Stealing Elections: An Analysis of Electoral Manipulation Strategies*

Miguel R. Rueda†

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Abstract

Corrupt politicians use a variety of manipulation strategies to win elections. How do they choose between them? While the current literature on electoral manipulation has concentrated on voters' characteristics that affect the incidence of one form of manipulation, this paper studies the effects of election-level factors on the relative incidence of distinct strategies. Using a new data set of citizens' and election monitors' reports of electoral crimes in Colombia, it is found that larger numbers of voters per polling station reduce reports of vote buying, but do not affect the number of reports of restriction on turnout. The finding lends support to the claim that vote buying in secret ballot elections can not be sustained when results are given at high levels of aggregation. It is also found that the size of the electorate has a larger negative effect on vote buying than on fraud or restrictions on turnout, which is consistent with vote buying having larger marginal costs of implementation than alternative methods.

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†Graduate Student, Department of Political Science, University of Rochester. Email: mrueda@mail.rochester.edu.

1 Introduction

In October 31 of 2011 in the town of Yopal Colombia, hundreds of people armed with stones, machetes and farm tools went to the local offices of the *Registraduría Nacional* (National Registrar's office) to protests against what they considered was the illegitimate victory of their newly elected Governor. As stated by some of them, people in the town had been given pre-marked ballots favoring the new Governor on election day. This was not the only anomaly reported in the Yopal. There were ten official reports of vote buying, four reports of polling place staff members favoring a particular candidate, one of people voting in a polling place different from the one assigned according to their place of residency, and one of abstention induced by threats. In the previous election however, Yopal had no reports of vote buying or miscounting, one of forced abstention, and none of the other previously mentioned forms of manipulation. Like in Yopal, all over the world there is a large variation of the extend and composition of actions that try to shape irregularly the outcomes of elections. What explains the choice between methods of manipulation? What factors make more likely the use of a particular method? Using a new dataset on reports of electoral crimes in Colombia, this paper answers these questions focusing on three methods: vote buying, restrictions on turnout, and direct alteration of vote totals or fraud.[1]

Differences in the costs associated to each method and more generally, differences in their implementation allows us to identify four determinants of manipulation variation: the levels of aggregation of electoral results, the possibility of having repeated interactions between voters and party operatives, the electorate size, and the presence of armed groups involved in politics. The secret ballot, is one key element that determines the differences in implementation between methods. In vote buying transactions voters can accept the bribes and then vote as the please protected by the secrecy of the ballot. Parties however, have come up with several mechanisms to avoid wasting their money. One of them is to target voters who are more likely to comply, like those who value reciprocity (Finan and Schechter 2012), or those who support the party but are unlikely to vote in the absence of inducements (Nichter 2008). Another one is to engage in direct monitoring of voters' choices using carbon copies of ballots, pictures of ballots taken with cell phones, or as reported in towns of the north cost of Colombia, by using little kids who do the monitoring accompanying voters to the voting booth while pretending to be the voters' children.[2] All these tricks however, have become harder to implement either because with an increased urbanization, parties do not have enough local knowledge to identify "good targets", or because the enforcement of the secret ballot has improved. Formal theoretical work has shown that individual monitoring might not be necessary to enforce compliance, and that as long as parties have access to results of small groups

[1] Vote buying is defined as the exchange between individual voters and party operatives of material benefits for votes; restrictions on turnout refers to activities that inhibit voting like buying or forcibly taken national identification cards from voters, and fraud includes any action carried by people involved in the counting process aimed at altering irregularly vote totals.

[2] Interview conducted by the author in Bogotá, Colombia, March 2012.

of voters, vote buying can be sustained through monitoring results of groups (Rueda 2012). Other methods are not affected by the level of aggregation of results since the secret ballot does not interfere with their implementation. The paper evaluates those previously untested claims using the Colombian data.

Group monitoring by itself can not enforce compliance in vote buying when payments are made before the secret ballot elections. Bribed voters need to believe that they will lose access to future benefits if the party does not obtain an expected number of votes. Repeated interactions between voters and brokers then seem necessary to sustain vote buying. Just as it was the case with the level of aggregation of results, repeated interactions do not play an important role in the implementation of other methods. While the case studies and theoretical literature has already emphasized the importance of repeated interactions in vote buying (Stokes 2005, 2007), there is no statistical evidence that is consistent with this mechanism. This paper examines whether vote buying presents stronger persistence over time relative to other methods as the described mechanism would imply.

The electorate size is the third factor affecting the choice of manipulation methods. When parties that engage in electoral misconduct are uncertain about the preferences of individual voters, a large electorate requires these parties to obtain irregularly a large number of votes to influence the results.[3] This lead us to expect a negative effect of the electorate size on the levels of all types of manipulation. However, differences in the marginal costs between vote buying, restrictions on turnout and fraud determine differences in the magnitude of this effect between the methods. The costs of an additional vote obtained with vote buying include the payments for the bribed voter and the cost of finding brokers that monitor small groups and that are able to identify good targets. Moreover, brokers in vote buying are expected to interact with voters repeatedly over time. With restrictions on turnout, party operatives only need to monitor turnout, do not have to pay voters to abstain (as often a threat of violence would suffice), and even when they do, do not need to establish long term relations with voters. Similarly, with fraud, once party operatives can directly manipulate the results at the counting stage, the cost of an additional vote is almost null. By covering several regional and national elections in most municipalities of Colombia, the data set allows us to test whether vote buying and restrictions on turnout are in fact more responsive to changes in the electorate size than fraud.

Differences in marginal cost of implementation between methods also explain why the presence of armed groups that are involved in politics determine the relative incidence of different manipulation methods. Armed actors will not choose to offer positive inducements if there is a cheaper way to obtain electoral support for their favorite candidate. Intimidating poll officials or voters directly is usually the cheapest available option. Also, competitors are less likely to

[3]It can be proven that in a two party contest where parties have the same prior on voters' preferences they need larger amounts of manipulation to achieve a given probability of winning in larger electorates.

choose vote buying as threats of violence usually dominate small bribes at influencing voters. The colombian data offers us the opportunity to evaluate those claims. In 2001 right wing paramilitary forces known as the *Autodefensas Unidas de Colombia* (AUC—United Self-Defense Organization of Colombia) started their active involvement into Colombian politics Valencia (2007). Left wing guerrillas have also been known to be involved influencing electoral results (although not as actively as the paramilitaries). Here, we test whether the presence of these armed groups in certain regions of the country is associated with systematic patterns of incidence of different types of manipulation.

The question of what factors determine different electoral manipulation methods is closely linked to the more general topic of the effectiveness of formal democratic institutions. Colombia is a good example of a country with a disconnect between formal democratic rules and perceived democratic outcomes. The country has a long tradition of democratic institutions by Latin American standards, but its citizens still see elections as being seriously affected by manipulation. According to the Latinobarometer survey in 2002, 86.7% of respondents think that with or without democracy the same people would be running the country, and an average of 77% of respondents between 1996 and 2010 think that elections are not clean and fair. Those numbers contrast with an average Polity score of 7 since 1956. Perhaps, Colombians are overly pessimistic about how well their democracy functions, but recent scandals seem to show that such perceptions might have a solid base. In July of 2012 for example, the police captured six former employees of the Registraduría Nacional for running a "counting and computing center" where they pretended to change the results of the elections for Governor in Valle. Later that month, new evidence showed that it was not the first time that this counting center had been used.[4] More telling are the numerous reports of cases during our period of analysis in which the AUC were involved in fraud and most frequently, intimidation of voters.[5] What the Colombian case illustrates is that corrupt politicians adapt to institutional changes, and with different degrees of success, are able to capture public office. Only through a clear understanding of the techniques that they use can we close the gap between democratic ideals and practices.

