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Political Incentives and Corruption: Evidence from Ghost Students*

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Abstract

We study the effect of links between politicians on corruption under prevailing clientelism. Connections between politicians increase fabricated "ghost" students to obtain more national transfers, without raising the quality or quantity of education. Bureaucratic turnover, temporary and discretionary hiring, electoral fraud, and complaints against functionaries also increase. Effects on ghosts are larger in municipalities with more clientelism, discretion over resource spending, and weaker oversight. The findings favor a venal view of corruption, where politicians divert resources for personal gain rather than to favor their constituencies. Nonetheless, they have better future career prospects, reflecting a failure of electoral control.

Keywords: Education, political agency, corruption, clientelism.
JEL: D7, H5, H7, I2.

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Incentivos políticos y corrupción: Evidencia de estudiantes fantasma*

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Abstract

Estudiamos el efecto de los vínculos entre políticos sobre la corrupción bajo clientelismo imperante. Las conexiones entre políticos aumentan los estudiantes "fantasmas" fabricados para obtener más transferencias nacionales, sin elevar la calidad ni la cantidad de la educación. También aumentan la rotación burocrática, las contrataciones temporales y discrecionales, el fraude electoral y las denuncias contra funcionarios. Los efectos sobre los fantasmas son mayores en los municipios con más clientelismo, discreción sobre el gasto de recursos y una supervisión más débil. Los hallazgos favorecen una visión venal de la corrupción, donde los políticos desvían recursos para beneficio personal en lugar de favorecer a sus electores. No obstante, tienen mejores perspectivas futuras de carrera, lo que refleja una falla en el control electoral.

Keywords: Educación, agencia polótica, corrupción, clientelismo.
JEL: D7, H5, H7, I2.

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1 Introduction

One of the key promises of democracy is that electoral incentives should discipline politicians. Early political agency models suggest this should be the case (Barro, 1973; Ferejohn, 1986; Austen-Smith & Banks, 1989). At the same time, this ideal might fail for many reasons, such as when citizens not only incentivize politicians but choose between types (Ashworth, 2012). For instance, voters may put ethnic, partisan, or other identities and loyalties first. They may also fail to obtain good information and to coordinate to control corrupt politicians (De Vries & Solaz, 2017; Banerjee & Pande, 2007; Banerjee, Green, McManus, & Pande, 2014).

Failures of electoral control of corruption can be particularly prevalent in clientelistic environments, where politicians exchange favors for political support with voters and with other politicians in their network (Fergusson, Molina, & Robinson, 2022). Clientelism limits voters' control of corruption and exacerbates politicians' incentives to engage in it. Voters remain fragmented, uninformed, and disengaged. Politicians need patronage and discretionary spending to "oil" the clientelistic machine.

This paper studies how political coordination can increase corruption where political relationships are prevalently clientelistic. Theoretically, we argue that resource extraction is particularly valuable to politicians connected to higher echelons of power, for three main reasons. First, these connections can help coordinate strategies for resource extraction. Second, providing funds for the clientelistic network may be a token for political favors, including looser oversight from such upper levels of government. Finally, these advantages can translate into more resources for clientelistic vote buying, so voters will not necessarily discipline well-connected but corrupt politicians (thus entrenching the clientelistic machine).

To explore these theoretical possibilities, we rely on an unusually precise measure of resource diversion in the education sector in Colombia, a heavily clientelistic country. The Ministry of Education commissioned an independent nationwide audit of all students enrolled in every school in 2012. The censual audit followed allegations of the fabrication by local bureaucrats and politicians of fake or so-called "ghost" students to increase (and later divert) national transfers for education. This independent audit provides a school-level measure of resource diversion in the form of (proportion) of ghost students.

Using a Regression Discontinuity Design, we show that political links (measured as partisan alignment) between local mayors of municipalities and regional governors of departments increase the proportion of ghost students by approximately 0.3 standard deviations. National standardized test scores and true measures of the number of students are instead not higher in connected municipalities.

Effects on ghosts are more prominent in municipalities with a stronger historical prevalence of clientelism, more discretion over resource spending, weaker institutions, and less qualified teachers and school officials. These results are consistent with our theoretical expectation that politicians engage more in corruption in places with less oversight and more rents and discretionary scope for the diversion of resources to reproduce the clientelistic network. In addition, the null findings on test scores and true service delivery indicate that a substantial part of the money is diverted for political and economic gain rather than to improve the quality of the service (Fernández-Vázquez, Barberá, & Rivero, 2016).

We further investigate the channels through which connections between politicians might contribute to the corrupt clientelistic machine. We find that local-regional connections increase school managers' appointments in the first year of the mayors' mandate and the share of temporary, discretionary hiring of employees. Connected mayors also sign more discretionary contracts in the education sector. These results are consistent with the first theoretical channel: different levels of government coordinating on strategies for resource extraction and, in particular, engaging in clientelistic patronage and more arbitrary contracting.

Exploring the second theoretical channel (that is, that such funds are partly a token to pay for future political favors) is empirically more demanding since these political favors are typically unobserved. As suggestive evidence along these lines, however, we show that connected local politicians experience better future electoral prospects than disconnected ones. One particular political benefit of connections could be weaker oversight from regional and national-level agencies where upper-level politicians may exert influence. We document that citizens complain more against connected local politicians' disciplinary violations (and specifically in the education sector), a finding consistent with greater willingness to behave arbitrarily because they anticipate weaker effective oversight.

Increased citizen complaints nonetheless raise the question of why this misbehavior might persist in equilibrium. Recalling the third theoretical incentive for resource diversion in a clientelistic setting (to extract resources to buy votes), we confirm that connected areas are more likely to exhibit future electoral vote-buying. Effective clientelistic vote buying thus helps explain why connected parties have better future electoral prospects despite diverting resources.

Our results are robust to a battery of robustness tests, including: changes in the bandwidth size and kernel types to estimate the effects of connections, including pre-determined controls, computing effects at the municipal rather than the school level, using alternative transformations of the dependent variable, and dropping outliers, observations falling very close to the threshold of the running variable or data from large cities. Falsification exercises evaluating covariate balance and placebo outcomes further lend credibility to our empirical

strategy to identify the effect of a connected mayor on outcomes. Also importantly, our design is a Politician-characteristic RD (Marshall, 2022) comparing a municipality managed by a connected politician who narrowly wins relative to one where a non-connected one narrowly wins. While this solves critical potential sources of municipality-level selection bias, other differences between politicians (which might change precisely to ensure elections remain close) may influence our estimates. Following Marshall (2022), we estimate the plausible biases that might arise and conclude that, if anything, our estimates are a lower-bound of the effect of connections "as such", net of these "compensating differentials". Substantively, this suggests that connected politicians winning a close election feature other characteristics that might reduce their fabrication of ghost students.

Our paper contributes to several strands of literature and related policy debates, besides the main question on the effects of electoral incentives on prevailing corruption.

First, it contributes to the measurement and understanding of corruption. By relying on an objective measure of corruption and within-country variation, we can help address the measurement and identification limitations of studies (often at the cross-national level) relying on perception-based measures of corruption (Treisman, 2007; Olken & Pande, 2012). A closely related seminal contribution is Reinikka and Svensson (2004), emphasizing local capture of government transfers for education by political elites. However, rather than explaining variation in capture with school–level features that affect schools' bargaining power, we study variation in the political incentives to divert the money.

An essential question in the literature on corruption concerns its efficiency costs since, at least theoretically, not every form of corruption decreases efficiency (Banerjee, 1997). Some empirical evidence suggests that corruption in education reduces quality (e.g., Ferraz, Finan, & Moreira, 2012), arguably an inefficient outcome. The prevalence of ghost students distorts the actual expenditure figures on education, impeding authorities from realizing the extent of service under-provision, potentially leading to inefficient fund distribution (Olken, 2007, 2009). These observations –coupled with no local increases in service delivery or quality– suggest that resource diversion through the fabrication of ghost students has inefficiency costs.

Second, we contribute to the literature on clientelism. The preponderance of the research emphasizes how focusing on particularistic transfers over public goods undermines political accountability (Bates, 1981; Kitschelt, 2000; Stokes, 2005). An additional critical problem (that our findings reinforce) is that clientelistic networks need funds for reproduction, and obtaining those funds may fuel corruption (e.g., Hicken, 2011; Lindberg, Bue, & Sen, 2022). We also divert from most of the literature by focusing on the incentives stemming from the

network of exchanges in a clientelistic environment, especially those between politicians.[1] Instead, most of the literature studies the exchange between politicians and voters through vote-buying, a key but single link among the many nodes of clientelistic deals.

Third, there is a broad literature on the effects of political connections between different levels of government. Most of it, however, looks at the impact on transfers from central to local governments and on incumbency effects (Solé-Ollé & Sorribas-Navarro, 2008; Brollo & Nannicini, 2012; Migueis, 2013; Bracco, Lockwood, Porcelli, & Redoano, 2015). One exception is Borrella Mas (2015), with an interesting and related exercise offering compelling evidence for the positive effects of political alignment on local corruption. As we will discuss below, some underlying mechanisms are also similar. However, our empirical strategy has several advantages. First, the corruption measure in Borrella Mas (2015) is a news-based indicator, which raises concerns about potential measurement error (for example, if journalists look harder in aligned areas or places with correlated features). Second, the study exploits within-municipality variation in connections that might potentially correlate with other changes affecting corruption.

Fourth, our findings help provide a possible explanation for the "learning crisis" (Sandefur, Pritchett, & Beatty, 2016). The literature has underlined, among others, unprepared or unmotivated teachers, insufficient complementary inputs at the school, poor household investment, inadequate community conditions, and the quality of school management practices.Our paper suggests that political incentives leading to resource diversion may be the root cause of many of these problems and it may thus contribute to the puzzle of disappointing education outcomes in poorer nations despite the substantial increase in public spending over the last several decades.

Fifth, our findings underscore the risks of incentive and fixed-rule schemes in financing public goods with weak oversight. In education, the literature has focused chiefly on teacher incentives, payment schemes, and management autonomy.[2] One exception is Angrist, Lavy, Leder-Luis, and Shany (2019), who document enrollment manipulation to obtain an extra class using the Maimonides rule, but the focus is not on the political determinants of manipulation. Our findings suggest, more generally, that when cheating is a possibility, it is essential to have robust monitoring for payment schemes based on quantities and results.[3]

[1] In this respect, our approach is closer to (Cruz & Keefer, 2015), who also consider the interaction between politicians in clientelistic environments and the resulting impacts on corruption, yet through a different mechanism: clientelistic politicians have weaker incentives to have strong oversight over executive policy implementation.

[2] Several studies show that teacher absenteeism responds to stimuli, though not always as intended, given difficulties when scaling up interventions or complementarities between teachers and other (missing) inputs.

[3] In this sense, our findings line up with Acemoglu, Fergusson, Robinson, Romero, and Vargas (2020), who study an extreme case where linking payments to quantities is costly: the assassination of civilians by army

In other words, rule-based program financing is not a safeguard when parameters can be tinkered with (Litschig, 2012).

Finally, we contribute to the literature on clientelism and decentralization. Our study extends the traditional analysis of vote buying to the broader non-dyadic clientelistic relationships across several levels of government (as suggested by León & Wantchekon, 2019). We provide a concrete example where clientelism can limit the advantages that political decentralization would otherwise provide by bringing politicians closer to voters (downward accountability, in León & Wantchekon, 2019) because these local politicians also have incentives to respond to their party patrons (upward accountability). Moreover, and perhaps surprisingly, leveraging on variation in administrative decentralization, we show that connected politicians in areas enjoying more discretion and direct responsibility over resources spent in education have even stronger incentives for corruption.[4] The logic is that once upward accountability becomes the prime concern, politicians do not use discretion to please voters but to reinforce clientelistic exchanges.

2 Theoretical discussion: clientelistic exchanges and corruption

In this section, we discuss our main theoretical predictions of the effects of political connections between different levels of government on the diversion of public funds in contexts with prevailing clientelism. The specific form of resource diversion that we have in mind is the fabrication of fake public service beneficiaries to increase intergovernmental transfers. We will therefore refer in this section to this form of diversion for concreteness, though the insights largely apply to other forms of corruption. This scheme, moreover, is common in several settings, including in Colombia, where we focus our empirical investigation. Two other examples in Colombia include fabricating fake hemophilia (Contraloría General de la Repúplica, 2016) and HIV/AIDS (Procuraduría General de la Nación, 2018) patients to obtain and divert resources for their treatment. Examples in other countries include ghost students in Chile (La Tercera, 2015), Costa Rica (Fallas, 2013) and Puerto Rico (Metro PR, 2015), ghost teachers in Mexico (Fernández, 2019), fictitious pension beneficiaries in Nigeria (BBC, 2021), and a program to feed nonexistent needy children during the pandemic in the US (The United States Department of Justice, 2022).

members to disguise them as killed rebels following the introduction of rewards for the number of guerrillas killed.

[4]See also Enikolopov and Zhuravskaya (2007) for a broader test of the effects of fiscal decentralization on the quality of government, taking into account the structure of political institutions.

Figure 1 offers a simplified scheme of political landscapes marked by a highly clientelistic pattern of political exchanges. First, at the lowest level of the clientelistic pyramid, voters sell votes to local leaders or party brokers. In exchange, they receive money and other gifts. Second, these leaders and brokers provide votes to a local politician, who promises money, jobs, or other gifts in exchange. Third, to return and finance the favors, the politicians involved in these exchanges take advantage of their access to public resources while in office. They may do so by controlling public jobs or influencing public contracting decisions (favoring political allies or demanding a cut for contracts given) and with direct control and misuse of resources.

The Figure also shows that the local clientelistic politician may connect to another politician at a different level of power. We focus on the corruption implications of connecting with such upper-level politicians. We propose thinking of two polar or extreme motivations behind the diversion of public resources when politicians connect. While one is venal, there is also an honest possibility.

Starting with the venal model, local politicians fabricate fake public goods and service recipients to divert the resources for private political or economic gain. Connected politicians may have increased incentives to do so for three main reasons. First, connected politicians can more easily coordinate the actions for resource extraction. For instance, drafting (fake) school enrollment lists and hiring functionaries and complementary services to attend the (ghost) public service recipients might require intergovernmental coordination. More substantially, in the venal model, related public sector hiring and contracting will be clientelistic, directing public patronage and contracting to employees and contractors who will help support the clientelistic machine. A connected local politician will have, through the network, more information to do this effectively. An observable prediction is that connected politicians should engage more in public sector patronage and arbitrary/discretionary contracting to direct funds to clientelistic partners.

A second and related reason a connected local politician has more substantial incentives to fabricate beneficiaries is that the resulting funds (in the form of diverted money, patronage jobs, or contracts) can be a token to pay the higher-level partners in the clientelistic network for political favors. While these favors are typically unobservable or hard to measure (for example, supporting them in a future election, connecting them to campaign donors, or sharing side payments), one implication is that connected local politicians will have better future political prospects than non-connected ones. Also, one crucial political favor in weakly institutionalized environments is weaker oversight from upper levels of government over which the higher-level politicians may exert influence. Anticipating this, connected politicians may misbehave more and face more citizen complaints, features that one could observe empirically.

Finally, in the venal model, the local politician needs money to finance vote-buying. This money comes from (part of) the diverted funds, either from public revenue or the partners in the clientelistic networks (campaign donors, contractors, or other politicians). Vote-buying also proxies for the broader (but harder to measure) set of clientelistic exchanges in political relations of Figure 1. This final theoretical channel has two observable implications: first, one should observe a more considerable increase in fake recipients due to political connections in historically highly clientelistic areas; second, connected politicians should engage more in vote buying and electoral fraud.

Conversely, a (simpler) honest model assumes that politicians do not create fake beneficiaries for personal benefit. Instead, they seek more funds to serve the real beneficiaries better. Under such a model, connections can also exacerbate the incentives to produce fake beneficiaries. In particular, these well-meaning politicians can better coordinate the necessary actions to fabricate beneficiaries, just as unscrupulous politicians do. Also, by sharing a political network or party, when actual beneficiaries ultimately get better service, these politicians should be able to claim credit for their service and improve their future electoral prospects. However, unlike the venal model, in this version one should not observe, at least as starkly, public sector patronage and arbitrary/discretionary contracting, which is likely detrimental to effective public service delivery. Also, in this model, citizen complaints against politicians should not increase with connections. Instead, there should be better public service delivery. Finally, in the honest model, the impact on fake beneficiaries should not be more prominent in historically clientelistic areas, nor should these politicians engage more in electoral fraud.

Table 1 summarizes the preceding discussion by showing the core assumption, connections' effects, and the resulting observable predictions of the polar venal and honest models. Notice that two key observable predictions of political links (increase in fake beneficiaries and improved electoral prospects) cannot distinguish between the models.[5] Instead, the conflicting predictions for patronage, citizen complaints, effective service delivery, and electoral fraud will help distinguish between our central hypothesis (the venal model) and the main alternative explanation (the honest model).

