dimensions across which autonomy

the decisional process of each single state, the governor plays a vital role, given the assigned executive authority. Specifically, the governor is in charge of the state budget and appropriations approval, and, in some states, he also has veto power that can be used for the removal of appropriations to which he objects. Accordingly, it is reasonable to hypothesize that governors' political preferences matter for environmental expenditure policies. A potential limitation of the environmental expenditure variable is that polluting industries are not primarily related with some expenditure components, related e.g. to parks and forests. However, notwhistanding this potential limitation, we think that using this variable is important to render our analysis and results comparable with previsous studies (e.g. List and Sturm (2006); Fredriksson et al. (2011), etc.) using the same variable.

4.2 Lobbying Data

Lobbying data at the U.S. state level come from the *National Institute on Money in State Politics*. The Institute collects lobbying contributions targeting candidates running for all U.S. state elections. To the best of our knowledge, this source of data has not yet been used with any empirical political economy literature. The principal advantage of these data is that they include a sectoral classification, allowing us to disentangle lobbying from the major polluting industries. More specifically, we use data from Political Action Committees (PACs), which have a 15 years time availability (2000-2014). These data report the affiliation party of each candidate receiving contributions[7].

In order to disentangle contributions from polluting industries, we use rankings of sectors according to the level of toxic releases and waste. Rankings are taken from the *Toxic Release Inventory* (TRI). The contributions of different sectors to total waste production and total release of toxic substances are shown in Figures A.1 and A.2, reported in Appendix A. According to TRI, which is based on the NAICS classification, a majority (66%) of chemical waste is produced by three sectors: chemical manufacturing, primary metals, and petroleum products manufacturing. As for toxic releases, we observe that almost two-thirds are originated by three industry sectors: metal mining, chemical manufacturing and electric utilities. Matching the NAICS classification from TRI with sectors defined by the *National Institute on Money in State Politics*, we note that almost all the top polluting sectors are included in the category "Energy and Natural Resources." Only the chemical industry is associated with a separate sector, named "Chemical and Related Manufacturing." We use the two above sectors to define

among states can vary, such as Local Governance Importance, Local Government Discretion, and Local Government Revenue Capacity.

[7]We exclude from our data candidates affiliated to independent parties, considering only Democratic and Republican politicians.

the group "Polluting Industries."

From Table I, showing summary statistics, we see contributions data over the period 2000-2014. The sample includes 684 candidates for gubernatorial elections, divided between Democrats and Republicans. Both general and primary elections are considered. For political contributions' sample means, it is clear that contributions given to Democratic candidates are higher than contributions given to Republican candidates. However, this difference is reversed when contributions from polluting industries are considered. Republican candidates receive from polluting industries on average twice as much as Democratic candidates.

4.3 Other Variables

Data on governors' political parties, margins of victory and information on term limits are taken from Dave Leip's Atlas of U.S. Elections. Data on U.S. states' income, population, and age characteristics of residents come from the Census Bureau. The variable accounting for the number of green voters comes from List and Sturm (2006) and consists of the number of members of the largest United States environmental organizations (*Sierra Club*, *National Wildlife Federation*, and *Greenpeace*). This variable, which has been taken from List and Sturm (2006), refers to 1987 membership data.[8] Finally, we used two alternative variables to proxy for electoral contributions at the State level, namely oil reserves and the share of "Polluting Industries" Gross State Product (GSP). Data on proven oil reserves is sourced from the EIA (Energy Information Administration). Oil reserves are measured in barrels and are available for all U.S. states starting from 1980. We weight oil reserves by a state's area in order to rule out potential effects due to a state's size.[9] Data on "Polluting Industries" GSP are sourced from BEA (Bureau of Economic Analysis), and measured as a share of total GSP in 1979. We are aware that our variables only approximate anti-environmental contributions, and that polluting industries do not only lobby on environmental matters, but also on other issues (eg. trade, fiscal or labor policies). However, a study by Goldberg et al. (2020), using 28 years of data, found a strong correlation between political contributions from oil and gas industries and officials' votes against environmental policies, suggesting that anti-environmentalism is a major lobbying issue.

Table I shows summary statistics for all variables employed in our model. Our sample, covering the period 1980-2014, consists of 48 states and 1617 observations, equally

[8]Note that we consider data for the year 1987 as a more updated release of this dataset was not available.

[9]Following an anonymous referee suggestion, we have also employed alternative normalization of the Oil reserve variable, such as computing its share over GSP. Using this alternative proxy, the results are qualitatively similar.

divided between years when Democratic governors are in charge and years when Republican governors hold office. From the sample means, note that *per capita* environmental expenditures are lower for Republican governors ($33.29), than for Democratic governors ($35.4). This difference is tested using a t-test, which rejects the equality of means. Moreover, we report summary statistics for various State characteristics (population, income, age of population) for elected Democratic versus Republican governors, as well as for the time-invariant variables (percentage of "green" voters, area-weighted oil reserves, the GSP share of polluting sectors and area-weighted oil reserves).

[Table I about here.]

5 Empirical Strategy

Our empirical strategy is structured as follows. We first conduct an exploratory analysis, where we relate candidates' party affiliation to contributions from industrial lobbies. This exploratory analysis is designed to investigate whether a relationship exists between political parties (Democratic vs. Republican) and the pattern of contributions. We consider the 2000-2014 time period, due to political contributions data availability.

Subsequently, we concentrate on investigating the relationship between the party affiliation of states' governors, lobbying, and environmental expenditures, using a 35-year time period (1980-2014). As emphasized by our theoretical framework, we hypothesize that expenditures depend both on the personal preferences of governors and political pressures from interest groups and voters. Our first purpose is to evaluate whether Democrats implement more environmentally-friendly policies as compared to Republicans, as conventional wisdom holds. Our second purpose is to test whether governors tend to deviate from their own political preferences in response to lobbying pressures and/or electoral incentives.

To address the endogeneity of lobbying, we extend the baseline model by testing for potential heterogeneity effects of governors' parties across states, interacting the party affiliation variable with the amount of oil reserves or, alternatively, the share of GSP of "polluting industry". In our context, these two variables are used as proxy for polluters' lobbies, and they both have pros and cons. First, the use of oil reserves has an important advantage: in contrast with other polluting industries, such as the chemical sector, the oil sector strictly depends on states' geological characteristics. Therefore, this variable does not raise serious endogeneity concerns with respect to the dependent variable. However, oil reserves are significantly more abundant in Southern States where Democrat governors tend to be more similar to Republican ones (see Lee et al. (2004)), thus making the interpretation of the lobbying effect potentially problematic. As an

alternative proxy for lobbying, we use the share of GSP of "Polluting Industry", which is an important determinants of campaign contributions (see, e.g., Grier et al. 1994). In this case the hypothesis is that the share of "polluting sector" GSP is uncorrelated with the error term in the outcome equation, conditional on the other covariates (see Becker et al. 2013). Thus, we are assuming that States with different share of polluting sector GSP do not differ in unobserved dimensions that are relevant for environmental expenditure. In the empirical application, we address possible endogeneity concerns in several ways. First, we measure the GSP share of polluting sector in 1979, which predates the main changes in US Federal and States environmental regulations. Second, we run fixed effects regressions, which wipe out time-constant factors. In addition, we take the Oil reserves and GSP share interaction variable as time-invariant, so that the effect picks up factors that change governor's behavior over longer horizons. Finally, we also interact the party dummy variable with characteristics of voters and a term limit dummy variable, equal to one for all years of the term during which the governor is not eligible for reelection (used as a proxy for the existence of electoral incentives).

Our analysis of both components is conducted on all 48 lower U.S. states. We exclude Hawaii and Alaska because of their exceptional dependence on federal funds. For our major empirical analysis (the second component), we consider a 35-year period (from 1980 to 2014), which allows comparison of a high number of gubernatorial terms. In a robustness check, we have also used a longer time span starting in 1970, by splitting the sample in two sub-periods (1970-1992 vs. 1993-2014), with the aim of investigating whether changes in political polarization occurred in more recent years.

5.1 Empirical Specification

To investigate how party affiliation and contributions affect environmental expenditures across U.S. states, we estimate the following specification:

$$Y_{st} = \alpha + \beta_1 D_{st} + \beta_2 D_{st} * C_{st} + \gamma' X_{st} + \delta_s + \phi_t + \epsilon_{st} \tag{11}$$

where the dependent variable, Y, is the amount of *per capita* environmental expenditures in state s and year t. D is a dummy variable equal to 1 if the governor is a Democrat, and 0 if she is a Republican. C is a variable accounting for contributions received by governor of state s and year t from the most polluting sectors. Finally, X is a vector of controls, δ_s accounts for state fixed effects, ϕ_t for time fixed effects, and ϵ_{st} is the error term.