2 Related Literature

The literature that studies manipulation in the post-secret ballot era has shown the importance of economic factors and voters' political preferences as drivers of manipulation.[6] The seminal work of Lehoucq and Molina (2002) who study petitions to nullify results in Costa Rica between 1901 and 1946, finds that the poorest and least populated regions concentrate most accusations. Besides

[4] See "Capturan 6 personas por supuesto intento de fraude electoral en Valle" (6 people captured for attempting to change the electoral results in Valle) in *El Tiempo*, July 1 2012, and "Investigan fraude lectoral in cinco departamentos" (Investigation of potential fraud in five Departamentos) in *El Tiempo*, July 7 2012.

[5] For examples of these reports and more formal statistical evidence that shows how paramilitary presence is associated to changes in voting patterns see Acemoglu, Robinson and Santos (2012).

[6] For a complete review of the literature in pre-reform electoral misconduct see Lehoucq (2003).

economic factors, electoral rules that increase competitiveness of elections in those same regions are presented as potential drivers of manipulation. While presenting evidence supporting that poverty and scarcely populated regions have more manipulation, Brusco, Nazareno and Stokes (2004) and Stokes (2005) using surveys from Argentina turn their attention on voters' political preferences as determinants of vote buying. Nichter (2008) shows that patterns in the Argentinean data are consistent with turnout buying where supporters are targeted with bribes. This paper contributes to the previous literature in two main ways: it develops and tests new hypotheses on the variations of patterns of manipulation that focus on intrinsic differences in implementation across methods, and it offers a new data set that allows examining the use of such methods in the same time and place allowing us to infer how parties choose their manipulation mix.

This paper is also directly related to recent theoretical work that studies the choice of manipulation methods. Gans-Morse, Mazzuca and Nichter (2009) and Morgan and Vardy (2011) explore how particular electoral institutions affect the incidence of mobilization and persuasion strategies. Both of these studies present case study evidence that examine how institutional changes like the introduction of the secret ballot or compulsory voting altered the optimal manipulation mix. This paper focuses instead on non-institutional determinants of manipulation using a large within country panel data set to test its main hypotheses.

3 Varieties of Manipulation

The level of aggregation of electoral results is the first explanatory variable that is examined. When the secret ballot was first introduced in Australia in 1856, it was supposed to counteract the rampant vote buying that was characteristic of elections. More than 150 years later, elections all over the world use the secret ballot and yet, there are still numerous reports of vote buying (Schaffer 2007). How do parties sustain compliance of bribed voters even though they can not monitor voters' behavior at the voting booth? One answer is that if the electoral results of small groups of voters are available, party operatives can induce compliance by conditioning future bribes on their party reaching pre-determined vote totals in those small groups. When only results for large groups are available the mechanism breaks down, as no bribed voter would perceive that her vote matters in determining whether or not the bribes will be given in the future.[7] This simple intuition, formally modeled in Rueda (2012) gives us an observable implication. Since in Colombia results are available at the polling station level, we should see that places where more people vote at each polling station should have fewer cases of vote buying.

Large numbers of voters at each polling station can also create obstacles for direct fraud.

[7] Other mechanisms that explains how politicians enforce compliance of bribed voters are social norms (Callahan and McCargo 1996; Scott 1972; White 1965), their ability to circumvent the secrecy of the ballot through deep local knowledge (Stokes 2005), or through more direct forms of verification (i.e. carbon copies of ballots, pictures taken with cell phones).

Large polling places where hundreds of people vote are more likely to concentrate the attention of poll-watchers and election monitors that oversee the counting process preventing fraud. However, if it is possible for a politician to circumvent this monitoring and to alter the results of a large polling station, the number of irregular votes obtained is larger. In that case, politicians have more incentives to concentrate their efforts in those stations. While the expected relationship between number of voters per polling station and cases of vote buying is negative, for fraud, we do not have a strong prior on the direction of the effect of polling station size. As for restrictions on turnout, the size of the average polling station should not affect the ability of party operatives to restrict turnout as this practice is not affected by the secret ballot or by the number of monitors present at the polling station on election day.

Low levels of aggregation of results is not the only element that sustains compliance with vote buying. The literature emphasizes the importance of repeated interactions between voters and brokers in these transactions (Barth 1959; Stokes 2005, 2007). Repeated interactions are important mainly because they help solve the dual commitment problem inherent in vote buying. Voters might vote according to their preferences protected by the secret ballot, and once the electoral results are attained, the broker might renege on repaying voters for their support. The expectation of future interactions allows brokers and voters to sustain a cooperative outcome. Repeated interactions also allow party operatives to learn voters' preferences and to identify voters who value reciprocity. For restrictions on turnout, repeated interactions between voters and party operatives are also beneficial as party operatives gain knowledge about voters' preferences and can then identify who should be prevented from voting. For fraud on the other hand, interactions between voters and party operatives are irrelevant. The observable implication is that the reported levels of vote buying and those of restrictions on turnout, should be persistent over time. On the other hand, previous levels of fraud should not be systematically related to future levels.

All manipulation methods involve costs that are proportional to the number of votes needed to tilt the election, but some methods have lower marginal cost of implementation than others. The size of the electorate affects the choice of manipulation strategy through these differences in the marginal cost. When buying votes, parties offer positive inducements through networks of brokers that monitor small groups of voters for several elections. The more involved in the community brokers are, the easier is for them to identify good targets—those who value reciprocity, or those that are under economic stress. Therefore, the cost of an additional irregular vote in vote buying not only captures the value of the bribe, but also part of the costs associated in finding additional well connected brokers. For restrictions on turnout it is also important to have a network of operatives working for the party that induce voters to abstain, but unlike vote buying, operatives' local knowledge is not as important as turnout is easily monitored. Moreover, restrictions on turnout not always involve individual positive inducements as people are sometimes threatened to force abstention. Fraud, has an even lower marginal cost per irregular vote than the previous

methods. Once party operatives are able to alter the results of a polling station (or at higher levels of aggregation) an additional irregular vote's cost is almost null. While the size of the electorate should affects negatively all methods, vote buying and restrictions on turnout have a higher marginal cost and should therefore have a stronger negative relationship with electorate size than that of fraud.

The last factor that I study as a determinant of the choice of manipulation method is presence of armed groups. In many developing democracies politicians have at their disposal armed organizations that can further help them at attaining their electoral goals. While vote buying implies the existence of a positive inducements, restrictions on turnout and fraud do not. Armed actors, can either restrict turnout without any positive inducement, or force electoral commission members to change the results through the use of threats and violence. This suggests that vote buying should be less frequently observed relative to other methods in areas where there is activity of armed actors that are interested in influencing election results. Moreover, other candidates that are not supported by armed groups that would otherwise buy votes, would abstain from doing so, as threats of violence are more effective convincing voters than small material payments. For the period for which data is available, right wing paramilitary groups in Colombia were directly and actively involved supporting politicians running in regional and national elections (see e.g. Acemoglu, Robinson and Santos 2012), which then offers an opportunity to test our hypothesized relationships.