Of course, the reality is more complex than two polar cases. Politicians may stand on a gray area where they fabricate beneficiaries partly for private gain and partly to better serve actual beneficiaries in their constituency. But the polar cases are still helpful in interpreting our results. For instance, if we observe increased effective service delivery (denoting some

[5]These basic predictions align with Borrella Mas (2015), who proposes a career concerns model for local politicians in which local corruption increases with alignment, so long as connections increase the resources for local politicians and reduce monitoring and accountability from upper-tier governments.

concern for the public) *and* more public patronage and electoral fraud (denoting use of funds for private gains and operation of the clientelistic network), we would interpret this as an indication of both motivations being present. Indeed, these two models are not entirely antagonistic. Suppose a clientelistic politician cannot survive electorally or extract enough rents merely through vote buying. In that case, he might also be induced to care about effective service delivery for popular support. As it turns out, however, in our empirical application, we find no support for any of the honest model's predictions.

3 Context: political clientelism and education in Colombia

This section discusses the overall political environment of our empirical setting, particularly the prevalence of clientelism and corruption in Colombia's political system. It then describes the institutional details of how education is financed and provided. This context will help interpret our data and findings and also justifies our working hypothesis that fake students are fabricated mainly for diversion and personal benefit, not to increase effective service delivery of actual beneficiaries.

3.1 Political clientelism and corruption

The prevalence of vote buying is well-known in Colombia. Fergusson, Molina, and Riaño (2018) provide direct evidence for it and the extent to which it is considered "normal". They apply list experiments (see, e.g., Blair and Imai (2012)) that protect the respondents' anonymity, thus preventing their answers from being influenced by a desire to say what is "correct" or "socially desirable". Using this method, they calculate that close to 20% of respondents typically make a voting decision based on the gifts or favors they receive from politicians or their brokers (the incidence appears to be slightly higher in rural than in urban areas). A second relevant finding is that the estimated incidence is the same when respondents are asked directly about this behavior, rather than indirectly with the list. This finding suggests that respondents are not embarrassed to admit to vote buying, consistent with the idea that this is a "normal" or "socially acceptable" behavior.

As illustrated in Figure 1, vote buying is typically just one link in a network of clientelistic exchanges of personal and at least partially-excludable benefits for political support. Thus, the voter trades with the broker, who trades with the politician, who trades with campaign donors, contractors, and other politicians.

These exchange patterns have been amply studied by the academic literature and documented in journalistic investigations in Colombia. For instance, reporting on the 2018 local elections, Huertas and Osorio (2018) describe the market for local leaders or brokers in the capital city of Bogotá, where they charge "70.000 Colombian pesos to secure a vote" and "often work for more than one candidate". The exchange also often involves patronage, with leaders telling candidates: "I help you with the votes, and [when] you are elected, you help me with jobs for ten people." Discussing their prevalence in the Northern region of Colombia, Ardila (2015) describes these brokers as the "professionals of vote buying", and the tokens of exchange they receive for securing votes include patronage, government contracts, and cash.

The resulting interactions between politicians at different government levels and the implications for corruption are well documented. One notable example directly related to the fabrication of fake public service beneficiaries comes from the Department of Cordoba. Governor Alejandro Lyons and his politician friends in different municipalities received campaign support from a health service provider later involved in the fake hemophilia patients scandal (Cantillo, 2017). The coordination between layers of government (the government and friendly mayors) and with others like campaign-donors-turned-public-contractors matches the "venal" model of political connections.[6]

The case of Buenaventura, a port in the Pacific and one of the most impoverished areas in the country, also illustrates these networks in operation when producing fake students (El Pais, 2014; Bermudez, 2015). This municipality had long been accused of corruption and student fabrication. The mayor from 2012 to 2015, Bartolo Valencia, created a group ("the group of 100") with several school principals and politicians to misuse education resources. School principals contributed to the political campaign in exchange for preferential treatment in distributing school resources. Other donors and supporters received other benefits: Pedro Marino Barahona won public contracts worth over $2,100 million pesos, and local leader Rodrigo Mina controlled jobs in the Secretary of Education. The Office of the General Attorney found evidence of the fabrication of ghost students and the creation of shell companies supposedly attending students contracted out by the administration. Buenaventura's share of ghost students is 4.24%, approximately 1.5 standard deviations more than the mean.

The case of Buenaventura also illustrates the critical role that school principals play in the fabrication of ghost students. More generally, school jobs are often crucial in the network of clientelistic exchanges and vote buying. Molano-Jimeno (2020) describes the details in

[6]More broadly, Bonilla-Mejía and Higuera-Mendieta (2017) also explore the clientelistic ties between local and national politicians, emphasizing the electoral gains that local mayors aligned with incoming presidential coalitions offer to congressional candidates, and the resulting additional discretionary transfers they receive. (Ruiz, 2017) provides quantitative evidence for Colombia suggesting that donor-funded candidates reciprocate donors with contracts.

one of the country's "epicenters" of vote buying: the municipality of Soledad in the Northern department of Atlántico. In his words, the place exemplifies the "most sophisticated and perverse method" of vote buying, a system that is "supported on the schools". A source describes the scheme as follows:

> The thing works like this: Soledad Mayor's Office or the Atlántico Governor's Office contracts private schools because public institutions cannot cover the demand. The agreement finances quotas for students and the salaries of professors. With this, they have two forms of corruption: one that works by collecting a fraction of the wages of the teachers and employees, and another that is converting the families of the scholarship recipients and the school workers into their voters.

A teacher confirms the scheme, adding that if one is unemployed, one can get a job at a school in Soledad so long as one is willing to receive a share of the salary while reporting as if accepting it in full. "They also asked us [teachers, employees, and families of the scholarship recipients] to vote and made us register the school as a polling station," he concludes.

In short, political clientelism and corruption are prevailing and interrelated features in Colombia. Schools may lie at the center of the vote-buying operation and fuel other clientelistic exchanges. Their jobs offer opportunities for political patronage, their students' families a captive electoral base, and the contracts offer opportunities to capture resources and reward political supporters. We predict that, in this context, a "friendly" connection between governors and mayors, as in the venal model of fake public sector beneficiaries, strengthens incentives and opportunities to produce ghost students. A local mayor with access to the departmental governor will likely face a more robust demand for (and supply of) siphoning opportunities. A connected clientelistic governor, who might have helped the mayor during the campaign, will expect the mayor to use part of the resources at its disposal in a clientelistic fashion, contributing to the governor's personal or political gain. The mayor may also expect access to other funds in office in return and support for his future political ambitions. Finally, the governor may turn a blind eye when this occurs in connected relative to disconnected municipalities. In the next section, we discuss the institutional details determining the funding and provision of education in Colombia and how it interacts with these political incentives.

3.2 Public education in Colombia: institutional details

Education in Colombia is a civic right and free for the 12-year compulsory education cycle. Schools or "Educational Institutions" have one or more "school branches," each usually

providing services for specific stages of the education cycle (primary, secondary, and higher secondary). All branches affiliated with a particular Educational Institution share a supporting management staff and the same governing body: the school principal, an academic committee, and an executive committee. School principals have broad responsibilities across five domains: (i) strategic management (e.g., aligning the school's mission and vision); (ii) human resource management (e.g., teaching staff assignment across branches and grades); (iii) leading pedagogical and academic processes to promote quality (e.g., developing specific study plans that are relevant and appropriate for the community and context); (iv) strengthening relationship with the community (e.g., leading community engagement activities); and (v) administering financial and physical resources (e.g., executing the school's budget and investment plans).

There are two coexisting –and somewhat opposing– tenure track regimes for teachers. The "old" regime dates to 1979 and has an automatic teacher promotion scheme based on an algorithm that combines teachers' years of service, education levels, and in-service training. Also, teachers are guaranteed to remain in service until retirement age, and those aspiring to become school principals can be hired directly by governors or mayors. The "new" regime, defined in 2002, embeds more meritocratic schemes in the tenure track system. Aspiring teachers compete in a public contest that includes an aptitude test, an evaluation of their credentials, and interviews by the National Civil Service Commission. Teacher promotion is conditional on completing at least three years of service, passing yearly assessments compiled by the school principal, certifying levels of education for each position, and passing a standardized aptitude test evaluating subject knowledge and teaching skills. Aspiring school principals must also pass an aptitude test and hold a professional degree with at least six years of experience.

Open calls must fill teaching positions. But when they fail, temporary direct hiring is allowed. Open calls are frequently alleged to be intentionally designed to fail to facilitate discretionary temporary hiring. Payroll, especially direct provisional hiring, has long been linked to electoral support for local politicians, particularly mayors, in a classic clientelistic patronage fashion (as illustrated in the previous section). Ayala-Guerrero (2017) argue that provisional, temporary hiring rewards political favors with a detrimental effect on quality. Anecdotal evidence from news stories also reveals politician control of school contracts and school jobs, especially of provisional hiring.[7]

The Secretary of Education monitors, supports, and administers Educational Institutions. The Office of the Secretary implements education policy plans, monitors funds managed by schools in their jurisdiction, and guarantees quality standards. More importantly, it hires,

[7]See, for instance, El Tiempo (2018) and Azuero and Leon (2015).

promotes, transfers, and fires public school principals and teachers. Each Secretary of Education ascribes to a *Entidad Territorial Certificada* (ETC, Certified Territorial Entity), certified to have the adequate institutional capacity to manage the regional or local education system. This process emerged to decentralize the education system gradually. All departments (32 in total) are ETCs and thus have a Secretary of Education.[8] In addition, 58 municipalities were certified as ETCs (and thus have an independent Secretary of Education).[9] Furthermore, given their strategic importance, five were designated as certified special districts, thus becoming ETCs with their own Secretary.[10]

The main responsibilities of department-level Secretaries are: distributing central government funds to un-certified municipalities in their jurisdiction; allocating principals, teachers, and staff across schools and municipalities (through appointments, transfers, or promotions); performing inspection, surveillance, and supervision activities; providing technical and administrative support to Educational Institutions; evaluating principal and teacher performance; and funding non-recurrent expenditures related to educational services. Local government bodies at certified municipalities and special districts have similar responsibilities within their jurisdiction. Finally, in non-certified municipalities, the local government is responsible for distributing and supervising the use of central government funds received from the Regional Secretary.

This discussion underlines the importance of local discretion in public funds use. While one presumption is that the effects of connections should be weaker in certified municipalities because they are more "independent" from the departmental government, discretion and autonomy in using local resources can aid corruption. In particular, these "autonomous" municipalities not only have more resources (which directly increases the corruption incentives (Borrella Mas, 2015)) but, at least as importantly, enjoy more discretion for local contracting (of teachers and other providers) and direct control over school principals. Also, since school principals, mayors, and the Secretary of Education are jointly responsible for consolidating

[8]The largest administrative division in Colombia are the departments, each headed by a publicly-elected Governor.

[9]Municipalities are the second largest administrative division.

[10]Historically, only municipalities with more than 100,000 people were certified (Law 715, 2001), while smaller municipalities had to demonstrate institutional capacity. Later regulation specified the minimum requirements for smaller municipalities' certification (Decree 2700 of 2005), and finally, it homogenized these requirements across large and small municipalities (Decree 3940 of 2007). This regulation implies that municipalities could select into certification status. Since we will examine the differential effect of connections on ghost students by certification status, we verify that connections do not predict this status in a basic RD estimation of the effect of alignment on certification, using the same specification for estimating these differential effects (Table 4). The coefficient is small, precisely estimated, and not distinguishable from zero (0.0076, standard error 0.0138). Beyond our sample of close elections, the corresponding cross-section specification also suggests that connections do not predict certification (coefficient -0.0085, standard error 0.0191).

the enrollment numbers, having a municipal-level Secretary can facilitate collusion to fabricate fake students. Perhaps paradoxically, having a local Secretary of Education may reduce oversight, to the extent that the corresponding department-level Secretary cannot oversee their process. Indeed, in the archetypical case of ghost student fabrication in Buenaventura, when the news scandal broke, the Department's Secretary of Education noted: "This is concerning for the department and the authorities. But we must remember that Buenaventura is autonomous in managing education. At the Secretariat, we cannot intervene and can only provide technical advice, if required" (Campo, 2014).

These expectations on the effects of autonomy align with those of education experts and former functionaries we interviewed. We discussed their view on the impact of municipal autonomy on corruption, in general, and in interaction with local-regional political alliances. A former departmental Secretary of Education noted: "You can benefit a lot from the certified municipality as a channel for good and bad things," then ironically adding to emphasize the "bad" things: "but you can certainly benefit a lot!"

The system used to finance education is also important to interpret our findings. Most of the money spent on education comes from central government transfers (88%), while regional governments contribute 3% of the total and local government sources complete the remaining 9% (Melo-Becerra, Hahn-De-Castro, Ariza-Hernández, & Carmona-Sanchez, 2016). A set of rules govern each of these sources. Regional and local governments' funds spent in education come from royalties from natural resources[11] and from regional or local taxes.[12]

The rules for central government funds are part of the *Sistema General de Participaciones*, (or SGP, the overall framework for decentralized public service provision in Colombia) and are summarized in Table 2. The table highlights the key role that student enrollment plays in allocating national resources to different areas. Government funds are divided into three accounts: payroll (*nómina*), quality-enrollment (*calidad-matrícula*), quality-access (*calidad-gratuidad*).

The majority of government funds (90%) come through the payroll account, with the remaining 10% split equally in the two "quality" accounts. The amount transferred by the Ministry of Education through the payroll account is a direct function of the number of teachers assigned to each school. The number of teachers, in turn, is a function of student enrollment.[13]

[11] Destined to investment projects approved by a special council with national, departmental, and municipal participation.

[12] In line with the government plan of the Governor or Mayor, approved by the Departmental Assembly or Municipal Council, respectively.

[13] Specifically, the norm (Decree 3020 of 2002) stipulates that allocating teachers must respect a minimal pupil-teacher ratio of 32:1 in urban areas and 22:1 in rural areas. The rationale for establishing a lower bound on the student-teacher ratio is to distribute scarce teachers better.

The quality-enrollment account is transferred to the regional and local Secretaries of Education. The criteria for distributing these national funds to different areas are threefold: enrollment, performance (in student dropout and grade repetition), and poverty indices. These funds can be used for infrastructure, teaching materials, utilities, teacher training, student transportation, and student meals. They cannot be used for payroll, uniforms and materials for individual students, machinery generating recurrent expenditures, or cleaning and security services.

Finally, funds from the quality-access account are transferred directly to schools as a function of enrolled students. They can cover teaching materials, infrastructure, office supplies, utilities, student travel expenses, subcontracting professional and technical services, pedagogical activities, transportation, and academic and non-academic activities. They cannot cover payroll, cleaning, security services, meals, or teacher training.

In short, this section reveals that artificially increasing the number of enrolled students implies receiving more national transfers, the primary source of resources. Also, municipalities enjoying autonomy, with an independent Secretary of Education, have a comparative advantage to fabricate these fake beneficiaries: more resources, discretion over their use, easier coordination between school principals and politicians, and reduced oversight from Departmental education authorities incentivize ghost students. Finally, a *de jure* meritocratic system to fill school vacancies is plagued with political patronage and provisional hires particularly useful to reward political favors.

4 Empirical strategy

4.1 Data: identifying ghost students

We build on the 2012 audit study financed and contracted by the National Ministry of Education. Fieldwork started in September and ended in the second week of December, the last day of classes. Audit firms implementing the study were competitively selected, and Ministry functionaries sought to protect the audit from cooptation, for instance, by avoiding local auditors.[14] In addition to the auditing firms, a separate set of firms was hired to inspect the auditing process.

[14]Previous audits of smaller scale were conducted during 2010 and 2011, covering 762,431 and 732,073 students, respectively (as opposed to over eight million in 2012). These audits targeted problematic municipalities with signs of mismanagement and corruption. To assuage the possible concern that the differential behavior of previously-audited places contaminates our estimates, we verified that political connections do not help predict prior audits or pre-existing measures of municipal corruption and inefficiency. Appendix Figure A-4 shows that connections do not predict ghosts found on previous audits nor pre-existing levels of municipal transparency or citizen complaints against functionaries.

The audit intended to reach all schools in the country, auditing the students reported on enrollment lists by June 30, 2012. Because of a few distant and rural schools, the goal was narrowly missed: 8,167,051 out of the 8,679,035 students in the Ministry's information system records were audited (94.10%).

Auditors physically visited every school for detailed face-to-face verification of each student. If a student was missing, they demanded complementary documentary evidence such as notes on the reasons for missing school, grade records, and examinations presented by the student. Also, Secretaries of Education and schools had just two days to respond and clarify (*Circular 28 of 2012*) any alleged mistake by the auditing firm. This short lapse allowed little margin to fabricate evidence. It helped guarantee that the schools either had good and reliable information to insist on their count or had to admit the revision. Also, while the audit dates in each ETC were announced shortly before the auditors' visits, all announcements came after the enrollment lists were compiled. Therefore, adjusting reported enrollment lists in anticipation of the visits was impossible. The type of proof demanded to justify inclusion in the enrollment lists also minimized opportunities to fabricate evidence and affect the number of detected ghost students.

The audit found 148,410 ghost students in total. With the auditors' final report, we construct our main dependent variable, the share of ghost students per school in each municipality. To assess the magnitude of this number, using the value of governments' transfers per student, we estimate a total cost of roughly US $110 million, representing about 3.5% of the payroll account.[15] Of course, this figure is just the direct cost of transferring money to nonexistent students. As Section 3 revealed, several additional opportunities for resource diversion may compound the financial burden of creating fake students.

The second key variable for our analysis is partisan alignment between the mayor and the corresponding governor, measuring the presence of a political connection between different levels of government. While political parties are notoriously weak programmatically (see Pizarro-Leongómez, 2006) and the traditional bipartisan clientelism gave rise since the 1990s to a more dispersed form of clientelism, these networks still revolve around the multiple parties, as noted in Ladrón de Guevara (1999). Thus, we use an indicator of whether the local mayor and governor parties coincide as our treatment variable.

