Vulnerability and Clientelism*

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Abstract

Citizens' vulnerability to negative shocks heightens their willingness to engage in clientelism, a phenomenon with important implications for democratic accountability and responsiveness. We use a randomized control trial in Northeast Brazil to show that reduced vulnerability decreases requests for private benefits, especially among citizens more likely to engage in clientelist relationships with local politicians. We also show that reduced vulnerability undermines the electoral performance of incumbent mayors during their re-election campaigns. Evidence points to the persistence of treatment effects, given that findings are observed not only during the election campaign, but also a full year later.

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1 Introduction

Many developing countries have adopted democratic forms of government in recent decades, and such transitions often have the potential to contribute to heightened prosperity.[1] However, democratic political institutions have often failed to provide a broader representation of the interests of the poor and vulnerable, who frequently comprise the vast majority of constituents. Scholars and policymakers often point to political clientelism – the contingent exchange of private benefits for political support (Kitschelt and Wilkinson 2007) – as a fundamental reason why politicians are not accountable and responsive to their constituencies in many countries (Stokes 2005, Keefer 2007). Indeed, many researchers argue that clientelistic political equilibria, which are pervasive in many developing and developed countries, contribute to various problems such as: policies that disproportionately benefit political elites, restricted political competition, and the under-provision of social insurance.[2]

Clientelism involves contingent exchanges that typically must be enforced through informal contracts. Much recent literature on the topic focuses on the strategies that politicians employ to ensure that voters follow through on their promises to deliver political support (e.g., Stokes 2005, Finan and Schechter 2012). In contexts where poor households are vulnerable – for example, where they struggle to cope with various aggregate economic, environmental and health risks, including unemployment, illness and drought – clientelistic arrangements often involve longer-term interactions in which politicians promise to provide help even after votes are cast. The need to sustain such long-term arrangements gives both politicians and citizens incentives to establish relational contracts based on repeated interactions and trust (Scott 1972).

Given the complexity of these arrangements, and the fact that local politicians in such contexts often focus on distributing contingent private benefits instead of delivering pub-

[1] See a recent review of the literature in Acemoglu et al. (2014).

[2] See, e.g., Anderson, Francois, and Kotwal (2015); Bardhan and Mookherjee (2012); Bates (1991); Kitschelt and Wilkinson (2007); Piattoni (2001); and Robinson and Verdier (2013).

lic goods or programmatic benefits, a first order question emerges in nascent democracies. To what extent is clientelism caused by citizens' economic vulnerability? If this relationship is indeed causal, then clientelism could, at least in principle, be reduced by remedies such as economic growth and redistributive programs. But perhaps the relationship is not causal; rather, once clientelism is established, it perpetuates a cycle of vulnerability. Isolating this causal relationship has been elusive in the existing literature, given data limitations about clientelism and the fact that causality likely works in both directions.

The present paper investigates this question by examining – with a randomized control trial – whether reduced vulnerability contributes to the breakdown of clientelism.. Following Ligon and Schechter (2003), our definition of vulnerability captures both poverty and risk, recognizing that both average income and a variety of sources of uncertainty contribute to a citizen's welfare. Both components of vulnerability are likely to motivate citizens to participate in clientelist relationships. Poverty leads citizens to place relatively greater value on material benefits than ideological concerns, due in part to the diminishing marginal utility of income (Dixit and Londregan 1996). As such, impoverished citizens are more likely to engage in ongoing clientelist relationships that allow them to procure building supplies or other benefits from trusted politicians in exchange for their political support. Moreover, uninsured risk motivates many citizens to participate in clientelist relationships with politicians who fulfill their requests during adverse shocks (Nichter in progress); for example, some citizens leverage these relationships to ask for water during droughts. We thus predict and test that a reduction in both components of vulnerability will undermine clientelism, in part by dampening citizen requests that often play a key role in contingent exchanges (Nichter and Peress 2016).

In turn, we expect this breakdown of clientelist relationships to undercut the performance of incumbent mayors during their reelection campaigns. Incumbents usually have greater financial and organizational resources to engage in clientelism, not least because they can more easily access government coffers, programs and employees (e.g., Gallego

and Wantchekon 2012; Stokes 2009). Studies suggest that the ability to control public programs and employment helps incumbents' electoral performance (Schady 2000; Folke, Hirano and Snyder 2011), and experimental evidence suggests that clientelism is more effective for incumbent candidates (Wantchekon 2003). Given that such findings suggest that clientelism tends to favor incumbent candidates, we thus predict and test that its weakening reduces incumbents' votes.

In order to test these predictions empirically, we designed a study in rural Northeast Brazil. This region is marked by substantial vulnerability: it is the largest pocket of poverty in Latin America, and recurring droughts heighten uncertainty in various aspects of residents' lives. To study the interplay of vulnerability and clientelism, we undertook a unique longitudinal household survey among a large representative sample of impoverished households in the region between 2011 and 2014. Among other contributions, this effort allows us to measure households' interactions with local politicians before, during and after Brazil's 2012 municipal elections. Crucially, the data collection allows us to distinguish individuals likely to have ongoing clientelist relationships with local politicians, as well as important details about the nature of their interactions.

Our study first establishes the relationship between vulnerability and clientelism in Northeast Brazil. Analyses suggest that rural households are more likely to participate in clientelism when they experience droughts, which represent severe negative shocks to living conditions. In particular, we find that droughts cause citizens to engage in two mechanisms of clientelism elaborated in Nichter (in progress). First, citizens experiencing these shocks are more likely to declare support publicly for politicians, a costly signal that they will provide political support in exchange for ongoing private benefits. Second, citizens subjected to droughts are more likely to request private help from politicians, especially water, medicine and medical treatments. Pointing towards the role of ongoing clientelist relationships, these responses are strongest among individuals who have a history of frequently interacting with local politicians, who represent a fifth of our sample.

Once we have established the link between vulnerability and clientelism, we make use of a large-scale randomized control trial we fielded to examine the prediction that reducing vulnerability dampens citizen participation in clientelism. This approach enables us to identify, for the first time, whether this causal relationship exists.In partnership with a Brazilian NGO, our intervention provided households with their own water cisterns in early 2012. These cisterns collect and store up to 16,000 liters of rainwater, increasing citizens' resiliency to droughts, as well as providing households access to a more reliable source of water. As predicted, we find that citizens in households randomly selected to receive cisterns become less likely to participate in clientelism. The intervention reduces the likelihood by 2.7 to 4.4 percentage points – a substantial 12 to 22 percent – that citizens ask politicians for private benefits. Most strikingly, these effects are fully concentrated among citizens who are more likely to be in clientelist relationships; that is, citizens who frequently conversed with politicians at least monthly before the 2012 political campaign began. Among such frequent interactors, we find a 10 percentage point reduction in citizen requests – a remarkable 30 percent reduction in proportional terms. By contrast, we find no effect among citizens who interacted sporadically if at all with politicians before the election period.

A novel aspect of this study is that it provides rigorous evidence about clientelism during *both* electoral and non-electoral periods.Whereas the ongoing nature of clientelism is understood in the qualitative literature, nearly all quantitative work focuses exclusively on campaign periods.We show that cisterns reduce requests not only around election time, but also during the 12-month period after the election.

Given this effect on clientelism, we also utilize the randomized control trial to examine the subsequent prediction elaborated above: a reduction in vulnerability undercuts incumbents' electoral performance. Our data is unique in that we are able to link individual subjects in the cisterns experiment to the electronic voting machines to which they are assigned, providing an unprecedented granular level of voting data outcomes. Com-

paring outcomes across voting machines with distinct, randomly assigned numbers of treated and control individuals allows us to measure electoral responses to the cisterns treatment. We find that the cisterns treatment – which reduces vulnerability to droughts – decreases the votes received by incumbent mayors vying for reelection. This finding not only corroborates our prediction that reductions in vulnerability harm incumbents electorally, but also points toward vulnerability as a first-order determinant of clientelism.

More broadly, the present paper makes several important contributions to the political economy literature. First, numerous observational studies show correlational evidence that citizens with low incomes are more likely to participate in clientelism.[3] Yet these studies cannot establish a causal relationship, as it is challenging to isolate effects from other unobserved determinants of these practices, such as voters' beliefs, attitudes and preferences.[4] By contrast, our study provides compelling causal evidence that reducing poverty – and more broadly, vulnerability – dampens citizens' willingness to participate in clientelist exchanges. Second, by showing how these changes in the political equilibrium are concentrated among voters in ongoing relationships, our study complements the work of Finan and Schechter (2012) that documents how politicians form clientelistic relationships in which they target reciprocal citizens. Third, we emphasize the role of citizens in clientelism, a demand-side perceptive that is often overlooked in the literature on clientelism.

Our project builds on recent work by Anderson, Francois, and Kotwal (2015). They present a theoretical model of clientelistic insurance in which political elites may have incentives to curtail government-mandated mechanisms that help poor and vulnerable households cope with shocks, precisely because doing so allows elites to sustain clien-

[3]For example, based on a cross-sectional comparison of voters in Argentina following the 2001 election, Brusco, Nazareno, and Stokes (2004) and Stokes (2005) show that 12 percent of low-income respondents reported receiving a gift from a candidate or party, higher incidence compared to the overall incidence of seven percent.

[4]For instance Finan and Schechter (2012) argue that, due to the limited enforceability of vote buying contracts, politicians and their middlemen will target individuals that are more likely to reciprocate, an individual characteristic that is generally difficult to observe.

telist arrangements. Although they do not examine the effects of introducing independent risk-coping mechanisms – such as water cisterns – to poor voters, their analysis has important implications that we test empirically. In particular, their model suggests that such exogenous improvements in independent forms of insurance should crowd out citizens' willingness to participate in contingent exchanges. Our paper, which shows that citizens demand fewer clientelist benefits when they randomly receive water cisterns, provides corroborative evidence. Furthermore, it suggests that improving insurance mechanisms might help to promote change in the de facto political power of elites in nascent democracies.

