Buying a Blind Eye: Campaign Donations, Forbearance, and Deforestation in Colombia

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Abstract

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 forbearance. Specifically, we argue that in return for campaign contributions, Colombian mayors who rely on donor-funding (compared to 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 is contracting practices by donor-funded mayors. Instead, evidence from analysis of fire clearance, and of heterogeneity in the effects according to the presence of alternative formal and informal enforcement institutions, supports the interpretation that campaign contributions buy forbearance from enforcement of environmental regulations.

KEYWORDS: Campaign donations, Deforestation, Forbearance

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1 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 138km 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, Pedro Pablo Novoa and Jhonivar Cumbe. But rather than enforce 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 capitalise on the forest clearance for financial gain. Indeed, over this same period these two municipalities experienced high levels of vegetation fires, a common practice used by farmers to illegally appropriate 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 regulatory non-enforcement, campaign donations are used to buy forbearance 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 favourable legislation and preferential access to contracting or public sector jobs (Stratmann, 2005; Boas, Hidalgo and Richardson, 2014; Ruiz, 2017; Colonnelli, Prem and Teso, 2020). But the case described above highlights another use of campaign contributions: buying forbearance. Existing work on forbearance, or the selective non-enforcement of laws, has focused primarily on its use as a form of redistribution to win votes from the poor (Holland, 2016). Within that work, however, there is an acknowledgement that forbearance can also take more regressive forms, benefiting wealthy individuals at the upper end of the income distribution. When non-enforcement is targeted towards specific wealthy individuals in a contingent manner it can represent a type of corruption, which can be purchased from politicians with goods such as bribes or campaign funds. Yet while forbearance as corruption may seem all too familiar, clear evidence of it remains limited, in part because it is difficult to observe.[3]

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

[2] See for example https://es.mongabay.com/2019/07/incendios-norte-amazonia-deforestacion-colombia/.

[3] Sun (2015) finds that the Chinese government selectively enforces land laws.

We address this gap by providing 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 that fund their own mayoral campaigns, we estimate that deforestation between 2012 and 2015 almost doubles in municipalities that elected a donor-funded mayor compared to those that elected a self-funded mayor. 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 pre-term 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 and mediation analysis show that this channel can only explain part of the estimated increase in deforestation. Instead, further analysis supports the interpretation that campaign contributions buy forbearance from enforcement of environmental regulations. First, 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.

Second, 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 pre-term 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, or 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 Comptroller 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. This fits with our claim that the estimated effect stems from mayors selling forbearance, turning a blind eye to illegal deforestation.

Third, 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 pre-term 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.

These results are consistent with an interpretation in which the behaviour of local elites changes when the mayor is a donor-funded politician. As Holland (2016) notes, under a "political" enforcement model, government forbearance encourages more legal violations. As explained in Section 3, Colombia's local elites have a long history of land appropriation and illegal expansion of the agricultural frontier. Our argument suggests that campaign donations create a connection between the elites and the ruling mayor, providing elites with a degree of protection when engaging in deforestation activities. As donor-funded mayors turn a blind eye to violations of environmental regulations, so elites are encouraged to commit further offences.

These results make at least three important contributions. First, they advance the literature on the influence of money in politics. Not only do campaign donations buy favourable legislation and access to preferential contracts, but they also buy the selective non-enforcement of laws. Second, in this way the results also contribute to the literature on forbearance. As well as being used by politicians as a form of redistribution to win the votes of poor, forbearance can be sold to donors as a form of corruption. Although this type of forbearance as corruption may be familiar, we believe this paper is one of the first to contribute clear evidence of its operation in practice. 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.

The paper is organised as follows: Section 2 discusses literature on deforestation, campaign donations, and forbearance. Section 3 provides details of the Colombian context, focusing specifically on issues related to deforestation and environmental regulation, and the role campaign donations play in local elections. Section 4 describes the data, Section 5 discusses our empirical strategy, Section 6 presents the main results and explores possible mechanisms, and Section 7 concludes.

2 Deforestation, donations, and forbearance

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.[4] Forests capture up to 45% of terrestrial carbon and remove large amounts of carbon dioxide (Bonan, 2008; Pan et al., 2011). However, despite the importance of these ecosystems, they are being destroyed at alarming rates.[5] 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 urbanisation as leading causes of deforestation (Curtis et al., 2018; Hosonuma et al., 2012). Understanding factors influencing the intensity of these activities can therefore facilitate better decision-making and more suitable policy design to effectively manage deforestation (see, for example, Prem, Saavedra and Vargas, 2020).

One such factor is electoral competition, which has been argued to influence deforestation in contrasting ways. On 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 is seen to be the net effect of various mechanisms, including increased access to information about environmental problems, the greater role of public opinion in policy making, 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 multi-party elections in Kenya in 1992, as districts loyal to the central government were allowed increased access to forest land.

[4] See https://www.nationalgeographic.com/environment/article/deforestation. Last accessed April 2021.

[5] See https://www.wri.org/insights/numbers-value-tropical-forests-climate-change-equation. Last accessed April 2021.

Likewise, Sanford (2018) 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 maximisation 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 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 favourable 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 behaviour. This is consistent with theoretical models which hypothesise that politicians will grant policy favours in exchange for campaign donations.[6]

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

[6] For examples see: Snyder (1990); Ainsworth and Sened (1993); Austen-Smith and Wright (1994).

with low land productivity and excessive deforestation.

Forbearance as corruption. Tying this literature together, we argue that campaign donations can influence deforestation through an alternative channel: by purchasing forbearance from the enforcement of environmental regulations. Recent work on forbearance has demonstrated its political use as a form of redistribution to win votes from the poor (Holland, 2017). Alongside this more progressive form, however, forbearance can also be regressive in nature, with non-enforcement targeted to benefit wealthy individuals and elites. This type of regressive forbearance may be extended generally to broad classes of elite interests, as with legal immunity afforded broadly to wealthy groups in Latin America (Méndez, O'Donnell and Pinheiro, 1999), or reduced enforcement of industry-wide coal mining regulations in the United States (Gordon and Hafer, 2013). When made conditional on the provision of political support, however, this type of regressive forbearance represents a form of corruption. As Sun (2015) demonstrates, for example, land use laws in China have been selectively enforced to allow violations by wealthy individual developers who have connections to high-level political elites. Yet while this type of forbearance as corruption seems familiar, to date there is only limited evidence of its operation in practice, in part because it is hard to observe.

As we discuss in Section 3, 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.

3 Context

Deforestation in Colombia. Natural forest covers roughly two-thirds of Colombia's surface area, an amount that includes about 10% of the Amazon rainforest. Part of this forest, equivalent to 17% of the country, is designated as 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.[7] Yet as elsewhere in the world, deforestation is an increasing problem in the country.

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

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 200 thousand hectares of forest are lost each year to pasturing.[8] 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 ceasefire between the government and Colombia's biggest illegal armed group, the FARC, 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 this type 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 (Guzmán, Fals Borda and Umaña, 2010; Fernandez, 2012). Moreover, institutional efforts to alter the distribution of land have been instrumentalised by elites to appropriate large land extensions (Ibañez and Muñoz-Mora, 2010).

Land inequality is a key factor underpinning the lasting 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 paved the way for the introduction of Law 48 in 1968, allowing the creation of private security forces used by wealthy landowners and cattle ranchers. These security forces represented the precursors to far-right paramilitary groups, which

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

frequently act to protect and promote the interests of local elites.[9] Central to these interests are activities involving intensive land exploitation, such as cattle ranching and cultivation, which are key drivers of deforestation.

Environmental regulatory institutions. The passage of Law 99 in 1993 created Colombia's National Environmental System (*Sistema Nacional Ambiental*, SINA), which governs the implementation of a set of general environmental principles.[10] Under SINA, the Ministry of Environment leads and coordinating 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 licences, 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 CAR's 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, have often played an essential role in protecting Colombia's natural habitat. Moreover, local governments at both the department and municipality levels are required under Law 99 to support CARs and to implement national environmental policy within their territories. As a result, municipalities play a crucial role in monitoring and enforcing environmental regulations.

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.[11] Furthermore, under Law 99, municipal governments have various mechanisms to enforce environmental laws, including

[9] See https://es.insightcrime.org/investigaciones/elites-crimen-organizado-colombia-introduccion/. Last accessed April 2021.

[10] Detailed information on the structure and responsibilities of environmental regulatory institutions in Colombia is provided by Blackman, Morgenstern and Topping (2006).

[11] 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.

the imposition of sanctions, the suspension of environmental licenses, permits, or concessions, and the power to close or demolish businesses and seize products or equipment. As a result, 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 four-year term.[12] Colombian mayoral election campaigns are not cheap. For the 2015 municipal elections, the total amount spent on mayoral campaigns was more than 238 billion pesos (about 82 million US dollar at the time), equivalent to 71% of the nation's entire science and technology budget (MOE, 2018.). Despite this high cost, public resources available for local election campaigns are scarce, and campaigns are primarily financed by personal or family resources and private donations (Casas-Zamora and Falguera, 2016). Furthermore, campaigns are frequently highly competitive, and there is evidence of 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 the provision of 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.[13] We explore this empirically in Section 6. 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 forbearance. In return for campaign contributions, mayors turn a blind eye to the illegal exploitation of land, thereby facilitating deforestation.

[12] Mayors cannot serve consecutive terms, but can be reelected to non-consecutive terms.