4 Empirical Strategy

I study the previous hypotheses examining the composition of total reports of electoral manipulation as well as their levels. As a first approximation, citizens' reported crimes are used to build the dependent variables. It is assumed then, that observed reports are able to reflect the general behavior of actual crimes. In the next sections, I address the potential effect that misreporting might have on the results that follow.

The number of reports of a particular crime $y_{i,t}$ is modeled as a linear combination of the explanatory variables of interest as follows,

$$y_{i,t} = v_{i,t}\ \alpha + s_{i,t}\ \beta + a_{i,t}\ \gamma + x_{i,t}\ \delta + u_{i,t}, \tag{1}$$

where the subindex i denotes a municipality and t an election year, $v_{i,t}$ is the aggregation level of results measured by the voting age population over polling stations in the municipality, $s_{i,t}$ is the average size of the electorate in all elections on that particular year, $a_{i,t}$ is a dummy variable that indicates the presence of armed groups, the vector $x_{i,t}$ contains control variables, and $u_{i,t}$ is an error term. I estimate the parameters $\xi = (\alpha, \beta, \gamma, \delta)$ for each manipulation method. For easy

of exposition, let $\mathbf{x}_{i,t} = (v_{i,t}, s_{i,t}, a_{i,t}, x_{i,t})$.

We can now summarize the hypothesized relations from last section using the introduced notation.

1. In vote buying models the coefficient α should be negative.

2. In all models the coefficient β is expected to be negative, but when vote buying and fraud reports are the dependent variable, it should have a larger magnitude than the one obtained in fraud models.

3. In vote buying models the coefficient γ should be negative.

Given that the number of reports is a discrete positive variable, I also present results where the number of reports is modeled as a negative binomial random variable. The negative binomial distribution is chosen as it is able to capture the potential positive contagion in electoral crime reports. It is easy to see why the occurrence of one report is likely not to be independent from having previously observed another. Consider the case in which a broker is buying votes. The broker usually bribes more that one person in a given neighborhood and therefore, once there is a vote buying transaction, it is more likely that there will be another one in the same area (up to a certain level). This explains why reports of particular transactions carried out by this broker will not be observed independently in a given municipality. A similar reasoning can be applied to restrictions on turnout. For fraud on the other hand, positive contagion might not be an issue.

To check the robustness of the results, I also estimate fixed effects models for the linear equations. Fixed effects models are of particular relevance when we study the effect of the level of aggregation of electoral results on the number of reported vote buying cases. Rural areas that are not densely populated have a lower number of potential voters per polling station, which is hypothesized to increase the incidence of vote buying. At the same time, communities in rural areas are more likely to share traditional values in which reciprocity is highly valued, which also facilitates compliance. Municipal fixed effects would allow us to account for those shared traditional values and other time invariant factors not included in $\mathbf{x}_{i,t}$ that could bias our results in the pooled specification.[8]

It is also of interest to explore the dynamics of different methods of manipulation. It has been hypothesized that the incidence of vote buying will present higher dependence on its previous levels than other methods. A simple OLS model that includes a lag of the dependent variable

[8] While accounting for the presence of unobserved time invariant factors in the linear model is straightforward, this is not the case when the number of reports follows a negative binomial distribution. The conditional fixed effects negative binomial estimator proposed by Hausman, Hall and Griliches (1984) presents some shortcomings. It does not allow the calculation of marginal effects, and more importantly, the municipality effects can not be interpreted as unobserved invariant factors. The reason for this is that the fixed effects not only differentiate the means of the cross section units but they appear as a separate shifter in their variances. The way they do this is different from the way other regressors affect the variance term (see Winkelmann 2008, p. 227). However, results of this estimator are generally consistent with the results of the paper and are available upon request.

in equation (1) would give us consistent estimates of our parameters of interest in the absence of municipality effects. However, strict exogeneity for the lagged term is clearly violated when municipality effects are indeed different from zero. As a robustness check, I estimate a linear fixed effects dynamic panel model using the GMM System Estimator (Blundell and Bond 1998) when examining that particular hypothesis.[9]

For models that explore the composition of manipulation, I use as a dependent variable the fraction of reported crimes of a given type on overall reported crimes. These models are estimated with OLS. One advantage of using shares of reports of particular manipulation methods in total reports as opposed to using the number of reports, is that we could ameliorate concerns about measurement error in our dependent variables caused by misreporting. If we assume that in each municipality in a particular year the true count of all three types of crimes are a constant factor of the observed reported crimes, the share of reports of a particular method in total reports is in fact, the share of crimes of that particular method in total crimes.

5 Data

The main dependent variables come from citizens' reports filed in regional offices of the Attorney General of Colombia. The data set contains the number of reports for every municipality per election year for the period from 2002 to 2011.[10]

To address concerns about how misreporting affects our baseline estimates, I also estimate models that use reports of crimes filed by election monitors. These reports are collected by the non-governmental organization *Misión de Observación Electoral* (MOE), which is the largest national organization monitoring Colombian elections. These reports are chosen for their coverage and independence from regional and national governments. Other monitor agencies cover fewer municipalities and only report incidents occurring few days prior and after the elections. The MOE works with smaller regional organizations that report incidents occurring months previous to the elections as well as incidents that occur few days prior, or after the election. Also, the MOE is financed by several international institutions from different countries, which lends more credibility to its political independence.[11] A limitation of this data however is that it covers less municipalities relative to the citizens' reports data and there are only reports available for the elections from 2006

[9] The model then is $y_{i,t} = c_i + y_{i,t-1}\eta + \mathbf{x}_{i,t}\,\xi + u_{i,t}$. The methodology, uses first differentiation to eliminate the municipality effects. Blundell and Bond (1998) noticed that in the absence of second order correlation of the residuals, the level of reports in $t-2$ and further lags could be used as instruments for the lag of dependent variable in the differences equation and that lags of first differences of reports can be used to instrument $y_{i,t-1}$ in the original model improving efficiency in a GMM setting.

[10] One shortcoming of the data is that there is no information available on the particular type of election that generated the report. That is, we can not distinguish if a given report filed in a general election year was filed against a candidate running for congress or for a presidential candidate.

[11] Some of these institutions are: United Nations, European Union, USAID, Konrad Adenauer Stiftung, Oxfam, Global Network of Domestic election Monitors, Ford Foundation.

to 2011.

Two main explanatory variables, the voting age population per polling place, and the electorate size are build with data from the Registraduría Nacional and from the National Statistics Office (DANE). The electorate size is calculated as the average number of valid votes of all elections in a given year. For example, in regional elections years (2003, 2007 and 2011), the electoral size of a given municipality is the average of the votes cast in the mayor election in the municipality, the votes for the local council candidates in the municipality, and the votes in the assembly's and governor's races in the *departamento* where the municipality is located.[12]

The third regressor of interest is an indicator of presence of guerrillas or paramilitary forces. The presence of armed groups in the municipality takes the value of one if there was a combat where either guerrillas or paramilitary forces were involved, or if there was a unilateral military action from any of these groups. The source of this information is the Conflict Analysis Resource Center (CERAC).