Our work also complements recent work by Fujiwara (2015), who shows that electronic voting machines heightened the enfranchisement of impoverished Brazilians.[5] The present paper suggests that beyond technological barriers to effective voting, vulnerability can also undermine elections, and this pattern can be partially reversed by improving households' resiliency to shocks.

The paper is organized as follows. Section II provides background on Northeast Brazil, the incidence of clientelism in the region, and the particularities of vulnerability of these households. We follow with a description of the project, and a description of the data in Section III. Section IV presents the intervention, the study's research design, and the empirical methodology. We present the central empirical results of the paper and robustness tests in Section V. The paper concludes in Section VI with a discussion of findings and their broader implications.

2 Context

This study focuses on Brazil's semi-arid zone, the vast majority of which is located in the country's Northeast region. Figure 1 shows this zone, which spans over one million square kilometers and has over 28 million residents, who are disproportionately poor

[5] See also Hidalgo (2010).

and rural. It is composed of 1,133 contiguous municipalities in nine states.[6] The semi-arid zone is particularly appropriate for our water cisterns intervention because it is marked by far lower average precipitation and higher rainfall variation than the rest of Brazil. Our rainfall data show that average rainfall in the region is just 57.2 cm, compared to 153.1 cm for the rest of the country in 2012.

As this study examines, many Brazilians living in this area are highly vulnerable to shocks. In late 2015, the prominent Institute for Applied Economic Research (Instituto de Pesquisa Econômica Aplicada, or Ipea) in Brazil released an "Index of Social Vulnerability," which identifies that vulnerability is "very high" in much of the Northeast region. A fundamental source of vulnerability is the region's exposure to recurring droughts, as its rainfall is temporally concentrated and its topography as well as temperature contribute to rapid evaporation. Income constraints prevent citizens from procuring sufficient self-insurance, and given the spatial correlation of rainfall shocks, the ability of social insurance to address rural citizens' needs is often limited. Health shocks are another major issue, as inadequate healthcare typically ranks as the top concern in opinion surveys across Brazil. While the 1988 Constitution offers free comprehensive health care to all citizens, in actuality services are often considered poor and medicines are frequently lacking. Impoverished Brazilians are particularly vulnerable to health shocks: the probability of experiencing catastrophic health expenditures is over seven times as higher for the poorest quintile as it is for the richest quintile (de Barros et al., 2011). Given that citizens are often vulnerable to and inadequately protected from shocks, they may establish exchange relationships with local politicians (Nichter in progress).

These local politicians are mayors and councilors, who are elected concurrently in each municipality. Local elections occur simultaneously nationwide every four years, with state and federal elections following two years later. Mayors are elected by plurality, except in municipalities with populations above 200,000, where run-off elections are held

[6]The nine states are: Alagoas, Bahia, Ceará, Minas Gerais, Paraiba, Pernambuco, Piauí, Rio Grande do Norte, and Sergipe.

if no candidate wins an outright majority. Mayors can only hold office for two consecutive terms, but can also be reelected again in a later election. Councilors, who do not face term limits, serve in the legislative branch of the municipal government. They are elected by open-list proportional representation, which allows a voter to influence not just the number of seats allocated to each party coalition, but also which particular candidates are elected within that coalition.

Within the Brazilian political environment, clientelism is a longstanding feature. In the Old Republic (1889-1930), local political bosses known as *coroneis* commanded the votes of millions of rural citizens across the nation, providing for their basic needs in exchange for loyalty (Leal, 1975). Although voters today have far more autonomy than in past generations, the contingent exchange of benefits for political support continues to be widely observed. A 2014 survey by the Latin American Public Opinion Project (LAPOP) suggests that 10.7 percent of Brazilians were offered a benefit in exchange for their vote in that year's state and federal elections. The chief electoral court in Brazil, the Tribunal Superior Eleitoral, ousted nearly 700 politicians for delivering handouts to voters during political campaigns between 2000 and 2008 (MCCE, 2009).

Several factors contribute to the use of clientelism by Brazilian politicians. The electoral institution of open list proportional representation for selecting councilors and other legislators fosters clientelism (Hagopian, 1996; Ames, 2002): by heightening intra-party competition, it tends to promote a focus on particularism rather than programmatic appeals. Brazil's highly fragmented party system also weakens the ability of many politicians to employ programmatic appeals, as a large number of parties makes it more difficult for voters to ascertain which ones align with their collective interests. In addition, Brazilian politicians who aim to influence elections illicitly may find it easier to distribute contingent rewards (i.e., clientelism) than to engage in strategies of electoral fraud such as registering fictitious voters or tampering with electoral returns. To reduce such fraud before voting, Brazil employs a national registration database and recurring voter regis-

tration audits, and in part to hinder fraud after voting, it became the first country in the world to institute fully electronic voting in 2000 (Nicolau, 2002; Mercuri, 2002).

Yet not all aspects of Brazil's institutional environment are favorable for clientelism. Consider the threat of opportunistic defection, a particular concern when exchanging benefits to citizens for political support. Analysts posit that a variety of mechanisms reduce the probability that recipients will renege on their side of the bargain in many countries, such as monitoring of vote choices (e.g., Stokes, 2005) and targeting reciprocal voters (e.g., Finan and Schechter 2012). In the Brazilian context, electronic voting undermines the ability of politicians to observe vote choices, as this technological innovation undercut traditional methods such as marking paper ballots. While violating ballot secrecy is thus particularly difficult, citizens help to overcome this challenge by publicly declaring support for candidates with whom they have ongoing exchange relationships (Nichter, 2014). Citizens are motivated to undertake this action when candidates provide their declared supporters with benefits during the campaign or preferential access to post-electoral benefits. Since mayors have substantial discretion in terms of local expenditures, access to local services is often contingent on past electoral support. While not all public expressions of political support involve clientelism, declared support is frequently observed during local elections in rural Brazil. In our 2012 survey, 18.5 percent of respondents wore campaign stickers or t-shirts, 38.7 percent placed political flags or banners on their homes, and 21.8 percent visibly showed their support at campaign rallies. By helping politicians to identify their supporters, this mechanism facilitates clientelism amidst electronic voting.

Our study emphasizes the role of the demand side of clientelism in Brazil. Whereas the vast majority of research on clientelism focuses on politicians' offers of handouts, evidence from Brazil and other countries across the world suggests that citizens often demand clientelist benefits (Nichter and Peress, in press). The three-year panel dataset employed in the present study reveals that when citizens in rural Northeast Brazil face shocks, they often turn directly to local politicians to request assistance. In the 2012 elec-

tion year, 21.4 percent of survey respondents asked for private help from a mayoral or councilor candidate. And during the following year, almost 7.7 percent requested assistance from the mayor or a councilor. While not all requests involve life necessities, most do – about a third of requests in both years involved health care and another quarter involved water. When responding to such requests, politicians often mete out assistance using political criteria, given that the number of requests often exceeds available resources. Given that the mayor and allied councilors have greater access to municipal resources, their supporters are often particularly likely to receive help through this demand-side channel (Nichter in progress).

3 Data and descriptive statistics

3.1 Data sources

3.1.1 Household surveys

As shown in the timeline in Figure 2, we conducted a panel survey spanning nearly three years. This survey involved face-to-face interviews in rural localities across Northeast Brazil. We first selected a random sample of neighborhood clusters, using the federal government's Cadastro Único as a sampling frame. In the localization survey (May-July 2011), we interviewed 1,308 household heads to obtain basic household characteristics, with the purpose of identifying eligible families (i.e., those without reliable access to water). In the first wave (October-December 2011), we conducted a more extensive baseline survey of 1,189 household heads, gathering detailed household characteristics as well as information about individual family members. These first two waves – which predated the cistern treatment – provide a rich set of household and individual level characteristics such as water access, education, health, depression, labor supply, food insecurity and time use. The construction of cisterns commenced in January 2012. The last two waves, which enable us to capture effects of the cistern treatment, asked questions of all present

household members at least 18 years of age. These waves not only repeated earlier questions to gather post-treatment data on household and individual characteristics, but also inquired about topics such as clientelism, interactions with politicians and political behavior. To capture effects around campaign season, the second wave of 1,238 households was fielded in November-December 2012, immediately after the October 2012 municipal elections. In addition to household heads, both post-treatment waves interviewed other family members, so the second wave had a combined total of 2,680 individual-level interviews. To capture effects during a non-election period, the third wave of 1,119 households was fielded in November 2013-February 2014, with a total of 1,944 individuals interviewed. These surveys were conducted in a total of 425 neighborhood clusters in 40 municipalities, which were located in 9 states in rural Northeast Brazil.

3.1.2 Rainfall

Given that our project randomizes the installation of water cisterns, rainfall presents another related source of exogenous variation. We thus gathered monthly precipitation data at the municipal level for the past quarter century (1986-2013) from the Climate Hazards Group Infrared Precipitation with Station (CHIRPS) database.[7] Municipalities in our sample had on average 40.9 cm of rainfall in 2012, and 69.3 cm in 2013. To ensure meaningful comparisons across municipalities with differing climatic conditions, our analyses below use rainfall for each monthdivided by the municipality's historical standard deviation of rainfall for that month in 1986-2011.[8]

3.1.3 Voting data

In order to employ survey respondents' electoral outcomes, we gathered the most granular voting data released by the Superior Electoral Court (TSE) for both the 2008 and 2012 municipal elections. These data provide voting data for each electronic voting ma-

[7]Site: http://chg.geog.ucsb.edu/data/chirps/.

