Online Appendix for "Corruption and the Incumbency Disadvantage: Theory and Evidence"

Contents

A1 Formal Model of Corruption and Incumbency Disadvantage

This section presents the formal model of the incumbency disadvantage and corruption informally discussed in the main text. The model draws on a more detailed analysis in Klašnja (Forthcoming).

The voter (the principal) makes a decision whether to reelect the incumbent (the agent) or replace him with a challenger. The incumbent chooses the level of public good spending in period t, $G_t \in (0, T_t]$ and the level of corruption, R_t. T_t is the level of tax revenue, such that $T_t = G_t + r_t$ in period t, where r_t will be defined shortly. There are two periods, $t = \{1, 2\}$.

The voter derives per-period utility solely from the public good G, $W_t = G_t$. There are two types of politicians, $\theta = \{H, L\}$, denoting the "high" (or "good") and "low" (or "bad") type, respectively. The good type is benevolent and cares only about the public good. The bad type is rent-seeking, and derives utility solely from corruption.[1]

Per-period rent is:

$$R_t = r_t - \theta^{\alpha_{t_I}} c(r_t).$$

r_t is the desired share of tax collection diverted to rents, and is the variable chosen by the incumbent. θ denotes incumbent's integrity (i.e. type). $\theta^L \in (0, 1)$, so that lower θ^L implies lower integrity. $\theta^{\alpha_{t_I}}$ captures two aspects. First, it captures the extent to which rent-seeking may vary over time. In particular:

$$\alpha_{t_I} \begin{cases} = 1 & \text{if} \quad t_I = 1 \\ \geq 1 & \text{if} \quad t_I = 2 \end{cases}$$

where t_I denotes the incumbent's term in office, with $t_I = 1$ denoting a newly elected incumbent, whether in $t = 1$ or $t = 2$, and $t_I = 2$ denoting a reelected incumbent, only possible in $t = 2$. This technology implies that rent-seeking can be increasing in a politician's tenure in office. For reasons why rents may be increasing, see the discussion in the text.

The second aspect is that the corruption increase interacts with the integrity of the rent-seeking politician, θ. The logic is simply that candidates more prone to rent-seeking will also be more likely to increase corruption over time. Since $\alpha = 1$ whenever $t_I = 1$, I henceforth drop it when characterizing first-period rent-seeking and drop the incumbent term subscript t_I to simplify the notation.

Finally, $c(\cdot)$ is a convex, strictly increasing time-invariant function, identical for all incumbents. I assume $c(\cdot) = (\cdot)^\omega$, with $\omega > 1$. I interpret this broadly as a time-invariant opportunity cost to corruption. In the paper, I interpret ω primarily as a politician's expected loss of monetary income in case of getting caught in corruption, i.e. the opportunity cost of corruption.

From the politicians' utility functions, it follows that the optimal per-period rent for the high type is zero; for the low incumbent type it is $\hat{r_t} = \left(\frac{1}{\omega\theta^\alpha}\right)^{\left(\frac{1}{\omega-1}\right)}$, and so $\hat{R_t} = \left(\frac{1}{\omega\theta^\alpha}\right)^{\left(\frac{1}{\omega-1}\right)} \left(1 - \frac{1}{\omega}\right)$. The corruption rent R_t is increasing in α, and decreasing in ω and θ.

The game ends at the end of the second period, implying that any second-period incumbent is a "lame-duck." The future is discounted with a discount rate $\beta < 1$. The rent-seeking incumbent maximizes the discounted sum of rents: $R_1 + \beta\sigma(G_1)R_2$, where σ is the voter's optimal reelection rule based on the provision of the good by the politician.

The probability distribution over politician types is common knowledge, with $Pr(\theta = H) = \pi$, i.e. the prior likelihood of a good-type politician being in office. (In the paper, I refer to π as the

[1] The results are substantively further strengthened if the bad type incumbent also cares about voter's welfare (Klašnja, Forthcoming).

quality of the pool of potential incumbents.) Both incumbents and challengers are drawn from the same distribution. However, the realization of a given politician's type is unobserved by the voter but observed by the incumbent, inducing adverse selection. I assume that $Pr(\theta = H|G_t \neq T) = 0$. The equilibrium concept is the perfect Bayesian equilibrium.

The order of play is as follows: (1) nature chooses the incumbent and his type between two candidates; (2) incumbent chooses rent and spending; (3) voter observes G_1 but not the type of the politician or R_1, updates her beliefs, and votes (end of period one); (4) if the incumbents is replaced, nature chooses the new incumbent and his type; the incumbent chooses rent and spending; (5) all payoffs are realized, and the game ends (end of period two).

Given that type H is benevolent, there can only be two levels of provision of the public good G on the equilibrium path in the first period, $G_1 \in \{T_1, T_1 - \hat{R}_1\}$, where $\hat{R}_t$ represents the low type's optimal per-period rent. Given that the high type is benevolent, to ease notation, I use θ to denote the low type's integrity, i.e. $\theta = \theta^L$. The rent-seeking politician, L, will have an incentive to mimic the benevolent incumbent in the first period and increase his reelection chances if and only if $\hat{R}_1 < \beta\sigma^* R_2$, where σ^* denotes the voter's optimal reelection rule. Substituting the rent-seeking politician's optimal per-period rent, this condition simplifies to $\sigma^*\beta > (\theta^{\alpha-1})^{\left(\frac{1}{\omega-1}\right)}$.

If $\beta \leq (\theta^{\alpha-1})^{\left(\frac{1}{\omega-1}\right)}$, the only equilibrium of the game is a separating equilibrium – an equilibrium in which the bad type steals in the first period, reveals himself to be corrupt to the voter and is therefore voted out of office. Keeping β and θ fixed, the condition for separation is more easily satisfied when ω is large and/or α is small. In this equilibrium, the reelection rate of a randomly chosen first-period incumbent, ρ^*, is proportional to π. Since the first-period incumbent is chosen randomly by nature at the start of the game between two candidates, the probability of becoming an incumbent is $\frac{1}{2}$. Therefore, the incumbency disadvantage exists when $\rho^* < \frac{1}{2}$. In the separating equilibrium the incumbency disadvantage thus exists if $\pi < \frac{1}{2}$. More generally, the incumbency disadvantage increases as π decreases – i.e. as the quality of the candidate pool deteriorates.

