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OCCUPY GOVERNMENT:
DEMOCRACY AND THE DYNAMICS OF PERSONNEL DECISIONS AND PUBLIC FINANCES

Klenio Barbosa
Fernando V. Ferreira

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ABSTRACT

We study the causes and consequences of patronage in Brazilian cities since the country's re-democratization. We test key mechanisms – fiscal rules, accountability, political ideology, and rent-seeking – and estimate the consequences of patronage for public finances. Our data consist of the universe of public sector employees merged with their party affiliations, and a dynamic regression discontinuity design is applied to disentangle patronage from the growing political participation. The short-term patronage effect is large, with winning political coalitions increasing their shares of public sector workers and wages by 4 and 6 percentage points, respectively, during a mayoral term. Part of this effect lasts longer than a decade, with winning coalitions also occupying civil servant jobs that perform service-oriented tasks. This political occupation of government jobs is not associated with ideology, though. Instead, lack of accountability and rent-seeking are the primary driving forces, while reliance on intergovernmental transfers only increases patronage for smaller cities. Higher patronage does not affect the size of local governments, but it changes the composition of expenditures: hiring politically connected workers crowds out, almost one-to-one, non-affiliated employees. Overall, patronage accounted for more than half of the dramatic increase in public sector political employment since the Brazilian re-democratization.

Klenio Barbosa
Insper Institute of Education and Research
Rua Quata 300, Vila Olimpia
Sao Paulo, SP 04546-042
Brazil
kleniosb@insper.edu.br

Fernando V. Ferreira
The Wharton School
University of Pennsylvania
1466 Steinberg Hall-Dietrich Hall
3620 Locust Walk
Philadelphia, PA 19104-6302
and NBER
fferreir@wharton.upenn.edu

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1. Introduction

Do elections influence city finances? The size and type of public expenditures in the United States are not significantly impacted by electing a democrat or republican to the mayoral office (Ferreira and Gyourko, 2009), in part because of Tiebout (1956) sorting of voters.[1] But in places with poor accountability and low quality of governance, for example, parties may use the government for their own benefit. This can take different forms, ranging from general corruption related to fraud in public procurements and diversion of funds (Ferraz and Finan, 2011) to the occupation of the governmental sector via a higher degree of patronage (Folke, Hirano, and Snyder, 2011; Xu, 2018) and public workers who receive a large wage premium relative to the private sector (Finan, Olken, and Pande, 2015). These practices can significantly affect public finances since local governments generally spend a high share of resources with public sector personnel.[2]

In this paper, we study how democratic elections affect city-government personnel decisions, the mechanisms behind those decisions, and their ultimate consequences for public finances. We proceed in three steps: First, we estimate the extent of patronage practices, i.e., the hiring of public employees politically connected with a mayor, and how patronage can have a lasting impact on the public sector personnel; Second, we investigate key mechanisms that may explain different levels of patronage observed in local governments – federal transfers, lack of accountability, party ideology, and rent seeking; Lastly, we show how different levels of patronage estimated across Brazilian cities can impact the size and composition of city expenditures.

Brazilian municipalities are the focus of our empirical work, where both personnel decisions and public expenditures have had striking patterns since the first presidential election with popular vote in 1990, after a 26-year military dictatorship. The government share of GDP in Brazil grew from 29% in the early 1990s to more than 40% in the late 2000s, with cities accounting for approximately half of the public sector. City expenditures on personnel almost doubled over the last two decades, increasing from 35% of local budgets in 1995 to almost 50% in the last year of our sample. The share of local labor force employed by city governments reached almost 10% in

[1] Hoteling (1929) and Downs (1957) argue that elections should not matter as long as politicians and their parties follow the wishes of the voters. However, political parties may matter at other levels of government (Besley and Case, 2003; Lee, Moretti, and Butler, 2004), and their influence could be the result of strategic extremism (Glaeser, Ponzetto, and Shapiro, 2005) or due to candidates that cannot credibly commit to moderation (Alesina, 1988; Besley and Coate, 1997).

[2] In general, governments responsible for labor-intensive services, such as education, health, safety, and city maintenance, will have the largest fraction of expenditures assigned to personnel. U.S. school districts, for example, spend more than 80% of current expenditures on wages and benefits.

