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Buying a Blind Eye: Campaign Donations, Regulatory Enforcement, and Deforestation

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While existing work has demonstrated that campaign donations can buy access to benefits such as favorable legislation and preferential contracting, we highlight another use of campaign contributions: buying reductions in regulatory enforcement. Specifically, we argue that in return for campaign contributions, Colombian mayors who rely on donor-funding (compared with those who do not) choose not to enforce sanctions against illegal deforestation activities. Using a regression discontinuity design, we show that deforestation is significantly higher in municipalities that elect donor-funded as opposed to self-funded politicians. Further analysis shows that only part of this effect can be explained by differences in contracting practices by donor-funded mayors. Instead, evidence of heterogeneity in the effects according to the presence of alternative formal and informal enforcement institutions, and analysis of fire clearance, support the interpretation that campaign contributions buy reductions in the enforcement of environmental regulations.

INTRODUCTION

Between 2015 and 2018, tens of thousands of hectares of forest were destroyed in the Colombian municipalities of Calamar and Miraflores, with the rate of devastation tripling over the period.[1] Clearance of the forest was connected in part to the development of a 138-km road, constructed between the two municipalities without the required environmental permits or licenses. Responsibility to enforce these environmental regulations lay with the mayors of the municipalities. But rather than enforcing the laws, the mayors chose to turn a blind eye, allowing the illegal road construction and related deforestation to proceed. While some ordinary citizens may have appreciated the improved transportation links, the primary beneficiaries of this failure to enforce environmental regulations were local elites and cattle ranchers, looking to capitalize on the forest clearance for financial gain. Indeed, over the same period, these two municipalities experienced high levels of vegetation fires, a common practice used by farmers to illegally clear lands for cattle ranching and illicit crop cultivation, and one which mayors also have a responsibility to monitor and prevent.[2] We argue that, given the benefits to be had from forest clearance, campaign donations are used to buy regulatory nonenforcement of this type, as mayors choose not to sanction illegal deforestation in return for campaign contributions.

Previous research has provided evidence that campaign donations can be used to buy benefits such as favorable legislation and preferential access to contracting or public sector jobs (Boas, Hidalgo, and Richardson 2014; Colonnelli, Prem, and Teso 2020; Ruiz 2017; Stratmann 2005). But the case described above highlights another use of campaign contributions: buying regulatory nonenforcement. An important strand of the public choice literature has highlighted the phenomenon of state capture by economic elites, recognizing a variety of means by which a rich elite can gain disproportionate influence within a democracy, including through patronage, vote-buying, and lobbying (Acemoglu, Ticchi, and Vindigni 2011). Taking the use of campaign donations as another means by which economic elites can achieve state capture, we argue that donors to mayoral election campaigns in Colombia

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[1] See https://www.semana.com/nacion/articulo/trochas-ilegales-acaban-con-la-amazonia-colombiana/649428 (last accessed June 2021).

[2] See, e.g., https://es.mongabay.com/2019/07/incendios-norte-amazonia-deforestacion-colombia/ (last accessed March 2022).

purchase reductions in the enforcement of environmental regulations.

We support this argument with evidence that mayors in Colombia allow violations of environmental regulations in return for campaign donations. Using a regression discontinuity design (RDD) on close elections between politicians who receive contributions from private donors and politicians who fund their own mayoral campaigns, we estimate that deforestation between 2012 and 2015 almost doubles in municipalities that elected a donor-funded mayor compared with those that elected a self-funded mayor. Given the central role of deforestation as a key driver of climate change, this is an important finding in itself. The quasi-experimental nature of the research design provides identification, overcoming concerns that differences in deforestation result, for example, from variation in pre-existing enforcement capacity or differences in other preterm municipal characteristics. As such, although we do not observe variation in enforcement by local mayors directly, the research design allows us to infer that differences in deforestation result from donor-funded mayors pursuing a politically motivated model of enforcement.

Given existing evidence on campaign donations and contracting, a possible alternative channel is that the estimated effect stems from an increase in infrastructure contracting rather than a reduction in regulatory enforcement. Analyzing the effects of victory by a donor-funded politician on contracting outcomes provides some support for this because the average value of infrastructure contracts is larger under donor-funded mayors. However, temporal trends show that this channel can only explain part of the estimated increase in deforestation. Moreover, although infrastructure contracts that could increase deforestation primarily relate to roads, we see no evidence of an increase in road density following the election of a donor-funded mayor. Further analysis supports the interpretation that campaign contributions buy reductions in the enforcement of environmental regulations.

First, we find that the effect of donor-funded mayors on deforestation is mitigated by the presence of alternative sources of environmental law enforcement. Specifically, exploring heterogeneous effects using preterm municipal characteristics measuring the extent of protected National Parks (which are subject to higher central government monitoring than most forest areas), and the presence of and distance to offices of Colombia's regional environmental management institutions (Autonomous Regional Corporations [CARs]), we find that both dampen the effect of donor-funded mayors. Similarly, the effect is also attenuated by the number of offices of the Procurator General (*Procuraduría*) and the Attorney General (*Fiscalía*), which we take as additional proxies for the extent of state presence within a municipality. These results, therefore, suggest that tighter institutional oversight beyond that provided by mayors reduces the deforestation linked to the victory of a donor-funded politician.

Second, we find that the activities of illegal armed actors affect the deforestation dynamics linked to the election of a donor-funded politician. While guerrilla groups such as the Revolutionary Armed Forces of Colombia (FARC) have often obstructed and attacked the business of local elites, paramilitary groups arose out of private security forces created by large landowners and cattle ranchers, and frequently act to protect the interests of these local elites. Exploring heterogeneous effects using preterm measures of attacks by armed groups, we find that while guerrilla attacks substantially lower the deforestation related to the victory of donor-funded politicians, attacks by paramilitary groups have no such impact. Third, unlike large-scale infrastructure projects, deforestation for cattle ranching and cultivation often makes use of aggressive and frequently illegal practices of clearance by burning. Using data from NASA's Fire Information for Resource Management System (FIRMS), we find a 32.9% increase in average fire intensity in donor-funded municipalities.

These results are consistent with donor-funded mayors selling regulatory nonenforcement. As explained in the Context section, Colombia's local elites have a long history of land appropriation and illegal expansion of the agricultural frontier. In line with existing arguments about local state capture by wealthy elites in Colombia and elsewhere (Hollenbach and Silva 2019; Sánchez-Talanquer 2020), our argument suggests that campaign donations create a connection between elites and the ruling mayor. This connection provides elites with a degree of protection when engaging in deforestation activities, as donor-funded mayors turn a blind eye to violations of environmental regulations.

The findings make at least three important contributions. First, they advance the literature on the influence of money in politics. Not only do campaign donations buy favorable legislation and access to preferential contracts, but they also buy the selective nonenforcement of laws. Second, in this way, the results also contribute to the literature on state capture. We provide evidence that campaign donations are used to purchase influence over the local state, which in this instance results in a reduction in regulatory enforcement. Third, the findings make an important contribution to our understanding of the political dynamics of deforestation. In doing so, they have the potential to inform the design of better policies to deal with the urgent challenge of climate change.

Existing work on the impact of corruption on environmental outcomes highlights the role of electoral incentives in ensuring the enforcement of environmental regulations (Aklin et al. 2014). This is in line with more general arguments about the ability of electoral accountability to generate effective enforcement and reduce the impact of corruption (Hurwicz 2008; Olken and Pande 2012). Yet, as Hurwicz (2008) notes, for elections to provide an effective means of "guarding the guardians" requires them to be free. The purchase of reduced regulatory enforcement through campaign donations by local elites subverts this process, highlighting the need to insulate enforcement, and its oversight, from distorted electoral incentives.

This emphasizes the importance of considering the complex interactions between interest groups, elected officials, and bureaucrats, in order to fully understand the politics of deforestation and natural resource management.

DEFORESTATION, DONATIONS, AND STATE CAPTURE

Deforestation

Increasing awareness of the threat posed by climate change has created an urgency in efforts to understand its drivers. One key factor is deforestation, which is closely linked with global warming.[3] Forests capture up to 45% of terrestrial carbon and remove large amounts of carbon dioxide (Bonan 2008). However, despite the importance of these ecosystems, they are being destroyed at alarming rates.[4] Limiting deforestation is, therefore, vital in combating climate change, and accurately understanding the causes of deforestation is crucial to these efforts. Existing research has highlighted activities such as cattle ranching, farming, logging, and urbanization as leading causes of deforestation (Curtis et al. 2018). Understanding factors influencing the intensity of these activities can, therefore, facilitate more suitable policy design to effectively manage deforestation (see, e.g., Prem, Saavedra, and Vargas 2020).

One such factor is electoral competition, which has been argued to influence deforestation in contrasting ways. On the one hand, the mere existence of democracy may limit deforestation. Li and Reuveny (2006) provide evidence that democratic regimes reduce deforestation, along with other forms of environmental degradation. This positive impact of democracy results from various mechanisms, including increased access to information about environmental problems, the greater role of public opinion in policymaking, and the aggregation and representation of interest groups. Similarly, Gulzar, Lal, and Pasquale (2021) find that local government representation in India substantially reduces deforestation. In contrast, Morjaria (2012) demonstrates that deforestation increased following the introduction of multiparty elections in Kenya in 1992, as districts loyal to the central government were allowed increased access to forest land. Likewise, Sanford (2021) provides cross-national evidence that competitive elections are associated with increased deforestation, arguing that deforestation provides short-term, private benefits to voters that politicians exploit to win (re-)election.