All estimated models include a set of controls that include a competitiveness of elections measure, the size of the total population, a poverty measure, and a local government fiscal autonomy indicator. Table 6 in the Appendix has a detailed description of the set of regressors used in the empirical exercises.

The degree of competitiveness of the elections has been frequently hypothesized to be one important determinant of overall manipulation. The question of whether politicians engaging in clientelism target core or swing voters has been extensively studied (e.g. Calvo and Murillo 2004; Stokes 2005; Magaloni 2006; Nichter 2008; Calvo and Murillo 2009). Our objective is not to explore this question but rather to account for potential biases that the omission of competitiveness might generate on the estimation of the electorate size effect. Since more competitive elections have been hypothesized to increase turnout, and competitiveness could also determine the extend of all types of manipulation, this variable is included as a control. The measure of competitiveness used in the regressions is the margin of victory in plurality elections. For elections to the national and regional legislative bodies, competitiveness is measured as the gap between the list winning the last seat and the closest loser. The variable is build using data from the Registraduría Nacional.

Similarly, when the dependent variables are reported levels of crimes, it is important to include total population in the set of regressors. Failing to do so, could bias upwards the estimated effect of larger constituencies. Total population data comes from DANE.

Income levels have also been hypothesized to be determinants of electoral manipulation. Poor voters are cheaper to bribe, do not have strong political preferences, and have few years of schooling, all characteristics that facilitate the application of all methods of manipulation. In vote buying for example, poor voters are targeted because of the declining marginal benefit of

[12] In national election years (2002, 2006, 2010) there are elections for congress and in a separate day elections for president.

consumption that allows the politicians to offer cheaper bribes in exchange for these voters' support (Calvo and Murillo 2004). The fact that poor voters tend not to be interested in politics further reduces the reservation price for their votes (Corstange 2010). These same arguments apply to restrictions on turnout whenever money is offered in exchange for abstention. As for fraud, one could argue that poor and uneducated voters are less likely to realize that miscounting has taken place. Income levels can also be related to at least one of our regressors of interest. Armed groups operate in rural areas where income per capita is lower, and therefore failure to control for income levels could potentially bias upwards the coefficient of the armed group dummy. A measure of poverty, the Unsatisfied Needs Index calculated by DANE is included in all regressions.

The share of local revenues in the total revenues of the municipality is the last element of the control set. This variable attempts to capture the rewards of holding office that increase the incentives to manipulate electoral results. It is expected that elected positions that bring more political power, like those that assign greater control over public resources, will have more politicians willing to engage in manipulation to attain them. In Colombia, local governments receive a large share of its revenues from the central government and those resources are specifically tied to particular expenditures (mainly expenditures in health and education). Local officials do not have much discretion when it comes to allocate expenditures if most of their revenues come from central government transfers. Following this logic we can expect to see that regions where the local government has a smaller share of its revenues transferred from the central government will have more electoral manipulation in regional elections.

6 Results

Table 1 shows in each column the coefficients of our regressors of interest when the dependent variable is the share in total reports of a particular manipulation method. We see that while more potential voters per polling station reduce the share of vote buying reports in total manipulation reports, it increases the shares of both restriction of turnout and fraud reports. An increase of 90 potential voters per polling station (which is one standard deviation of this variable in the regression sample) reduces in 5.4% ($90 \times -0.0006 \approx 0.054$) the share of vote buying reports, and it increases the share of restrictions on turnout by 2.7% ($90 \times 0.0003 \approx 0.027$) and of fraud by 1.8% ($90 \times 0.0002 \approx 0.018$). These results are consistent with the hypothesized inability of brokers to sustain compliance where only results of large groups of voters are available.

The table also shows that in municipalities where armed groups are present, politicians switch from vote buying to other manipulation methods. A municipality where either guerrillas or paramilitary forces operate have a share of vote buying reports that is 13.9% lower than the one that municipalities with no armed groups have. The armed group dummy significantly increases the share of restrictions on turnout and to a lesser extend, those of fraud. This is again in line with

our expectations. In municipalities where armed groups involved in politics are present, they use methods that do not require delivery of positive inducements to voters.

Finally, larger electorate sizes reduce the share of vote buying reports in total reports and it increases the share of restrictions on turnout. The share of fraud reports in total reports is not significantly affected by this variable. A 1% increase in the average electorate size reduces the share of vote buying by 2.8%, and it increases the share of turnout buying by 2.2%. Increasing marginal cost of irregular votes in vote buying can account for the reduction of its share with large electorates. Restrictions on turnout and fraud do not require a network of brokers with local knowledge that is proportional in size to the amount of votes needed to tilt the election, and therefore, these methods are not negatively affected in their shares by the electorate size.

Table 1: Composition of Total Manipulation

Dep. Variable:	Vote Buying (1)	Turnout Restrictions (2)	Fraud (3)
Voting Pop./Polling Places	-0.0006***	0.0003*	0.0002**
	(0.0002)	(0.0002)	(0.0001)
Armed Group	-0.1389***	0.1031***	0.0764***
	(0.0322)	(0.0267)	(0.0269)
log(Electorate Size)	-0.0279***	0.0224***	0.0057
	(0.0057)	(0.0048)	(0.0045)
Observations	1,000	1,000	1,000

This table presents coefficients of a linear model estimated by OLS. The dependent variable is the share of the reports of the manipulation method at top of each column in total manipulation. Standard errors clustered at the municipality level are in parentheses. All models include as controls: the log of total population, the lag of the Unsatisfied Basic Needs index, the lag of the share of local revenues in total revenues, and a previous election's margin of victory measure. $***$ denotes significance at 99%, $**$ denotes significance at the 95% level and $*$ at the 90%. For more detailed data definitions and sources, see Appendix.

The composition of manipulation results give us a general picture of how our main explanatory variables shape the choice between different manipulation methods. Using shares as our dependent variables also allows us to ameliorate concerns of potential biases caused by misreporting as explained previously. However, shares could mask some of the relations of interest as we do not clearly identify what changes in the numerator and the denominator of the fraction are driving its overall changes. Because of this, I now focus attention on the level models.

Table 2 presents in each column the coefficients of the regressors of interest for a model where the dependent variable is the count of reports of a particular manipulation method. Columns (1), (4) and (7) present the OLS results. For those models we see the expected negative relationship between the three regressors of interest and the levels of reported vote buying. For other manipulation methods, the pooled linear models do not show a significant relationship.

