Online Appendix for “Vulnerability and Clientelism”

Gustavo J. Bobonis, Paul J. Gertler, Marco Gonzalez-Navarro, and Simeon Nichter

Appendix A: Model of Vulnerability and Clientelism

As discussed in the Introduction, our experimental study is theoretically motivated by Anderson, Francois, and Kotwal’s (2015) [henceforth AFK] model of clientelism as informal insurance. In their model, clientelist politicians undermine policies for poor and vulnerable households, so that they can facilitate clientelist arrangements. These clientelist arrangements involve informal insurance transfers — more specifically, in contingent exchange for votes, clientelist politicians provide transfers to particular citizens if they experience negative shocks. Clientelist politicians make such arrangements in order to increase the likelihood that they win election, and they provide lower levels of public goods while in office to extract rents that can be partially used for these clientelist transfers. We extend this model to examine implications when an intervention — such as our water cisterns — reduces vulnerability by providing an independent risk-coping mechanism that affects both the level and variability of consumption. Consistent with our empirical results, the model predicts that the exogenous reduction in citizens’ vulnerability from an independent risk-coping mechanism causes a decrease in votes traded in exchange for state-contingent clientelist transfers.

The Model

Setup

Each individual l is either a citizen i ($i \in M$) or a politician j ($j \in P$); there are $2n$ citizens and a number of politicians normalized to size 1 in the municipality, where 1 <<

n. Each individual has type regarding clientelism (denoted c_l), either $c_l = C$, or $c_l = N$, denoting clientelist and non-clientelist types (respectively). Each agent is thus identified by their political class (M, P) and clientelism type (C, N). Citizens own negligible land or capital and make private good consumption decisions from an exogenous source of state-contingent income (y_s), where $s \in \{g, b\}$ respectively denote the good and bad states of the world; the latter occurs with probability $\mu \in (0, 1)$. They also enjoy utility from the consumption of a public good (G) provided by the government. Clientelist citizens ($c_i = C$) tend to have stronger relationships with clientelist politicians ($c_j = C$) than do non-clientelist citizens ($c_i = N$); this will be formally specified below.

Officeholders are tasked with providing pro-poor public goods to citizens. There are two coalitions of politicians: incumbents and challengers. The incumbent coalition has access to existing government revenue from federal transfers (T). Following AFK, we assume that all politicians in the incumbent coalition are clientelist types who expend this exogenous revenue stream on public goods (G) and pecuniary rents (R). All politicians enjoy ego rents (E) from office. We also assume that clientelist types — unlike non-clientelist types — extract pecuniary rents R while in office in part to fund clientelist transactions described below. Also following AFK, we assume that when in office, the clientelist coalition's expenditure on public goods ($\tilde{G}$) is strictly lower than the non-clientelist coalition's expenditure on public goods (G). We assume that the challenging coalition is composed of non-clientelist types.[33]

[33]This assumption is a simplification of a more complex scenario in which challengers could be clientelist or non-clientelist, with their type drawn at random from the pool of potential politicians. In this alternative scenario, clientelist opposition candidates may engage in vote trading with citizens via similar insurance promises. If their types are known to citizens, this complicates the analysis in the model but does not affect the theoretical results. While such modeling assumptions do not precisely match reality, our survey data do suggest that incumbent candidates are indeed more clientelistic than challengers. As discussed in Section 2, control-group respondents were more likely to have received private benefits from incumbents than from challengers during both survey waves. Given that these patterns may reflect incumbents' disproportionate access to resources, we also consider questions in the 2012 wave about citizens' perceptions of both incumbent and challenger candidates in that year's election. In particular, we inquired whether respondents "strongly agreed," "agreed," "disagreed," or "strongly disagreed" that these candidates were competent and honest, respectively. Whereas 83.5 percent of control-group respondents perceived challengers as honest, only 71.1 percent perceived incumbents as honest — a stark difference of 12.4 percentage points (17.4 percent in proportional terms; p-value < 0.001). Analogously, 77.2 percent of control-group respon-

Citizens have additively-separable preferences over the consumption of the private good consumed from state-contingent income (y_s) and from S_i^j, a possible insurance transfer from clientelist politician j to citizen i, the aforementioned public good, and idiosyncratic preferences for the incumbent coalition:

$$U_{ik}(C_{jk}) = v(\widetilde{G}) + \mu u(y_b + S_i^j) + (1-\mu)u(y_g) + \phi_k \tag{6}$$

where U_{ik} denotes the expected utility outcome corresponding to the coalition in parentheses controlling the municipal government, in this case a clientelist government. Citizens exhibit decreasing marginal utility (and risk aversion) over the consumption of the private good ($u' > 0$, $u'' < 0$) and the public good ($v' > 0$, $v'' < 0$). The ϕ_k term, drawn from distribution $g(\phi_k)$, represents the citizens' idiosyncratic preferences for the incumbent coalition j in municipality k; for instance, a higher quality group of clientelist candidates increases ϕ_k.

Politicians are risk neutral and seek to maximize the expected value of office, net of informal insurance arrangements they have promised to clientelist citizens in contingent exchange for electoral support. Through these arrangements, politicians trade informal insurance -– which provides transfers during a state of need (i.e., the bad state) — for votes. Such informal insurance transfers would be needed to cover, for example, medical expenses for health shocks to a household member, loss or damage to a household asset such as the dwelling, as well as basic needs (e.g., water). An insurance promise is a commitment by the politician to a transfer when needed by the citizen. We assume that the need state is observable to both politicians and citizens but is unenforceable by formal/legal mechanisms. As mentioned above, S_i^j denotes the value of the insurance transfer from clientelist politician j to individual i, where the magnitude of S_i^j depends on the extent of the insurance commitment.

dents perceived challengers as competent, compared to only 67.2 percent for incumbents — a substantial difference of 10 percentage points (14.9 percent in proportional terms; p-value < 0.001).

To maintain power, the incumbent coalition must ensure they receive at least n votes in order to win the election. To this end, members of the incumbent coalition divide vote trading responsibilities symmetrically. Each politician has an incentive to free-ride on the vote-trading of his colleagues; to overcome this, they impose sanctions on individuals who renege in their obligations. Following AFK, we assume that a clientelist politician j receives a punishment X_C imposed by all the other clientelist politicians if he reneges on his promise to citizen i. In contrast, no clientelist insurance agreements take place between opposition candidates and citizens; thus the punishment clientelist politicians impose on each other is greater than the punishment non-clientelist politicians would impose (X_N), or $X_C \geq X_N = 0$. In addition, clientelist citizens can impose non-pecuniary punishments $X \geq 0$ on politicians who renege on the insurance obligation in the case of need; it is equivalent to (and can be interpreted as) the utility loss to the politician from a breakdown of a relationship with a clientelist citizen.