If $\beta > (\theta^{\alpha-1})^{\left(\frac{1}{\omega-1}\right)}$, the only equilibrium is a partially-pooling equilibrium in which the politician mixes between stealing in the first period and thus revealing corruption, and mimicking the good type and thus refraining from corruption in the first period. The voter in turn mixes between reelecting the incumbent and voting him out of office in such a way that $\sigma_i^* = \frac{1}{\beta}(\theta^{\alpha-1})^{\left(\frac{1}{\omega-1}\right)}$, where σ_i^* denotes the voter's optimal reelection rule. From σ_i^*, we can derive the equilibrium reelection rate as $\rho^* = \frac{\pi}{\beta}\frac{\hat{R}_1}{\hat{R}_2 - \hat{R}_1(1-\pi)}$. Given that the optimal per-period corruption rent $\hat{R}_t$ is increasing in α, as well as decreasing in ω, ρ_i^* increases with ω and decreases with α. Also, as in the separating equilibrium, ρ^* is increasing in π. Moreover, in the partially pooling equilibrium, the incumbency disadvantage, defined as $\rho^* < \frac{1}{2}$, exists if $\frac{2\pi}{\beta} + (1-\pi) < \left(\frac{1}{\theta^{\alpha-1}}\right)^{\left(\frac{1}{\omega-1}\right)}$, which is more easily satisfied if ω is low and π is low (Prediction 1), or α is high (Prediction 2).[2]

[2]As is common in principal agent models, it is difficult to examine empirically which equilibrium is being played. The effect of the selection of corrupt politicians into politics, described in the model by parameter π, is qualitatively the same in both equilibria, and therefore empirical tests of this prediction are unencumbered by the question of equilibrium selection. On the other hand, given that I find strong evidence of increasing corruption in tenure among Romanian mayors, and that the incumbency disadvantage is larger for parties running with more experienced mayors, it is plausible that voters and politicians in Romania engage in behavior characterized by a partially-pooling equilibrium of the model.

A2 Adapting the RDD to Romanian Local Elections

The standard regression discontinuity design (Lee 2008, henceforth the RDD) requires three adjustments in the context of Romanian mayoral elections: the redefinition of the margin of victory in the presence of a runoff between the top two parties; the choice of the unit of analysis given the multi-party nature of the Romanian party system; and accounting for party switches among local candidates.

A2.1 Defining the Running Variable in the Presence of a Runoff

Romanian mayoral elections involved until recently the possibility of a runoff among the top two candidates, triggered by a failure of any party to win more than 50% of the vote.[3]

In a simple first-past-the-post election without a runoff, a party becomes an incumbent if it wins the most votes. When parties' vote shares are reexpressed as the difference between the top party's vote share and the vote share of any other opponent, the winners at t always have a positive vote margin (also called the "running variable"), whereas non-incumbents have a negative vote margin. Where the running variable equals zero is the threshold at which the incumbency status changes. The RDD compares incumbents and non-incumbents in a close vicinity around that threshold.

In the presence of a runoff round, there are two ways the running variable can be defined. One can disregard the first round and define the running variable in the standard way based only on the vote shares of the top two parties in the runoff round. Alternatively, one can define the vote margin based on the outcomes in the first round, while taking into account that the runoff took place, by recognizing that only parties that make it to the runoff have a positive probability of becoming an incumbent. Therefore, the location of the threshold at which the incumbency status changes moves from the difference between the top party and the rest, as in no-runoff elections, to the difference between the second party and the rest. However, the discontinuity at this threshold is not "sharp," because even though parties below the threshold are certain to be non-incumbents, ex ante both parties above the threshold may win in the runoff round.

In the empirical analysis in the text, in elections with a runoff, I opt for the second method. If the first round results are disregarded, the vote margin is defined only for the top two parties, while all other parties are excluded from the analysis. This induces non-negligible selection bias, because the effective number of parties at or below two in less than 10% of elections. Also, the parties that do not make it to the runoff at t have a non-negligible chance of winning in the next election: parties that make it to the runoff by less than 10% win only 17% of the time (compared to 55% overall).[4] Therefore, disregarding parties that do not make it to the runoff likely attenuates any incumbency disadvantage.

Nonetheless, Table A1 shows that the results defining the running variable only with the runoff vote shares are broadly similar to those presented in the text, although they are somewhat smaller in magnitude and more noisy – consistent with the discussed attenuation bias.

Participation in the runoff round ("treatment assignment") can be considered an instrument for the actual incumbency status based on the runoff round outcomes ("treatment status"). Hence,

[3] Until the 2004 election, the runoff round could be triggered by another condition: if the turnout was lower than 50% plus one registered voter. In the 2004 cycle, this condition was discarded, but the condition based on the vote shares remained until 2012, when the possibility of the runoff round was eliminated altogether.

[4] 30% of elections with the runoff feature the first-round vote difference between the second and the third party of less than 10% of the vote.

two different RDD estimates of the incumbency disadvantage are available. First, one can disregard the actual outcome of the runoff and examine the effect of participating in the runoff on subsequent electoral success. This is an intention-to-treat (ITT) effect in the presence of one-sided non-compliance (see for example Gerber and Green, 2012, Chapter 5). Second, one can adjust this ITT estimate with the effect of participating in the runoff on becoming an incumbent, which represents an instrumental-variables, or a "fuzzy" RD, estimate of the incumbency disadvantage on the compliers (see for example Angrist and Pischke, 2008). The compliers are those whose incumbent status changed because of the participation in the runoff round (Angrist, Imbens, and Rubin, 1996).

I focus on the ITT estimates in the main text. The fuzzy RDD estimator is unbiased only if participation in the runoff round strongly predicts the incumbency status (strong instrument), and if it affects future electoral outcome only through its effect on incumbency (the exclusion restriction). In my analysis, the first assumption, which is testable, is satisfied in the entire sample, but is violated when I focus on comparisons across the salary/population threshold due to small samples. The second assumption, while untestable, could plausibly be violated when participation in the second round affects the likelihood of a party running or raising campaign funds differently than if it did not participate in the runoff. Also, the ITT estimates likely underestimate the true effect of incumbency (Imbens and Rosenbaum, 2005), given that they include a proportion of non-incumbents – those who went to the runoff round but lost.

Table A2 shows that the overall incumbency disadvantage results using the fuzzy RDD estimates are substantively similar to the ITT estimates in Table 1 in the main text.

A2.2 Unit of Analysis in Multi-Party Elections

The second adjustment stems from the fact that unlike Lee's (2008) RDD application to a de-facto two-party system in the U.S., Romanian mayoral elections are overwhelmingly multi-party contests. This poses a question as to which party to choose as the reference party. In the case of a two-party system, estimating the incumbency advantage of one party is fully informative of the incumbency advantage of the other party. In multi-party systems, some applications choose one reference party, such as the largest or the longest-lived party (e.g. Eggers et al., 2015), or present results for multiple parties when the theory warrants party comparisons (Klašnja and Titiunik, 2014). With three parties of relatively equal importance in national politics in Romania (PSD, PNL, and PD-L) and several parties prominent in local elections (e.g. the ethnic Hungarian UDMR), it would be challenging to present the results of all the tests for all the parties. Therefore, I pool the parties that comprise close to 90 percent of mayorships and define a *generic incumbent party*: a party in a locality that won an election at $t-1$ – thus being an incumbent party at t. In this way, the reference party is whichever party has previously won in a given locality. The analysis thus uses election triplets rather than election pairs, as in typical RDD applications. Five electoral cycles (1996, 2000, 2004, 2008, and 2012) provide three election triplets: 1996/2000/2004, 2000/2004/2008, and 2004/2008/2012.

