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# Complete Loss of Competition:

# Uncontested Elections and Political Rents

April 20, 2026

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keywords: Uncontested elections, Politicians' behavior, Political rent, No competition

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# Complete Loss of Competition: Uncontested Elections and Political Rents

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**Abstract**

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**Keywords:** Accountability, Uncontested elections, Politicians' learning, Political rent

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# 1 Introduction

In a democracy, political leaders are selected in competitive elections with citizens' participation (Schumpeter, 2013; Dahl, 1998; Geddes, Wright, and Frantz, 2014). Electoral competition is the engine of political accountability, solving a fundamental principal-agent problem in which citizens delegate authority to politicians who face persistent temptations to use their positions for personal benefits (Barro, 1973; Ferejohn, 1986; Besley, 2006; Fearon, 2011; Ashworth, 2012; Sieg and Yoon, 2022). By contrast, authoritarian elections in non-democratic regimes serve as a tool that dictators can use to co-opt elites, party members, and broader constituencies for their own interests (Gandhi and Przeworski, 2006; Wright, 2008; Gandhi and Lust-Okar, 2009; Boix and Svolik, 2013). To extract these political rents, dictators employ various means such as electoral fraud and violence to secure overwhelming election victories (Schedler, 2002; Magaloni, 2006; Simpser, 2013; Norris, 2014). These effectively eliminate electoral competition and stand in contrast to democratic principles, where competitive elections structure representation and accountability (Dahl, 1998; Beaulieu, 2014).

This contrast raises an important puzzle for democratic politics. Even under democratic institutions, can the absence of electoral competition foster excessive political rent-seeking? Despite the fundamental role of electoral competition for democratic accountability, many democracies, including countries like the United States, parts of Europe, and Japan, routinely feature uncontested elections, in which a single candidate is elected without a vote (Hidayat, 2024).[1] Uncontested elections represent the complete absence of electoral competition at the moment of selection and raise fundamental questions about whether political accountability can be sustained even in a democracy. Political accountability is widely understood as a mechanism that can restrain rent extraction by politicians, but those typically presume that elections are contested and that voters can choose between at least two

[1] Uncontested elections are a widespread phenomenon. In the United States, 53 percent of nearly 8,000 mayoral contests across six states from 2000 to 2016 were uncontested (Marschall, Lappie, and Williams, 2017; Wrighton and Squire, 1997). In Bavaria, more than 45 percent of 25,180 mayoral elections since 1945 featured a single candidate (Freier, 2015). In Italy, 19.2 percent of mayoral contests were uncontested in 2019 (Kouba and Lysek, 2023). In Japan, 47.2 percent of municipal mayoral elections between 2011 and 2014 were uncontested (Sumi, 2017), and about 30 to 40 percent of mayoral elections have been uncontested in recent decades.

viable candidates. We know little about how a lack of electoral competition shapes political accountability in democratic contexts.

To understand how uncontested elections affect political accountability, we develop a dynamic principal-agent model that endogenizes the occurrence of elections themselves through challenger entry decisions. Standard models of electoral accountability assume that politicians know the competitive environment they face and focus on how voters learn about politician quality (Besley, 2006; Ashworth, 2012). We depart from this approach by allowing politicians to be uncertain about challenger entry costs and to update their beliefs based on electoral outcomes. The core insight is that whether an election is contested or uncontested provides information to politicians about future competitive threats. If an election goes uncontested, politicians infer that potential challengers likely face high entry barriers and update their beliefs accordingly. This learning mechanism reveals how uncontested elections affect political accountability through sanctioning channels. Uncontested elections not only eliminate immediate electoral discipline by depriving voters of the ability to punish incumbents at the polls, but also weaken the disciplinary effect of potential future elections. The revised belief reduces the perceived threat of future competition, relaxing the constraint that normally moderates rent extraction between elections.

The model yields two main predictions about rent extraction dynamics. First, rent extraction is higher after an uncontested election than after a contested one. This increase arises because experiencing an uncontested election leads the incumbent to update her belief that potential challengers face high entry costs, which weakens the perceived threat of future competition. Second, the rent extraction response diminishes with repeated uncontested victories. Although politicians who win consecutive uncontested elections continue to update their beliefs about the competitive environment, the informational value of each observation diminishes over time as beliefs converge toward certainty. Therefore, the first uncontested election produces the largest increase in rent extraction, with smaller increments following subsequent uncontested wins.

To test these predictions empirically, we examine how uncontested mayoral elections in Japan influence the subsequent mayor's salary. Mayors' salaries provide one of the most direct, observable, and transparent measures of political rents. Although political rents may also include non-monetary benefits, these often take the form of administrative slack or inefficiency and are difficult to measure with precision (Svaleryd and Vlachos, 2009). By contrast, according to standard definitions in the

literature, an interpretation of political rents is directly related to monetary transfers such as public financing of political parties and excessively high wages for top politicians (Persson and Tabellini, 2002; Svaleryd and Vlachos, 2009; Benito, Bastida, Ríos, and Vicente, 2014).[2] Furthermore, mayoral pay is set by municipal ordinance, and any increase requires approval by the municipal council, making changes publicly observable and attributable solely to politicians' decisions. In the relationship between uncontested elections and the mayor's salary, the predictions are straightforward. When no electoral challenge arises, elected candidates infer that future competition is unlikely and raise their salaries to levels sufficient to deter potential challengers. The highest salary increases follow the first uncontested victory.[3]

The Japanese cases of uncontested elections have several advantages for investigating the effects of uncontested elections. First, Japanese mayors are directly elected under uniform national electoral rules, minimizing institutional heterogeneity.[4] Second, Japanese mayoral elections have no term limits, allowing us to distinguish the effects of uncontested elections from the incentives created by binding limits that are central to leading accounts of political rent seeking (Besley and Case, 1995; Alt, Bueno de Mesquita, and Rose, 2011; Fouirnaies and Hall, 2022). Third, most mayoral candidates are formally nonpartisan, which reduces confounding from party strategy. Finally, the incidence of uncontested races is high and stable, about 40 percent in recent decades, which provides rich variation within municipalities and over time for studying dynamic responses to uncontested elections.

Using this setting of uncontested elections, we construct a stacked event-time panel of municipalities centered on each mayoral election. We stack balanced windows spanning from three years before to three years after the election.[5] In this stacked panel, we estimate difference-in-differences and an event-study specification with municipality-by-election fixed effects and event-time-by-election fixed

[2] In Section 1, we once again clarify the position of mayoral salaries within the broader context of political rents.

[3] For details regarding the outcomes of interest, please refer to Section 4.2.

[4] Countries such as the United States, the United Kingdom, and Australia adopt regionally varied electoral systems in which both direct elections and parliamentary selections coexist. Additionally, in countries like Spain and France, mayors are elected within municipal councils.

[5] Since Japanese elections are held on a four-year cycle, no elections are held for the three years preceding and following an election.

effects, which absorb time-invariant factors within each election window and common shocks at each relative year across all windows, respectively. In addition, to address concerns about time-varying unobservables correlated with whether an election is uncontested, we also implement a triple differences that introduces additional variation in whether a municipality has ever experienced an uncontested election.

We find that a mayor who wins unopposed raises their own salary by about 3.3 percent, with flat pre-trends and a sharp, persistent step-up beginning in the election year. The results are robust to alternative specifications, placebo outcomes, and tests addressing potential confounding channels. Furthermore, we conduct a subsample analysis and show that the effects of salary increases diminish as the number of consecutive uncontested wins grows. These findings are consistent with our theoretical prediction and suggest that mayors perceive residual slack for further increases beyond the second term, yet they are approaching the feasible upper bound. We also find that deputy-mayor salaries and council remuneration increase by approximately 1.2 percent and 1.1 percent, respectively. These results are consistent both with the institutional requirement that salary ordinances pass the council and with the mayor's appointment power over deputy mayors, and they indicate that mayors who returned unopposed prioritize pecuniary gains and secure them by compensating key stakeholders.

This study contributes to several strands of the literature. First, it relates to the broad research on political accountability. A large literature shows that political accountability driven by electoral competition raises the expected cost of rent extraction, which reduces excessive political rents (Barro, 1973; Ferejohn, 1986; Besley and Case, 2003; Di Tella and Fisman, 2004; Besley, Persson, and Sturm, 2010; Folke, Persson, and Rickne, 2017; Curto-Grau, Solé-Ollé, and Sorribas-Navarro, 2018). This discipline mechanism may depend on the information available to voters (Ashworth, 2005; Snyder Jr and Strömberg, 2010; Chiang and Knight, 2011; Ashworth, De Mesquita, and Friedenberg, 2017; Yazaki, 2017; Ashworth, Bueno de Mesquita, and Friedenberg, 2018) and informal political norms regarding accountability (Bidner and Francois, 2013). Those works emphasized how voters learn about politicians' quality through their entry and performance (Gordon, Huber, and Landa, 2007; Alexander, 2021; Morrier, 2024). We instead focus on how politicians themselves learn about the competitiveness of their electoral environment from election outcomes rather than the voter-side perspective. By incorporating a dynamic learning framework into models of political rent seeking and studying how politicians update their beliefs about future electoral threats, our analysis offers new

insights into the literature on political accountability.

Second, this study is also closely related to decades of work on incumbency advantages by highlighting an informational mechanism generated by incumbents' learning through the election. Incumbent politicians often enjoy an electoral advantage over potential candidates that stems from access to office resources and office perks, name recognition, and benefits from partisan support (Redmond and Regan, 2015; Fowler and Hall, 2014; Carson, Engstrom, and Roberts, 2007; Matland and Studlar, 2004; Ansolabehere, Snyder, and Stewart, 2000; Gelman and King, 1990). In practice, a large empirical literature shows that incumbents and incumbent parties perform substantially better in subsequent electoral contests across national, subnational, and local settings (Fiva and Smith, 2018; Fowler and Hall, 2014; Trounstine, 2011; Uppal, 2010; Hirano and Snyder, 2009; Lee, 2008; Butler, 2009). Our framework in an uncontested election also offers an informational advantage to the incumbent. When no challenger enters, incumbents can infer that potential challengers face high barriers to entry and revise downward the perceived threat of future competition. These informational advantages may enable incumbents to secure higher compensation, suggesting that incumbency advantages can be reinforced even in uncontested elections.

Third, this study contributes to research on political rent-seeking. Much rent extraction operates within the law, through choices over compensation and other legal means (Kaufmann and Vicente, 2011). Evaluating politician behavior in these legal domains is therefore essential, and recent work has provided evidence along these lines (Adserà, Boix, and Payne, 2003; Besley and Case, 2003; Becker, Peichl, and Rincke, 2009; Ferraz and Finan, 2011a; Kaufmann and Vicente, 2011; Solé-Ollé and Viladecans-Marsal, 2012; Fisman, Schulz, and Vig, 2014; Gavoille and Verschelde, 2017; Curto-Grau et al., 2018; Avis, Ferraz, and Finan, 2018). However, much of this literature examines rent extraction by focusing on reported assets, outside earnings, individual effort, lobbying activity, public sector wages, fiscal transfers, and corruption indices. Many of these indicators capture slack or inefficiency rather than rents themselves (Svaleryd and Vlachos, 2009). Because political rents are often interpreted as a form of monetary transfers to officeholders, mayors' salaries provide a direct and transparent measure of political rents, which aligns more closely with the precise nature (Persson and Tabellini, 2002; Svaleryd and Vlachos, 2009; Benito et al., 2014). We examine the political rents using mayors' salaries, contributing to the growing literature on rent seeking within legal institutional contexts.

Finally, a large body of research treats politicians' salaries as a key determinant of political entry and performance, showing that higher pay can affect the pool of candidates and reshape their incentives (Messner and Polborn, 2004; Besley, 2004). Leveraging institutional and legal variation in compensation, prior studies show the effects of political competition on officeholder quality, officeholder performance, and the composition of those who hold office (Maddox, 2004; Ferraz and Finan, 2011b; Gagliarducci and Nannicini, 2013; Bowen and Mo, 2013; Hoffman and Lyons, 2014; Carnes and Hansen, 2016). In contrast, we study how politicians influence compensation, focusing on salary manipulation following uncontested mayoral elections. Our findings show that politicians place value on the level of pay and can translate electoral circumstances into direct changes in compensation. As an outcome of political choice, we highlight a channel through which incumbents' strategic behavior can directly shape salary outcomes, complementing existing work that shows the consequences of exogenous variation in pay.

# 2 Institutional Background

## 2.1 Local government

Japan has a three-tier system comprising the national government, 47 prefectures, and municipalities. Prefectures and municipalities constitute the two layers of local self-government. As of 2018, there were 1718 municipalities, consisting of 792 cities, 743 towns, and 183 villages. Municipalities are responsible for public services that include local infrastructure, primary and lower-secondary education, welfare and public health, disaster preparedness, and community services. Local governments finance their activities through a mix of own-source revenues, including local taxes, and intergovernmental fiscal transfers.

## 2.2 Electoral institutions

Municipal mayors are directly elected in single-winner elections by popular vote. Terms are four years, and there are no term limits. Because election calendars are set by the municipality, mayoral

elections are held somewhere in Japan every year.[6] Candidates must be Japanese citizens aged 25 or older, and they need not reside in the municipality. Nearly all candidates run as independents rather than as nominees of official parties. Deputy mayors are appointed by the mayor and must be approved by the municipal assembly.

The municipal council (assembly) is elected separately from the mayor. Councilor elections are held every four years, and the number of seats varies by municipality. Although elections may sometimes be held on the same date, mayoral and council elections are legally independent.