Finally, in addition to the costs or punishments common to all individuals of a particular type, we follow AFK and allow for each politician-citizen pair to share a common idiosyncratic history that generates utility loss (x_i^j) to the politician if he reneges on the promise of an insurance transfer to citizen i in the state of need. This captures (in a reduced-form manner) the loss to the politician of the continuation value of the relationship with the citizen. Consistent with the literature characterizing the structure and value of relationships in social networks (e.g., Jackson and Wolinsky 1996; Johnson and Gilles 2000), most ties tend to be relatively weak and socially distant. We thus assume that the distribution of these relationship values is randomly and independently drawn from a cumulative distribution $F(x_i^j)$ with unimodal and decreasing density.[34]

[34]For example, this structure is satisfied by assuming that $F(x_i^j)$ follows a Pareto distribution with minimum $x_m > 0$ and scale parameter $\alpha > 0$. This assumption regarding the shape of the distributional of these relationship values is consistent with the empirical observation across multiple contexts that most ties tend to be relatively weak and socially distant (e.g., Banerjee et al. 2013; Cruz 2019; Duarte et al. 2019) and with the role of close relationships in the self-enforcement of informal contracts or arrangements (Chandrasekhar, Kinnan, and Larreguy 2018). We make the independence assumption for purposes of tractability.

Therefore, clientelist politicians will choose the structure of insurance commitments to maximize their payoff:

$$max_{S_i^j} \, P_{win|VT}(k)[E+R] - \mu n S_i^j, \tag{7}$$

where $P_{win|VT}(k)$ denotes the probability that the incumbent politicians win reelection under clientelism (i.e., vote trading), subject to the government budget constraint and a set of individual rationality and incentive compatibility constraints. Specifically, insurance transfers between each politician j and citizen i must satisfy the incentive compatibility condition that the value of the transfer should not be greater than the cost to the politician of reneging on the promise, or:

$$S_i^j \leq (X_i + I_i^j X + x_i^j), \tag{8}$$

where I_i^j is an indicator variable equal to one if both the citizen and the politician are clientelist types ($c_i = C$ and $c_j = C$), and $I_i^j = 0$ otherwise. The informal insurance arrangement must also satisfy politicians' individual rationality constraint, or

$$P_{win|VT}(k)[E+R] - \mu n S_i^j \geq P_{win|NVT}(k)[E+R]. \tag{9}$$

where $P_{win|NVT}(k)$ denotes the probability that incumbent politicians win the election if they refrain from engaging in clientelism. Finally, the scheme requires each incumbent politician j's actions to be compatible with the citizen's decision to enter the informal contract with him. That is, the citizen's expected utility from voting for a clientelist government must be greater than or equal to his expected utility from voting for the challenging coalition (the citizens' IR constraint), or $U_{ik}(C_j) \geq U_{ik}(N)$. In the absence of clientelist insurance, the non-clientelist opposition politicians (N) would win the election, and in that case the citizen's utility is:

$$U_{ik}(N) = v(G) + \mu u(y_b) + (1-\mu)u(y_g). \tag{10}$$

Timing

The timing of the model is as follows: (1) Incumbent politicians, and citizens, can make clientelist insurance arrangements. Each arrangement specifies a transfer S_i^j from an incumbent politician to a citizen if in the state of need (i.e., the bad state), in exchange for the citizen's vote. (2) The state is revealed to both parties. (3) Each politician chooses the transfer level if the bad state arises. (4) Elections occur. If the need state occurred and the transfer received by citizen i is (at least) S_i^j, he casts his vote for the incumbent politician with whom he made a clientelist arrangement. If the bad state occurred and the transfer received is less than S_i^j, he casts his vote against the incumbent politician. Sanctions by other clientelist politicians and citizens are imposed on any reneging incumbent politician. If the bad state does not arise, citizens in clientelist arrangements vote for incumbent politicians as promised.

Characterization of Equilibrium

Following AFK, we first present the conditions under which a clientelistic relationship produces a surplus of a given citizen-politician pair. That is, clientelist vote trading is both individually rational and incentive compatible for a citizen (i)-politician (j) pair if and only if:

$$x_i^j \geq u^{-1}((1/\mu)(\triangle v(\widetilde{G}) - \phi_k) + u(y_b)) - y_b - X_i - I_i^j X. \tag{11}$$

where $\triangle v(\widetilde{G}) = v(G) - v(\widetilde{G})$ represents the gap in the citizen's utility value of the public good offered by the non-clientelist and clientelist politicians. Specifically, the clientelist insurance arrangement takes place if and only if:

$$x_i^j \geq \begin{cases} u^{-1}((1/\mu)(\triangle v(\widetilde{G}) - \phi_k) + u(y_b)) - y_b - (X_C + X) \; for \; c_i = C \; and \; c_j = C \\ u^{-1}((1/\mu)(\triangle v(\widetilde{G}) - \phi_k) + u(y_b)) - y_b - X_C \; for \; c_i = N \; and \; c_j = C \end{cases} . \tag{12}$$

Proofs of all results are presented at the end of this Appendix.

A high value of the incumbent coalition's valence (ϕ_k) makes it less costly for citizens to vote for the clientelist candidates, and their individual rationality easier to satisfy. A high value of the idiosyncratic utility loss (x_i^j) to the politician makes reneging on a promised transfer a more costly action, and hence supports a greater range of incentive compatible transfers from them in return for citizens' votes. When citizens and politicians are in a clientelist relationship ($c_i = C$ and $c_j = C$) (condition (a)), this sustains higher punishments, X, and hence makes higher transfers incentive compatible. Because citizens who do not have a relationship with a clientelist politician cannot punish him, the citizen-induced punishment X term disappears in condition (b), and so only other clientelist politicians can punish (X_C) the reneging politician; this limits the range of incentive compatible transfers to non-clientelist citizens.

Defining the Likelihood of Clientelist Insurance and Transfer Levels

The probability of clientelist insurance (and thus of individual vote trading) for clientelist and non-clientelist citizen types can be defined respectively as:

$$P_{VT}[k|c_i = C] = 1 - F[u^{-1}((1/\mu)(\triangle v(\widetilde{G}) - \phi_k) + u(y_b)) - y_b - (X_C + X)], \tag{13}$$

and

$$P_{VT}[k|c_i = N] = 1 - F[u^{-1}((1/\mu)(\triangle v(\widetilde{G}) - \phi_k) + u(y_b)) - y_b - (X_C)]. \tag{14}$$

We next consider the relationship between these individual conditions and the likelihood of clientelism and vote trading in aggregate. Because no single clientelist politician can manage to independently control all clientelist insurance arrangements, the group must be able to contract votes from a sufficiently large number of citizens to ensure a majority in the election. Following AFK, we assume that if and only if a majority of politicians find it individually rational to accept incentive-compatible transfer arrangements, then vote trading occurs and clientelist politicians can exert control. It is equivalent to assuming that politicians have the capability to act in their collective interests; if there are sufficient gains to be made from engaging in clientelism, we assume that it occurs. If, however, the votes that can be feasibly traded by clientelist politicians are not sufficient for them to gain control of the municipal government, they do not engage in the practice.