2010, representing about 40% of all legally registered employees in the average Brazilian city (a large fraction of private sector employment are still conducted under informal labor agreements).[3]

In order to identify the political connections of each public worker with the party coalition in power, we access an annual individual-level dataset with the universe of public employees, including their names, wages, labor contract, and occupation, for almost all Brazilian municipalities from 1995 to 2013.[4] We then merge these microdata with the universe of individuals affiliated with political parties in Brazil, with party histories dating back to 1980. Approximately 10% of the adult population in Brazil was associated with a political party in 2013, a share that has grown steadily since re-democratization. With the merged data in hand, we show in Figure 1 that the share of public employees affiliated with a political party increased from 17% in 1995 to more than 30% since 2000s. Moreover, Figure 2 presents a map with the distribution of those shares in 1995 and 2013 by city, holding constant the 1995 quintile thresholds. The increase in share of affiliated workers was widespread across the country, and not just concentrated in a few cities or regions.

While shocking, this large increase in share of public workers with political affiliation may not necessarily correspond to an increase in patronage. Political parties in power are generally stronger electorally, and likely to have more sympathizers and affiliates, including public employees. In order to deal with this endogeneity, we compare the public employment of political coalitions that barely won an election with the same outcome of coalitions that barely lost. Using five four-year municipal electoral cycles, from 1996 to 2012, including data from all party coalitions formed in each election, we show that this regression discontinuity design (Lee, 2008) produces levels and pre-trends of political public employment that are similar for winning and losing coalitions in the years prior to an election.

Another challenge to identification is the dynamics of several election cycles that may confound short and long-term outcomes of winning a particular election. For example, winning (losing) by a narrow margin of victory may also increase (decrease) the probability of re-election, and therefore affect the probability of "treatment" in the next election. Moreover, coalitions may change during this period in which we observe five election cycles. We deal with these potential changes in treatment status by implementing a dynamic regression discontinuity design developed by Cellini, Ferreira, and Rothstein (2010). We adapt this approach to our setting in order to estimate the short and long-term impact of electing a mayor from a given coalition under dynamic treatment

[3] These data are from the Brazilian Institute of Geography and Statistics (IBGE) and from the Brazilian National Treasury Secretariat (STN).

[4] Our data set is based on RAIS (Relação Annual de Informações Sociais), a mandatory database assembled and managed by the Brazilian Ministry of Labor, and contains information for more than 95% of all cities in Brazil. Details of the microdata are presented in Section 3.

assignments. These are "treatment-on-the-treated" effects that, in practice, hold constant all past election-coalition outcomes in a city. We also estimate separate effects for leading and supporting parties, a critical step given that political coalitions in Brazil have more than three supporting parties, on average.

We apply our dynamic estimator using the most comprehensive dataset of local elections, public employees, party affiliations, and public finances assembled to date. We find that the share of city wages allocated to a winning political coalition increases by 4.5 percentage points in the first year of a mayoral term, and then reaches almost 6 percentage points prior to the next election cycle. Estimates for share of city employees of the winning coalition are usually smaller, by approximately 2 percentage points, indicating that the positions filled by party loyalists offer higher compensation. Of these total patronage effects, two-thirds of the gains in employment and wages are concentrated in the party that leads a coalition, while one-third goes to supporting parties.

The dynamic of public sector occupation varies over the course of a mayoral term. Hiring party members (already affiliated before the election) and firing opposing parties employees account for 50 and 30 percent of the first year "winning" effect, respectively. Losing coalitions see declines in both employment and wage shares, but those effects are concentrated in the first year, and do not offset the disproportional hiring of the winning parties, especially later in a term. In fact, by the third year of a mayoral term, two other categories gain relevance in the occupation of public sector jobs: newly affiliated party members (affiliated after the election) and old public employees who decide to join the winning parties. These new and old employees affiliated after elections accounted for 35 percent of the total patronage effect in the third year after of a mayoral term.

Winning coalitions occupy both political appointee bureaucratic positions as well as civil servant jobs in service-oriented occupations. As civil servants are tenured positions, they are more likely to stay in government for longer than one mayoral term. These dynamics explain why we find that patronage effects can last longer than a decade, thereby having long-lasting effects on local public personnel.

What are the mechanisms behind the increasing capture of the public sector employment by political parties? We investigate potential channels related to i) Fiscal rules (intergovernmental transfers), ii) Lack of accountability (audits, media presence, and city size), and iii) Political economy (ideology and rent-seeking).