## 2.3 Mayor's salary

The salary (monthly pay and bonuses/allowances) of the mayor, deputy mayor, and municipal councilors is determined by a municipal salary ordinance. Any change to mayoral pay requires passage of an ordinance by the municipal council. Therefore, while mayors possess the right to submit ordinances and initiate budgets, they cannot unilaterally alter compensation levels. Deputy mayors' and councilors' compensation is likewise set in the same salary ordinance.

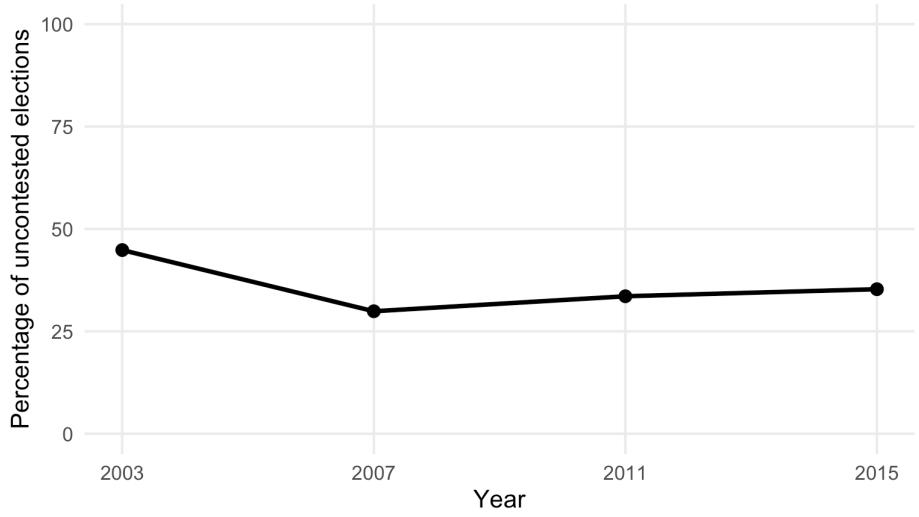
## 2.4 Uncontested elections

An uncontested election refers to a situation where the number of candidates is equal to or fewer than the number of seats available in an electoral district, resulting in an election without a vote. In the case of Japanese mayoral elections, there is only one seat available, so an uncontested election refers to an election with only one candidate. Figure 1 plots the share of uncontested elections. The rates remained at around 30-40 percent between 2003 and 2015. [7]

[6] Roughly one-third of municipalities align their elections with the nationwide Unified Local Elections held every four years in April.

[7] The election cycles in 2003, 2007, 2011, and 2015 are "unified local elections," with roughly 30 percent of municipalities participating in this cycle. Consequently, the largest number of elections is typically held in these years.

Figure 1: Trends in the percentage of uncontested elections




Note: The figure plots the share of uncontested elections among all local elections in 2003, 2007, 2011, and 2015. Japan has a four-year election cycle called the Unified Local Elections, and roughly 30 percent of municipalities align their election timing with this cycle. Therefore, we focus on these cycle years, which offer relatively large samples.

Uncontested elections may arise from various factors, including entry costs, challenger quality, geographic characteristics of municipalities, electoral district size, and the dominance of particular political parties (Kouba and Lysek, 2023; Kostroski, 1973). The Japanese context also appears consistent with these mechanisms. Sumi (2017) demonstrates that candidates with college degrees and those recruited from municipal executive positions are more likely to run unopposed. Tsukiyama (2019) points to regional characteristics, including population size and industrial composition, as predictors of uncontested elections. Iwagami (2020) suggests that a smaller number of electoral districts and greater stability in district boundaries increase the likelihood of uncontested races. While these factors may confound estimates of the effects of uncontested elections, our analysis provides robust evidence in several ways. For details, please refer to Sections 5 and 6.

# 3 Theoretical Framework

In this section, we develop a dynamic electoral competition model that extends standard principal-agent frameworks of Barro (1973), Ferejohn (1986), and Persson and Tabellini (2002) by endogenizing challenger entry decisions. Traditional models assume elections are contested and discipline politicians through selection and sanctioning. In contrast, our model incorporates costly entry decisions to capture uncontested elections, situations where no challenger emerges. The absence of a challenger weakens both accountability mechanisms. A distinctive feature of our model is the focus on politicians' learning. Whereas much of the existing literature examines how voters learn about politicians' quality, we analyze how politicians themselves learn about the competitiveness of their electoral environment from election outcomes. This learning, combined with endogenous challenger entry and strategic rent extraction, generates predictions about the level and dynamics of rent extraction following uncontested elections. Throughout this section, we present the key components of the model and their intuitions. Formal derivations and proofs are provided in Appendix B.

The key insight is that uncontested elections serve as informative signals about the competitive environment. When incumbents face no challenger, they infer through belief updating that entry costs are likely high and revise downward the probability of future competition. This learning relaxes the disciplinary constraint of potential electoral punishment and enables increased rent extraction. The model further predicts that the rent response diminishes with repeated uncontested victories. The first uncontested election provides the most information about the competitive environment and triggers the largest increase in rent extraction. Subsequent uncontested victories generate progressively smaller adjustments as beliefs converge toward certainty about high entry barriers. These predictions about both the level and the dynamic pattern of rent extraction provide the basis for our empirical tests.

## 3.1 Model layout

We study a single municipality with three actors: a unit mass of voters, a potential challenger, and an incumbent mayor. Time is discrete, $t = 1, 2, 3, \ldots$. In each period, the incumbent chooses a rent level $r_t$ representing the mayor's salary, which constitutes the per-period payoff when in office, with future payoffs discounted by $\beta \in (0, 1)$.

The incumbent's objective is to maximize the sum of current rents and discounted continuation

value. This creates a fundamental trade-off whereby higher rent extraction increases immediate payoffs but may attract challengers and reduce reelection probability. Before each election, a potential challenger decides whether to enter based on privately observed entry costs. The true distribution of entry costs is unknown to the incumbent, who maintains a belief $\mu_t$ about it and updates this belief based on whether elections are contested.

We focus on stationary equilibria in which the incumbent's strategy depends only on the current state, defined by whether the most recent election was contested or uncontested.

## 3.2 Voter behavior

Following the probabilistic voting model of Persson and Tabellini (2002), voters evaluate the incumbent based on the rent level $r_t$ and an idiosyncratic ideological preference term $\epsilon_{i,t}$. Voter $i$ compares the incumbent's utility $U^{\text{inc}}_{i,t+1} = -r_t + \epsilon_{i,t}$ with the challenger's expected utility $U^{\text{chal}}_{i,t+1} = -\bar{r}_e$, where $\bar{r}_e$ denotes the expected rent that a challenger would extract if elected and $\epsilon_{i,t}$ is uniformly distributed on $[-\frac{1}{2}, \frac{1}{2}]$. In the interior case, the incumbent's winning probability in a contested election becomes $\phi_{t+1}(r_t) = \frac{1}{2} + \bar{r}_e - r_t$, which is strictly decreasing in $r_t$, confirming that voters punish rent extraction.[8]

## 3.3 Challenger entry

Before the election at $t + 1$, potential challengers observe the incumbent's past rent $r_t$ and decide whether to enter. Each challenger privately knows her entry cost $K$, which is uniformly distributed on $[0, \bar{K}]$. The true upper bound $\bar{K} \in \{\bar{K}_L, \bar{K}_H\}$ with $\bar{K}_L < \bar{K}_H$ is unknown to the incumbent. Entry occurs whenever the expected benefit $[1 - \phi_{t+1}(r_t)]V^P_{t+1}$ exceeds the privately observed cost $K$, where $V^P_{t+1}$ denotes the continuation value of holding office.[9] Given $\bar{K} = \bar{K}_j$ for $j \in \{L, H\}$, the objective probability of entry is $p_{t+1,j}(r_t) = (\frac{1}{2} - \bar{r}_e + r_t)V^P_{t+1}/\bar{K}_j$, which is strictly increasing in $r_t$ and larger under the low cost regime since $p_{t+1,L}(r_t) > p_{t+1,H}(r_t)$. This differential response implies

[8] When $r_t - \bar{r}_e$ falls outside the range $[-\frac{1}{2}, \frac{1}{2}]$, the winning probability reaches its boundaries: $\phi_{t+1}(r_t) = 1$ if all voters prefer the incumbent, and $\phi_{t+1}(r_t) = 0$ if no voters prefer the incumbent.

[9] We assume that the value of holding office is the same for both the incumbent and the challenger. In the stationary equilibrium, this value depends on whether the previous election was contested or uncontested.

that an uncontested election is more likely under the high-cost regime, providing the incumbent with information about the competitive environment.

## 3.4 Politicians' Belief updating

The incumbent does not observe the true cost distribution parameter $\bar{K} \in \{\bar{K}_L, \bar{K}_H\}$ but maintains a belief $\mu_t = \Pr(\bar{K} = \bar{K}_L)$ about the entry cost regime.

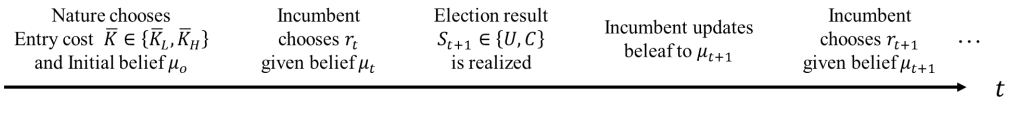
After an uncontested election at $t+1$, the incumbent updates the belief to $\mu_{U,t+1} < \mu_t$. Conversely, after a contested election, the belief increases to $\mu_{C,t+1} > \mu_t$, signaling that entry costs are likely low. The specific updating formulas follow standard Bayesian rules and are provided in Appendix B. These belief updates directly affect optimal rent extraction. As the incumbent becomes more confident that entry costs are high following an uncontested election, the perceived threat of future competition diminishes, creating room for higher rent extraction.

## 3.5 Timing of the game

Figure 2 illustrates the timing of moves. At the start of the game, nature determines the entry cost regime $\bar{K} \in \{\bar{K}_L, \bar{K}_H\}$, which remains fixed throughout, and the incumbent begins with an initial belief $\mu_0$. In each period, the incumbent chooses rent $r_t$ given belief $\mu_t$. The election result $S_{t+1} \in \{U, C\}$ is then realized, where $U$ denotes an uncontested election and $C$ denotes a contested election. After observing the outcome, the incumbent updates the belief to $\mu_{t+1}$ and chooses $r_{t+1}$ in the next period. This process repeats over time.

The key feature of this timing is that the election outcome serves as a signal about the competitive environment. An uncontested election leads the incumbent to revise downward the belief that entry costs are low, while a contested election leads to an upward revision. These belief dynamics drive the incumbent's rent extraction behavior over time.

Figure 2: Timing of the Game




Note: The figure illustrates the sequence and timing of moves in the game.

## 3.6 Incumbent's optimization problem

Given belief $\mu_{s,t}$ in state $s \in \{U, C\}$, the incumbent forms a subjective probability of challenger entry. Weighting the entry probabilities under each cost regime by the belief, this subjective probability is

$$p^{\text{subj}}_{s,t+1}(r_t) = \mu_{s,t} p_{t+1,L}(r_t) + (1 - \mu_{s,t}) p_{t+1,H}(r_t) = \left(\tfrac{1}{2} - \bar{r}_e + r_t\right) V^P_{C,t+1} \cdot \Theta_{s,t},$$

where $\Theta_{s,t} = \mu_{s,t}/\bar{K}_L + (1 - \mu_{s,t})/\bar{K}_H$ captures the incumbent's perception of competition intensity. This parameter serves as a sufficient statistic for the incumbent's belief about how responsive challenger entry is to rent extraction. Lower values of $\Theta$ indicate that the incumbent perceives weaker competitive threats, as she assigns higher probability to the high-cost regime where entry is less likely.

The incumbent chooses rent $r_t$ to maximize $V^P_{s,t} = \max_{r_t} \left\{ r_t + \beta \mathbb{E}[V^P_{s',t+1} | s, r_t] \right\}$, where the expected continuation value reflects the probability of remaining in office:

$$\mathbb{E}[V^P_{s',t+1} | s, r_t] = [1 - p^{\text{subj}}_{s,t+1}(r_t)] V^P_{U,t+1} + p^{\text{subj}}_{s,t+1}(r_t) \phi_{t+1}(r_t) V^P_{C,t+1}.$$

The first term captures the payoff when no challenger enters, in which case the incumbent wins unopposed and enters the next period in state $U$. The second term captures the payoff when a challenger enters, weighted by the probability of winning the contested election. This formulation reveals that higher rent extraction increases immediate payoffs but reduces future electoral prospects through two channels: it raises the probability of attracting challengers and lowers the probability of winning if challenged. The formal derivation is provided in Appendix B.

## 3.7 Theoretical predictions

The model generates two main predictions about rent extraction that guide our empirical analysis. The first prediction concerns the level of rent extraction following contested versus uncontested elections.

**Result 1** (Electoral competition and rent extraction)**.** *Politicians extract higher rents following uncontested elections than following contested elections.*

$$r^*_U > r^*_C$$

This result emerges from politicians' learning about the competitive environment. When an election is uncontested, the incumbent infers that challenger entry costs are likely high ($\mu_U < \mu_C$), which reduces the perceived competition intensity ($\Theta_U < \Theta_C$). Politicians facing lower perceived competition extract higher rents. Conversely, contested elections signal lower entry costs, leading to more restrained rent extraction.