In order to move from individual-level measures of the likelihood of clientelist insurance and electoral support for the incumbent coalition, we aggregate in the following way to municipal-level outcomes. Denote $P_{win|VT}[k]$ as the proportion of citizens who enter clientelist arrangements, and hence vote for the incumbent group, in municipality k:

$$P_{win|VT}[k] = \sigma_{CC,k} P_{VT}[k|c_i = C] + \sigma_{NC,k} P_{VT}[k|c_i = N] \tag{15}$$

where σ_{ij} are the frequencies of citizen i and politician j pairs in municipality k. Similarly, the transfer level required to ensure citizens agree to vote trade must satisfy the condition that citizens are willing to vote for the incumbent group, or:

$$v(\widetilde{G}) + \mu u(y_b + S_i^j) + (1-\mu)u(y_g) + \phi_k \geq v(G) + \mu u(y_b) + (1-\mu)u(y_g). \tag{16}$$

This implies that the level of transfers must satisfy the following condition:

$$S_i^{j*} \geq u^{-1}((1/\mu)(\triangle v(\widetilde{G}) - \phi_k) + u(y_b)) - y_b. \tag{17}$$

Comparative Statistics

We now examine the implications of the introduction of independent risk-coping mechanisms for citizens, analogous to our cisterns intervention. Specifically, we examine the effects on the likelihood that citizens enter a clientelist insurance arrangement following an improvement in their income levels in the state of need (y_b).

Result 1: An improvement to the citizen's state-contingent income in the bad state (y_b) decreases the probability that both clientelist and non-clientelist citizens will engage in vote trading: $\frac{\partial P_{VT}[k|c_i=C]}{\partial y_b} < 0$ and $\frac{\partial P_{VT}[k|c_i=N]}{\partial y_b} < 0$. The response for clientelist citizens is stronger in absolute terms than that of non-clientelist types.

Result 2: An improvement to the citizen's state-contingent income in the bad state (y_b) decreases votes for incumbent clientelist politicians.

We now clarify why these results provide theoretical motivation for our study. Recall that our treatment examines effects of decreasing vulnerability, which as shown by Ligon and Schechter's (2003) theoretical work, is a function of both the level and variability of consumption. The cisterns intervention not only insures citizens against bad states (by mitigating negative shocks to water consumption during droughts), but also increases consumption in good states (by heightening their ability to harvest rainfall). In the model, an improvement in the citizen's state-contingent income in the good state (y_g) does not affect the probability that clientelist or non-clientelist citizens engage in vote trading ($\frac{\partial P_{VT}[k|c_i=C]}{\partial y_g} = 0$ and $\frac{\partial P_{VT}[k|c_i=N]}{\partial y_g} = 0$), or that they vote for incumbent clientelist politicians. Given Results 1 and 2 above, the cisterns intervention is thus expected to decrease clientelism and incumbent votes, because the insurance value of the transfer decreases with improvements in the bad state.

This model also suggests why the intervention decreases citizens' involvement in clientelism instead of leading to alternative forms of requests. Following Anderson, Francois, and Kotwal (2015), our adaptation assumes that citizens have additively separable utility from consumption of a private good and a public good. The intervention provides an income transfer in the bad state, thus reducing the marginal utility of consumption of the private good. As a direct consequence, a cistern decreases the citizen's expected benefit from participating in a clientelist arrangement — which provides an income transfer from the politicians during the bad state, in contingent exchange for the citizen's vote. This intuition can also be easily derived from a more generalized model with multiple normal goods, so long as the utility function is strictly concave (i.e., with decreasing marginal utility of consumption of each good). In this more general model, citizens consume various private goods (including water) and the intervention is modeled as an in-kind transfer of water. If the in-kind transfer is inframarginal, then the increase in water consumption is equivalent to an income transfer, yielding the result that requests for *all* types of goods decrease — not just requests for water. Even if the in-kind water transfer is extramarginal, the cistern decreases the citizen's benefit from participating in a clientelist arrangement due to her utility function's strict concavity: a cistern increases consumption of all goods, so the value of a transfer of any good from the politician during the bad state decreases. All in all, our model — as well as the more generalized model with multiple goods — suggests that the cisterns intervention should reduce citizens' involvement in clientelism rather than leading to alternative forms of requests.

Proofs of Propositions

Proof of Conditions for Vote Trading to Satisfy IC and IR Constraints:

We first present the conditions under which a clientelistic relationship produces a surplus for a given citizen-politician pair. The citizen's IR constraint is:

$$v(\widetilde{G}) + \mu u(y_b + S_i^j) + (1-\mu)u(y_g) + \phi_k \geq v(G) + \mu u(y_b) + (1-\mu)u(y_g)$$

Following AFK's characterization of equilibrium, we assume the politician's incentive compatibility (IC) constraint (condition (9)) is binding. Substituting this IC constraint into the citizen's IR constraint above and rearranging results in the condition:

$$x_i^j \geq u^{-1}((1/\mu)(\triangle v(\widetilde{G}) - \phi_k) + u(y_b)) - y_b - X_i - I_i^j X$$

shown as condition (12) above.

Proof of Result 1:

In the case of clientelist citizens, from equation (13) it is the case that, $\frac{\partial P_{VT}[k|c_i=C]}{\partial y_b} = -f[u^{-1}((1/\mu)(\triangle v(\widetilde{G}) - \phi_k) + u(y_b)) - y_b - (X_C + X)][u^{-1'}((1/\mu)(\triangle v(\widetilde{G}) -$

$\phi_k) + u(y_b)) - 1][u'(y_b)]$. Since $[u^{-1'}(((1/\mu)(\triangle v(\widetilde{G}) - \phi_k) + u(y_b))] = \frac{u'(y_b)}{u'(u^{-1}((1/\mu)(\triangle v(\widetilde{G})-\phi_k)+u(y_b))}$, and the term in the denominator equals the citizen's marginal utility of consumption in the bad state given the minimum transfer level $\underline{S}_i^j$ that satisfies the citizen's IR constraint ($u'(u^{-1}((1/\mu)(\triangle v(\widetilde{G}) - \phi_k) + u(y_b))) = u'(y_b + \underline{S}_i^j)$), then $\frac{u'(y_b)}{u'(u^{-1}((1/\mu)(\triangle v(\widetilde{G})-\phi_k)+u(y_b)))} > 1$ for any $S_i^{j*} > 0$. Therefore, $\frac{\partial P_{VT}[k|c_i=C]}{\partial y_b} < 0$. Following the same logic for non-clientelist citizens, based on equation (14) it is the case that $\frac{\partial P_{VT}[k|c_i=N]}{\partial y_b} < 0$.

To show that the response for clientelist citizens is stronger in absolute terms than that of non-clientelist types, note that $\frac{\partial P_{VT}[k|c_i=C]}{\partial y_b} < \frac{\partial P_{VT}[k|c_i=N]}{\partial y_b}$ if $f[u^{-1}((1/\mu)(\triangle v(\widetilde{G}) - \phi_k) + u(y_b)) - y_b - (X_C + X)] > f[u^{-1}((1/\mu)(\triangle v(\widetilde{G}) - \phi_k) + u(y_b)) - y_b - (X_C)]$. Because $X > 0$, this condition will hold for any unimodal probability distribution $f(x_i^j)$ with decreasing density.