Another factor influencing deforestation is corruption. Burgess et al. (2012) argue that the management of logging rules in Indonesia is driven by a process of rent maximization by local officials. Focusing on Brazil, Pailler (2018) also highlights the role of corruption in encouraging deforestation. Connecting corruption back to electoral competition, she argues that corrupt politicians exploit forest resources to fund their re-election campaigns. This is supported with evidence from Brazilian municipalities demonstrating an increase in deforestation in election years, but only in municipalities where corrupt incumbent mayors are running for re-election. Unlike our argument, however, Pailler (2018) suggests that the link between deforestation and campaign finance is due to activities such as granting licenses for firms to engage in deforestation-related activities, rather than a reduction in enforcement. In contrast, Balboni et al. (2021) find evidence of a decrease in forest fires in election years in Indonesia, followed by a steep increase the following year.

Campaign Donations

Arguments about re-election incentives connect deforestation firmly to the literature on campaign contributions. It is well established that campaign donations can buy preferential treatment in the form of favorable legislation or privileged access to contracts or licenses. Although studies have provided mixed evidence concerning the impact of campaign contributions on policy decisions, a meta-analysis by Stratmann (2005) supports the claim that contributions do affect legislative voting behavior. This is consistent with theoretical models that hypothesize that politicians will grant policy favors in exchange for campaign donations.[5]

Moreover, recent evidence has demonstrated clear effects of campaign donations on preferential access to government contracts. Using an RDD to analyze data from Brazil, Boas, Hidalgo, and Richardson (2014) find that firms specializing in public-works projects receive a substantial boost in contracts when they donate to a ruling party candidate who wins the election. Similarly, Ruiz (2017) shows that electing a donor-funded politician more than doubles the probability of donors receiving contracts in Colombia. Linking donations and deforestation more closely, Bulte, Damania, and Lopez (2007) found that wealthy Latin-American farmers bribe politicians with contributions to obtain rural subsidies that are associated with low land productivity and excessive deforestation.

State Capture

Tying this literature together, we argue that campaign donations can influence deforestation through an alternative channel: by purchasing reductions in the enforcement of environmental regulations. In this way, campaign donations serve to achieve a form of local state capture, whereby a rich elite exerts excessive influence over the local state. Existing literature has highlighted a variety of means by which economic

[3] See https://www.nationalgeographic.com/environment/article/deforestation (last accessed April 2021).

[4] See https://www.wri.org/insights/numbers-value-tropical-forests-climate-change-equation (last accessed April 2021).

[5] For example, see Austen-Smith and Wright (1994) and Snyder (1990).

elites gain disproportionate influence within a democracy, including through patronage, vote-buying, and lobbying. For example, Acemoglu, Ticchi, and Vindigni (2011) present a model in which the rich generate an inefficient state structure by coopting bureaucrats through patronage. This allows the rich to capture democratic politics, thereby reducing the amount of redistribution under democracy.

Other studies offer clear examples of state capture in practice. Hollenbach and Silva (2019) provide evidence from Brazil that wealthy elites corrupt local officials and undermine state fiscal capacity to lower their own tax liabilities. Similarly, Sánchez-Talanquer (2020) argues that local elites in Colombia used their influence over mayors to keep land undervalued, thereby limiting their tax burdens. Both cases highlight the use of economic power by wealthy elites to exert disproportionate influence over the local state, to their own benefit. We make a similar argument, that local elites in Colombia use their economic influence to achieve local state capture. By our account, however, this influence is asserted through campaign donations, in return for which donor-funded mayors reduce the enforcement of environmental regulations.[6]

As we discuss below, local elites in Colombia have strong economic interests in activities such as cattle ranching and cultivation that represent a significant threat to forests. The pursuance of these interests is limited by environmental regulations designed to restrict deforestation, which municipal authorities have a responsibility to enforce. Mayors, therefore, have the power, as the heads of municipal authorities, to reduce the extent of regulatory enforcement, to benefit local elites. We argue that they do so in return for campaign donations that fund their election to office.

CONTEXT

Deforestation in Colombia

Natural forest covers between half to two-thirds of Colombia's surface area, an amount that includes about 10% of the Amazon rainforest.[7] Part of this forest, equivalent to 17% of the country, is designated as a protected area under the care of the National Parks administration, and is subject to more stringent regulation and monitoring overseen directly by the national government.[8] Yet, as elsewhere in the world, deforestation is an increasing problem. From 2001 to 2020, Colombia lost more than 4.6 million hectares of tree cover, equivalent to a 5.7% decrease in the total forest area (Global Forest Watch 2019).

As in much of Latin America, the most notorious driver of deforestation is cattle ranching (FAO 2006). Colombia has a long history of cattle production, being the fourth largest cattle breeder in the region and the seventh worldwide, and over two hundred thousand hectares of forest are lost each year to pasturing.[9] The impact of cattle ranching on deforestation has been accompanied by the deleterious effects of other activities such as mining, illegal logging and crop production, infrastructure development, and the growth of agro-businesses.

Deforestation in Colombia has also been affected by the country's shifting political environment. Following the December 2014 cease-fire, and the FARC's subsequent disarmament in 2016, deforestation rose in areas previously under FARC control (Prem, Saavedra, and Vargas 2020). That this effect was greater in areas with lower state presence and more land-intensive economic activities highlights the impact of regulatory enforcement and activities such as cattle ranching on deforestation.

Economic Interests of Local Elites

Land-intensive activities of these types are key to the economic interests of Colombian local elites. Since colonial times, Colombian landlords have steadily increased their land ownership and consolidated their power through it (Fernandez 2012; LeGrand 1988), resulting in substantial land inequality. This inequality has been exacerbated by violent periods such as "La Violencia" in the late 1940s, which led to massive forced displacement and land expropriation (Fernandez 2012; Guzmán, Fals Borda, and Umaña 2010). Moreover, institutional efforts to alter the distribution of land have been instrumentalized by elites to appropriate large land extensions (Ibañez and Muñoz-Mora 2010).

Land inequality is a factor underpinning the presence of illegal armed actors in Colombia. The foundation of guerrilla groups such as the FARC was justified in part to protect impoverished rural people and, as such, these groups presented themselves as enemies of the local elites. In response, the rise of guerrilla groups led to the creation of private security forces used by wealthy landowners and cattle ranchers. These forces represented the precursors to far-right paramilitary groups, which frequently act to protect and promote the interests

[6] This argument resonates with the literature on forbearance, or the selective nonenforcement of laws for political ends. A major contribution of recent work on forbearance has been to demonstrate its political use as a form of redistribution to win votes from the poor (Holland 2017). Within that work, there is also an acknowledgement that forbearance can take more regressive forms, benefiting individuals at the upper end of the income distribution (Holland 2016). As such, our findings may be taken as evidence of this type of "forbearance as corruption."

[7] See Global Forest Watch (2019) and the IDEAM web page: http://181.225.72.78/Portal-SIAC-web/faces/Dashboard/Biodiversidad2/bosques/estadoCifrasBosques.xhtml;jsessionid=CABWeu1Z+KOBlwOi3SA4rdcB.public1?tematica=Superficie+de+bosque&anio=2016&entidad=IDEAM&instituto=IDEAM (last accessed March 2022).

[8] See https://news.mongabay.com/2021/03/colombias-national-parks-at-a-crossroads-as-new-director-installed/ (last accessed June 2021).

[9] For details on the cattle industry in Colombia, see UNODC (2016).

of local elites.[10] Central to these interests are activities involving intensive land exploitation, such as ranching and cultivation, which are key drivers of deforestation.

Environmental Regulatory Institutions

Colombia's National Environmental System (*Sistema Nacional Ambiental*, SINA) governs the implementation of a set of general environmental principles.[11] Under SINA, the Ministry of Environment leads and coordinates environmental management, but the key institutional actors responsible for implementing environmental policy are the CARs. As independent corporate entities endowed with fiscal and administrative autonomy, CARs have broad responsibility for managing natural resources and promoting sustainable development within their territories. This remit includes granting required environmental concessions, permits, or licenses, overseeing activities involving natural resources, collecting fees and tariffs for the use of renewable resources, and imposing sanctions when environmental protection norms are violated.

Despite the CARs' jurisdiction over the nation's natural resources, their ability to maintain oversight and enforce regulations is often insufficient (Montes Cortés 2018). Hence, other institutional actors also play a significant role in environmental protection. The national government, through the Ministry of Environment, the Department of Planning, and the army, contribute to protecting Colombia's natural habitat. Moreover, local governments at both the department and municipality levels are legally required to support CARs and implement national environmental policy within their territories.

Under the Constitution, mayors represent the foremost policing authorities within their municipalities, and are responsible for supervising the National Police assigned to the area under their jurisdiction. This includes the specialized Environmental and Natural Resource Police unit created to assist territorial authorities with the enforcement of environmental laws.[12] Furthermore, municipal governments have various legal mechanisms to enforce environmental laws, including the imposition of sanctions, suspension of environmental licenses, permits, or concessions, and power to close or demolish businesses and seize products or equipment. Therefore, mayors have significant responsibilities for enforcing environmental regulations and have substantial powers to meet these responsibilities.