We collect several additional variables for robustness exercises and explore further implications that shed light on the motivation and nature of ghost students. Appendix Table A-1 describes all the variables and sources.

[15]The US dollar value of ghosts uses the average exchange rate in 2012, COP $1,800 per dollar.

4.2 Econometric specification: local-regional political connections and ghost students

We exploit the randomness in the outcome of close municipal races for mayor, causing party alignment with the elected governor. Our Regression Discontinuity (RD) Design (Lee, 2008; Lee & Lemieux, 2010) thus compares the share of ghost students for schools in municipalities where a candidate of the same party as the elected governor narrowly won the election to that same quantity in places where it narrowly lost.

To measure connections between municipality- and department-level politicians, we focus on the 2011 local elections for mayors of municipalities, representatives of municipal councils, department governors, and departmental assemblies. Mayors are elected by simple plurality rule in the municipality, as are governors in the department. Local councilors and assembly members are elected from open or closed lists (parties can choose which) with a proportional, single-district representation system in the municipality and department at large, respectively. Mayor terms are four years, starting on January 1st, 2012. As soon as they are elected, governors and mayors form their cabinets, including Secretaries of Education, who influence the allocation of school principals and other school staff (as our results below confirm). Leveraging the timing of the censual audit process, we can verify the effects of connections on ghosts reported six months later.

Our running variable is the margin of victory of the governor's candidate. Our sample includes 4,383 schools in 332 municipalities where at least one mayoral candidate belonged to the elected governor's political party.[16] To illustrate our variation, Figure 2 shows the main variables in the analysis and their geographical distribution in Colombia. We use darker colors for a higher proportion of ghosts in the municipality. The squares show all places where a candidate of the elected governor party competed and lost in a close race, using a 13% vote margin between winner and runner-up that corresponds to our baseline optimal bandwidth. The green triangles show the places where it won. We see significant variation in the proportion of ghosts in municipalities and that competitive races involving governor-party candidates (and winners) are well dispersed throughout the territory.[17]

[16]To understand better the extent to which our sample of schools and municipalities is representative of the Colombian context, in Appendix Table A-2 we compare the characteristics of the schools and municipalities in our sample to the ones that are outside of our sample. The table reports the averages and differences for 17 school-level and 17 municipal-level variables. In Panel A, 4 of the 17 variables are statistically different, suggesting that our sample has more students living in lower socioeconomic neighborhoods and lower standardized test scores. In Panel B, 6 out of 17 municipal characteristics are different, suggesting that municipalities in our sample tend to be more rural and with lower state capacity. We show the robustness of our results to controlling for these few differences.

[17]There are much fewer but larger municipalities in the sparsely populated areas of the Eastern Planes (on the east of the map) and the Amazon (towards the south and south-east).

Our baseline RD specification is

$$y_{im} = \alpha + \tau \text{Connection}_m + f(\text{margin}_m) + Z'_{im}\Gamma + \epsilon_{im}, \tag{1}$$

where i indexes schools, m denotes municipalities, y_{im} is the share of ghost students in school i, Connection_m is an indicator variable that equals one if the municipality m elected a connected mayor, $f(\text{margin}_m)$ denotes a polynomial that controls for a smooth function of the margin of victory of the mayor, and Z_{im} denotes a vector of covariates that includes both school and municipal level controls. We also verify the robustness of our findings with regressions at the municipal level, with one observation per municipality instead of one per school. This approach helps address concerns about spillovers and within-municipality correlation. Specifically, our municipal-level specification takes the following form:

$$y_m = \alpha + \tau \text{Connection}_m + f(\text{margin}_m) + Z'_m\Gamma + \epsilon_{im}, \tag{2}$$

where y_m is the share of ghosts in municipality m. Similarly, Z_m now denotes municipal-level controls.

The coefficient of interest, τ, is the average effect of a political connection on the proportion of fabricated students at the cutoff. A positive coefficient indicates that partisan links between municipal and departmental politicians increase the proportion of ghost students in the school or municipality. We use the MSE-optimal bandwidth, bias correction, and clustered standard errors (at the municipality level) proposed by Calonico, Cattaneo, and Titiunik (2014) and Calonico, Cattaneo, Farrell, and Titiunik (2019). Also, following Gelman and Imbens (2017), we limit our analysis to linear and quadratic (local) polynomials estimated separately on both sides of the winning threshold.

5 Results

5.1 Descriptive statistics

Descriptive statistics for the main variables in the analysis are in Appendix Table A-3, at the school and municipality level.[18] We present these summary statistics (sample means and standard deviations) for the entire sample and subsamples within the optimal bandwidth, split by our treatment variable.

The first row reveals that, on average, 1.3% of the students in Colombian schools are false students. Interestingly, there is a significant variation in the proportion of ghosts in

[18] Appendix Table A-4 presents descriptive statistics for additional variables.

schools. On the one hand, approximately half of the schools in our sample correctly reported the number of students. On the other hand, schools in the top 1% of the distribution were fabricating 20% or more of their enrolled students. Crucially, the proportion of ghost students is about one-third larger in schools with a connected mayor (1.5% versus 1.1%). The difference is more prominent at the municipal level: the average share of ghosts in connected municipalities is about twice that of disconnected municipalities (1.7% versus 0.9%).

The following rows on Panel A show that schools in our sample have verbal and math standardized test scores between one-third and one-quarter of a standard deviation below the national average. Also, about 1 in 4 teachers are temporary hires in the average school. This hiring process method is considerably more common in connected schools: the share of temporary teachers is approximately 50% higher than in disconnected schools. Similarly, the percentage of students under contracted services seems to have grown much faster since the 2011 election in connected schools.

On Panel B, the total coverage rate is almost 90%, confirming that Colombia is not too far from universal coverage. The prevalence of risk of electoral fraud is widespread: nearly three-quarters of municipalities in our sample had anomalies in the 2015 elections. In addition, each municipality had an average of 30 complaints against its public servants from 2012 to 2014. Of those, on average, 0.217% were against school employees. Finally, discretionary contracts awarded through the direct selection method are, on average, approximately 25%, measured as the share of the number of contracts, with a slightly lower 22% when considering the value of those contracts.

5.2 Political connections and ghost students

Main effects

Figure 3 presents our main results graphically. There is a sizable and significant increase in the share of ghosts in municipalities where the mayor is connected to the governor. This result is robust to using linear or quadratic local polynomials. In Panel A of Table 3, we look at these effects in more detail and their robustness to the types of kernel (Triangular, Epanechnikov, Uniform) and polynomials (linear or quadratic). We observe an increase of 1.2 to 1.5 percentage points in the share of ghosts (roughly as large as the mean value of this variable and a third of its standard deviation).

Moreover, in Panel B, we rely on a triangular kernel weighting scheme (i.e., linearly down-weighting observations within the optimal bandwidth) and use the covariate-adjusted regressions of Calonico et al. (2019) with a linear polynomial. We include different sets of covariates, all measured pretreatment. Column 1 has all the student controls (student

features aggregated at the school level), while column 2 adds the school controls. In column 3, we simultaneously include all these school-level variables. Column 4 considers a different exercise, including municipal-level controls. Column 5 adds electoral controls, among which there are fixed effects for each of the main parties in the election. The motivation for this exercise is addressing the possible concern that our effects are driven not so much by electing a connected candidate but rather one of a "big" or "major" party, which mechanically is more likely to coincide with that of the governor but could have an independent influence on the share of ghosts. Finally, column 6 includes all these controls simultaneously. Our results are robust to all these checks, with the coefficient for Connection changing in magnitude only modestly and our statistical precision improving.

Robustness

In Appendix Figure A-1, we estimate quantile treatment effects following (Frandsen, Frölich, & Melly, 2012) and find that the largest impact is at a relatively high prevalence of ghosts students. This result is interesting as the cost of fabricating public service beneficiaries where there are none may be higher, both in terms of reputational costs for those involved and since where the scheme for doing this is inexistent or less prevalent, it may be more costly to set it up and more likely to get caught.

As noted, our baseline specifications rely on the optimal bandwidth from Calonico et al. (2014) and Calonico et al. (2019). We also verify the robustness of the results to the bandwidth choice in Figure A-2. This figure shows not only the estimated treatment effect and confidence bands but the number of observations as we vary the bandwidth from 50% to 150% of the optimal bandwidth (for the baseline linear polynomial bias-corrected coefficient with a triangular kernel). The coefficient is stable, changing only slightly and smoothly as we alter the window. Also, we only lose conventional statistical significance with bandwidths that are 60-70% as large as the optimal. Even then, the changes are more in the estimates' precision than in the estimated effects' size.

Appendix Table A-5 estimates the regressions at the municipality level. The baseline coefficients in columns 1 to 6 range from 2.2 to 5.4 and imply an increase of 1 to 2.2 standard deviations in the share of ghost students in connected municipalities. The covariates increase estimates precision in columns 7 to 9 while finding similar quantitative coefficients. Appendix Table A-6 tests the robustness of our main results to different transformations of the dependent variable in columns 1 to 3. When using a simple dummy for ghost incidence, the coefficient is positive (0.065) but has a large standard error of 0.186. Also, regarding raw descriptives, the median for a ghost dummy is one when the municipality is connected and zero when not. In short, some differences are also apparent in the extensive margin,

though these are not as conclusive as those in the intensive margin. This finding is also consistent with the quantile treatment effects. Considering the log or inverse hyperbolic sine of ghosts, in columns 2 and 3, we find again sizable and precisely-estimated positive effects of connection on ghosts (the coefficients are, respectively, 0.36 with standard error 0.14 and 0.45 with standard error 0.18). To investigate if our main results are driven by outliers, in column 4, we drop all observations above the 99th percentile in the distribution of the share of ghost students. We also use alternative percentiles in columns 5 and 6 (3% and 5% of the observations). In all cases, we find positive impacts, even if the magnitudes fall, in line with the findings on the quantile treatment effects and the extensive margin. Columns 7 to 9 show the results are not sensitive to using a "donut hole" approach that excludes municipalities close to the cutoff (M. Cattaneo, Idrobo, & Titiunik, 2018). Finally, columns 10 to 12 find similar effects if we exclude big cities (larger than 1 million, half million, or one hundred thousand inhabitants) where, perhaps, it might be less critical for the mayor to connect with the governor.

5.3 Validation: placebo treatments, balance on covariates, manipulation, compensating differentials, and intergovernmental transfers

Our RD approach assumes that other factors besides our treatment variable vary smoothly at the threshold between a connected candidate's win or loss. Thus, any discontinuous change in the proportion of ghost students is only attributable to the current partisan affiliations of the mayor and governor.

Appendix Figures A-3 and A-4 present a series of falsification tests that help validate our identification assumption. Panel A of Appendix Figure A-3 estimates our standard RD analysis where the dependent variable is ghost students from the 2012 census and the treatment variable is a mayor and governor party connection in each election year from 1997 to 2011. The results reveal that only links in the 2011 election, and *not* in precedent terms (1997, 2000, 2003, or 2007), predict fake students in 2012. Another approach to help validate our identification assumption is running RD analyses using predetermined baseline covariates as "placebo" outcomes of our treatment variable. Panel B shows balance in a critical predetermined variable: political alignment in previous races. In particular, we look at whether a connection in the 2011 election can predict the success of connected candidates in past elections. Reassuringly, we find no discernible robust differences between treatment and control municipalities at the threshold. The figure thus provides evidence that concurrent connections (not prior connections or some other omitted variable of areas that typically tend

to be connected) explain the higher incidence of ghosts.

Appendix Figure A-4 looks more systematically at balance across the win-loss threshold in predetermined observables. Panel A shows the (standardized) RD coefficients for the effect of selecting a connected mayor on predetermined school characteristics, and Panel B repeats the exercise for candidate and municipal characteristics. In general, we find no apparent differences in these covariates, and the point estimates are close to zero (in a few cases, there is considerable imprecision, so even though the point estimates are not significant at conventional levels, we cannot rule out relatively large differences).[19] Recall also that controlling for observables only confirms our conclusions for the main coefficient of interest, increasing its precision without substantial effects on its magnitude.

We also evaluate the possibility that electoral results are manipulated (for example, by connected mayors having a differential advantage in fraudulently winning close races), which would violate our identification assumption by creating a selected sample of narrow winners that might not be comparable to narrow losers. In Panel A of Appendix Figure A-6, we implement the McCrary test (McCrary, 2008) to verify the distribution of the running variable around the winning threshold and estimate the jump in the distribution to be equal to 0.027 (with a standard error of 0.265). This estimate is a very precise zero that implies no grounds to reject the null of no jump.[20] In Panel B, we also validate the assumption using the test proposed by M. D. Cattaneo, Jansson, and Ma (2018) and again found no evidence of manipulation. We also fail to reject the null hypothesis of no manipulation around the treatment cutoff in the test of Bugni and Canay (2021) with a p-value of 0.749.

Our design is a Politician-characteristic RD (PCRD, Marshall, 2022), which does not compare winners to losers (say, outcomes for the politician who wins the election relative to outcomes of his runner-up). Instead, it compares winners of different types: a municipality managed by a connected politician who narrowly wins relative to one where a disconnected one narrowly wins. This comparison solves critical potential sources of municipality-level selection bias, as confirmed by the balancing tests, but may be influenced by other differences between politicians. Also, Marshall (2022) notes that these candidate-level characteristics may be "compensated" precisely to ensure elections remain close between candidates that differ in alignment. For instance, the sample of connected politicians facing close elections may have relatively low talent or motivation. Estimating the *sole* effect of connections net

[19] Appendix Figure A-5 extends the analysis to additional variables, corroborating no discontinuous change in predetermined characteristics.

[20] There are fewer observations to the right than to the left of the winning threshold, and this reflects that, in a system with many parties as in Colombia, there are many ways for a connected mayor to narrowly lose (many disconnected contenders that can have a chance) and only one way to win. The essence of our strategy, of course, is the balance near the threshold.

of these "compensating differentials" with a PCRD requires strong assumptions: either that connections do not affect candidate vote shares or that no other compensating differentials affect the outcome. Also, interpreting the balancing tests on candidate characteristics is not straightforward since these differences respond to restricting to a close election.

In Appendix Figure A-7, we follow Marshall (2022) to bound and correct the magnitudes of the estimated effect using the observable compensating differentials. Marshall (2022) proposes a corrected estimator given by:

$$\hat{\tau}^{\text{corr}} = \hat{\tau} - \sum_{k} \hat{\gamma}_k \hat{\delta}_k,$$

where $\hat{\tau}$ is the uncorrected (baseline) estimate, $\hat{\delta}_k$ is the RD estimator for the effect of Connection on each observable compensating differential k – candidate-level characteristics, theoretically distinct from mayor-governor connections, that guarantee closed elections –, and $\hat{\gamma}_k$ is the estimated LATE of each k on ghost students at the discontinuity. Since we lack identification strategies for our compensating differentials, to capture plausible values of $\hat{\gamma}_k$, we estimate a regression of ghost students on our compensated differentials and use these OLS estimators to create a grid of plausible values for each $\hat{\gamma}_k$. In Panel A, we show the distribution of the corrected coefficients, $\hat{\tau}^{\text{corr}}$, generated by scaling each estimated γ_k by 0.5, 1, and 1.5.[21] The distribution of corrected coefficients is centered at 1.44, larger than our baseline estimate of 1.40, suggesting that our results could be downwardly biased by the observable compensating differentials. In the top portion of Panel B, for reference, we display the values of $\hat{\gamma}_k$ estimated by OLS. In the lower part, we calculate the value of each $\hat{\gamma}_k$ that would nullify the corrected estimate of the Connection effect on ghost students. Most of the coefficients would have to be implausibly large and, in some cases, change signs to make $\hat{\tau}^{\text{corr}}$ equal to zero.

Finally, a mayor-governor connection could affect many policies other than those concerning the education sector. Our estimates should be interpreted with this caveat in mind. Given the extensive literature on political alignment on the matter, however, one crucial question is whether connections produce significant changes in subnational transfers. Crucially, Colombia's fiscal decentralization gives a limited role to direct transfers from departments to municipalities. This feature appears in Appendix Table A-7, where we report the mean and standard deviations of average municipal tax and transfer revenue (in logs and as a percentage of total revenue). While national transfers to municipalities averaged 78% of total municipal revenue, all non-national transfers add, on average, a mere 0.98%. Moreover, we

[21] Since we have 11 observable compensated differentials and three possible values, this procedure amounts to 177,147 ways of estimating $\hat{\tau}^{\text{corr}}$.

do not find significant changes when examining whether municipal-departmental connections influence these transfers. Thus, while we cannot rule out that our effects respond to other issues aside from educational policies that vary when local mayors connect to governors, the potential role of perhaps the main confounder, intergovernmental transfers, is minimal.

5.4 Venal or honest ghosts?

So far, we have established that mayors connected with politicians at higher levels of power produce more ghosts than those missing this link. Our theoretical discussion, however, emphasized that connected politicians would create more fake beneficiaries under a venal (private gain) or honest motivation (public benefit).