A2.3 Accounting for Party Switching

The third consideration stems from the fact that this application of the RDD to elections, like those before it, treats the party as the unit of analysis, rather than the individual, as in most earlier studies of the incumbency advantage (for more details, see Erikson and Titiunik, Forthcoming).

This focus is important because it alleviates the problem of selection bias due to the possibility of strategic retirement. However, the difference between the focus on the individual and the party is potentially important in the Romanian context because in about 20 percent of elections, mayors switch parties during their tenure in office.[5] Moreover, my hypothesized effects of corruption on the incumbency disadvantage should work more so at the individual than the party level. As a middle ground between more closely integrating the theory with the empirical testing and avoiding an important source of selection bias, I adopt a coding scheme that tracks the individuals to the extent possible, but without dropping observations when an individual retires but the party runs a new candidate. Nevertheless, I also perform the analysis that focuses on the personal rather than the party incumbency disadvantage, by utilizing the framework outlined in Gelman and King (1990). The results are qualitatively unchanged in that there is statistically significant incumbency disadvantage. Results are available upon request.

A3 Measures of Local-Level Corruption

Here, I describe in more detail the data collection and the construction of the three sets of measures of local corruption used in the main text.

A3.1 Wealth Accumulation

Since 2007, declarations of privately-owned immovable, movable and financial household assets have been mandatory for all electoral candidates and are posted on the internet portal of the Romanian National Integrity Agency.[6] A sample page of an asset declaration is given in Figure A1.

I limit the calculation of wealth accumulation to top two or top three rerunning candidates, because the format requires manual coding of each declaration (documents are filled out in writing). Assets are declared in their own natural units, such as square meters or acres for land, and currency for income. I calculate the change in wealth between 2008 and 2012 for each asset class separately, and then sum these rates, because for example selling an apartment – a decrease in immovable assets – should normally be reflected in the increase in gross financial assets. Because of potential zero initial stock, the rates of change are calculated with respect to the mean of the initial and final value, giving the range of overall wealth accumulation from -6 to 6 (-600% to 600%). Formally:

$$\Delta\text{Wealth}_{i,j,k} = \frac{\text{Wealth}_{i,j,k,2012} - \text{Wealth}_{i,j,k,2008}}{\frac{1}{2}(\text{Wealth}_{i,j,k,2012} + \text{Wealth}_{i,j,k,2008})},$$

$$\Delta\text{Wealth}_{i,j} = \sum^{k} \Delta\text{Wealth}_{i,j,k},$$

for candidate i in locality j who runs both in 2008 and 2012, with k denoting an asset class (immovable, movable, or financial).

Focusing on rerunning candidates may induce some selection bias, but it plausibly attenuates the wealth accumulation differential between incumbents and non-incumbents. If one assumes that wealth accumulation positively affects rerunning decisions, and given that incumbents accumulate more wealth (see Table 2 in the main text), winners will recontest at higher rates. Thus, losers

[5] Party switches were more common before 2004, when switching was sanctioned by legislation with the loss of mayorship.

[6] `http://declaratii.integritate.eu`

with relatively lower wealth accumulation will not rerun, decreasing the difference between those winners and losers who remain in the sample. The same logic applies in reverse (i.e. if one assumes that wealth accumulation negatively affects rerunning choices). Also, corrupt politicians are more likely to under-report wealth increase or transfer assets outside of the immediate household, or both.[7]

A3.2 Procurement Corruption Risk

The data on close to four million public procurement contracts come from two sources: scraping a large set of html documents drawn through a private provider from a public portal maintained by the Agency for Digital Agenda of Romania,[8] and the Agency's public repository of the subset of the entire public procurement archive.[9]

I extract information for 2008-2012 from the two most common types of contracts: direct acquisitions, used for small and regularized purchases of standard products, and public works/service contracts, used for the majority of other, more complex and expensive works or services.

The three indicators used in the paper are: *Opaque Procedure* measures the frequency with which a procedure other than a default, highest-transparency procedure (open auction) is used; this includes the use of any of the following: restricted auction, accelerated restricted auction, negotiation, accelerated negotiation, and negotiation without a participation notice. *Price per Quantity* measures the price per quantity procured of regularized purchases such as office or medical supplies. *Single Bidder Tenders* measures the frequency with which a public procurement tender was fulfilled with only one accepted bid. Each indicator is standardized with respect to the relevant product market to mean zero and standard deviation of one.[10] The standardized values are then averaged by locality. Formally:

$$\mathrm{OP}_{c,m,j} = \begin{cases} 0 & \text{if using open auction procedure} \\ 1 & \text{if using any other procedure} \end{cases}$$

$$\mathrm{OP}_j = \frac{1}{c} \sum^{c} \frac{\mathrm{OP}_{c,m,j} - \overline{\mathrm{OP}}_m}{s_{\mathrm{OP}_m}},$$

where c denotes a public procurement contract in locality j with a primary object of the contract being a product or service within the CPV class m; $\overline{\mathrm{OP}}_m$ and s_{OP_m} are the average and the standard deviation of the frequency of use of an opaque procedure within the CPV class m market across all localities. The construction of the other indicators follows the same logic.

A3.3 Missing Infrastructure

The measure of "missing infrastructure" compares the change in the actual stock of infrastructure and the change in spending on it in the period 2008-2012, controlling for other factors. The data

[7] For example, Constantin Pârvulescu, the mayor of Fărcăşeşti, a town in Gorj county, received during the period 2000-2008 bribes and kickbacks of about €370,000 in exchange for preferential award of public procurement contracts to two companies. These financial gains were claimed mostly through a firm owned by the mayor's brother-in-law, Constantin Cincă, and an apartment in the capital Bucharest registered in the name of his daughter-in-law, Anda Luiza Pîrvulescu. See `http://www.pna.ro/faces/comunicat.xhtml?id=2330`

[8] The portal is accessible at `www.e-licitatie.ro`

[9] Accessible at `http://data.gov.ro/dataset/achizitii-publice-2007-2014`

[10] The relevant market is determined by the first two digits of the Common Procurement Vocabulary (CPV) codes.

on the length in kilometers of sewer and water pipes is from the Romanian Statistical Office,[11] and on infrastructure spending from the Ministry of Finance and the Ministry of Regional Development and Public Administration.[12].