Federal and state transfers are the main source of funding for Brazilian municipalities (85 percent) and local taxes (property and service taxes, building permits fees) only represent 6 percent

of the budget. These soft budget constraints created by excessive transfers may potentially lead to corruption and misuse of funds (Fisman and Gatti, 2002). We use a research design based on discontinuous changes in federal transfers (FPM) to municipalities at given population thresholds to causally estimate how patronage varies with intergovernmental transfers. Municipalities that belong to a particular population bracket receive the same amount of federal and state transfers in a given year, whereas municipalities slightly above (below) the upper (lower) bound of each bracket receive, on average, 20 percent more (less) revenue. We find that FPM transfers do increase the share of total wages assigned to employees affiliated to elected parties. The patronage effect is particularly large for small cities (with population around 10,000), for which FPM transfers correspond to a large fraction of municipal revenues.

Next, we examine whether accountability and the quality of governance can limit the occupation of the public sector by winning parties. We find that the capture of the public sector by political parties is larger in smaller (and less developed) cities that lack accountability. These results match heterogeneity in low quality of governance and poor personnel practices across countries (Finan, Olken, and Pande, 2015). In addition, the presence of local media (radio, newspapers, magazines, TV and internet) limits patronage practices in public sector personnel decisions. We also find that government audits of public resources in Brazil (in Ferraz and Finan, 2008, 2011; in Brollo, Nannicini, Perotti and Tabellini, 2013; and in Avis, Ferraz and Finan, 2018) reduce future patronage practices. All these proxies for accountability point in the same direction and may explain why municipal voters have little hope to punish politicians that adopt such hiring practices.

We then analyze the political economy channels by testing if party ideology is responsible for the expansion of public sector's political employment. For instance, one might expect left leaning governments to allocate a larger share of expenditures on personnel given that leftist parties are known for defending a larger size of government –the most notable example being the Communist Party of China. There is a fair amount of heterogeneity in the dynamic treatment effect of winning an election, with some parties gaining almost 6 percent in wage shares during a mayoral term, while others barely gaining 1 percent. But such variation does not seem correlated with the ideology index developed by Power and Zucco (2009, 2012, 2018), which classifies Brazilian parties according to a left-centrist-right leaning scale. Instead, the top three parties in terms of political patronage are PMDB (center), PP (right), and PT (left), which also happen to be the parties implicated in the recent corruption scandal involving the largest Brazilian company, Petrobras, ultimately leading to the impeachment of former president Dilma Rousseff in 2015. We do,

however, find another important source of heterogeneity: the patronage effect is larger for bigger parties, i.e., with a larger share of local party members. This indicates that the country's low quality governance system is exploited by all parties, in a rent-seeking competition where bigger parties have more people demanding and being rewarded with jobs in the public sector.

What are the consequences of these large patronage effects on local public finances? First, predictions from our model show that patronage explains more than half of the total increase in the share of affiliated public personnel since the re-democratization of the country, shown in Figure 1. Second, there is no change in the size of local governments given that local governments have little control over their revenues – due to the large share of intergovernmental transfers. However, we do test for changes in the composition of expenditures by first estimating a long-term patronage effect for each city in the country within our dynamic RD model. With those city specific patronage indices in hand, we model local shares of total expenditures with affiliated and non-affiliated personnel as a function of the city specific patronage. We find that patronage not only increases expenditures with affiliated employees, but also decreases the expenditures with non-affiliated employees, in practically a one-to-one crowd out. Finally, other local expenditures, such as the share of local investments, do not vary by the level of patronage in Brazilian cities.

Related Literature. In addition to the public economics and political science literatures that study whether political parties matter, our work is also related to the literature on how democratic institutions shape governments and policy. Aidt and Jensen (2013) show that franchise extension can increase the size of government, while Fujiwara (2015) shows that improving the political participation of less educated voters can advance policies that benefit them. Acemoglu, Naidu, Restrepo, and Robinson (2015) found a dynamic impact of democracy on tax revenues as a fraction of GDP, potentially leading to fiscal redistribution as well. Our results empirically corroborate these views, although our mechanisms are related to rent-seeking and lack of accountability.

Our paper also relates to the literature on personal benefits of political connections. While we show that individuals affiliated with a party benefit from winning an election, recent papers have examined the wealth accumulation of politicians. Using an RD design, Eggers and Hainmueller (2009) find that British Conservative Party members of Parliament (MPs) benefit financially from public office while Labour MPs do not. Querubin and Snyder (2009) examine the wealth accumulation of US politicians during 1850-80 using a RD design and find that election

winners outearn losers only from 1870 to 1880. Fisman, Schulz and Vig (2014) show a much higher rate of wealth accumulation of state politicians in India.