Proof of Result 2:

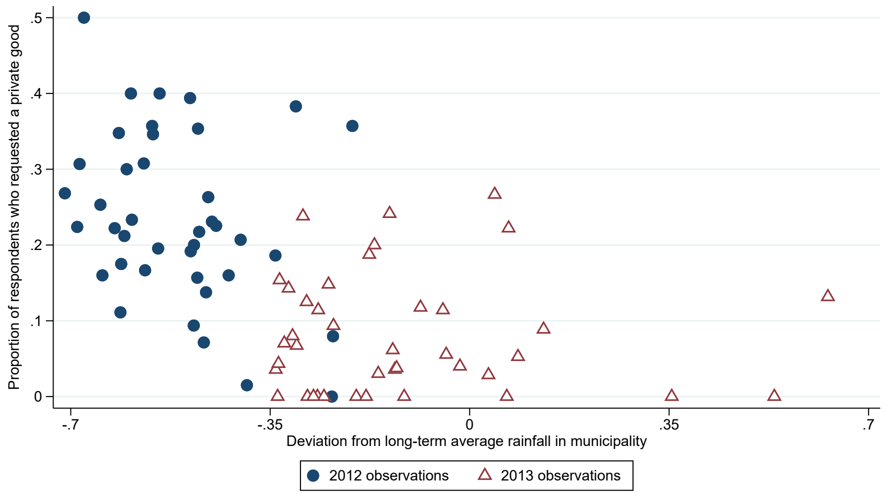
From equation (15), it follows that:

$$\frac{\partial P_{win|VT}[k|]}{\partial y_b} = \sigma_{CC,k}\frac{\partial P_{VT}[k|c_i = C]}{\partial y_b} + \sigma_{NC,k}\frac{\partial P_{VT}[k|c_i = N]}{\partial y_b},$$

and thus $\frac{\partial P_{win|VT}[k]}{\partial y_b} < 0$ given Result 1.

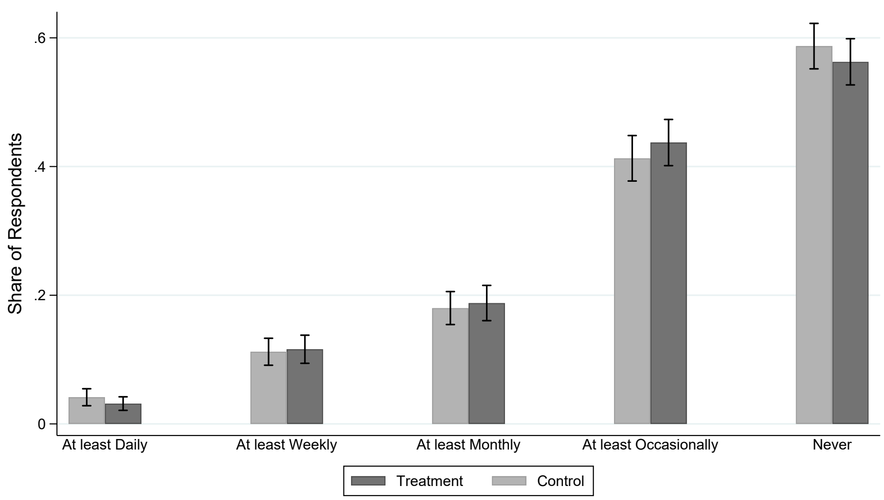
Appendix B: Additional Figures and Tables

Figure A1: Requests for Private Goods and Rainfall Shocks



Notes: Data are collapsed by municipality-year. The rainfall shock for each municipality and year is measured as the difference between rainfall in January-September of the relevant year and its historical municipal mean during identical months in 1986-2011, divided by the municipality's historical monthly standard deviation of rainfall.

Figure A2: Frequency of Conversations before 2012 Election Campaign, by Treatment Status



Notes: Figure shows frequency of interactions with a local politician before the 2012 electoral campaign by treatment assignment. Categories are not mutually exclusive: "at least occasionally" includes respondents in the "at least monthly" category; "at least monthly" includes respondents in the "at least weekly" category; and "at least weekly" includes respondents in the "at least daily" category. Whiskers denote 95% confidence intervals around point estimates.

Table A1: Compliance and Attrition

	Wave 0 2011 Localization (Households) (1)	Wave 1 2012 Baseline (2)	Wave 2 2012 Election Year (3)	Wave 3 2013 Non-election Year (4)
Panel A: Compliance				
Assigned to Cisterns Treatment	615	–	67.45%	90.78%
Assigned to Control	693	–	20.23%	65.30%
Total	1,308			
Panel B: Attrition				
Households	1,308	1,189	1,238	1,119
Rate of Attrition from Wave 0		9.10%	5.35%	14.45%
Correlation with Treatment Status	-0.019			
Standard Error	(0.017)			

Notes: In Panel A, column 1 reports the number of households in each of the treatment arms. Columns 3 and 4 report the percentage of households in each treatment arm who had a cistern in each of the post-treatment waves (in 2012 and 2013). Panel B shows the percentage of the 1,308 households identified for study participation that were not successfully interviewed in each wave, as well as the correlation of attrition with treatment status.

Table A2: Baseline Characteristics of Treatment and Control Groups

	Treatment Group Mean (1)	Control Group Mean (2)	Difference w/ Municipal FEs (3)	Standard Error of Difference (4)	Observations (5)
Individual Characteristics					
Age	36.587	37.393	-0.345	(0.642)	2,988
Female	0.518	0.535	-0.016	(0.011)	2,990
Current Student	0.139	0.126	0.005	(0.013)	2,972
Years of Education	5.903	5.728	0.006	(0.193)	2,931
P-value of Joint F-test			0.601		
Household Characteristics					
Household Size	4.288	4.221	0.054	(0.119)	1,308
Number of Total Neighbors	17.658	15.959	1.997	(1.377)	1,283
Neighbor has Cistern	0.664	0.598	0.060	(0.035)	1,237
Bolsa Familia Amount Received	91.954	85.915	4.945	(4.327)	1,290
Total Household Expenditure	367.149	376.861	-6.454	(12.636)	1,281
Total Household Wealth	18,955.478	20,256.436	-1,187.803	(992.416)	1,299
Age of Household Head	43.899	44.840	-0.555	(0.937)	1,307
Household Head Education	5.734	5.830	-0.241	(0.250)	961
Household Head is Female	0.182	0.182	0.007	(0.019)	1,308
Owns House	0.863	0.873	-0.016	(0.021)	1,308
Number of Rooms in House	5.266	5.331	-0.082	(0.079)	1,294
Has Access to Electricity	0.883	0.905	-0.018	(0.018)	1,308
Migrated Recently	0.111	0.107	0.006	(0.017)	1,303
Owns Land	0.483	0.465	-0.004	(0.030)	1,307
Land Size	3.413	3.554	-0.218	(0.684)	1,308
Children in Household 0-6 Months	0.047	0.058	-0.015	(0.013)	1,308
Children in Household 6 Months - 5 Years	0.631	0.612	-0.001	(0.038)	1,308
Household Members 5-64 Years	3.397	3.316	0.099	(0.112)	1,308
Household Members Older than 64 Years	0.213	0.235	-0.029	(0.028)	1,308
Voted in 2008 Municipal Election	0.891	0.865	0.020	(0.019)	1,290
P-value of Joint F-test			0.839		