The missing infrastructure indicator is defined as the difference between predicted and observed change (inverse residuals) in the physical stock of infrastructure within an electoral cycle from a multi-level regression of the change in the physical stock on the change in spending at the local level on the same infrastructure for the same period, controlling for a variety of other factors. Formally:

$$\hat{e}_j = \{\Delta\text{Spending}_j + \mathbf{X}_j\hat{\beta} + \mathbf{Z}_k\hat{\gamma} + \tilde{u}_k\} - \Delta\text{Stock}_j,$$

$$\text{Missing Infrastructure}_j = \frac{\hat{e}_j - \overline{\hat{e}}}{s_{\hat{e}}},$$

where ΔStock is the change in the stock of water and sewage pipes in locality j between 2012 and 2008 (in km), $\Delta\text{Spending}_j$ is the concomitant change in local spending on local water and sewage distribution, $\mathbf{X}_j$ is a vector of locality controls, $\mathbf{Z}_k$ is a vector of county controls, u_k are the county random intercepts, $\overline{\hat{e}}$ is the sample average of the locality-level residuals, and $s_{\hat{e}}$ is the sample standard deviation of the residuals.[13]

A4 Population/Salary Thresholds

Table A3 shows the details on all the population/salary thresholds in Romanian localities. As discussed in the main text, only the 7,000 threshold gives a unique salary discontinuity and the sufficient sample size to conduct meaningful analysis.

Figure A2 graphically shows a sharp increase in the declared average monthly salary immediately above the threshold. The RDD estimate of the jump is about 18 percent, from an average of about 2,100 lei/month to about 2,500 lei/month, and statistically significant at $p < .026$.

A5 RDD Assumption Validity Tests

This section presents the results of regression discontinuity design (RDD) validity tests. Figure A3 shows that the main incumbency disadvantage estimate is by and large stable across bandwidths of different size; at smaller bandwidths, there is a noticeable loss of power, but the point estimate is broadly stable. Table A4 shows that a number of predetermined variables are balanced across the vote margin threshold, i.e. as expected, there are no incumbency disadvantage effects on variables realized before the assignment of incumbency. Table A5 shows there is no effect of a jump in salary

[11] Available for a fee at `www.insse.ro`

[12] The data are available at `www/dpfbl.mdrap.ro/sit_ven_si_chelt_uat.html`, and `www.mfinante.ro/rapoarteMFP.html?pagina=domenii`

[13] $\mathbf{X}_j$ contains: central government transfers to the local council for wanter and sanitation, and road maintenance, repatriation of a portion of income tax revenue, change in total expenditures and revenue, change in capital expenditures, tax collection effectiveness, exposure to floods during 1999-2007, a dummy for mayoral co-partisanship with the central government, and the mayor's margin of victory in 2008. $\mathbf{Z}_k$ contains: central government transfers to the county council for water and sanitation, and road maintenance, change in total expenditures and revenue, change in capital expenditures, county GDP in constant 2008 lei, average road utilization in 2008 (10^3 vehicles/km, logged), a dummy for county president's co-partisanship with the central government, and the county president's margin of victory in 2008.

at the 7,000 threshold in 2008 on predetermined variables. Table A6 shows no evidence of the manipulation of the running variable (McCrary, 2008) for the two margins, in the overall samples (columns 1 and 3) and within the balanced population window (columns 2 and 4; see Section A6 for the definition of the balanced population window).

A6 The Balanced Population Window

The analysis in Table 4 in the main text seeks to compare the incumbency effects in close elections within a certain bandwidth around the population threshold. Therefore, two bandwidths need to be chosen.[14] I first choose the window around the population threshold, and then proceed to estimate the incumbency disadvantage on each side of that population window, within an optimal bandwidth around the vote margin.

Because the aim of this analysis is to compare the incumbency disadvantage in very similar villages that only differ with respect to salary, the population window is chosen such that important predetermined characteristics are balanced across the population/salary threshold. To find balance, I follow the procedure outlined in Cattaneo, Frandsen, and Titiunik (Forthcoming). For each of eight predetermined variables[15] I conduct a difference-in-means t-test across the salary threshold within a window of successively smaller size, starting from a population window of +/- 50% on each side of the salary threshold, and moving down symmetrically by 1%. The minimum p-values for each window size are plotted in Figure A4. The largest bandwidth after which the minimum p-value is consistently greater than .15, shown with the vertical line, is the balanced population window (at $[-.186, .186]$).[16]

Based on this balanced population window, I perform two additional validity tests. First, for the most important pre-determined variables in the incumbency disadvantage analysis – previous victory and vote margin – I conduct balance tests within the balanced population window to ensure that even within the population window incumbency is as good as randomly assigned. The results, shown in rows 1 and 3 of Table A4, suggest balance. Second, I verify in columns 2 and 4 of Table A6 that there is no evidence of manipulation of either the vote margin or the population margin within the balanced population window.

A7 Additional Results and Robustness Checks

This section presents additional results and robustness checks briefly discussed in the main text. Estimates of the incumbency disadvantage for a party's future victory and vote share shown in Table 1 in the text are conditional on that party running at $t + 1$. The estimates may be biased if the decision to run is related to the expected electoral success, and *differently* so following a narrow

[14] This is similar – but not identical – to a two-dimensional RDD, in which the running variable is a two-dimensional area with a single two-dimensional bandwidth. In two-dimensional designs, observations usually receive *one* treatment when they score above a threshold on *both* running variables simultaneously (e.g. Papay, Willett, and Murnane, 2011). In my application, by contrast, observations can receive one of *two* treatments – incumbency in localities below the salary threshold, or incumbency above the salary threshold.

[15] See notes to Figure A4.

[16] Because the aim of the balance tests is to fail to reject the null hypothesis, a conservative test should minimize the probability of a Type II Error – hence the p-value that is greater than .05 (Cattaneo, Frandsen, and Titiunik, Forthcoming).

win compared to a narrow loss (De Magalhaes, 2015). Table A7 shows no evidence for concern about this type of bias.

Table A8 shows that greater wealth accumulation among mayors (relative to close losers) in column 1 in Table 2 in the main text cannot be explained by mayors being initially poorer or richer. Similarly, Table A9 shows that greater wealth accumulation among mayors with lower salary relative to mayors with higher salary shown in column 2 in Table 2 cannot be explained by lower-salary mayors being initially poorer.

Table A10 verifies that the patterns across the salary threshold in the procurement corruption indicators shown in Table 3 in the main text are not simply due to differences in sample size.