In estimating equation 11, we might encounter two potential different endogeneity issues. First, as already noted in previous literature (see, for example, Beland (2015) and Fredriksson et al. (2013)), governors' political party could be endogenous resulting

from omitted variable bias. In our specific case, there may be some variables influencing both votes in gubernatorial elections and environmental expenditures. This may be the case, for example, of some preferences of voters, as well as economic shocks affecting specific states. If an economic shock happening in state s at time t affected the spending behavior of politicians, and at the same time influenced voting behavior of citizens, then the party affiliation of the governor and the level of expenditures would be related due to factors that are not included in equation 11. Second, political contributions might be endogenous because of a reverse causality with environmental expenditures. Indeed, lobbying behavior of polluting firms could be a response to stricter or looser environmental regulations.

To address the above potential sources of endogeneity and the difficulty of isolating appropriate instuments, we implement a Regression Discontinuity Design (RDD). Lee (2008) demonstrates that focusing on close elections provides quasi-random variation in winners, allowing an identification of the causal effect of party affiliation on political outcomes. Our treatment variable is an indicator which is equal to 1 for Democratic governors and 0 for Republican governors. Our "forcing" variable is the Democratic margin of victory, given by the difference between the percentage of votes received by the Democratic candidate and the percentage of votes received by the Republican candidate. The threshold, representing the cutoff between Democratic and Republican victory, corresponds to zero margin of victory. This methodology has been previously implemented by other authors, such as Beland (2015), Lee et al. (2004) and Beland and Boucher (2015).

As exogenous proxy for lobbying, we use two alternative time invariant proxy, namely the amount of oil reserves across states and the share of GSP of polluting sectors, which are interacted with the political party indicator variable. This results in a heterogeneous RDD along the line of Becker et al. (2013), allowing us to assess whether the effect of belonging to the Democratic party (as opposed to the Republican party) varies with the presence of lobbying groups from polluting sectors.

Instead of using a non-parametric RDD, which only allows using observations close to the threshold, we use a parametric specification that accounts for all observations, both close and far away from the threshold.

Our RDD is specified as follows:

$$Y_{st} = \alpha + \beta_1 D_{st} + \beta_2 D_{st} * \tilde{C}_s + \beta_3 D_{st} * E_s + F(MV_{st}) + X_{st} + \delta_s + \phi_t + \epsilon_{st} \qquad (12)$$

where D is a dummy variable equal to one if the governor of state s in year t is a Democrat and zero if he is a Republican. $\tilde{C}_s$, which is interacted with our treatment variable D, represents our proxy for lobbying pressure from the polluting industries. This variable is either proxy with the state-specific variable Oil, which accounts for

time-invariant oil reserves, and normalized by a states' area, or with the time invariant share of GSP of polluting industries. Both these variables are estimated at the beginning of the period, to avoid potential endogeneity bias. MV is the margin of victory of the Governor, and $F(MV)$ is a polynomial function of the margin of victory. For $F(MV)$, we investigate first, second, third, and fourth order polynomials. Note that $F(MV)$ enters also in the model interacted with our treatment variable D. X_{st} is a vector of State level control variables. We rely on List and Sturm (2006) to select variables which can be correlated with environmental expenditures, namely characteristics of states' population (percentage of people under 17 years old and over 65 years old), personal income, and population. State fixed effects (δ_s) and time fixed effects (ϕ_t) are included in (12), and the error term is ϵ_{st}.

The use of different polynomial forms for MV is based on Lee and Lemieux (2010). Their analysis recognizes that, since we cannot know *a priori* which specification produces the smallest bias and best approximates the data, the most appropriate solution is to test different parametric forms in order to investigate the robustness of results.

For the inclusion of the interaction term between party affiliation and oil reserves (or share of GSP of polluting industries), we rely on Becker et al. (2013), who first theoretically specified the heterogeneous RDD model. The use of a proxy variable for the lobby activity of polluting industries has several advantages. First, the heterogeneous RDD requires interaction terms to be continuous about the forcing variable at the threshold. This would not be the case for political contributions, which have a strong relationship with politicians' parties. Moreover, using political contributions would also be fraught with potential endogeneity. By contrast, oil reserves and the share of GSP of polluting industries are more likely to be exogenous. This is because both are considered at the beginning of the considered period, and the former in particular depends on geographical characteristics of states.

To account for electoral incentives, we use two different interaction terms, indicated by E in equation 12. First, we investigate whether the effect of political parties differs between years when governors face a term limit and years when they are, instead, eligible for re-election. The idea of using term limits as a potential determinant is based on existing literature. In particular, List and Sturm (2006), find that states' environmental expenditures differ between years when governors are term limited and years when they can run for re-election. Fredriksson et al. (2011) show evidence that lame duck democratic governors are significantly associated to a lower growth of environmental expenditures that republican governors, while re-electable governors do not present any significant difference. Fredriksson et al. (2013) found that term limits significantly matter in determining states' tax policies. The intuition is that, when a politician can no longer be elected, she may tend to implement less populist policies, since she is

less concerned with increasing voters' support. Second, we use an interaction variable, accounting for the number of "green" voters as a percentage of states' population. Green voters are defined as those people who are members of one of the three largest U.S. environmentalist organizations (*Greenpeace*, the *Sierra Club* and the *National Wildlife Federation*). As in List and Sturm (2006), we use a time-invariant variable built from 1987 membership data. While the number of green voters over time could be influenced by lobbying from environmentalist associations, the use of a variable measured in the initial period attenuates this potential endogeneity problem.

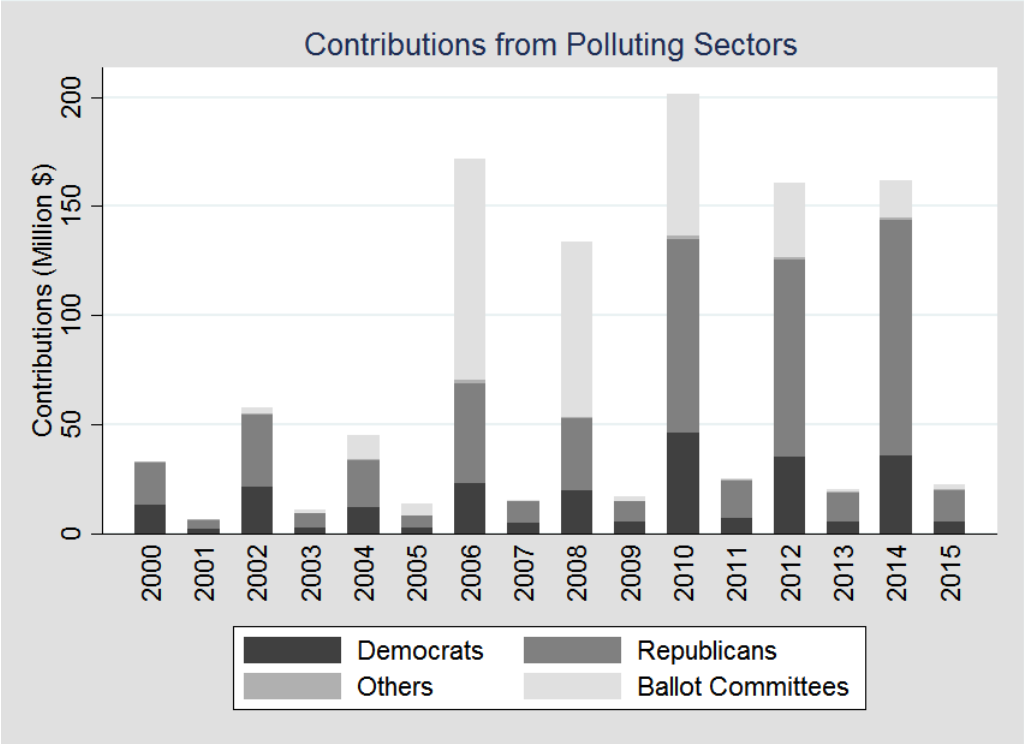
6 Results

6.1 Preliminary Evidence from Political Contributions

We first explore the link between the party affiliation of governors and the contributions they receive from polluting industry groups. Indeed, the pattern of contributions can give some indication about the preferences of politicians with respect to the environment. We focus on testing whether there is a relationship between the level of oil reserves across states and the amount of contributions from polluting sectors. This allows us to investigate whether states' oil reserves can represent a good exogenous proxy for the contributions from lobbies. Note that the existence of a correlation between politicians' parties and political contributions is already evident in Figures 1 and 2. Here, using contributions data from the *National Institute on Money in State Politics*, we find that environmentalist associations mainly support Democratic candidates, while polluting industry groups allocate most of their lobbying resources to Republicans. Moreover, the contributions from environmentalists are much smaller in magnitude than contributions from industries. (In particular, we show in Figure 2 donations from the "Energy and Natural Resources" sector, which includes most of the industries classified as polluting.) This first result supports what has been theoretically suggested by Yu (2005), namely that polluting industrial groups dedicate more resources to direct lobbying than do environmentalist groups.