Colombian Local Elections

Since 1986, mayors in Colombia have been directly elected via a first-past-the-post system for a single 4-year term.[13] The mayor's term coincides exactly with the calendar year. For the period we study, the mayoral term starts on January 1, 2012 and ends on December 31, 2015. Colombian mayoral election campaigns are expensive. For the 2015 municipal elections, the total spent on mayoral campaigns was more than 238 billion pesos (about 82 million U.S. dollars), equivalent to 71% of the nation's entire science and technology budget (MOE 2018). Despite this cost, public resources available for local election campaigns are scarce and campaigns are primarily financed by personal resources and private donations (Casas-Zamora and Falguera 2016). Furthermore, campaigns are frequently highly competitive and there is a strong correlation between campaign spending and the probability of victory (Gulzar, Robinson, and Ruiz 2020). Consequently, candidates have powerful incentives to secure private contributions. Such campaign contributions can be very valuable to donors, with the election of a donor-funded politician increasing the probability that donors receive municipal contracts (Ruiz 2017).

As discussed in Ruiz (2017), mayors in Colombia have discretion over around 20% of spending within their municipalities, with resources from property tax revenues funding services including education, healthcare, water, and sanitation. Some of the activities undertaken under the purview of these contracts, especially where they involve infrastructure provision such as road construction, are likely to result in deforestation and other forms of environmental degradation.[14] We explore this empirically in the Results section. But, given the strong economic interest that local elites have in land-intensive activities such as forest clearance and cattle ranching, and the crucial role that mayors play in the enforcement of environmental regulations limiting such activities, our central argument is that campaign donations also purchase reductions in regulatory enforcement. In return for campaign contributions, mayors turn a blind eye to the illegal exploitation of land, thereby facilitating deforestation.

DATA

Combining data from various sources, we build a municipality-candidate-level dataset to study the effect of a donor-funded politician victory on deforestation. We focus on the 2011 elections and the subsequent 2012–15 mayoral term.

[10] See https://es.insightcrime.org/investigaciones/elites-crimen-organizado-colombia-introduccion/ (last accessed April 2021).

[11] See https://www.minambiente.gov.co/ordenamiento-ambiental-territorial-y-sistema-nacional-ambiental-sina/ (last accessed February 2022). For information on environmental regulatory institutions in Colombia, see Blackman, Morgenstern, and Topping (2006).

[12] Mayors also have a duty to procure sufficient resources for fire services within their municipalities, in part to stop forest fires from expanding and mitigate illegal deforestation. See https://www.procuraduria.gov.co/portal/Procuradora-apropiacion-recursos-servicio-bomberos.news (last accessed June 2021).

[13] Mayors cannot serve consecutive terms, but can be reelected to nonconsecutive terms.

[14] Examples of such contracts in the data that we employ include works to the road connecting the municipality of Regidor with the township of San Cayetano, and the improvement of rural roads in San Jose del Guaviare.

Election Results and Campaign Donations

Electoral information comes originally from Pachón and Sánchez (2014), who gathered mayoral election results for all municipalities reported by the Registraduría Nacional del Estado Civil, the Colombian electoral authority. Campaign contributions data were collected from the National Electoral Commission by Ruiz (2017), who shows it to be highly reliable with low incentives to misreport. Political parties were obliged to electronically report sources and amounts of campaign expenditure and then provide physical evidence corroborating this. Moreover, in 2011, the Electoral Commission had the power to penalize candidates with fines, which generated an 89% compliance rate (Ruiz 2017). The commission subsequently lost this sanctioning power, limiting reporting compliance for the 2015 electoral period, and, therefore, we focus our analysis on the 2011 elections.[15]

We code candidates as donor-funded if they receive any private donations. The results in the Supplementary Material show that the findings are robust to various alternative definitions setting thresholds on the share of private funding and the number of private donors and donations (Supplementary Table A1).[16] Of the 1,080 municipalities that elected mayors in 2011, our sample is first restricted to the 996 municipalities where the top two candidates reported their campaign financing. Of these, we focus on the 408 races decided between a candidate who received private donations and one who did not, implementing an RDD around the margin of victory of the candidates. These races are arguably representative; they are spread throughout the country, and across a variety of characteristics, the municipalities in the sample are not statistically different to those that are excluded (Supplementary Table A3).

Deforestation

Our measurement of deforestation comes from the Global Forest Change dataset collected by Hansen et al. (2013), who analyze Landsat satellite images to identify changes in forest cover between 2000 and 2020. These data, comprising pixels of 30 meters by 30 meters (approximately), have been widely used to measure deforestation (Prem, Saavedra, and Vargas 2020; Zhu et al. 2016).

Tree cover is defined as vegetation taller than 5 meters and is coded as a percentage per output grid cell. We adopt a definition that considers any pixel with tree cover superior to 50% of its surface as forest. Hence, deforestation is a pixel change from the status of forest to nonforest. These data are aggregated to the municipal level. Using the baseline coverage levels and the yearly tree-cover loss and gain for each municipality, we recover the yearly coverage in each municipality, allowing us to calculate our deforestation measure.[17] Our primary deforestation variable is defined as the negative of the change in forest area in the municipality during the mayor's term relative to the municipality tree cover in the year before the new mayor's mandate, as follows:

$$\text{(Relative) Deforestation in term} = \frac{-\Delta Coverage_{\text{government term}}}{Coverage_{\text{election year}}}. \quad (1)$$

We calculate the deforestation measure for the 2011 election (2012–15 government term) and the previous election, the 2007 election (2008–11 government term).[18] Figure 1 shows that deforestation was a broad phenomenon across the country during the study period. Moreover, deforestation was rapidly consuming the country's tree cover. As shown in Table 1, the 1,080 municipalities that elected a mayor in 2011 lost on average almost 1.2% of their tree cover during the subsequent mayoral term (2012–15).

Additional Data

Since illegal deforestation is often undertaken using aggressive fire clearance, we use FIRMS data to track fires during the study period.[19] We use detailed contracting data from the SECOP (*Sistema Electrónico para la Contratación Pública*) system, which collects information on all government contracts, to investigate whether the estimated effect of donor-funded candidate victory results from an increase in deforestation-related contracting. To evaluate whether the main effects are mediated by the presence of illegal armed groups, we use the violent events data collected by Restrepo, Spagat, and Vargas (2004) and updated by Universidad del Rosario.[20] Finally, we use a set of municipal-level covariates taken primarily from data collected by Universidad de Los Andes and their Center for Economic Development Studies.

EMPIRICAL STRATEGY

If campaign donations purchase reductions in the enforcement of environmental regulations designed to limit deforestation, we should expect to see more deforestation in municipalities electing donor-funded mayors. However, the victory of a donor-funded

[15] No data on campaign donations are available for elections prior to 2011 because the reporting system was introduced in 2009.

[16] Existing data make it very difficult to identify donors who would specifically benefit from deforestation. Our best efforts to do so produce only a very limited sample that is likely underpowered. Results using this sample are positive but not significant in most estimates (see Supplementary Table A2).

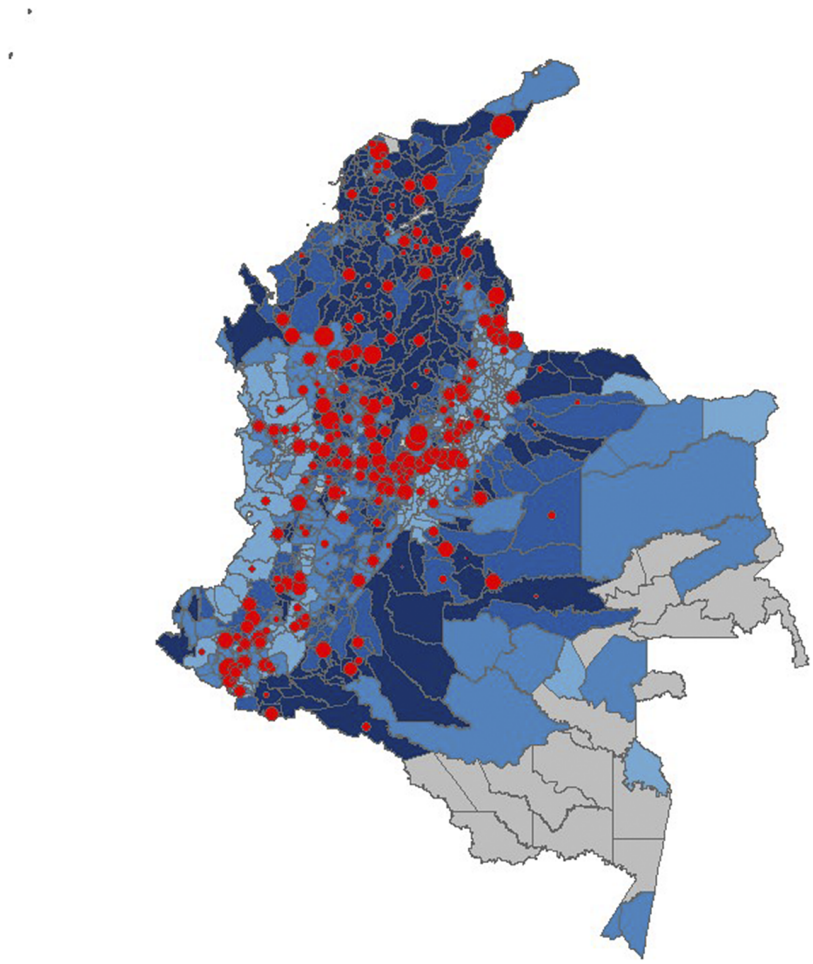
[17] The yearly coverage is obtained as $coverage_t = coverage_{2000} + \sum_{i=2001}^{t}(gain_i - loss_i)$.