The mechanism operates through the informational content of whether an election is contested. An uncontested victory serves as a credible signal that potential challengers face prohibitive entry barriers, relaxing the disciplinary constraint of future electoral competition. This allows incumbents to increase their compensation. The magnitude of this effect depends on the difference in perceived competition intensity between the two states, with larger belief differentials leading to more substantial rent extraction.[10]

Result 1 establishes that uncontested elections lead to higher rent extraction at any given point in time. A natural question is how rent extraction evolves when politicians experience multiple uncontested elections in sequence. The following result addresses this dynamic dimension by characterizing the path of rent extraction under repeated uncontested victories.

**Result 2** (Dynamic learning effects)**.** *Under sequential uncontested elections, the optimal rent path* $\{r^*_{U,n}\}$ *converges monotonically and the marginal increase in rent extraction diminishes over time, with*

$$\lim_{n\to\infty} |r^*_{U,n+1} - r^*_{U,n}| = 0$$

*Moreover, the rent increments decrease monotonically, satisfying* $r^*_{U,n+2} - r^*_{U,n+1} < r^*_{U,n+1} - r^*_{U,n}$ *for all n.*

This result follows from the convergence of beliefs under repeated uncontested elections. As politicians experience consecutive uncontested elections, their beliefs about high entry costs strengthen but at a decreasing rate. The sequential Bayesian updating leads to belief convergence, with $\mu_{U,n}$ approaching 0 as $n$ increases. This means the incumbent becomes increasingly certain that entry costs are high. The convergence in beliefs causes the rent extraction response to flatten over time, reflecting the decreasing informational value of additional uncontested elections. The first uncontested election provides substantial information about the competitive environment, while subsequent ones add pro-

[10] See Proposition 1 in Appendix B for the formal statement and proof.

gressively less new information. The convexity of the rent function with respect to beliefs ensures that each successive uncontested victory leads to a smaller rent increase than the previous one, creating a monotone convergence pattern.[11]

These theoretical predictions provide testable implications for our empirical analysis. In our setting, rent extraction corresponds to the mayor's salary, which is set by municipal ordinance. Result 1 predicts that mayors who win uncontested elections subsequently raise their salaries more than those who face competition. We test this prediction by comparing salary changes in municipalities with uncontested elections to those with contested elections, using a difference-in-differences framework. Result 2 generates a more distinctive prediction about the dynamic pattern of salary adjustments. The model implies that salary levels rise with each consecutive uncontested victory, but the increments shrink over time. We test this by estimating treatment effects separately for mayors experiencing their first, second, and third consecutive uncontested victories. This analysis provides evidence on whether the politicians' learning mechanism operates as the model predicts. We address potential alternative mechanisms through robustness checks and placebo tests in our empirical analysis.

# 4 Data

We assemble a stacked panel of municipalities built from seven-year windows centered on each municipal mayoral election. In Japan, mayoral elections occur on a fixed four-year cycle, so there is typically one election year within each seven-year window. Therefore, as illustrated in Figure A.1, each seven-year window comprises the election year, the three preceding years, and the three subsequent years.[12] Because election calendars are set by each municipality, election years vary across places. We stack all seven-year windows whose focal election falls between 2009 and 2013, creating a dataset that spans calendar years 2006–2016.[13] Summary statistics for the main variables are

[11] See Propositions 2 and 3 in Appendix B for the formal statements, which establish both the belief convergence and the resulting monotone rent dynamics.

[12] If a mayor resigns, a municipality may hold more than two elections within the seven-year window. We exclude such municipalities from the sample.

[13] We begin in FY2006 because mayoral salary data are first available in that year. Election outcomes are compiled from the Local Election Results Survey by the Japan Research Institute for Local

presented in Table A.1.

These data constructions indicate that the unit of observation is the municipality, election, and year relative to the election. The stacked panel contains each municipality multiple times, and the years relative to the election can span different calendar years. Our fixed effects specification absorbs any overlap across units and includes calendar-year indicators (see Section 5). Furthermore, to avoid confounding from institutional restructuring, we exclude municipalities that merged during the sample period.[14]

## 4.1 Treatment variables

We define the treatment group as municipalities with uncontested elections. Accordingly, we construct a treatment indicator that takes the value of 1 if the election is uncontested in a given seven-year window, and 0 otherwise. In the baseline analysis, we exclude from the sample any municipalities with two consecutive uncontested elections. Figure A.2 shows a map of cities, towns, and villages where uncontested elections occurred at least once between 2006 and 2016, illustrating that uncontested elections were distributed sporadically across Japan. Although cities, towns, and villages typically have larger populations in that order, the distribution of uncontested elections shows no clear pattern once the relative shares of each municipal type are taken into account.

## 4.2 Outcome variables

In our work examining municipal elections at the mayor level, the outcomes of interest are the municipal mayor's salary.[15] We focus on the average monthly salary as of April 1 of each year, which is set by municipal ordinance.[16]

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Government, which covers up to FY2016.

[14]The number of municipalities declined from 1,821 in 2006 to 1,718 in 2016 due to mergers. Because mergers often entail concurrent changes in administrative structure and fiscal arrangements, we drop municipalities that undergo a merger within our sample years.

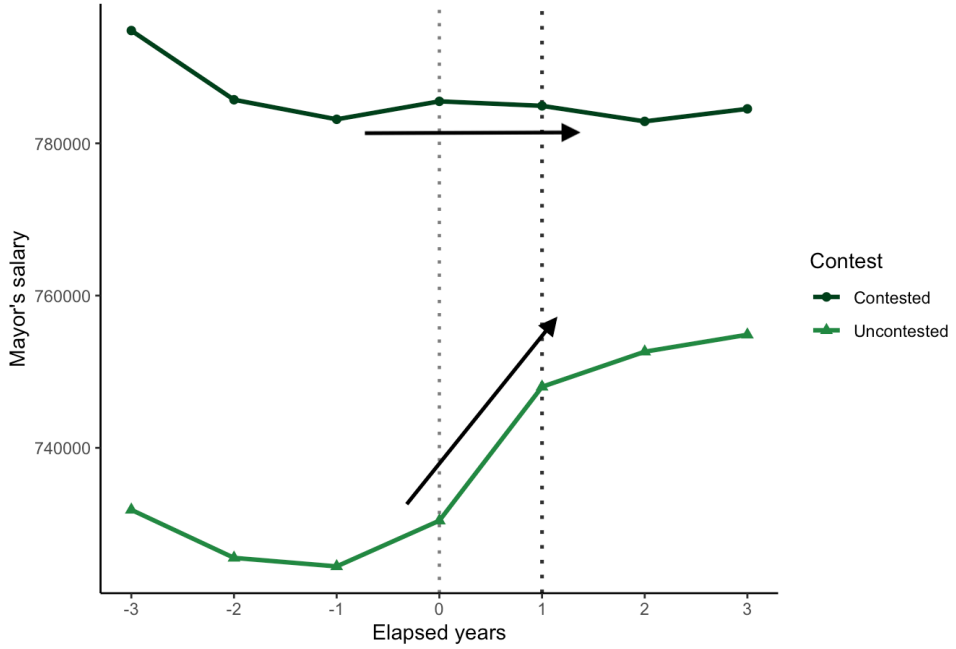
[15]Salary data are taken from the Ministry of Internal Affairs and Communications' Survey on salaries and staffing.

[16]Japan's fiscal year runs from April 1 to March 31

Figure 3 illustrates event–time means of the average monthly mayoral salary from the stacked panel. The light green line with triangles indicates municipalities whose focal election was uncontested (treatment group), while the dark green line with circles indicates municipalities whose election was contested (control group). The horizontal axis is event time, with $t = 0$ denoting the election fiscal year.

During the pre-treatment periods (i.e., $-3, -2, -1$), the two groups' mean outcomes evolve in parallel. In the post-treatment periods (i.e., $1, 2, 3$), average salaries rise sharply only in municipalities with uncontested elections, while salaries remain essentially flat in municipalities with contested elections. The absence of differential pre-treatment trends is consistent with the parallel trend assumption underlying our empirical strategy.

Figure 3: Mayoral salary trends in municipalities with contested and uncontested elections




Note: This figure plots average monthly mayoral salaries by event time, computed using the stacked panel. Light green triangles indicate municipalities with uncontested elections, and dark green circles indicate municipalities with contested elections.

Furthermore, we focus on the average monthly salary of the deputy mayor and expenditure on municipal council salaries. Because municipality-level data on councilors' monthly salaries are unavailable, we use the annual expenditure on municipal council salaries as a proxy for council com-

pensation. In particular, given that a mayoral salary raise requires council approval, mayors may try to increase their salary by simultaneously increasing council salaries.

We also use the annual expenditure on executive salaries. This expenditure encompasses the total amount spent by municipalities on the salaries of key officials, including mayors, deputy mayors, superintendents of education, and members of personnel and audit committees. Because those variables are available for a longer time span than the average mayoral salary, we use them to extend the observation window of our stacked panel (see Section 5 for details).

# 5 Empirical Strategy

Uncontested elections occur across Japan, but specific municipal factors may lead to uncontested elections, as noted in Section 2. If there are unobserved differences between municipalities with uncontested elections and those with contested elections, and if macro shocks coincide with election timing, a simple comparison between those two groups based on election timing could yield misleading inferences about the effects of uncontested elections. To address this concern, we estimate the following difference-in-differences specification.

$$Y_{i,e,t} = \beta(Uncontested_{i,e} \times I_t) + \mu_{i,e} + \rho_{e,t} + \varepsilon_{i,e,t} \tag{1}$$

We use normalized time $t$, which represents the year relative to the election within each seven-year panel (i.e., $t$ ranges from -3 to 3). The variable $Y_{i,e,t}$ is the outcome of interest for municipality $i$ in a seven-year window in election timing $e$ at normalized time $t$. All outcome variables are converted into their logarithmic form. $Uncontested_{i,e}$ is a binary variable equal to 1 if municipality $i$ experienced an uncontested election during the seven-year panel, and 0 otherwise. $I_t$ is an indicator variable equal to 1 for post-election years (i.e., when $t$ is equal to 0 or more) and 0 otherwise. The main parameter of interest is $\beta$.

The specification also incorporates a set of fixed effects that mitigates several identification concerns. $\mu_{i,e}$ represents municipality-by-election-window fixed effects, which control for time-invariant differences across municipalities within each window. $\rho_{e,t}$ denotes normalized-time-by-election-window fixed effects, which control for macro-level shocks that vary over time but are common across municipalities. In particular, although the treatment timing is aligned across municipalities,

treatment effects are estimated across different calendar years. Therefore, the estimated effects come from differential changes around the election between treated and control municipalities within the same election window. Moreover, this specification ensures robustness to potential confounding from national-level macroeconomic shocks because the average treatment effect is identified from comparisons made across multiple calendar election years rather than from a single common year. $\varepsilon_{i,e,t}$ is the error term. Furthermore, to examine dynamics and the parallel-trends assumption, we estimate the following event-study specification.

$$Y_{i,e,t} = \sum_{\tau=-3,\tau\neq-1}^{3} \beta_\tau (Uncontested_{i,e} \times I_t^\tau) + \mu_{i,e} + \rho_{e,t} + \varepsilon_{i,e,t} \tag{2}$$

$I_t^\tau$ are the lead and lag indicators that take a value of 1 if $t$ is equal to $\tau$.[17] $\beta_\tau$ are the coefficients of interest, representing dynamic treatment effects for the 3 periods before and the 3 periods after the election timing. Event study analysis offers two advantages. First, the DiD approach relies on the parallel trends assumption, which requires that the outcome variables for the treatment and control groups would have followed similar trends in the absence of treatment. By examining the coefficients on the lead indicators, we can check the validity of the parallel trend assumption. Second, the event study design enables us to explore how the effects of uncontested elections evolve over time following the election. For instance, if a salary increase ordinance is enacted and remains unchanged, we expect sustained or rising post-election coefficients.

While the two specifications control for unobservable time-invariant municipal characteristics and macro-level shocks, they do not account for time-varying confounders across municipalities. As a robustness check, we implement the following the triple differences design.

$$\begin{aligned} Y_{i,e,t} =& \beta_1 (Uncontested_i \times I_t) + \beta_2 (Uncontested_i \times D_{i,e} \times I_t) \\ &+ \mu_{i,e} + \rho_{e,t} + \varepsilon_{i,e,t} \end{aligned} \tag{3}$$

where *Uncontestedi* equals one if municipality $i$ experiences an uncontested mayoral election at any point in our sample, and $D_{i,e}$ equals one if election timing $e$ is the window in which municipality $i$ actually has an uncontested race and zero in its other windows. The coefficient $\beta_2$ is our object of interest, capturing the within-municipality treatment effect by contrasting a municipality's treated

[17] We exclude $\tau$ = -1 from the equation as the reference period.

window with its own untreated windows. By contrast, $\beta_1$ captures any post-election divergence common to municipalities that ever experience an uncontested race, which is a time-varying confounder on the selection of uncontested elections. Therefore, $\beta_2$ isolates time-varying confounders based on geographical, sociodemographic within each municipality.[18]

Mayoral salary data are available from 2006 onward, which limits within-municipality repetition in the stacked panel. To increase temporal coverage and ensure multiple elections per municipality, we construct an alternative outcome using annual expenditure on executive salaries, including the mayor, as a proxy for mayoral salary. These variables are available from FY2000, allowing us to extend our panel dataset to focal elections from 2003 to 2013. In this extension, each municipality contributes at least two mayoral elections within the sample. We examine the effects on this proxy outcome as a robustness check.