A recent set of papers study the personnel economics of the state. These papers look, among other things, at how public servants' behavior maps into the performance of public services and how internal policies may be framed to make the best of the conflicting interests faced by officials (Finan, Olken and Pande, 2015; Cameron, de Figueiredo and Lewis, 2016). For instance, Akhtari, Moreira and Trucco (2016) explore how political turnover in Brazil impacts the replacement rate of headmasters and teachers in schools controlled by the municipality, thereby negatively impacting the public education provision. Other recent papers study the selection of public servants and how political connections shape public personnel decisions (Dal Bó et al., 2017; Dal Bó, Finan, and Rossi, 2013; Deserran, 2018; Weaver, 2018; Fang et al., 2018).

Two recent papers about patronage in Brazil are closely related to our independently developed research. First, Colonnelli, Prem and Teso (2018) conduct a groundbreaking investigation of the causal effect of becoming a campaign donor and/or running as a candidate for city councilor, on the probability of obtaining a public-sector job. They find significant political favoritism in the allocation of public jobs, and show that such patronage practices have a negative effect on the quality of the public workforce. Second, Brollo, Forquesato and Gozzi (2017) estimate, as we do in the first part of our paper, the causal effect of being the party in power on the employment of all party members in the public sector. Different from Brollo, Forquesato and Gozzi (2017) though, we use longitudinal data on the universe of Brazilian public sector employees and party affiliates over the 1995-2013 period, and employ a dynamic treatment effects model that accounts for multiple waves of mayoral elections and party coalitions. More importantly, the second and third parts of our paper focus on the causes and consequences of patronage in Brazilian cities, and especially on how patronage dynamically affects personnel decisions and local public finances.

The rest of the paper proceeds as follows: Section 2 describes the Brazilian institutions, Section 3 discusses our empirical methods, and Section 4 describes our database. In Section 5 we present our results, in Section 6 the potential mechanisms, and in Section 7 the consequences for public expenditures. Section 8 concludes.

2. Brazilian Institutions

Brazil is a federal republic with a presidential system organized in three levels: federal, state and municipal. There are more than 5,500 municipalities as of 2015, and each has an executive and

legislative branch. The mayor is the head of the executive branch of the municipality, and each city also has a city council.[5] Municipalities are generally responsible for managing and delivering a large range of public goods and services to their citizens, such as child care, early childhood and primary education, basic health services, local public transportation, local traffic safety, recreational facilities, water supply and sanitation.[6]

Each city has its own budget and the freedom to implement its own public policies and to make spending choices. Funding for the services and goods provided by municipalities comes from local taxes (e.g., property and service taxes, building permits fees), and from state and federal transfers (whose main source of revenues are sales taxes and income taxes, respectively). Transfers are the main source of funding for municipalities, accounting for 85 percent of the municipality revenue on average. A major role is played by the federal fiscal transfer scheme called *Fundo de Participação dos Municípios* (FPM). FPM is the largest program of transfers to municipalities, accounting for almost 80 percent of all types of federal transfers and for 31 percent of municipal revenues.[7]

2.1 Public Sector Careers

Municipalities in Brazil independently create, manage and modify public sector careers. Each municipality has its own plan for positions, careers and wages, which establishes tasks, functions and required qualifications for every position in the municipal bureaucracy. Municipalities are also responsible for the selection and hiring of municipal workers. Those workers mainly fall into three categories: civil servants, political appointees, and temporary workers.

The largest category of public sector jobs is civil service. The Brazilian constitution establishes that municipalities have to rely on transparent rules and requirements for the selection of civil servant public works, and that each city is responsible for the details of the implementation of those rules. In theory, each job applicant is to present academic and professional credentials and undertake a formal civil service examination, which is job-specific and consists of a combination

[5] The number of seats in each city council depends on the municipality population size. Council members are responsible for making local laws, overseeing the corresponding executive branch, and proposing and approving the annual budget.

[6] States, on the other hand, are mainly responsible for secondary education, general safety (police and firefighters), non-basic health services, and any infrastructure project that involves multiple municipalities.