Table 2: Determinants of Citizens' Electoral Crime Reports

Dep. Variable:	Vote Buying			Turnout Restrictions			Fraud		
	OLS (1)	F.E. (2)	Neg. Bin. (3)	OLS (4)	F.E. (5)	Neg. Bin. (6)	OLS (7)	F.E. (8)	Neg. Bin. (9)
Voting Pop./Poll. Places	-0.001*	-0.002**	-0.002***	0.003	0.001	-0.001	-0.001	-0.001	-0.002***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Armed Group	-0.123*	-0.144**	-0.321***	-0.031	-0.132	-0.027	-0.136	-0.224*	-0.280*
	(0.065)	(0.069)	(0.105)	(0.094)	(0.106)	(0.120)	(0.105)	(0.115)	(0.157)
log(Electorate Size)	-0.032*	-0.035**	-0.162***	0.014	-0.007	-0.061***	0.024	-0.008	-0.033
	(0.018)	(0.017)	(0.015)	(0.035)	(0.022)	(0.022)	(0.024)	(0.010)	(0.020)
Log-Likelihood			-2589.99			-1226.89			-1026.84
Observations	2,555	2,555	2,555	1,025	1,025	1,025	967	967	967
Municipalities	439	439	439	178	178	178	166	166	166

This table presents coefficients of linear models estimated with OLS in columns (1), (4) and (7); coefficients of Fixed Effects linear models in columns (2), (5), and (8), and negative binomial count models' coefficients in columns (3), (6) and (9). Standard errors clustered at the municipality level are in parentheses. All models include as controls: the log of total population, the lag of the Unsatisfied Basic Needs index, the lag of the share of local revenues in total revenues, and a previous election's margin of victory measure. $***$ denotes significance at 99%, $**$ denotes significance at the 95% level and $*$ at the 90%. For more detailed data definitions and sources, see Appendix.

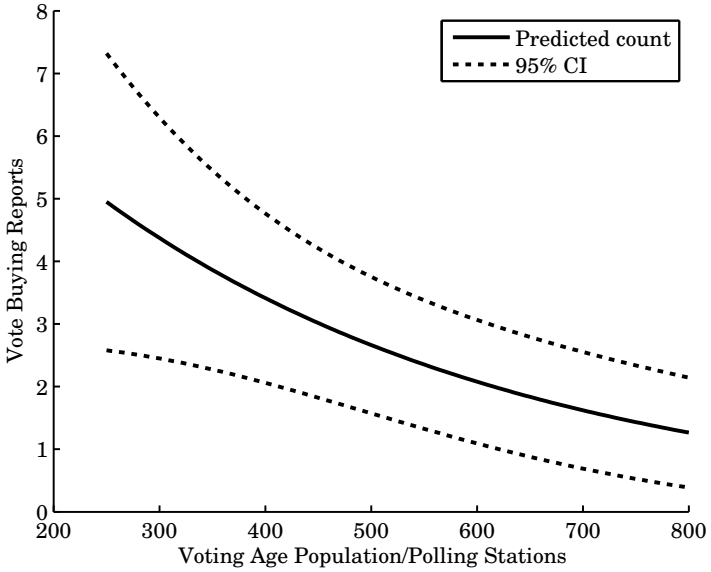
If there are factors that are invariant over time that affect reported crimes and that are correlated to any regressor, we could have inconsistent estimates of our parameters of interest with the pooled OLS models. Take for example, two alternative explanations that could account for the negative relationship between levels of aggregation in vote counts and the number of reports of vote buying in column (1). The first, which was mentioned in section 4, states that isolated areas have different traditions and social norms than the ones held in urban areas, and that some of those norms could facilitate compliance in vote buying. Since isolated areas have polling stations that serve fewer voters, our measure of aggregation could be picking up the "social norms" effect. A second mechanism, emphasizes how in these same isolated areas the population lacks valuable information about the candidates and could use the bribes as a signal of particular attributes of the candidate like her ability to provide goods and other benefits in the future.[13] This mechanism would explain voters' compliance in vote buying as voters give their support voluntarily to a candidate that distributes bribes. Again, the coefficient on the potential number of voters per polling station could be capturing this lack of information. Considering that general lack of information about politics, and social norms do not change quickly over time, these and similar concerns are addressed with the fixed effects regressions' results presented in columns (2), (5) and (8). We see that after accounting for unobserved invariant factors at the municipality level, the main conclusions remain. It now appears however, that in places were there are armed actors not only reports of vote buying

[13] See Kramon (2009, 2011) for a discussion on the role of signaling in vote buying.

are reduced but also those of fraud.

Finally, columns (3), (6) and (9) present the results of the negative binomial count regressions. Once again, voting age population per polling station, the armed group dummy, and the electorate size are all negatively related with the number of vote buying reports. We see that levels of aggregation also affect negatively the number of fraud reports. As mentioned in the theory section this finding could be explained by the larger number of poll-watcher and monitors that large polling places concentrate. Armed groups presence also reduce fraud reports. It is also worth noting that electorate size is negatively and significantly related to the restrictions on turnout reports and that its coefficient has a smaller magnitude than that of the vote buying model.

Figure 1: Levels of Aggregation of Results and Reports of Vote Buying



How large is the impact of aggregation levels of electoral results on vote buying? Figure 1 shows the magnitudes of this effect for Cartagena, an intermediate city located in the north of Colombia were reports of vote buying are frequent.[14] The figure presents the estimated number of reports using the negative binomial results from column (3) in Table 2. In 2007 Cartagena had an average of 297 potential voters per polling station. If this number jumps to 600, the model predict that the number of reports would be reduced by more than half. Clearly, increasing the number of voters that a typical voting station takes in such magnitude brings great logistical challenges. Alternatively, we could say that aggregating the results of two polling stations before publishing them, instead of publishing the results of individual stations would reduce the number of vote

[14] Cartagena has a margin of victory in previous elections of 5.51% of the valid votes, 24.7% of its population lives in poverty, 25.61% of its revenues come from local sources, and it has a population of approximately 922,000 people.

buying reports by more than half.

The results presented so far are consistent with our expectations. The secret ballot represents an obstacle for vote buying as perfect monitoring of bribed voters' actions at the voting booth is not possible. As a result, brokers and other individuals that engage in vote buying need to have access to highly disaggregated vote counts that allow them to sustain compliance among those voters that accept the bribes. That mechanism is consistent with the negative coefficient of potential voters per polling place found across all estimation methods in vote buying models. On the other hand, restrictions on turnout are effective regardless of the level of aggregation of the results. As long as the agent engaged in restricting turnout knows the preferences of voters, it should make no difference whether many voters cast their ballots in a given polling station or not. This point as well was supported by the data as we found no evidence of a systematic relationship between the number of potential voters in a polling station and restrictions on turnout. As mentioned before, polling stations that serve many voters could concentrate the attention of poll watchers reducing the likelihood of fraud in these polling places as well. Also as expected, we saw that vote buying is more sensitive to increases in electorate size than other methods. Lastly, it was found that armed groups presence reduces vote buying reports, which is possibly explained by their ability to intimidate voters through threats or violence.