# 6 Results

## 6.1 Main Results

Columns (1) and (2) of Table 1 present the estimation results in Equation (1) using the average monthly mayoral salary and the annual expenditure on executive salaries as outcomes. The results indicate that an uncontested mayoral election leads to increases of approximately 3.3 percent and 3.0 percent in these outcomes, respectively, both statistically significant at the 1 percent level. At the sample mean, the 3.3 percent effect corresponds to an increase of about 25,000 yen (roughly $170). Column (3) reports estimates of Equation (3) for the annual expenditure on executive salaries and likewise indicates a post-election increase in uncontested municipalities. The magnitude closely matches that in Column (2), reinforcing that the baseline results are robust to time-varying confounders within each municipality.[19]

Figure 4 presents the point estimates of $\beta_\tau$ from Equation (2) for the average monthly mayoral

[18] For more details, see Olden and Møen, 2022, for example.

[19] Because the expenditure on executive salaries aggregates one year's compensation for multiple senior officials in addition to the mayor's salary, the coefficient is not directly comparable to the coefficient on mayoral salary.

Table 1: DiD estimate of the effect of uncontested elections on mayoral salaries

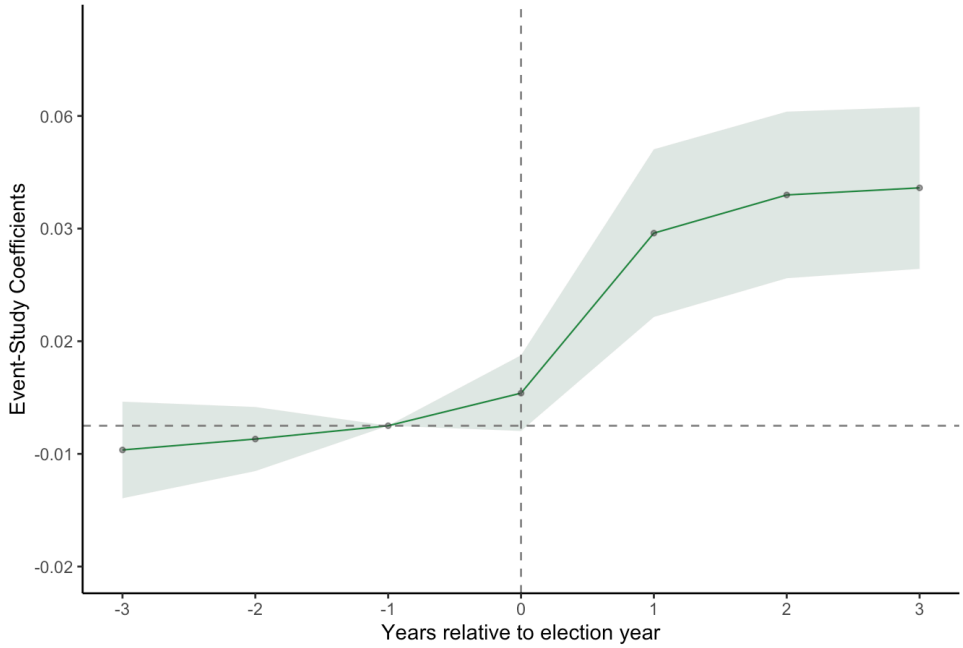
| | (1) Monthly salaries of mayors | (2) Expenditure on salaries | (3) Expenditure on salaries |
|---|---|---|---|
| Uncontested | 0.033*** | 0.030*** | |
| | (0.005) | (0.010) | |
| Uncontested Experience | | | 0.032** |
| | | | (0.014) |
| R-squared | 0.827 | 0.882 | 0.889 |
| Observations | 9359 | 9359 | 13447 |
| Municipality by Election FE | Yes | Yes | Yes |
| Year by Election FE | Yes | Yes | Yes |

Note: Columns (1) and (2) report the estimation results from Equation 1 on the average monthly salary of the mayor and the annual expenditure on executive salaries, respectively. Column (3) shows the estimation results from Equation 3 on the annual expenditure on executive salaries. All specifications include municipality-by-election and year-by-election fixed effects. Standard errors clustered at the municipality level are shown in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

salary, with 95% confidence intervals. The post-election coefficients are positive and statistically significant, whereas the pre-election coefficients are close to zero and statistically indistinguishable from zero. The findings support the parallel-trends assumption and indicates no pretreatment differences between treated and control municipalities. The results are also consistent with the visual evidence in Figure 3.[20] Taken together, the estimation results suggest that mayors elected without opposition subsequently raise their own salaries to maximize personal gain.

[20]The estimated effects are larger from the second post-election period. This pattern likely reflects the timing of the salary records. Data are measured on April 1 and capture information available only through March of that year. As a result, the treatment is reliably incorporated into the outcome variables in the following year.

Figure 4: Event study estimates of the effect of uncontested elections on mayoral salaries




Note: The figure presents the estimation results from the event study analysis based on Equation 2, along with 95% confidence intervals shaded in green. The horizontal axis represents years relative to the election year. Standard errors are clustered at the municipality level.

The results also may reflect salary adjustments by both newly elected mayors and reelected incumbents.[21] A remaining concern is that the effect might vary with incumbent status, since political dominance accumulated over multiple elections may be correlated with the likelihood of an uncontested race. To evaluate this possibility, we conduct an additional analysis incorporating an interaction term between the treatment variable and the number of terms the mayor has won. Table 2 presents the results with this interaction term, corresponding to Table 1. Across all specifications, the baseline coefficients remain stable, and the interaction terms are small and statistically insignificant. These results suggest that the estimated effects are driven by mayors' experiencing and learning from uncontested elections, regardless of their incumbent status.

[21] As shown in Section 4, the main analysis excludes municipalities with consecutive uncontested elections from the sample.

Table 2: DiD estimate with interaction of consecutive terms

| | (1) Monthly salaries of mayors | (2) Expenditure on salaries | (3) Expenditure on salaries |
|---|---|---|---|
| Uncontested | 0.039*** | 0.035** | |
| | (0.008) | (0.018) | |
| Uncontested × Consecutive terms | −0.003 | −0.003 | |
| | (0.002) | (0.005) | |
| Uncontested Experience | | | 0.035* |
| | | | (0.020) |
| Uncontested Experience × Consecutive terms | | | −0.001 |
| | | | (0.006) |
| R-squared | 0.828 | 0.881 | 0.889 |
| Observations | 9359 | 9359 | 13447 |
| Municipality by Election FE | Yes | Yes | Yes |
| Year by Election FE | Yes | Yes | Yes |

Note: Columns (1) and (2) report the estimation results from Equation 1 on the average monthly salary of the mayor and the annual expenditure on executive salaries, respectively. Column (3) shows the estimation results from Equation 3 on the annual expenditure on executive salaries. This table additionally includes interaction terms between the treatment indicator and the number of consecutive terms of the incumbent mayor. All specifications include municipality-by-election and year-by-election fixed effects. Standard errors clustered by municipality code are shown in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

## 6.2 Robustness checks and placebo test

This subsection evaluates whether the main findings are sensitive to alternative specifications, sample restrictions, and a placebo outcome. Through this series of additional analyses, we also examine the potential channels underlying our main results.

**Incumbent advantage** Although Table 2 shows no heterogeneity by term length, uncontested elections may still correlate with an incumbent's underlying electoral advantage. One measure of such advantage is the margin of victory in prior contested elections. If the key mechanism of the main results is learning from the experience of running unopposed, then the post-election salary response should not depend on the competitiveness of previous races. To test those possibilities indirectly, we examine heterogeneous effects by prior electoral competitiveness, measured by the vote-share margin in the election preceding event time $t = 0$. Figure A.4 reports event-study estimates from Equation (2) for samples split at the median of the prior vote-share margin. The upper panel shows estimates for incumbents with above-median prior margins, while the lower panel shows estimates for those with below-median prior margins. In both subsamples, the post-election coefficients are positive and statistically significant, while the pre-election coefficients remain near zero. The similarity across

panels provides little evidence that the treatment effect varies with prior electoral competitiveness. The findings support the interpretation that the uncontested election itself drives the estimated effects in our main results.

**Electoral-cycle dynamics.** A further concern is that incumbents might strategically restrain salaries immediately before elections to improve electoral prospects. If treated municipalities exhibit pre-election restraint, then using $t = -1$ as the reference period in Equation (2) could mechanically inflate the estimated post-election effect. To address this possibility, Figure A.5 reports event study estimates that use earlier pre-election periods as the omitted category, including the elections two and three terms prior. All the results are very similar to those in Figure 4. We find no evidence that differential pre-election salary adjustments drive the estimated post-election increase.

**Time-varying controls and municipality type.** Our baseline specifications include some fixed effects, which absorb differences across municipalities and common shocks over time. Even so, we cannot completely rule out the possibility that the timing of uncontested elections is correlated with time-varying municipal characteristics that also affect salaries. To control those potential concerns, we estimate Equation (1) with a vector of time-varying covariates capturing demographics, industrial structure, and fiscal capacity. These covariates include (i) population size, (ii) the shares of residents under 15 years old and over 65 years old, (iii) the employment shares in the primary and secondary industries, and (iv) a fiscal indicator that measures the gap between expenditure needs and revenue from taxes and other sources. [22] The top-left panel in Figure A.6 then presents event-study estimates from Equation (2), including this covariate set. The post-election response exhibits the same sharp, positive jump as in Figure 4, while the pre-treatment coefficients remain close to zero. Additionally, we conduct separate analyses by municipality size, distinguishing between "cities" and "towns and villages." [23] The top-right panel of Figure A.6 presents estimates from Equation (2) restricted to cities, while the bottom-left panel presents estimates restricted to towns and villages. Both subsample

[22] Figure A.3 reports covariate balance regressions of the treatment indicator on these controls. Although coefficients are generally small, the share of residents over 65 and the employment shares in the primary and secondary sectors are positively associated with treatment, whereas the share under 15 and the fiscal indicator are negatively associated.

[23] Section 4.1 presents Figure A.1, which displays the temporal distribution of uncontested elections by municipality type.

results are consistent with the full-sample analysis. Overall, conditioning on observed time-varying municipal characteristics and municipal size does not alter the substantive conclusions.

**Placebo outcome.** As a placebo test, we estimate Equation (1) using expenditure on public-employee salaries as the outcome variable. This expenditure refers to public sector wages that are not directly linked to the mayor's or the executive's salary. Since Japanese public employee salaries follow a seniority-based system, and estimates may be influenced by factors such as the correlation between uncontested elections and an aging population, we estimate Equation (3) to address those factors. Table A.2 shows no statistically significant effect of uncontested elections on public-employee salaries, and the coefficient is close to zero.

## 6.3 Testing the Learning Mechanism

The main results establish that uncontested elections lead to higher mayoral salaries. This subsection investigates whether the underlying mechanism is consistent with Bayesian learning about the competitive environment, as specified in our theoretical framework.

Result 2 generates a distinctive prediction that distinguishes learning from alternative explanations. Under Bayesian updating, each uncontested election provides information about the entry cost environment, but the informational value of each observation diminishes as beliefs converge toward certainty. The first uncontested victory should therefore produce the largest salary increase, with smaller increments following subsequent uncontested wins. This monotone convergence pattern is a signature of the learning mechanism.

To test this prediction, we estimate Equation (1) separately for subsamples defined by the incumbent's number of consecutive uncontested victories. We restrict the treatment group to mayors experiencing their first uncontested win, the same mayors experiencing their second consecutive uncontested win, and the same mayors experiencing their third consecutive uncontested win.

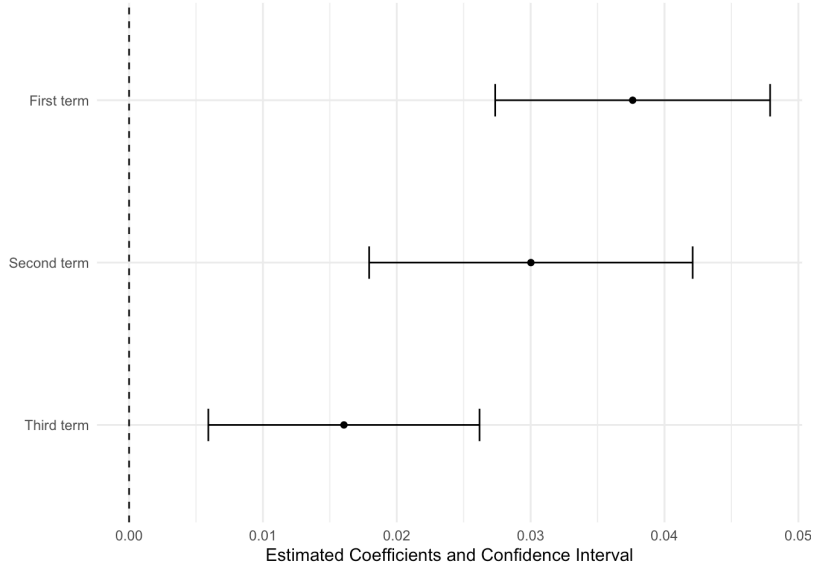
Figure 5 presents the point estimates with 95 percent confidence intervals. The results reveal a clear declining pattern. The first uncontested victory yields the largest salary increase, statistically significant at the 1 percent level. The effect falls for the second consecutive uncontested win and declines further for the third.

This monotonic decline in the magnitude of salary increases is consistent with the Bayesian learning mechanism. A first uncontested election provides substantial new information that entry costs are

high, prompting mayors to revise their beliefs and raise their compensation. Subsequent uncontested victories continue to shift beliefs in the same direction, but each additional observation adds less information as the posterior approaches the boundary. The salary response therefore diminishes over time as mayors converge toward their perceived maximum feasible salary level.