[18] The main results are robust to an alternative deforestation measure calculated relative to the year 2000. These results are available upon request.

[19] We acknowledge the use of data and/or imagery from NASA's FIRMS (https://earthdata.nasa.gov/firms).

[20] For details, see Prem et al. (2022).

FIGURE 1. Deforestation during Term by Municipality



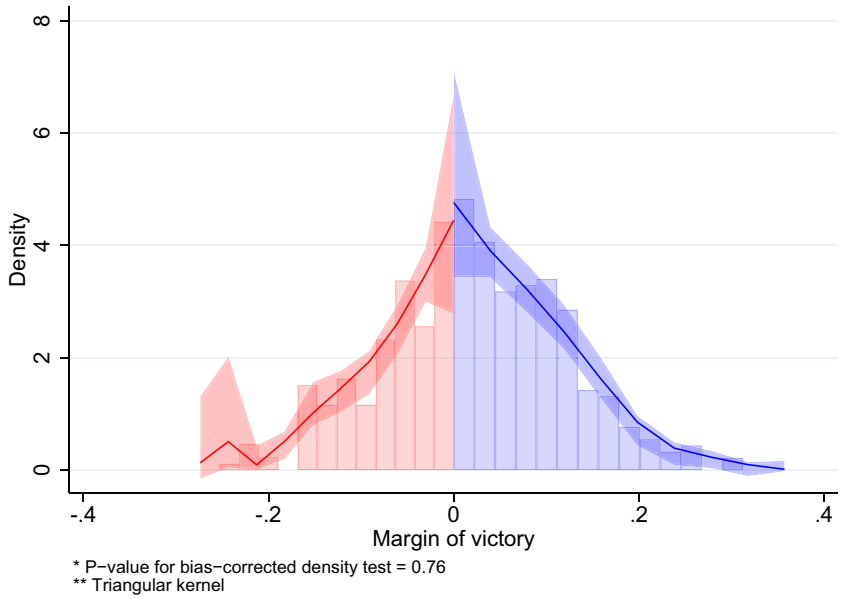
Note: This figure shows the geographical distribution of deforestation and the vote share of privately funded candidates for the 2011 election period. The shades of blue correspond to the quartiles of deforestation during the full term. The bubble size correspond to the quartiles of the margin of victory of privately funded candidates.

TABLE 1. Summary Statistics

	No. of obs.	Mean	Std. dev.	Minimum	Median	Maximum
	(1)	(2)	(3)	(4)	(5)	(6)
A. Elections						
Private income % total	2,160	0.17	0.27	0	0	1
Margin of victory of donor-funded	408	0.022	0.101	−0.354	0.019	0.383
B. Deforestation						
Deforestation ratio 2008–11	1,080	2.141	2.023	0.000	1.526	14.565
Deforestation ratio 2012–15	1,080	1.182	1.572	0.000	0.576	16.625

Note: This table presents summary statistics for the main variables of interest used in the analysis. An observation is a municipality except for the Private income % total that uses as unit of observation the candidate (top two candidates per each municipality).

FIGURE 2. Manipulation Test



Note: This figure presents the density test suggested by Cattaneo, Jansson, and Ma (2018) using a quadratic polynomial and triangular kernel weights. The *p*-value for the bias corrected density test is 0.76. The *p*-values using a polynomial of degree 1 and 3 are 0.25 and 0.59, respectively.

candidate is plausibly correlated with a broad range of municipal characteristics, including enforcement capacity. Moreover, deforestation itself may be determined by municipality characteristics. For example, more rural municipalities might have more cattle ranching that may increase deforestation. Due to these identification problems, a straightforward comparison of deforestation across municipalities electing donor-funded as opposed to self-funded mayors may be confounded by local municipality characteristics.

To overcome these problems, we employ a quasi-experimental RDD. Using the margin of victory as the running variable, we take advantage of the discontinuous change at the threshold between the victory of a donor-funded as opposed to a nondonor-funded mayor. This defines the treatment rule:

$$L_i = \left\{ \begin{array}{ll} L_i = 1, & \text{if } x_i > 0, \\ L_i = 0, & \text{if } x_i < 0, \end{array} \right\} \tag{2}$$

where x_i reflects the margin of victory for the donor-funded politician and L_i represents the treatment status, as a dummy variable taking the value of 1 if a donor-funded politician won the election.

Following this, our main analysis estimates a regression of the form:

$$y_i = \alpha + \beta_1 L_i + \beta_2 f(x_i) + \beta_3 L_i \times f(x_i) + \varepsilon_i. \tag{3}$$

Here, y_i is the outcome, measured as the change in deforestation during the elected mayor's term in office. β_1 is our estimate of the effect of electing a donor-funded mayor. $f(x_i)$ is a polynomial in the donor-funded politician margin of victory. Finally, ε_i corresponds to the idiosyncratic error term.

Correctly estimating β_1 requires two key assumptions: (1) there should be no manipulation of election results around the cutoff and (2) covariates potentially correlated with the treatment and outcome variables must vary smoothly around the cutoff. On the first, results from the Cattaneo, Jansson, and Ma (2018) manipulation test based on density discontinuity presented in Figure 2 show no statistically significant evidence of systematic manipulation.[21] On the second, Table 2 shows that there is no discontinuity of covariates at the cutoff, suggesting that municipalities are similar except in the treatment status.

We follow Cattaneo, Idrobo, and Titiunik (2020) and estimate the RDD specified in Equation 3 nonparametrically using polynomials of order 1 and 2, and weight observations according to their distance to the cutoff using triangular kernel weights.[22] Additionally, we employ an optimal data-driven bandwidth selection procedure that minimizes the asymptotic mean square error (MSE). Since MSE bandwidths produce nonrobust confidence intervals, we estimate robust standard errors and confidence intervals but report conventional point estimates within the MSE optimal bandwidth (Cattaneo, Idrobo, and Titiunik 2020).

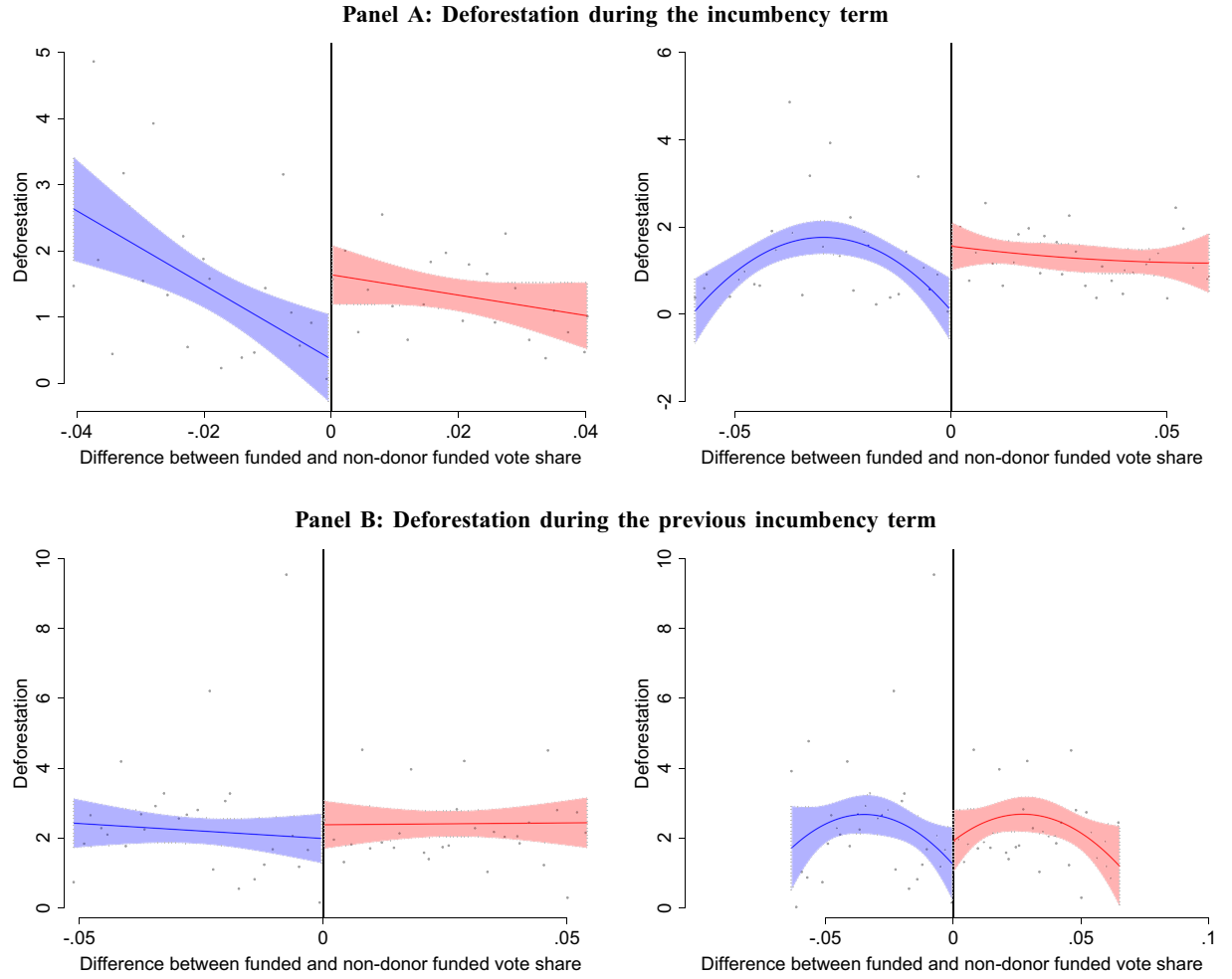
[21] Similar results are found using the McCrary (2008) test for sorting around the threshold with a *p*-value of 0.29.
[22] Supplementary Table A4 presents results using a cubic polynomial.