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

Table A3: Voting Outcomes: Balance Across Machines in Voters' Characteristics

	Age (1)	Schooling Years (2)	Female Respondents (3)
Treated Individuals	0.102	-0.001	0.001
	(0.063)	(0.016)	(0.002)
Respondents	-0.021	-0.008	-0.002
	(0.051)	(0.016)	(0.002)
Control for Registered Voters	Yes	Yes	Yes
Location Fixed Effects	Yes	Yes	Yes
Missing Outcome Indicator	Yes	Yes	Yes
Rescaled Regressors	Yes	Yes	Yes
Observations	909	909	909
Mean of Y: Overall	38.369	5.644	0.546

Notes: Dependent variables are mean characteristics of study voters linked to a particular voting machine as indicated in the column headers. Standard errors clustered at the voting location site are reported in parentheses.

Table A4: Wealth and Assignment to Treatment (2013)

	Value of Durables (1)	Value of Livestock (2)	Value of Property (3)	Net Savings (4)	Total Wealth (5)
Cisterns Treatment	-41.2	-110.4	-1,012.8	261.8	-902.6
	(308.8)	(342.5)	(1,120.8)	(195.2)	(1,243.0)
Municipality Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	1,128	1,128	1,128	1,128	1,128
Mean of Y: Treatment Group	3,770.9	2,064.5	24,756.1	-584.9	30,006.5
Mean of Y: Control Group	3,667.0	2,206.5	26,540.7	-776.7	31,637.5

Notes: Each column reports the coefficient from regressing each wealth measure on treatment, with municipality fixed effects. Durables in column 1 are defined as the sum of the estimated values of: cars, trucks, motorcycles, refrigerator, stove, washing machine, sewing machine, television, DVD player, cell phone, computer, and satellite television. Livestock in column 2 are defined as the sum of the estimated values of: cows, steer, calves, horses, donkeys, female goats, male goats, young sheep, adult sheep, pigs, chickens, ducks, turkeys, geese, rabbits, fish, and other animals. Value of property in column 3 is defined as the sum of the estimated values of residential property and agricultural plots. Net savings in column 4 are defined as total liquid assets minus total loans, in which total liquid assets include liquid savings, cash, loaned money and seed stock. Total loans include loans from family, loan sharks, banks, stores, government, and other sources. Total wealth in column 5 is defined as the sum of the measures in columns 1-4. Standard errors are clustered at the neighborhood level and reported in parentheses.

Table A5: Characteristics of Respondents with and without Clientelist Relationships (2011 and 2012)

	Individuals with Marker of Clientelist Relationship (1)	Individuals without Marker of Clientelist Relationship (2)	Difference w/ Municipal FEs (3)
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	5,894.113	5,641.094	175.033
			(387.676)
Household Expenditure per Member	103.230	104.900	-0.640
			(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)
Household Vulnerability Indicators			
-(CES-D) Scale	3.363	3.323	0.029
			(0.043)
SRHS Index	2.815	2.830	-0.007
			(0.039)
Child Food Security Index	-0.503	-0.607	0.044
			(0.072)
Overall Vulnerability Index	0.044	-0.001	0.029
			(0.041)
Political Activities			
Voted in 2008 Municipality Election	0.916	0.871	0.043
			(0.019)
Voted for Mayor/Councilor of the Same Coalition	0.732	0.719	0.006
			(0.033)
Entire Household Voted for 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 survey repondents with versus without the clientelism marker. As discussed in Section 7, this marker is coded one if a respondent conversed at least monthly with a local politician before the 2012 electoral campaign; 0 otherwise. 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.

Table A6: Clientelism Marker and Assignment to Treatment

	Clientelist Relationship	
	(1)	(2)
β_1: Cisterns Treatment	-0.002	
	(0.017)	
β_2: Rainfall Shock		-0.010
		(0.008)
Municipality Fixed Effects	Yes	No
Observations	2,667	2,667
Mean of Y: Treatment Group	0.188	0.188
Mean of Y: Control Group	0.180	0.180

Notes: The outcome variable is the marker for clientelist relationships discussed in Section 7. This marker (Clientelist Relationship) is coded one if a respondent conversed at least monthly with a local politician before the 2012 electoral campaign; 0 otherwise. Cisterns treatment is coded 1 if respondent's household is in a neighborhood cluster selected for treatment; 0 otherwise. Rainfall shock is measured as the difference between rainfall in January-September 2012 and its historical municipal mean during identical months in 1986-2011, divided by the municipality's historical monthly standard deviation of rainfall (see Section 4.4).

Table A7: Citizen Requests for Private Goods, Controlling for Citizen Engagement (2012 and 2013)

	Request Any Private Good			
	(1)	(2)	(3)	(4)
β_1: Cisterns Treatment	-0.003	-0.013	0.051	0.058
	(0.014)	(0.013)	(0.036)	(0.037)
β_2: Cisterns Treatment × Clientelist Relationship	-0.092	-0.096	-0.097	-0.095
	(0.034)	(0.034)	(0.034)	(0.034)
β_3: Rainfall Shock	-0.020	-0.021	-0.003	-0.003
	(0.010)	(0.011)	(0.020)	(0.020)
β_4: Rainfall Shock × Clientelist Relationship	-0.011	-0.012	-0.014	-0.014
	(0.016)	(0.016)	(0.016)	(0.016)
β_5: Clientelist Relationship	0.115	0.119	0.117	0.115
	(0.026)	(0.026)	(0.026)	(0.026)
Member of a Community Association	Yes	No	No	Yes
Member of a Community Association × Cisterns Treatment	Yes	No	No	Yes
Member of a Community Association × Rainfall Shock	Yes	No	No	Yes
President of a Community Association	No	Yes	No	Yes
President of a Community Association × Cisterns Treatment	No	Yes	No	Yes
President of a Community Association × Rainfall Shock	No	Yes	No	Yes
Voted in 2008 Municipal Election	No	No	Yes	Yes
Voted in 2008 Municipal Election × Cisterns Treatment	No	No	Yes	Yes
Voted in 2008 Municipal Election × Rainfall Shock	No	No	Yes	Yes
Municipality Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	4,288	4,288	4,231	4,231
Mean of Y: Treatment Group	0.149	0.149	0.149	0.149
Mean of Y: Control Group	0.177	0.177	0.177	0.177
Mean of Y: Clientelist Relationship in Control Group	0.285	0.285	0.286	0.286

Notes: Outcome variable is coded 1 if respondent reported requesting a private good from a local politician in 2012 or 2013; 0 otherwise. Specifications employ pooled data to examine requests in either year. Cisterns treatment is coded 1 if respondent belongs to a participating household in a neighborhood cluster selected for treatment; 0 otherwise. Marker for clientelist relationship is coded one if a respondent conversed at least monthly with a local politician before the 2012 electoral campaign; 0 otherwise (see Section 7). Rainfall shock is measured as the difference between rainfall in January-September of the relevant year and its historical municipal mean during identical months in 1986-2011, divided by the municipality's historical monthly standard deviation of rainfall (see Section 4.4). Observations for 2013 employ the subset of individuals for which this marker was measured in 2012. Standard errors clustered at the neighborhood cluster level reported in parentheses.