These findings provide evidence that the salary response to uncontested elections reflects a dynamic learning process rather than a one-time adjustment. Politicians update their beliefs about the competitive environment based on electoral outcomes, and this updating shapes their subsequent rent extraction behavior in a manner consistent with the theoretical predictions.

Figure 5: Heterogeneous effects on mayoral salaries by the number of consecutive uncontested elections




Note: The figure presents point estimates from Equation 1 with 95% confidence intervals. In the results, the treatment group is restricted to uncontested victories by the same mayor at the first, second, and third consecutive elections, shown from top to bottom.

## 6.4 Other executive compensation

We also examine two proximate pecuniary outcomes, the deputy mayor's salary and expenditure on municipal council salaries. In Japan, deputy mayors are appointed by the mayor, and any change to the mayor's salary requires a salary ordinance passed by the municipal council. These institutional

features create incentives for mayors to raise the compensation of these stakeholders to secure support for increases in their own pay.

Columns (1) and (2) of Table 3 report estimates of Equation (1) with the average monthly deputy mayor salary and the annual expenditure on councilor salaries. Those results show that following the elections, the monthly deputy mayor salary and council salary expenditure rise by approximately 1.2 percent and 1.1 percent in municipalities with uncontested races relative to those with contested races. These patterns suggest that unopposed mayors compensate key stakeholders to facilitate the passage of ordinances that raise their own salaries.

Table 3: DiD estimate of the effect of uncontested elections on stakeholders' salaries

| | (1) Monthly salaries of deputy mayors | (2) Expenditure on municipal council's salary |
|---|---|---|
| Uncontested | 0.012*** | 0.011*** |
| | (0.003) | (0.006) |
| R-squared | 0.921 | 0.991 |
| Observations | 9359 | 9359 |
| Municipality by Election FE | Yes | Yes |
| Year by Election FE | Yes | Yes |

Note: Columns (1) and (2) report the estimation results from Equation 1 on the deputy mayor's salary and expenditure on the municipal council's salary, respectively. All specifications include municipality-by-election and year-by-election fixed effects. Standard errors clustered at the municipality level are shown in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

This interpretation raises the question of whether the observed mayoral salary effects depend on the electoral environment of the municipal council. If relations with the assembly are important in determining mayoral salary responses, changes in council composition or in the competitiveness of council contests may affect post-election mayoral salary increases. Council elections held at the same time as the mayoral election are particularly relevant because they are the most direct source of contemporaneous changes in council membership and electoral competitiveness.

Table A.3 examines this possibility using two complementary specifications. Column (1) adds an interaction between the indicator for an uncontested mayoral election and an indicator for whether a municipal council election occurred in the same year to Equation (1). The interaction term is small and statistically indistinguishable from zero, indicating that the post-election salary increase does not depend on the assembly election schedule. Column (2) instead adds a separate treatment indicator for

an uncontested council election. In this specification, the coefficient on uncontested council elections is negative and small in magnitude, and it is only marginally statistically significant at the 10 percent level. Moreover, the coefficient of interest remains positive and consistent with the main results.

The findings that deputy-mayor and council compensation both increase are consistent with mayors compensating stakeholders to secure ordinance passage. At the same time, the results indicate that the magnitude of the post-election mayoral salary response does not systematically depend on contemporaneous council electoral conditions.

# 7 Conclusions

We examine how the complete absence of electoral competition shapes politicians' incentives to extract rents. Although electoral competition is central to democratic accountability, many democracies regularly feature uncontested elections in which a single candidate is elected without a vote. An uncontested election eliminates competition at the moment of selection. Political accountability is widely understood as a mechanism that can restrain rent extraction by politicians, and we know little about whether accountability can be sustained when the threat of challenger entry is absent. To address the gap between the prevalence of uncontested elections and the lack of theoretical and empirical predictions, this paper investigates the effects of the absence of challenger entry on post-election rent extraction.

We develop a dynamic principal–agent model in which the occurrence of elections is endogenous, driven by challengers' entry decisions. In this setting, whether an election is contested becomes an informative signal about the competitive environment faced by politicians. When an election goes uncontested, politicians infer that potential challengers likely face high entry barriers, leading them to assign a lower probability to future contests and to update their beliefs accordingly. This belief updating generates two main predictions about rent extraction dynamics. First, weaker expectations of future electoral threats relax intertemporal discipline and increase the level of rents that an optimizing politician chooses to extract. Second, the rent extraction response diminishes with repeated uncontested victories, because the room for increases diminishes as beliefs converge toward certainty. As a result, the first uncontested election produces the largest increase in rent extraction, with progressively smaller increases following subsequent uncontested wins.

We test these predictions in Japanese municipal mayoral elections, a setting with uniform institutions, direct executive elections, and a persistently large share of uncontested races. We focus on mayors' salaries as a political rent outcome, which is one of the most direct, observable, and transparent measures. Using a stacked event-time panel centered on each election and difference-in-differences estimators, we find that uncontested victories increase mayors' monthly salaries by approximately 3.3 percent. In event-study analysis, the effect emerges immediately after the election, with flat pre-trends, and the higher salary level persists throughout the term. These results are robust across a wide range of checks, including additional specifications designed to mitigate concerns about time-varying confounders and placebo tests using outcomes that should not respond to mayoral rent extraction. Those main findings align with our dynamic predictions. Furthermore, we find that the first uncontested win generates the largest raise, with progressively smaller increments after the second and third wins. Those results are consistent with a mechanism in which beliefs converge over time.

This pattern extends beyond mayors to pivotal stakeholders. Following an uncontested mayoral victory, deputy mayor salaries and spending on councilor salaries also increase. Because changes in mayoral compensation require an ordinance approved by the council, and because deputy mayors are appointed by the mayor, these results suggest that mayors raise stakeholder compensation in ways that help secure support for their own pay increases.

We provide novel evidence on how accountability is formed when elections are uncontested. We formalize this process as incumbent learning about challenger entry costs and present empirical patterns consistent with the model. Whereas much of the accountability literature emphasizes voter learning, we consider the nature of uncontested elections and highlight a politician-learning channel that has received less attention. By shifting the focus from voters' information to incumbents' beliefs about future competition, our study adds a new perspective to research on political accountability.

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Online Supporting Information (Online Appendix)

# Complete Loss of Competition: Uncontested Elections and Political Rents

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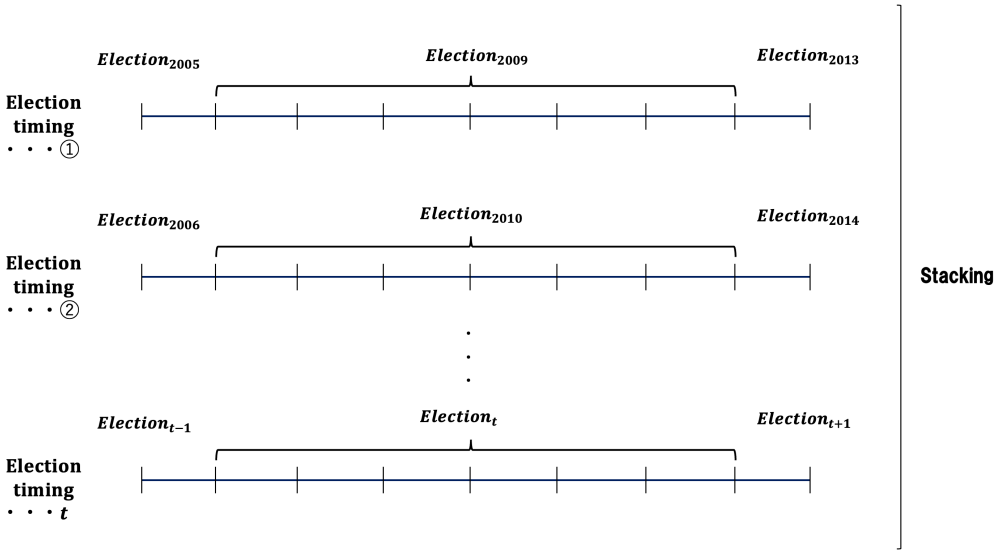
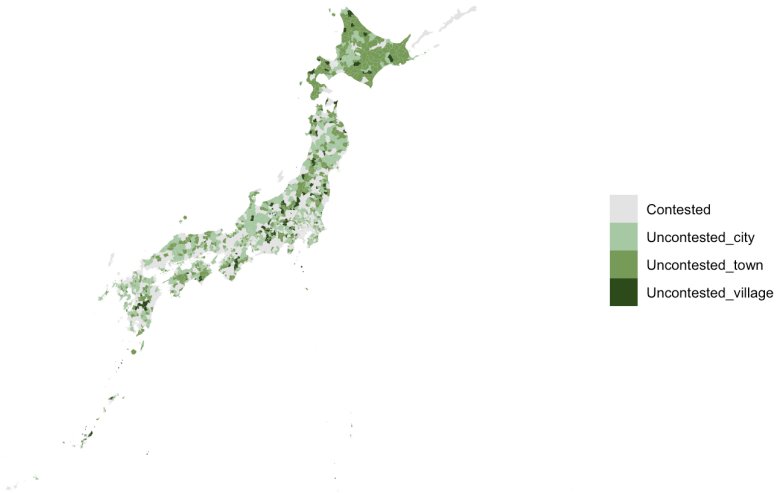
# A Supplementary Figures and Tables

Figure A.1: Data structure




Note: The figure shows the process of dataset creation.

Figure A.2: Geographic distribution of municipalities with uncontested elections



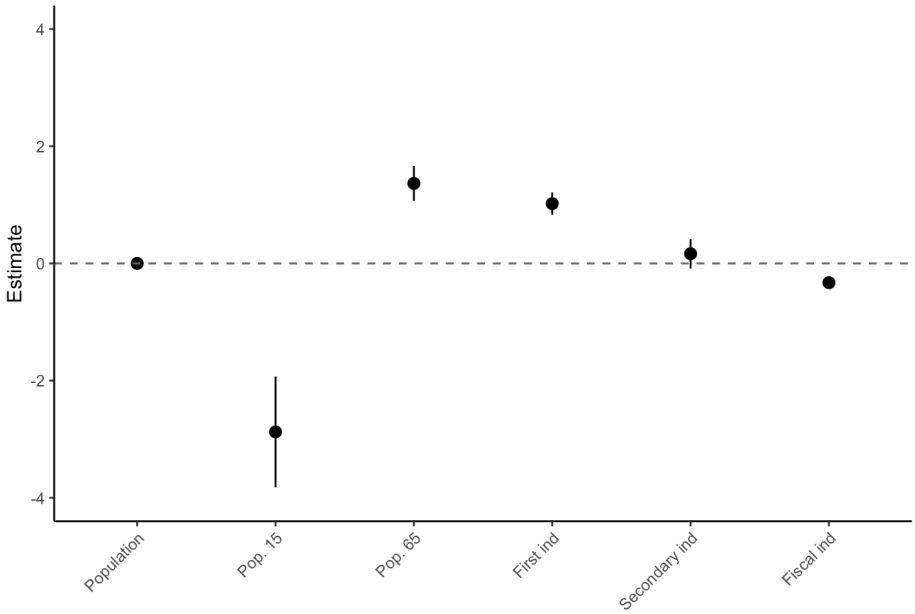

Note: This figure displays the geographic distribution of municipalities that experienced at least one uncontested mayoral election between 2006 and 2016. Darker shades indicate villages with uncontested elections, medium shades represent towns, and lighter shades represent cities.

Table A.1: Summary statistics

| Variables | Mean | SD |
|---|---|---|
| **Outcome variables** | | |
| Mayor's salary (per month) | 770054 | 140076 |
| Deputy mayor's salary (per month) | 643844 | 106436 |
| Expenditure on executive salaries (thousand JPY) | 39270 | 18121 |
| Expenditure on council salaries (thousand JPY) | 35094 | 15654 |
| **Covariates** | | |
| Population | 65590 | 170314 |
| Pop. 15 (%) | 0.13 | 0.022 |
| Pop. 65 (%) | 0.26 | 0.068 |
| Primary ind. (%) | 0.13 | 0.11 |
| Secondary ind. (%) | 0.28 | 0.083 |
| Financial indicator | 0.53 | 0.32 |

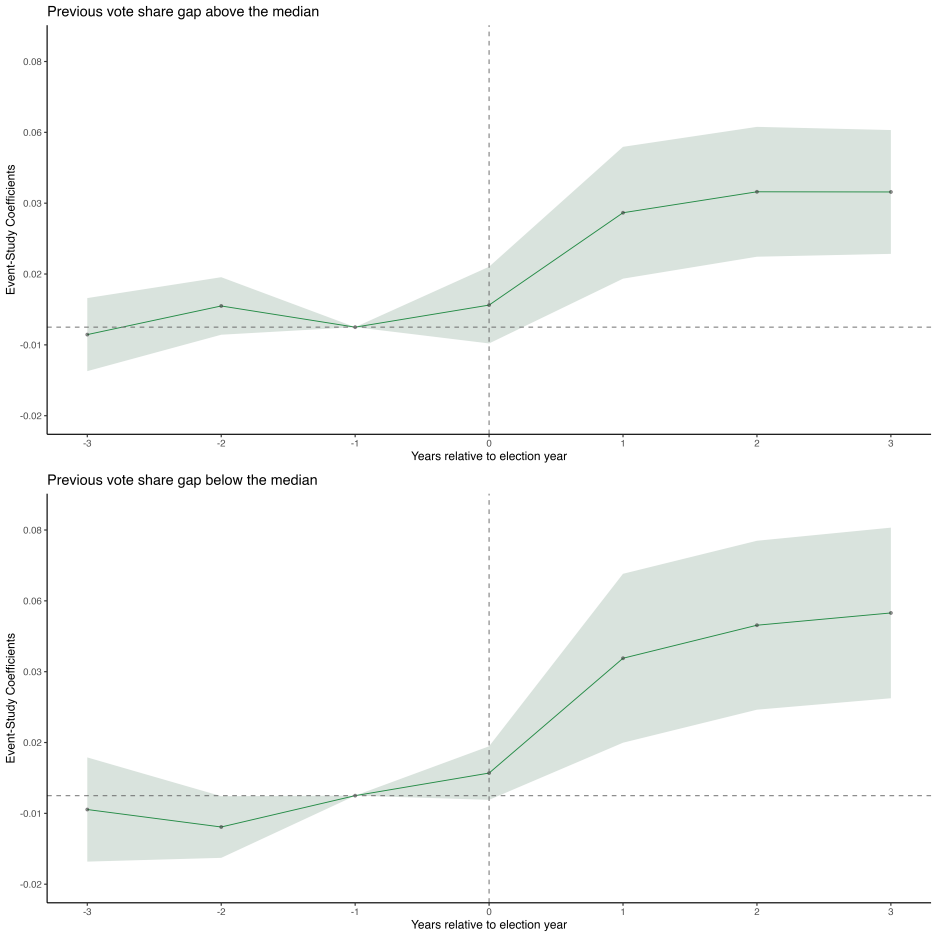
Note: The mayor's salary and the deputy mayor's salary are the average monthly salaries as of April 1. The expenditure unit is 1000 yen, which equals approximately 6.67 dollars at an exchange rate of 150 yen to 1 U.S. dollar. The first column shows the average of the outcome variables. The second column shows the standard deviation of the outcome variables.