[7] The ICMS-Parcel, is another important transfer that corresponds to 15 percent of the municipal budget, and is based on a fraction of the state sponsored value-added tax raised within the municipality. Lastly, the FUNDEF/FUNDEB is special federal fund for expenditures in education and accounts for 10 percent of municipal revenues. It is a non-discretionary fund for daily operations of municipal public schools.

of written and oral tests. Civil servants acquire tenure after three years of service, following which they can be fired only for reasons of misconduct after a judicial decision. Although legislation has determined that the recruitment and selection process for civil service positions should be based on candidates' merits and professional capabilities, the effective criteria for hiring civil servants are established according to local needs. This affords city mayors a margin of discretion that can potentially allow them to favor members of their parties when selecting new hires. In fact, newspaper articles often report scandals of manipulation and fraud in civil service examinations in Brazilian municipalities that aimed to favor the hiring of a certain group of candidates.[8]

The hiring of political appointees is limited to positions of high-level public officials (including directors, managers, supervisors, and advisors). Federal legislation gives discretion to politicians to select people for these leadership roles.[9] Finally, temporary public servants are hired to meet temporary and exceptional needs of public administrations, defined by politicians or high-level public officials. In such cases, no civil service exam is required and the selection process can be based on the analysis of applicants' curriculum, without other formal objective criteria.[10]

There are many advantages of holding a public sector job in Brazil, such as the fact that government positions are formal and guarantee many benefits such as (at least) 13 monthly wages, one-month of paid vacation, a special retirement plan, and lower work load among others.

2.2 Political Parties and Party Affiliation

Brazil has a multiparty political system, composed of 35 officially registered national parties as of 2015. According to TSE, 12 million Brazilians were affiliated with political parties in 2015, which corresponds to 6 percent of the Brazilian population.[11] Parties need affiliates to be legally recognized and to provide support to their candidates in the elections. For instance, the Brazilian electoral legislation establishes that a party must have a minimum number of members, which corresponds to 0.5% of the votes casts in the previous National Election, homogenously distributed across the 26 Brazilian states.

Based on shares of total affiliates, the most important parties are the Workers' Party (PT), the Brazilian Democratic Movement Party (PMDB), the Brazilian Social Democratic Party

[8] For instance, in 2012 UOL, the largest Brazilian news portal, reported a series of frauds involving civil service exam leaks to individuals politically aligned to the city mayors, and that were under investigation by the Brazilian Public Prosecution Offices (Ministério Público).

[9] Regular civil servants can be promoted to positions of trust which are high-level public posts with similar status, earning and power of appointee positions.

[10] The legislation describes the instances that fall under temporary jobs, and the responsible hirers can be prosecuted in case that they contract temporary workers without accurate justification.

(PSDB), and Democrat Party (DEM).[12] Other medium sized parties, like the Republican Party (PR) and the Progressive Party (PP), play significant roles in the National Congress; and others, like the Brazilian Socialist Party (PSB) and the Democratic Labor Party (PDT), have political power in strategic states.

In terms of ideology, political scientists categorize parties in Brazil in a wide range. Coppedge (1997), based on the perception of experts, classifies PT and PSB as left-wing, the PSBD and PDT as center-left, PMDB as center, PP as center-right, and PR and DEM as right-wing. Power and Zucco (2009, 2012, 2018) develop an alternative measure of party ideological position based on survey responses of federal legislators from 1990 to 2017. By this measure, there is a great dispersion across Brazilian party ideology.

All eligible voters can affiliate with a political party at any point in time.[13] As opposed to the United States, affiliation is not determined during voting registration. Every political party has its own membership rules. Some impose registration fees and a selection process that may involve interviews and formal examinations, while others parties, especially more recently, just require an online registration. The rights and duties of affiliates are described in the statute of the party. Parties may request financial contribution from their members for internal party maintenance, provide support to party candidates in electoral campaigns, and physical presence in certain party activities. Affiliates can also vote to choose the official candidate in the upcoming elections. However, internal decisions tend to be centralized in the directories, since voting power, in general, is not the same for all members.

2.3 Municipal Elections, Candidates, and Coalitions

Municipal elections for mayors and municipal councilors happens every four years midway between the national and state level elections. Those elections take place in October, and the winner candidates takes office in January of the following year to serve a four-year term. In municipalities with less than 200,000 registered voters, mayors are elected by a simple majority rule in a single-round election. In the other municipalities, mayors are elected by a simple and popular majority

[12] They are also the parties with the longest tradition in the country, having elected numerous and important legislators, senators and governors since the Brazilian re-democratization. PSDB won the presidency in 1994 and 1998, in a coalition in which DEM assigned the vice-president. PT was the leading party of a coalition that governed the country from 2002 until the recent impeachment of President Rousseff in 2016. PMDB occupied the vice-presidency from 2006 to 2016, and then occupied the presidency after the impeachment.