In addition to the effect of aggregation of electoral results, armed groups presence and electorate size, we are interested in how certain methods of manipulation are particularly dependent on previous interactions between voters and agents seeking to manipulate elections. Table 3 present the results of linear models that include the lag of the dependent variable as a regressor. "Lag manipulation" in the table refers to the coefficient associated to the level of reported manipulation in the previous election. Columns (1), (3) and (5) present the result of pooled autoregressive panel model estimated with OLS. We see that previous reports of all manipulation methods are positively associated to current manipulation reports. We also see that even when we control for the lag of the dependent variable, we still find that the level of aggregation of results is negatively and significantly associated to the number of vote buying and fraud reports but not to the number of reports of restrictions on turnout.[15]

Just as it is the case with the baseline specification, it is important to check whether the previous results are robust to including municipality effects. Columns (2), (4) and (6) present the results of the dynamic panel fixed effects estimator. We see that while the lag of manipulation is positive and significant at conventional levels for restrictions on turnout and fraud, for vote buying we see that it is only significant at the 89% level. We continue to observe that both, aggregation levels and presence of armed groups negatively affect reports of vote buying and fraud, but not the level of restrictions on turnout.

[15] Table 3 does not present the coefficients of electorate size as all the estimated coefficients have an absolute magnitude smaller than $4.79e-11$

Table 3: Determinants of Citizens' Electoral Crime Reports (Dynamic Models)

Dep. Variable:	Vote Buying		Turnout Restrictions		Fraud	
	OLS (1)	Blundell-Bond (2)	OLS (3)	Blundell-Bond (4)	OLS (5)	Blundell-Bond (6)
Lag. Manipulation	0.4140***	0.0965	0.7804***	0.3103***	0.5792***	0.3391**
	(0.0757)	(0.0609)	(0.1699)	(0.0599)	(0.1065)	(0.1506)
Voting Pop./Polling Places	-0.0004**	-0.0012***	0.0003	0.0006	-0.0002***	-0.0008***
	(0.0002)	(0.0003)	(0.0003)	(0.0006)	(0.0001)	(0.0003)
Armed Group	-0.0120	-0.0976***	0.0034	0.0024	-0.0254	-0.0608*
	(0.0308)	(0.0371)	(0.0221)	(0.0305)	(0.0198)	(0.0364)
No Autocorrelation (p-value)		0.3038		0.1676		0.1540
Observations	5,386	5,386	5,386	5,386	5,386	5,386
Municipalities	1,098	1,098	1,098	1,098	1,098	1,098

This table presents coefficients of dynamic panel linear models estimated with OLS in columns (1), (3) and (5), and coefficients of the GMM Blundell and Bond estimator in columns (2), (4), and (6). Standard errors clustered at the municipality level are in parentheses. All models include as controls: the log of total population, the log of the previous election's electorate size, the lag of the Unsatisfied Basic Needs index, the lag of the share of local revenues in total revenues, and a previous election's margin of victory measure. Models in columns (2), (4), and (6) specify as predetermined variables the lag of the Unsatisfied Basic Needs index, the log of the previous election's constituency size, the lag of the share of local revenues in total revenues the previous election's margin of victory measure, the lag of the presence of armed groups, and the voting age population per polling station. Autocorrelation (p-value) gives the p-value for the test of second order autocorrelation in the first-differenced errors where the null is no autocorrelation. $***$ denotes significance at 99%, $**$ denotes significance at the 95% level and $*$ at the 90%. For more detailed data definitions and sources, see Appendix

The results show that the time persistence of vote buying is not as strong as the one that other methods have. This could be explained by bribes not being distributed in areas where people have complied before. There is a simple explanation for why there could be "punishments" even though voters comply by voting for the candidate that gave them the bribes. Brokers evaluate how well their candidates did in the past trying to assess whether it is a good investment to distribute goods again to those previously bribed. However, the secret ballot only allows for an imperfect monitoring of groups of bribed voters. Usually brokers are not able to buy all voters that are registered to vote in a given polling station and those that are not bribed can vote freely and sometimes, in unexpected ways, making interruption of future benefits inevitable. Those interruptions might be affecting our ability to precisely estimate the time persistence of vote buying in our data.[16]

7 Misreporting

Are the inferences drawn from the previous results affected by misreporting? In this section I investigate how much, if at all, the main conclusions change after we explicitly take into account the possibility that not all electoral crimes are reported, and that some that did not exist, do end up being included in our data.

Misreporting can affect the levels of manipulation, possibly in different ways for different manipulation methods. While vote buying and restrictions on turnout are likely to be observed by the average voter in a municipality, fraud is seen mainly by those who are directly involved in the counting process (e.g. partisan observers, independent poll-watchers). Having a smaller number of people being aware of fraud being committed could further reduce the reports of fraud relative to the reports of other manipulation methods. How does this affect our main conclusions? If misreporting is not systematically related to any of the regressors, this would mainly affect the intercept of the linear models and it would increase estimated coefficients' standard errors without biasing the estimated coefficients of interest.

Unfortunately, it is unlikely that misreporting is not determined by factors that affect directly the choice between manipulation methods. For example, a low income level can facilitate the implementation of all manipulation methods and it can also reduce the reports of crimes. Poor voters have a higher distrust of institutions and they might perceive that the authorities do not take seriously their testimony, or they might lack information about the procedures to file a report. If that is the case, our estimates of the impact of poverty in all manipulation methods can be underestimated. In a similar way, political competition can determine reporting. A voter who observes a crime and who opposes the candidate that benefits from the crime is more likely to report it when such candidate has high chances of winning. If the candidate is not likely to win,

[16]The previous arguments suggest that in places where there are not many unexpected fluctuations of voters' preferences the interruption of payments should be less frequent. In the future, I expect to test such hypothesis.

even after using manipulation, the voter could save himself the costs associated to reporting.

This paper addresses the potential problems created by misreporting using two strategies. First, the previous models of levels of manipulation are estimated with a different dataset on reports filed by election monitors. The logic behind this strategy is that misreporting is less likely when monitors are independent outside actors, and more importantly, that the factors that affect the true count of electoral crimes do not determine what crimes the monitors decide to report. This approach is not without shortcomings. Election monitors are not present in every municipality, the selection of municipalities that is covered is not random, and the data on monitors' reports covers fewer elections. The second approach is to explicitly model misreporting and to incorporate such a model into the estimation of the parameters of interest. For this, I use a generalized negative binomial mixture Poisson model proposed by Li, Trivedi and Guo (2003).

7.1 Election Monitors' Reports

Before examining the results that account for potential misreporting, it is worth examining differences between the reports filed by monitors and those given by citizens. Table 7 in the Appendix show how the number of citizens' reports of each method of manipulation are related to the MOE monitors' reports. We see that as expected, for all methods, and for the sum of reports of all methods the correlation is positive. However, these correlations are far from being one, indicating that the variables gives us different information.

Table 4: Determinants of Election Monitors' Crime Reports

Dep. Variable:	Vote Buying			Turnout Restrictions			Fraud		
	OLS (1)	F.E. (2)	Neg. Bin. (3)	OLS (4)	F.E. (5)	Neg. Bin. (6)	OLS (7)	F.E. (8)	Neg. Bin. (9)
Voting Pop./Polling Places	0.001	0.002	-0.002**	0.001	0.003	-0.000	0.001	0.008	-0.004***
	(0.002)	(0.006)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)	(0.006)	(0.001)
Armed Group	0.022	0.328	-0.188	0.019	0.104**	0.369	0.039**	0.118	2.091**
	(0.102)	(0.216)	(0.266)	(0.021)	(0.046)	(0.391)	(0.016)	(0.085)	(0.877)
log(Electorate Size)	-0.115**	-0.176***	-0.291***	-0.018	-0.065	-0.111	-0.028	1.750**	-0.157
	(0.047)	(0.106)	(0.036)	(0.014)	(0.062)	(0.097)	(0.025)	(0.991)	(0.146)
Observations	1,071	1,071	1,071	1,071	1,071	1,071	776	776	766
Municipalities	633	633	633	633	633	633	611	611	611

This table presents coefficients of linear models estimated with OLS in columns (1), (3) and (5), and negative binomial count models' coefficients in columns (2), (4) and (6). Standard errors clustered at the municipality level are in parentheses. All models include as controls: the log of total population, the lag of the Unsatisfied Basic Needs index, the lag of the share of local revenues in total revenues, and a previous election's margin of victory measure. $***$ denotes significance at 99%, $**$ denotes significance at the 95% level and $*$ at the 90%. For more detailed data definitions and sources, see Appendix.