Figure A.3: Covariate balance



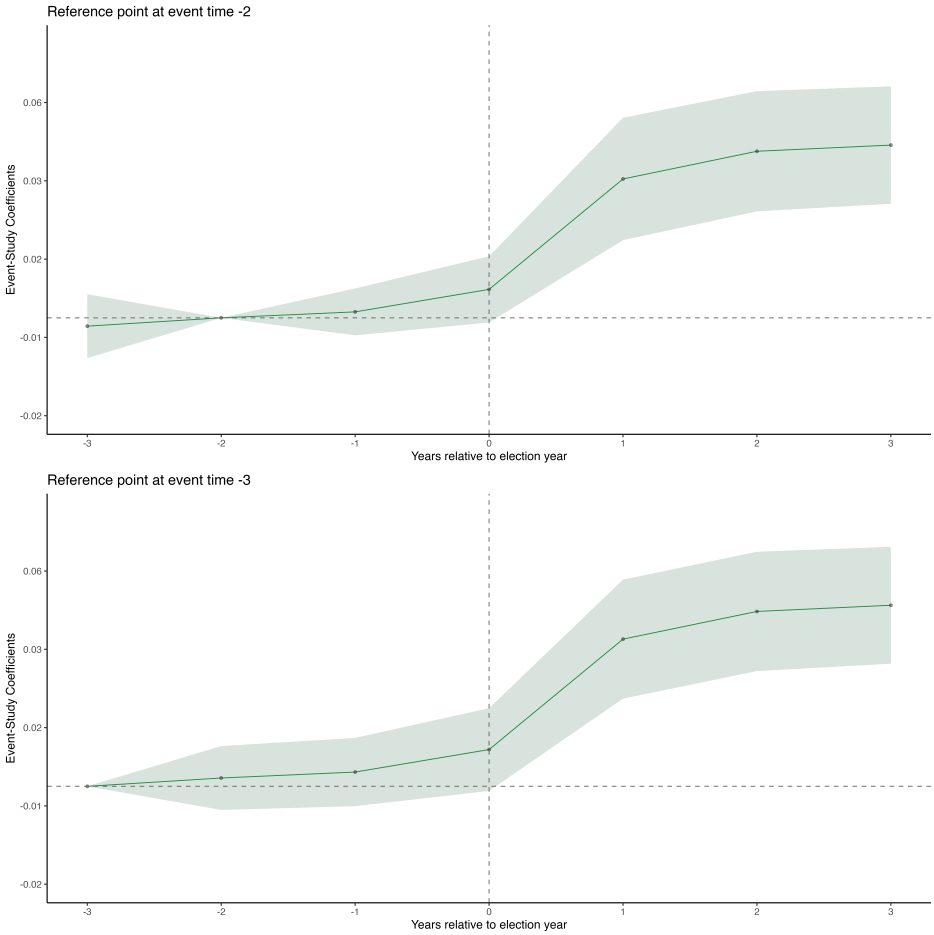

Note: This figure presents the results of covariate balance tests across election timing windows in 2011. The treatment indicator, which equals 1 for municipalities that experienced uncontested elections, is regressed on the full set of covariates.

Figure A.4: Event study estimates by prior vote-share gap



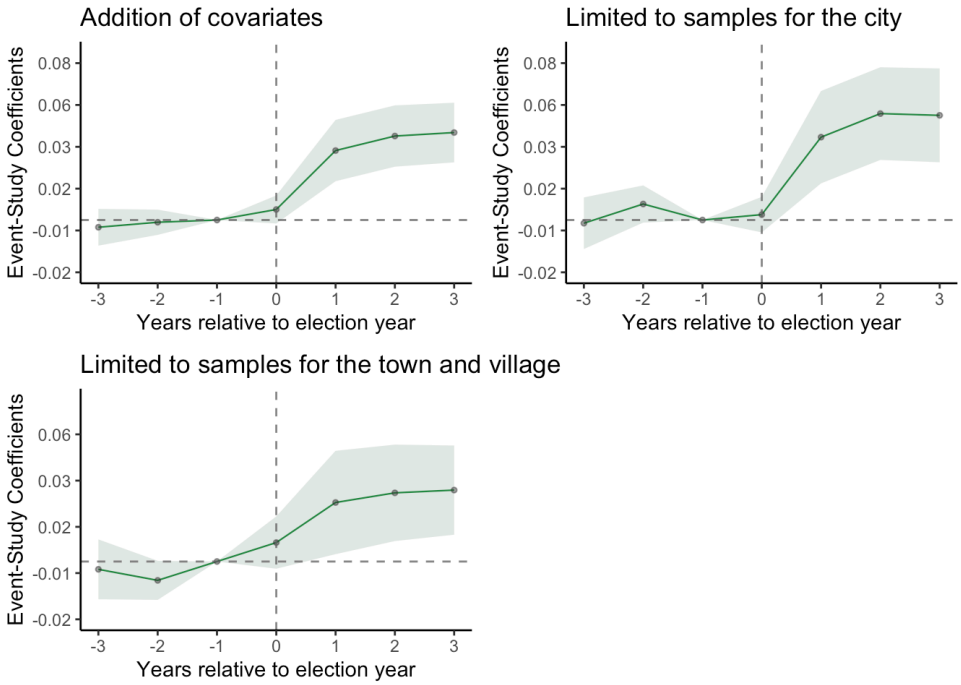

Note: The figure presents event-study estimates from Equation 2. The shaded area represents 95% confidence intervals. The top panel restricts the sample to municipalities with an above-median prior vote-share margin, and the bottom panel restricts the sample to those with a below-median prior vote-share margin. The horizontal axis represents years relative to the election year. Standard errors are clustered at the municipality level.

Figure A.5: Event study estimates with alternative reference periods




Note: The figure presents event-study estimates from Equation 2. The shaded area represents 95% confidence intervals. The top panel uses the election two terms prior as the omitted category; the bottom panel uses the election three terms prior. The horizontal axis represents years relative to the election year. Standard errors are clustered at the municipality level.

Figure A.6: Event study estimates with covariates




Note: The figure presents event-study estimates from Equation 2, with the shaded area indicating 95% confidence intervals. The top-left panel adds the full set of time-varying covariates described in Section 6.2. The top-right panel restricts the sample to cities, and the bottom-left panel restricts the sample to towns and villages. The shaded area represents 95% confidence intervals. The horizontal axis represents years relative to the election year. Standard errors are clustered at the municipality level.

Table A.2: DiD estimate of the effect of uncontested elections on general staff salary

| | (1)<br>Expenditure on<br>general staff salary |
|---|---|
| Uncontested Experience | -0.006 |
| | (0.004) |
| R-squared | 0.999 |
| Observations | 13447 |
| Municipality by Election FE | Yes |
| Year by Election FE | Yes |

Note: Column (1) reports the estimation results from Equation 3 on the expenditure on general staff salary. All specifications include municipality-by-election and year-by-election fixed effects. Standard errors clustered at the municipality level are shown in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A.3: DiD estimate with council election

| | (1) | (2) |
|---|---|---|
| Uncontested (Mayor) | 0.038*** | 0.033*** |
| | (0.007) | (0.006) |
| Uncontested (Mayor) × Council election | −0.013 | |
| | (0.008) | |
| Uncontested (Council) | | −0.012* |
| | | (0.007) |
| R-squared | 0.828 | 0.828 |
| Observations | 9359 | 9359 |
| Municipality by Election FE | Yes | Yes |
| Year by Election FE | Yes | Yes |

Note: The treatment variable "Uncontested (Mayor)" indicates whether the mayoral election was uncontested. Column (1) additionally includes an interaction term between the mayoral uncontested indicator and an indicator for whether the council election was held on the same year. Column (2) instead adds a separate treatment indicator for whether the council election was uncontested, without interacting it with the mayoral treatment. All specifications include municipality-by-election and year-by-election fixed effects. Standard errors clustered by municipality code are shown in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

# B Theoretical Framework: Detailed Calculations and Proofs

## B.1 Voter behavior and winning probability

Consider a representative voter $i$ in municipality at time $t+1$. The voter derives utility from the incumbent politician's rent extraction level $r_t$ and has an idiosyncratic ideological preference $\epsilon_{i,t}$ for the incumbent.

In a contested election, voter $i$ compares utilities from the incumbent and challenger:

$$U^{\text{inc}}_{i,t+1} = -r_t + \epsilon_{i,t} \quad \text{(utility from incumbent)}$$
$$U^{\text{chal}}_{i,t+1} = -\bar{r}_e \quad \text{(utility from challenger)}$$

where $r_t$ is the rent extracted by the incumbent in period $t$, $\bar{r}_e$ is the expected rent from the challenger, and $\epsilon_{i,t} \sim \text{Unif}[-\frac{1}{2}, \frac{1}{2}]$ is voter $i$'s idiosyncratic preference for the incumbent. Voter $i$ votes for the incumbent if and only if $U^{\text{inc}}_{i,t+1} \geq U^{\text{chal}}_{i,t+1}$.

Voter $i$ votes for the incumbent if and only if

$$U^{\text{inc}}_{i,t+1} \geq U^{\text{chal}}_{i,t+1}$$

This condition is equivalent to

$$-r_t + \epsilon_{i,t} \geq -\bar{r}_e$$

$$\epsilon_{i,t} \geq r_t - \bar{r}_e$$

Since $\epsilon_{i,t} \sim \text{Unif}[-\frac{1}{2}, \frac{1}{2}]$, the probability that a randomly selected voter supports the incumbent is

$$\begin{aligned}
\phi_{t+1}(r_t) &= \Pr[\epsilon_{i,t} \geq r_t - \bar{r}_e] \\
&= \Pr[\epsilon_{i,t} > r_t - \bar{r}_e] \quad \text{(since } \epsilon_{i,t} \text{ is continuous)} \\
&= 1 - F_\epsilon(r_t - \bar{r}_e)
\end{aligned}$$

where $F_\epsilon(\cdot)$ is the CDF of the uniform distribution on $[-\frac{1}{2}, \frac{1}{2}]$.

For $\epsilon \sim \text{Unif}[-\frac{1}{2}, \frac{1}{2}]$, the CDF is

$$F_\epsilon(x) = \begin{cases} 0 & \text{if } x < -\frac{1}{2} \\ x + \frac{1}{2} & \text{if } -\frac{1}{2} \leq x \leq \frac{1}{2} \\ 1 & \text{if } x > \frac{1}{2} \end{cases}$$

Therefore, when $-\frac{1}{2} \leq r_t - \bar{r}_e \leq \frac{1}{2}$ (the interior case)

$$\begin{aligned}
\phi_{t+1}(r_t) &= 1 - F_\epsilon(r_t - \bar{r}_e) \\
&= 1 - (r_t - \bar{r}_e + \frac{1}{2}) \\
&= \frac{1}{2} + \bar{r}_e - r_t
\end{aligned} \tag{4}$$

This expression reveals the fundamental trade-off facing the incumbent. The winning probability starts at one-half when the incumbent extracts the same rent as the challenger would be expected to extract, reflecting the symmetric distribution of voter preferences. Each additional unit of rent extraction directly reduces the winning probability by one unit, creating a linear relationship between rent-seeking and electoral prospects. The incumbent thus faces a choice between immediate pecuniary

gains and future electoral success.

Taking the derivative with respect to $r_t$

$$\phi'_{t+1}(r_t) = \frac{\partial}{\partial r_t}\left(\frac{1}{2} + \bar{r}_e - r_t\right) = -1 < 0$$

This negative derivative confirms that higher rent extraction reduces the incumbent's winning probability.