TABLE 2. Smooth Covariates

	Mean	Std. dev.	Donor-fund. won	Std. error	No. of obs.	P-value	P-value Canay
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Individual covariates							
Women	0.115	0.319	0.119	0.202	132	0.121	0.789
Age	45.229	9.698	−3.551	5.398	126	0.573	0.061
Black	0.044	0.204	−0.023	0.195	126	0.865	0.490
Indigenous background	0.107	0.309	0.050	0.230	126	0.570	0.423
Left-wing party	0.025	0.155	0.018	0.165	132	0.801	0.664
Right-wing party	0.239	0.427	0.181	0.147	132	0.474	0.816
Sanctioned before	0.028	0.164	0.071	0.098	132	0.139	0.677
Has political experience	0.362	0.481	0.156	0.181	132	0.336	0.871
Panel B. Policy outcomes							
Total income Y (COP M)	47,220.688	362,151.334	12,723.550	8,666.063	132	0.704	0.467
Land taxes (%Y)	3.888	4.700	0.346	2.083	132	0.938	0.303
Industry (%Y)	3.369	5.963	1.378	1.755	132	0.823	0.252
Funct. expen. (%Y)	13.281	5.035	−1.439	4.719	132	0.535	0.758
Investment (%Y)	86.719	5.035	1.439	4.719	132	0.535	0.757
Deficit (%Y)	11.353	9.587	1.049	6.648	132	0.613	0.963
Panel C. Other municipality socioeconomic characteristics							
Altitude (m)	1,158.560	1,162.926	−227.936	571.983	132	0.885	0.164
Area in square kilometer	877.615	2,989.117	−91.459	578.174	132	0.323	0.713
Forest coverage (10,000 hectares)	5.343	22.028	−0.441	5.031	132	0.307	0.492
Proportion of forest coverage	0.507	0.278	−0.096	0.173	132	0.326	0.337
Agricultural land (10,000 hectares)	3.841	11.271	−0.018	3.132	132	0.921	0.769
Agricultural production (1,000 ton)	40.941	174.776	12.829	20.575	132	0.836	0.473
Distance to department capital	78.661	56.094	13.930	25.906	132	0.855	0.112
Distance to Bogota	319.296	189.660	−84.390	183.531	132	0.286	0.609
Pop. density	148.653	676.871	15.406	45.587	132	0.764	0.283
Road density	0.830	0.451	0.256	0.250	132	0.356	0.252
Nighttime lights	1.521	1.155	0.183	0.642	132	0.968	0.800
Literacy rate	83.895	8.491	−0.536	5.141	132	0.818	0.138
Rurality index (0–1)	0.564	0.240	−0.107	0.133	132	0.322	0.225
Unsatisfied basic needs	44.641	20.274	9.368	9.454	132	0.197	0.187
National Parks area (10,000 sq. hectares)	0.925	7.624	0.961	1.207	132	0.819	0.615
CAR office	0.143	0.350	−0.030	0.205	132	0.545	1.000
Distance to CAR office	29.843	32.585	−4.168	14.664	132	0.363	0.935
Comptroller general offices	0.617	6.458	0.044	0.091	132	0.636	1.000
Attorney general offices	4.112	38.473	0.810	0.683	132	0.629	0.570
Paramilitary attacks	1.286	9.825	0.151	1.882	132	0.724	0.173
Guerilla attacks	0.608	2.090	0.424	1.215	132	0.995	0.205
Panel D. Other potential explanations							
Deforestation during previous term	2.141	2.023	0.791	0.693	132	0.256	0.358
Disposable income (mw)	29,121.991	394,762.662	1,078.397	5,317.036	126	0.719	0.305
Municipal category	5.706	0.997	0.095	0.241	132	0.264	1.000
Mayor wages	6.694	2.549	−0.190	0.481	132	0.264	1.000
Council size	10.954	2.912	1.775	1.292	132	0.217	0.081
Total population	41,810.242	257,758.644	8,672.028	9,205.110	132	0.926	0.214
Income from royalties	0.070	0.151	0.022	0.159	130	0.487	0.747

Note: The first two columns present the basic statistics (mean and standard deviation) of each covariate. Column 3 reports the RDD's point estimate of the effect of a donor-funded candidate victory on each covariate (as the dependent variable) and the MSE optimal bandwidth for the main model is used throughout. Bias-corrected robust standard errors are reported in column 4. The number of effective observations is detailed in column 5. Column 6 reports the estimated *p*-value, whereas column 7 reports the Canay and Kamat (2018) permutation test for the null hypothesis of continuity of the distribution around the cutoff.

FIGURE 3. Effect of Electing a Donor-Funded Politician on Deforestation



Note: This figure presents a graphical approximation of the regression discontinuity design. We present deforestation during the full incumbency term in the first row, whereas deforestation during the previous incumbency term is shown in the second row. The observations are shown within MSE optimal bandwidth. From left to right, the first figure uses a linear polynomial approximation; meanwhile, the second uses a quadratic approximation.

In further exercises, we perform parametric estimations, including additional interactions, to capture possible heterogeneous effects. In these, we estimate the RDD parametrically within the MSE optimal bandwidth sample, using OLS regression weighted by a triangular kernel, and controlling for a linear polynomial.

RESULTS

Main Effects

Figure 3[23] presents our main estimate of the effect of electing a donor-funded mayor on deforestation. The left and right panels show estimates using linear and quadratic polynomial approximations, respectively. We find a clear discontinuous jump in deforestation around the threshold determining victory of a donor-funded mayor. Moreover, the jump is statistically significant for both the linear and quadratic approaches. This result implies that the amount of deforestation in a municipality during a donor-funded mayor's term in office is significantly higher than that during the term of a self-funded mayor.

Table 3[24] presents the main result in greater detail. Our coefficient of interest represents the effect on deforestation of electing a donor-funded compared with a self-funded mayor. The estimates in columns 2 and 4 also include the measure of deforestation for the

[23] Panel A of this figure corresponds to the article's main table—columns 1 and 3 of Table 3. Panel B corresponds to Supplementary Table A30.

[24] The full model table, reporting the coefficients for the added covariates, is available in Supplementary Table A31.

TABLE 3. Donor-Funded Politician and Deforestation during Term in Office

	(1)	(2)	(3)	(4)
Donor-funded	1.099***	0.627**	1.290**	0.972**
Robust *p*-value	0.008	0.019	0.026	0.021
CI 95%	[0.339, 2.220]	[0.127, 1.442]	[0.158, 2.471]	[0.158, 1.940]
Previous deforestation		✓		✓
No. of obs.	408	408	408	408
Bandwidth obs.	132	174	191	198
Mean	1.182	1.182	1.182	1.182
Effect mean (%)	92.98	53.05	109.14	82.23
Bandwidth	0.041	0.053	0.060	0.064
(Local) polynomial order	1	1	2	2

Note: Columns 1 and 2 present the local linear estimates of average treatment effects at the cutoff estimated with triangular kernel weights and optimal MSE bandwidth. Columns 3 and 4 present the quadratic estimates of average treatment effects at the cutoff estimated with triangular kernel weights and optimal MSE bandwidth. Ninety percent robust confidence intervals and robust *p*-values are computed following Calonico, Cattaneo, and Titiunik (2014). Bandwidth obs. denotes the number of observations in the optimal MSE bandwidth. The effect size (%) is computed as the point estimate over the mean× 100. Columns 2 and 4 include as covariates the measure of deforestation in the previous term (2008–11). ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

previous term, 2008–11. Prior deforestation varies smoothly around the cutoff, as shown in Panel B of Figure 3, but we employ this measure as a robustness check and improve the precision of the estimates (Lee and Lemieux 2010). The estimates are positive and significant across all specifications, showing robustness to linear or quadratic polynomials, and the inclusion of the previous deforestation measure. Moreover, the effect of electing a donor-funded politician is substantial, representing an increase in deforestation of 92.9% of the self-funded average for the linear specification. The effect size remains reasonably stable across specifications, ranging between 53% and 109% of the self-funded average.

In Figure 4,[25] we explore the resilience of the results to variation in bandwidth size. Following the best practice, we report results for a range of bandwidths around the MSE optimal bandwidth, from half to double the size. Overall, the results are encouraging, with the effect remaining robust to a considerable range of bandwidths. It is not surprising that the results do not hold for very small bandwidths, for which the estimates are unlikely to have sufficient power. However, the effect remains reassuringly robust up to bandwidths of 0.08, where races are far less competitive and municipalities less comparable.

Overall, these main effects provide compelling evidence that deforestation in Colombia increases in municipalities that elect donor-funded mayors.[26] This in itself is an important finding. Deforestation is a key driver of climate change and efforts to limit it are key to long-term environmental sustainability. Consequently, evidence highlighting political determinants of deforestation are crucial to the formulation of effective environmental protection policies.