Heterogeneous effects by school or municipal characteristics

To begin disentangling these possibilities, we look in Table 4 at the effect of a connection in different types of schools or municipalities. Columns 1 to 3 of the table show the importance of opportunities for corruption. In municipalities with weaker and less transparent institutions, fabricating ghost students should be easier. We, therefore, split the sample (above and below the median) with several different available measures of institutional capacity and transparency: an open government index measuring the amount of information reported by municipal governments and their standards of public management (column 1); an integral performance index also evaluating public management standards and decision making with public funds (column 2); and a municipal transparency index that assesses the mechanisms used by the municipalities to guide and strengthen the relationship between the citizens and the State (column 3). Stronger institutional quality appears to help reduce the impact of a connection on ghost students: all coefficients in Panel A are considerably larger than the ones in Panel B. These differences suggest that schools in municipalities with weaker and less transparent institutions drive the baseline RD estimates.

Besides municipal governance causing variation in ghost prevalence, fabricated students should be lower in better-managed schools within municipalities. While we lack direct measures of school-level governance, we have data on education for school employees. In column 4, Panel B, we show that connections do not seem to increase the share of fabricated students in schools managed by qualified employees (with a graduate degree). By contrast, the coefficient in Panel A is statistically significant, suggesting that having less educated employees produces a positive relationship with connections while having qualifications instead creates a negative relationship. Moreover, in column 5, we test whether schools with managers in the "old regime," with no meritocratic schemes and more potential direct appointments by

politicians, amplify the effect of political connections. Schools with managers of the non-meritocratic system drive the impact of connections on ghost students. Overall, results in columns 4 and 5 align with the idea that more transparent and accountable schools likely attract the best personnel.

Columns 1 to 5 indicate a venal motivation driving the increase in ghost students for connected mayors. But it could still be that an honest politician would be more willing to fabricate beneficiaries in municipalities and schools where corruption is more prevalent, as this reduces the probability of receiving sanctions. Moreover, such features of municipalities and schools may be correlated with poverty and bad student outcomes, increasing the need to inflate transfers to improve service.

To make further progress in distinguishing between the two polar models of corruption, recall that a critical expectation from experts and functionaries is that more autonomous municipalities with more resources and discretion over spending have more incentives and opportunities to increase the number of ghost students for resource diversion. In column 6 of Table 4, we investigate this prediction by splitting the sample based on municipalities' autonomy: the treatment effect is larger in schools located in municipalities with autonomy in their spending budgets.

We next turn to our theoretical discussion, paying particular attention to those predictions of Table 1 that help identify the underlying model of corruption driving the results. In column 7 of Table 4, we focus on whether the impacts are stronger where the clientelistic nature of political exchange is more prevalent. While we have good measures of vote buying as one useful proxy from Fergusson et al. (2018), this is only available for a subset of municipalities. We, therefore, use the risk of electoral fraud indicator of the elections of 2007 produced by the *Misión de Observación Electoral* (MOE, Mission of Electoral Oversight), the leading independent organization overseeing electoral processes in Colombia. The key effect is only present for municipalities with above-median risk, in line with the expectation of a venal motivation.

Public benefit? Effects on public service quantity and quality

We now examine the implications on other relevant outcomes that help us distinguish the two polar models. We first ask whether the students receive better or worse (and less or more) education. If the net effect of connections on public service provision is positive, then this suggests some diversion of resources is for public gain. Columns 1 to 6 in Table 5 examine whether students in connected municipalities have better test scores in the college-level entry exams (the equivalent of the US SAT). Since the impact of connections on scores might take some time to show up, we look at scores in 2012, 2013, and 2014 in columns 1

to 3. Also, to increase potential precision and as an additional test, in columns 4 to 6, we look at the improvements from the baseline 2010 level up to each of these years. Finally, we look at the language section in Panel A and math in Panel B. In columns 7 to 9 of Panel A, we look at quantity rather than quality and examine municipal coverage rate (students enrolled in schools as a proportion of those that should be attending) in each municipality as the dependent variable. To avoid relying on fabricated enrollment figures, in column 7, we focus on enrollment numbers that correct for detected ghosts (in 2012). We also look at the numbers in 2013 and 2014, warning that this assumes that the likelihood of significant (new) fake students might be lower a few years after the audit.

Most of the coefficients for Connection in Table 5 are negative, suggesting that these places do not offer more education or better quality. In Panel A, the point estimates indicate that connections decrease language tests score by 0.12 to 0.32 standard deviations. The coefficients of columns 4 to 6 range from 0.036, for the improvements from 2010 to 2013, to -0.195, for the 2010-2014 change in language test scores. In turn, connections marginally reduce the municipal coverage rate by roughly 3.9 to 5 percentage points, although the coefficients are not statistically significant. Even though the coefficients are noisily estimated for the math scores in Panel B, all are statistically identical to zero.

While some of these estimates are not precise, that coefficients are either significantly negative or negative, even if not statistically significant at conventional levels, point to no evidence of better outcomes in the quality or quantity of education in connected municipalities. They are, therefore, consistent with the "corruption for personal gain" motivation of the venal model than with the "diversion for public benefit" interpretation of the honest model.

Effects on fraud, citizen complaints, and contracting patterns

The venal model also predicts that politicians using public office for private gain are more willing to engage in electoral fraud and clientelistic exchanges with voters later on, investing in anticipation of their future rents by manipulating elections or offering voters private rewards in exchange for political support. In columns 1 and 2 of Table 6, we, therefore, evaluate an additional dependent variable: the risk of electoral fraud in the 2015 elections.[22] This analysis, at the municipality level, reveals that connected municipalities are more likely to feature a higher risk of future electoral fraud. The Connection coefficient is 0.39 (with a standard error of 0.20) for the mayor's race and 0.30 (with a standard error of 0.18) for the

[22]Electoral risk uses six dimensions of anomalies in the election: atypical level of participation, abrupt changes in participation, unusual null votes and unmarked ballots, electoral dominance, and *electoral transhumance* (the practice of illegally registering in a district other than the district where the voter lives).

governor's election. The increase is roughly half of the mean in both cases.

Recall also that if a clientelistic machine captures public service delivery in connected municipalities, we should observe more complaints involving disciplinary problems against public functionaries in these places, particularly in the education sector, crucial according to the anecdotal evidence. We explore this in columns 3 to 5 of Table 6. We use data on citizen complaints against public functionaries from the Office of the Inspector General (*Procuraduría*). In column 3, the dependent variable is the sum of total complaints against all functionaries in a given municipality. In column 4, we look instead at complaints involving school functionaries (labeled education complaints). In column 5, we use the share of education complaints as the outcome of interest. Apart from narrowing the focus on the education sector, an advantage of this last measure is that it may deal with permanent differences in reporting rates across municipalities (Acemoglu et al., 2020). Indeed, some areas may have lower reporting rates of public officials than others. By taking the ratio between education complaints and all other complaints, any municipality-specific reporting rate cancels out. Results show that connected municipalities report more complaints against functionaries (column 3), especially in the education sector, when we measure the dependent variable as the share of complaints (columns 4 and 5).

In columns 6 and 7, we study the effects of connections on discretionary public contracts awarded through a direct select method and, thus, that do not allow competition among bidders. Although discretionary spending is not illegal or inconvenient *per se*, it generates more opportunities for wrongdoing and might lead to more corruption (Gallego, Prem, & Vargas, 2020). The coefficient in column 6 implies that connections increase discretionary contracts in the education sector as a percentage of the total number of contracts by 11.7 percentage points, about three-quarters of a standard deviation. Similarly, connections increase the value of discretionary education contracts as a percentage of the total value of contracts by 17.4 percentage points, representing about 85% of a standard deviation.[23]

Patronage and correlated resource diversion? Effects on hiring patterns and outsourcing service

We next investigate how political connections create different contracting approaches associated with patronage and opportunities for misallocating school resources. We first study

[23]When not restricted to the education sector, we find positive and economically large coefficients for the effects on the percentage of number and value of discretionary contracts, but they are not significant: 18.52 (standard error, 19) and 6.90 (standard error, 17.06), respectively. For all sectors, the percentage of the number of discretionary contracts and the value of the contracts are, respectively, 67.78 (standard deviation, 37.02) and 45.80 (standard deviation, 34.01). The more precise results for education may reflect its key role in the clientelistic networks, as reviewed in the context section.

whether schools in connected municipalities changed their employees in managing positions after the election. In columns 1 and 2 of Table 7, we estimate the effect of connections on a dummy variable equal to one if the school hired a new employee in the managing positions and on the share of these new employees. Connections increase the probability of a new hire by three percentage points or roughly 50% of a standard deviation. It also increases the share of new hires by 0.426 percentage points or 10.14% of a standard deviation. In columns 3 to 6, we confirm that connections increase the share of temporary employees, who are directly hired and often linked to patronage. Indeed, in columns 3 and 4, the 2012 share of teachers (coefficient 9.108, standard deviation 4.579) and management (coefficient 0.803, standard deviation 0.309) increase in connected municipalities, with sustained impacts through 2013 (columns 5 and 6). Finally, columns 7 to 10 complete our look at discretionary contracts and those most likely linked to patronage and corruption by examining, respectively, the share of contracted service in 2012, 2013, and 2014 and its growth from 2011 to 2014. The results indicate sizable increases, especially by 2014.

Taking stock of all the evidence, it concurs with the venal model of fake public service beneficiaries. The last column in Table 1 summarizes our empirical findings, contrasting them with the predictions. Focusing on the observable predictions that can help distinguish between the core underlying assumption about connected politicians' behavior, consistent with the venal model, we find evidence for: increased patronage and discretionary contracting (the honest model predicts no change); increased citizen complaints (the honest model predicts either change or a decrease); no increase in effective service (the honest model predicts an increase); stronger effects in high-electoral fraud areas (the honest model predicts no difference); and more subsequent electoral fraud (the honest model predicts no change).

Political survival: future party and politician prospects

This evidence thus points to an entrenchment of a corrupt clientelistic machine capturing and distorting public service delivery. The evidence on electoral fraud is especially relevant because, ideally, a well-functioning democracy would punish corrupt politicians and functionaries by not electing them subsequently. But with clientelism and electoral corruption, these types may persist in power by targeting key voters or through outright electoral fraud. This discussion leads to the one remaining ingredient of our theoretical predictions that we have yet to examine: the future electoral prospects of connected mayors. While connected mayors should outperform disconnected ones under the venal or the honest model, since the remaining evidence points to the venal model, revising this issue is particularly important to explore whether or not these corrupt politicians can persist in power.

In Table 8, Panel A, we run a standard party-level incumbency advantage analysis sep-

arately for connected and disconnected mayors. Specifically, using all local elections since 1997, we look at the impact of narrow wins by a given party on its performance in the next election (we focus on parties rather than candidates since there is a one-term limit for mayors in Colombia). Columns 1 and 2 show that narrowly winning does not significantly increase the likelihood of running again compared to narrow losers, either for disconnected or connected mayors. Column 3 reveals an incumbency disadvantage in Colombia for disconnected mayors: narrowly winning *decreases* the probability of winning a future election by 13.7 percentage points, representing approximately 70% of the mean. This disadvantage has been documented by Fergusson, Querubin, Ruiz, and Vargas (2021) and noted more broadly for Latin America by Klašnja and Titiunik (2017). By contrast, in the sample of connected mayors in column 4, incumbent parties are 13.5 percentage points *more* likely to win again than narrow losers. In columns 5 and 6, we look at subsequent *vote shares* (set at zero for parties not running). Though it is clear that incumbents have a disadvantage in the disconnect sample, connected candidates overcome the average disadvantage. In the sample of disconnected parties, narrow wins reduce the future vote share by about 4 percentage points. In contrast, narrowly winning in the sample of connected parties increases the future share of votes by approximately 7.15 percentage points. In short, political connections reverse a prevailing incumbency disadvantage.

In Panel B, we switch attention from parties to politicians and present RD regressions tracing individuals involved in close mayoral elections from 1997 to 2011, and comparing winners' and losers' subsequent electoral careers. The dependent variables are dummies for participating, winning, and winning conditional on running, in any future local, regional or national election. In each case, we report the effect of a win on disconnected winners and on connected winners. The findings in columns 1 and 2 reveal that candidates in close elections have a baseline probability of running for elected offices in the future of 40%. Disconnected winners are more likely to run again (coefficient 0.07, standard error 0.03). The magnitude for connected winners is similar, yet since we have a smaller sample, the estimation is not very precise (coefficient 0.06, standard error 0.05). While this may suggest that connected winners are not more successful than disconnected ones, columns 3 to 6 reveal the opposite: out of a baseline unconditional probability of winning future elections for narrow competitors of 16.6%, connected winners are able to increase it sizably, by 37.5 percentage points (coefficient 0.375, standard error 0.034) while disconnected winners observe no change (coefficient 0.01, standard error 0.021). Consistent with these findings, connected winers are much more likely to win conditional on running whereas unconnected ones are not (columns 5 and 6).

Overall, Table 8 reveals that connected parties and politicians perform better than disconnected parties after narrowly winning an election. This result has the troubling implication

of enabling the political survival of corrupt politicians, reflecting a failure of electoral control

6 Discussion

This paper investigates a particularly prevalent form of corruption in the public sector: the fabrication of fake public sector beneficiaries to increase governmental transfers for potential diversion. Our focus is on the impact that connections to higher-level politicians may have on the incentives of local politicians to engage in this practice. We distinguish between two polar theoretical possibilities. Under a venal model, likely to arise in settings where the nature of the political connections is highly clientelistic, politicians inflate beneficiaries to divert the associated resources for personal economic or political benefit. Under an honest model, politicians seek more funds to serve the real beneficiaries better. These two polar models have distinct observable predictions: while both agree in predicting that connected politicians should produce more "ghost" public service users and should enjoy better future electoral prospects, predictions on the use of patronage and discretionary contracting, citizen complaints, impacts on effective service delivery, subsequent electoral fraud, and prevalence in areas with a history of clientelistic features help distinguish between the two models.

Politicians may be partly venal and partly honest, and both motivations may be complementary. Indeed, local politicians and bureaucrats might grab or misallocate part of the extra money for personal economic or political gain while also using part of the resources for beneficiaries, thus pleasing voters and eventually "getting away" more easily with corruption. Nevertheless, the conflicting predictions of the polar cases still help to identify the presence of venality, where predictions divert from a purely honest model.

Focusing on the case of ghost students in Colombia, a country exhibiting prevalent clientelism, we find evidence consistent with the venal model of this form of corruption. Politicians do not break the rules to improve their constituencies' welfare. Indeed, when estimating the impacts of political connections, we observe contracting practices that are consistent with patronage, an increase in citizen disciplinary complaints (especially in the education sector), no evidence of improvement in service delivery, increases in subsequent electoral fraud, and more substantial effects in areas with a history of clientelistic practices.

The findings reveal a substantial failure of electoral control, where political incentives may not help maintain politicians accountable. Indeed, the evidence not only points to the diversion of public resources for political and economic gain rather than to improve the quantity or quality of the service. In addition, the impacts are more substantial where fake beneficiaries are more prevalent, precisely the places that would benefit most from better accountability. Moreover, there is no indication that the practices might erode in these areas,

as the evidence indicates that connected parties and politicians have better future electoral prospects. The results thus uncover a key and persistent source of widening inequalities.

Our findings are relevant to the policy debate on improving educational outcomes in developing countries, where substantial money has increased coverage with only meager impacts on learning. Since the 1980s, spending has doubled on average in Latin America and Sub-Saharan Africa, tripled in the Middle East, increased more than five times in East Asia, and risen almost eight times in South Asia (Glewwe, Hanushek, Humpage, & Ravina, 2011). Consequently, formal schooling has experienced a dramatic expansion globally, reaching an almost-universal coverage of primary education and showing a significant leap in school enrollment in post-primary education.[24] However, the expansion and reach of formal education systems have not been accompanied by proportional progress in education quality (Mbiti, 2016), especially outside richer countries and households.[25] Our paper emphasizes that deep-rooted political incentives may explain such disappointing outcomes.[26]

[24]The data collected in the World Bank's 2018 World Development Report (The World Bank, 2018) shows that, between 1980 and 2010, net enrollment rates in primary education reached more than 90% in East Asia & Pacific (99.6%), Latin America & Caribbean (99.5%), Middle East & North Africa (98.0%), South Asia (97.5%), Sub-Saharan Africa (90.1%). Moreover, during the same period, enrollment in secondary education more than doubled in all of these developing regions: in East Asia & Pacific, net secondary enrollment rates jumped from 39.8% to 80.6%, in Latin America & Caribbean from 28.1% to 81.9%, in the Middle East & North Africa from 34.2% to 66.8%, in South Asia from 22.5% to 57.1%, and in Sub-Saharan Africa from 15.9% to 41.9%.

[25]According to the results from the OECD's Programme for International Student Assessment (PISA), students' median score in 23 of the 45 countries in the 2015 study performed below the established minimum proficiency threshold in mathematics (Pisa, 2016). More importantly, this cross-country assessment shows that learning is substantially lower in low- and middle-income countries and for children from most vulnerable households (The World Bank, 2018).

[26]See also Callen, Gulzar, Hasanain, Khan, and Rezaee (2023) for the case of health services.