[13] The electoral legislation requires all parties to submit twice a year (April and October) an up to date list all of their members to the Superior Electoral Court (TSE). Superior Electoral Court (TSE) actively tracks party affiliation of all voters, cancelling the oldest membership if a voter is affiliated with more than one party.

vote in a two-round system. Since 1998 mayors can be elected for no more than two consecutive terms; before that reelection was not allowed.

Every political candidate must be a member of a legal party in order to run for public office. The electoral rules establish that a candidate must be affiliated with a political party at least six months before the election. As municipal elections are the first electoral races for the vast majority of individuals running for a public office, a new wave of affiliates happens in the municipal elections years.

But given that all political parties are relatively small, candidates heavily rely on political alliances in order to increase their electoral chances. Political coalitions are legally and independently formed a few months before each election in each city. These political coalitions provide many benefits to a candidate during the electoral campaign, such as the backing of a larger number of sympathizers and donors, and more public resources for the electoral campaign in the form of free radio and TV air time.[14] They also may help the elected candidates during the mayoral term, although at that point political parties are free to change their alliances.

3. Empirical Strategy

Suppose that a political party p runs for the mayoral office in city c and receives vote share v_{pc}. Let $b_{pc} = 1(v_{pc} > v_{p'c})$ be an indicator for the party receiving more votes than any of the other parties running for office, and therefore winning the election. Initially ignoring the dynamics of multiple election cycles and the possibility of forming coalitions, we can write an outcome y_{pc} (total wages received by local public employees that belong to a party, for example) as:

$$y_{pc} = b_{pc}\theta + u_{pc}, \tag{1}$$

where θ is the causal effect of winning an election and u_{pc} represents all other determinants of y_{pc}. However, winning an election may be correlated with other characteristics that influence outcomes, so $E[u_{pc}b_{pc}] \neq 0$. The standard regression discontinuity strategy to deal with this issue, as pointed out by Lee (2008), is that as long as there is some unpredictable random component of

[14] Brazilian electoral legislation establishes that during the 45 days prior of the municipal elections, parties are authorized to broadcast political agenda of their mayor and municipal councilor candidates on the radio and on the television. All parties together are entitled to 70 minutes a day in insertions. 90 percent of that time is distributed in proportion to the number of representatives that the parties have in the Federal Congress. The remaining 10 percent is distributed equally. In case there is an alliance between parties in the majority elections, it will be considered the sum of the federal deputies affiliated to the six largest parties of the coalition. In the case of coalitions for proportional (council) elections, the radio and TV time will be the result of the sum of the number of representatives of all parties.

the vote, a narrowly-decided election approximates a randomized experiment. The causal effect of winning an election can be identified by comparing personnel outcomes for parties that barely won an election (the "treatment group") with other parties that barely lost (the "control group").[15] Assuming that $E[u_{pc}|v_{pc}]$, the conditional expectation of the unobserved determinants of y given the realized vote share, is continuous, we can approximate it by a polynomial function of order g with coefficients γ_u, $F_g(v_{pc}, \gamma_u)$. Under this assumption we can rewrite (1) as:

$$y_{pc} = b_{pc}\theta + F_g(v_{pc}, \gamma_u) + u'_{pc}, \quad (2)$$

where u'_{pc} is asymptotically uncorrelated with v_{pc} (and therefore with b_{pc}), and a regression of realized outcomes on the winning indicator, controlling for a flexible polynomial in the vote share, thus consistently estimates θ.