**Boundary cases and probability projection** When $r_t - \bar{r}_e$ falls outside $[-\frac{1}{2}, \frac{1}{2}]$

- If $r_t - \bar{r}_e < -\frac{1}{2}$: All voters prefer the incumbent, so $\phi_{t+1}(r_t) = 1$
- If $r_t - \bar{r}_e > \frac{1}{2}$: No voters prefer the incumbent, so $\phi_{t+1}(r_t) = 0$

## B.2 Challenger entry

A potential challenger at time $t+1$ faces an entry decision. The challenger must pay a privately known entry cost $K$ to enter the race. The potential challenger observes the incumbent's rent $r_t$ and decides whether to enter. We assume that the value of holding office is the same for both the incumbent and the challenger, denoted by $V^P_{C,t+1}$. The challenger enters if and only if the expected benefit from entry exceeds the privately observed cost $K$, which gives us

$$[1 - \phi_{t+1}(r_t)]V^P_{C,t+1} \geq K$$

Substituting $\phi_{t+1}(r_t) = \frac{1}{2} + \bar{r}_e - r_t$ from the previous section yields

$$\left(\frac{1}{2} - \bar{r}_e + r_t\right)V^P_{C,t+1} \geq K$$

Therefore, entry occurs if

$$K \leq \left(\frac{1}{2} - \bar{r}_e + r_t\right)V^P_{C,t+1}$$

**Distribution of entry costs** The entry cost $K$ is privately observed by each potential challenger and follows a uniform distribution.

$$K \sim \text{Unif}[0, \bar{K}_j]$$

where $\bar{K}_j \in \{\bar{K}_L, \bar{K}_H\}$ with $\bar{K}_L < \bar{K}_H$, and $j \in \{L, H\}$ denotes the low and high cost regimes, respectively.

**Probability of entry** Given the uniform distribution of $K$ on $[0, \bar{K}_j]$, the probability that a challenger enters is

$$p_{t+1,j}(r_t) = \Pr\left[K \leq \left(\frac{1}{2} - \bar{r}_e + r_t\right) V^P_{C,t+1}\right]$$

When $0 \leq \left(\frac{1}{2} - \bar{r}_e + r_t\right) V^P_{C,t+1} \leq \bar{K}_j$ (interior case)

$$p_{t+1,j}(r_t) = \frac{\left(\frac{1}{2} - \bar{r}_e + r_t\right) V^P_{C,t+1}}{\bar{K}_j} \tag{5}$$

This expression captures the strategic interaction between incumbent rent extraction and challenger entry. Higher rent extraction by the incumbent creates electoral vulnerability, which increases the expected payoff from challenging. Specifically, each unit increase in rent extraction raises the entry probability proportionally, scaled by the value of holding office and inversely by the entry cost distribution. The mechanism operates through voter dissatisfaction—as the incumbent extracts more rents, the challenger's expected vote share increases, making entry more attractive even for challengers with higher entry costs. The parameter $\bar{K}_j$ represents the heterogeneity in entry barriers, capturing factors such as campaign costs, organizational requirements, and political networks. In environments with lower entry barriers (smaller $\bar{K}_j$), the incumbent faces a more elastic entry response to rent extraction, creating stronger disciplinary pressure.

## B.3 Belief updating

The incumbent does not observe the true entry cost parameter $\bar{K} \in \{\bar{K}_L, \bar{K}_H\}$ but maintains a belief about it. Let $\mu_t$ denote the incumbent's belief at time $t$ that the entry cost is low.

$$\mu_t = \Pr(\bar{K} = \bar{K}_L)$$

After observing the election outcome at $t+1$, the incumbent updates this belief using Bayes' rule.

**Updating after an uncontested election** If the election at $t+1$ is uncontested (no challenger enters), the incumbent updates the belief as follows.

By Bayes' rule:

$$\mu_{U,t+1} = \Pr(\bar{K} = \bar{K}_L \mid \text{no entry at } t+1)$$

Using Bayes' theorem

$$\mu_{U,t+1} = \frac{\Pr(\text{no entry} \mid \bar{K} = \bar{K}_L) \times \Pr(\bar{K} = \bar{K}_L)}{\Pr(\text{no entry})}$$

The probability of no entry under each regime is

$$\Pr(\text{no entry} \mid \bar{K} = \bar{K}_L) = 1 - p_{t+1,L}(r_t)$$
$$\Pr(\text{no entry} \mid \bar{K} = \bar{K}_H) = 1 - p_{t+1,H}(r_t)$$

The unconditional probability of no entry is

$$\begin{aligned}\Pr(\text{no entry}) &= \Pr(\text{no entry} \mid \bar{K}_L) \times \Pr(\bar{K}_L) + \Pr(\text{no entry} \mid \bar{K}_H) \times \Pr(\bar{K}_H) \\ &= [1 - p_{t+1,L}(r_t)]\mu_t + [1 - p_{t+1,H}(r_t)](1 - \mu_t)\end{aligned}$$

Therefore,

$$\mu_{U,t+1} = \frac{\mu_t[1 - p_{t+1,L}(r_t)]}{\mu_t[1 - p_{t+1,L}(r_t)] + (1 - \mu_t)[1 - p_{t+1,H}(r_t)]} \tag{6}$$

Since $p_{t+1,L}(r_t) > p_{t+1,H}(r_t)$, we have $1 - p_{t+1,L}(r_t) < 1 - p_{t+1,H}(r_t)$. This implies

$$\frac{1 - p_{t+1,L}(r_t)}{1 - p_{t+1,H}(r_t)} < 1$$

Rewriting the updated belief

$$\mu_{U,t+1} = \frac{\mu_t[\frac{1-p_{t+1,L}(r_t)}{1-p_{t+1,H}(r_t)}]}{\mu_t[\frac{1-p_{t+1,L}(r_t)}{1-p_{t+1,H}(r_t)}] + (1 - \mu_t)}$$

Since $\frac{1-p_{t+1,L}(r_t)}{1-p_{t+1,H}(r_t)} < 1$, the updated belief decreases

$$\mu_{U,t+1} < \mu_t \tag{7}$$

This downward revision in beliefs following an uncontested election represents a critical learning mechanism. The absence of a challenger serves as an informative signal about the underlying competitive environment. When no opponent emerges despite the incumbent's rent extraction, the incumbent rationally infers that potential challengers likely face prohibitive entry costs. This inference strengthens with the level of rent extraction, as high rents that fail to attract challengers indicate particularly severe entry barriers. The updated belief $\mu_{U,t+1} < \mu_t$ implies that the incumbent perceives reduced future competition risk, which relaxes the electoral discipline constraint. This learning effect creates a self-reinforcing dynamic where uncontested victories lead to higher rent extraction, which in turn may deter future entry, perpetuating the cycle of non-competition.

**Updating after a contested election** If the election at $t + 1$ is contested (a challenger enters), the incumbent updates similarly

$$\mu_{C,t+1} = \Pr(\bar{K} = \bar{K}_L \mid \text{entry at } t + 1)$$

Following the same Bayesian logic

$$\begin{aligned} \mu_{C,t+1} &= \frac{\Pr(\text{entry} \mid \bar{K} = \bar{K}_L) \times \Pr(\bar{K} = \bar{K}_L)}{\Pr(\text{entry})} \\ &= \frac{\mu_t p_{t+1,L}(r_t)}{\mu_t p_{t+1,L}(r_t) + (1 - \mu_t) p_{t+1,H}(r_t)} \end{aligned} \tag{8}$$

Since $p_{t+1,L}(r_t) > p_{t+1,H}(r_t)$, we have $\frac{p_{t+1,L}(r_t)}{p_{t+1,H}(r_t)} > 1$, which implies

$$\mu_{C,t+1} > \mu_t \tag{9}$$

This upward revision following a contested election reveals the disciplinary role of electoral competition. The emergence of a challenger signals that entry costs are likely low enough to make challenging worthwhile. The incumbent learns that the political environment is more competitive than previously believed, with potential challengers able and willing to mount campaigns. This updated belief

$\mu_{C,t+1} > \mu_t$ heightens the perceived threat of future competition, inducing the incumbent to moderate rent extraction to avoid attracting challengers. The magnitude of the belief revision depends on the likelihood ratio between the two cost regimes. A larger difference between $p_{t+1,L}(r_t)$ and $p_{t+1,H}(r_t)$ makes the election outcome more informative, leading to sharper belief updates. This learning mechanism ensures that electoral competition disciplines incumbent behavior not just through immediate electoral consequences but also through its informational content about future competitive threats.

## B.4 Incumbent's optimization problem

**Lemma 1** (Optimal rent function)**.** *In the stationary equilibrium, given belief $\mu_s$ about the entry cost environment in state $s \in \{U, C\}$, the optimal rent is*

$$r_s^* = \bar{r}_e - \frac{V_U^P}{2V_C^P} + \frac{1}{2\beta\,\Theta_s\,(V_C^P)^2} \tag{10}$$

*where $\Theta_s = \frac{\mu_s}{\bar{K}_L} + \frac{1-\mu_s}{\bar{K}_H}$ captures the perceived competition intensity in state $s$.*

The optimal rent expression reveals three key forces shaping the incumbent's rent extraction decision in the stationary equilibrium. The first term $\bar{r}_e$ represents the baseline rent level expected from challengers. The second term captures the value differential between uncontested and contested elections. This negative adjustment reflects the incumbent's incentive to deter entry by keeping rents below levels that would attract challengers. The third term represents the rent premium the incumbent can extract when believing entry costs are high. This premium is inversely related to the perceived competition intensity $\Theta_s$. When $\Theta_s$ is low, the incumbent believes that entry costs are high and thus faces reduced electoral discipline, leading to more aggressive rent extraction.[24]

*Proof.* We derive this result by first solving the general dynamic optimization problem with time indices and then imposing the stationary equilibrium conditions. This approach allows us to clearly identify how the time-invariant value functions emerge from the underlying dynamic structure.

[24]This stationary equilibrium characterization emerges as a special case of the general dynamic problem where value functions and policy functions are time-invariant. Specifically, when $V_{s,t}^P = V_s^P$ for all $t$, the general dynamic formula reduces to the stationary form presented above.

Consider the general dynamic problem where the incumbent at time $t$ in state $s$ maximizes

$$V_{s,t}^P = \max_{r_t} \left\{ r_t + \beta \mathbb{E}[V_{s',t+1}^P \mid s, r_t] \right\} \tag{11}$$

This optimization problem embodies the fundamental trade-off between current rent extraction and future electoral prospects. Higher rent extraction increases immediate payoffs but raises the probability of attracting challengers and reduces the likelihood of winning if challenged. The incumbent must balance these competing forces, with the optimal choice depending critically on beliefs about the competitive environment. When the incumbent believes entry costs are high, the perceived threat of competition weakens, tilting the balance toward more aggressive rent extraction.

We solve this optimization problem for arbitrary time $t$ and then specialize to the stationary equilibrium where $V_{s,t}^P = V_s^P$ for all $t$. This method ensures that our stationary equilibrium characterization is consistent with the full dynamic model.

**Step 1: Expected continuation value** The expected continuation value depends on whether a challenger enters

$$\begin{aligned} \mathbb{E}[V_{s',t+1}^P \mid s, r_t] = \Pr(\text{no entry}) \times V_{U,t+1}^P + \Pr(\text{entry}) \times \Pr(\text{win} \mid \text{entry}) \times V_{C,t+1}^P \\ + \Pr(\text{entry}) \times \Pr(\text{lose} \mid \text{entry}) \times 0 \end{aligned} \tag{12}$$

Substituting the probabilities

$$\mathbb{E}[V_{s',t+1}^P \mid s, r_t] = [1 - p_{s,t+1}^{\text{subj}}(r_t)] V_{U,t+1}^P + p_{s,t+1}^{\text{subj}}(r_t) \phi_{t+1}(r_t) V_{C,t+1}^P$$

where $p_{s,t+1}^{\text{subj}}(r_t)$ is the subjective probability of entry given belief $\mu_{s,t}$,

$$\begin{aligned} p_{s,t+1}^{\text{subj}}(r_t) &= \mu_{s,t} p_{t+1,L}(r_t) + (1 - \mu_{s,t}) p_{t+1,H}(r_t) \\ &= \mu_{s,t} \frac{(\frac{1}{2} - \bar{r}_e + r_t) V_{C,t+1}^P}{\bar{K}_L} + (1 - \mu_{s,t}) \frac{(\frac{1}{2} - \bar{r}_e + r_t) V_{C,t+1}^P}{\bar{K}_H} \\ &= (\tfrac{1}{2} - \bar{r}_e + r_t) V_{C,t+1}^P \left[ \frac{\mu_{s,t}}{\bar{K}_L} + \frac{1 - \mu_{s,t}}{\bar{K}_H} \right] \\ &= (\tfrac{1}{2} - \bar{r}_e + r_t) V_{C,t+1}^P \Theta_{s,t} \end{aligned} \tag{13}$$

**Step 2: First-order condition** The incumbent's objective function is

$$\begin{aligned}\mathcal{V}(r_t) &= r_t + \beta\mathbb{E}[V^P_{s',t+1} \mid s, r_t] \\ &= r_t + \beta\Big\{[1 - p^{\text{subj}}_{s,t+1}(r_t)]V^P_{U,t+1} + p^{\text{subj}}_{s,t+1}(r_t)\phi_{t+1}(r_t)V^P_{C,t+1}\Big\} \end{aligned} \tag{14}$$