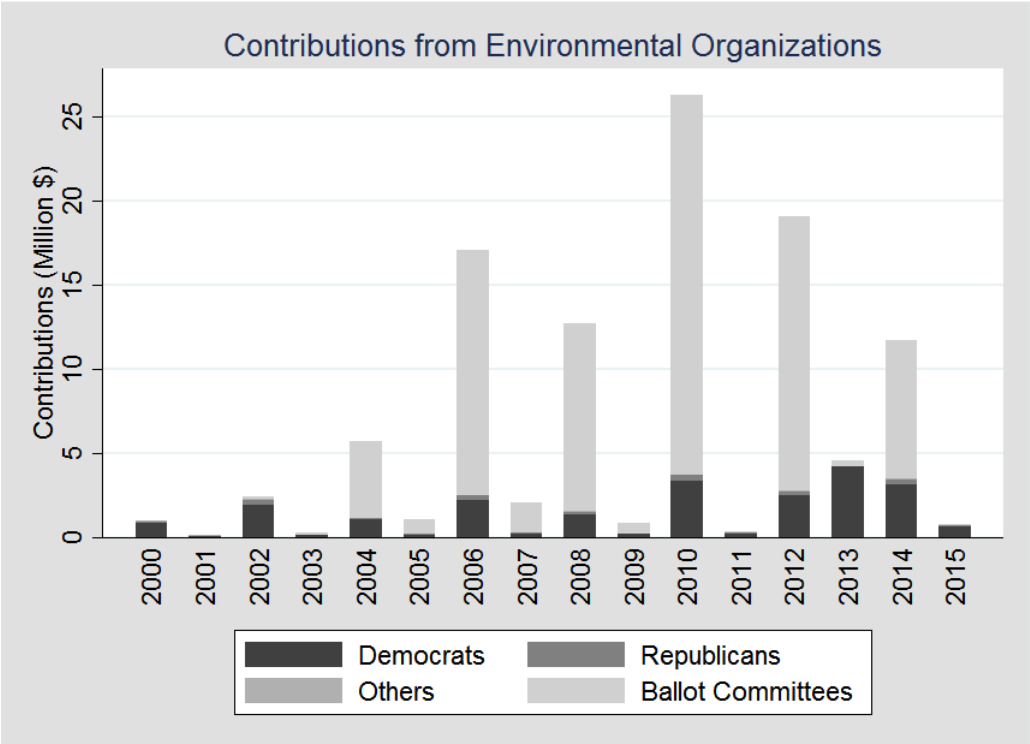
In Table II, OLS results are reported, aimed mainly at testing the relationship between the political affiliation of candidates to gubernatorial elections and contributions

Figure 1: Politicians' parties and political contributions from polluting sectors



Source: Authors' calculation from National Institute on Money in States' Politics

Figure 2: Politicians' parties and political contributions from environmental organizations



Source: Authors' calculation from National Institute on Money in States' Politics

from polluting industries[10]. To evaluate this relationship, we use a dataset structure combining all possible candidate-industry pairs and considering all candidates running for gubernatorial elections within state legislatures and all industries classified by the Institute on Money in States Politics.[11] The analysis is performed on elections over the available years, namely over the period 2000-2014. Results displayed on Table II show that, even if Democratic candidates are not significantly associated, on average, with different contributions as compared to Republican politicians for all the other industries, this relationship becomes negative and significant for "polluting" sectors. In other words, these industries allocate more contributions to Republicans as compared to Democrats, as shown by the coefficient on the interaction term between the "Democrat" dummy variable and the "Polluting Sector" indicator. Furthermore, as shown in columns 3 to 5 of Table II, contributions from polluting sectors significantly increase with a state's estimated oil reserves. This is in line with the distribution of contributions across industries displayed in Figure 3, showing that the oil sector is, among polluter industries, the sector donating the most to politicians. A similar pattern is detected when, instead of the Oil reserves variable, we interact polluting sectors with their GSP share (see Columns 6-8). In other words, and not surprisingly, contributions from polluting sectors are higher in state where their GSP is more relevant, but less so for democratic candidates. Overall, these results confirm that both the Oil reserves and the GSP share of polluting sectors are good proxy explaining the pattern of contributions. All results are robust to the inclusion of different fixed effects (state, industry) and control variables (general vs. primary elections; governors vs. members of the House or Senate).[12]

[Table II about here.]

[10]The estimated baseline equation is the following:

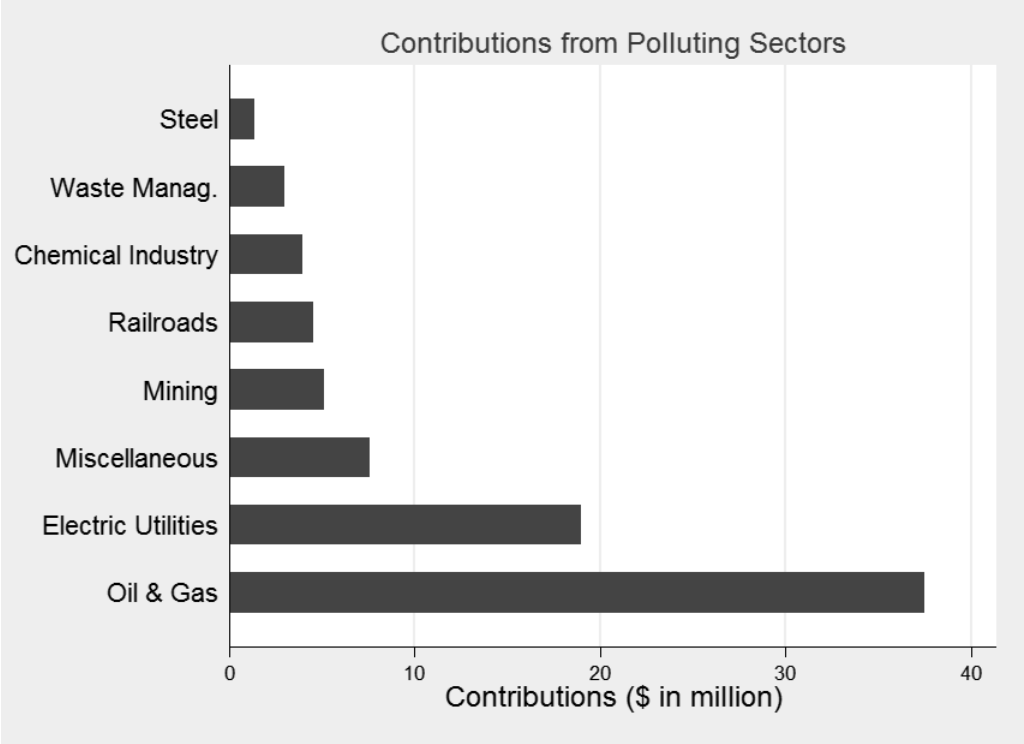
$$Ln(Contributions_{ipt}) = \alpha + \beta_1 Poll_i + \beta_2 D_{pt} + \beta_3 Poll_i * D_{pt} + \delta X'_{pt} + \sigma_t + \sigma_s + \sigma_i + \epsilon_{ipt} \quad (13)$$

where the dependent variable is the amount of money (in logarithm) given by contributors in sector i to politician p in year t. $Poll_i$ is a dummy variable indicating whether sector i is a polluting industry; D_{pt} is an indicator variable equal to 1 when politician p, running for elections in year t, is a Democrat, and to 0 when he is a Republican. X_{pt} is a vector of control variables specific to politician p in year t; σ_t, accounts for time fixed effects, while σ_s, σ_i and σ_p account for state and industry fixed effects, respectively, that have been used alternatively in the different estimations; finally, ϵ_{ipt} is the error term. Note that as we also consider zero contribution, the dependent variable is calculated as one plus the amount of contributions received by the governor candidates.

[11]Note that the results are robust to the inclusion of all other candidates running for other offices. These additional results are not shown to save space, but are available upon request from the authors.