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Table 1: Venal versus honest models of fake public service beneficiaries

Model type:	Venal	Honest	Empirical evidence
Core assumption	Politicians fabricate beneficiaries for personal gain	Politicians fabricate beneficiaries for public benefit	
Connection effects/incentives	1. Improved coordination of necessary actions	1. Improved coordination of necessary actions	
	2. Funds are token for exchange of political favors	2. Improved credit-claiming	
	3. Funds for clientelistic vote buying	3. Funds for better service	
Observable predictions	$\uparrow$ fake beneficiaries	$\uparrow$ fake beneficiaries	$\uparrow$
	1. $\uparrow$ patronage and discretionary contracting	1. $\rightarrow$ patronage and discretionary contracting	$\uparrow$
	2. $\uparrow$ electoral prospects	2. $\uparrow$ electoral prospects	$\uparrow$
	2. $\uparrow$ citizen complaints	2. $\rightarrow/\downarrow$ citizen complaints	$\uparrow$
	3. $\rightarrow$ / $\downarrow$ effective service	3. $\uparrow$ effective service	$\not\uparrow$
	3. $\uparrow$ fake beneficiaries in high electoral fraud areas	3. $\rightarrow$ fake beneficiaries in high electoral fraud areas	$\uparrow$
	3. $\uparrow$ electoral fraud	3. $\rightarrow$ electoral fraud	$\uparrow$

Table 2: Rules for Central Government Funds

Account	**Percent of total resources**	**Transferred to**	**Distribution criteria**
Payroll	90%	Paid directly by Ministry of Education	Number of Teachers, itself a function of *student enrollment.*
Quality-enrollment (*calidad-matrícula*)	5%	Regional Secretary of Education	Performance, poverty, and *student enrollment.*
Quality-access (*calidad-gratuidad*)	5%	Schools	*Student enrollment.*

Table 3: Main results: the effect of connection on ghost students (%)
RD estimators with optimal bandwidth

Dependent variable is ghost students per school (in %).						
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. No controls						
Connection	1.402**	1.272*	1.213*	1.588**	1.510*	1.172
	(0.692)	(0.708)	(0.726)	(0.765)	(0.783)	(0.888)
Observations	4,383	4,383	4,383	4,383	4,383	4,383
Obs. in bandwidth	1338	1249	1099	2090	1926	1455
Bandwidth	0.130	0.118	0.107	0.215	0.197	0.144
Kernel	Triangular	Epanechnikov	Uniform	Triangular	Epanechnikov	Uniform
Local polynomial order	1	1	1	2	2	2
Panel B. Controls						
Connection	1.434**	1.512**	1.319**	1.313*	1.568***	1.536***
	(0.689)	(0.614)	(0.616)	(0.706)	(0.571)	(0.573)
Observations	3,939	3,939	3,939	4,383	4,383	3,939
Obs. in bandwidth	1475	1352	1435	844	768	720
Bandwidth	0.160	0.143	0.153	0.082	0.079	0.080
School controls	✓		✓			✓
Student & teacher controls		✓	✓			✓
Municipality controls				✓	✓	✓
Electoral controls					✓	✓

Notes: The unit of observation is schools. Panel A reports standard bias-corrected RD estimators (Calonico et al., 2014) using different kernels and polynomials. Panel B reports covariate-adjusted and bias-corrected RD estimators (Calonico et al., 2019) weighted using a triangular kernel and including a linear polynomial. All estimates are computed within the optimal bandwidth and with robust standard errors clustered at the municipality level. *Connection* is an indicator variable equal to one if the candidate of the governor's party won the election. Dependent variable is the ratio of fake students to total students in 2012. *School controls*, *student & teacher controls*, *municipality controls*, and *electoral controls* are listed on Appendix Table A-1. * is significant at the 10% level, ** is significant at the 5% level, *** is significant at the 1% level.

Table 4: The effect of connection on ghost students: State capacity, management, autonomy and historical clientelism

Dependent variable is ghost students per school (in %).

	State Capacity			*Managers...*			
	Open government index	Performance index	Transparency index	Non-graduate	Old regime	Autonomy	Risk of Electoral Fraud, 2007
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. Dummy=1 or below median							
Connection	2.146*	2.048**	2.859***	2.346*	1.680**	4.005***	4.109***
	(1.114)	(0.933)	(0.944)	(1.251)	(0.837)	(1.257)	(0.433)
Observations	1,906	1,965	2,040	951	2,237	596	2,185
Obs. in bandwidth	634	819	784	326	794	271	698
Bandwidth	0.130	0.130	0.130	0.130	0.130	0.150	0.130
Panel B. Dummy=0 or above median							
Connection	-0.216	-0.269	-0.002	-0.520	-0.700	1.535	-1.093
	(0.237)	(0.363)	(0.277)	(0.387)	(0.887)	(0.996)	(1.138)
Observations	2,033	1,974	1,899	1,571	285	3,343	1,754
Obs. in bandwidth	607	422	457	579	111	1006	543
Bandwidth	0.130	0.130	0.130	0.130	0.130	0.130	0.130

Notes: The unit of observation is schools. Covariate-adjusted and bias-corrected RD estimators (Calonico et al., 2019) using *school controls*, *student & teacher controls*, *municipality controls*, and *electoral controls*. All estimates are computed inside the baseline bandwidth (0.130) with robust standard errors clustered at the municipality level. Regressions are weighted with a triangular kernel and include a linear polynomial of the running variable. *Connection* is an indicator variable equal to one if the candidate of the governor's party won the election. Dependent variable is the ratio of fake students to total students in 2012. In column 6, Panel A, a bandwidth of 0.15 is used in order to have enough observations to run the analysis. Variables definitions and the list of controls are on Appendix Table A-1. * is significant at the 10% level, ** is significant at the 5% level, *** is significant at the 1% level.

Table 5: Political connections and school quality:
Average test (Saber 11) scores at the school level & coverage rate at the municipal level

	Test score levels			Test score changes			Total coverage rate		
	2012	2013	2014	$\Delta 2012-2010$	$\Delta 2013-2010$	$\Delta 2014-2010$	2012	2013	2014
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A. Dependent variable is the level or change in the score of SABER 11: Language & Total coverage rate									
Connection	-0.269**	-0.320**	-0.122	0.036	-0.164	-0.195*	-3.910	-5.034	-4.716
	(0.129)	(0.129)	(0.124)	(0.172)	(0.158)	(0.105)	(8.249)	(9.691)	(10.71)
Observations	1,883	1,932	1,930	1,727	1,715	1,682	329	329	329
Obs. in bandwidth	413	250	347	380	375	369	143	149	149
Mean dependent	-0.200	-0.251	-0.341	-0.003	0.020	-0.034	89.291	88.819	88.819
Std. dev. dependent	0.970	0.907	0.950	0.818	0.787	0.777	20.453	20.501	20.501
Bandwidth	0.0844	0.0533	0.0764	0.0846	0.0837	0.0854	0.157	0.162	0.161
Panel B. Dependent variable is the the level or change in the score of SABER 11: Math									
Connection	-0.194	0.195	-0.007	-0.196	0.169	-0.182			
	(0.159)	(0.122)	(0.106)	(0.164)	(0.150)	(0.118)			
Observations	1,883	1,932	1,930	1,727	1,715	1,682			
Obs. in bandwidth	307	347	294	313	310	259			
Mean dependent	-0.306	-0.220	-0.272	0.058	0.075	0.095			
Std. dev. dependent	0.918	0.814	0.862	0.756	0.790	0.665			
Bandwidth	0.0696	0.0765	0.0617	0.0784	0.0792	0.0667			

Notes: The unit of observation is schools in columns 1-6 and municipalities in columns 7-9. Covariate-adjusted and bias-corrected RD estimators (Calonico et al., 2019) using *school controls*, *student & teacher controls*, *municipality controls*, and *electoral controls*. All estimates are computed inside the optimal bandwidth with robust standard errors clustered at the municipality level. Regressions are weighted with a triangular kernel and include a linear polynomial of the running variable. *Connection* is an indicator variable equal to one if the candidate of the governor's party won the election. Dependent variable is indicated at the top of each column. Variables definitions and the list of controls are on Appendix Table A-1. * is significant at the 10% level, ** is significant at the 5% level, *** is significant at the 1% level.

Table 6: Political connections and other municipal outcomes
Electoral fraud, Inspector General complaints, & Discretionary education contracts

Dependent variable is...	*Risk of electoral fraud in 2015...*		*Inspector General Complaints*			*Education Contracts*	
	Mayor	Governor	Total complaints	Education complaints	Share of education complaints	Discretionary contracts (#)	Discretionary contracts (value)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Connection	0.387*	0.300*	8.407**	0.365	1.741*	11.71**	17.37**
	(0.202)	(0.182)	(3.931)	(0.240)	(1.049)	(5.407)	(7.111)
Observations	329	329	329	329	329	168	168
Obs. in bandwidth	117	123	81	124	130	43	60
Mean dependent	0.667	0.593	29.444	0.065	0.270	8.398	13.506
Std. dev. dependent	0.473	0.493	91.041	0.355	1.580	14.904	20.278
Bandwidth	0.127	0.134	0.0910	0.136	0.142	0.105	0.133

Notes: The unit of observation is municipalities. Covariate-adjusted and bias-corrected RD estimators (Calonico et al., 2019) using *municipality controls* and *electoral controls*. All estimates are computed inside the optimal bandwidth with robust standard errors clustered at the municipality level. Regressions are weighted with a triangular kernel and include a linear polynomial of the running variable. *Connection* is an indicator variable equal to one if the candidate of the governor's party won the election. Dependent variable is indicated at the top of each column. Variables definitions and the list of controls are on Appendix Table A-1. * is significant at the 10% level, ** is significant at the 5% level, *** is significant at the 1% level.

Table 7: Political connections and school outcomes
New and temporary employees & contracted service

Dependent variable is...	*Management...*		*Share of temporary...*				*Contracted service (%)...*			
	New (dummy)	New (share)	Teachers 2012	Management 2012	Teachers 2013	Management 2013	2012	2013	2014	$\Delta 2011 - 2014$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Connection	0.031***	0.426***	9.108**	0.803***	9.759*	1.135***	2.756**	1.768	7.555***	7.534***
	(0.008)	(0.138)	(4.579)	(0.309)	(4.994)	(0.273)	(1.141)	(1.615)	(1.091)	(1.091)
Observations	3,864	3,864	3,859	2,517	3,719	2,427	3,939	3,790	3,374	3,374
Obs. in bandwidth	578	582	606	378	621	356	579	511	364	364
Mean dependent	0.005	0.225	27.969	0.747	26.965	0.751	4.085	5.538	6.262	5.934
Std. dev. dependent	0.071	4.201	35.111	3.472	34.182	3.480	11.207	13.356	15.054	14.335
Bandwidth	0.0578	0.0594	0.0672	0.0576	0.0682	0.0567	0.0562	0.0664	0.0520	0.0520

Notes: The unit of observation is schools. Covariate-adjusted and bias-corrected RD estimators (Calonico et al., 2019) using *school controls*, *student & teacher controls*, *municipality controls*, and *electoral controls*. All estimates are computed inside the optimal bandwidth with robust standard errors clustered at the municipality level. Regressions are weighted with a triangular kernel and include a linear polynomial of the running variable. *Connection* is an indicator variable equal to one if the candidate of the governor's party won the election. Dependent variable is indicated at the top of each column. Variables definitions and the list of controls are on Appendix Table A-1. * is significant at the 10% level, ** is significant at the 5% level, *** is significant at the 1% level.

Table 8: Party & politicians future prospects
Municipal incumbency-advantage analysis

Dependent variable is...	*Run...*		*In next elections, ... Win...*		*Vote share (Panel A) or Win | Run = 1 (Panel B)...*	
Sample:	Disconnected	Connected	Disconnected	Connected	Disconnected	Connected
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Party future prospects						
$\text{Win}_{t=0}^{\text{Party}}$	-0.00220	0.0306	-0.137***	0.135***	-0.0409***	0.0715***
	(0.0178)	(0.0225)	(0.0221)	(0.0235)	(0.00850)	(0.0101)
Observations	13,800	1,882	13,800	1,882	13,800	1,882
Obs. in bandwidth	3721	585	3337	452	3141	652
Mean dependent	0.445	0.443	0.178	0.176	0.158	0.157
Std. dev. dependent	0.497	0.497	0.382	0.381	0.209	0.209
Bandwidth	0.0720	0.0635	0.0638	0.0474	0.0595	0.0713
Panel B: Candidate future prospects						
$\text{Win}_{t=0}^{\text{Candidate}}$	0.0744***	0.0633	0.0119	0.375***	0.00654	0.271***
	(0.0286)	(0.0513)	(0.0211)	(0.0345)	(0.0420)	(0.0389)
Observations	15,448	2,988	15,448	2,988	5,567	1,208
Obs. in bandwidth	3094	699	3271	424	1203	296
Mean dependent	0.404	0.404	0.167	0.167	0.411	0.411
Std. dev. dependent	0.491	0.491	0.373	0.373	0.492	0.492
Bandwidth	0.0514	0.0516	0.0547	0.0296	0.0497	0.0507

Notes: In Panel A, the unit of observation is parties in the 1997, 2000, 2003, 2007 and 2011 election years, $Win_{t=0}^{Party}$ is an indicator variable equal to one if the party's candidate was elected in the mayoral election, and the dependent variable is the performance of the party in the next election (run, win, or vote share). In Panel B, the unit of observation is mayoral candidates in the 1997, 2000, 2003, 2007 and 2011 election years, $Win_{t=0}^{Candidate}$ is an indicator variable equal to one if the candidate was elected mayor, and the dependent variable is the performance of the candidate in any election (municipal, regional, or national) after the next regional election. Covariate-adjusted and bias-corrected RD estimators (Calonico et al., 2019) using municipality fixed effects, party fixed effects, and year fixed effects in Panel A and using municipality and year fixed effects in Panel B. All estimates are computed inside the optimal bandwidth with robust standard errors clustered at the municipality level. Regressions are weighted with a triangular kernel and include a linear polynomial of the running variable. Dependent variable is indicated at the top of each column. Variables definitions and the list of controls are on Appendix Table A-1. * is significant at the 10% level, ** is significant at the 5% level, *** is significant at the 1% level.

Figure 1: A simplified scheme of clientelistic political transactions

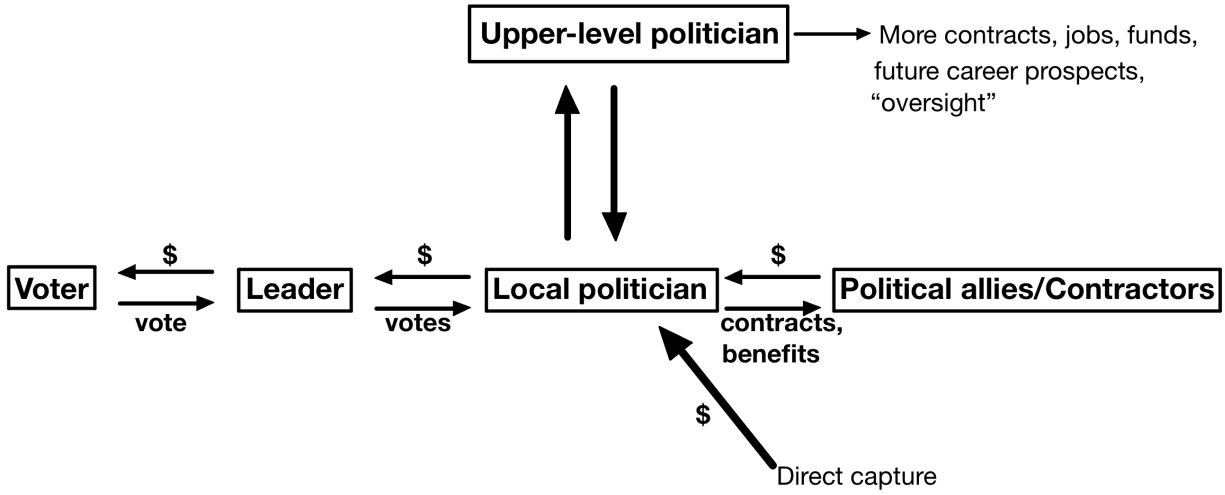
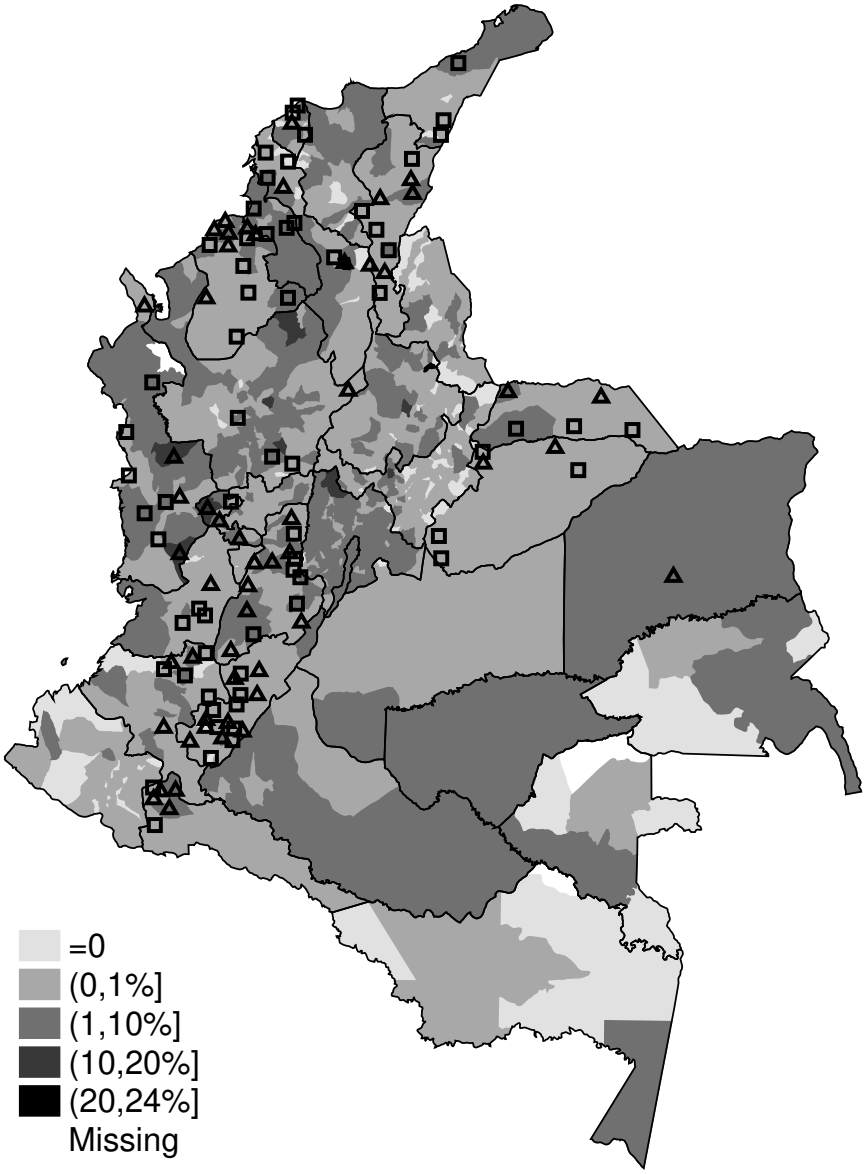
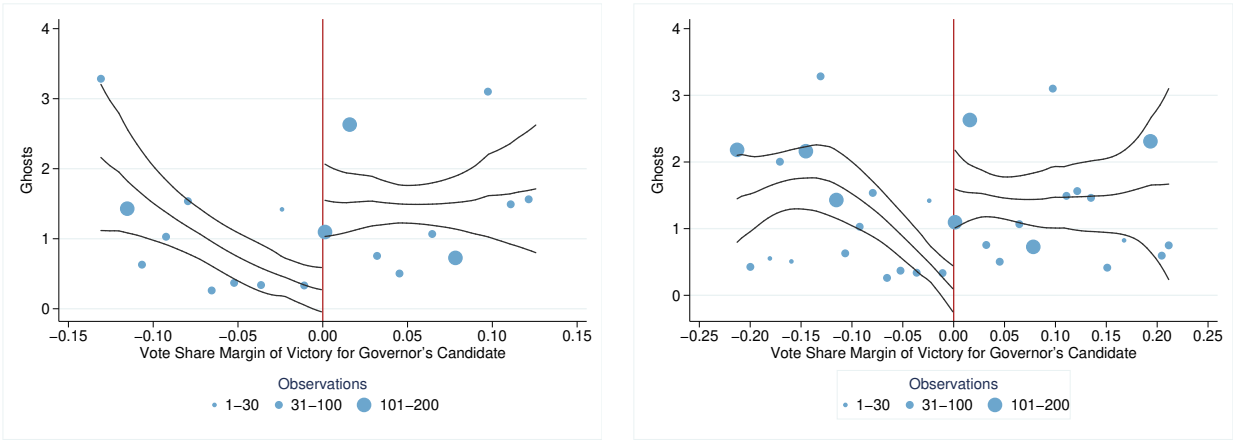