[8]Findings for rainfall are robust to several alternative rainfall measures, including the use of raw rainfall. However, we preferred this measure since it captures over time variation in precipitation in a commonsense manner. For example, traditional standardization led to huge variation in rainfall during dry months simply because the standard deviation of rainfall in such months was very low in some municipalities.

chine in surveyed municipalities. We submitted information requests to the TSE to obtain the geographic location of each voting machine, enabling comparisons of votes received by mayoral candidates across machines in the same polling location. Of the 40 municipalities in our sample, 27 mayors were serving their first term in office, and thus eligible to run for reelection in 2012. Of these 27 mayors, 21 (77.8 percent) chose to run again, and eight were reelected (i.e., 38.1 percent of those who ran). In comparison, across Brazil in 2012, 74.8 percent of eligible mayors chose to run again, and those that ran experienced a reelection rate of 55.0 percent.[9] In our sample, the 21 incumbent mayors running for re-election in 2012 received an average of 46.9 percent of the votes cast, whereas their top challenger received 49.1 percent of votes cast. This difference of just 2.2 percentage points is consistent with the competitiveness of many local elections in Brazil. Of our overall sample, 1,355 respondents were in municipalities in which the incumbent was running for reelection.

To examine the impact of the cistern treatment on electoral results, we matched survey respondents to their voting machines. This task involved asking respondents in Wave 2 for their voting "section number" (*seção eleitoral*), an identification number that Brazilians provide on various official documents (e.g., when applying for *Bolsa Família*). Each section number corresponds to a unique voting machine in a municipality.[10] We then asked to view their voter identification cards to confirm their section number; 84.92 percent had reported the accurate section number. It should be noted that in Brazil, voters do not choose the voting machine to which they are assigned – though they can request a different voting location – and absentee voting is generally prohibited. In addition, voting is compulsory for all literates between their 18th and 70th birthdays. In municipalities with the incumbent mayor running for reelection, the voting machines to which survey

[9] "Mais da Metade dos Atuais Prefeitos que Disputaram o Segundo Mandato foram Eleitos," *Agência Brasil*, October 13, 2012.

[10] More specifically, it corresponds to a unique voting machine in an electoral zone, which usually (but not always) corresponds to a municipality. Our matching process incorporates this point: we asked respondents not only their voting machine number but also the name of their voting location, and thus could cross-check with official TSE records about respondents' electoral zones.

respondents were assigned had an average of 334 eligible voters. These respondents' voting machines were situated in voting locations that often had other voters' machines as well; most precisely, these locations had on average 5 machines. In these survey respondents' machines, on average 257 of 334 eligible voters cast a ballot for a candidate, 19 cast blank or invalid votes, and 58 abstained. Of all votes cast in these machines, the incumbent candidate received an average of 117 votes (45.5 percent) and the challenger received 140 votes (54.5 percent) – a vote margin of 23 votes (9 percentage points). Given that Brazil was in the process of implementing biometric voting (in which voters use their fingerprints to identify themselves) in 2012, we also show robustness to the exclusion of municipalities that underwent this change before the 2012 election. The reason is that biometric voting requires all voters to re-register to vote, a process that can also affect the performance of incumbent mayors during their reelection campaigns (Hidalgo and Nichter 2016). This robustness check removes four of the 21 municipalities with mayors running for reelection in our sample.

4 Descriptive Analysis

4.1 Vulnerability

A descriptive analysis using our household surveys and rainfall data sheds light on the link between water and vulnerability in the countryside of Northeast Brazil. If rural households could simply self-insure against rainfall shocks, then we would expect no correlation between precipitation and vulnerability. But much to the contrary, bivariate regression coefficients shown in Table 1 suggest that negative rainfall shocks increase several measures corresponding to different aspects of vulnerability. The first vulnerability measure is based on the prominent CES-D scale (Radloff 1977), which is often used across the world to identify numerous symptoms of depression using self-reported questions. The four-point scale reflects how often respondents experienced five depressive symptoms, and is coded such that lower values correspond to more depression (to fa-

cilitate comparisons with other measures). A one standard deviation decrease in rainfall increases depression by 0.219 points (significant at the .01 level). The second vulnerability measure is the Child Food Security Index, a five-point scale summing binary responses from five questions about whether any child in the household encountered limited food over the past three months. Again, this index is inverted, such that lower measures correspond to less food security (and hence, greater vulnerability). A one standard deviation decrease in rainfall worsens children's food security by 0.217 points (significant at the .01 level). The third vulnerability measure is the Self-Reported Health Status (SRHS) index, which indicates how healthy respondents believed they were (i.e., higher values indicate better reported health). A one standard deviation decrease in rainfall decreases self-reported health on this five-point scale by 0.184 points (significant at the .01 level).

Also indicative of the link between water and vulnerability in this rural setting, low rainfall also decreased the level of household expenditures over the 30 days preceding the survey. To interpret the magnitude of this effect on expenditures, we can multiply the coefficient by the average variation of precipitation observed in sampled municipalities. A one standard deviation decrease in rainfall reduces household expenditures by R$ 73.28 – more specifically, it cuts R$ 40.04 from expenditures on food and R$ 34.67 from other expenditures such as rent, clothing, health, gas and electricity (all three coefficients significant at the .01 level).

4.2 Political interactions

Given their vulnerability to droughts as well as other shocks, many citizens in rural Northeast Brazil rely on ongoing clientelist relationships with politicians for assistance. The present study argues that the random assignment of water cisterns reduced citizens' vulnerability, thereby undermining ongoing clientelist relationships. Before investigating the cisterns intervention, we first provide contextual information about these relationships in Table 2. Prior to the 2012 municipal campaign, 18.4 percent of survey respondents talked at least monthly with a local politician. As examined below, these frequent interac-

tions provide opportunities for citizens in ongoing exchange relationships to request help from politicians. While these citizens most often converse with a single councilor, their relationships might also be expected to yield political support for that councilor's allied mayoral candidate: 71.8 percent of respondents reported voting for a mayor and councilor of the same political group or coalition. In addition, there are likely to be spillover effects of relationships on voting behavior within households, as 77.3 percent of respondents report that all family members vote for the same mayoral candidate. Citizens do not appear to form these relationships as a response to negative shocks – as shown by the bivariate regression coefficients in the right column, there is no significant association of the first two measures with rainfall shocks earlier in the year. By contrast, citizens exposed to negative rainfall shocks are more likely to vote for the same mayoral candidate as others in their households (significant at the .05 level).

During local political campaigns, mayoral candidates employ an extensive network of operatives to canvass citizens' homes. Over the course of the 2012 municipal campaign, 69.6 percent of respondents reported receiving at least one home visit from the group of a mayoral candidate, a figure uncorrelated with rainfall shocks. While operatives' reasons for such visits are often multifaceted, their reach to so many poor, isolated households suggest that there exists in sampled municipalities the extensive political network typically required for clientelism. As discussed above, clientelism involves contracts that must be self-enforcing, and declared support is a key mechanism by which politicians can obtain information about the trustworthiness of their clients. Nearly half of respondents engaged in at least one form of declared support, either on their bodies, on their homes, or at rallies. Table 2 also reveals that citizens are more likely to engage in each form of declared support when they experience negative rainfall shocks (significant at the .01 to .05 level). Our interpretation is that citizens involved in ongoing clientelist relationships are most likely to undertake costly actions to maintain these relationships when their vulnerability is heightened.

A key finding of the present paper is that randomly receiving a water cistern only makes citizens less likely to request handouts only if they are engaged in long-term relationships with politicians. As mentioned above, we define such relationships as conversing with a politician at least monthly before the 2012 election campaign began. Even before investigating these experimental findings, one might be concerned that these frequent interactions are merely a proxy for their level of economic vulnerability or other important characteristics. For example, perhaps only the poorest citizens are motivated to interact frequently with politicians, given their needs. Table 3 suggests that contrary to this hypothesis, frequent interactors do not have significantly lower (or higher) incomes or wealth on a per capita basis than survey respondents who did not regularly converse with politicians before the campaign began. In addition, they are not significantly different with respect to age, education or home ownership. However, frequent interactors are more likely to be male and live in a larger household that is headed by a male. Moreover, as might be expected, their political behavior also differs from citizens who did not frequently converse with politicians. Frequent interactors are more likely to have voted in the 2012 election, and are also more likely to report that all members of their households voted for the same mayoral candidate (both significant at the .05 level). They were also significantly more likely to have received campaign visits during the 2012 campaign (at the .0l level), but had a similar tendency to report voting for a mayoral and councilor candidate of the same political group. Also, frequent interactors were significantly more likely to have declared support publicly during the 2012 campaign (at the .01 level). Overall, citizens in ongoing relationships with politicians do not differ markedly from others with respect to their socioeconomic characteristics, but as one might expect, they do tend to be more politically engaged.

5 Empirical methodology

5.1 Research design

5.1.1 Study population and sampling

This study's population consists of rural households in the Brazilian semi-arid zone without access to tap water. Specifically, to participate in the study, households had to lack piped drinking water, have physical space on the property to build a cistern, and have a $40m^2$ roof consisting of metal sheeting or tile (enabling rainfall collection).

Household sample selection involved two steps. First, municipalities were randomly selected using weights proportional to the number of households without access to piped water according to the most recent administrative data from the federal government's Cadastro Único. In the second step, clusters of neighboring households (*logradouros*) were selected at random within the sample municipalities. Up to six eligible households were interviewed in each cluster. In order to ensure independence of observations across clusters of households these groupings were restricted to be at least two kilometers away from each other.