Taking the derivative with respect to $r_t$

$$\frac{\partial \mathcal{V}}{\partial r_t} = 1 + \beta\left\{-\frac{\partial p^{\text{subj}}_{s,t+1}}{\partial r_t}V^P_{U,t+1} + \frac{\partial p^{\text{subj}}_{s,t+1}}{\partial r_t}\phi_{t+1}(r_t)V^P_{C,t+1} + p^{\text{subj}}_{s,t+1}(r_t)\frac{\partial \phi_{t+1}}{\partial r_t}V^P_{C,t+1}\right\}$$

Computing the derivatives

$$\begin{aligned}\frac{\partial p^{\text{subj}}_{s,t+1}}{\partial r_t} &= V^P_{C,t+1} \times \Theta_{s,t} \\ \frac{\partial \phi_{t+1}}{\partial r_t} &= -1\end{aligned}$$

Substituting these derivatives yields

$$\frac{\partial \mathcal{V}}{\partial r_t} = 1 + \beta\Big\{V^P_{C,t+1}\Theta_{s,t}[\phi_{t+1}(r_t)V^P_{C,t+1} - V^P_{U,t+1}] - p^{\text{subj}}_{s,t+1}(r_t)V^P_{C,t+1}\Big\}$$

**Step 3: Solving the first-order condition** At the optimum, $\frac{\partial \mathcal{V}}{\partial r_t} = 0$. This yields

$$1 + \beta V^P_{C,t+1}\Theta_{s,t}[\phi_{t+1}(r_t)V^P_{C,t+1} - V^P_{U,t+1}] - \beta p^{\text{subj}}_{s,t+1}(r_t)V^P_{C,t+1} = 0$$

Substituting $\phi_{t+1}(r_t) = \frac{1}{2} + \bar{r}_e - r_t$ and $p^{\text{subj}}_{s,t+1}(r_t) = (\frac{1}{2} - \bar{r}_e + r_t)V^P_{C,t+1}\Theta_{s,t}$

$$1 + \beta V^P_{C,t+1}\Theta_{s,t}[(\tfrac{1}{2} + \bar{r}_e - r_t)V^P_{C,t+1} - V^P_{U,t+1}] - \beta(\tfrac{1}{2} - \bar{r}_e + r_t)V^P_{C,t+1}\Theta_{s,t}V^P_{C,t+1} = 0$$

Expanding and simplifying

$$1 + \beta V^P_{C,t+1}\Theta_{s,t}[(\tfrac{1}{2} + \bar{r}_e - r_t)V^P_{C,t+1} - V^P_{U,t+1}] - \beta(\tfrac{1}{2} - \bar{r}_e + r_t)(V^P_{C,t+1})^2\Theta_{s,t} = 0$$

The terms with $(\frac{1}{2} + \bar{r}_e - r_t)$ and $(\frac{1}{2} - \bar{r}_e + r_t)$ simplify to give

$$1 + \beta V^P_{C,t+1}\Theta_{s,t} \times (-2r_t V^P_{C,t+1} - V^P_{U,t+1} + 2\bar{r}_e V^P_{C,t+1}) = 0$$

Solving for $r_t$ yields the general dynamic solution

$$\begin{aligned} 1 &= 2\beta(V^P_{C,t+1})^2\Theta_{s,t}r_t - 2\beta\bar{r}_e(V^P_{C,t+1})^2\Theta_{s,t} + \beta V^P_{C,t+1}V^P_{U,t+1}\Theta_{s,t} \\ r^*_{s,t} &= \bar{r}_e - \frac{V^P_{U,t+1}}{2V^P_{C,t+1}} + \frac{1}{2\beta\Theta_{s,t}(V^P_{C,t+1})^2} \end{aligned} \tag{15}$$

**Step 4: Imposing stationarity** In the stationary equilibrium, value functions are time-invariant. We have $V^P_{U,t+1} = V^P_U$ and $V^P_{C,t+1} = V^P_C$ for all $t$. Moreover, beliefs in state $s$ are constant over time, implying $\mu_{s,t} = \mu_s$ and consequently $\Theta_{s,t} = \Theta_s$. Substituting these stationary values into the general solution yields

$$r^*_s = \bar{r}_e - \frac{V^P_U}{2V^P_C} + \frac{1}{2\beta\Theta_s(V^P_C)^2} \tag{16}$$

This establishes the stationary equilibrium rent formula presented in lemma1. The stationary equilibrium rent formula reveals three economically meaningful components. The baseline $\bar{r}_e$ anchors expectations. The negative adjustment $-\frac{V^P_U}{2V^P_C}$ reflects the incumbent's incentive to deter entry by keeping rents below levels that would attract challengers. The positive term $\frac{1}{2\beta\Theta_s(V^P_C)^2}$ represents the rent premium enabled by perceived high entry costs.

The parameter $\Theta_s$ serves as a sufficient statistic for the incumbent's perception of competition intensity in state $s$. When $\Theta_s$ is low, the incumbent believes that entry costs are high and thus perceives that even substantial rent extraction will not trigger entry. This effectively relaxes the electoral constraint. Crucially, this premium is inversely proportional to $\Theta_s$, meaning that mayors who believe they face little competitive threat extract substantially higher rents. Since uncontested elections lead to lower beliefs about competition intensity ($\Theta_U < \Theta_C$), this mechanism drives the paper's main empirical prediction that uncontested elections lead to higher subsequent rent extraction. □

## B.5 Main propositions

### B.5.1 Result 1

**Proposition 1** (Cross-state rent differential)**.** *In the stationary equilibrium, politicians extract higher rents after uncontested elections than after contested elections.*

$$r_U^* - r_C^* = \frac{1}{2\beta(V_C^P)^2}\left[\frac{1}{\Theta_U} - \frac{1}{\Theta_C}\right] > 0 \tag{17}$$

This rent differential arises from the informational content of electoral outcomes. An uncontested election signals high entry barriers, leading the incumbent to perceive weaker future competitive threats. The magnitude of the differential depends on the gap in perceived competition intensity between the two states, captured by the difference in $1/\Theta$. The term $(V_C^P)^2$ in the denominator shows that the rent differential increases with the square of office value, amplifying the stakes of electoral competition. The discount factor $\beta$ moderates this effect, as more patient incumbents extract smaller rent premiums to preserve future electoral advantages.

*Proof.* From Lemma 1, in the stationary equilibrium we have

$$r_s^* = \bar{r}_e - \frac{V_U^P}{2V_C^P} + \frac{1}{2\beta\,\Theta_s\,(V_C^P)^2}$$

The first two terms are identical across states $s \in \{U, C\}$. The differential arises entirely from the third term, which depends on the state-specific belief parameter $\Theta_s$.

The learning mechanism operates as follows. After an uncontested election, Bayesian updating yields $\mu_U < \mu_C$. Specifically, the absence of a challenger signals that entry costs are likely high, leading to a lower belief that entry costs are low. Conversely, the presence of a challenger in a contested election signals that entry costs are sufficiently low to make challenging worthwhile, leading to a higher belief that entry costs are low.

Since $\Theta(\mu) = \mu/\bar{K}_L + (1-\mu)/\bar{K}_H$ is increasing in $\mu$, we have $\Theta_U < \Theta_C$. Intuitively, when the incumbent believes entry costs are more likely to be low, the expected entry probability for any given rent level increases, captured by higher $\Theta$.

The rent differential follows directly from the optimal rent formula

$$r_U^* - r_C^* = \left[\bar{r}_e - \frac{V_U^P}{2V_C^P} + \frac{1}{2\beta\,\Theta_U\,(V_C^P)^2}\right] - \left[\bar{r}_e - \frac{V_U^P}{2V_C^P} + \frac{1}{2\beta\,\Theta_C\,(V_C^P)^2}\right]$$
$$= \frac{1}{2\beta(V_C^P)^2}\left[\frac{1}{\Theta_U} - \frac{1}{\Theta_C}\right] \tag{18}$$

Since $\Theta_U < \Theta_C$ implies $1/\Theta_U > 1/\Theta_C$, and with $V_C^P > 0$ and $\beta > 0$, we have $r_U^* - r_C^* > 0$. □

### B.5.2 Result 2

**Assumption 1** (Interior path)**.** For all $\mu \in (0, 1]$ the no-entry path satisfies

$$\tfrac{1}{2} - \bar{r}_e + r_U^*(\mu) \in (0, 1) \tag{19}$$

Equivalently, along the path one has $0 < p_H(r_U^*(\mu)) < p_L(r_U^*(\mu)) < 1$.

**Proposition 2** (Belief convergence under repeated non-entry)**.** *Fix time-invariant primitives and Assumption 1. Let the incumbent set $r_t = r_U^*(\mu_t)$ each term and suppose that n consecutive elections are uncontested. Then the posterior sequence $\{\mu_{U,n}\}$, updated via $\mu_{U,n+1} = B(\mu_{U,n}, r_U^*(\mu_{U,n}))$, is strictly decreasing and $\mu_{U,n} \to 0$ as $n \to \infty$.*

*Proof.* Write $q_j(r) = 1 - p_j(r)$ for $j \in \{L, H\}$ and define the no-entry posterior

$$B(\mu, r) = \frac{\mu\, q_L(r)}{\mu\, q_L(r) + (1 - \mu)\, q_H(r)} \tag{20}$$

Assumption 1 gives $p_L(r) > p_H(r)$ and thus $q_L(r) < q_H(r)$. Hence $B(\mu, r) < \mu$ for any $\mu \in (0, 1)$. Along the policy $r_t = r_U^*(\mu_t)$ one has $\mu_{t+2} = B(\mu_{t+1}, r_U^*(\mu_{t+1})) < \mu_{t+1}$, so $\{\mu_{U,n}\}$ is strictly decreasing and bounded below by 0. Let $L$ be its limit. Continuity of $B$ and of $r_U^*(\cdot)$ implies $L = B(L, r_U^*(L))$. Since $B(\mu, r) < \mu$ for every interior $\mu$, no interior fixed point exists. The sequence is strictly decreasing whenever $\mu_0 < 1$, so $L \neq 1$. Therefore $L = 0$. □

**Lemma 2** (Path properties under repeated non-entry)**.** *Under Assumption 1, the sequence $\{\mu_{U,n}\}_{n\geq 0}$ satisfies the following properties.*

*(1) The sequence exhibits monotonicity, with $\mu_{U,n+1} < \mu_{U,n}$ for all n.*

*(2) The sequence converges to zero, that is, $\mu_{U,n} \to 0$ as $n \to \infty$.*

*(3) The updates diminish over time, satisfying $|\mu_{U,n+1} - \mu_{U,n}| \to 0$ as $n \to \infty$.*

*Proof.* For (1), since $B(\mu, r) < \mu$ for all $\mu \in (0,1)$ as established in Proposition 2, and since $\mu_{U,n+1} = B(\mu_{U,n}, r^*_U(\mu_{U,n}))$, we have $\mu_{U,n+1} < \mu_{U,n}$ for all $n$. Property (2) follows directly from Proposition 2. For (3), the monotone convergence of a bounded sequence implies that the differences between consecutive terms must converge to zero, hence $|\mu_{U,n+1} - \mu_{U,n}| \to 0$. □

**Proposition 3** (Monotone convergence of rent dynamics)**.** *Under Assumption 1 and along a run of uncontested elections, the optimal rent path $\{r^*_{U,n}\}$ exhibits monotone convergence. Specifically, the following properties hold.*

1. *The rent path converges to $r^*_{U,\infty}$ for some finite $r^*_{U,\infty}$.*
2. *The rent increments vanish, with $\lim_{n\to\infty} \left|r^*_{U,n+1} - r^*_{U,n}\right| = 0$.*
3. *The rent increments decrease monotonically, satisfying $r^*_{U,n+2} - r^*_{U,n+1} < r^*_{U,n+1} - r^*_{U,n}$ for all $n$.*

*Proof.* From Lemma 1 one has

$$r^*_{U,n} = \bar{r}_e - \frac{V^P_{U,t+1}}{2V^P_{C,t+1}} + \frac{1}{2\beta(V^P_{C,t+1})^2} \cdot \frac{1}{\Theta_{U,n}}$$
$$\Theta_{U,n} = \frac{\mu_{U,n}}{\bar{K}_L} + \frac{1-\mu_{U,n}}{\bar{K}_H}$$

By Lemma 2, we know that $\mu_{U,n} \to 0$, which implies $\Theta_{U,n} \to 1/\bar{K}_H$. Therefore, $r^*_{U,n}$ converges to a finite limit. The continuity of the rent function with respect to beliefs ensures that $\left|r^*_{U,n+1} - r^*_{U,n}\right| \to 0$.

To establish monotone convergence, we examine the convexity of the rent function. The mapping $\mu \mapsto \frac{1}{\Theta(\mu)}$ is strictly convex, as its second derivative

$$\frac{d^2}{d\mu^2}\left(\frac{1}{\Theta(\mu)}\right) = 2\left(\frac{1}{\bar{K}_L} - \frac{1}{\bar{K}_H}\right)^2 \cdot \frac{1}{\Theta(\mu)^3} > 0 \tag{21}$$

is positive for all $\mu \in (0,1)$. This convexity, combined with the monotone decrease of $\mu_{U,n}$ established in Lemma 2, guarantees that the rent increments $r^*_{U,n+1} - r^*_{U,n}$ decrease monotonically over time. Hence, the convergence occurs without oscillation, completing the proof. □

The monotone convergence without oscillation reflects the smooth Bayesian learning process. As the incumbent accumulates uncontested victories, each additional signal provides diminishing information about the competitive environment, leading to progressively smaller salary adjustments. The convexity of the rent function in beliefs ensures this adjustment path is smooth rather than erratic.