Figure 2: Ghost students in the Colombian territory



Notes: Share of ghost students per municipality (darker=more ghosts). Squares (triangles) are places where a candidate of the elected governor competed in a close race, defined using the baseline bandwidth of 13%, and lost (won).

Figure 3: Main results: the effect of connection on ghost students (%)
Graphical analysis



Notes: The unit of observation is schools. Standard bias-corrected RD estimators (Calonico et al., 2014). The left figure uses a linear fit while the right figure uses a quadratic fit. All estimates are computed inside the optimal bandwidth with robust standard errors clustered at the municipality level. Bins are selected to mimic the variance (evenly spaced using spacing estimators).

Appendix

Table A-1: Variables and Sources

Variable	Description	Source
	Main Variables	
Ghosts (%)	Ratio of false students to total students in 2012.	Ministry of Education, 2012 Audit
Connection	Treatment variable. Dummy = 1 if the mayoral candidate of the governor's party won the election.	Data from Pachón and Sánchez-Torres (2014). Own coding.
	School characteristics	
SABER 11 test scores	Average result (standardized) of the national college-level entry exam in the verbal and math sections.	Colombian Institute for the Evaluation of Education (*ICFES*)
New management (dummy)	Dummy = 1 if principal or one of the coordinators was hired in 2012.	Ministry of Education
New management (%)	Share of managers (principals and coordinators) that were hired in 2012.	Ministry of Education
Temporary teachers	Share of teachers who were hired through direct provisional hiring and not by open calls.	Ministry of Education
Temporary managers	Share of managers (principals and coordinators) who were hired through direct provisional hiring and not by open calls.	Ministry of Education
Autonomy	Dummy = 1 if the school is in a certified municipality (*i.e.*, the municipality has autonomy in the use of local education resources).	Own coding.
Non-postgraduate managers	Dummy = 1 if the principal or one of the coordinators does not that have a graduate level education title.	Ministry of Education
Old regime managers	Dummy = 1 if the principal or one of the coordinators were hired by the old regime of Decree 2277 of year 1979.	Ministry of Education
Contracted service (%)	Yearly share of students whose education is provided by a private contractor but financed by the Nation's budget. $\Delta 2011 - 2014$ refers to the change in the share of students un contracted service from 2011 to 2014.	Ministry of Education
School inputs (dummy)	Dummy = 1 if the school has laptops, desktop computers, tablets, electricity, or internet in 2014.	National Administrative Department of Statistics (2014)

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Table A-1 Variables and sources: – continued from previous page

Variable	Description	Source
School inputs (share)	Share of school students with access to laptops, desktop computers, tablets, electricity, or internet in 2014.	National Administrative Department of Statistics (2014)
	Municipal characteristics	
Total coverage rate	Students enrolled in schools of the municipality as a proportion of those that should be attending.	Ministry of Education
Risk of electoral fraud, 2007	Dummy = 1 if a municipality had risk of electoral fraud in the 2007 regional elections. Electoral risk is based on five dimensions of anomalies in the election: atypical level of participation, abrupt changes in participation, unusual null votes and unmarked ballots, and electoral dominance.	MOE (2018)
Risk of electoral fraud 2015, mayor	Dummy = 1 if a municipality had risk of electoral fraud in the mayoral elections. Electoral risk is based on five dimensions of anomalies in the election: atypical level of participation, abrupt changes in participation, unusual null votes and unmarked ballots, and electoral dominance.	MOE (2018)
Risk of electoral fraud 2015, governor	Dummy = 1 if a municipality had risk of electoral fraud in the gubernatorial elections. Electoral risk is based on five dimensions of anomalies in the election: atypical level of participation, abrupt changes in participation, unusual null votes and unmarked ballots, and electoral dominance.	MOE (2018)
Total complaints	Total complaints against public servants from 2012 to 2014.	Inspector General (*Procuraduría*)
Education complaints	Total complaints against schools employees from 2012 to 2014. Schools employees are identified using the entity of the individual involved in the complaint of the Inspector General.	Inspector General (*Procuraduría*)
Share of education complaints	Ratio of complaints against schools employees to total complaints from 2012 to 2014.	Inspector General (*Procuraduría*)
Discretionary contracts (#)	Number of contracts awarded through the direct selection method as a share of the total contracts. Following Gallego et al. (2020), we define 'competitive' contracts as those that are awarded using public tenders, auctions, selection based on merits, or a special regime. We focus only in municipal contracts from 2012 to 2015.	SECOP (*Sistema Electrónico para la Contratación Pública*)
Discretionary contracts (value)	Value of contracts awarded through the direct selection method as a share of the value of total contracts.	SECOP (*Sistema Electrónico para la Contratación Pública*)
Open government index	*Indice de gobierno abierto*. It measures the amount of information reported by municipal governments and the status in the implementation of standards that seek to promote better public management. The index is based on four components: systems of internal accountability, information management, visibility in contracting, and transparency in the accountability process. Measured from 0 to 100.	Inspector General (*Procuraduría*)

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Table A-1 Variables and sources: – continued from previous page

Variable	Description	Source
Performance index	*Indice de desempeño integral*. It evaluates four components of public management and decision making in the use of public resources: effectiveness in the accomplishment of proposals, efficiency in the use of public resources for health, education and drinking water, regulatory compliance of *SGP* regulations, and fiscal performance. Measured from 0 to 100.	National Planning Department (*Departamento Nacional de Planeación*)
Municipal transparency	Component of the Open government index that evaluates the mechanisms used by municipalities to guide and strengthen the relationship between the citizens and the State. Specifically, it determines if the municipal administration reports to the community and the quality of that reporting. Measured from 0 to 100.	Inspector General (*Procuraduría*)
Tax Revenue	Municipality average tax revenue between 2012 and 2014, expressed as the logarithm of the per capita revenue or the share of the total municipal revenue.	National Planning Department (*Departamento Nacional de Planeación*)
Transfers	Average transfer to the municipality between 2012 and 2014, expressed as the logarithm of the per capita transfer or the share of the total municipal revenue. We use total transfers, the transfers from the national government, and the transfers from non-national entities (*i.e.*, departmental transfers).	National Planning Department (*Departamento Nacional de Planeación*)
	Incumbency-advantage analysis	
Run	Dummy equal to one if the party or candidate participated in an election.	Data from Pachón and Sánchez-Torres (2014) and Torres (2023). Own coding.
Win	Dummy equal to one if a candidate of the party won the election.	Data from Pachón and Sánchez-Torres (2014) and Torres (2023). Own coding.
Vote Share	Votes for the party as a proportion of total votes in the election. If the party is not running, the vote share is set to zero.	Data from Pachón and Sánchez-Torres (2014). Own coding.
Win| Run=1	Dummy equal to one if a candidate won the election, focusing only on candidates that participated in any election.	Data from Torres (2023). Own coding.
	School Controls	
In rural area (%)	Share of students that live in rural areas.	Ministry of Education
Extended school day (%)	Share of students that are enrolled in full-time school.	Ministry of Education
Contracted service (%)	Share of students whose education is provided by a private contractor but financed by the Nation's budget.	Ministry of Education

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Table A-1 Variables and sources: – continued from previous page

Variable	Description	Source
Total students	Total number of students registered in the school.	Ministry of Education
Total teachers	Total number of teachers in the school.	Ministry of Education
Managers (%)	Share of school employees that have administrative duties.	Ministry of Education
	Students & Teachers Controls	
Men (%)	Share of men students in the school.	Ministry of Education
Minors (%)	Share of students that are underage (less than 18 years old).	Ministry of Education
High school (%)	Share of the students that are in the last four years of school.	Ministry of Education
With disabilities (%)	Share of students with physical disability.	Ministry of Education
In stratum 0, 1 or 2 (%)	Share of students in the lower stratums. Neighborhoods are classified from zero to six stratums, with six being the wealthiest and zero the poorest.	Ministry of Education
Teachers without diploma (%)	Share of teachers that lack education titles.	Ministry of Education
	Municipality controls	
Total Population	Municipality's total population.	Acevedo, Bornacelly Olivella, et al. (2014)
Urban Population	Municipality's urban population.	Acevedo et al. (2014)
Notaries	Number of notaries in the municipality.	Acevedo et al. (2014)
Elevation	Geographical elevation of the municipality in meters above the sea level.	Acevedo et al. (2014)
Distance to Bogota	Distance in kilometres from a municipality to Bogota, the capital city of Colombia.	Acevedo et al. (2014)
Area (km2)	Area of the municipality in square kilometers.	Acevedo et al. (2014)

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Table A-1 Variables and sources: – continued from previous page

Variable	Description	Source
Distance to Dep. capital	Distance in kilometres from a municipality to the department capital.	Acevedo et al. (2014)
	Electoral controls	
Council votes	Share of votes of the governor party in the municipal council.	Data from Pachón and Sánchez-Torres (2014). Own coding.
Fixed effects for main parties	The top 5 parties with the most elected mayors in our sample - *Partido Liberal*, *Partido Verde*, *Partido de la U*, *Partido Consevador*, and *Movimiento ASI*.	Data from Pachón and Sánchez-Torres (2014). Own coding.
Female mayor	Dummy equal to one if the mayor is a woman.	Ruiz (2017)
Ethnicity of mayor	Categorical variable. Categories are: (1) Indigenous, (2) Afro-Colombian, or (3) White.	Ruiz (2017)
	Other municipal characteristics	
Per capita property tax	Per capita tax revenue from taxes on all properties.	Acevedo et al. (2014)
Investment on education	Investment in education by the local government.	Acevedo et al. (2014)
SGP on education	Central government's SGP transfers to finance education.	Acevedo et al. (2014)
Coca presence	Hectares of coca cultivation.	Acevedo et al. (2014)
Forced displacement	Number of people that forcibly emigrated the municipality.	Acevedo et al. (2014)
Infant mortality rate	Number of deaths per 1,000 live births.	Acevedo et al. (2014)
Private schools	Total number of private schools in the municipality.	Acevedo et al. (2014)
Rural population	Municipality's rural population.	Acevedo et al. (2014)

Table A-2: Descriptive statistics, differences in characteristics

Variable	Full Sample Mean	In Sample Mean	Out Sample Mean	p-value
	(1)	(2)	(3)	(4)
		A. School level		
Ghosts (%)	1.23	1.35	1.18	0.47
In rural area (%)	67.28	73.54	64.54	0.14
Extended school day (%)	32.38	35.37	31.07	0.37
Contracted service (%)	15.44	10.55	17.58	0.06
Total students	249.43	273.44	238.95	0.13
Total teachers	24.44	23.41	24.95	0.67
Coordinators (%)	1.80	1.67	1.87	0.40
Men (%)	52.12	52.17	52.10	0.78
Minors (%)	91.68	90.67	92.12	0.05
Teachers without diploma (%)	1.92	1.78	1.99	0.63
High school (%)	28.10	27.27	28.46	0.63
With disabilities (%)	2.34	2.35	2.34	0.98
In stratum 0, 1 or 2 (%)	94.97	97.04	94.06	0.02
Verbal test score, 2010	0.00	-0.26	0.11	0.00
Math test score, 2010	-0.00	-0.31	0.13	0.00
Δ Verbal test score, 2011-2010	0.03	-0.03	0.06	0.01
Δ Math test score, 2011-2010	0.04	0.04	0.03	0.66
		B. Municipal level		
Ghosts (%)	1.19	1.27	1.16	0.47
Total Population	41,109.54	36,313.80	43,130.08	0.54
Urban Population	31,145.89	23,125.44	34,525.07	0.30
Notaries	0.77	0.75	0.78	0.78
Elevation	1,142.27	709.66	1,324.54	0.00
Distance to Bogota	321.13	391.13	291.64	0.00
Area (km2)	1,013.28	1,155.60	953.31	0.39
Distance to Dep. capital	81.19	82.01	80.84	0.77
Per capita property tax	32.02	25.25	34.94	0.00
Investment on education	8.94	6.38	10.03	0.25
SGP on education	0.14	0.15	0.13	0.01
Coca	95.59	57.58	111.29	0.11
Forced displacement	238.02	336.84	196.71	0.00
Births	483.52	519.43	468.37	0.56
Infant mortality rate	22.11	24.71	21.01	0.00
Car theft	7.23	2.28	9.32	0.14
Private schools	3.30	2.04	3.83	0.17

Notes: The table reports the balance tests comparing groups inside and outside our baseline sample. Column 4 reports the p-value of a t-test of the in sample mean (column 2) and out of sample mean (column 3). See the text and Appendix Table A-1 for more details and definitions.