Table 4 shows the results of estimations of equation (1) using the election monitors' data.

There are similarities with the models that use the citizens' reports. Just as we saw before, we find that for all vote buying models a larger electorate is associated to fewer vote buying reports, and that this effect is generally stronger than the one estimated in restrictions on turnout and fraud models. We also find evidence of a negative relationship between the number of potential voters per polling place and the number of vote buying reports in the negative binomial regression, however, this is not found in the linear models. One difference with the results of Table 2 is that armed groups presence appears to be positively and significantly associated to fraud reports. The same holds in the Fixed Effects models of restrictions on turnout reports.

7.2 Modeling Misreporting

I now briefly describe the methodology used to model misreporting. The Li, Trivedi and Guo (2003) methodology models the true count of electoral crimes in municipality i at election t, denoted by $y^*_{i,t}$ as a negative binomial with mean $exp(\mathbf{x}_{i,t}\xi)$. Conditional on $y^*_{i,t} = 0$, $y_{i,t}$, the reported count of crimes, is assumed to be Poisson distributed with mean $exp(\mathbf{z}_{i,t}\phi)$. In a similar way, it is assumed that conditional on $y^*_{i,t} > 0$ the observed count is distributed Poisson with mean $y^*_{i,t}exp(\mathbf{z}_{i,t}\theta)$. Note then, that a positive number of true crimes shifts the mean of the Poisson distribution of the reports when there are crimes. The model allows to estimate the parameters ξ, ϕ and θ and hence to identify what factors determine the true count of crimes, over-reporting and underreporting. In the Appendix, I present the likelihood function derived from this model and explain how a simulated maximum likelihood estimator is implemented to recover the parameters of interest.

For our regressions the vector $\mathbf{x}_{i,t}$ has the same variables used previously. The variables used to model misreporting (those included in $\mathbf{z}_{i,t}$) are the lag of our poverty measure, the previous election margin of victory, the lag of the presence of armed groups, the log of the total population, and a measure of 'closeness' of the local government to the central government.

The margin of victory can affect accurate reporting as follows. If elections are highly competitive, false reports filed before the election could be used to misinform a large number of weak supporters of a given party. Also if armed groups are supporting a candidate, it is likely that people would fear the consequences of reporting against them. Reprisals can be facilitated by the fact that people have to give their personal information when they fill the reports. Lastly, If both local and central government are controlled by the same parties and the party that engages in manipulation is the incumbent party (either in a regional or national elections), people could perceive that it is less likely that their reports would bring any consequences. Therefore if there is ideological affinity between the central government and local governments, we expect to see more underreporting. Our measure of closeness is the percentage of senators from the mayor's party in the municipality that voted in favor of key legislation supported by the central government. The Appendix provides more details on this and other variables used in the analysis.

Table 5 presents the results of the mixed negative binomial-Poisson models. The top panel

Table 5: Determinants of Manipulation and Misreporting

	Vote Buying (1)	Turnout Restrictions (2)	Fraud (3)
	Crimes equation coefficients (ξ)		
Voting Pop./Polling Places	-0.296**	-0.189**	-0.215**
	(0.128)	(0.086)	(0.099)
Armed Group	-0.572*	-0.537*	-0.085
	(0.344)	(0.283)	(0.401)
Electorate Size	-18.588***	-15.274***	-14.11***
	(1.603)	(2.807)	(3.34)
	Misreporting with no crimes equation coefficients (ϕ)		
Margin	10.051***	20.8***	7.8**
	(2.481)	(6.313)	(3.326)
Poverty	-2.229**	-22.198**	-5.112***
	(1.171)	(10.945)	(1.98)
Closeness Central Govt.	-0.089	2.815***	-36.406
	(0.348)	(1.184)	(157.711)
	Misreporting with crimes equation coefficients (θ)		
Margin	9.446***	1.934	-3.488***
	(3.617)	(2.59)	(1.53)
Poverty	-1.454***	-1.017**	-0.947
	(0.598)	(0.531)	(0.675)
Closeness Central Govt.	-0.226	-0.457**	-0.177
	(0.148)	(0.241)	(0.308)

This table presents coefficients of the negative binomial model of true crimes in the top panel. Coefficients of the Poisson count of reports conditional on not having crimes are in the second panel. Coefficients of the Poisson count of reports conditional on having a positive count of crimes are at the bottom panel. Standard errors clustered at the municipality level are in parentheses. All true crime count equations include as controls the log of total population and the lag of the share of local revenues in total revenues. Misreporting equations include as additional controls the log of the total population and an indicator of the presence of armed groups. $***$ denotes significance at 99%, $**$ denotes significance at the 95% level and $*$ at the 90%. For more detailed data definitions and sources, see Appendix.

presents the coefficients associated to the true count of crimes, the second the coefficients of the observed count conditional on not having any true crimes and the third, the coefficients of the observed count conditional on having at least one true crime. The table only presents the coefficients for some regressors of interest.[17]

As it was expected, vote buying continues to be strongly and negatively related to the level of aggregation of electoral results. Surprisingly, restrictions on turnout are also found to be negatively related to the same variable. We again see both the presence of armed groups and the size of the electorate negatively associated with vote buying. In fact, the size of the electorate is negatively related to all methods of manipulation but the magnitude of the coefficient is larger for vote buying, again consistent with our expectations.

The second and third panel show us some interesting results. The lack of competitiveness of the election seems to be associated with significant overreporting when no manipulation has been committed. Perhaps, supporters of the parties that expect to loose by a large margin have witnessed manipulation in previous elections and expect those practices to persist. This is explained as the margin is calculated with electoral results of previous elections. Note here that the effect of previous manipulation on previous margins has not been accounted for in our regressions and further work is required to reach more firm conclusions.[18] Also, when there is manipulation, an expected larger margin of victory creates overreporting on vote buying but induces underreporting in fraud. More in line with our expectations, we see that both local and central government closeness and poverty induce underreporting.

8 Concluding Remarks

We are now in a position to answer the question presented at the beginning of the paper. How do corrupt politicians choose between vote buying, restrictions on turnout and fraud? What the results of the paper suggest is that politicians engaging in manipulation have more incentives to choose vote buying over other methods whenever they have a network of workers that operate in places where they have access to highly disaggregated results. This technique works whenever the election that is being manipulated is a regional one, with a small electorate. For other elections, the evidence suggest that they switch to methods that have a lower marginal cost. Finally, if they have control over armed thugs that intimidate voters and polling station officials, they would exercise that power rather than buying votes.