[13] 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.

4 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 2012-2015 mayoral term.

Election results and campaign donations. We use detailed data on election results and campaign contributions from Ruiz (2017). The electoral information comes originally from Pachón and Sánchez (2014), who gathered mayoral election results for all Colombian municipalities reported by the Registraduría Nacional del Estado Civil, the Colombian electoral authority. The campaign contributions data was collected from the National Electoral Commission by Ruiz (2017), who shows it to be highly reliable with low incentives to misreport or lie. 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.[14]

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 (Appendix Table A1).

Deforestation. Our measurement of deforestation comes from the Global Forest Change dataset collected by Hansen et al. (2013), who analyse Landsat satellite images to identify changes in forest cover between 2000-2020. 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; Nepstad et al., 2014).

[14] The campaign finance reporting system was introduced in 2009, meaning no data on campaign donations is available for elections prior to 2011.

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 a tree cover superior to 50% of its surface as forest. Hence, deforestation is a pixel change from the status of forest to non-forest. This data is 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.[15] 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 (2012-2015 government term) and the previous election, the 2007 election (2008-2011 government term). Furthermore, we also calculate an alternative version of the deforestation measure relative to the year 2000.[16] 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 period of the subsequent mayoral term (2012-2015).

Table 1: Summary statistics

	(1)	(2)	(3)	(4)	(5)	(6)
	Obs	**Mean**	**Standard Deviation**	**Minimum**	**Median**	**Maximum**
A. Elections						
Private income % total	2160	0.19	0.27	0	0	1
Margin of victory donor-funded	408	0.022	0.101	-0.354	0.019	0.383
B. Deforestation						
Deforestation ratio 2008-2011	1080	2.141	2.023	0	1.526	14.565
Deforestation ratio 2012-2015	1080	1.182	1.572	0	0.576	16.625

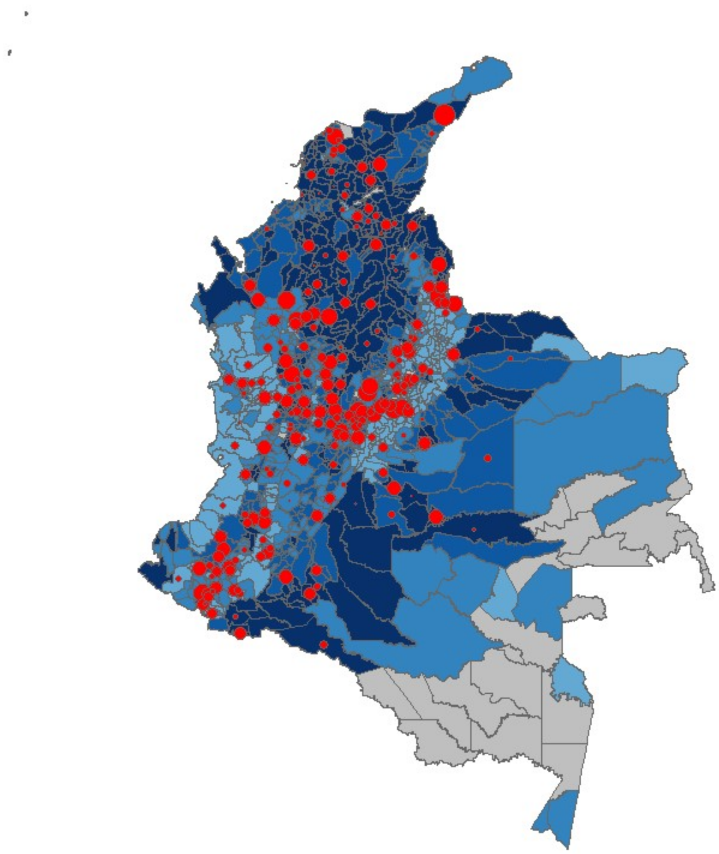
Note: This table presents summary statistics for the main variables of interest used in the analysis. An observation is a municipality except for the Private income % total that uses as unit of observation the candidate (top two candidates per each municipality).

Additional data. Since illegal deforestation is often undertaken using aggressive fire clearance, we

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

[16] The main results are robust to this change in the relative year and are available upon request.

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 privately funded candidates.

use FIRMS data to track fires during the study period.[17] We use detailed contracting data from the SECOP 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.[18] 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.[19]

[17] We acknowledge the use of data and/or imagery from NASA's Fire Information for Resource Management System (FIRMS) (`https://earthdata.nasa.gov/firms`), part of NASA's Earth Observing System Data and Information System (EOSDIS).

[18] For details see Prem et al. (2021).

[19] See Acevedo and Bornacelly (2014).

5 Empirical Strategy

If campaign donations buy forbearance from environmental regulations designed to limit deforestation, we should expect to see more deforestation in municipalities that elect donor-funded mayors. However, the victory of a donor-funded 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 the effect of local municipality characteristics.

To overcome these problems we employ a quasi-experimental Regression Discontinuity Design (RDD). Using margin of victory as the running variable, we take advantage of the discontinuous change between victory of a donor-funded as opposed to a non-donor-funded mayor at the threshold between the donor-funded politician's victory or loss.[20] This defines the treatment rule:

$$L_i = \begin{cases} L_i = 1 & \text{if } x_i > 0 \\ L_i = 0 & \text{if } x_i < 0 \end{cases} \tag{2}$$

where x_i reflects margin of victory for the donor-funded politician, and L_i represents treatment status, as a dummy variable taking the value of one (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. The coefficient of interest is β_1, our estimate of the effect of electing a donor-funded mayor. $f(x_i)$ is a polynomial, either linear or quadratic, in the donor-funded politician margin of victory. Finally, ε_i corresponds to the idiosyncratic error term.

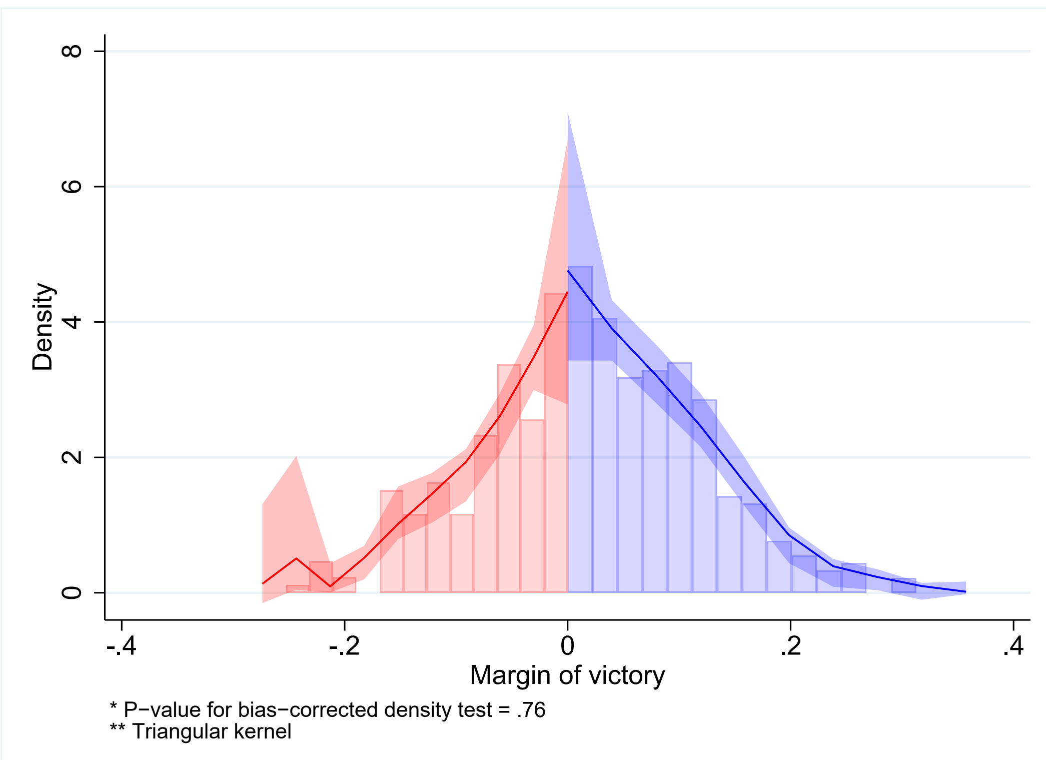
To correctly estimate the coefficient of interest β_1 requires us to make two key assumptions. First, there should be no manipulation of the electoral results around the cutoff; in other words,

[20] This is a widely used design. For example, Nellis and Siddiqui (2018) compare religious conflict across districts in Pakistan where secular parties narrowly won or lost elections.

it should not be the case that donor-funded politicians consistently win by small margins. Second, covariates potentially correlated with the treatment and outcome variables must vary smoothly around the electoral victory cut-off, such that the estimated effect only reflects the discontinuous change in deforestation related to the candidate's source of funding.

To evaluate the identifying assumptions we first check for systematic manipulation of electoral results around the threshold. Using the Cattaneo, Jansson and Ma (2018) manipulation test based on density discontinuity we find no statistically significant evidence of systematic manipulation.[21] Results are presented in Figure 2. Second, we test whether other covariates jump discontinuously at the cutoff. As shown by the results presented in Table 2, we find that there is no discontinuity of covariates at the cut-off, suggesting that municipalities are similar except in the treatment status.

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 one and three are 0.25 and 0.59, respectively.