Mechanisms

We argue that there are two primary channels through which the election of a donor-funded mayor could result in greater deforestation: contracting and regulatory nonenforcement. These channels are not mutually exclusive. Indeed, as highlighted by the example of the Calamar–Miraflores road discussed in the introduction, they may operate hand in hand, with contracts for infrastructure projects being accompanied by the selective nonenforcement of environmental regulations pertaining to the ensuing construction work. Nevertheless, we explore the extent to which each is driving the estimated effects.

Contracting

To examine the contracting channel, we explore its implied temporal sequence, whereby any impact of electing a donor-funded mayor on contracting precedes the subsequent deforestation. First, in Table 4, we break down the main result by each year of the mayoral term. The positive effect is significant in all but the third year and intensifies during the final year of the term.[27] Although the estimated coefficient is substantially larger for the final year, in comparison with the average for self-funded mayors, the difference is less stark. For year 1, deforestation in municipalities with a donor-funded mayor is about 92.4% higher vis-à-vis municipalities that elected self-funded mayors, whereas for the last year, it is 107.7% higher.[28] It seems implausible that deforestation in year 1, at least, derives from the

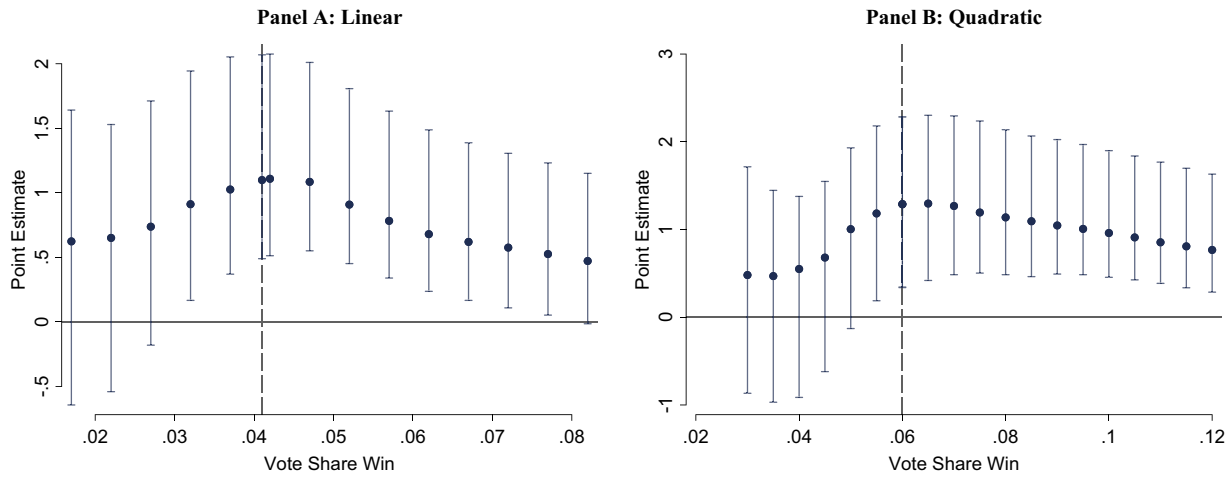
[25] A table with the precise point estimates and confidence intervals is available in Supplementary Table A33.

[26] Results hold with OLS regressions using all 996 municipalities that elected mayors in 2011 (Supplementary Table A5).

[27] Estimating a nonparametric differences-in-difference model, we also see a large and significant increase in deforestation for the last year of the term (Supplementary Figure A1).

[28] Similar results hold with a quadratic polynomial, although the relative effect size is more consistent across years 1–3 and then greater in year 4 (Supplementary Table A6).

FIGURE 4. Different Bandwidth Sizes: Effect of Electing a Donor-Funded Politician on Deforestation



Note: Estimates of average treatment effects at the cutoff, using triangular kernel weights. Optimal MSE bandwidths are displayed in the dotted line. Following Cattaneo, Idrobo, and Titiunik (2020), we display estimates between half and double the optimal bandwidth. Robust 90% confidence intervals estimated following Calonico, Cattaneo, and Titiunik (2014).

TABLE 4. Donor-Funded Politician and Deforestation by Year of Government

	Year of government			
	1	2	3	4
	(1)	(2)	(3)	(4)
Donor-funded	0.195***	0.220**	0.117	0.490***
Robust *p*-value	0.003	0.029	0.224	0.006
CI 95%	[0.077, 0.376]	[0.027, 0.504]	[–0.095, 0.404]	[0.164, 0.959]
No. of obs.	408	408	408	408
Bandwidth obs.	132	139	187	130
Mean	0.211	0.305	0.211	0.455
Effect mean (%)	92.42	72.13	55.45	107.69
Bandwidth	0.041	0.043	0.059	0.040
(Local) polynomial order	1	1	1	1

Note: Local linear estimates of average treatment effects at the cutoff estimated with triangular kernel weights and optimal MSE bandwidth. Ninety percent robust confidence intervals and robust *p*-values are computed following Calonico, Cattaneo, and Titiunik (2014). Bandwidth obs. denotes the number of observations in the optimal MSE bandwidth. Each column shows the deforestation rate, defined as lost $coverage_t/coverage_{\text{election year}}$, for a given year of government. The effect size (%) is computed as the point estimate over the mean× 100. ***$p<0.01$, **$p<0.05$, *$p<0.1$.

contracting channel since insufficient time would have passed for contacts to have been awarded and environmentally harmful work to have commenced. We explore this further by estimating the effect of electing donor-funded mayors on contracting outcomes.

Since infrastructure construction is a major state-related source of deforestation, we test whether there is a differential increase in the number and average value of infrastructure contracts. As Table 5 shows, we find no evidence that donor-funded mayors commission more infrastructure projects, but their election is related to an increase in the average value of infrastructure contracts, with the estimated effect corresponding to an increase of 109% over municipalities electing self-funded mayors.[29] It is worth noting that contracts awarded to campaign donors have been found to involve significant overcosts (Ruiz 2017), which suggests that the estimated increased average value of infrastructure contracts may not actually result in larger projects that could induce greater deforestation, but instead may simply increase the cost of similar projects to those undertaken in municipalities run by self-funded mayors. This possibility is reinforced by the fact that we see no significant increase in road density

[29] Results are equivalent with a quadratic polynomial (Supplementary Table A7).

TABLE 5. Donor-Funded Politician and Contracts

	Infrastructure			*Environmental*		*Mining*	
	Number	*Log avg. value*	Road construction	*Number*	*Log avg. value*	*Number*	*Log avg. value*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Donor-funded	−30.151	1.091**	−0.015	−4.904	0.486	0.209	−0.307
Robust *p*-value	0.357	0.017	0.346	0.742	0.150	0.637	0.672
CI 95%	[−127.980, 46.163]	[0.219, 2.258]	[−0.060, 0.021]	[−55.157, 39.293]	[−0.197, 1.294]	[−0.774, 1.265]	[−1.785, 1.150]
No. of obs.	401	400	401	401	366	401	145
Bandwidth obs.	226	165	211	211	174	216	96
Mean	140.740	4.817	0.015	18.227	3.796	0.974	3.614
Effect mean (%)	−21.42	109.10	−100.00	−26.91	48.60	21.46	−30.70
Bandwidth	0.077	0.049	0.071	0.073	0.062	0.074	0.112
(Local) polynomial order	1	1	1	1	1	1	1

Note: Local linear estimates of average treatment effects at the cutoff estimated with triangular kernel weights and optimal MSE bandwidth. Ninety percent robust confidence intervals and robust *p*-values are computed following Calonico, Cattaneo, and Titiunik (2014). Bandwidth obs. denotes the number of observations in the optimal MSE bandwidth. The average value of contracts was transformed using inverse hyperbolic sine. The contracts are catalogued in each category by analyzing their reported object. For columns 1, 3, 4, and 6, the effect size (%) is computed as the point estimate over the mean× 100, whereas for the rest of the columns, it is the point estimate× 100. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

following the election of donor-funded mayors, despite roads being a major component of infrastructure contracts, and the type of infrastructure project most likely to result in deforestation. We also look at contracts for mining and environmental work, both of which may be related to deforestation, but find no significant differences in their number or average value between municipalities electing self-funded and donor-funded mayors.

Given the implied temporal sequence, we analyze the impact of electing a donor-funded politician on the value of infrastructure contracts by year of the mayoral term. The results in Supplementary Table A8 show that the estimated coefficient is only significant in year 3. Given the larger magnitude of the estimated effect on deforestation in year 4, this finding is consistent with the claim that donor-funded mayors contribute to deforestation in part by awarding larger contracts for infrastructure projects. Therefore, the contracting channel may explain part of the estimated effect of donor-funded mayors on deforestation that occurs in the final year of the mayoral term.[30] In a final test of the contracting mechanism, we explore the extent to which infrastructure contracts relate to activities that can plausibly influence deforestation. Coding all infrastructure contracts, we find that only 27% were for activities that might affect deforestation, of which the vast majority were for road construction.[31] These findings, therefore, suggest that the contracting channel alone cannot account for the overall effect of electing a donor-funded mayor on deforestation.