Table A11 shows the RDD estimates across the population/salary threshold for indicators derived from the corruption prosecutions, not discussed in the text. The first column shows the results for the total number of prosecutions by both the Anti-Corruption Directorate (PNA) and the National Integrity Agency (ANI). The second column shows the results only for the cases led by ANI, given that these cases are more frequent among local officials than the more high-level corruption cases investigated by PNA. Finally, the last column of Table A11 shows the result for the number of distinct public institutions within a locality whose members were charged by either PNA or ANI, as a proxy for the "diversity" in corrupt actors in a locality. The results are remarkably consistent with all the previous measures of corruption.

Finally, Figure A5 shows that the comparison of the incumbency disadvantage across the population/salary threshold, shown for the balanced population window (.186) in Table 4 in the main text, is stable across a number of other population windows.

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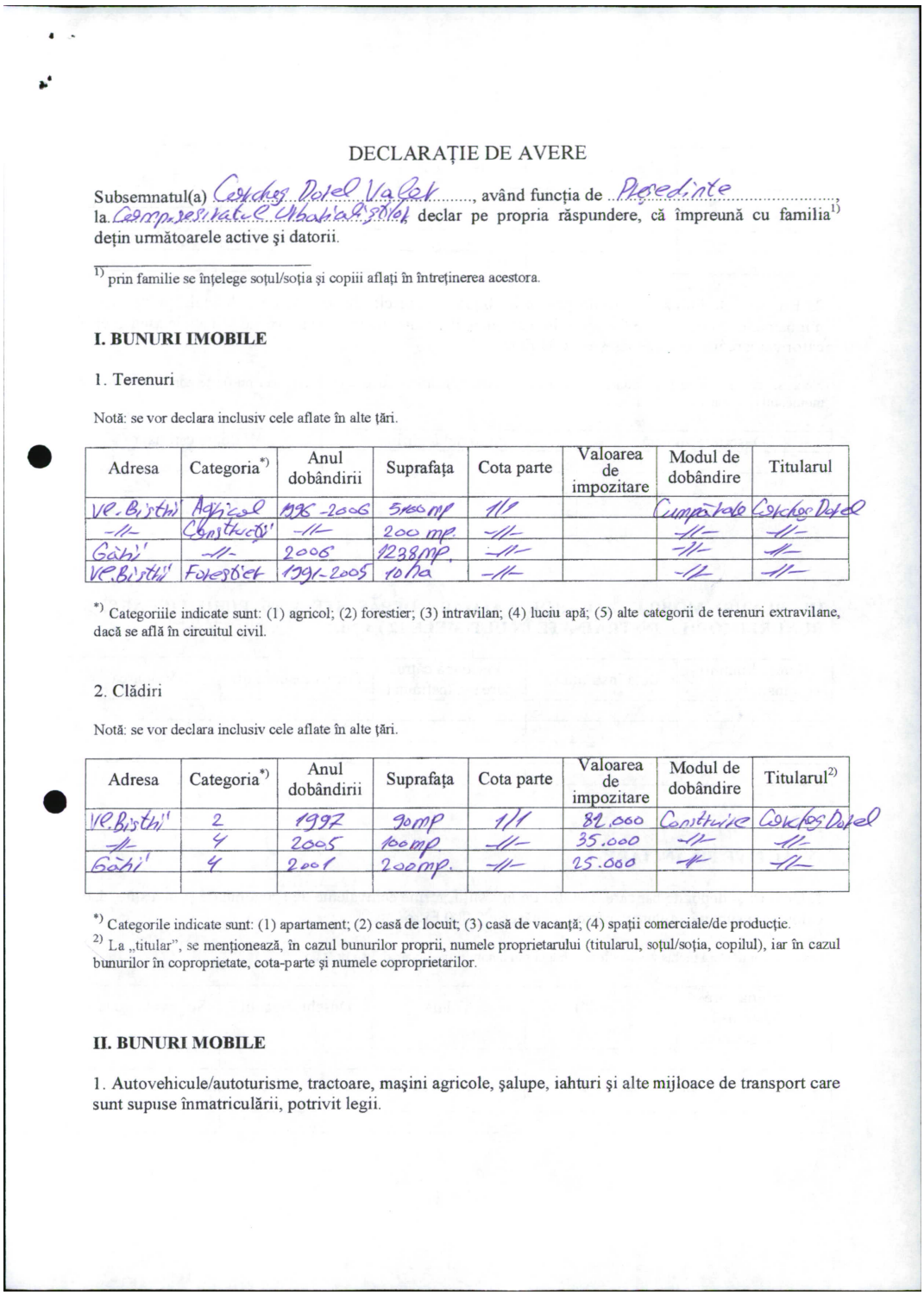
Figure A1: Example of Asset Declaration



DECLARAȚIE DE AVERE

Subsemnatul(a) Cotcheș Dorel Vasile, având funcția de Președinte la Consiliul Județean Mehedinți, declar pe propria răspundere, că împreună cu familia[1] dețin următoarele active și datorii.

[1] prin familie se înțelege soțul/soția și copiii aflați în întreținerea acestora.

I. BUNURI IMOBILE

1. Terenuri

Notă: se vor declara inclusiv cele aflate în alte țări.

Adresa	Categoria*)	Anul dobândirii	Suprafața	Cota parte	Valoarea de impozitare	Modul de dobândire	Titularul
Vr. Bistrii	Agricol	1995-2006	5500 mp	1/1		Cumpărare	Cotcheș Dorel
-11-	Construcții	-11-	200 mp.	-11-		-11-	-11-
Gâlvi	-11-	2006	1238 mp.	-11-		-11-	-11-
Vr. Bistrii	Forestier	1991-2005	10 ha	-11-		-11-	-11-

*) Categoriile indicate sunt: (1) agricol; (2) forestier; (3) intravilan; (4) luciu apă; (5) alte categorii de terenuri extravilane, dacă se află în circuitul civil.

2. Clădiri

Notă: se vor declara inclusiv cele aflate în alte țări.