[21] Similar results are found using the McCrary (2008) test for sorting around the threshold with a p-value of 0.29.

Table 2: Smooth covariates

	(1) Mean	(2) Std. Dev.	(3) Donor fund. won	(4) Std. Error.	(5) Obs	(6) P-value	(7) Pval Canay
A. Individual covariates							
Women	0.116	0.320	0.119	0.202	132	0.121	0.789
Age	45.245	9.709	-3.551	5.398	126	0.573	0.061
Black	0.044	0.205	-0.023	0.195	126	0.865	0.490
Asian	0.107	0.309	0.050	0.230	126	0.570	0.423
Left-wing party	0.024	0.154	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
Previously sanctioned	0.121	0.326	-0.024	0.137	132	0.813	0.119
Illegal registration of ID.	0.005	0.071	0.013	0.009	132	0.268	1.000
Has political experience	0.448	0.497	0.326	0.196	132	0.157	0.323
Has electoral experience	0.361	0.480	0.156	0.181	132	0.336	0.871
B. Policy Outcomes							
Total income Y(COP M)	47102.906	361239.511	12723.550	8666.063	132	0.704	0.467
Land taxes (%Y)	3.889	4.695	0.346	2.083	132	0.938	0.303
Industry (%Y)	3.377	5.967	1.378	1.755	132	0.823	0.252
Funct. expen. (%Y)	13.284	5.045	-1.439	4.719	132	0.535	0.758
Investment (%Y)	86.716	5.045	1.439	4.719	132	0.535	0.757
Deficit (%Y)	11.346	9.573	1.049	6.648	132	0.613	0.963
C. Other municipality socio-economic characteristics							
Altitude (meter)	1158.170	1161.175	-227.936	571.983	132	0.885	0.164
Area in square km	876.992	2982.007	-91.459	578.174	132	0.323	0.713
Distance to department capital	78.701	56.010	13.930	25.906	132	0.855	0.112
Distance to Bogota	319.459	189.400	-84.390	183.531	132	0.286	0.609
Literacy rate	83.903	8.484	-0.536	5.141	132	0.818	0.138
Rurality index (0-1)	0.564	0.239	-0.107	0.133	132	0.322	0.225
Unsatisfied basic needs	44.622	20.279	9.368	9.454	132	0.197	0.187
National Parks Area (10 000 sq. hectares)	0.920	7.605	0.961	1.207	132	0.819	0.615
CAR office	0.140	0.347	-0.030	0.205	132	0.545	1.000
Distance to CAR office	0.030	0.033	-0.004	0.015	132	0.363	0.935
Comptroller general offices	0.604	6.388	0.044	0.091	132	0.636	1.000
Attorney general offices	4.042	38.057	0.810	0.683	132	0.629	0.570
Paramilitary attacks	1.279	9.780	0.151	1.882	132	0.724	0.173
Guerrilla attacks	0.608	2.091	0.424	1.215	132	0.995	0.205
D. Other potential explanations							
Deforestation during previous term	0.022	0.022	0.007	0.006	132	0.334	0.365
Disposable Income (mw)	29004.315	393732.953	1078.397	5317.036	126	0.719	0.305
Municipal category	5.708	0.995	0.095	0.241	132	0.264	1.000
Total population	41707.711	257110.752	8672.028	9205.110	132	0.926	0.214
Income from royalties	0.070	0.150	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 dependant variable), the MSE optimal bandwidth for the main model is used throughout. Bias corrected robust standard errors (column 4). The number of effective observations is detailed in column 5. Column 6 reports the estimated p-value, while column 7 reports the Canay and Kamat (2015) permutation test for the null hypothesis of continuity of the distribution around the cutoff.

As discussed in Ruiz (2017), we follow (Cattaneo, Idrobo and Titiunik, 2020), and estimate the RDD specified in equation 3 non-parametrically using a polynomial of order one, 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 minimises the asymptotic mean square error (MSE). This allows for the selection of a bandwidth that accounts for the trade-off between efficiency and bias. In other words, the technique minimising MSE achieves a bandwidth

[22] The appendix presents results using a quadratic polynomial.

large enough to avoid imprecise estimates due to small sample size, but also small enough to guarantee that municipalities around the cutoff are comparable, without discontinuous variation in their characteristics at the cutoff (Lee and Lemieux, 2010). However, since MSE bandwidths produce non-robust confidence intervals, we follow Cattaneo, Idrobo and Titiunik (2020) and estimate robust standard errors and confidence intervals but report conventional point estimates within the MSE optimal bandwidth.

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

6 Results

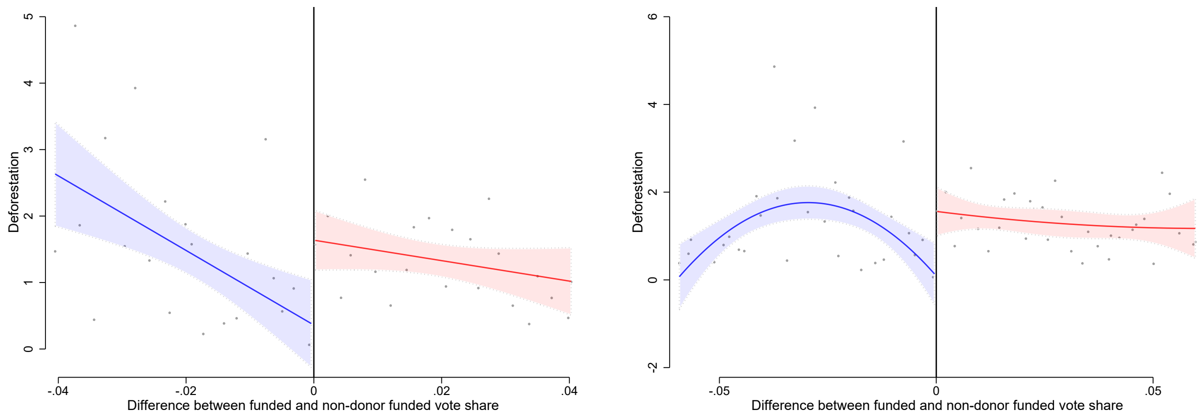
6.1 Main effects

Figure 3 graphically presents our main estimate of the effect of electing a donor-funded mayor on deforestation. The left and right panels show the estimates using linear and quadratic polynomial approximations, respectively. We find a clear discontinuous jump in deforestation around the threshold of victory determining 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.

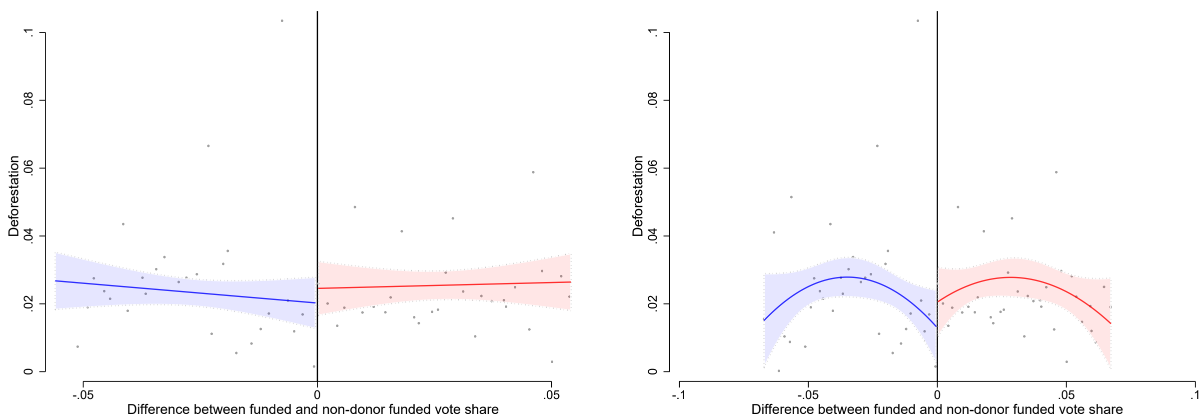
Table 3 presents the main result in greater detail. Our coefficient of interest represents the effect on deforestation of electing a donor-funded mayor compared to a self-funded one. The estimates in Columns 2 and 4 also include the measure of deforestation for the previous term, 2008-2011. Prior deforestation varies smoothly around the cutoff, as shown in the lower panels 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 to the inclusion of the previous deforestation measure. Moreover, the effect of electing a donor-funded politician is substantial, representing

Figure 3: Effect of electing a donor funded politician on deforestation

Panel A: Deforestation during the incumbency term



Panel B: Deforestation during the previous incumbency term



Note: This figure presents a graphical approximation of the regression discontinuity design. We present deforestation during the full incumbency term in the first row, while 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.

an increase in deforestation of 91.7% of the self-funded average for the linear specification. The effect size remains reasonably stable across specifications, ranging between 58.3% and 108.3% of the self-funded average.

Finally, in Figure 4 we explore the resilience of the results to variation in bandwidth size. Following best practice, we report the 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.