Regulatory Nonenforcement

We argue that these effects also result from donor-funded mayors rewarding donors with selective nonenforcement of environmental regulations. It is difficult to directly observe selective regulatory nonenforcement. One benefit of the RDD we employ is that, given the balance on preterm municipal characteristics, we can be confident the observed differences in deforestation do not result from variation in previous enforcement capacity. However, the problem remaining is that we observe the outcome, deforestation, rather than directly observing compliance with or enforcement of environmental regulations. Our approach is, therefore, to explore a series of further implications of this mechanism: first, that selective nonenforcement of environmental regulations by mayors should be offset by alternative formal enforcement institutions; second, that selective

[30] Mediation analysis using sequential g-estimation (Acharya, Blackwell, and Sen 2016) finds almost no impact of infrastructure contracting as a potential mediator, suggesting that preferential contracting alone cannot explain the effect of electing a donor-funded mayor on deforestation (Supplementary Figures A2 and A3).

[31] Many contracts were related to projects such as the construction of schools, hospitals, and sports centers, all in the pre-existing urban areas of municipalities. Supplementary Table A9 presents the estimates of the effect of electing a donor-funded mayor on infrastructure contracts separately for contacts that were and were not related to deforestation. Effects are slightly larger for contracts related to deforestation.

TABLE 6. Heterogeneous Effects: State Presence

	Measure Z				
	National Parks area	CAR office	Distance to CAR	Procurator offices	Attorney offices
	(1)	(2)	(3)	(4)	(5)
A Donor-funded	1.117**	1.195**	−0.149	1.024**	1.325***
	(0.439)	(0.466)	(0.518)	(0.427)	(0.496)
Z	0.210**	0.487	0.000	1.195***	0.215**
	(0.105)	(0.592)	(0.008)	(0.175)	(0.099)
B *Z* × Donor-funded	−0.279*	−1.610*	0.037**	−2.434***	−0.450***
	(0.144)	(0.966)	(0.015)	(0.245)	(0.162)
No. of obs.	408	408	408	408	408
Bandwidth obs.	132	132	132	132	132
R^2	0.051	0.062	0.209	0.053	0.067
Bandwidth	0.041	0.041	0.041	0.041	0.041
(Local) polynomial order	1	1	1	1	
A + B	0.838	−0.415	−0.112	−1.410	0.875
Effect size (%)	93.111	−34.992	−15.197	−72.123	102.339
Ho: $A + B = 0$					
F-statistic	4.388	0.241	0.048	34.504	4.698
p-Value	0.038	0.624	0.827	0.000	0.032

Note: OLS regression weighted by a triangular kernel within the MSE optimal bandwidth sample and controlling for a linear polynomial. Bandwidth obs. denotes the number of observations in the optimal MSE bandwidth. The dependent variable is deforestation during the full term. National Parks area is defined as the total area with national parks in the municipality, CAR office is a dummy that takes the value of 1 if there was at least one CAR office in the municipality, Distance to CAR is the distance to the closest CAR office, Procurator offices is the number of offices of the Procurator General (*Procuraduría*), and Attorney offices is the number of offices of the Attorney General (*Fiscalía*). The Effect size (%) is computed as 100 × (A + B) / (*constant* $+\beta_Z$). ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

nonenforcement should be offset by informal enforcement actors; and third, that illegal deforestation is more likely to be accompanied by fires.[32]

Alternative Formal Enforcement Institutions. If donor-funded mayors turn a blind eye to their donors' illegal deforestation activities, the effect of electing donor-funded mayors on deforestation should be mitigated by the presence of alternative sources of environmental law enforcement. Where other enforcement institutions are present, selective nonenforcement by mayors should determine deforestation levels to a lesser extent. We investigate whether the effect of electing a donor-funded mayor is conditional on either of two alternative enforcement institutions: the CARs and the National Parks administration. We also test whether the main effect is attenuated by the number of offices of the Procurator General (*Procuraduría*) and of the Attorney General (*Fiscalía*), which we take as additional proxies for the extent of state presence within the municipality. Importantly, all measures capturing the presence of these alternative formal enforcement institutions vary smoothly at the cutoff (see Table 2).

As detailed in the Context section, part of Colombia's natural forest is designated protected area under the care of the National Parks administration, and is subject to more stringent regulation and monitoring overseen directly by the national government.[33] This means that in areas designated as National Parks, responsibility for enforcement of environmental regulations falls less heavily on local municipal officials. Column 1 of Table 6 presents results from an analysis interacting donor-funded politician victory with a measure of area in square kilometers designated as National Parks in the municipality. Consistent with our interpretation, the estimated coefficient on the interaction term is negative and significant, indicating that an increase in National Parks areas reduces the additional deforestation linked to electing a donor-funded mayor.

The Context section also detailed the CARs significant role in monitoring and enforcing environmental regulations across Colombia. While CARs delegate much of this responsibility to territorial governments, their own offices still play an important role in enforcement. Therefore, we study how the presence of and distance to CAR offices mediate the effects of victory by donor-funded mayors on deforestation. Columns 2 and 3 in Table 6 show the estimates where the indicator of donor-funded politician victory is interacted with a dummy for the presence of a CAR office in the municipality, and with the distance to the closest

[32] We also attempt to explore the effect of electing a donor-funded mayor on land cover and methane emissions to provide further evidence that illegal deforestation occurs to make way for agricultural activity. Unfortunately, the quality of the available data is not sufficiently high to estimate these effects with sufficient precision. Results are included in Supplementary Table A15.

[33] Bonilla-Mejía and Higuera-Mendieta (2019) show that protected area designation reduces deforestation.

TABLE 7. Heterogeneous Effects: Armed Conflict

	Attacks measure Z	
	Paramilitary	Guerrilla
	(1)	(2)
A Donor-funded	0.704*	1.133***
	(0.422)	(0.427)
Z	0.116	0.574***
	(0.139)	(0.187)
B *Z* × Donor-funded	0.123	–0.623**
	(0.153)	(0.241)
No. of obs.	408	408
Bandwidth obs.	132	132
R^2	0.116	0.131
Bandwidth	0.041	0.041
(Local) polynomial order	1	1
A + B	0.827	0.510
Effect size (%)	90.185	42.821
Ho: A + B = 0		
F-statistic	4.598	1.370
p-Value	0.034	0.244

Note: OLS regression weighted by a triangular kernel within the MSE optimal bandwidth sample and controlling for a quadratic polynomial. Bandwidth obs. denotes the number of observations in the optimal MSE bandwidth. The dependent variable is deforestation during the full term. Paramilitary (Guerrilla) attacks is the number of paramilitary (guerrilla) attacks during the previous term (2008–11). The effect size (%) is computed as $100 \times$ (A +B)/(constant $+\beta_Z$). ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

CAR office from the centroid of the municipality, respectively. Once again, the results support the regulatory nonenforcement channel. The presence of CAR offices significantly diminishes the effect of a donor-funded victory on deforestation. Meanwhile, the greater the distance to the CAR offices, the greater the increase in deforestation when a donor-funded politician is elected.

We also explore whether there is heterogeneity in the main effects according to the number of offices of the Procurator General (*Procuraduría*) and of the Attorney General (*Fiscalía*). As shown in Table 6, the coefficients on the interaction terms between both these additional measures and victory by a donor-funded politician are negative and significant. These findings, therefore, add further weight to the idea that the presence of alternative formal enforcement institutions mitigates the impact of selective regulatory nonenforcement by donor-funded mayors.

Informal Enforcement Institutions. Landowners and cattle ranchers benefit from selective regulatory enforcement by exploiting land with greater intensity. The activities of these local elites have long been affected by the dynamics of internal conflict in Colombia. As such, we posit that an additional source of alternative regulatory enforcement comes from informal institutions, in particular illegal armed groups.

The lasting presence of illegal armed actors in Colombia is closely connected to conflict over land, with the actions of guerrilla groups such as the FARC often justified by a desire to push back against inequality exacerbated by land expropriation by local elites. Partly in response, far-right paramilitary groups have frequently acted to protect and promote the economic interests of these elites. Given this history, we consider these armed groups as representing informal institutions for the enforcement of environmental protection. Specifically, because guerrilla groups have often obstructed and attacked the business of elites, we expect their presence to limit illegal deforestation by local elites, thereby offsetting selective nonenforcement of environmental regulations by donor-funded mayors. The presence of paramilitary groups, on the other hand, should have no such effect.

Taking preterm attacks by these two types of armed groups as proxies for their presence in a municipality, we study how this affects our main result. As with formal institutions, the measures capturing the presence of these informal enforcement institutions also vary smoothly at the cutoff (see Table 2). Table 7 presents the estimated effects of the impact of a donor-funded politician on deforestation, conditional on the number of attacks by each type of group in the municipality.[34] The results are consistent with the historical alignment of armed groups with local elites. While attacks by guerrilla groups mitigate the increase in deforestation linked to a donor-funded victory, paramilitary attacks have no such impact. Taking attacks by guerrilla groups as a proxy for the presence of informal institutions providing checks on illegal deforestation by local elites, therefore, these findings provide further evidence in support of the regulatory nonenforcement mechanism.[35]

Fires. In Colombia and elsewhere, fire clearance of forest areas for cattle ranching and cultivation is widespread and this environmentally harmful practice is regulated by the law.[36] Moreover, intensive fire clearance practices are much more likely to be employed for illegal land grabbing linked to cattle ranching and cultivation than for government-contracted infrastructure projects. Therefore, we check for an increase in the intensity of forest fires in municipalities governed by donor-funded mayors. A differential increase in fire intensity would strongly indicate unregulated land exploitation through fire clearance. Following the same RDD approach described above, we test for a discontinuous jump in fire intensity, measured as average fire brightness, when a donor-funded mayor is elected.

[34] Results hold with a quadratic polynomial (Supplementary Table A10).