Table A-3: Descriptive statistics, main variables

	Full sample	Close races < 13%	
		Connected	Disconnected
Variable	(1)	(2)	(3)
A. School level			
Outcome variables			
Ghosts (%)	1.348	1.525	1.117
	(4.774)	(4.532)	(4.741)
Verbal test score, 2012	-0.307	-0.218	-0.400
	(0.912)	(0.996)	(0.817)
Verbal test score, 2013	-0.287	-0.140	-0.430
	(0.938)	(0.989)	(0.825)
Verbal test score, 2014	-0.325	-0.179	-0.512
	(0.932)	(1.006)	(0.859)
Δ Verbal test score, 2012-2010	0.016	-0.044	0.099
	(0.780)	(0.733)	(0.784)
Δ Verbal test score, 2013-2010	0.030	0.028	0.030
	(0.775)	(0.765)	(0.713)
Δ Verbal test score, 2014-2010	0.020	0.014	-0.005
	(0.757)	(0.762)	(0.715)
Math test score, 2012	-0.276	-0.188	-0.391
	(0.925)	(0.992)	(0.839)
Math test score, 2013	-0.275	-0.133	-0.359
	(0.910)	(1.062)	(0.730)
Math test score, 2014	-0.282	-0.172	-0.413
	(0.919)	(0.951)	(0.859)
Δ Math test score, 2012-2010	0.091	0.078	0.021
	(0.745)	(0.718)	(0.748)
Δ Math test score, 2013-2010	0.093	0.136	0.037
	(0.796)	(0.933)	(0.690)
Δ Math test score, 2014-2010	0.105	0.107	0.039
	(0.700)	(0.720)	(0.649)
New mgmt. (dummy)	0.007	0.005	0.006
	(0.086)	(0.074)	(0.074)
New mgmt. (%)	0.471	0.323	0.324
	(6.255)	(5.307)	(4.924)
Temporary teachers, 2012 (%)	23.866	25.041	16.294
	(32.329)	(33.724)	(23.459)
Temporary managers, 2012 (%)	0.382	0.508	0.363
	(2.629)	(2.646)	(2.389)
Temporary teachers, 2013 (%)	25.807	24.093	18.959
	(32.566)	(32.812)	(23.892)
Temporary managers, 2013 (%)	0.361	0.546	0.292
	(2.508)	(2.772)	(1.891)
Contracted service 2012 (%)	8.099	5.875	5.880
	(17.975)	(16.364)	(12.926)
Contracted service 2013 (%)	9.202	7.226	6.276
	(19.335)	(17.881)	(13.792)
Contracted service 2014 (%)	9.054	8.116	5.326
	(19.746)	(20.064)	(13.678)
Contracted service, Δ2011 − 2014	8.837	7.764	5.218
	(19.435)	(19.575)	(13.516)
Mayor-governor party connection			
Connection	0.313	1.000	0.000
	(0.464)	(0.000)	(0.000)
School characteristics			
Autonomy	0.186	0.318	0.062
	(0.389)	(0.466)	(0.242)
Non-graduate mgmt.	0.378	0.318	0.425
	(0.485)	(0.466)	(0.495)
Old regime mgmt.	0.886	0.853	0.898
	(0.318)	(0.355)	(0.303)

	Full sample	Close races < 13%	
		Connected	Disconnected
Variable	(4)	(5)	(6)
B. Municipal level			
Outcome variables			
Ghosts (%)	1.266	1.712	0.892
	(2.346)	(4.147)	(1.253)
Total coverage rate, 2012	87.866	86.979	90.007
	(18.761)	(20.315)	(21.048)
Total coverage rate, 2013	88.339	88.167	90.197
	(19.478)	(20.408)	(23.413)
Total coverage rate, 2014	87.697	87.833	89.776
	(20.839)	(21.686)	(25.540)
Electoral fraud 2015, mayor	0.720	0.679	0.667
	(0.450)	(0.471)	(0.475)
Electoral fraud 2015, governor	0.636	0.547	0.636
	(0.482)	(0.503)	(0.485)
Total complaints	29.301	45.792	14.591
	(66.283)	(117.086)	(12.632)
Educ. complaints	0.063	0.151	0.034
	(0.299)	(0.533)	(0.205)
Educ. complaints (%)	0.217	0.662	0.107
	(1.283)	(2.434)	(0.890)
Discretionary contracts (#)	25.034	9.559	16.714
	(30.454)	(15.413)	(21.568)
Discretionary contracts (value)	22.158	14.230	13.344
	(29.460)	(23.037)	(18.368)
Mayor-governor party connection			
Connection	0.298	1.000	0.000
	(0.458)	(0.000)	(0.000)
Municipal characteristics			
Open gov. index	61.881	63.942	61.134
	(13.030)	(11.609)	(13.333)
Performance index	56.136	55.522	55.233
	(14.877)	(14.335)	(14.478)
Transparency index	51.924	53.640	47.874
	(20.846)	(18.195)	(23.424)
Electoral fraud, 2007	0.488	0.528	0.364
	(0.501)	(0.504)	(0.485)

Notes: The table reports the mean values of variables in the samples described in the column heading, with standard deviations in parentheses. Close races are defined using the Calonico et al. (2014) optimal bandwidth in our baseline specification, 13.0%. See the text and Appendix Table A-1 for more details and definitions.

Table A-4: Descriptive statistics, additional variables

	All sample			Close races < 13%					
				Connected			Not connected		
	N	*Mean*	*S.D.*	*N*	*Mean*	*S.D.*	*N*	*Mean*	*S.D.*
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A. School level									
Ghosts (dummy)	4,383	0.47	0.50	783	0.55	0.50	555	0.48	0.50
In rural area (%)	4,344	73.54	42.89	771	73.60	42.89	552	74.58	41.76
Extended school day (%)	4,344	35.37	46.58	771	20.50	38.91	552	23.26	40.57
Contracted service (%)	4,344	10.55	25.50	771	5.52	17.29	552	8.41	19.57
Total students	4,344	273.44	295.79	771	314.87	327.06	552	314.10	269.23
Total teachers	3,945	23.41	27.75	732	24.64	28.00	513	27.72	25.82
Coordinators (%)	3,945	1.67	3.33	732	1.80	2.95	513	1.73	2.31
Men (%)	4,344	52.17	7.50	771	51.62	8.19	552	52.45	6.35
Minors (%)	4,344	90.67	12.11	771	89.30	13.45	552	88.87	11.50
Teachers without diploma (%)	3,945	1.78	8.40	732	2.31	11.77	513	1.87	8.10
High school (%)	4,344	27.27	24.71	771	28.47	25.19	552	31.62	22.19
With disabilities (%)	4,344	2.35	5.17	771	2.85	6.09	552	3.00	6.30
In stratum 0, 1 or 2 (%)	4,344	97.04	6.89	771	97.04	7.65	552	97.77	5.14
Verbal test score, 2010	1,849	-0.26	0.95	345	-0.09	1.02	278	-0.44	0.89
Math test score, 2010	1,849	-0.31	0.92	345	-0.20	0.99	278	-0.34	0.84
Δ Verbal test score, 2011-2010	1,831	-0.03	0.79	341	-0.05	0.71	277	-0.03	0.86
Δ Math test score, 2011-2010	1,831	0.04	0.68	341	0.00	0.69	277	-0.01	0.70
B. Municipal level									
Ghosts (dummy)	332	0.95	0.22	53	0.98	0.14	66	0.95	0.21
Total Population	332	36,313	62,793	53	43,405	93,658	66	24,933	20,591
Urban Population	332	23,125	57,170	53	28,801	85,762	66	13,282	15,368
Notaries	329	0.75	0.77	53	0.87	1.24	66	0.64	0.48
Elevation	332	709.66	1,518.97	53	738.98	700.47	66	489.42	565.21
Distance to Bogota	332	391.13	190.09	53	372.82	162.80	66	412.52	213.39
Area (km2)	332	1,155	3,916	53	2,154	8,962	66	956	1,735
Distance to Dep. capital	332	82.01	61.55	53	84.36	62.96	66	75.68	45.30
Council votes	332	0.18	0.12	53	0.23	0.10	66	0.22	0.09
Mayor Party 1	332	0.26	0.44	53	0.23	0.42	66	0.27	0.45
Mayor Party 2	332	0.09	0.28	53	0.09	0.30	66	0.06	0.24
Mayor Party 3	332	0.18	0.39	53	0.08	0.27	66	0.05	0.21
Mayor Party 4	332	0.24	0.43	53	0.40	0.49	66	0.35	0.48
Mayor Party 5	332	0.04	0.19	53	0.09	0.30	66	0.03	0.17
Female mayor	332	0.07	0.25	53	0.04	0.19	66	0.08	0.27
Indigenous Mayor	332	0.13	0.33	53	0.11	0.32	66	0.17	0.38
Afro-Colombian Mayor	332	0.09	0.29	53	0.08	0.27	66	0.06	0.24
White Mayor	332	0.78	0.41	53	0.81	0.39	66	0.77	0.42
Fiscal dependency	314	0.72	0.18	51	0.75	0.13	63	0.69	0.22
Per capita property tax	332	25.25	37.04	53	21.83	27.53	66	26.98	51.09
Investment on education	323	6.38	19.96	52	9.94	30.38	65	2.10	2.42
SGP on education	323	0.15	0.15	52	0.16	0.19	65	0.11	0.04
Coca	309	57.58	346.65	51	107.92	679.44	61	31.65	188.73
Forced displacement	329	336.84	524.06	53	365.17	487.42	66	232.70	454.47
Births	332	519.43	947.67	53	642.09	1,338.57	66	331.23	268.98
Mortality rate	332	24.71	9.96	53	24.77	8.19	66	25.72	10.61
Car theft	332	2.28	9.50	53	2.85	12.16	66	1.18	4.18
Private schools	332	2.04	6.39	53	2.85	9.25	66	1.08	2.30
Rural population	332	13,095.70	13,765.98	53	14,537.13	14,085	66	11,547.50	9,909.85

Notes: The table reports the mean and standard deviations of variables in the samples described in the column heading. Close races are defined using the (Calonico et al., 2014) optimal bandwidth in our baseline specification, 13.0%. See the text and Appendix Table A-1 for more details and definitions.

Table A-5: Municipal-level results: political connections and ghosts (%)
RD estimators with optimal bandwidth

Dependent variable is ghost students per municipality (in %).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Connection	3.872*	3.931*	2.232	5.270*	5.413*	3.786	4.604**	3.605*	4.030**
	(2.382)	(2.380)	(1.919)	(2.851)	(2.867)	(2.566)	(2.345)	(2.048)	(2.038)
Observations	332	332	332	332	332	332	309	332	309
Obs. in bandwidth	109	96	117	143	133	153	97	109	102
Bandwidth	0.119	0.107	0.126	0.159	0.145	0.165	0.113	0.117	0.118
Kernel	Triangular	Epanechnikov	Uniform	Triangular	Epanechnikov	Uniform	Triangular	Triangular	Triangular
Local polynomial Order	1	1	1	2	2	2	1	1	1
Municipality controls							✓		✓
electoral controls								✓	✓

Notes: The unit of observation is municipalities. Columns 1-6 report standard bias-corrected RD estimators (Calonico et al., 2014) using different kernels and polynomials. Columns 7-9 report covariate-adjusted and bias-corrected RD estimators (Calonico et al., 2019) including a linear polynomial and weighted using a triangular kernel. All estimates are computed inside the optimal bandwidth with robust standard errors clustered at the municipality level. *Connection* is an indicator variable equal to one if the candidate of the governor's party won the election. Variables definitions and the list of controls are on Appendix Table A-1. * is significant at the 10% level, ** is significant at the 5% level, *** is significant at the 1% level.

Table A-6: Political connections and ghosts: Basic robustness

Dependent variable is...	Ghost students per school (in %), cols											
	Dependent variable transformations			Dropping outliers *Extreme values*			Donut hole *% of the optimal bandwith*			Dropping large cities *Muns. with a pop. of over...*		
	dummy	log	asinh	1 %	3 %	5 %	1 %	3 %	5 %	1 M	500 K	100 K
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Connection	0.065	0.358**	0.458**	1.009**	0.762**	0.540**	1.549**	1.304*	1.331*	1.402**	1.444**	2.149**
	(0.186)	(0.144)	(0.182)	(0.504)	(0.313)	(0.249)	(0.693)	(0.685)	(0.723)	(0.692)	(0.673)	(1.049)
Observations	4,383	4,383	4,383	4,339	4,251	4,161	4,370	4,348	4,334	4,383	4,193	3,531
Obs. in bandwidth	1193	1548	1548	1519	1313	1361	1265	1243	1229	1338	1479	987
Mean dependent	0.508	0.444	0.556	1.059	0.801	0.645	1.367	1.367	1.367	1.356	1.425	1.113
Std. dev. dependent	0.500	0.718	0.901	2.490	1.718	1.289	4.681	4.681	4.681	4.622	4.743	3.346
Bandwidth	0.112	0.152	0.152	0.147	0.131	0.140	0.125	0.125	0.124	0.130	0.151	0.120

Notes: The unit of observation is schools. Table reports standard bias-corrected RD estimators (Calonico et al., 2014) using a triangular kernel and including a linear polynomial. All estimates are computed within the optimal bandwidth and with robust standard errors clustered at the municipality level. *Connection* is an indicator variable equal to one if the candidate of the governor's party won the election. Variables definitions and the list of controls are on Appendix Table A-1. * is significant at the 10% level, ** is significant at the 5% level, *** is significant at the 1% level.

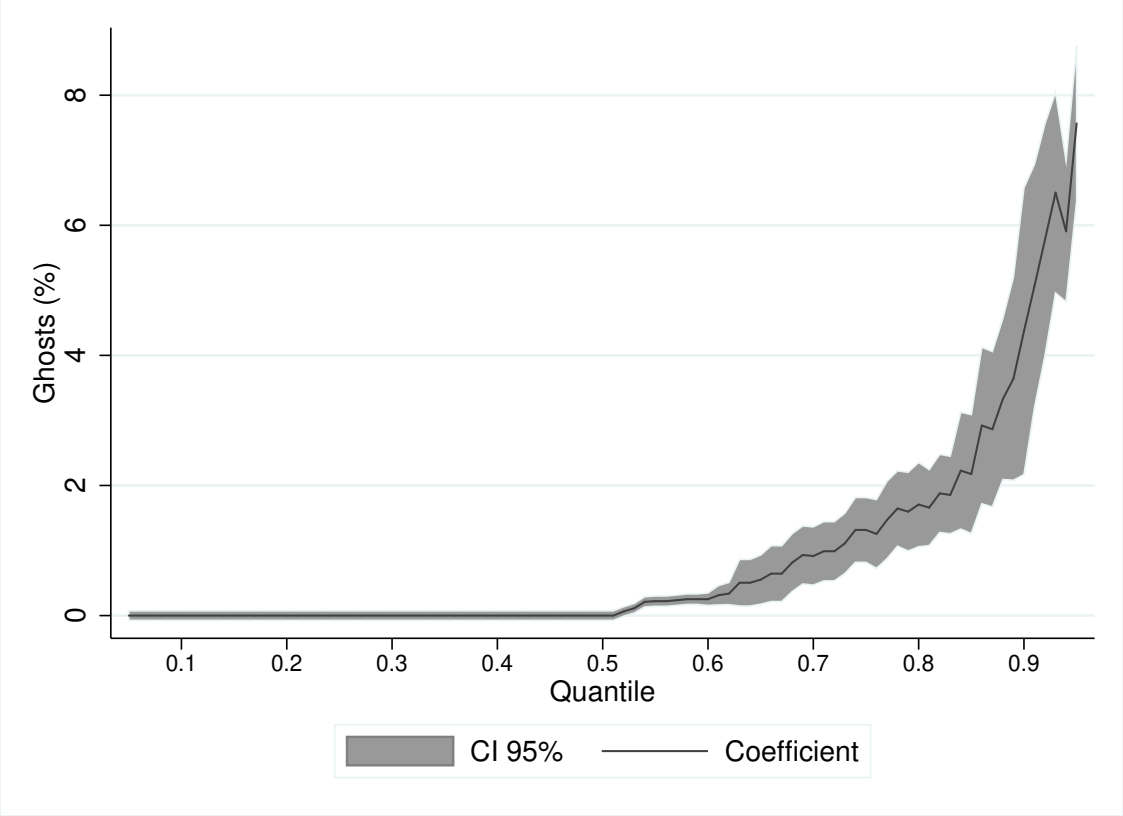
Table A-7: Political connections and fiscal performance: Tax revenue and transfers

Dependent variable is average (2012-2014)...

	Tax Revenue		Total Transfers		Transfers from...			
					National Gov.		Non-national entities	
	log per capita	% of total revenue	log per capita	% of total revenue	log per capita	% of total revenue	log per capita	% of total revenue
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Connection	-0.053	-0.098	-0.184	0.514	-0.088	7.925	-0.139	-5.466
	(0.055)	(4.470)	(0.139)	(5.984)	(0.081)	(8.613)	(0.131)	(5.216)
Observations	332	332	332	332	332	332	332	332
Obs. in bandwidth	111	128	138	127	131	133	169	170
Mean dependent	0.122	12.013	0.617	78.778	0.600	77.925	0.016	0.984
Std. dev. dependent	0.139	10.906	0.247	12.735	0.189	13.607	0.121	4.951
Bandwith	0.122	0.141	0.152	0.141	0.144	0.145	0.195	0.198

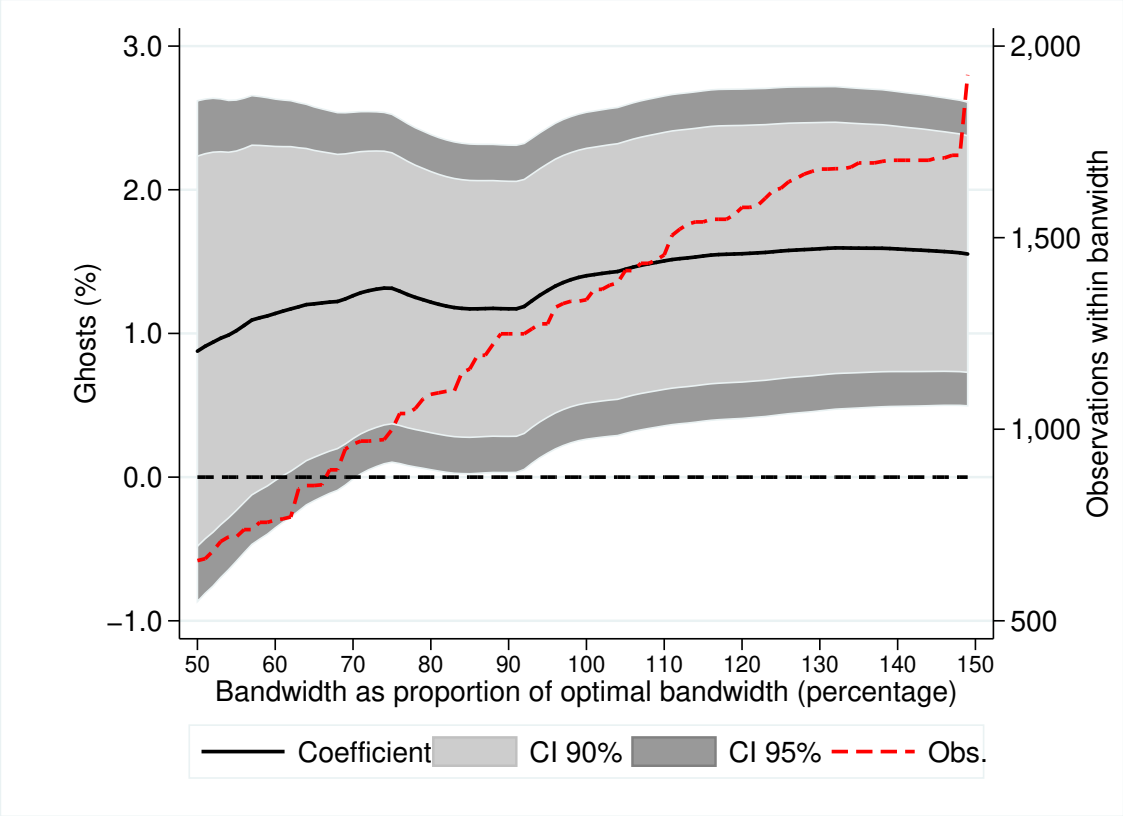
Notes: The unit of observation is municipalities. Covariate-adjusted and bias-corrected RD estimators (Calonico et al., 2019) using *municipality controls* and *electoral controls*. All estimates are computed inside the optimal bandwidth with robust standard errors clustered at the municipality level. Regressions are weighted with a triangular kernel and include a linear polynomial of the running variable. *Connection* is an indicator variable equal to one if the candidate of the governor's party won the election. Dependent variable is indicated at the top of each column. Variables definitions and the list of controls are on Appendix Table A-1. * is significant at the 10% level, ** is significant at the 5% level, *** is significant at the 1% level.