[12]Note that we also run the same set of estimations using candidate fixed effects, and the main results remain robust. These estimations are not shown to save space, but are available upon request.

Figure 3: Contributions from Polluting Sectors by Industry



Source: Authors' calculation from National Institute on Money in States' Politics

In Table A.1 in Appendix, we show results from evaluating such relationship using a different estimator (i.e. Poisson Pseudo Maximum Likelihood estimator), which is considered more suitable in presence of a large number of zeros in the dependent variable (Silva and Tenreyro, 2006). The results remain stable and robust to this additional test.

The empirical results from Table II support the conventional wisdom that Democrats might have a more environmentalist attitude as compared to Republicans, attracting more contributions from ideological environmental groups and fewer donations from polluting industries. This explanation would be in line with previous findings from the literature as well as with the theoretical framework outlined in Section 3, where the link between ideology and contributions has revealed in the political science literature. In particular, Barber (2016) shows that individual contributors rank ideological concerns as highly important when deciding whom to support. Bonica (2014) argues that the pattern of contributions can be used to define the ideology of candidates. Finally, Bertrand et al. (2014) find that ideological affinity between lobbyists and candidates is an important determinant of lobbying patterns at the federal level. Alternatively, this finding could be explained by the tendency of the Democratic party's candidates to promote policies that do not facilitate polluting industries' activities, such as higher

taxes or more stringent labor or production standards. Reed (2006), for instance, shows that tax burdens increase, on average, when Democrats control the state legislature as opposed to Republicans.

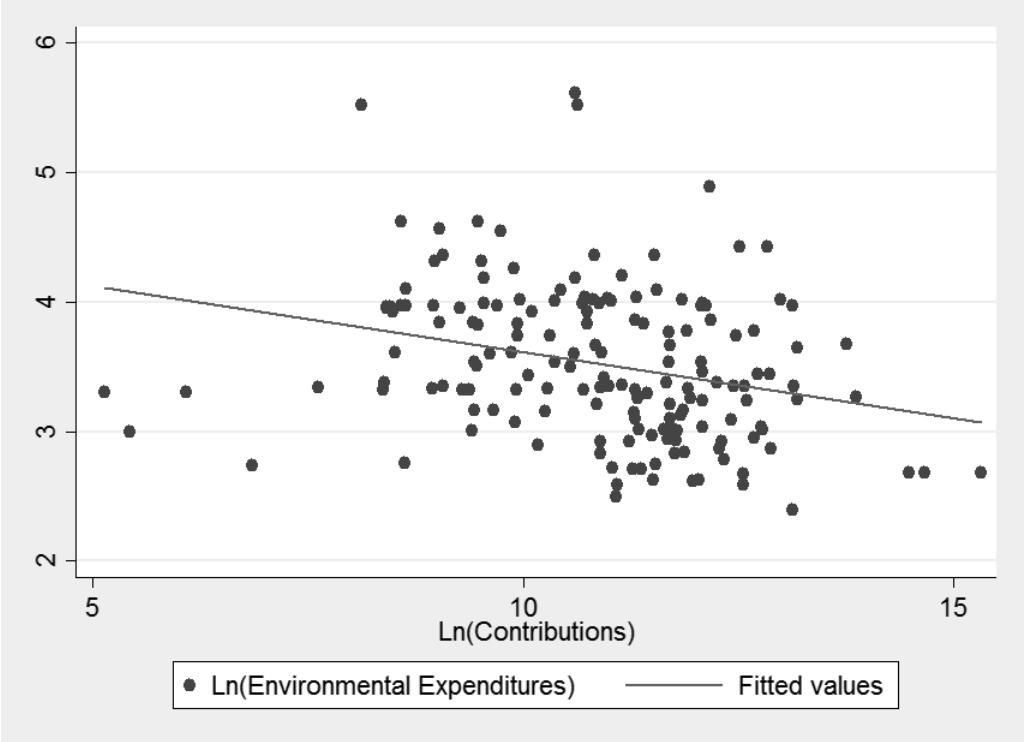
If the amount of contributions received from polluting (or environmental) lobbying "reveals" the ideology of governors, then we should find some correlation between contributions and states' policy outcomes. Figure 4 reports some preliminary evidence of this link, by plotting the relationship between political contributions received by states governors from polluting sectors and environmental expenditure over the period 2000-2014. The figure shows that there is a negative correlation between these two variables, suggesting that governors receiving higher contributions are associated with lower expenditures on the conservation of the environment and regulation of polluting activities. It is not possible to infer, from a simple correlation, to what extent the relationship is attributable to governors' parties and to what extent it is due to political contributions themselves. Indeed, as we have shown, there is a strong association between contributions and whether a candidate is affiliated with the Democratic or Republican party.

6.2 Principal Results

Table III reports results from the Regression Discontinuity Design model specified in equation 12.[13] We first test an RDD where our main explanatory variable of interest is an indicator equal to 1 for Democratic governors and to 0 for Republican governors. Our RDD estimations include also the following control variables at the state level: Share of population older than 65; Share of population younger than 17; (log) of State population; (log) of Personal Income. As is well known, although the inclusion of additional variables in an RDD setting is not strictly necessary, it may potentially increase the precision of the estimations. Note, moreover, that our results remain stable and robust even if these additional control variables are removed from the estimations. We choose a parametric form, using four different polynomials (from first order to fourth order). Given the quasi-random assignment to treatment (where the treatment variable is our dummy D), it is possible to infer causal effects. Yet, it must be kept in mind that RDD identifies a *local* average treatment effect (LATE); namely, that the coefficients that are isolated apply to cases where the margin of victory between the Democratic and the Republican candidate is close to zero. Results reveal that the political party

[13] Although data on environmental expenditures are available starting from 1970, our main estimations use data from 1980, as data on oil reserves are only available from 1980 onward. However, in the robustness checks we also run estimates starting from 1970, and splitting the overall sample in subperiods to investigate the extent to which political polarization between Democrats and Republicans increased in most recent periods.

Figure 4: Correlation between contributions and environmental expenditures



Source: Authors' calculations on data for electoral contributions from National Institute on Money in States' Politics and data for environmental expenditures sourced from the annual Census publication State Government Finances.

of the governor has an impact on *per capita* environmental expenditures. The relevant coefficient, β_1, from equation (12) is always positive and statistically significant at conventional levels, irrespective of the estimated polynomial, suggesting that results are stable across alternative specifications. The magnitude of the coefficient ranges between 0.08 and 0.15, suggesting that environmental expenditures increase by about 10% under Democratic governors as compared to Republican ones.[14] These results are confirmed in Figures A.4 (a)- A.4 (c) (see Appendix), graphically showing that there exists a discontinuity in environmental expenditures at the threshold corresponding to margin of victory equal to zero.

[Table III about here.]

The validity of the RDD is investigated through a manipulation test of a local polynomial density estimation. This instrument has been recently proposed by Cattaneo and Ma (2018), and allows establishing whether or not there is continuity in the density of the variable of interest around the cutoff point.[15] This test is informative about whether the presence of self-selection (or not-random sorting) of our data into treatment and control units would undermine the reliability of our analysis. Figure 5 plots the results of the test.[16] We can observe that a discontinuity in our density variable (i.e. the margin of victory between the Democratic and the Republican candidate) around the cutoff point would be unlikely. This test performs a t-test of the cumulative distribution of the two functions (left and right approximation at the cutoff point of the overall distribution), under the null hypothesis of "no manipulation". The result of the manipulation test provides a value of t-statistic=-0.836, with a p-value=0.402, which definitely suggests to reject the null hypothesis, thus confirming that there is no statistical proof of manipulation in our variable of interest.[17]