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		✓		✓
Observations	408	408	408	408
Bandwidth obs.	132	174	191	198
Mean	1.183	1.183	1.183	1.183
Effect size (%)	92.90	53.00	109.05	82.16
Bandwidth	0.041	0.053	0.060	0.064
(Local) polynomial order	1	1	2	2

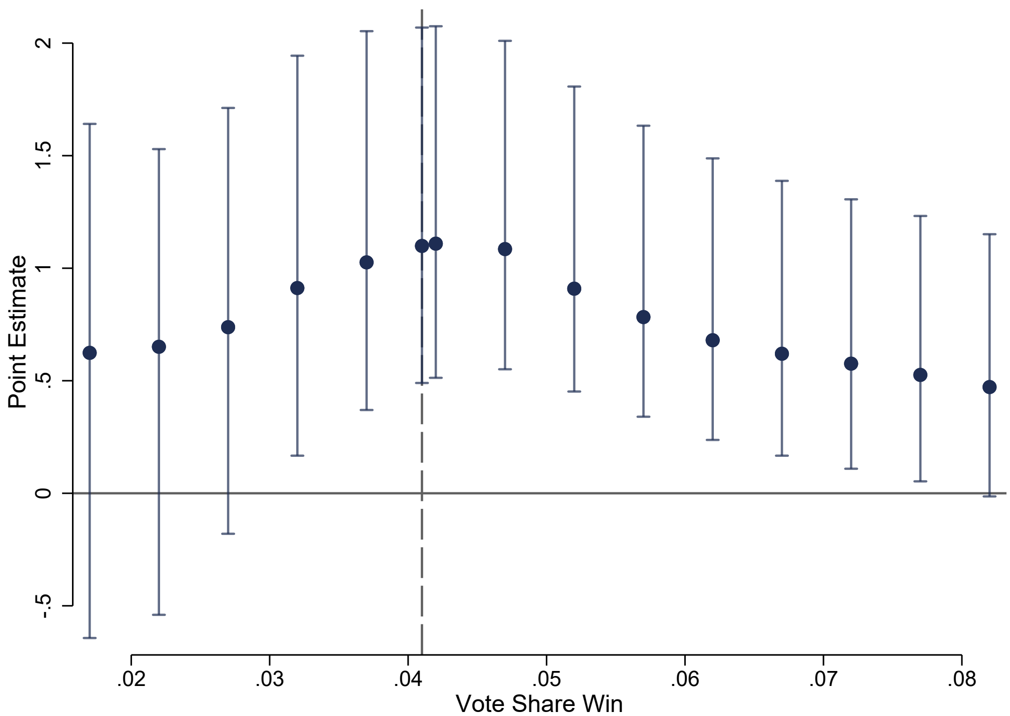
Note: Columns 1 and 2 present the local linear estimates of average treatment effects at cut-off estimated with triangular kernel weights and optimal MSE bandwidth. Columns 3 and 4 presents the quadratic estimates of average treatment effects at cut-off estimated with triangular kernel weights and optimal MSE bandwidth. 95% robust confidence intervals and robust p-values are computed following Calonico, Cattaneo and Titiunik (2014). Bandwidth obs. denotes number of observations in the optimal MSE bandwidth. The Effect Size (%) is computed as the point estimate over the mean x 100. Columns (2) and (4) include as covariate the measure of deforestation in the previous term (2008-2011). *** p<0.01, ** p<0.05, * p<0.1.

Overall, these main effects provide compelling evidence that deforestation in Colombia increases in municipalities that elect donor-funded mayors. 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. In the following analysis we explore the mechanisms underlying this effect.

6.2 Mechanisms

There are two channels through which the election of a donor-funded mayor could result in greater deforestation: contracting and forbearance. 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 non-enforcement of environmental regulations pertaining to the ensuing construction work. Nevertheless, we explore the extent to which each is driving the estimated effects. First, if increased deforestation results from preferential contracting, we should observe a temporal sequence whereby any impact of electing a donor-funded mayor on contracting precedes its effect on defor-

Figure 4: Different bandwidth sizes: Effect of electing a donor-funded politician on deforestation. Linear local polynomial



Note: Estimates calculated using optimal MSE bandwidths and triangular kernel weights. Robust 90% confidence intervals estimated following Calonico, Cattaneo and Titiunik (2014).

estation. Disaggregating the effects over time provides some support for this mechanism, but also shows that contracting can only partially explain the main effects, a conclusion that is further supported by mediation analysis. Second, although we cannot directly observe forbearance, we explore three pieces of evidence to investigate whether the remainder of the effect is driven by selective non-enforcement: (1) fire intensity, (2) the conditional impact of alternative formal enforcement institutions, (3) the conditional impact of illegal armed groups that serve as informal enforcement actors. All of the results support our central claim that campaign contributions are used, at least in part, to purchase forbearance from environmental regulations.

6.2.1 Contracting

To examine the contracting channel we explore its implied temporal sequence, whereby any impact of electing a donor-funded mayor on contracting precedes its effect on 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.[23] Although the estimated coefficient is substantially larger for the final year, in comparison to the average for self-funded mayors the difference is less stark. For the first year of government, deforestation in municipalities with a donor-funded mayor is about 92.4% higher vis-a-vis municipalities that elected self-funded mayors, while for the last year it is 107.7% higher.[24] It seems implausible that deforestation in year one, at least, derives from the 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.

Table 4: Donor funded politician and deforestation by year of government

	(1)	(2)	(3)	(4)
	Year of government			
	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]
Observations	408	408	408	408
Bandwidth obs.	132	139	187	130
Mean	0.211	0.306	0.211	0.455
Effect size (%)	92.42	71.90	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 cut-off estimated with triangular kernel weights and optimal MSE bandwidth. 95% robust confidence intervals and robust p-values are computed following Calonico, Cattaneo and Titiunik (2014). Bandwidth obs. denotes number of observations in the optimal MSE bandwidth. Each column shows the deforestation rate, defined as lost $\text{coverage}_t / coverage_{\text{election year}}$, for a given year of government. The Effect size (%) is computed as the point estimate over the mean x 100. *** p<0.01, ** p<0.05, * p<0.1.

[23] Estimating a non-parametric differences-in-differences model we also see a large and significant increase in deforestation for the last year of the term, despite not finding effects for the previous years, although we do see an upward trend in deforestation across the years. See Appendix Figure A3.

[24] Similar results hold with a quadratic polynomial, although the relative effect size is more consistent across years one to three and then greater in year four (see appendix Table A2).

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 take on 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 139% over the average value of infrastructure contracts in municipalities electing self-funded mayors. It is worth noting that contracts awarded to campaign donors have been found to involve significant over-costs (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. We also test for differences in contracts for mining and environmental work, both of which may be related to deforestation. The results in Table 5 show no significant differences in the number or average value of mining or environmental contracts between municipalities electing self-funded and donor-funded mayors.

Table 5: Donor funded politician and contracts

	(1)	(2)	(3)	(4)	(5)	(6)
	Infrastructure		*Environmental*		*Mining*	
	Number	*Avg. value*	*Number*	*Avg. value*	*Number*	*Avg. value*
Donor Funded	-30.151	1.091**	-4.904	0.486	0.209	0.486
Robust p-value	0.357	0.017	0.742	0.150	0.637	0.150
CI 95%	[-127.980, 46.163]	[0.219, 2.258]	[-55.157, 39.293]	[-0.197, 1.294]	[-0.774, 1.265]	[-0.197, 1.294]
Observations	401	400	401	366	401	366
Bandwidth obs.	226	165	211	174	216	174
Mean	140.896	4.818	18.197	3.795	0.976	3.795
Effect size (%)	-21.40	22.64	-26.95	12.81	21.41	12.81
Bandwidth	0.077	0.049	0.073	0.062	0.074	12.81
(Local) polynomial order	1	1	1	1	1	1

Note: Local linear estimates of average treatment effects at cut-off estimated with triangular kernel weights and optimal MSE bandwidth. 95% robust confidence intervals and robust p-values are computed following Calonico, Cattaneo and Titiunik (2014). Bandwidth obs. denotes 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 analysing their reported object. The Effect size (%) is computed as the point estimate over the mean x 100. *** p<0.01, ** p<0.05, * p<0.1.

Given the temporal sequence implied by the contracting channel, next we analyse the impact of electing a donor-funded politician on the the value of infrastructure contracts by each year of the mayoral term. Results in Table 6 show that the increase is concentrated in the third year. The estimated coefficient is positive across the term, but is only significant in year three, and is substantially larger in that year relative to all others. Taking into account the larger magnitude of the estimated effect on deforestation in year four (see Table 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.

Table 6: Donor funded politician and avg. value of infrastructure contracts per year

	Year of government			
	1	2	3	4
Donor Funded	0.520	0.484	1.391***	0.760
Robust p-value	0.245	0.252	0.008	0.116
CI 95%	[-0.410, 1.610]	[-0.404, 1.538]	[0.385, 2.597]	[-0.217, 1.968]
Observations	381	386	386	389
Bandwidth obs.	179	195	193	179
Mean	4.204	5.092	5.284	5.508
Effect size (%)	12.37	9.51	26.32	13.80
Bandwidth	0.060	0.070	0.068	0.058
(Local) polynomial order	1	1	1	1

Note: Local linear estimates of average treatment effects at cut-off estimated with triangular kernel weights and optimal MSE bandwidth. 95% robust confidence intervals and robust p-values are computed following Calonico, Cattaneo and Titiunik (2014). Bandwidth obs. denotes 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 analysing their reported object. The Effect size (%) is computed as the point estimate over the mean x 100. *** p<0.01, ** p<0.05, * p<0.1.