Adresa	Categoria*)	Anul dobândirii	Suprafața	Cota parte	Valoarea de impozitare	Modul de dobândire	Titularul[2]
Vr. Bistrii	2	1997	90 mp	1/1	82.000	Construire	Cotcheș Dorel
-11-	4	2005	100 mp	-11-	35.000	-11-	-11-
Gâlvi	4	2001	200 mp.	-11-	25.000	-11-	-11-

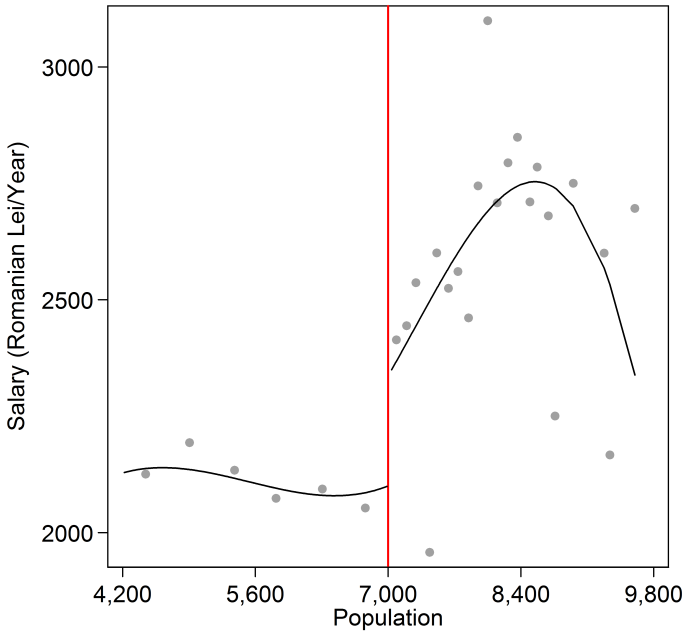
*) Categorile indicate sunt: (1) apartament; (2) casă de locuit; (3) casă de vacanță; (4) spații comerciale/de producție.
[2] La „titular", se menționează, în cazul bunurilor proprii, numele proprietarului (titularul, soțul/soția, copilul), iar în cazul bunurilor în coproprietate, cota-parte și numele coproprietarilor.

II. BUNURI MOBILE

1. Autovehicule/autoturisme, tractoare, mașini agricole, șalupe, iahturi și alte mijloace de transport care sunt supuse înmatriculării, potrivit legii.

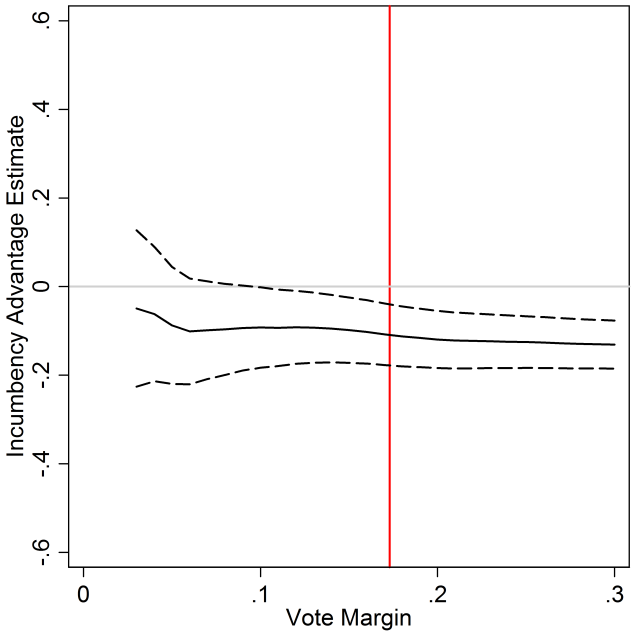
Source: `http://declaratii.integritate.eu`

Figure A2: Salary Change across the Salary Threshold



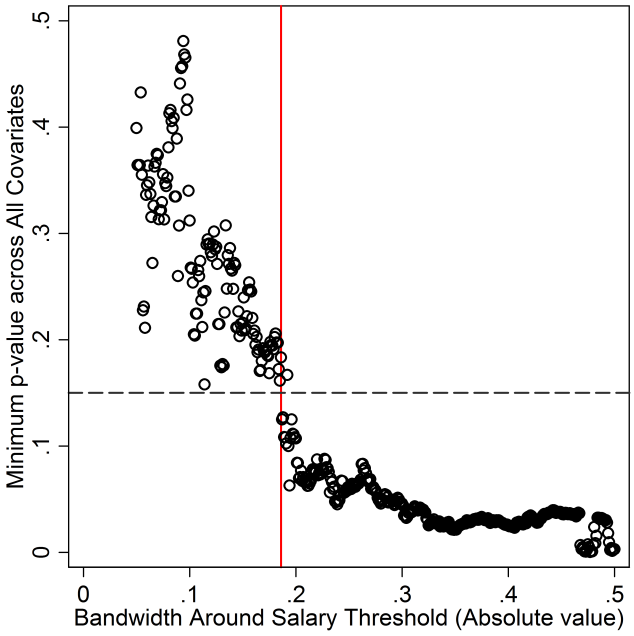
Note: The graph shows the mayors' average monthly salary, as reported on their 2008 declaration of assets. The dots show the average salary within a bin containing a small range of the population, shown on the x-axis. The lines are the third-order local polynomial best-fit lines, fit separately on each side of the threshold, indicated with the vertical red line. The plot is based on the procedure developed by Calonico, Cattaneo, and Titiunik (2014a).

Figure A3: Sensitivity of the Incumbency Disadvantage Estimates to Bandwidth Size



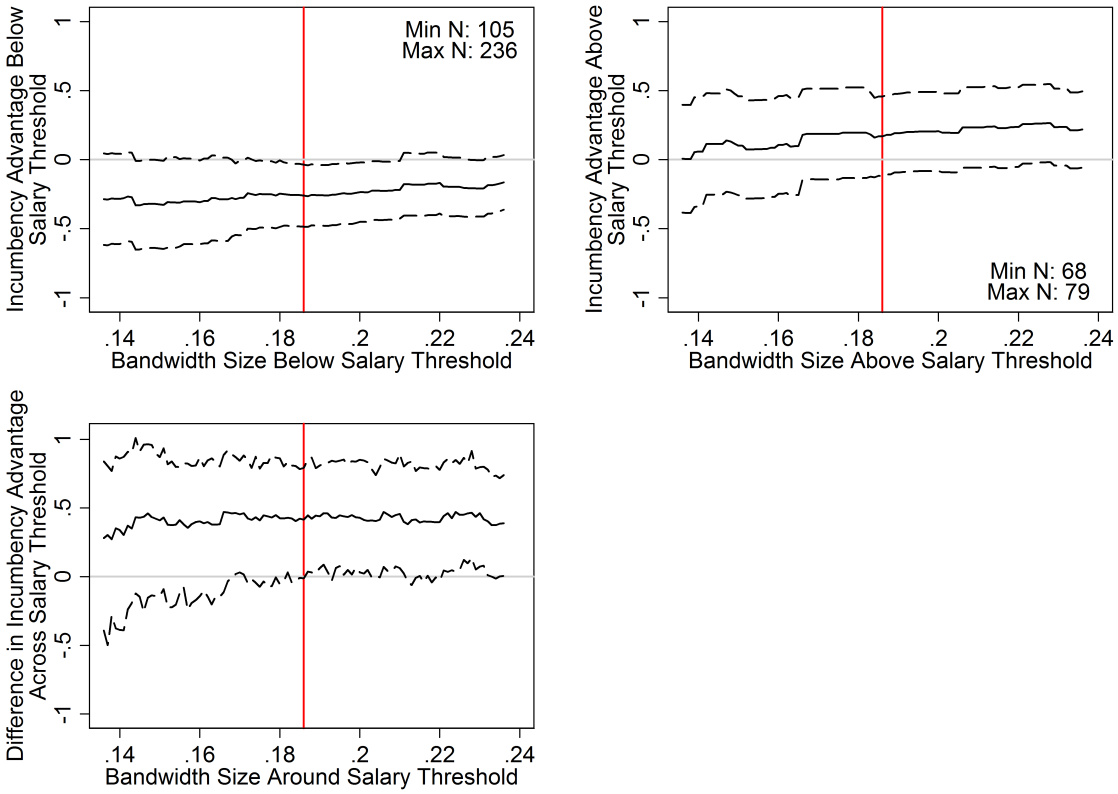
Note: The outcome variable is the victory in the next election $(t+1)$. The full line represents the estimate akin to that in column 1 in Table 1 for bandwidths of different size, shown on the x-axis. The dashed lines show the 95% confidence interval. The vertical red line shows the optimal bandwidth chosen by the procedure developed by Calonico, Cattaneo, and Titiunik (2014b), used in the paper.