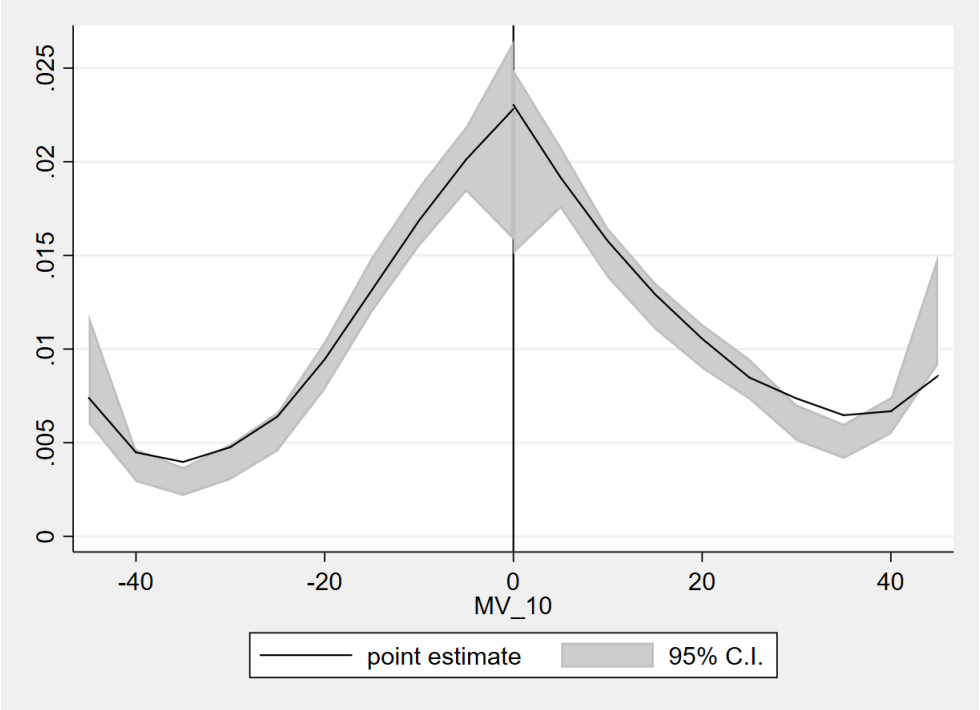
[14] As the characteristics of Democratic governors elected in oil rich states may be different from those of other Democratic governors elected in other states, we run some sensitivity analyses by dropping, alternatively, a state from our sample and running the same estimations as in Table III. The main results are almost unaffected and, thus, prove to be robust. However, since evidence in the literature suggest that democratic governors in Southern States are likely to behave similarly to republican governors, we also consider this important issue in Table IV and Table V.

[15] Specifically, we run this test using the *rddensity* command in STATA 15.

[16] The test has been built using a polynomial of second order. The use of higher-order polynomials does not affect the main result.

[17] Note that we check the continuity of our running variable (i.e. Margin of Victory) around the cutoff point also using a McCrary (2008) test. The results of the test plotted in Figure A.3 appears to be consistent with those in Figure 5. Moreover, the log discontinuity in the density parameter estimated by the McCrary (2008) test presents a value of 0.0122 with a standard error of (.108), which suggests to reject the null hypothesis of no discontinuity in the margin of victory variable, thus confirming the result of the Cattaneo and Ma (2018) test.

Figure 5: Test of the continuity of Margin of Victory around the cutoff point



Source: Authors' calculations on Data on governors' political parties and margins of victory taken from Dave Leip's Atlas of U.S. Elections.

Given that party affiliation matters for environmental expenditures, we investigate whether this effect is heterogeneous across states, considering time-invariant variables accounting for polluting industries' presence and electoral incentives. As a first indication of the presence of heterogeneous effects, we used interaction terms in our RDD estimations, to split the effect on our main variable of interest (Democrat) between State with oil reserves weighted by a state's area above and below the median. We then run the same analysis using our alternative proxy for lobbying activity of the "brown" industry, namely the share of GSP of polluting industries. The results are presented in columns 1 and 2 of Table IV.[18] Since our proxy for lobbying activity (i.e. oil reserves and share of GSP of polluting industries) are positively and significantly correlated with polluting industries' contributions, such a measures can be used as a proxy for industrialists' lobbying activity. The results reported in Table IV suggest that the party effect coming from our baseline specification is heterogeneous across states' abundance in oil resources and where the share of GSP of polluting industries is higher. Indeed, the coefficient on the interaction term D with Oil reserves weighted by a state's area and the share of GSP of polluting industries is higher in magnitude and significant in those states with low Oil endowment and lower share of GSP of polluting industries. In other words, in oil-abundant states and where the GSP of polluting industries is more relevant, the difference in environmental expenditures between Democratic and Republican governors is smaller (and not significant) than for the complement states, which is likely driven by the impact of polluting lobbies on governors' decisions.

In column 3 we present the results by splitting the effect of our main variable of interest (Democrat) between States with the share of "green voters" above and below the median. The results presented in column 3 suggest that the party effect is only relevant in magnitude and statistically significant for observations above the median, namely for those states where the number of memberships of environmental organizations is higher. This result is in line with our expectations, and thus suggesting that the sensitivity of citizens toward environmental issues, may actually lead governors to adopt environmentally-oriented policies.

In column 4 of Table IV we split the effect of our main variable of interest (Democrat) between Southern States and other States. This test is motivated by the fact that there exists evidence in the literature suggesting that Democratic governors in Southern States are more likely to behave as Republican governors (see for instance Lee et al. (2004)). Our results indeed seem to confirm this fact, with democratic governors in Non-southern states proving to have higher environmental expenditure than Southern

[18] All the specifications presented in Table IV, include I order polynomial function of the Democratic Margin of Victory and its interaction with the treatment dummy variable D. Note that, when running the same estimations using polynomial function of higher order, the main results still hold.

States governors, although the difference is not very high. Finally, in column 5 of Table IV, we evaluate our RDD specification using interaction variables of our treatment variable (i.e. D) for re-electable governors vs. term-limited governors. It is worth noting that in most of the cases (about 1,210 observations) the governor is non-term-limited, while in a lower number of cases (about 406 observations) she cannot be re-electable. The magnitude of the party effect in the two interaction terms is quite similar, both in terms of magnitude and level of significance, even if it is slightly higher for Democratic governors not facing a term limit. In addition, we further refine this last estimation, by dropping those re-electable governors who lost their first re-election. This is because these governors may be flawed, and, thus, their omission may allow us to provide a cleaner test on the difference between re-electable and term-limited governors. The results of this further test are presented in column 6 of Table IV, and suggest that our main findings remain almost unaffected.[19]

Overall, Table IV results point to the presence of heterogeneity of treatment effects. Since the use of interaction terms built by splitting the variables according to their median values may be arbitrary, we implement a heterogeneous RDD, which allows capturing whether there exist some determinants leading democratic governors to act differently from other governors with the same party affiliation. For this modification the empirical results are presented in Table V, which incorporates several interaction variables.

[Table IV about here.]

[Table V about here.]

All six columns of results are based on first-order polynomial function and include state and year fixed-effects as well as controls for State characteristics.[20] Standard errors are clustered at the State level. Column 1 adds to the baseline RDD specification the interaction term between our treatment variable D and the logarithm of (time invariant) states' oil reserves in 1980. The coefficient on the interaction term confirms previous results, namely that the gap between Democratic and Republican candidates shrinks as the amount of oil reserves increases. Based on these results, as oil reserves increase by 10%, the difference in expenditures under Democratic and Republican governors shrinks by 0.06 percentage points. In column 2, we drop Southern States from our sample, to consider the fact that Republican and Democratic governors may behave similarly in

[19] We run a Wald test on the interaction terms between Democrat and Term-Limited and Non-Term-Limited Governors in column 5 and 6, which suggest that these coefficients are statistically different with each other, at the conventional level of significance.

[20] Note that when running the same estimation as Table V using polynomial function of higher order, the main results still hold.

these states. The results in column 2 prove indeed to be affected by this change: although the two coefficients of interest have the same positive and negative signs, they are no longer significant in this specification that omits Southern States. Thus, the existence of an overlapping between Southern States with the oil reserves renders the identification of the contribution from the polluting lobbying problematic. Therefore, the polluting lobby is more active in these regions than in others, thus leading our proxy to be weak. Thus, using the Oil reserves variable we cannot properly disentangle to what extent the results are driven by the polluting lobby activity or, differently, by the similarity in Southern States between Democratic and Republican Governors. For this reason, we run the same estimations presented in columns 1 and 2 using as alternative proxy the (time invariant) share of GSP of polluting industries. The share of polluting industries GSP, indeed, other than to be a robust determinants of their political contributions (see Table II), on the one hand is positive correlated with the Oil reserves (r=0.44), but, on the other hand it should better proxy the lobby activity of polluting industries in Southern States. The results in column 3 of Table V are in line with those in column 1, thus suggesting that democratic governors in states where the share of GSP of polluting industries is relevant, are associated with lower environmental expenditures than Democratic governors in other states. Interestingly, these results proved to be robust to the exclusion of Southern States, as shown in column 4. These last results thus provide further credence to the fact that polluting lobbying activities are likely to affect the environmental expenditures of Democratic governors. In column 5 we present the results of adding to our specification the interaction term between our treatment variable D with a continuous and time-invariant "green voters" variable, not finding any significant heterogeneous effect. Similarly, in column 6, when adding to our specification the interaction between our treatment variable D and a dummy variable indicating term-limit governors, we do not find any significant difference in *per capita* environmental expenditures between term limited governors and re-electable ones, when the effect of the polluting industry lobbying is controlled for. This is in contrast with evidence from List and Sturm (2006), who found that, when state governors are term-limited, environmental expenditures significantly increase. This discrepancy could be explained by the fact that their analysis does not take into account the party affiliation of governors, nor lobbying activity, and considers a different time period (1970-2000) with respect to the present study.[21]