We evaluate the contracting mechanism further by running mediation analysis, with results presented in Appendix Figure A4. First we re-run the baseline specification from Table 3, adding in a control for the average value of expenditures on infrastructure. Doing so has almost no impact on the baseline parameter. Since this approach may lead to biased estimates, we also estimate the controlled direct effect using the sequential g-estimation approach suggested by Acharya, Blackwell and Sen (2016), taking the average value of expenditures on infrastructure as a potential mediator. Again, we find that the sequential g-estimate is almost identical to the baseline estimate, suggesting that preferential contracting alone cannot explain the effect of electing a donor-funded mayor on deforestation.

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 the top 10 percentile (by size) of infrastructure contracts, we find that only 17% were for activities that might affect deforestation, of which the vast majority were for road construction.[25] These findings therefore suggest that the contracting channel cannot fully, or even primarily, account for the overall effect of electing a donor-funded mayor on deforestation.

6.2.2 Forbearance

We argue instead that these effects result predominantly from a forbearance channel, whereby donor-funded mayors reward their donors with selective non-enforcement of environmental regulations. One challenge with empirically substantiating claims about forbearance is that it is difficult to observe directly. A key benefit of the RDD we employ is that, given balance on pre-term municipal characteristics, we can be confident that the observed differences in deforestation do not result from variation in previous enforcement capacity.[26] 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 consider and explore a series of further implications of the forbearance mechanism. First, that illegal deforestation is more likely to be accompanied by fires. Second, that selective non-enforcement of environmental regulations by mayors should be offset by the presence of alternative formal enforcement institutions. And third, that selective non-enforcement should be offset by the presence of informal enforcement actors.

Fires. In Colombia and elsewhere, the use of fires to clear forest areas for cattle ranching and cultivation is widespread, and this environmentally harmful practice is regulated by the law.[27] 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 be a strong indicator of 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

[25] Many contracts were related to projects such as the construction of schools, hospitals, and sports centres, all in the pre-existing urban areas of municipalities. Table A6 presents 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.

[26] A useful alternative approach to identify regulatory manipulations and distinguish forbearance from state weakness is "enforcement process tracing" proposed by Bozçağa and Holland (2018).

[27] See for example, `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.

donor-funded mayor is elected. Table 7 presents results consistent with our interpretation; we find an increase in average fire intensity of 32.9% when a donor-funded mayor is elected. The results are robust to selecting a linear or quadratic polynomial (Table A7), and hold across a range of bandwidths (Figure A2).

Table 7: 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		✓
Observations	408	408
Bandwidth obs.	195	198
Mean	246.141	246.141
Effect size (%)	32.90	30.66
Bandwidth	0.061	0.063
(Local) polynomial order	1	1

Note: Local linear estimates of average treatment effects at cut-off estimated with triangular kernel weights and optimal MSE bandwidth. 95% robust confidence intervals and robust p-values are computed following Calonico, Cattaneo and Titiunik (2014). Bandwidth obs. denotes number of observations in the optimal MSE bandwidth. Column (2) includes as covariate the measure of fire intensity from the previous term (2009-2011), 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 x 100. *** p<0.01, ** p<0.05, * p<0.1.

Mediation analysis equivalent to that run to explore the contracting channel implies that part (around 20%) of the estimated effect of donor-funded mayors on deforestation operates through fire clearance (Appendix Figure A4). When the estimates of fire intensity are disaggregated we see the effect is concentrated in the final year (Table 8). This behaviour may be consistent with an increase in illegal deforestation towards the end of the term as perpetrators seek to extract as much as possible 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 (Tables A9 and A10).[28] Moreover, it suggests

[28] 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.

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.

Table 8: Donor funded politician and fire intensity by year of government

	(1)	(2)	(3)	(4)
	Year of government			
	1	2	3	4
Donor Funded	31.434	55.882	1.715	110.844**
Robust p-value	0.461	0.225	0.978	0.018
CI 95%	[-65.426, 144.208]	[-42.699, 181.289]	[-110.545, 107.437]	[20.741, 224.285]
Observations	408	408	408	408
Bandwidth obs.	232	200	215	237
Mean	189.663	183.108	185.204	198.902
Effect size (%)	16.57	30.52	0.93	55.73
Bandwidth	0.078	0.066	0.073	0.082
(Local) polynomial order	1	1	1	1

Note: Local linear estimates of average treatment effects at cut-off estimated with triangular kernel weights and optimal MSE bandwidth. 95% robust confidence intervals and robust p-values are computed following Calonico, Cattaneo and Titiunik (2014). Bandwidth obs. denotes number of observations in the optimal MSE bandwidth. 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 x 100. *** p<0.01, ** p<0.05, * p<0.1.

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 non-enforcement 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. In addition, we test whether the main effect is attenuated by the number of offices of the Comptroller 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 of the measures capturing the presence of these alternative formal enforcement institutions vary smoothly at the cutoff, as shown in Table 2.

As detailed in Section 3, 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.[29] This means that in areas designated as National Parks, responsibility for enforcement of environmental regulations falls less heavily on

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

local municipal officials. In column 1 of Table 9, we present results from an analysis in which we interact the variable capturing victory by a donor-funded politician with a measure of the amount of area in square kilometres 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 the amount of National Parks area within a municipality reduces the additional deforestation linked to electing a donor-funded mayor.

Table 9: Heterogeneous Effects: State Presence

		(1)	(2)	(3)	(4)	(5)
		Measure Z				
		National Parks Area	CAR office	Distance to CAR	Comptroller offices	Attorney offices
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	0.0003	1.195***	0.215**
		(0.105)	(0.592)	(0.0079)	(0.175)	(0.0992)
B	Z × Donor funded	-0.279*	-1.610*	0.0371**	-2.434***	-0.450**
		(0.144)	(0.966)	(0.0153)	(0.245)	(0.162)
Observations		408	408	408	408	408
Bandwidth obs.		132	132	132	132	132
R-squared		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	-0.416	-0.111	-1.410	0.875
Effect size (%)		93.09	-35.04	-15.12	-72.136	102.267
Ho: A + B = 0						
F-statistic		4.39	0.24	0.05	34.5	4.7
P-value		0.04	0.62	0.83	0.05	0.30

Note: OLS regression weighted by a triangular kernel within the MSE optimal bandwidth sample and controlling for a linear polynomial. Bandwidth obs. denotes 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 one if there was at least on CAR office in the municipality, Distance to CAR is the distance to the closest CAR, Comptroller offices is the number of offices of the Comptroller General (*Procuraduría*), and Attorney offices is the number of offices of the Attorney General (*Fiscalía*). The Effect size (%) is computed as $100x(A+B)/(constant+\beta_Z)$. *** p<0.01, ** p<0.05, * p<0.1.

Section 3 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 condition the effects of victory by donor-funded mayors on deforestation. Columns 2 and 3 in Table 9 show estimates where the indicator of victory by a donor-funded politician is interacted with a dummy for the presence of a CAR office in the municipality, and with the distance to the closest CAR office from the centroid of the municipality, respectively. Once again, the results support the forbearance 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 the main effects are conditional on the number of offices of the Comptroller General (*Procuraduría*) and of the Attorney General (*Fiscalía*), which we take as additional proxies for the extent of state presence. As shown in Table 9, the coefficients on the interaction terms between both of 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 extent of forbearance.

Informal enforcement institutions. The ultimate beneficiaries of increased deforestation in our preferred interpretation are landowners and cattle ranchers, who exploit land with greater intensity when a donor-funded mayor is elected. The activities of these local elites have long been affected by 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.

As discussed in Section 3, 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 the history of violence in the country, therefore, 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 local elites, we expect their presence to limit illegal deforestation by local elites, thereby offsetting selective non-enforcement of environmental regulations by donor-funded mayors. The presence of paramilitary groups, on the other hand, should have no such effect.

Taking pre-term attacks by these two different types of illegal armed group as a proxy for their presence in a municipality, we study how acts of violence by each type of group affects our main result. As with the formal institutions, the measures capturing the presence of these informal enforcement institutions also vary smoothly at the cutoff (see Table 2). Table 10 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. The results are consistent with the historical alignment of these 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 forbearance mechanism.

Table 10: Heterogeneous Effects: Armed Conflict

		(1)	(2)
		Attacks measure Z	
		Paramilitary	Guerrilla
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)
Observations		408	408
Bandwidth obs.		132	132
R-squared		0.116	0.131
Bandwidth		0.041	0.041
(Local) polynomial order		1	1
A + B		0.827	0.510
Effect size (%)		90.17	42.86
Ho: A + B = 0			
F-statistic		4.60	1.37
P-value		0.03	0.24

Note: OLS regression weighted by a triangular kernel within the MSE optimal bandwidth sample and controlling for a quadratic polynomial. Bandwidth obs. denotes 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 (2008-2011). The Effect size (%) is computed as $100x(A+B)/(constant+\beta_Z)$. *** p<0.01, ** p<0.05, * p<0.1.

7 Conclusions

We provide evidence that in Colombia, the election of mayors who rely on campaign donations significantly increases deforestation within their municipality. In line with existing literature on the impact of money in politics, we show that this may be due in part to differential contracting practices. Specifically, the average value of infrastructure contracts increases with the election of a donor-funded mayor. But temporal dynamics and mediation analysis demonstrate that the more standard contracting story only provides a partial explanation for the effects that we estimate. Instead, we provide evidence consistent with the argument that campaign donations also influence deforestation through another unexplored channel: forbearance. Donor-funded mayors turn a blind eye to activities resulting in illegal deforestation in return for campaign contributions.