Table A8: Cisterns Treatment and Other Electoral Outcomes (2012)

	Votes for Incumbent Mayor		Votes for Candidates From President's Party	Votes for Candidates From President's Coalition	Votes for Candidates From Governor's Coalition	Votes for Right-Leaning Candidates
	(1)	(2)	(3)	(4)	(5)	(6)
Treated Individuals		-1.143	-0.047	-0.048	-0.059	-0.079
		(0.655)	(0.026)	(0.064)	(0.061)	(0.062)
		[0.041]	[0.232]	[0.343]	[0.269]	[0.321]
Respondents		0.250	0.033	0.046	0.020	0.072
		(0.493)	(0.022)	(0.051)	(0.047)	(0.047)
		[0.520]	[0.257]	[0.248]	[0.611]	[0.242]
Treated Individuals with Clientelist Relationship	-0.272					
	(0.146)					
	[0.097]					
Treated Individuals without Clientelist Relationship	-0.052					
	(0.072)					
	[0.491]					
Respondents with Clientelist Relationship	0.047					
	(0.108)					
	[0.663]					
Respondents without Clientelist Relationship	0.011					
	(0.046)					
	[0.800]					
Control for Registered Voters	Yes	Yes	Yes	Yes	Yes	Yes
Location Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Rescaled Regressors	Yes	No	Yes	Yes	Yes	Yes
Observations	909	909	909	909	909	909

Notes: Dependent variables are the number of votes cast as indicated in the column headers. The estimation sample is the 21 municipalities where the incumbent mayor ran for reelection in 2012. Marker for clientelist relationship is coded 1 if a respondent conversed at least monthly with a local politician before the 2012 electoral campaign; 0 otherwise (see Section 7). Rainfall shock is measured as the difference between rainfall in January-September of the relevant year and its historical municipal mean during identical months in 1986-2011, divided by the municipality's historical monthly standard deviation of rainfall (see Section 4.4). Standard errors clustered at the voting location are reported in parentheses. P-values from a wild cluster bootstrap-t procedure that allows for error terms to be correlated within municipalities are reported in brackets.

Table A9: Politician Responses and Citizen Beliefs (2012)

	Politician Responses				Citizen Beliefs about Incumbent		
	Campaign Visit	Campaign Visit with Handout	Politician Offered Handout	Accepted Politician's Handout	Incumbent Mayor is Honest	Incumbent Mayor is Competent	Incumbent Group is Competent
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A							
Cisterns Treatment	0.001	0.009	-0.003	-0.005	0.053	0.027	-0.040
	(0.022)	(0.012)	(0.015)	(0.010)	(0.034)	(0.035)	(0.037)
Municipality Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Panel B							
Rainfall Shock	0.015	-0.011	-0.023	-0.009	0.045	0.035	0.045
	(0.011)	(0.007)	(0.008)	(0.004)	(0.019)	(0.022)	(0.028)
Municipality Fixed Effects	No	No	No	No	No	No	No
Observations	2,680	2,308	1,634	1,624	923	1,083	1,095
Mean of Y: Treatment Group	0.702	0.072	0.077	0.030	0.765	0.708	0.493
Mean of Y: Control Group	0.691	0.067	0.077	0.036	0.711	0.672	0.524

Notes: Dependent variables for columns 1-4 are coded 1 if the respondent answered affirmatively to: receiving a campaign visit to the home by politicians or their representatives in 2012 (col. 1; asked in 2012), receiving a handout during these politician-initiated campaign visits in 2012 (col. 2; asked in 2012), receiving any offer of a handout from a politican in exchange for a vote in 2012 (col. 3; asked retrospectively in 2013 and not limited to campaign visits), and accepted the politican's offer in 2012 if answering affirmatively to the prior question (col. 4; asked retrospectively in 2013); 0 otherwise. For column 5 (6), the dependent variable is coded 1 if the respondent agreed or strongly agreed in the 2012 wave with the statement that the incumbent mayor is honest (competent); 0 otherwise. For column 7, the dependent variable is coded 1 if the respondent indicated (in 2012) that the incumbent group was more competent than the opposition group; 0 otherwise. The survey did not ask about the honesty of the incumbent group. Cisterns treatment is coded 1 if respondent's household is in a neighborhood cluster selected for treatment; 0 otherwise. Rainfall shock is measured as the difference between rainfall in January-September 2012 and its historical municipal mean during identical months in 1986-2011, divided by the municipality's historical monthly standard deviation of rainfall (see Section 4.4). The sample for columns 1-2 comprises respondents who were surveyed in 2012, for columns 3-4 respondents who were surveyed in 2012 and 2013, and for columns 5-7 respondents who were surveyed in 2012 in municipalities in which the incumbent mayor ran for reelection. Standard errors clustered at the neighborhood cluster level reported in parentheses.

Table A10: Citizens' Preferences and Assignment to Treatment

	Risk Preference		Altruism		Reciprocity		Discount Rate		Public Goods Contribution
	2012	2013	2012	2013	2012	2013	2012	2013	2013
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A									
Cisterns Treatment	0.015	0.007	-0.030	-0.010	0.003	-0.022	-0.335	0.012	0.011
	(0.024)	(0.026)	(0.022)	(0.025)	(0.026)	(0.025)	(0.144)	(0.200)	(0.013)
Municipality Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Incentivized Task	No	Yes	No	Yes	No	Yes	No	No	Yes
Panel B									
Rainfall Shock	-0.016	-0.022	-0.007	-0.005	-0.046	-0.000	-0.123	-0.038	0.014
	(0.012)	(0.015)	(0.011)	(0.014)	(0.013)	(0.012)	(0.082)	(0.100)	(0.008)
Municipality Fixed Effects	No	No	No	No	No	No	No	No	No
Incentivized Task	No	Yes	No	Yes	No	Yes	No	No	Yes
Observations	2,025	1,622	2,546	1,625	2,540	1,625	2,597	1,605	1,625
Mean of Y: Treatment Group	0.603	0.593	0.135	0.439	0.256	0.365	2.335	4.275	0.557
Mean of Y: Control Group	0.586	0.592	0.167	0.442	0.263	0.381	2.629	4.289	0.553

Notes: Dependent variables are listed in column headers; see Online Appendix E for details of the construction of these measures. Cisterns treatment is coded 1 if respondent's household is in a neighborhood cluster selected for treatment; 0 otherwise. Rainfall shock is measured as the difference between rainfall in January-September of the relevant year and its historical municipal mean during identical months in 1986-2011, divided by the municipality's historical monthly standard deviation of rainfall (see Section 4.4). Observations employ the subset of individuals for which this marker was measured in the 2012 wave. Standard errors clustered at the neighborhood cluster level reported in parentheses.