5.1.2 Cistern Treatment

The experimental treatment consists of rain-fed water cisterns. The cisterns were designed by a regional NGO ASA (Articulação no Semi-Arido Brasileiro[11]) as a strategy to cope with irregular rainfall among low-income, rural households. They consist of an enclosed structure made of reinforced concrete capable of holding up to 16,000 liters of water (about the size of a small room), fed by a gutter and tube system that collects rainfall from the roof of a house. A picture of a cistern is presented in Figure 3. Each cistern is partially buried so that a manual pump on its top is located at hip-level height. A small metal door provides internal access for cleaning and maintenance. ASA requires that the

[11] www.asabrasil.org.br

total roof area providing water for the cistern is at least $40m^2$, to provide enough drinking and cooking water to last the dry season. Each cistern costs approximately US$1,000 (R$1,500 in 2010) to construct.

The cistern is an important asset for the houshold since it provides a reliable technology to store water. While cisterns are designed to collect rainfall from a household's roof, we installed ultrasonic sensors in a subsample of the cisterns that were built and found that about half the time they were filled by water trucks instead of rainfall. This means that the cistern is not only collecting rainfall but also serving as a storage device. Households can buy water from a truck and store it in the cistern in case rainfall is insufficient.

5.1.3 Experimental design

The clusters of households were stratified by municipality in October 2011 and were randomly allocated into a treatment and control arms. Randomization was executed across logradouros (i.e., neighborhood clusters) within municipalities.

Experimental compliance is shown in Table A1. In Wave 2 of the survey in November 2012, 67% of households assigned to treatment had received a cistern. This percentage increased to 91% by Wave 3 in November 2013. Some of the non-compliance stems from the fact that our partner, ASA, is an umbrella NGO coordinating hundreds of small associations at the municipal level or below. In some cases, we learned ex-post that certain local associations had less human resources to organize construction than initially expected.

With regards to compliance among households assigned to the control group, 20% of households had a cistern by Wave 2 and 65% did by Wave 3. Treatment among those assigned to the control group mainly resulted from an unforeseen national strategy of the Dilma Rouseff administration to roll out cisterns throughout the region. At the beginning of our study, ASA was the primary builder of cisterns in the region, but the federal government's action led other contractors to ramp up delivery of cisterns in the region.

Following the usual approach in experimental studies, we address such complications by focusing on intent to treat effects (ITT). That is, analyses focus on the randomized

variable "assigned to treatment." In addition, we show below that observable covariate balance was achieved between households assigned to treatment and control conditions.

5.1.4 Attrition

Household attrition across rounds was remarkably low. Table A2 shows that from the 1,308 households identified for participation in the study, 9.1% were not successfully interviewed during the baseline survey (Wave 1). During the election year survey (Wave 2), the attrition rate was lower at 5.4%. In the post-election survey (Wave 3), attrition increased to 14.5%.

5.1.5 Baseline balance

Baseline balance is presented in Table A3. Mean values for the treatment and control groups are shown, as well as differences in means and standard errors of these differences. The table demonstrates that our randomization was executed effectively, as it achieved statistically similar treatment and control groups.

These figures also provide additional information about our sample. Slightly over half of individuals in our sample are female. On average, respondents are 37 years old and have six years of education (i.e., they completed primary school). Household size is just over 4 members, and about 63% of households have at least one neighbor with a cistern. This latter characteristic had a small but significant difference of 6% between the treatment and control groups.

More importantly, basic socioeconomic indicators were balanced across the two groups: expenditures per capita, wealth per capita, age of the household head, home ownership, electricity, migration, land ownership, land size, number of children and political participation were all balanced. An F-test of whether all coefficients are zero is not rejected.

5.2 Empirical strategy

Our empirical analyses focus on outcomes obtained from household surveys as well as official electoral results. The type of data informs the regression models used in each

analysis. We describe each specification below.

5.2.1 Household vulnerability

We first establish the effects of the cistern on different vulnerability indicators. We do so by estimating:

$$y_{ij} = \alpha_j + \beta_1 \cdot D_{ij} + \epsilon_{ij}, \tag{1}$$

where y_{ij} is a vulnerability indicator for household i in municipality j, D_{ij} is a dummy indicating household i in municipality j was assigned to treatment. α_j is a municipal fixed effect. The municipal fixed effect is identified since clusters were randomly assigned to treatment within a municipality. Because households within a given cluster are neighbors and may share common shocks, we allow for arbitrary intra-cluster correlation of the error term ϵ_{ij} by using clustered standard errors at the neighborhood cluster (*logradouro*) level.

5.2.2 Requests for private help

To analyze requests for private goods as well as their fulfillment by politicians, we use individual level data to estimate:

$$y_{ij} = \alpha_j + \beta_1 \cdot D_{ij} + \beta_2 \cdot I_{infrequent\ interactor\ ij} + \beta_3 D_{ij} I_{infrequent\ interactor\ ij} + \epsilon_{ij}, \tag{2}$$

where y_{ij} is a dummy indicating whether individual i in municipality j requested private goods from a politician (or alternatively requested and received private goods). $I_{infrequent\ interactor\ ij}$ is an indicator for the person being an infrequent interactor before the electoral campaign. D_{ij} is a dummy indicating whether individual i in municipality j lives ina household assigned to receive a cistern, and α_j is the municipal fixed effect. This specification is similar to that in Equation (1), except that we include the effect of being an infrequent interactor as well as the interaction between treatment and infrequent in-

teractor. We also show regressions in which we pool the 2012 and 2013 samples, and in that case include a year fixed effect to account for generalized differences in the request of goods over time.

5.2.3 Electoral outcomes

As described above, we are able to link survey respondents to the specific electronic voting machines in which they cast votes. For 2012, we matched survey respondents to 909 voting machines. Specifically, we estimate:

$$y_{smj} = \alpha_{sj} + \gamma_1 \cdot Treated\ Voters_{smj} + \gamma_2 \cdot Control\ Voters_{smj} + \gamma_1 \cdot Eligible\ Voters_{smj} + \epsilon_{smj}, \tag{3}$$

where y_{smj} is the number of votes for the incumbent mayor in voting location s, voting machine m, in municipality j. The variable of interest is $Treated\ Voters_{smj}$ describing the number of participants receiving the cistern treatment who vote in that particular voting machine. Given that many voting machines have no treated or control individuals, we employ an inverse hyperbolic sine transformation log function, which is defined as $\log(y + \sqrt{y^2 + 1}) \approx log(2) + log(y))$. This function is less sensitive than common methods of handling zeros with a traditional logarithmic specification (to which results are also robust). We include α_{sj}, a voting location fixed effect, which improves the identification of causal effects by comparing electoral results across multiple electronic voting machines in the same voting location (e.g., school building). This approach addresses the concern that politicians may have systematically greater levels of electoral support in different regions of a municipality. Furthermore, this approach is important because although citizens cannot influence the electronic voting machine to which they are assigned within a given voting location, they may request a voting location that is close to their work or is otherwise more convenient for them. We cluster the standard errors at the municipality level, since the candidates are common within a municipality.

We also control for several important factors, to which we again apply the inverse

hyperbolic sine transformation log function for the rationale outlined above. First, we include $Control\ Voters_{smj}$, the number of control individuals per voting machine, as the number of treated individuals is random conditional on the overall number of individuals in the experimental sample assigned to the voting machine.[12]

Second, we control for $Eligible\ Voters_{smj}$, the number of total eligible voters in the voting machine during the prior municipal election (in 2008), as this quantity of voters would be expected to affect the number of votes received by the incumbent. In some specifications, we also include an additional control variable – the change in eligible voters between 2008 and 2012 – which likewise might be expected to influence the number of votes received by an incumbent, ceteris paribus.

Finally, we can also examine differences in votes in identical voter machines between the 2008 and 2012 elections. This step allows us to estimate Equation 3 in changes from 2008 to 20012. However, since the Brazilian electoral authority implemented biometric voter re-registration procedures in some municipalities in our sample, we can only implement the differences regression for municipalities that did not undergo this procedure between 2008 and 2012.

6 Results

6.1 Effects of Cisterns on Household Vulnerability

The overall argument of this paper is that the introduction of water cisterns reduces vulnerability, which in turn decreases clientelist requests and worsens incumbents' electoral performance. As such, the first step of the empirical analysis is to establish that the cisterns treatment indeed reduces vulnerability. To this end, Table 5 provides estimates on the effect of the cisterns intervention on various measures of household vulnerability. As shown in column 1, with respect to the adapted CES-D scale of depres-

[12]More precisely, for a given voting machine, the proportion of voters from the experimental sample who are assigned to the treatment condition is assigned randomly. We obtain a measure of this proportion by including the number of control individuals in the specification, as well as our primary variable of interest.

sive symptoms described above, survey respondents experience an improvement of 0.09 units in 2013 (significant at 95 percent confidence). The second measure of vulnerability described above, the child food security index, also shows a significant improvement of 0.075 among treated households (significant at the 95 percent level; column 2). Self-reported health status also shows an improvement of similar magnitude (0.08), though this estimate is imprecisely estimated (column 3). An overall index measure that standarizes and adds these three components as in Kling, Liebman and Katz (2007) suggests that there is a substantial 0.12σ reduction in vulnerability caused by the cisterns program (significant at 99 percent confidence; column 4). Overall, this analysis confirms the cisterns program has first-order intended effects in reducing the vulnerability of these households.