Summarizing, our results from heterogeneous RDD suggest that governors mainly

[21]Note that we have also controlled whether the fact that governor and state legislature are both from the same political party can affect our findings. The results of this test, available from the authors upon request, show that the occurrence of this event does not have any relevant effect on our main results.

take into account interests from industrial groups and, in some cases, preferences of "green" voters when setting environmental policies, confirming the theoretical predictions outlined in Section 3. The fact that Democratic governors spend less on environmental conservation in those states where the presence of polluting industries is actually engaged in lobbying could have several explanations. First, industrial groups could have a higher "stake" in securing their self-interest than environmental groups. Second, in states where they are strong, polluting industries are a crucial portion of a state's economy, and thus they exert a strong pressure on governors decisions on environmental issues, which prevails on policy motivated or office motivated governors behavior. Third, in states where the presence of polluting industries is strong, Democratic candidates could have, on average, less environmentally-friendly behavior, and be thus more responsive to lobbying pressures. Finally, in states where the presence of the oil sector or other polluting industries is strong, the median voter might also have less environmentalist preferences, which would influence governor's choices. Our finding about the role of polluting lobbying in changing the government preference over environmental policy is in line with evidence from Cooper et al. (2018) who finds that, in the North Eastern United States, access to shale gas through fracking changed the House of Representatives' behavior on environmental policy, making votes considerably less favorable for the environment.

7 Robustness of the RDD

In this section, some tests on the robustness of our model, following Lee and Lemieux (2010), Becker et al. (2013) an Carpenter and Dobkin (2017), are presented. Figures and Tables showing results from our robustness tests are reported in the Appendix of the paper.[22] First, we want to examine concerns related to potential persistence in our dependent variable. Indeed, as argued by Beland (2015), there could be some state-specific trends influencing the probability that Democratic governors are elected. To address this concern, we run two placebo tests, where the baseline RDD without interaction effects is implemented on the dependent variable from previous and subsequent electoral terms (term_{-1} and term_{+1}). Our results, summarized in Table A.2, show that the coefficients on D are statistically insignificant at conventional levels when lagged and anticipated environmental expenditures are considered as dependent variables.

[22]Note that although most of the RDD estimations presented as robustness checks use first order polynomial, our results are robust to the use of higher order polynomials (II, III and IV order). Our choice of showing as preferred estimation those with polynomial of order 1, follows the recommendation by Gelman and Imbens (2019), who argue that controlling for higher order polynomials in RDD estimations is a flawed approach.

Second, as suggested by Lee and Lemieux (2010), we test whether some baseline covariates are continuous at the threshold. Since the RDD is analyzed as a randomized experiment, one of its underlying assumptions is that all the "baseline characteristics" should have the same distribution just above and just below the cutoff. If this condition does not hold, then one could argue that there are some factors determining the treatment variable at the threshold and the validity of the RDD would be questionable. To test this condition, we perform "placebo" tests, replacing the dependent variable of our RDD with baseline covariates included in our previous specifications. Results from our "placebo" tests, displayed in Table A.3, show that none of the covariates is discontinuous at the threshold, providing further evidence of the reasonableness of our RDD strategy.

In addition, we show evidence of the validity of our RDD with heterogeneous effects. As explained by Becker et al. (2013), a fundamental assumption under which the heterogeneous local average treatment effect (*HLATE*) can be estimated is that interaction variables are continuous about the forcing variable (in our case, the Democratic margin of victory) at the threshold. If this assumption is verified, then we are sure to capture genuine variation in interaction variables. In order to test this condition, we plot the average value of our interaction variables by categories of margin of victory. The graphs are constructed in the same way as the ones on environmental expenditures shown in Figures A.4 (a)- A.4 (c). Figures A.5 (a) - A.5 (b), reporting first and third order polynomial functions for the logarithm of oil reserves, show that there is no evidence of a discontinuity of this interaction variable at the threshold. Similarly, Figures A.5 (c) and A.5 (d) show that the discontinuity does not exist for the percentage of green voters, and the same for the share of GSP of polluting industries in A.5 (e) and A.5 (f).

Finally, following Carpenter and Dobkin (2017), we test the robustness of our RDD results to the bandwidth choice. This is a key element in RDD estimations, as alternative results often emerge from different bandwidths. In our case the bandwidth is expressed in terms of Margin of Victory. We focus on the estimation presented in Table V, and we take as an example the interaction between our treatment variable D and the logarithm of states' oil reserves. As shown in Figure A.6, where the estimated coefficients (blue line) and the 95% confidence intervals (dotted lines) are presented, the negative relationship between our interaction term and environmental expenditures holds irrespective to the bandwidth chosen in the RDD estimation.

Overall, this additional evidence confirms that our results are robust to the potential limitations of the RDD.

In order to control the robustness of our results to the time period under investigation, we run our main estimations extending the considered period to 1970 onwards,

using polynomials of different order, and both considering States' oil reserves and the share of GSP of polluting industries as proxy for lobbying activity. The results are presented in Table A.4 and Table A.5 in Appendix. As shown by the results at the top of the two tables, when considering the entire period 1970-2014, the Democrat coefficient is always positive, irrespective of the polynomial order, but proves to be significant only for first and fourth order polynomials. The interaction term between our treatment variable D and the two proxy for the polluting lobby activity, is negative but never significant, irrespective to the polynomial order. Next, we further split this sample in two period (i.e. 1970-1992 vs. 1993-2014), to check whether there exist a time heterogeneity on our results. The results of this test are presented in the middle and bottom parts of Table A.4 and Table A.5 in Appendix. These results clearly suggest that the higher environmental expenditures associated with Democratic governors are evident especially in the period 1993-2014. In contrast, the results for the period 1970-1992 are not statistically significant. The same pattern is evident in our interaction terms, thus suggesting that the polluting lobby activity proved to be more effective in the recent period. This test thus suggest the existence of an increase in polarization on environmental issues over the considered period. Given the importance attached to this topic, the polluting lobby thus increased in the last two decades its pressure on governors, to avoid the enforcement of policies that could potentially damage these sectors.[23]

8 Summary and Conclusions

This paper examines the determinants of environmental policies in U.S. states, focusing in particular on the party affiliation of governors and political pressure from interest groups. We present a theoretical framework, where governors choose the optimal level of environmental expenditures taking into account governors' own preferences, lobbying from both environmentalist and industrialist interest groups, and preferences of the median voter. The influence of these three factors is tested through an empirical analysis aimed at investigating whether environmental expenditures within U.S. states differ when the governor is a Democrat as compared to Republican. Moreover, we test whether governors deviate from their preferred level of expenditures when they face pressures from interest groups and electoral incentives. We employ a Regression Discontinuity Design (RDD) to account for the potential endogeneity of governors' party affiliation, focusing on close elections, which allows a causal effect to be inferred. Our results reveal that, when states are governed by Democrats, environmental expenditures are,

[23]We thank an anonymous referee for recalling our attention to the possible heterogeneity of the democratic effect over time.

on average, higher than when a Republican governor is elected. However, this effect turns out to be highly heterogeneous. By using alternatively states' oil reserves and the share of GSP of polluting industries as an exogenous components of industrial lobbying power, we find that, in oil-abundant states and where the share of GSP of polluting industries is higher, Democratic governors decrease their environmental expenditures. This suggests that the presence of industrial interest groups leads politicians to deviate from their own preferences. Yet, this effect proved to be stronger in the most recent period, suggesting higher polarization on environmental issues over time.

Our findings add additional empirical evidence to the political economic literature for environmental policies. The focus on governors' preferences relies in part on the theoretical framework by List and Sturm (2006), where governors are defined as either "green" or "brown". Moreover, our findings are in line with the theoretical framework by Yu (2005), arguing that a government modifies its preferences towards environmental policy according to political contributions from industrialist groups and preferences of voters, which can be in turn influenced by environmental interest groups. According to our theoretical framework and empirical results, the tendency of Democratic governors to deviate from environmentally friendly policies where the presence of polluting industries is strong may be due to a combination of different mechanisms, to the higher "stake" of industrial lobbies in environmental expenditures where the presence of "dirty" industries is pervasive; the persuasion actions of these interest groups towards voters; and to a less environmentally friendly attitude of Democratic governors in these states, resulting in a stronger influence of industrialist lobbies on the actual environmental expenditures. Further investigation of these different mechanisms could be developed within a future extension of the present work. Moreover, in order to overcome the limitations coming from the use of proxy variables, it will be necessary in the future to build more precise measures of lobbying expenditures and influence from both polluting groups and environmentalist ones.