Using an 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, well-identified evidence of the political dynamics affecting deforestation, a central driver of environmental degradation and climate change. One key benefit of the RDD here is to rule out the possibility that this variation is due to differences in pre-existing institutional enforcement capacity across municipalities. Disaggregating by year of office 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 non-enforcement of environmental regulations by mayors looking to reward their donors.

Although we cannot observe enforcement by mayors directly, we present a range of additional evidence consistent with this interpretation. First, 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. Second, 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). Finally, we show that the effect is also mitigated by the presence of illegal armed groups that serve as informal enforcement actors. Taken together, this range of evidence supports our interpretation that campaign donors in Colombia purchase regulatory non-enforcement by mayors, allowing them to exploit land in a way that increases deforestation. Although the available evidence is compelling, future work could use-fully seek to 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 burgeoning work on forbearance by providing clear evidence of its use as a form of corruption. 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.

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APPENDIX (For Online Publication)

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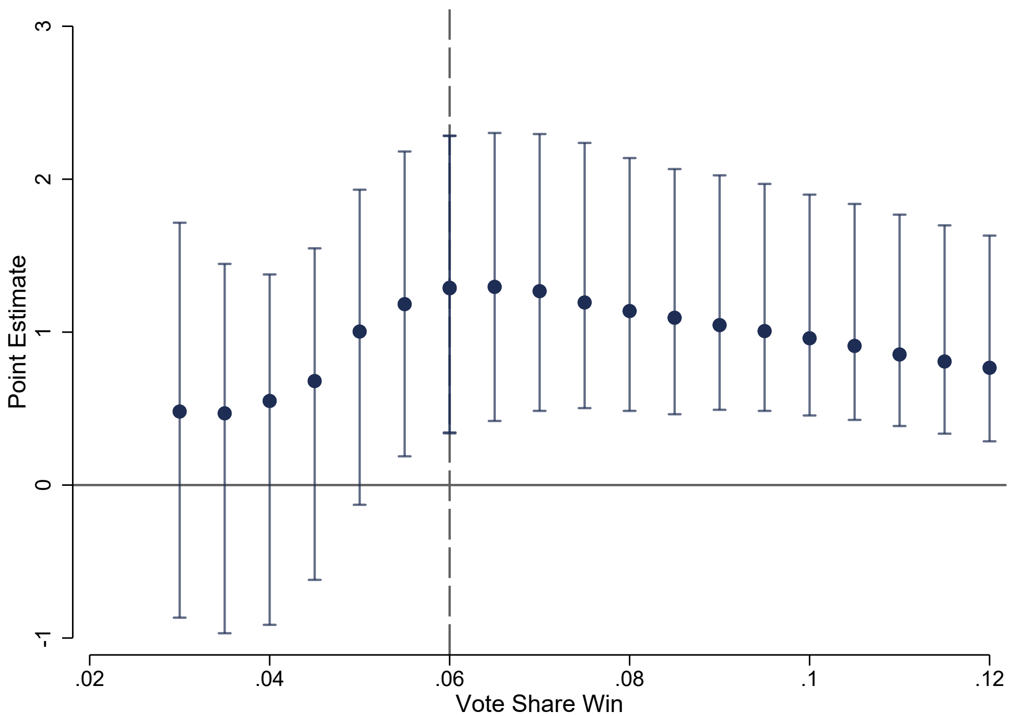
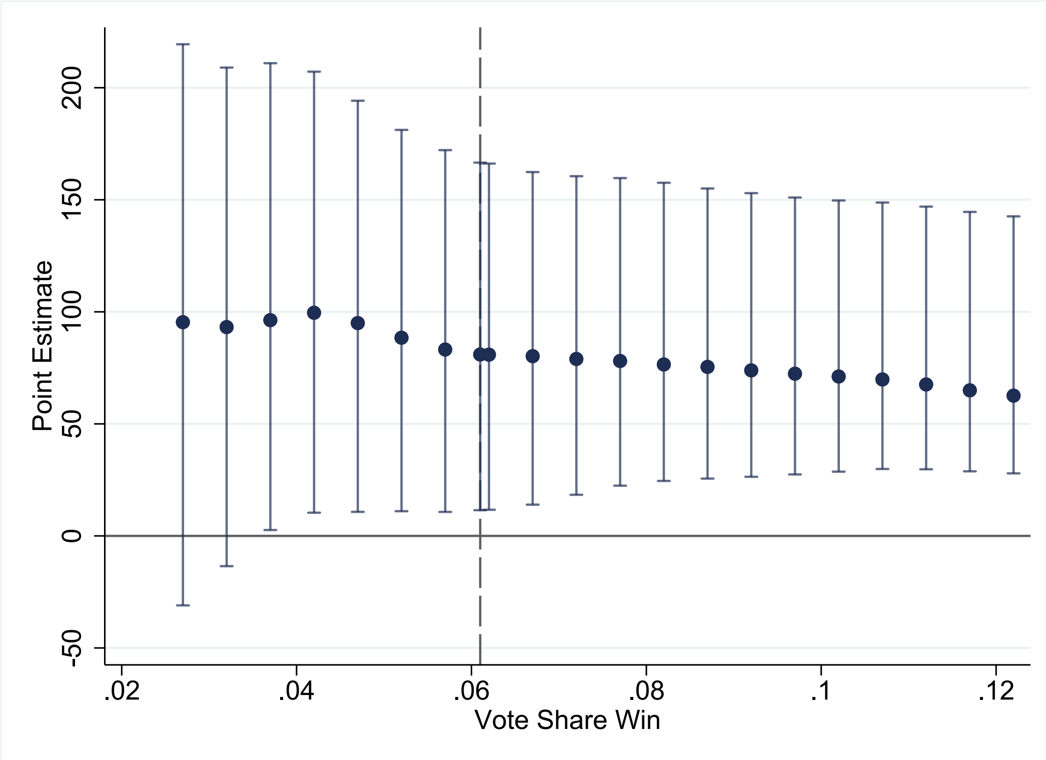
Figure A1: Different bandwidth sizes. Donor funded politician and deforestation. Quadratic local polynomial



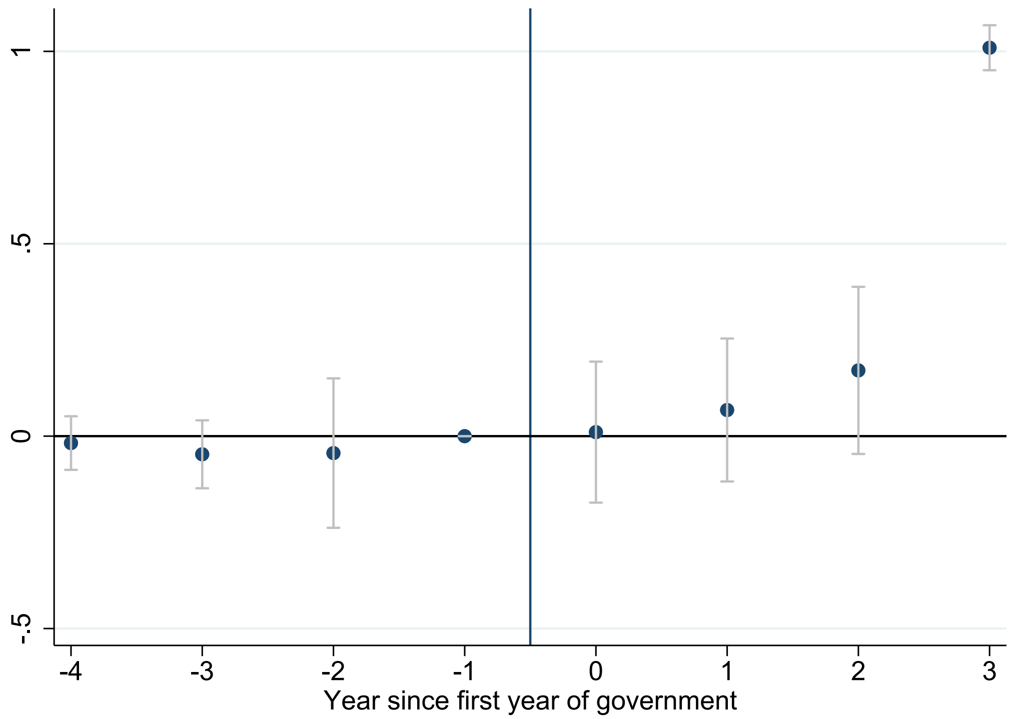
Note: Estimates calculated using optimal MSE bandwidths and triangular kernel weights. Robust 90% confidence intervals estimated following Calonico, Cattaneo and Titiunik (2014).