6.2 Effects of Cisterns on Clientelism

Given that the cisterns treatment lowered vulnerability, we turn to our next prediction: reduced vulnerability decreases clientelism. To investigate, we present estimates of the causal impacts of the cistern intervention on citizens' participation in clientelism. As shown in column 1 of Table 6, the intervention leads to a 2.7 percentage point (12.0 percent) reduction in the likelihood that poor individuals request private forms of assistance from politicians during the 2012 electoral year (p-value=0.106). Most strikingly, these effects are fully concentrated among citizens who are most likely to be involved in clientelist relationships – those having at least monthly conversations with a politicians before the 2012 electoral campaign began. Among this group of "frequent interactors," we estimate a 10.3 percentage point (29.8 percent) reduction in requests (significant at 95 percent confidence). By contrast, among other respondents, we estimate an insignificant 1.0 percentage point reduction in requests (p-value=0.57; column 2). When we decompose these effects by type of good requested, we observe that the treatment effect for frequent interactors is negative for all good types: water requests fall by 3.9 percentage points, construction materials fall by 3.7 percentage points, and medicines or medical treatment

show a 2.3 percentage point reduction, although the latter is imprecisely estimated (reported in appendix in Table A4).

The stark reduction in citizen requests fully persists over the next year, as measured in Wave 3 in late 2013. As shown in column 3, on average citizens are 3.1 percentage points (33.4 percent) less likely to make requests (significant at 95 percent confidence). Again, we find that these persistent effects are substantial among the population of frequent interactors who are most likely to be clientelist relationships, with requests falling by 10.5 percentage points (56 percent) – a result significant at the 95 percent confidence level. Yet again, these effects are negligible and statistically insignificant among infrequent interactors (column 4).

In order to heighten comparability with analyses of individuals' voting behavior below (see Section 5.3), we also estimate the aforementioned models using only the subsample of municipalities in which the incumbent mayor runs for reelection (columns 7-12). We find reductions in the overall proportion of citizen requests by 4.4 percentage points during the electoral year, and of 3.4 percentage points in the following year; these findings are significant at the 95 and 90 percent level, respectively (columns 7, 9). Again, the effects are substantial and concentrated among the subsample of frequent interactors (columns 8, 10).

Whereas the above specifications focus on whether the cisterns treatment affects citizens' requests for private assistance, we also examine whether the treatment affects the equilibrium level of requests fulfilled by politicians (Table 7). Column 1 shows that the cistern intervention does not have an overall impact on the equilibrium probability of fulfilled requests (point estimate = -0.0036). However, a substantial reduction of 7.2 percentage points is observed among frequent interactors during the 2012 election year, a finding significant at the 95 percent level of confidence (column 2). This effect does not persist in the subsequent year (column 4), although on average across years it does persist (column 6). Again, the effects are very similar among municipalities with incumbent

mayor running for reelection (columns 7-12).

6.3 Effects of the Cisterns on Voting Outcomes

Thus far, results suggest that the cisterns intervention reduces vulnerability and clientelism, both in electoral and non-electoral years. Given these findings and the fact that clientelism disproportionately favors incumbents (see Section 1), the cisterns treatment is expected to undercut the performance of the incumbent mayors during their reelection campaigns. As explained above, we link respondents to their electronic voting machines, the lowest level at which electoral results are released in Brazil. This approach enables us to examine whether incumbent mayors indeed receive fewer votes in voting machines where greater numbers of individuals received water cisterns.

In line with this prediction, the first row of Table 8 provides evidence of this negative relationship, significant at the 95 percent level across all specifications. As discussed above, given that many voting machines have no treated or control individuals, we employ an inverse hyperbolic sine transformation log function. This coefficient corresponds to the elasticity of incumbent votes with respect to the cisterns treatment. To be more precise, it corresponds to the proportional change in the number of incumbent votes relative to the proportional change in the number of treated individuals assigned to a voting machine. Employing the elasticity of -.0146 in column 1, we estimate that for each voting machine, each individual receiving the cisterns treatment caused the incumbent mayor to lose an estimated 0.98 votes.[13] This finding corroborates the prediction that reduced vulnerability undermines the electoral performance of incumbent mayors. However, this figure overestimates the impact of the cisterns treatment, as there are more citizens of voting age in surveyed households than we actually interviewed in the 2012 survey (when we collected respondents' electronic voting machine numbers) .[14] Thus, to provide a more conservative estimate, we adjust this figure by share of voting-age individuals per

[13] This calculation employs the incumbents' mean number of votes per electronic voting machine in the estimation sample.

[14]

household that was interviewed. This step reduces the effect to 0.77 fewer votes for the incumbent.

We show robustness of the negative effect of the cisterns treatment on incumbent mayoral performance using alternative specifications. In columns 3 and 4, we show that findings remain significant at the 95 percent level of confidence and similar in magnitude when excluding municipalities that implemented biometric voting in the run-up to the 2012 election. The reason for this robustness test is that the implementation of biometric voting involves a voter re-registration process that can affect the number of registered voters as well as the electoral performance of incumbents (Hidalgo and Nichter, 2016). As a further robustness check, we also estimate the model in first differences across the 2008 and 2012 elections, a step that addresses unobserved heterogeneity at the level of the voting machine. Again, results in columns 5 and 6 are robust and remain quantitatively similar in size.

Overall, these findings suggest that cisterns not only reduce recipients' vulnerability and their clientelist requests, but also undercut the performance of incumbent mayors in the electronic voting machines where treated respondents cast ballots. More broadly, it corroborates our argument that vulnerability – in a context where formal mechanisms of social insurance are largely absent – is a first-order determinant of clientelism.

7 Conclusion

The cisterns experiment employed in this study suggests that decreases in vulnerability have the potential to undermine clientelist relationships. We randomly assigned the placement of water cisterns – which collect and store rainwater, thus reducing recipients' susceptibility to droughts – among households in nine states across rural Northeast Brazil. Our randomized control trial yields several important findings, which are consistent with theoretical predictions. First, several distinct measures reveal reduced levels of vulnerability among cistern recipients. Second, results indicate that receiving a cis-

tern reduces demands for private benefits, especially among those who are most likely to engage in clientelist relationships. Evidence suggests the persistence of treatment effects, given that findings are observed not only during the election campaign, but also a full year later. Third, our analysis of election results at the electronic voting machine level reveals that the cisterns treatment undercut the number of votes received by the incumbent mayors during their re-election campaigns. Overall, these findings are consistent with our argument that cisterns – by reducing vulnerability – undermine ongoing clientelist relationships and thereby impinge on the electoral performance of incumbents. More broadly, these findings also suggest that vulnerability is a first-order determinant of clientelism in contexts with limited formal mechanisms of social insurance.

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Figures and Tables

Figure 1: Brazilian semi-arid region

Notes: The Brazilian semi-arid region consists of 1,133 municipalities spread across 9 states. It is characterized by lower rainfall than the rest of the country and higher rainfall variance. Source: Agência Nacional de Águas.

Figure 2: Timeline

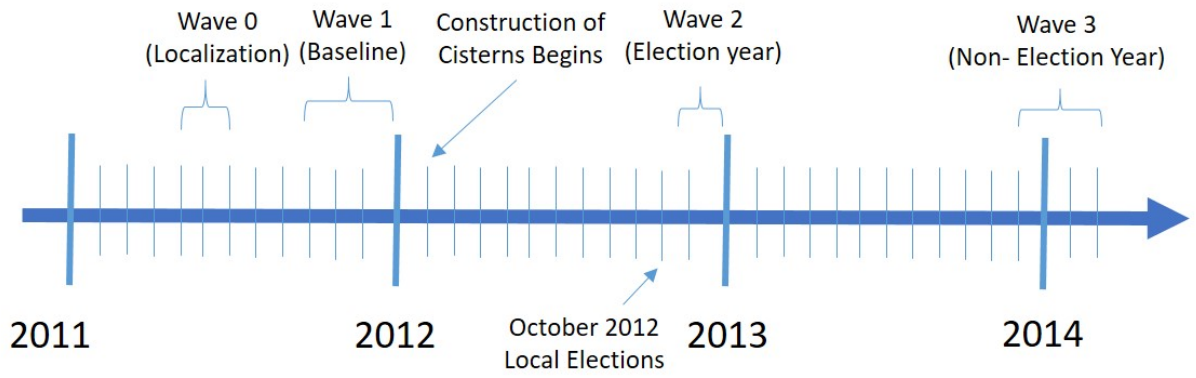

Figure 3: Cistern

Notes: The ASA cisterns stores up to 16,000 liters of water and is made out of reinforced concrete.

Table 1: Vulnerability and Rainfall Shocks

Variable	Mean	Relationship with Rainfall Shocks
-(CES-D Scale)	3.331	0.219***
	(0.642)	(0.076)
Child Food Security Index	-0.309	0.217***
	(0.914)	(0.123)
Self Reported Health Status (SRHS) Index	-2.172	0.184**
	(0.531)	(0.080)
Total Household Expenditure	367.85	73.278***
	(200.07)	(20.036)
Total Household Food Expenditure	239.15	40.039***
	(133.48)	(13.538)
Total Household Non-Food Expenditure	133.62	34.669***
	(130.26)	(11.094)

Notes: Column 1 presents the mean of each vulnerability measure, while column 2 reports the coefficients from regressing each of the vulnerability measures on rainfall shocks. Standard errors are clustered at the neighborhood level and reported in parentheses. Rainfall is measured in standard deviations of rainfall during January-September of the relevant year from the historic average rainfall during 1986-2011. The CES-D scale is a short self- report scale designed to measure depressive symptomatology in the general population. The Child Food Security Index is a sum of Yes/No (1/0) responses to whether in last 3 months any child skipped a meal, ate less than they should, was hungry but did not eat, did not have varied consumption, had only limited types of food. All responses enter negatively, which means a higher Child Food Security Index indicates better food security for children. The Self-Reported Health Status (SRHS) Index measures responses on a 4-point scale regarding how good respondents believed their health is. Higher values of Health Index indicate better reported health. The non-food household expenditure includes rent, clothing, health, gas, electricity and other expenses. * 10%, ** 5%, *** 1% significance levels.