References

Ackerman, Bruce and Hassler, William T. (1981). Clean coal/dirty air: Or how the clean air act became a multibillion-dollar bail-out for high-sulfur coal producers. Yale University Press.

Aidt, Toke S. (1998). Political internalization of economic externalities and environmental policy. Journal of Public Economics, 69(1):1–16.

Barber, Michael (2016). Donation motivations: Testing theories of access and ideology. Political Research Quarterly, 69(1):148–159.

Becker, Sascha O., Egger, Peter H., and Von Ehrlich, Maximilian (2013). Absorptive capacity and the growth and investment effects of regional transfers: A regression discontinuity design with heterogeneous treatment effects. American Economic Journal: Economic Policy, 5(4):29–77.

Beland, Louis-Philippe (2015). Political Parties and Labor Market Outcomes : Evidence from US States. American Economic Journal: Applied Economics, 7(4):198–220.

Beland, Louis-Philippe and Boucher, Vincent (2015). Polluting politics. Economics Letters, 137:176–181.

Beland, Louis-Philippe and Oloomi, Sara (2017). Party affiliation and public spending: Evidence from us governors. Economic Inquiry, 55(2):982–995.

Bertrand, Marianne, Bombardini, Matilde, and Trebbi, Francesco (2014). Is it whom you know or what you know? an empirical assessment of the lobbying process. The American Economic Review, 104(12):3885–3920.

Besley, Timothy and Coate, Stephen (2001). Lobbying and welfare in a representative democracy. The Review of Economic Studies, 68(1):67–82.

Bonica, Adam (2014). Mapping the ideological marketplace. American Journal of Political Science, 58(2):367–386.

Callander, Steven (2008). Political motivations. The Review of Economic Studies, 75(3):671–697.

Carpenter, Christopher and Dobkin, Carlos (2017). The minimum legal drinking age and morbidity in the united states. The Review of Economics and Statistics, 99(1):95–104.

Cattaneo, Matias D., Jansson Michael and Ma, Xinwei (2018). Manipulation testing based on density discontinuity. Stata Journal, 18(1):234–261(28).

Cooper, Jasper, Kim, Sung Eun, and Urpelainen, Johannes (2018). The broad impact of a narrow conflict: How natural resource windfalls shape policy and politics. The Journal of Politics, 80(2):630–646.

Downs, Anthony (1957). An Economic Theory of Democracy. Harper and Row, New York.

Fredriksson, Per G. (1997). The political economy of pollution taxes in a small open economy. Journal of Environmental Economics and Management, 33(1):44–58.

Fredriksson, Per G., Wang, Le, and Mamun, Khawaja A. (2011). Are politicians office or policy motivated? the case of u.s. governors'environmental policies. Journal of Environmental Economics and Management, 62:241–253.

Fredriksson, Per G., Wang, Le, and Warren, Patrick L. (2013). Party politics, governors, and economic policy. Southern Economic Journal, 80(1):106–126.

Gelman, Andrew and Imbens, Guido (2019). Why high-order polynomials should not be used in regression discontinuity designs. Journal of Business & Economic Statistics, 37(3):447–456.

Goldberg, Matthew H., Marlon, Jennifer R., Wang, Xinran, van der Linden, Sander, and Leiserowitz, Anthony (2020). Oil and gas companies invest in legislators that vote against the environment. Proceedings of the National Academy of Sciences, 117(10):5111–5112.

Grossman, Gene and Helpman, Elhanan (1994). Protection for sale. The American Economic Review, 84(4):833.

Herrnstadt, Evan and Muehlegger, Erich (2014). Weather, salience of climate change and congressional voting. Journal of Environmental Economics and Management, 68(3):435–448.

Hillman, Arye L. (1982). Declining industries and political-support protectionist motives. The American Economic Review, 72(5):1180–1187.

Kartik, Navin and McAfee, R. Preston (2007). Signaling character in electoral competition. American Economic Review, 97(3):852–870.

Kim, Sung Eun and Urpelainen, Johannes (2017). The polarization of american environmental policy: A regression discontinuity analysis of senate and house votes, 1971–2013. Review of Policy Research, 34(4):456–484.

Lee, David S. (2008). Randomized experiments from non-random selection in us house elections. Journal of Econometrics, 142(2):675–697.

Lee, David S. and Lemieux, Thomas (2010). Regression discontinuity designs in economics. Journal of Economic Literature, 48(2):281–355.

Lee, David S., Moretti, Enrico, and Butler, Matthew J. (2004). Do voters affect or elect policies? evidence from the US House. The Quarterly Journal of Economics, 119(3):807–859.

List, J. A. and Sturm, Daniel M. (2006). How elections matter: Theory and evidence from environmental policy. The Quarterly Journal of Economics, 121(4):1249–1281.

McAusland, Carol (2003). Voting for pollution policy: the importance of income inequality and openness to trade. Journal of International Economics, 61(2):425–451.

McCrary, Justin (2008). Manipulation of the running variable in the regression discontinuity design: A density test. Journal of Econometrics, 142:698–714.

Oates, Wallace E. and Portney, Paul R. (2003). The political economy of environmental policy. Handbook of Environmental Economics, 1:325–354.

Obach, Brian K. (2015). a fracking fracas demonstrates movement potential. Contexts, 14(4):72–75.

Perez-Sebastian, Fidel and Raveh, Ohad (2019). Federal tax policies, congressional voting, and natural resources. Canadian Journal of Economics, 52(3):1112–1164.

Persson, Torsten and Tabellini, Guido (2000). Political economics: explaining public policy.

Rausser, Gordon C., Swinnen, Johan, and Zusman, Pinhas (2011). Political power and economic policy: Theory, analysis, and empirical applications. Cambridge University Press.

Reed, W. Robert (2006). Democrats, Republicans, and taxes: Evidence that political parties matter. Journal of Public Economics, 90(4):725–750.

Silva, JMC Santos and Tenreyro, Silvana (2006). The log of gravity. The Review of Economics and statistics, 88(4):641–658.

Wittman, Donald (1983). Candidate motivation: a synthesis of alternatives. American Political Science Review, 77:142–157.

Wolman, Hal, McManmon, Robert, Bell, Michael, and Brunori, David (2008). Comparing local government autonomy across states. George Washington Institute for Public Policy, Washington, Working Paper, 35.

Yu, Zhihao (2005). Environmental protection: a theory of direct and indirect competition for political influence. The Review of Economic Studies, 72(1):269–286.

Table I: Summary Statistics: Sample Means, Main Variables

	Democratic Governors	Republican Governors
Candidates	304	380
Mean of contributions from All Industries	$ 191,763 (1,256,139)	$ 184,659 (1,868,138)
Mean of contributions from Polluting Industries	31,694 (117,725)	71,702 (460,195)
Environmental Expenditures (per capita 1984 real $)	35.55 (29.54)	33.41 (27.60)
Margin of Victory	16.90 (13.45)	-15.78 (13.23)
Population (Million)	5.22 (52.74)	6.12 (67.63)
% Over 65 years	11.25 (3.98)	10.98 (4.51)
% Under 18 years	18.45 (1.73)	18.70 (1.77)
% Green Voters (1987)	0.87 (0.37)	0.80 (0.33)
Oil Reserves (1979) (barrels/area)	3,160 (9,600)	4,949 (12,485)
% GSP poll. ind (1979)	15.33 (7.89)	14.98 (7.042)
Terms	224	220
Years with Term Limit	210	196
Observations	812	805

Notes: Standard deviations are reported in parentheses. Data on per capita environmental expenditures, sourced from the annual Census publication State Government Finances. Data on lobbying contributions at the U.S. state level come from the National Institute on Money in State Politics. Data on governors' political parties, margins of victory and information on term limits are taken from Dave Leip's Atlas of U.S. Elections. Oil reserves data are sourced from the Energy Information Administration. Data on "Polluting Industries" GSP are source from BEA (Bureau of Economic Analysis). Data on green voters comes from List and Sturm (2006). Data on U.S. states' income, population, and age characteristics of residents come from the Census Bureau.