Figure A4: Population/Salary Window Selection Based on Predetermined Variables



Note: The graph shows the minimum p-value across all predetermined variables from a difference-in-means t-test between observations below and above the population/salary threshold within a certain window. The window size is shown on the x-axis. The dashed horizontal line represents $p = 0.15$. I examine eight predetermined variables: turnout in mayoral election at t, effective number of parties in mayoral election at t, vote share of the incumbent mayor's party at $t-1$, agricultural area (as a share of total area) at t, fiscal revenues (average in the previous 4 years), fiscal expenditures (average in previous 4 years), co-partisanship of the mayor's party with the national government at $t-1$, and the vote margin of the co-partisan mayor's party relative to the strongest opposition party at $t-1$. The window around the population/salary used in the analysis shown in the text is 0.186 – the first bandwidth after which all the predetermined variables are balanced across the population/salary threshold at $p > 0.15$. The test is based on (Cattaneo, Frandsen, and Titiunik, Forthcoming).

Figure A5: Sensitivity of the Incumbency Disadvantage Estimates across the Population/Salary Threshold



Note: The graph shows the sensitivity to population window size of the RDD effect of incumbency on victory in the next election across the population/salary threshold. The main estimates are shown in Figure 2 in the text. The top left [right] panel shows the estimates (full line) and the 95% confidence interval (dashed lines) of the RD incumbency effect below [above] the 7,000 population/salary threshold for a range of population windows below [above] the population/salary threshold. The vertical red line indicates the balanced population window (see Figure A4), used in the analysis in the text.

Table A1: The Incumbency Disadvantage Estimates with the Alternative Running Variable

	All Elections	Largest Parties
Estimate	-0.053	-0.090
St. Error	0.041	0.049
p-value	0.194	0.063
Bandwidth	0.166	0.119
N	2250	1439
N Below Threshold	1016	670
N Above Threshold	1234	769

Note: The dependent variable is victory in the next election. The sample in the first column comprises about 90 percent of Romanian localities. The sample in the second column is limited to the three largest parties (the socialist PSD, the liberal PNL, and the liberal-conservative PD-L). For the definition of the samples, see Section A2.2 below. For he definition of the running variable, see the text above.

Table A2: The Fuzzy Regression Discontinuity Model Estimates

	Victory $t+1$	Vote Margin $t+1$
Estimate	-0.545	-0.256
St. Error	0.198	0.142
p-value	0.006	0.070
First Stage	0.200	0.206
St. Error	0.027	0.029
p-value	0.000	0.000
Bandwidth	0.173	0.148
N	2587	2212
N Below Threshold	1017	912
N Above Threshold	1570	1300

Note: The outcome variable is indicated in the column header. Victory $t+1$ is the probability of winning in the next election. Vote Margin $t+1$ is the difference between a party's first-round vote share in the next election and the vote share of the strongest first-round opponent. The results are from the fuzzy regression discontinuity (RDD) model, rather than a reduced form model (as shown throughout the main text). See the text above for more details.

Table A3: Population/Salary Thresholds

Salary Threshold	Locality Type	Years in Place	Other Policy Discontinuities	Gross Salary Change[c]	N around Threshold[d]
3,000	Commune	1991-	1,2	13.6%	1,047
7,000	Commune	1991-		12%	320
15,000	Commune	1991-2009[a]		10.7%	-
10,000	Town	1991-	1,2	10.4%	89
30,000	Town	1991-	1,2	9.5%	8
100,000	Municipality	1991-2009[a]	1,2	8.8%	13
150,000	Municipality	2009-[b]		12.5%	-
200,000	Municipality	1991-2009[a]	1,2	9%	7
320,000	Municipality	1991-2009[a]		7.4%	7
-	Bucharest	1991-	1,2,3	18.5%	1

Note:
1. Local Council size (L 215/2001)
2. Maximum number of positions for public officials (L 273/2006)
3. A number of other policies, such as taxes on land and buildings, urbanization certificates (L 571/2003), repatriation of a part of income tax collected (273/2006), zoning (L 215/2001), various state transfers and allocation of European funds (e.g. OUG 261/2008), etc.
a. Abolished in 2009 by L 330/2009
b. Established in 2009 by L 330/2009
c. The salary scale in the period 1998-2009 was determined by L 154/1998, which provisioned for the "hierarchy coefficient" which multiplied with a fixed base gives the gross salary for all public officials in Romania (for mayors, vice-mayors and local councilors, see Anexa Nr. 2/1, "Functii de Demnitate Publica Alese"). The gross salary change in the last column is calculated based on these hierarchy coefficients. The fixed base was indexed with inflation until 2010. L 330/2009 changed the scale, effective 2010 (see Anexa Nr. IX/3). The scale was subsequently adjusted again by L 284/2010, effective 2011.
d. Number of observations +/- 25% around the population threshold.