Appendix C: Survey Questions for Key Variables

1.- Variable: *Request for Private Goods (asked in 2012 and 2013)*.

- Definition: Respondent requested private good from a local politician.
- Coded 1 if answered yes to requesting from politician, unless specifying that the request was for a non-private benefit; 0 otherwise.
- Questions used in 2012 wave to define this variable:
  - (a) "This year, did you ask a city councilor candidate for help?";
  - (b) [If yes:] "What did you ask for?";
  - (c) "This year, did you ask a mayor candidate for help?";
  - (d) [If yes:] "What did you ask for?"
- Identical questions were asked in 2013, first inquiring about requests of candidates who won the election, and then inquiring about requests of candidates who lost the election.

2.- Variable: *Ask for and Receive Private Good (asked in 2012 and 2013)*.

- Definition: Respondent reported receiving private good requested from a politician.
- Coded 1 if answered yes to receiving a requested private good; 0 otherwise.
- This variable is generated from a question asked directly after *Request* variable described above. Question: "Did you receive it?"

3.- Variable: *Talked Monthly with Politicians Before 2012 Campaign (asked in 2012)*.

- Definition: Respondent reports conversing with a political candidate at least monthly before the 2012 campaign began.

- Coded 1 if answered yes to having spoken with politician at least monthly; 0 otherwise.
- Questions:
  - (a) "This year, did you speak with any city councilor candidate?";
  - (b) [If yes:] "How often before the political campaign (before June)?";
  - (c) "This year, did you speak with any mayor candidate?";
  - (d) [If yes:] "How often before the political campaign (before June)?"

Appendix D: Cisterns Treatment and Electoral Outcomes – Rescaling of Regressors

For analyses of the cistern intervention's effects on electoral outcomes, this appendix discusses the rescaling of regressors as well as procedures to conduct appropriate inference. As emphasized in Section 5.2.3, the statistical significance of findings is robust without any adjustments (see also Table A8). However, the procedure described below improves estimation of the magnitude of treatment effects on electoral outcomes.

Before further discussion, recall that we use extraordinarily granular official data: electoral outcomes at the voting-machine level for Brazil's 2012 mayoral elections. The analysis employs the voting machine as the unit of analysis (given ballot secrecy), and focuses exclusively on the cisterns intervention (as rainfall shocks are only measured at the municipal level). We link survey respondents to the specific electronic voting machines to which they are assigned by electoral authorities. Our primary specification is as follows:

$$y_{slm} = \alpha_{lm} + \gamma_1 \cdot TV_{slm} + \gamma_2 \cdot EV_{slm} + \gamma_3 \cdot RV_{slm} + \epsilon_{slm}, \tag{18}$$

where y_{slm} is the number of votes for the incumbent mayor in electronic voting machine (i.e., "electoral section") s, in voting location l, in municipality m. The regressor of interest is TV_{slm}, the number of treated individuals in our study assigned by electoral authorities to vote in that particular machine. Other controls in the regression are EV_{slm}, the overall number of individuals in our study assigned to that machine; α_{lm}, a voting location fixed effect to control for differential voting patterns across voting locations in a municipality; and RV_{slm}, the total number of registered voters assigned to that machine (regardless of whether they are in our study sample). Recall that for a given voting machine, the proportion of voters from the experimental sample who are assigned to the treatment condition is assigned randomly. Furthermore, within a given polling place, citizens are assigned to a specific voting machine by electoral authorities.[35] Therefore, once

[35]Our identification strategy is robust to any influence citizens may have regarding their polling place.

we condition on the total number of individuals in the study registered to vote in the machine, we can identify γ_1 – the effect of an additional person assigned to the cisterns treatment on votes for the incumbent mayor.

Rescaling of Regressors

As mentioned, analyses show that the cisterns treatment significantly reduces votes for the incumbent mayor, without conducting any adjustments. However, further consideration is needed because specifications about electoral outcomes (but not about requests) involve aggregate data: TV_{slm} and EV_{slm} sum how many treatment and overall study participants are assigned by their voter identification cards to vote in a particular machine in a given polling location. Accurately measuring treatment effects on electoral outcomes with these aggregate data requires attention to three measurement issues: (a) treatment effects for members of treated households who we cannot link to voting machines (e.g., registered voters in sampled households were only interviewed if present during our home visits); (b) spillover effects on neighbors' voting behavior (e.g., due to sharing water with ineligible households); and (c) peer effects on voting behavior by neighbors in the cluster. Failing to address the possible undercounting of other treated household members, as well as positive spillover and peer effects, could bias upward our estimates of treatment effects (in absolute terms). Therefore, we rescale TV_{slm} and EV_{slm} to incorporate estimates of: (a) how many voting-age members of sampled households we cannot link to machines, (b) how many voters live in other households in the neighborhood cluster (i.e., those potentially affected by spillover or peer effects of the cisterns treatment), and (c) the probabilities that these individuals are assigned by their voter registration cards to vote in the same locations and same voting machines as our interviewees. Rescaling the TV_{slm} and EV_{slm} regressors addresses upward bias in the magnitude of the estimate of treatment effects on electoral outcomes.

The following discussion explains the procedure for rescaling the number of treated individuals (TV_{slm}); we follow an analogous procedure to rescale EV_{slm}.

The regressor of interest, TV_{slm}, can be expressed as follows:

$$TV_{slm} = \sum_{c} TV_{cslm}, \tag{19}$$

where TV_{cslm} is the total number of treated voters in neighborhood cluster c assigned to vote in electronic voting machine s, in voting location l, in municipality m. This can be further decomposed into the following expression:

$$TV_{slm} = \sum_{c} \left[TV^{I,h}_{cslm} + TV^{NI,h}_{cslm} + TV^{NI,h_{-}}_{cslm} \right], \tag{20}$$

where $TV^{I,h}_{cslm}$ denotes voters who were interviewed (denoted by the superscript I) from household h in cluster c and who are assigned (as specified by electoral authorities on the respondent's voting identification card) to vote in the machine denoted by slm. $TV^{NI,h}_{cslm}$ refers to voters from the same household h who were not interviewed (denoted by the superscript NI), and $TV^{NI,h-}_{cslm}$ denotes all voters from households other than h (i.e. households that were not part of our survey) from cluster c who are assigned to vote in the machine denoted by slm.

To estimate TV_{slm}, we follow this procedure:

(a) We obtain $TV^{I,h}_{cslm}$ directly from a question in our survey, which inquires about which electronic voting machine the respondent is assigned to vote (as specified by electoral authorities on the respondent's voting identification card).

(b) We obtain the number of other individuals in the interviewed household who are eligible to vote ($TV^{NI,h}_{cm}$) directly from information in the household roster in the baseline survey.

(c) We generate estimates of the number of neighbors who are eligible to vote from responses to two questions in our surveys. The first question (in our localization survey) asked individuals to report the number of neighboring households. The second question (in the baseline survey) provides information about how many household members are of voting age. With these data by cluster, we estimate the number of additional eligible voters in the neighborhood by using the median of households' responses about the number of neighboring households $\times$ the median number of household members of voting age.