Figure A2: Different bandwidth sizes. Donor funded politician and fire intensity



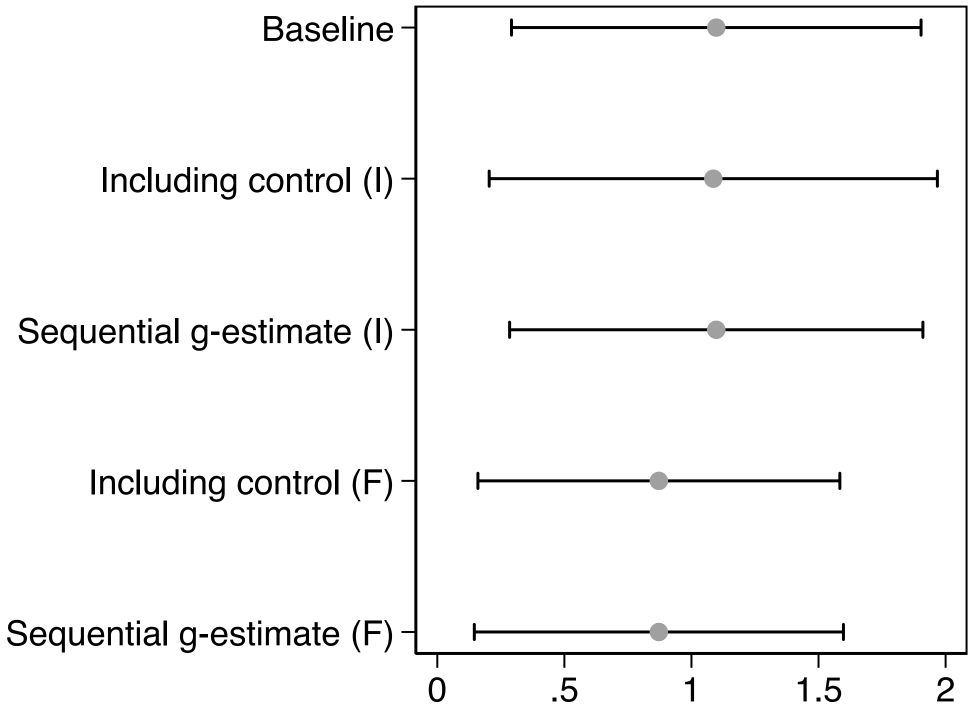
Note: Estimates calculated using optimal MSE bandwidths and triangular kernel weights. Robust 90% confidence intervals estimated following Calonico, Cattaneo and Titiunik (2014).

Figure A3: Donor-funded politician on deforestation: Non-parametric DiD



Note: We perform a non-parametric difference-in-differences interacting the treatment by the year dummy. 90% confidence intervals. The year zero represents the first year of government and the year -1, is the election year. We use the full sample 408 of races between donor-funded and non-donor-funded top candidate.

Figure A4: Mediation analysis



Note: This figure presents the mediation analysis for expenditures in infrastructure and fires. *Baseline* presents the point estimate and the 95% confidence interval for our baseline specification from column 1 Table 3. *Including control (I)* presents the point estimate and the 95% confidence interval for the main specification but adding the hyperbolic sine transformation of the average value of expenditures in infrastructure after the election as a control. *Sequential g-estimate (I)* presents the point estimate and the 95% confidence interval for the sequential g-estimate suggested by Acharya, Blackwell and Sen (2016) using as mediator the hyperbolic sine transformation of the average value of expenditures in infrastructure after the election. *Including control (F)* presents the point estimate and the 95% confidence interval for the main specification but adding the number of fires after the election as a control. *Sequential g-estimate (F)* presents the point estimate and the 95% confidence interval for the sequential g-estimate suggested by Acharya, Blackwell and Sen (2016) using as mediator the number of fires after the election. In the case of the *Sequential g-estimate (I)*, we construct the confidence intervals using a non-parametric bootstrap procedure that includes the two estimation stages as suggested by the authors.

Table A1: Difference between RD sample and rest of the country

	(1)	(2)	(3)	(4)	(5)	(6)
	In sample		**Rest of the country**			
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**p-value difference**	**Standardized difference**
A. Individual covariates						
Women	0.136	0.344	0.093	0.290	0.115	0.137
Age	43.492	9.328	45.057	9.782	0.092	-0.164
Black	0.079	0.271	0.041	0.199	0.057	0.160
Asian	0.111	0.316	0.111	0.315	0.997	-0.000
Left-wing party	0.053	0.225	0.024	0.154	0.060	0.149
Right-wing party	0.152	0.360	0.252	0.434	0.011	-0.252
Previously sanctioned	0.083	0.277	0.120	0.325	0.215	-0.122
Illegal registration of ID.	0.008	0.087	0.007	0.086	0.981	0.002
Has political experience	0.470	0.501	0.456	0.498	0.770	0.027
Has electoral experience	0.348	0.478	0.371	0.483	0.621	-0.046
B. Policy Outcomes						
Total income Y(COP M)	2.0e+04	2.1e+04	5.1e+04	3.9e+05	0.351	-0.115
Land taxes (%Y)	3.508	3.890	3.941	4.803	0.321	-0.099
Industry (%Y)	3.054	6.380	3.413	5.907	0.518	-0.058
Funct. expen. (%Y)	13.030	5.259	13.316	5.006	0.541	-0.056
Investment (%Y)	86.970	5.259	86.684	5.006	0.541	0.056
Deficit (%Y)	11.239	10.189	11.369	9.508	0.884	-0.013
C. Other municipality socio-economic characteristics						
Altitude (meter)	960.114	899.361	1186.192	1193.095	0.036	-0.214
Area in square km	772.886	1488.967	892.197	3142.693	0.668	-0.049
Distance to department capital	84.502	54.130	77.844	56.357	0.202	0.121
Distance to Bogota	338.659	201.668	316.599	187.932	0.211	0.113
Literacy rate	83.997	7.463	83.881	8.631	0.883	0.014
Rurality index (0-1)	0.539	0.219	0.567	0.242	0.201	-0.123
Unsatisfied basic needs	43.599	17.666	44.786	20.620	0.529	-0.062
National Parks Area (1,000 sq. hct)	0.568	2.838	0.974	8.070	0.566	-0.067
CAR office	0.136	0.344	0.143	0.351	0.827	-0.020
Distance to CAR office	0.033	0.028	0.029	0.033	0.260	0.111
Comptroller general offices	0.053	0.334	0.695	6.890	0.285	-0.132
Attorney general offices	0.894	1.792	4.560	41.051	0.305	-0.126
Paramilitary attacks	1.394	7.212	1.271	10.141	0.893	0.014
Guerrilla attacks	0.652	2.268	0.602	2.066	0.800	0.023
D. Other potential explanations						
Deforestation during previous term	2.359	2.046	2.110	2.019	0.185	0.122
Disposable Income (mw)	6255.348	1.1e+04	3.2e+04	4.2e+05	0.489	-0.087
Municipal category	5.902	0.460	5.679	1.048	0.016	0.275
Total population	1.9e+04	2.0e+04	4.5e+04	2.7e+05	0.281	-0.133
Income from royalties	0.102	0.186	0.066	0.145	0.009	0.222

Note: The first two columns present the basic statistics (mean and standard deviation) of each covariate for the regression discontinuity sample within the optimal bandwidth, while columns 3 and 4 present them for the rest of the country. Column 5 presents the p-value of the differences in means, while column 6 presents the standardized difference between the two groups.

Table A2: Donor funded politician and deforestation ratio - Quadratic Polynomial

	(1)	(2)	(3)	(4)
	Year of government			
	1	2	3	4
Donor Funded	0.002***	0.002*	0.002	0.005**
Robust p-value	0.009	0.074	0.166	0.048
CI 95%	[0.001, 0.004]	[-0.000, 0.005]	[-0.001, 0.006]	[0.000, 0.009]
Observations	408	408	408	408
Bandwidth obs.	188	200	209	187
Mean	0.012	0.012	0.012	0.012
Effect size (%)	16.67	16.67	16.67	41.67
Bandwidth	0.059	0.066	0.070	0.059
(Local) polynomial order	2	2	2	2

Note: Local quadratic estimates of average treatment effects at cut-off estimated with triangular kernel weights and optimal MSE bandwidth. 95% robust confidence intervals and robust p-values are computed following 132014Calonico, Cattaneo and TitiunikCalonico, Cattaneo and Titiunik (). Bandwidth obs. denotes number of observations in the optimal MSE bandwidth. Each column shows the deforestation rate, defined as lost $\text{coverage}_t/coverage_{\text{election year}}$, for a given year of government. The Effect size (%) is computed as the point estimate over the mean x 100. *** p<0.01, ** p<0.05, * p<0.1.

Table A3: Heterogeneous Effects: State Presence - Quadratic Polynomial

		(1)	(2)	(3)	(4)	(5)
				Measure Z		
		National Parks Area	CAR office	Distance to CAR	Comptroller offices	Attorney offices
A	Donor funded	0.679*	0.750*	-0.234	0.624*	0.830**
		(0.366)	(0.386)	(0.429)	(0.361)	(0.405)
	Z	0.348	1.532*	-0.00279	1.062***	-0.0685
		(0.240)	(0.798)	(0.0101)	(0.310)	(0.143)
B	Z × Donor funded	-0.329*	-2.072***	0.0267**	-1.695***	-0.285**
		(0.176)	(0.660)	(0.0133)	(0.574)	(0.118)
Observations		408	408	408	408	408
Bandwidth obs.		191	191	191	191	191
R-squared		0.069	0.083	0.201	0.068	0.087
Bandwidth		0.060	0.060	0.060	0.060	0.060
(Local) polynomial order		2	2	2	2	2
A + B		0.350	-1.322	-0.207	-1.071	0.545
Effect size (%)		17.56	-41.28	-12.05	-38.988	30.569
Ho: A + B = 0						
F-statistic		.99	6.09	0.24	3.83	4.7
P-value		0.32	0.01	0.62	0.05	0.11

Note: OLS regression weighted by a triangular kernel within the MSE optimal bandwidth sample and controlling for a quadratic polynomial. Bandwidth obs. denotes 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 one if there was at least on CAR office in the municipality, Distance to CAR is the distance to the closest CAR, Comptroller offices is the number of offices of the Comptroller General (*Procuraduría*), and Attorney offices is the number of offices of the Attorney General (*Fiscalía*). The Effect size (%) is computed as $100x(A+B)/(constant+\beta_Z)$. *** p<0.01, ** p<0.05, * p<0.1.