Table A4: The Effect of Incumbency on Predetermined Variables

	Estimate	St. Error	p-value	Band-width	N	N Below Threshold	N Above Threshold
Lagged Vote Margin	0.011	0.013	0.407	0.147	2461	1084	1377
Lagged Vote Margin (Salary Window)	0.039	0.025	0.121	0.241	379	147	232
Lagged Victory	-0.039	0.059	0.505	0.167	1267	485	782
Lagged Victory (Salary Window)	-0.182	0.170	0.283	0.163	113	46	67
Turnout	-0.013	0.008	0.096	0.136	2303	1022	1281
Effective Number of Parties	0.009	0.157	0.956	0.127	2141	950	1191
Co-Partisanship with N'tl Gov't	-0.069	0.042	0.101	0.168	2809	1208	1601
Population	0.053	0.054	0.334	0.217	3587	1391	2196
Employment Rate	0.008	0.007	0.216	0.202	3361	1340	2021
Pupils (Share of Population)	0.001	0.003	0.873	0.236	3881	1455	2426
Agricultural Area (% of Total)	0.029	0.020	0.147	0.136	2303	1023	1280
Revenues (Mean Prev. 4 Years)	0.170	0.288	0.553	0.145	2418	1065	1353
Expenditures (Mean Prev. 4 Years)	0.162	0.285	0.569	0.145	2415	1064	1351

Note: The dependent variable is indicated in each row. All dependent variables are measured before the election (predetermined). In each row except second and fourth, the sample consists of all elections, as in the first column of Table 1. In the second and fourth row, the sample is constrained to the window around the 7,000 population/salary threshold where the predetermined variables are balanced. For the definition of the balanced window, see the discussion in Section A6 and Figure A4 in this Online Appendix.

Table A5: The Effect of Population/Salary Threshold on Predetermined Variables

	Estimate	St. Error	p-value	Band-width	N	N Below Threshold	N Above Threshold
Turnout	0.001	0.012	0.909	0.206	886	604	282
Effective Number of Parties	0.363	0.238	0.127	0.231	1018	706	312
Incumbent Vote Margin	-0.003	0.013	0.792	0.210	900	617	283
Agricultural Area (% of Total)	-0.024	0.031	0.439	0.204	893	611	282
Revenues (Mean Prev. 4 Years)	-0.299	0.445	0.501	0.191	812	545	267
Expenditures (Mean Prev. 4 Years)	-0.284	0.442	0.521	0.190	809	543	266
Co-Partisanship with N'tl Gov't	-0.014	0.074	0.846	0.207	895	613	282
Co-Partisan Vote Margin	-0.034	0.037	0.355	0.234	1042	728	314

Note: The dependent variable is indicated in each row. All dependent variables are measured before the election (predetermined). Each row represents a regression discontinuity estimate that compares an outcome for localities below the 7,000 population/salary threshold and localities above the threshold.

Table A6: Tests of the Manipulation of the Running Variable

	Vote Margin, All Elections	Vote Margin, Salary Window	Population Margin	Population Margin (Balanced)
Estimate	-0.075	0.072	0.095	-0.068
St. Error	0.086	0.209	0.138	0.162
p-value	0.384	0.731	0.492	0.673
Bandwidth	0.188	0.263	0.290	0.186
N	2818	375	1432	789
N Below Threshold	1073	128	1074	526
N Above Threshold	1745	247	358	263

Note: The estimates are from the test of the jump in the density of the running variable at the threshold due to McCrary (2008). A statistically significant estimate suggests a possibility that actors are able to strategically manipulate their position relative to the threshold. The first two columns show the results for the vote margin, on all elections (column 1) and elections in localities close to the 7,000 population/salary threshold (column 2). The last two columns show the results for the population margin around the 7,000 population/salary threshold, on all localities within the optimal bandwidth chosen by the procedure (column 3), and within the balanced window where predetermined variables are balanced (column 4). For the definition of the balanced population window, see Section A6.

Table A7: Propensity to Run in the Next Election across the Vote Margin Cutoff

	All Elections	Below Salary Threshold	Above Salary Threshold
Estimate	0.010	0.042	0.005
St. Error	0.029	0.083	0.073
p-value	0.723	0.610	0.947
Bandwidth	0.139	0.168	0.178
N	2337	185	93
N Below Threshold	1037	81	32
N Above Threshold	1300	104	61

Note: The dependent variable is an indicator of whether a party ran in the next election. The sample in the fist column includes all election triplets and all observations. The sample in the second (third) column is confined to localities within the balanced population window below (above) the threshold.

Table A8: Mayors' Wealth at Baseline Relative to Challengers

	Immovable Assets	Movable Assets	Financial Assets
Estimate	-0.760	-0.233	-0.026
St. Error	1.325	0.211	0.265
p-value	0.566	0.270	0.921
Bandwidth	0.190	0.174	0.274
N	1413	1325	1825
N Below Threshold	710	672	873
N Above Threshold	703	653	952

Note: The dependent variable is the stock of the indicated category of wealth, as reported in candidates' declarations of assets in 2008. Each column represents an RDD estimate that compares mayors' wealth in 2008 with wealth in 2008 of unsuccessful rerunning challengers.

Table A9: Mayors' Wealth at Baseline across the Population/Salary Threshold

	Immovable Assets	Movable Assets	Financial Assets
Estimate	2.263	1.525	0.408
St. Error	3.021	0.479	0.623
p-value	0.454	0.001	0.513
Bandwidth	0.218	0.118	0.145
N	113	55	69
N Below Threshold	77	29	41
N Above Threshold	36	26	28

Note: The dependent variable is the stock of the indicated category of wealth, as reported in mayors' declarations of assets in 2008. Each column represents an RDD estimate that compares wealth in 2008 of mayors below the 7,000 population/salary threshold and mayors above the threshold.

Table A10: Number of Public Procurement Contracts across the Population/Salary Threshold

	Estimate	St. Error	p-value	Band-width	N	N Below Threshold	N Above Threshold
Opaque Procedure	0.456	0.794	0.566	0.069	29	18	11
Price Per Quantity	-11.419	7.933	0.150	0.160	50	32	18
Single-Bidder Tender	-2.007	2.669	0.452	0.080	66	41	25

Note: Each row shows an RDD estimate that compares the number of contracts used to calculate the measures of procurement corruption risk, indicated in each row, for localities below the 7,000 population/salary threshold and localities above the threshold. For the construction of the indicators, see Section A3.2.

Table A11: Corruption Prosecution Measures across the Salary Threshold

	All Corruption Prosecutions	Charges by ANI	Number of Public Institutions Charged
Estimate	-0.523	-0.242	-0.278
St. Error	0.213	0.095	0.127
p-value	0.014	0.010	0.029
Bandwidth	0.158	0.143	0.285
N	176	152	406
N Below Threshold	118	99	309
N Above Threshold	58	53	97

Note: Each column shows an RDD estimate that compares an outcome, indicated in the column header, in localities below the 7,000 population/salary threshold and localities above the threshold. The outcome variables are described in the text above.