Table II: Determinants of Political Contributions, 2000-2014

Dependent Variable ln(Contributions)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Democrat	-0.255	-0.259	-0.256	-0.260		-0.254	-0.258	
	(-1.34)	(-1.36)	(-1.34)	(-1.36)		(-1.33)	(-1.35)	
Polluting Sector	-0.877***		-1.468***		-1.348***	-1.658***		-1.478***
	(-8.24)		(-8.38)		(-8.90)	(-7.43)		(-7.54)
Democrat*Polluting Sector	-0.667***	-0.653***	0.308	0.207	0.076	-0.184	-0.264	-0.352**
	(-4.44)	(-4.39)	(1.12)	(0.75)	(0.36)	(-0.92)	(-1.32)	(-2.03)
General Election	6.544***	6.541***	6.539***	6.537***		6.542***	6.540***	
	(30.52)	(30.53)	(30.49)	(30.50)		(30.52)	(30.52)	
Polluting Sector*Oil			0.151***	0.145***	0.130***			
			(4.31)	(4.15)	(4.97)			
Democrat*Polluting Sector*Oil			-0.242***	-0.214***	-0.178***			
			(-4.25)	(-3.79)	(-4.94)			
Polluting Sector*						0.050***	0.048***	0.041***
% GSP poll. sectors						(3.85)	(3.76)	(3.70)
Democrat*Polluting Sector						-0.006***	-0.005***	-0.004***
*% GSP poll. sectors						(-3.58)	(-2.95)	(-3.05)
Time F.E.	Yes	Yes	Yes	Yes	No	Yes	Yes	No
State F.E.	Yes	Yes	Yes	Yes	No	Yes	Yes	No
Industry F.E.	No	Yes	No	Yes	No	No	Yes	No
N	13,612	13,612	13,612	13,612	13,612	13,612	13,612	13,612

Notes: OLS regression results in the table concern the relationship between the political affiliation of candidates to gubernatorial elections and contributions from polluting industries. Data on lobbying contributions at the U.S. state level come from the National Institute on Money in State Politics. Data on governors' political parties, margins of victory are taken from Dave Leip's Atlas of U.S. Elections. Polluting sectors are classified based on the Toxic Release Inventory. Oil reserves data are sourced from the Energy Information Administration. The variable Oil is weighted by states' area. Data on Polluting Industries' GSP are sourced from the Bureau of Economic Analysis.
t statistics are shown in parentheses. Standard errors are clustered at candidate level. * denotes significance at 10%. ** denotes significance at 5%. *** denotes significance at 1%.

Table III: RDD, Governor's Political Ideology and Environmental Expenditures

	I Order	II Order	III Order	IV Order
Democrat	0.0799**	0.0972***	0.168***	0.170***
	(2.55)	(2.78)	(3.63)	(2.88)
% Pop. > 65 yrs.	2.160	2.197	2.195	2.107
	(1.23)	(1.25)	(1.28)	(1.27)
% Pop. < 17 yrs.	0.0796	0.177	0.220	0.201
	(0.07)	(0.15)	(0.19)	(0.17)
(ln) Population	-0.203	-0.201	-0.206	-0.207
	(-1.00)	(-0.99)	(-1.02)	(-1.04)
(ln) Personal Income	1.619***	1.621***	1.632***	1.630***
	(4.37)	(4.44)	(4.56)	(4.52)
State F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
N	1,617	1,617	1,617	1,617

Notes: Table show results of estimating equation 11 through a RDD, concerning the relationship between per-capita environmental contributions and political party. The dependent variable is the amount of per capita environmental expenditures, sourced from the annual Census publication State Government Finances. Data on governors' political parties, margins of victory are taken from Dave Leip's Atlas of U.S. Elections. Data on U.S. states' income, population, and age characteristics of residents come from the Census Bureau.
t statistics are shown in parentheses. Standard errors are clustered at the State level. * denotes significance at 10%. ** denotes significance at 5%. *** denotes significance at 1%.

Table IV: RDD, Heterogenous effects using interaction terms

Dependent Variable: ln(Env. Exp.)	(1)	(2)	(3)	(4)	(5)	(6)
Democrat*Oil/Area > Median	0.0350	-	-	-		-
	(1.26)	-	-	-	-	-
Democrat*Oil/Area <= Median	0.127***	-	-	-	-	-
	(2.90)	-	-	-	-	-
Democrat*% GSP poll. ind > Median	-	0.0417	-	-	-	-
	-	(1.36)	-	-	-	-
Democrat*% GSP poll. ind <= Median	-	0.127***	-	-	-	-
	-	(3.07)	-	-	-	-
Democrat*South States	-	-	0.0672	-	-	-
	-	-	(1.43)	-	-	-
Democrat*Non-South States	-	-	0.0863**	-	-	-
	-	-	(2.53)	-	-	-
Democrat*Green Voters > Median	-	-	-	0.102***	-	-
	-	-	-	(2.78)	-	-
Democrat*Green Voters <= Median	-	-	-	0.0589	-	-
	-	-	-	(1.46)	-	-
Democrat*Non Term Limited	-	-	-	-	0.0922**	0.106**
	-	-	-	-	(2.16)	(2.32)
Democrat*Term Limited	-	-	-	-	0.0781**	0.102***
	-	-	-	-	(2.48)	(2.89)
Observations	1617	1617	1617	1617	1617	1493

Notes: Table show results of estimating equation 12 through a RDD, concerning the relationship between per-capita environmental contribution and political party using interaction terms to check for heterogeneity of the results across states. The dependent variable is the amount of per capita environmental expenditures, sourced from the annual Census publication State Government Finances. Data on governors' political parties, margins of victory and information on term limits are taken from Dave Leip's Atlas of U.S. Elections. Oil reserves data are sourced from the Energy Information Administration. Data on "Polluting Industries" GSP are source from BEA (Bureau of Economic Analysis). Data on green voters comes from List and Sturm (2006). Data on U.S. states' income, population, and age characteristics of residents come from the Census Bureau.

All specifications include I order polynomial functions of the Democratic Margin of Victory and its interaction with the treatment dummy variable Democrat, and include State and Time Fixed Effects. Coefficients on on U.S. states' income, population, and age characteristics are estimated but are not shown to save space. Estimation sample in column 6 excludes governors who lose their first re-election. Wald test on the Interaction terms between Democrat and Term Limited and Non-Term Limited Governors in column 5 and 6 suggests that these coefficients are statistically different with each other, at the conventional level of significance.

t statistics are shown in parentheses. Standard errors are clustered at the State level. * denotes significance at 10%. ** denotes significance at 5%. *** denotes significance at 1%.

Table V: RDD with Heterogeneous Effects, Democratic Margin of Victory

Dependent Variable: ln(Env. Exp.)	(1)	(2)	(3)	(4)	(5)	(6)
Democrat	0.0830***	0.0558	0.190***	0.183***	0.177**	0.189***
	(2.78)	(1.66)	(3.80)	(3.29)	(2.07)	(3.72)
Democrat*Oil	-0.00597**	-0.00261	-	-	-	-
	(-2.45)	(-0.88)	-	-	-	-
Democrat* % GSP poll. ind	-	-	-0.00727***	-0.00844***	-0.00711***	-0.00727***
	-	-	(-3.45)	(-3.14)	(-3.10)	(-3.44)
Democrat*Green Voters	-	-	-	-	0.0129	-
	-	-	-	-	(0.21)	-
Democrat*Term Limit	-	-	-	-	-	0.0138
	-	-	-	-	-	(0.42)
State F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Polynomial Order	I	I	I	I	I	I
N	1617	1067	1617	1067	1617	1617

Notes: Table show results of estimating equation 12 through a RDD, concerning the relationship between per-capita environmental contribution and political party, controllyng for the role of lobby activity. The dependent variable is the amount of per capita environmental expenditures, sourced from the annual Census publication State Government Finances. Data on governors' political parties, margins of victory and information on term limits are taken from Dave Leip's Atlas of U.S. Elections. Oil reserves data are sourced from the Energy Information Administration. Data on "Polluting Industries" GSP are source from BEA (Bureau of Economic Analysis). Data on green voters comes from List and Sturm (2006). Data on U.S. states' income, population, and age characteristics of residents come from the Census Bureau.
Estimations in columns (2) and (4) exlude US Southern States. Coefficients on on U.S. states' income, population, and age characteristics are estimated but are not shown to save space.
t statistics are shown in parentheses. Standard errors are clustered at the State level. * denotes significance at 10%. ** denotes significance at 5%. *** denotes significance at 1%.