This paper findings have clear policy implications. Since disaggregated results sustain vote buying but not other strategies, pooling votes from all the polling places in a district before counting

[17] Complete results are available upon request.

[18] To avoid potential endogeneity concerns, we have lagged this variable one period in all regressions. Preliminary findings using an instrumental variables approach to account for this potential endogeneity show that the main results of the paper hold.

can further reduce vote buying practices. One potential problem with this policy is that increasing aggregation in publicly available results could end up facilitating fraud. The results suggest that if anything, there was a negative relationship between the measure of aggregation of results and reported fraud, possibly explained by a better monitoring of large polling stations. For this reason, it would seem sensible to concentrate the monitoring at the counting stage after the votes are pooled at the district level. Concentrating monitoring efforts at the counting stage rather than sending monitors to the streets to report vote buying might also be more efficient in national elections where the size of the electorate is large.

A Modeling Misreporting

Given the model specification discussed in the paper, it is easy to show that the probability mass function of the observed count of crimes is

$$f(y_{i,t} \mid x_{i,t}, z_{i,t}, \xi, \phi, \theta) = \frac{e^{-\mu^0_{i,t}} {\mu^0_{i,t}}^{y_{i,t}}}{y_{i,t}!}\left(\frac{\nu}{\nu+\lambda_{i,t}}\right)^{\nu} + \sum_{y^*_{i,t}=1}^{\infty} \frac{e^{-y^*_{i,t}\mu_{i,t}}(y^*_{i,t}\mu_{i,t})^{y_{i,t}}}{y_{i,t}!}\frac{\Gamma(y^*_{i,t}+v)}{\Gamma(v)\Gamma(y^*_{i,t}+1)}\left(\frac{\nu}{\nu+\lambda_{i,t}}\right)^{\nu}\left(\frac{\lambda_{i,t}}{\nu+\lambda_{i,t}}\right)^{y^*_{i,t}}$$

where $\mu^0_{i,t} = exp(\mathbf{z}_{i,t}\phi)$, $\lambda_{i,t} = exp(\mathbf{x}_{i,t}\xi)$ and $\mu_{i,t} = exp(y^*_{i,t}\mathbf{z}_{i,t}\theta)$, and ν is one over the overdispersion parameter.

Maximum likelihood estimation can not be directly implemented for this model given the presence of the infinite series in the above expression. Li, Trivedi and Guo (2003) solve this problem by implementing a simulated maximum likelihood estimator. They find an unbiased simulator for the probability mass function of the observed count, $\widetilde{f}(y_{i,t}, x_{i,t}, z_{i,t}, u; , \xi, \phi, \theta)$

$$E[\widetilde{f}(y_{i,t}, \mathbf{x}_{i,t}, \mathbf{z}_{i,t}, u; , \xi, \phi, \theta) \mid y_{i,t}, \mathbf{x}_{i,t}, \mathbf{z}_{i,t}] = f(y_{i,t} \mid \mathbf{x}_{i,t}, \mathbf{z}_{i,t}, \xi, \phi, \theta)$$

with the expectation taken over an appropriate distribution of u.

The simulator is in our case

$$\widetilde{f}(y_{i,t}, \mathbf{x}_{i,t}, \mathbf{z}_{i,t}, u; , \xi, \phi, \theta) = \frac{e^{-\mu^0_{i,t}} {\mu^0_{i,t}}^{y_{i,t}}}{y_{i,t}!}\left(\frac{\nu}{\nu+\lambda_{i,t}}\right)^{\nu} + \frac{\frac{e^{-u\mu_{i,t}}(u\mu_{i,t})^{y_{i,t}}}{y_{i,t}!}\frac{\Gamma(u+v)}{\Gamma(v)\Gamma(u+1)}\left(\frac{\nu}{\nu+\lambda_{i,t}}\right)^{\nu}\left(\frac{\lambda_{i,t}}{\nu+\lambda_{i,t}}\right)^{u}}{p(u|\mathbf{x}_{i,t})},$$

where $p(u \mid \mathbf{x}_{i,t})$ is the truncated at zero negative binomial distribution with parameters estimated from a naive negative binomial model of the observed count. The naive negative binomial is the one that does not account for misreporting.

The simulated maximum likelihood estimator is

$$(\widehat{\xi}, \widehat{\phi}, \widehat{\theta}) = \arg\max_{\xi,\phi,\theta} \sum_{t=1}^{T}\sum_{i=1}^{N} \log \frac{1}{S}\sum_{s=1}^{S} \widetilde{f}(y_{i,t}, \mathbf{x}_{i,t}, \mathbf{z}_{i,t}, u^s_{i,t}; \xi, \phi, \theta),$$

where $u^s_{i,t}$ with $s = 1, ...S$ are random draws taken from the truncated at zero negative binomial distribution $p(u \mid \mathbf{x}_{i,t})$.

B Complementary Tables

Table 6: Variable Definitions and Sources

Variable	Description	Source
Voting Pop./Polling Places	Population 20 years or older divided by the number of polling places in the municipality	National Department of Statistics (DANE) and *Registraduría Nacional del Estado Civil* and author's calculations
Armed Group	Dummy variable that takes the value of 1 if there was a combat where either guerrillas or paramilitary forces were involved, or if there was a unilateral military action taken by any of these groups.	Conflict Analysis Resource Center (CERAC)
Electorate Size	Average of the total valid votes of all races in that particular year. For a regional election year it is the average of the valid votes in mayor and local council members races at the municipality level, and of assembly and governor races at the *departamento* level. For a national election year is the average of the valid votes of lower house members races at the departamento level and of president and senate races at the national level.	Registraduría Nacional del Estado Civil and author's calculations
Margin	Average of all margins of victory in races of a given year weighted by valid votes of each race. Margins for plurality elections (mayor, governor and president) are calculated as the gap between the winner's and the runner-up's votes. For proportional representation races (local council, departamento assembly, lower house and senate) after 2003 margins are the gap between the electoral quotient of the party winning the final seat and the electoral quotient of the closest loser as in Selb (2009). Before 2003, it is calculated as the gap between the votes of the party winning the final seat and the votes of the closest loser	Registraduría Nacional del Estado Civil and author's calculations
Poverty	Unsatisfied Basic Needs Index	DANE and author's calculations
Closeness Central Govt.	Percentage of senators from same party as the mayor of the municipality that vote in favor of important legislation that the central government supported. If the mayor belongs to a party that has no senators the variable takes the value of zero. Two roll call votes are used. The first from 2009 decided in favor of a referendum for a constitutional change that allowed president Alvaro Uribe to run for office for the third time. The second in 2004, approved the constitutional change that allowed the first reelection of president Alvaro Uribe.	*Gaceta del Senado* and author's calculations
Local Revenues	Share of revenues of the local government in the municipality as a share if its total revenues that include transfers from the central government.	National Planning Department.
Total Population	Total population	DANE

Table 7: Correlations of Citizens' and Monitors' Reports

All	Vote Buying	Neg. Turnout	Fraud
0.3810	0.2430	0.3176	0.1526

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