Figure A-1: Quantile treatment effects



Notes: The unit of observation is schools. The figure plots the nonparametric estimator for local quantile treatment effects (Frandsen et al., 2012) and 95% confidence intervals for the effect of political connections on the distribution of ghost students per school (in %). All estimates are computed inside the optimal bandwidth (Calonico et al., 2014).

Figure A-2: Main results: Robustness to bandwidth choice

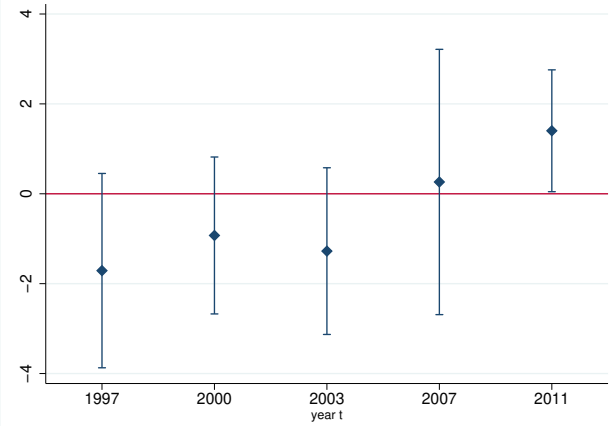


Notes: The unit of observation is schools. Standard bias-corrected RD estimators (Calonico et al., 2014). All estimates are computed inside the optimal bandwidth with robust standard errors clustered at the municipality level. Regressions are weighted with a triangular kernel and include a linear polynomial of the running variable.

Figure A-3: Falsification tests
Predicting ghosts and previous political connections

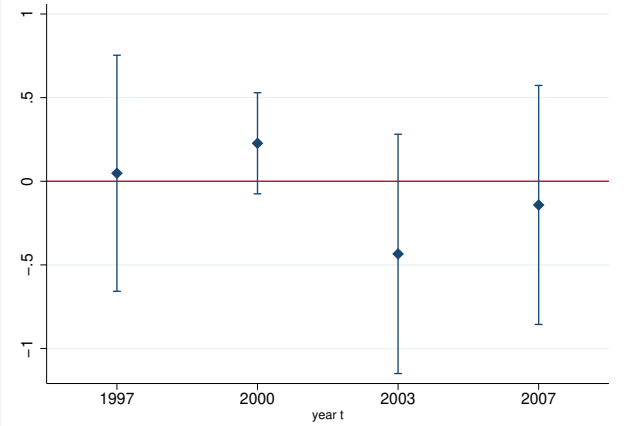
Panel A

Ghosts in 2012 (%) = f(connection in year t)



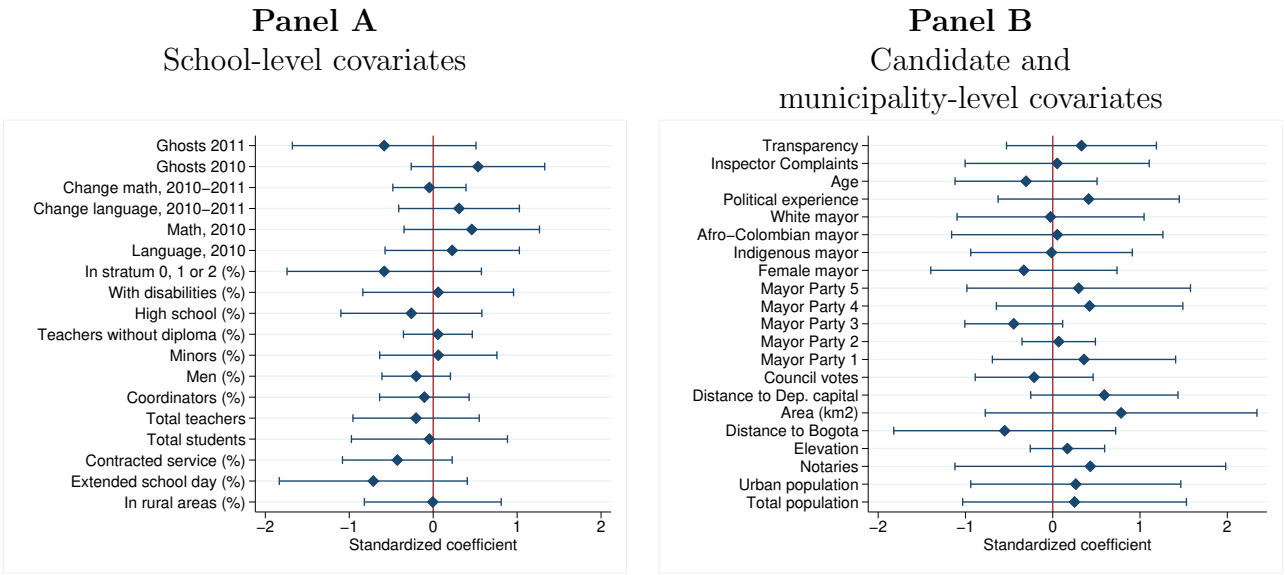
Panel B

Connection in year t = f(connection in 2011)



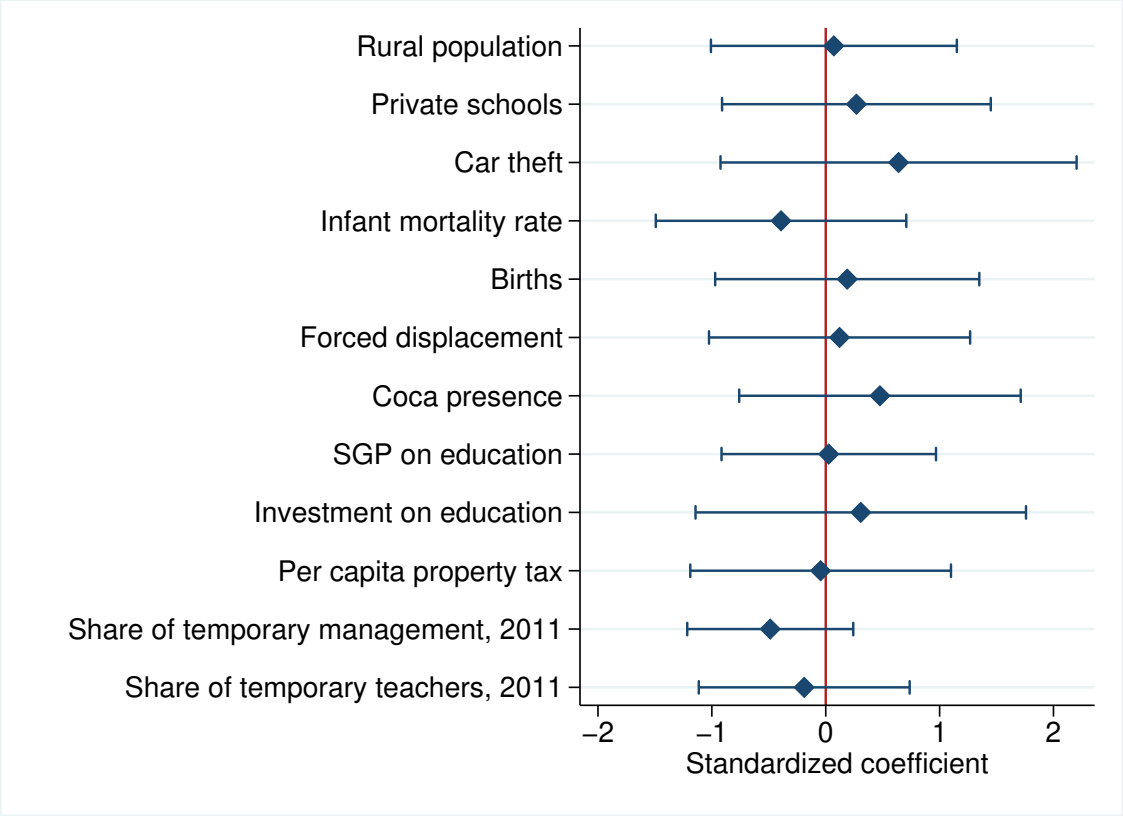
Notes: The unit of observation is schools. Standard bias-corrected RD estimators (Calonico et al., 2014). All estimates are computed inside the optimal bandwidth with robust standard errors clustered at the municipality level. In Panel A, the dependent variable is the share of ghost students and the treatment variable is mayor and governor party connection in each election year marked in the x-axis. In Panel B, the dependent variable is connection between mayor and governor in each election marked in the x-axis and the treatment variable is mayor and governor party connection in 2011.

Figure A-4: Balance on observable variables: school, politician and municipality levels



Notes: Standard bias-corrected RD estimators (Calonico et al., 2014). All estimates are computed inside the optimal bandwidth with robust standard errors clustered at the municipality level. All effects are standardized.

Figure A-5: Balance on observable variables, additional variables

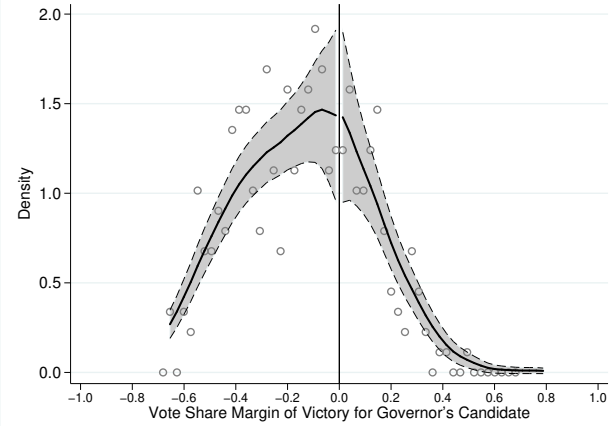


Notes: Standard bias-corrected RD estimators (Calonico et al., 2014). All estimates are computed inside the optimal bandwidth with robust standard errors clustered at the municipality level. All effects are standardized.

Figure A-6: Verifying manipulation density test for running variable

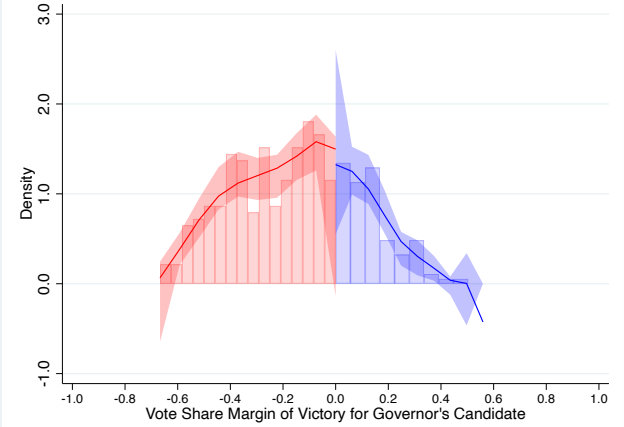
Panel A

McCrary (2008)



Panel B

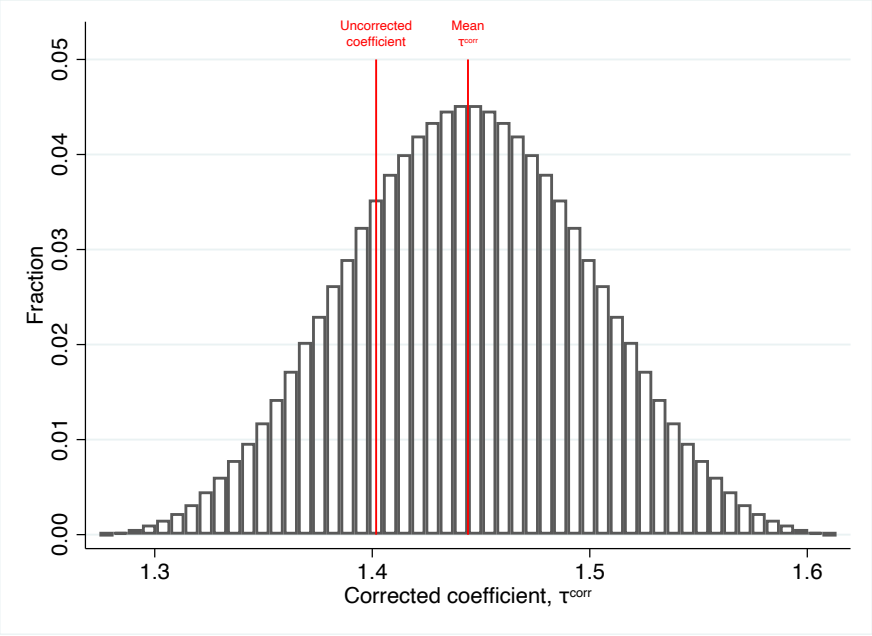
Cattaneo et al. (2020)



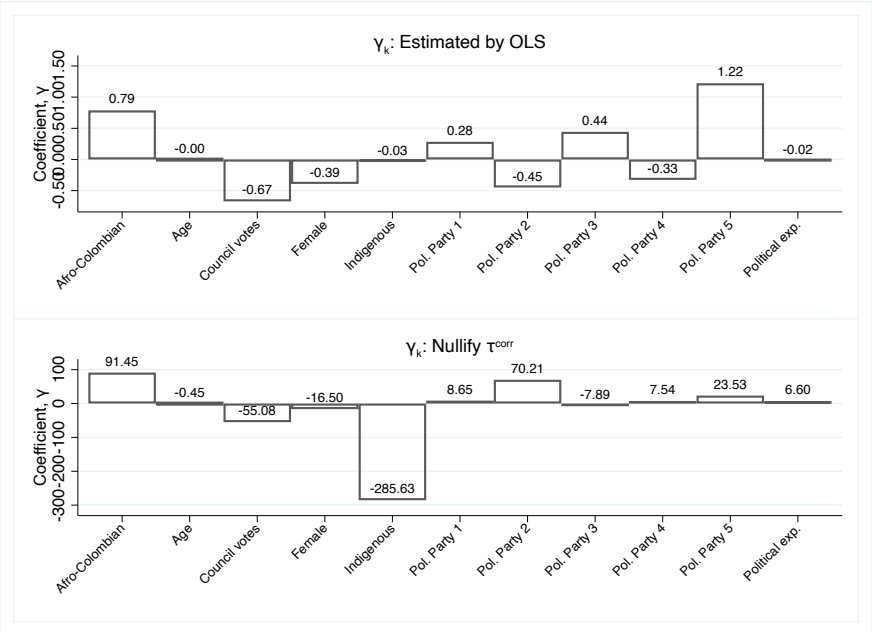
Notes: In Panel A, the discontinuity estimate is 0.0268 with a standard error of 0.2647. In Panel B, the difference between the two estimators of the density (above and below) at the boundary point is 0.839 with a standard error of 0.716.

Figure A-7: Marshall (2022)

Panel A: Corrected coefficient



Panel B: Sensitivity



Notes: Panel A plots distribution of Marshall (2022) corrected estimator, $\hat{\tau}^{\text{corr}} = \hat{\tau} - \sum_k \hat{\gamma}_k \hat{\delta}_k$, generated by scaling each estimated γ_k by 0.5, 1, and 1.5. The top portion of Panel B displays the values of $\hat{\gamma}_k$ estimated by OLS. The lower portion of panel B calculates the value of each $\hat{\gamma}_k$ that would nullify the mean corrected estimated effect. See the text for more details.