Table 2: Interactions with Politicians (2012)

Variable	Mean	Relationship with Rainfall Shocks
Interact at least monthly with a politician, before electoral campaign	0.184	-0.082
	(0.387)	(0.069)
Voting for the same group/coalition	0.718	-0.112
	(0.450)	(0.105)
All household members voting for the same mayoral candidate	0.773	-0.186**
	(0.419)	(0.094)
Received visit from any mayoral candidate	0.696	0.122
	(0.460)	(0.093)
Any declared support	0.485	-0.542***
	(0.500)	(0.130)
Declaration on person's body (sticker, shirt)	0.185	-0.172**
	(0.388)	(0.076)
Declaration on person's house (flag, banner, painting)	0.387	-0.484***
	(0.487)	(0.132)
Declaration at rally (Attend rally, wear sticker/show support in rally)	0.218	-0.298***
	(0.413)	(0.085)

Notes: Column 1 presents the mean of each variable and the standard deviations are reported in parentheses. Column 2 reports the coefficients from regressing each of the variables on rainfall shocks. Standard errors are clustered at the neighborhood level and reported in parentheses. Rainfall shocks are measured by the standard deviations of rainfall during January-September of the relevant year from the historic average rainfall during 1986-2011. * 10%, ** 5%, *** 1% significance levels.

Table 3: Frequent and Infrequent Interactors: Baseline Individual and Household Characteristics

Variable	Frequent Interactors	Infrequent Interactors	Difference
Individual Characteristics			
Age	37.445	37.377	0.208
			(0.856)
Years of Education	6.105	5.746	0.274
			(0.228)
Female	0.451	0.558	-0.114***
			(0.025)
Household Characteristics			
Household Wealth Per Member	5894.11	5641.09	175.03
			(387.676)
Household Expenditure Per Member	103.23	104.90	-0.64
			(4.752)
Household Head Education	5.882	5.688	0.059
			(0.279)
Household Head is Female	0.150	0.194	-0.063**
			(0.025)
Owns House	0.881	0.858	0.024
			(0.022)
Household Size	4.539	4.187	0.383***
			(0.136)
Political Activities			
Voted in 2008 Municipality Election	0.916	0.871	0.043**
			(0.019)
Voting for the same group/coalition	0.732	0.719	0.006
			(0.033)
All household members voting for the same mayoral candidate	0.819	0.761	0.051**
			(0.023)
Received visit from any mayoral candidate	0.802	0.676	0.099***
			(0.021)
Any declared support	0.655	0.448	0.187***
			(0.026)

Notes: Columns 1-2 present the mean of each variable for the frequent and infrequent interactors respectively. Frequent interactors are those who interacted with either the mayor or the councilor at least once a month before the election campaign period. Column 3 reports differences estimated in an OLS regression model with municipality fixed effects. Standard errors are clustered at the neighborhood level and reported in parentheses. * 10%, ** 5%, *** 1% significance levels.

Table 4: Clientelistic Relationships

	Mean (2012)	Mean (2013)	Relationship with Rainfall Shocks (2012)	Relationship with Rainfall Shocks (2013)	P-Value from Pooling Test
Panel A: Ask for private help from any politician					
Any	0.213	0.081	-0.298***	-0.008	0.001
	(0.409)	(0.273)	(0.079)	(0.030)	
Water	0.055	0.010	-0.177***	0.003	0.001
	(0.228)	(0.098)	(0.051)	(0.007)	
Medicines or Medical Treatment	0.071	0.021	-0.083**	0.014	0.030
	(0.257)	(0.142)	(0.042)	(0.016)	
Construction Materials	0.057	0.016	-0.072	-0.014	0.237
	(0.233)	(0.125)	(0.046)	(0.013)	
Panel B: Ask for and receive private help from any politician					
Any	0.124	0.032	-0.176***	0.004	0.007
	(0.330)	(0.176)	(0.064)	(0.023)	
Water	0.034	0.004	-0.083***	-0.004	0.081
	(0.182)	(0.064)	(0.045)	(0.005)	
Medicines or Medical Treatment	0.051	0.010	-0.061***	0.011	0.065
	(0.219)	(0.098)	(0.036)	(0.014)	
Construction Materials	0.022	0.002	-0.039	-0.006***	0.241
	(0.146)	(0.045)	(0.028)	(0.003)	

Notes: Columns 1-2 present the mean of each clientelism measure and the standard deviations are reported in parentheses. Columns 3-4 report the coefficients from regressing each of the clientelism measures on rainfall shocks. Standard errors are clustered at the neighborhood level and reported in parentheses. Rainfall shocks are measured by the standard deviations of rainfall during January-September of the relevant year from the historic average rainfall during 1986-2011. Column 5 presents the p-value from the *F*-test to test whether the coecients reported in columns 3 and 4 are equal to each other. * 10%, ** 5%, *** 1% significance levels.

Table 5: Vulnerability and Assignment to Treatment

	-(CES-D Scale)	Child Food Security Index	SRHS Index	Overall
Treatment	0.0925**	0.0749**	0.0843	0.126***
	(0.0375)	(0.0332)	(0.0540)	(0.0426)
Municipality Fixed Effects	Yes	Yes	Yes	Yes
Observations	1128	1052	1128	1128
Mean of Dependent Variable	3.331	-2.172	-0.309	0.0006

Notes: Each column reports the coefficient from regressing each of the vulnerability measures on treatment with municipality xed eects. Standard errors are clustered at the neighborhood level and reported in parentheses. The CES-D scale is a short self-report scale designed to measure depressive symptomatology in the general population. The Child Food Security Index is a sum of Yes/No (1/0) responses to whether in last 3 months any child skipped a meal, ate less than they should, was hungry but did not eat, did not have varied consumption, had only limited types of food. All responses enter negatively, which means a higher Child Food Security Index indicates better food security for children. The Self-Reported Health Status (SRHS) Index is a sum of Yes/No (1/0) responses to how good respondents believed their health is. Higher values of Health Index indicate better reported health. The Overall Vulnerability Index is the unweighted mean of standardized values of all of the above indexes. * 10%, ** 5%, *** 1% significance levels.

Table 6: Private Help Requests

	All Municipalities						Municipalites with Incumbent Mayors Running for Re-election					
	2012		2013		Pooled		2012		2013		Pooled	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Treatment	-0.0271	-0.103**	-0.0306**	-0.0969**	-0.0287**	-0.105***	-0.0438**	-0.113**	-0.0339*	-0.128**	-0.0403**	-0.125***
	(0.0167)	(0.0414)	(0.0139)	(0.0391)	(0.0123)	(0.0320)	(0.0213)	(0.0537)	(0.0175)	(0.0506)	(0.0156)	(0.0396)
Infrequent Interactor with Politician		-0.133***		-0.0818**		-0.117***		-0.148***		-0.113**		-0.140***
		(0.0330)		(0.0321)		(0.0264)		(0.0404)		(0.0451)		(0.0330)
Treatment × Infrequent Interactor with Politician		0.0925**		0.0800**		0.0935***		0.0870		0.114**		0.105**
		(0.0440)		(0.0397)		(0.0337)		(0.0578)		(0.0525)		(0.0424)
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	Yes	Yes	No	No	No	No	Yes	Yes
Observations	2667	2667	1625	1625	4292	4292	1345	1345	852	852	2197	2197
Mean of Y : Overall		0.213		0.0788		0.162		0.196		0.0669		0.146
Mean of Y : Control Group		0.224		0.0923		0.175		0.211		0.0835		0.162
Mean of Y : Frequent Interactors in Control Group		0.345		0.174		0.283		0.353		0.177		0.289
P-Value of $\beta_1 + \beta_3$		0.573		0.213		0.350		0.239		0.441		0.211
P-Value from Pooling Test					0.8623	0.2801					0.6925	0.3945

Notes: β_1 is the coefficient on *Treatment*, β_3 is the coefficient on *Treatment X Infrequent Interactor With Politician*, Y is the outcome variable *Probability of asking for private help*. * 10%, ** 5%, *** 1% significance levels.

Table 7: Ask for and Receive Private Help Requests

	All Municipalities						Municipalites with Incumbent Mayors Running for Re-election					
	2012		2013		Pooled		2012		2013		Pooled	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Treatment	-0.00364	-0.0721**	-0.00956	-0.0340	-0.00590	-0.0609**	-0.0171	-0.0735*	-0.00777	-0.0395	-0.0141	-0.0657**
	(0.0134)	(0.0330)	(0.00880)	(0.0232)	(0.00950)	(0.0237)	(0.0180)	(0.0410)	(0.0110)	(0.0296)	(0.0126)	(0.0292)
Infrequent Interactor with Politician		-0.0971***		-0.0265		-0.0734***		-0.0900**		-0.0399		-0.0752***
		(0.0270)		(0.0191)		(0.0189)		(0.0347)		(0.0261)		(0.0235)
Treatment × Infrequent Interactor with Politician		0.0840**		0.0296		0.0671***		0.0709		0.0387		0.0639**
		(0.0351)		(0.0243)		(0.0249)		(0.0440)		(0.0306)		(0.0300)
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	Yes	Yes	No	No	No	No	Yes	Yes
Observations	2663	2663	1625	1625	4288	4288	1344	1344	852	852	2196	2196
Mean of Y : Overall		0.124		0.0314		0.0891		0.118		0.0246		0.0815
Mean of Y : Control Group		0.124		0.0360		0.0914		0.122		0.132		0.0857
Mean of Y : Frequent Interactors in Control Group		0.218		0.0694		0.164		0.216		0.190		0.161
P-Value of $\beta_1 + \beta_3$		0.404		0.625		0.531		0.889		0.938		0.891
P-Value from Pooling Test					0.5749	0.0923					0.6253	0.2164

Notes: β_1 is the coefficient on treatment and β_3 is the coefficient on Treatment X Infrequent Interactor With Politician, Y is the outcome variable *Probability of asking for and receiving private help.* * 10%, ** 5%, *** 1% significance levels.