Table A4: Donor funded politician and contracts - Quadratic Polynomial

	(1)	(2)	(3)	(4)	(5)	(6)
	Infrastructure		*Environmental*		*Mining*	
	Number	*Avg. value*	*Number*	*Avg. value*	*Number*	*Avg. value*
Donor Funded	-30.151	1.091**	-4.904	0.486	0.209	0.486
Robust p-value	0.357	0.017	0.742	0.150	0.637	0.150
CI 95%	[-127.980, 46.163]	[0.219, 2.258]	[-55.157, 39.293]	[-0.197, 1.294]	[-0.774, 1.265]	[-0.197, 1.294]
Observations	401	400	401	366	401	366
Bandwidth obs.	226	165	211	174	216	174
Mean	140.896	4.818	18.197	3.795	0.976	3.795
Effect size (%)	-21.40	22.64	-26.95	12.81	21.41	12.81
Bandwidth	0.077	0.049	0.073	0.062	0.074	12.81
(Local) polynomial order	1	1	1	1	1	1

Note: Local quadratic estimates of average treatment effects at cut-off estimated with triangular kernel weights and optimal MSE bandwidth. 95% robust confidence intervals and robust p-values are computed following 132014Calonico, Cattaneo and TitiunikCalonico, Cattaneo and Titiunik (). Bandwidth obs. denotes 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 analysing their reported object. The Effect size (%) is computed as the point estimate over the mean x 100. *** p<0.01, ** p<0.05, * p<0.1.

Table A5: Donor funded politician and infrastructure contracts by year of government - Quadratic polynomial

	Year of government			
	1	2	3	4
Donor Funded	0.561	0.195	1.431**	0.886
Robust p-value	0.418	0.918	0.028	0.114
CI 95%	[-0.752, 1.812]	[-1.209, 1.344]	[0.161, 2.785]	[-0.230, 2.136]
Observations	381	386	386	389
Bandwidth obs.	210	217	268	265
Mean	4.204	5.092	5.284	5.508
Effect size (%)	13.34	3.83	27.08	16.09
Bandwidth	0.075	0.076	0.108	0.105
(Local) polynomial order	2	2	2	2

Note: Local quadratic estimates of average treatment effects at cut-off estimated with triangular kernel weights and optimal MSE bandwidth. 95% robust confidence intervals and robust p-values are computed following 132014Calonico, Cattaneo and TitiunikCalonico, Cattaneo and Titiunik (). Bandwidth obs. denotes 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 analysing their reported object. The Effect size (%) is computed as the point estimate over the mean x 100. *** p<0.01, ** p<0.05, * p<0.1.

Table A6: Donor funded politician and infrastructure contracts by relation to deforestation

	(1)	(2)	(3)	(4)
	No deforestation related		*Deforestation related*	
	Number	*Avg. value*	*Number*	*Avg. value*
Donor Funded	-18.177	0.617*	2.201	0.911*
Robust p-value	0.165	0.077	0.733	0.052
CI 95%	[-54.796, 9.383]	[-0.073, 1.415]	[-11.740, 16.685]	[-0.010, 2.057]
Observations	401	392	401	378
Bandwidth obs.	185.000	234.000	211.000	173.000
Mean	42.171	5.211	14.343	5.091
Effect Mean(%)	-43.10	11.84	15.35	17.89
Bandwidth	0.059	0.085	0.073	0.059
(Local) polynomial order	1	1	1	1

Note: Local linear estimates of average treatment effects at cut-off estimated with triangular kernel weights and optimal MSE bandwidth. 95% robust confidence intervals and robust p-values are computed following Calonico, Cattaneo and Titiunik (2014). Bandwidth obs. denotes 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 analysing their reported object. The Effect size (%) is computed as the point estimate over the mean x 100. *** p<0.01, ** p<0.05, * p<0.1.

Table A7: Donor funded politician and fire intensity - Quadratic polynomial

	(1)	(2)
Donor Funded	92.839**	77.625
Robust p-value	0.044	0.145
CI 95%	[2.659, 187.461]	[-26.568, 180.535]
Previous intensity		✓
Observations	408	408
Bandwidth obs.	312	217
Mean	246.141	246.141
Effect size (%)	37.72	31.54
Bandwidth	0.124	0.073
(Local) polynomial order	2	2

Note: Local quadratic estimates of average treatment effects at cut-off estimated with triangular kernel weights and optimal MSE bandwidth. 95% robust confidence intervals and robust p-values are computed following Calonico, Cattaneo and Titiunik (2014). Bandwidth obs. denotes number of observations in the optimal MSE bandwidth. Column (2) includes as covariate the measure of fire intensity from the previous term (2009-2011), 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 x 100. *** p<0.01, ** p<0.05, * p<0.1.

Table A8: Donor funded politician and fire intensity by year of government - Quadratic polynomial

	Year of government			
	1	2	3	4
Donor Funded	51.029	118.096*	4.267	122.898*
Robust p-value	0.451	0.100	0.952	0.068
CI 95%	[-90.214, 203.103]	[-25.585, 292.761]	[-145.384, 154.528]	[-9.357, 256.419]
Observations	408	408	408	408
Bandwidth obs.	238	204	233	267
Mean	189.663	183.108	185.204	198.902
Effect size (%)	26.91	64.50	2.30	61.79
Bandwidth	0.082	0.068	0.079	0.097
(Local) polynomial order	2	2	2	2

Note: Local quadratic estimates of average treatment effects at cut-off estimated with triangular kernel weights and optimal MSE bandwidth. 95% robust confidence intervals and robust p-values are computed following Calonico, Cattaneo and Titiunik (2014). Bandwidth obs. denotes number of observations in the optimal MSE bandwidth. 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 x 100. *** p<0.01, ** p<0.05, * p<0.1.

Table A9: Donor funded politician and agro-cattle firms entry by year

	Year of government			
	1	2	3	4
Donor Funded	1.093	1.831	1.340	2.569**
Robust p-value	0.314	0.243	0.496	0.019
CI 95%	[-1.151, 3.585]	[-1.308, 5.169]	[-1.893, 3.910]	[0.495, 5.653]
Observations	408	408	408	408
Bandwidth obs.	190	198	232	161
Mean	0.211	0.306	0.211	0.455
Effect size (%)	518.01	598.37	635.07	564.62
Bandwidth	0.060	0.063	0.077	0.048
(Local) polynomial order	1	1	1	1

Note: Local linear estimates of average treatment effects at cut-off estimated with triangular kernel weights and optimal MSE bandwidth. 95% robust confidence intervals and robust p-values are computed following Calonico, Cattaneo and Titiunik (2014). Bandwidth obs. denotes number of observations in the optimal MSE bandwidth. The dependent variable is the number of firms registered in agro-cattle business during that year. The Effect Size (%) is computed as the point estimate over the mean x 100. *** p<0.01, ** p<0.05, * p<0.1.

Table A10: Donor funded politician and agro-cattle firms entry by year - Quadratic

	Year of government			
	1	2	3	4
Donor Funded	1.116	1.749	1.168	2.671**
Robust p-value	0.415	0.346	0.505	0.030
CI 95%	[-1.515, 3.671]	[-1.788, 5.097]	[-2.152, 4.370]	[0.278, 5.574]
Observations	408	408	408	408
Bandwidth obs.	245	271	267	246
Mean	0.211	0.306	0.211	0.455
Effect size (%)	528.91	571.57	553.55	587.03
Bandwidth	0.084	0.099	0.097	0.085
(Local) polynomial order	2	2	2	2

Note: Local quadratic estimates of average treatment effects at cut-off estimated with triangular kernel weights and optimal MSE bandwidth. 95% robust confidence intervals and robust p-values are computed following Calonico, Cattaneo and Titiunik (2014). Bandwidth obs. denotes number of observations in the optimal MSE bandwidth. The dependent variable is the number of firms registered in agro-cattle business during that year. The Effect Size (%) is computed as the point estimate over the mean x 100. *** p<0.01, ** p<0.05, * p<0.1.

Table A11: Heterogeneous Effects: Armed Conflict - Quadratic Polynomial

		(1)	(2)
		Measure Z	
		Attacks	
		Paramilitary	Guerrilla
A	Donor funded	0.337	0.733**
		(0.364)	(0.367)
	Z	-0.0783	0.435*
		(0.144)	(0.227)
B	Z × Donor funded	0.168	-0.554**
		(0.156)	(0.241)
Observations		408	408
Bandwidth obs.		191	191
R-squared		0.108	0.166
Bandwidth		0.0600	0.0600
(Local) polynomial order		2	2
A + B		0.505	0.179
Effect size		30.50	8.68
Ho: $A + B = 0$			
F-statistic		2.43	0.21
P-value		0.12	0.64

Note: OLS regression weighted by a triangular kernel within the MSE optimal bandwidth sample and controlling for a quadratic polynomial. Bandwidth obs. denotes 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 (2008-2011). The Effect size (%) is computed as $100x(A + B)/(constant + \beta_Z)$. *** p<0.01, ** p<0.05, * p<0.1.