(d) We estimate the average ratio of total eligible voters per survey respondent across all neighborhood clusters in the sample; the estimated mean ratio is 11.3 for the primary estimation sample of 21 municipalities in which the incumbent mayor ran for reelection (and 9.96 for the expanded sample of 39 municipalities in which a candidate can be assigned to an incumbent group.

(e) Finally, we rescale TV_{slm} and EV_{slm} by multiplying the number of treated and overall number of individuals in our study assigned to vote in each particular machine by this average ratio across all municipalities in our estimation sample.

This procedure improves estimation of the magnitude of treatment effects on electoral outcomes. Estimates are smaller in magnitude, making our inferences about treatment effects on electoral outcomes more conservative. Table 4 reports point estimates from the specification with rescaled regressors of interest, along with cluster robust standard error at the voting location level as well as p-values from the wild cluster bootstrap-t procedure (see column 2). Finally, for purposes of comparability, Table A8 estimates the effects of an additional respondent assigned to the treatment condition on the number of votes for the incumbent mayor — without any rescaling of the regressors. As shown, the statistical significance of findings is robust without any such adjustments.

Appendix E: Measures of Citizens' Preferences

Measures of citizens' preferences employed in Section 8.4 were obtained through unincentivized or incentivized games in the 2012 and 2013 survey waves. These games were designed to capture risk preferences, social (other regarding) preferences, and time preferences, as well as public-mindedness and trust of community members. All tasks in the 2012 wave were played in unincentivized hypothetical scenarios, whereas some tasks in the 2013 wave were probabilistically incentivized.[36] All tasks were completed in the same order by respondents, with the time preferences task first. After all tasks had been completed, participants selected for payment in the 2013 wave were chosen by a random draw and paid in a private setting for one or more decisions. Each task is discussed below.

Risk Preferences

Measures of risk preferences in 2012 are based on a hypothetical gamble-choice task that measures attitudes towards financial risk designed by Eckel and Grossman (2008). The task is a series of choices over money gambles with increasing expected payoffs and risk:

(a) First, respondents are asked to choose between a bag that contains a R$20 bill, and one that contains a R$2 bill and a R$50 bill;

(b) Respondents who preferred the first bag in (a) are then asked to choose between a bag that contains a R$20 bill, and one that contains a R$5 bill and a R$50 bill; and

(c) Respondents who person preferred the first bag in (b) are then asked to choose between a bag that contains a R$20 bill, and one that contains a R$10 bill and a R$50 bill.

[36] Though the unincentivized nature of the games in the 2012 wave may be a limitation, some evidence suggests that choices in incentivized experiments are often in line with choices in hypothetical games (Ben-Ner, Kramer, and Levy 2008). The choices made by individuals in the incentivized risk and trust games in 2013 discussed below correlate with those of the unincentivized games we carried out with survey respondents in 2012.

After completing each choice, the participant would hypothetically put her hand inside one of the bags and take out only one bill, thereby "winning" that money. The risk preferences measure in 2013 is based on an incentivized version of this gamble-choice task with choices over the following money gambles (also with increasing expected payoffs and risk):

(a) First, respondents are asked to choose between a bag that contains a coin representing R$2, and a bag with two coins representing R$0.20 and R$5;

(b) Respondents who preferred the first bag in (a) are then asked to choose between a bag that contains a coin representing R$2, and a bag with two coins representing R$0.50 and R$5; and

(c) Respondents who preferred the first bag in (b) are then asked to choose between a bag that contains a coin representing R$2, and a bag with two coins representing R$1 and R$5;

With respect to incentivization, respondents who chose the bag with one coin in all rounds received R$2. For respondents who chose a bag with two coins in their final round, they drew one of two coins from that bag.

Our measure of risk preferences for each year is a variable indicating an individual's preference in option c (i.e., the riskiest gamble). The findings in Section 8.4 are robust to other indicators of risk preferences based on this task.

Social Preferences

Our measures of altruism and reciprocity are constructed from play in a trust game with anonymous partners (Berg et al. 1995). The game played in 2012 was unincentivized and with a hypothetical anonymous community member; the study participant had the role of player 2. In this game, the hypothetical first mover was given R$5 and had to decide whether to send nothing, R$1, R$2, R$3, R$4, or R$5 to the second mover. Whatever he sent was tripled and the second mover could keep or return as much as she wanted.

The study participant ("second mover") was asked how much she would return if she received R$6, how much if R$9, and how much if R$12.

The measures generated in 2013 are based on a probabilistically incentivized trust game played where the first mover was given R$10 and had to decide whether to send nothing, R$2, R$4, R$6, R$8, or R$10 to the second mover. Whatever he sent was tripled and the second mover could keep or return as much as she wanted. Before finding out how much was sent to him, the second mover was asked how much she would return to the first mover if she received R$6, how much if R$12, how much if R$18, how much if R$24, and how much if R$30. Each player was randomly and anonymously matched to another player in the area; payments were calculated based on the responses just mentioned. Players in one out of ten neighborhoods were randomly selected to be compensated for their plays in the trust game.

Following Finan and Schechter (2012), we measure reciprocity by calculating the average share returned when the individual receives more than half of the first mover's endowment minus the share returned when receiving less than half of the first player's endowment. (We implicitly assume that when the first mover sends at least half, the second mover thinks that she has been treated well. On the other hand, if the first mover sends less than half, then it is assumed that the second mover thinks she has been treated poorly.) In this way, we subtract a measure of altruism in order to have a measure focused on reciprocity. Our reciprocity (i.e., reciprocal individual) variable is an indicator equal to one if the difference in the shares returned to player 1 described above is positive. Accordingly, our measure of altruism (i.e., altruistic individual) is a variable indicating whether the average share returned when the individual receives less than half of the first mover's endowment is positive.

Time Preferences

We used a hypothetical game in both the 2012 and 2013 survey rounds to measure the individual's time discount rate: the implicit interest rate at which an individual would be willing to wait x months to receive a prize of a certain amount instead of receiving a hypothetical prize of R$100 the next day. In the 2012 survey round, the series of questions asked the respondent to state her preference between a R$100 prize tomorrow or a guaranteed prize of R$110, R$150, R$200, R$300, R$500, R$700, or R$1,000 in one month. In the 2013 survey wave, we asked an analogous series of questions for the respondent to state their preference between the prize of R$100 tomorrow and a guaranteed prize three months later of each higher amount just mentioned. We construct implied discount rates for each individual based on their responses to these questions.

Public Goods Contribution

Finally, our measure of public goods contribution is constructed from play in a probabilistically incentivized voluntary contributions game with three anonymous neighbors in the community, in the 2013 survey round. The variable "contribution to public goods" tracks the share of funds the individual contributes to a joint account — rather than keeping it for herself — out of R$5 offered to the player. In this game, funds in the joint account are multiplied by a factor of 2 and then divided equally between the four participants.

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