Table 8: Effect on Electoral Support of Incumbent Mayor (2012)

	All municipalities		Municipalities without biometric voting			
	2012		2012		Δ(2008-2012)	
	(1)	(2)	(3)	(4)	(5)	(6)
Log Number of Treated Individuals in Voting Machine	-0.0146**	-0.0208**	-0.0159**	-0.0192**	-0.0191**	-0.0223**
	(0.00611)	(0.00846)	(0.00632)	(0.00889)	(0.00861)	(0.00994)
Log Number of Control Individuals in Voting Machine	0.00598	0.00255	0.00511	0.0138**	0.00853	0.0167
	(0.00751)	(0.0151)	(0.00692)	(0.00624)	(0.0111)	(0.0113)
Change in Log Eligible Voters	0.925***		1.101***		1.032***	
	(0.101)		(0.117)		(0.0838)	
Log of Total Eligible Voters in Voting Machine in 2008	0.854***	0.0190	1.010***	0.0539	0.0607	-0.836***
	(0.104)	(0.0802)	(0.0806)	(0.123)	(0.0560)	(0.0773)
Constant	0.00663	5.301***	-0.985*	5.081***	-0.195	5.493***
	(0.659)	(0.501)	(0.513)	(0.767)	(0.354)	(0.482)
Location FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	909	909	803	803	803	803
Mean of Votes Received by Incumbent		117.93		119.66		119.66

Notes: Robust standard errors clustered at the municipality level in parentheses. Outcome variable: Log of votes received by the incumbent mayoral candidate at a given voting machine. To deal with log of zero, we use the inverse hyperbolic sine transformation (defined as $\log(y + \sqrt{y^2+1}) \approx log(2) + log(y)$) on the dependent and explanatory variables. * 10%, ** 5%, *** 1% significance levels.

Online Appendix - Not for Publication

Additional Figures and Tables

Table A1: Compliance

	Households	Cisterns in November 2012	Cisterns in November 2013
Assigned to Treatment	615	67.45%	90.78%
Assigned to Control	693	20.23%	65.30%
Total	1308		

Table A2: Attrition

	Wave 0 (Localization)	Wave 1 (Baseline)	Wave 2 (Election Year)	Wave 3 (Non-election Year)
Households	1,308	1,189	1,238	1,119
Rate of Attrition from Wave 0		9.10%	5.35%	14.45%

Table A3: Treatment and Control: Baseline Individual and Household Characteristics

Variable	Treatment Group	Control Group	Difference	Standard Error of Difference
Individual Characteristics				
Age	36.587	37.393	-0.345	(0.642)
Female	0.518	0.535	-0.016	(0.011)
Current Student	0.139	0.126	0.005	(0.013)
Years of Education	5.903	5.728	0.006	(0.193)
Household Characteristics				
Household Size	4.288	4.221	0.054	(0.119)
Number of Total Neighbors	17.658	15.959	1.997	(1.377)
Neighbor has Cistern	0.664	0.598	0.060***	(0.035)
Bolsa Familia Amount Received	91.954	85.915	4.945	(4.327)
Total Household Expenditure	367.149	376.861	-6.454	(12.636)
Household Wealth Per Member	18,955.48	20,256.44	-1,187.8	(992.416)
Household Expenditure Per Member	100.324	109.276	-7.745	(4.776)
Age of Household Head	43.899	44.840	-0.555	(0.937)
Household Head Education	5.734	5.830	-0.241	(0.250)
Household Head is Female	0.182	0.182	0.007	(0.019)
Owns House	0.863	0.873	-0.016	(0.021)
Number of Room in House	5.266	5.331	-0.082	(0.079)
Has Access to Electricity	0.883	0.905	-0.018	(0.018)
Migrated Recently	0.111	0.107	0.006	(0.017)
Owns Land	0.483	0.465	-0.004	(0.030)
Land Size	3.413	3.554	-0.218	(0.684)
Children 0-6 Months	0.047	0.058	-0.015	(0.013)
6 Months - 5 Years	0.631	0.612	-0.001	(0.038)
5 Years - 64 Years	3.397	3.316	0.099	(0.112)
Older than 64 Years	0.213	0.235	-0.029	(0.028)
Voted in 2008 Municipality Election	0.891	0.865	0.020	(0.019)

Notes: Columns 1-2 present the mean of each variable for the treatment and control group respectively. Column 3 reports differences estimated in OLS regression model with municipality fixed effects. Column 4 reports the standard errors of the differences, which are clustered at the neighborhood level and reported in parentheses. * 10%, ** 5%, *** 1% significance levels.

Table A4: Asking for Specific Goods: Pooled Data

	All Municipalities			Municipalites with Incumbent Mayors Running for Re-Election		
	Water	Construction	Medical Treatment/Medicine	Water	Construction	Medical Treatment/Medicine
Treatment	-0.0386**	-0.0374*	-0.0232	-0.0394*	-0.0311	-0.0373
	(0.0155)	(0.0203)	(0.0192)	(0.0210)	(0.0247)	(0.0265)
Infrequent Interactor with Politician	-0.0420***	-0.0418**	-0.0123	-0.0430**	-0.0375*	-0.0356
	(0.0131)	(0.0168)	(0.0172)	(0.0173)	(0.0205)	(0.0235)
Treatment × Infrequent Interactor with Politician	0.0422***	0.0367*	0.0100	0.0332	0.0320	0.0173
	(0.0163)	(0.0211)	(0.0214)	(0.0213)	(0.0264)	(0.0294)
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4292	4292	4292	2197	2197	2197
Mean of Dep Variable						
P-Value of $\beta_1 + \beta_3$	0.567	0.921	0.105	0.423	0.917	0.0332

Notes: β_1 is the coefficient on *Treatment*,β_3 is the coefficient on *Treatment X Infrequent Interactor with Politician*. Outcome variable: *Probability of asking for private help*. * 10%, ** 5%, *** 1% significance levels.

Table A5: Asking for and Receiving Specific Goods: Pooled Data

	All Municipalities			Municipalites with Incumbent Mayors Running for Re-Election		
	Water	Construction	Medical Treatment/Medicine	Water	Construction	Medical Treatment/Medicine
Treatment	-0.0298**	-0.00308	-0.0232	-0.0136	0.0000608	-0.0374*
	(0.0131)	(0.0117)	(0.0158)	(0.0179)	(0.0141)	(0.0195)
Infrequent Interactor with Politician	-0.0336***	-0.0104	-0.0114	-0.0216*	-0.00609	-0.0230
	(0.0106)	(0.00870)	(0.0146)	(0.0114)	(0.0103)	(0.0173)
Treatment × Infrequent Interactor with Politician	0.0434***	0.00526	0.0134	0.0159	0.00570	0.0207
	(0.0134)	(0.0121)	(0.0175)	(0.0165)	(0.0146)	(0.0212)
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4288	4288	4288	2196	2196	2196
Mean of Dep Variable						
P-Value of $\beta_1 + \beta_3$	0.0141	0.575	0.139	0.737	0.234	0.0320

Notes: β1 is the coefficient on treatment and β3 is the coefficient on Treatment X Infrequent Interactor With Politician β4 is the coefficient on Treatment X Rainfall and β4 is the coefficient on Treatment X Rainfall X Infrequent Interactor Outcome variables: Probability of asking for private help. * 10%, ** 5%, *** 1% significance levels.

Table A6: Did you ask for any private help: Pooled Data with Rainfall

	All Municipalities			Municipalites with Incumbent Mayors Running for Re-Election		
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	-0.108***	-0.143***	-0.119***	-0.131***	-0.184***	-0.143**
	(0.0342)	(0.0360)	(0.0457)	(0.0426)	(0.0462)	(0.0707)
Infrequent Interactor with Politician	-0.118***	-0.117***	-0.0879**	-0.141***	-0.140***	-0.0921
	(0.0264)	(0.0264)	(0.0383)	(0.0329)	(0.0329)	(0.0615)
Rainfall	-0.0663	-0.0634	-0.122	0.0214	0.0264	-0.0842
	(0.0569)	(0.0569)	(0.0907)	(0.0929)	(0.0926)	(0.181)
Treatment × Infrequent Interactor with Politician	0.0933***	0.136***	0.107**	0.106**	0.173***	0.124*
	(0.0337)	(0.0366)	(0.0459)	(0.0422)	(0.0480)	(0.0712)
Treatment × Rainfall	-0.00807	-0.104	-0.0411	-0.0163	-0.172*	-0.0646
	(0.0461)	(0.0721)	(0.107)	(0.0620)	(0.104)	(0.180)
Treatment × Rainfall × Infrequent Interactor		0.120*	0.0418		0.198**	0.0702
		(0.0671)	(0.108)		(0.0949)	(0.180)
Rainfall × Infrequent Interactor			0.0782			0.128
			(0.0846)			(0.152)
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4292	4292	4292	2197	2197	2197
Mean of Dep Variable			0.162			0.146
P-Value of $\beta_1 + \beta_3$						
P-Value of $\beta_1 + \beta_3 + \beta_4$	0.707			0.610		
P-Value of $\beta_1 + \beta_3 + \beta_4 + \beta_5$		0.882	0.855		0.848	0.865

Notes: β1 is the coefficient on treatment and β3 is the coefficient on Treatment X Infrequent Interactor With Politician β4 is the coefficient on Treatment X Rainfall and β4 is the coefficient on Treatment X Rainfall X Infrequent Interactor Outcome variable: Probability of asking for private help. * 10%, ** 5%, *** 1% significance levels.