[35] These results could also reflect underlying elite preferences for infrastructure projects across areas with paramilitaries/guerrillas, although the evidence of a differential increase in deforestation in FARC-controlled areas following the cease-fire suggest otherwise (Prem, Saavedra, and Vargas 2020).

[36] See, e.g., https://news.mongabay.com/2019/09/as-the-amazon-burns-colombias-forests-decimated-for-cattle-and-coca/ and https://theecologist.org/2020/aug/17/deforestation-colombia (last accessed June 2021).

TABLE 8. Donor-Funded Politician and Fire Intensity

	(1)	(2)
Donor-funded	80.976*	75.464**
Robust *p*-value	0.059	0.041
CI 95%	[−3.381, 181.446]	[3.189, 156.092]
Previous fire intensity		✓
No. of obs.	408	408
Bandwidth obs.	195	198
Mean	246.324	246.324
Effect mean (%)	32.87	30.64
Bandwidth	0.061	0.063
(Local) polynomial order	1	1

Note: Local linear estimates of average treatment effects at the cutoff estimated with triangular kernel weights and optimal MSE bandwidth. Ninety percent robust confidence intervals and robust *p*-values are computed following Calonico, Cattaneo, and Titiunik (2014). Bandwidth obs. denotes the number of observations in the optimal MSE bandwidth. Column 2 includes as a covariate the measure of fire intensity from the previous term (2009–11), being 2009 the first year with data availability. Fire intensity is measured as the average brightness of fires in a municipality. The effect size (%) is computed as the point estimate over the mean× 100. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 8[37] presents results that are consistent with our interpretation; we find an increase in the average fire intensity of 32.9% when a donor-funded mayor is elected. Results are robust to selecting linear or quadratic polynomials (Supplementary Table A11) and hold across a range of bandwidths (Supplementary Figure A4).[38]

Disaggregating the estimates of fire intensity shows that this effect is concentrated in the final year (Supplementary Table A12). This behavior may be consistent with an increase in illegal deforestation toward the end of the term as perpetrators seek to maximize extraction before their preferred mayor leaves office, due to the potential increased risk of punishment under a future mayor. Indeed, this fits with additional evidence that municipalities electing donor-funded mayors see a significant increase in the chamber of commerce registration of agro-cattle firms, which are known for the use of fire clearance practices and that this effect is concentrated in the final year of the mayoral term (Supplementary Tables A13 and A14).[39] Moreover, it suggests that the increase in deforestation in the final year of the mayoral term (shown in Table 4) is not solely due to an increase in the average value of infrastructure contracts.[40]

Alternative Explanations

This section addresses two alternative mechanisms that could plausibly explain increased deforestation following the election of donor-funded mayors: variation in agricultural pressure, and candidate characteristics.[41]

Agricultural Pressure

Deforestation could reflect the level of pressure from local agricultural interests to access potential agricultural land. By this mechanism, donations are used to buy access to land, rather than buy reductions in regulatory enforcement. This is unlikely because powers to grant land access via environmental concessions or licenses rests with CARs, not with mayors themselves. The environmental role of municipal governments lies primarily in the local enforcement of regulations through policing and sanctioning regulatory violations. Nevertheless, we explore the potential impact of agricultural pressure empirically, in several ways.

First, in Table 2, we show that there is no discontinuity at the cutoff for a variety of measures capturing preterm levels of agricultural pressure, including hectares of forest coverage and agricultural land, and levels of agricultural production. Second, our main results and the heterogeneous effects based on the National Parks area and CAR presence are all robust to the inclusion of controls for the aforementioned agricultural pressure measures (Supplementary Tables A16 and A17). Third, the results also hold when we weight observations using preterm forest coverage or municipality area, thus giving the same weight to each square kilometer (Supplementary Table A18). Finally, we find no evidence of differential effects of electing a donor-funded mayor on deforestation according to preterm measures of agricultural pressure (Supplementary Table A19).

Candidate Characteristics

While our research design identifies the effect of candidates being supported by donors, it is possible that donations are directed toward candidates with particular characteristics, as opposed to donations inducing particular behavior (i.e., regulatory nonenforcement) from candidates. This raises a second possible

[37] The full model table, reporting the coefficients for the added covariates is available in Supplementary Table A32.
[38] Mediation analysis suggests around 20% of the estimated effect of donor-funded mayors on deforestation operates through fire clearance (Supplementary Figure A2).
[39] For reports on the use of fire clearance by agro-businesses, see https://www.eltiempo.com/vida/medio-ambiente/opinion-480690 and https://es.mongabay.com/2019/07/incendios-norte-amazonia-deforestacion-colombia/ (last accessed June 2021).
[40] This temporal pattern is also consistent with fire clearance being used in the final year to make way for infrastructure projects contracted in year 3.
[41] We are grateful to anonymous reviewers for suggesting these. Another possibility is that deforestation results from favors to facilitate the future election of co-partisans. Analysis of the effects of deforestation on various electoral outcomes suggests that this is not the case (see Supplementary Table A29).

alternative mechanism: that donors support candidates who are more skeptical of environmental regulation and less willing to enforce regulations strictly. Several empirical results help rule this out.

First, Table 2 shows that covariates measuring candidate characteristics are all smooth at the cutoff, suggesting that donations are not targeted to candidates based on these characteristics. This includes ideology, which likely captures much of the variation in candidates' attitudes toward environmental regulation. It also includes measures of candidates' prior political experience and of whether they have previously been sanctioned by the comptroller's office.[42] These are intended to capture prior history of, or greater proclivity for, malfeasance in office, respectively. Second, we show that our main results are robust to controlling for these measures (Supplementary Table A16).

Third, we find no evidence that deforestation is affected by the election of a right-wing politician (Supplementary Table A20), which shows that electing more conservative candidates does not itself lead to greater deforestation, as this alternative mechanism would imply.[43] Finally, we find no evidence of differential effects of electing a donor-funded mayor on deforestation according to candidates' ideology, prior experience, or history of having been sanctioned (Supplementary Table A21). This suggests that even among conservative candidates, or those with a proclivity for malfeasance, donor-supported candidates cause more deforestation.

CONCLUSIONS

We provide evidence that in Colombia, the election of mayors who rely on campaign donations significantly increases deforestation. In line with existing literature, we show that this may be due in part to differential contracting practices because the average value of infrastructure contracts increases with the election of a donor-funded mayor. But temporal dynamics demonstrate that the more standard contracting story only partially explains the estimated effects. Instead, we provide evidence consistent with the argument that campaign donations also influence deforestation through another unexplored channel: by purchasing regulatory nonenforcement. Donor-funded mayors turn a blind eye to activities resulting in illegal deforestation in return for campaign contributions.

The RDD alleviates endogeneity concerns and gives us confidence that the estimated effect of electing a donor-funded politician on deforestation is identified. This finding is important in itself because it provides clear evidence of the political dynamics affecting deforestation, a central driver of environmental degradation and climate change. One key benefit of the RDD is to rule out the possibility that this variation is due to differences in pre-existing institutional enforcement capacity across municipalities. Disaggregating by year shows that this effect is present across the mayoral term and that differential contracting practices can only explain the effect observed in the final year, and even then only partially so. We argue that the remainder of the overall effect results from the selective nonenforcement of environmental regulations by mayors rewarding their donors.

Although we cannot observe enforcement by mayors directly, we present a range of additional evidence consistent with this interpretation. First, we demonstrate that the effect of victory by a donor-funded politician on deforestation is attenuated by the presence of alternative formal enforcement institutions (which are beyond the mayor's control). Second, we show that the effect is also mitigated by the presence of illegal armed groups that serve as informal enforcement actors. Finally, because illegal deforestation frequently makes use of aggressive fire-clearance practices, we show that fire intensity is significantly higher in municipalities that elect donor-funded mayors. Taken together, this range of evidence supports our interpretation that campaign donors in Colombia purchase regulatory nonenforcement by mayors, allowing them to exploit land in a way that increases deforestation. Although the available evidence is compelling, future work could bolster these findings with qualitative evidence garnered through enforcement process tracing (Bozçağa and Holland 2018).

The findings make a number of important contributions. First, they advance the literature on the influence of money in politics, moving beyond a focus on favorable legislation and preferential contracting to acknowledge that campaign donations may also influence regulatory enforcement. In doing so, they contribute to the work on state capture by highlighting campaign finance as another means by which economic elites may exert disproportionate influence over the local state. And, finally, the findings increase our understanding of the political dynamics of deforestation, and of environmental degradation more broadly. This matters because learning how political competition and incentives influence the implementation of environmental regulations is vital if we are to effectively counter the challenge of climate change.

SUPPLEMENTARY MATERIAL

The supplementary material for this article can be found at https://doi.org/10.1017/S0003055423000412.

DATA AVAILABILITY STATEMENT

Research documentation and data that support the findings of this study are openly available in the American Political Science Review Dataverse at https://doi.org/10.7910/DVN/GYX7GC. Limitations

[42] These are sanctions for whether the candidates had embezzled or lost public money as a result of inadequate fiscal management.

[43] We also see no evidence that deforestation is affected by the election of a candidate with prior political experience (Supplementary Table A22). The number having been sanctioned is too small to estimate the effect of electing such a candidate.

on data availability are discussed in the text and/or the Supplementary Material.

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CONFLICT OF INTEREST

The authors declare no ethical issues or conflicts of interest in this research.

ETHICAL STANDARDS

The authors affirm this research did not involve human subjects.

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