Table A7: Did you ask for and receive any private help: Pooled Data with Rainfall

	All Municipalities			Municipalites with Incumbent Mayors Running for Re-Election		
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	-0.0685***	-0.0953***	-0.0551*	-0.0722**	-0.0978***	-0.0427
	(0.0256)	(0.0259)	(0.0302)	(0.0320)	(0.0358)	(0.0475)
Infrequent Interactor with Politician	-0.0735***	-0.0735***	-0.0238	-0.0757***	-0.0755***	-0.0114
	(0.0189)	(0.0189)	(0.0243)	(0.0234)	(0.0233)	(0.0361)
Rainfall	-0.0284	-0.0262	-0.124*	0.0170	0.0194	-0.128
	(0.0492)	(0.0494)	(0.0706)	(0.0786)	(0.0782)	(0.132)
Treatment × Infrequent Interactor with Politician	0.0671***	0.101***	0.0513*	0.0646**	0.0970***	0.0327
	(0.0249)	(0.0259)	(0.0299)	(0.0300)	(0.0346)	(0.0445)
Treatment × Rainfall	-0.0207	-0.0951*	0.0104	-0.0178	-0.0934	0.0492
	(0.0388)	(0.0565)	(0.0795)	(0.0488)	(0.0774)	(0.128)
Treatment × Rainfall × Infrequent Interactor		0.0929*	-0.0376		0.0964	-0.0740
		(0.0516)	(0.0812)		(0.0670)	(0.128)
Rainfall × Infrequent Interactor			0.131**			0.170
			(0.0639)			(0.110)
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4288	4288	4288	2196	2196	2196
Mean of Dep Variable			0.0891			0.0815
P-Value of $\beta_1 + \beta_3$						
P-Value of $\beta_1 + \beta_3 + \beta_4$	0.662			0.683		
P-Value of $\beta_1 + \beta_3 + \beta_4 + \beta_5$		0.954	0.546		0.972	0.545

Notes: β1 is the coefficient on treatment and β3 is the coefficient on Treatment X Infrequent Interactor With Politician β4 is the coefficient on Treatment X Rainfall and β4 is the coefficient on Treatment X Rainfall X Infrequent Interactor Outcome variable: Probability of asking for private help. * 10%, ** 5%, *** 1% significance levels.

Table A8: Asking for Specific Goods: 2012

	All Municipalities					
	Water	Water	Construction Materials	Construction Materials	Medicine and Treatment	Medicine and Treatment
Treatment	-0.00457	-0.0370	-0.00963	-0.0497*	-0.0151	-0.0170
	(0.00956)	(0.0226)	(0.0102)	(0.0274)	(0.0102)	(0.0265)
Infrequent Interactor with Politician		-0.0452**		-0.0524**		-0.00345
		(0.0181)		(0.0231)		(0.0220)
Treatment × Infrequent Interactor with Politician		0.0397*		0.0492*		0.00241
		(0.0235)		(0.0289)		(0.0295)
Constant	0.0799***	0.112***	0.0488*	0.0864**	0.0735***	0.0760**
	(0.0245)	(0.0278)	(0.0268)	(0.0336)	(0.0261)	(0.0334)
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2667	2667	2667	2667	2667	2667
Mean of Dep Variable		0.0547		0.0574		0.0712
P-Value of $\beta_1 + \beta_3$		0.780		0.957		0.196

Notes: β1 is the coefficient on treatment and β3 is the coefficient on Treatment X Interact Monthly With Politician. Share of people interacting with politician at least monthly before campaign is 18.37%.* 10%, ** 5%, *** 1% significance levels.

Table A9: Asking for and Receiving Specific Goods: 2012

	All Municipalities					
	Water	Water	Construction Materials	Construction Materials	Medicine and Treatment	Medicine and Treatment
Treatment	0.0103	-0.0310*	0.00295	-0.00597	-0.0169**	-0.0386*
	(0.00851)	(0.0187)	(0.00610)	(0.0182)	(0.00845)	(0.0226)
Infrequent Interactor with Politician		-0.0415***		-0.0186		-0.0182
		(0.0151)		(0.0132)		(0.0204)
Treatment × Infrequent Interactor with Politician		0.0508***		0.0110		0.0266
		(0.0192)		(0.0188)		(0.0251)
Constant	0.0508**	0.0804***	0.00977	0.0232	0.0744***	0.0873***
	(0.0199)	(0.0238)	(0.0106)	(0.0146)	(0.0260)	(0.0329)
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2665	2663	2665	2663	2665	2663
Mean of Dep Variable		0.0342		0.0218		0.0507
P-Value of $\beta_1 + \beta_3$		0.0251		0.406		0.203

Notes: β1 is the coefficient on treatment and β3 is the coefficient on Treatment X Interact Monthly With Politician. Share of people interacting with politician at least monthly before campaign is 18.37%. * 10%, ** 5%, *** 1% significance levels.

Table A10: Asking for Specific Goods: 2013

	All Municipalities					
	Water	Water	Construction Materials	Construction Materials	Medicine and Treatment	Medicine and Treatment
Treatment	-0.00169	-0.0339**	-0.0135**	-0.0169	-0.0143**	-0.0299
	(0.00382)	(0.0165)	(0.00555)	(0.0208)	(0.00683)	(0.0211)
Infrequent Interactor with Politician		-0.0314**		-0.0223		-0.0236
		(0.0154)		(0.0161)		(0.0179)
Treatment × Infrequent Interactor with Politician		0.0385**		0.0144		0.0187
		(0.0174)		(0.0215)		(0.0228)
Constant	0.000847	0.0262**	0.00675	0.0185	0.144***	0.168***
	(0.00200)	(0.0133)	(0.00557)	(0.0142)	(0.0378)	(0.0390)
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1943	1625	1943	1625	1943	1625
Mean of Dep Variable		0.0105		0.0123		0.0234
P-Value of $\beta_1 + \beta_3$		0.280		0.607		0.174

Notes: β1 is the coefficient on treatment and β3 is the coefficient on Treatment X Interact Monthly With Politician. Share of people interacting with politician at least monthly before campaign is 18.37%. * 10%, ** 5%, *** 1% significance levels.

Table A11: Asking for and Receiving Specific Goods: 2013

	All Municipalities					
	Water	Water	Construction Materials	Construction Materials	Medicine and Treatment	Medicine and Treatment
Treatment	-0.000696	-0.0202*	-0.00253**	0.00212	-0.00620	0.00309
	(0.00275)	(0.0111)	(0.00128)	(0.00214)	(0.00473)	(0.0141)
Infrequent Interactor with Politician		-0.0159		0.00435		0.00228
		(0.00973)		(0.00312)		(0.0125)
Treatment × Infrequent Interactor with Politician		0.0234**		-0.00522		-0.00969
		(0.0109)		(0.00346)		(0.0160)
Constant	0.000348	0.0137	0.00127	-0.00231	0.0486	0.0474
	(0.00140)	(0.00898)	(0.00111)	(0.00211)	(0.0348)	(0.0345)
Mun. FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1943	1625	1943	1625	1943	1625
Mean of Dep Variable		0.00369		0.00185		0.0105
P-Value of $\beta_1 + \beta_3$		0.189		0.0873		0.266

Notes: β1 is the coefficient on treatment and β3 is the coefficient on Treatment X Interact Monthly With Politician. Share of people interacting with politician at least monthly before campaign is 18.37%.* 10%, ** 5%, *** 1% significance levels.

Table A12: Effect on Turnout in 2012

	All municipalities				Municipalities without biometric voting			
	2012		Δ(2008-2012)		2012		Δ(2008-2012)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Number of Treated Individuals in Voting Machine	-0.00132	-0.00790	0.00387	-0.00223	-0.000815	-0.00385	0.00334	0.000492
	(0.00261)	(0.00636)	(0.00245)	(0.00448)	(0.00260)	(0.00546)	(0.00254)	(0.00326)
Log Number of Control Individuals in Voting Machine	0.00143	-0.00222	0.000111	-0.00327	0.00269	0.0106***	0.000779	0.00825***
	(0.00310)	(0.0125)	(0.00253)	(0.0105)	(0.00332)	(0.00292)	(0.00286)	(0.00256)
Change in Log Eligible Voters	0.985***		0.915***		1.004***		0.944***	
	(0.0181)		(0.0363)		(0.0315)		(0.0575)	
Log of Total Eligible Voters in Voting Machine in 2008	0.957***	0.0680	-0.0284	-0.854***	0.951***	0.0780	-0.00908	-0.829***
	(0.0234)	(0.0606)	(0.0357)	(0.0600)	(0.0247)	(0.0950)	(0.0529)	(0.0961)
Constant	0.0901	5.724***	0.170	5.403***	0.123	5.659***	0.0470	5.248***
	(0.147)	(0.378)	(0.225)	(0.375)	(0.156)	(0.592)	(0.334)	(0.599)
Location FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	909	909	909	909	803	803	803	803

Notes: Robust Standard errors clustered at the municipality level in parentheses. To deal with log of zero, we use the inverse hyperbolic sine transformation (defined as $\log(y + \sqrt{y^2 + 1}) \approx log(2) + log(y)$) on the dependent and explanatory variables. * 10%, ** 5%, *** 1% significance levels.