We now extend the setup to allow for multiple elections in the same city, closely following the dynamic regression discontinuity framework developed in Cellini, Ferreira, and Rothstein (2010). Redefine b_{pct} to equal one if party p in city c wins the election and holds the mayoral office during the calendar years t associated with a mayoral term, and zero otherwise (i.e., if the party did not run for mayor in that electoral cycle or if the party ran and lost the election). We can then write outcomes in any year t as a function of the full history of mayoral elections in a city:

$$y_{pct} = \sum_{\tau=1}^{\tau=\bar{\tau}} b_{pc,t-\tau}\theta_\tau + u_{pct}, \quad (3)$$

which estimates the causal effect of winning an election in $t-\tau$ on outcomes in year t, with $\bar{\tau}$ as the maximum number of relative years since an election allowed by the data. The causal parameter θ_τ is commonly known as the effect of the "treatment on the treated", or TOT, since equation (3) explicitly controls for all other election outcomes. An OLS estimate of (3) would yield biased estimates of the TOT effects, so we again appeal to the assumption that winning an election is as good as randomly assigned conditional on a smooth function of the measured vote share. To bring the RD methodology to the "structural" equation (3), we augment each of the lagged election outcome indicators $b_{pc,t-\tau}$ and a polynomial in the vote share, $F_g(v_{pc,t-\tau}, \gamma_\tau)$. Both the $b_{pc,t-\tau}$ coefficient and the polynomial coefficients are allowed to vary freely with τ, where τ is number of

[15] We include all parties in our estimates, as there is a large number of third and fourth place candidates with meaningful vote shares. See Anagol and Fujiwara (2016) for the importance of the runner-up effect. Our online appendix shows the histogram for each vote share for the 1st, 2nd, and 3rd place candidates.

years after and election (for $\tau > 0$).[16] We also add fixed effects for each party, city, and calendar year, such that we can write (3) as follows:

$$y_{pct} = \sum_{\tau=1}^{\tau=\bar{\tau}} \left[b_{pc,t-\tau}\theta_\tau + F_g\left(v_{pc,t-\tau}, \gamma_\tau\right) \right] + \pi_p + \kappa_c + \lambda_t + \varepsilon_{pct}. \quad (4)$$

With the inclusion of controls for the election and vote share history in (3), the θ_τ coefficients are identified from the contrast between parties in cities where an election in $t - \tau$ was narrowly won and those where the election was narrowly lost but the sequence of prior and subsequent elections and votes is similar. This has the advantage, for example, of not confounding the effects of winning an election with winning or losing other election cycles, which is key to understanding the long-term impact of party control on city personnel decisions.

So far, we have ignored the possibility of forming coalitions across parties in order to run for the mayoral office, which is a common feature of the Brazilian political system. In order to capture the impact coalitions we first assign vote shares to all parties in a coalition. Precisely, we replace $b_{pc,t-\tau}$ in equation (4) for two other dummies $b^l_{pc,t-\tau}$ and $b^s_{pc,t-\tau}$, which are, respectively, indicators for whether the party is a leading or supporting party of a winning candidate. Second, we add two other terms to equation (4), $l_{pc,t-\tau}$ and $s_{pc,t-\tau}$, which are dummies that represent, respectively, the parties are leading or supporting parties of mayoral candidate. Our final estimating equation becomes:

$$y_{pct} = \sum_{\tau=1}^{\tau=\bar{\tau}} [b^l_{pc,t-\tau}\theta_\tau + b^s_{pc,t-\tau}\varphi_\tau + l_{pc,t-\tau}\alpha_\tau + s_{pc,t-\tau}\beta_\tau + F_g\left(v_{pc,t-\tau}, \gamma_\tau\right) + \\ + l_{pc,t-\tau}F_g\left(v_{pc,t-\tau}, \delta_\tau\right)] + \pi_p + \kappa_c + \lambda_t + \varepsilon_{pct}. \quad (5)$$

We estimate this equation using a conventional panel of outcomes by party and city over calendar years. Standard errors are clustered by city. We label θ_τ and φ_τ the patronage effects from leading and supporting parties of the winning coalitions.

A caveat with the model above is that θ_τ and φ_τ could be overestimated because of a mechanical effect in which the losing party leaves office (giving up the leadership of the main departments, for example) and the new party in power just replaces the main leadership positions. We first deal with this issue by exploiting our microdata: we know wheter an employee is a political appointee in a leadership position or if the employee is a civil servant providing a direct service to

[16] We also run some specifications that allow for $\tau \leq 0$ in order to test for pre-trends.

the population. By estimating outcomes that vary by type of labor contract and occupation we can focus on positions that suffer less from the mechanical effect. Second, we decompose the total effect into employees that were employed (or not) by the city in the year prior to the election, as that allows us to compare how much of the total effect is due to replacement of old positions vs new hires. Additionally, we interact those dummies with a dummy for belonging to a party in the year prior to the election. This interaction aims to decompose the effects and to capture other potential mechanisms, such as employees switching parties or becoming affiliated for the first time because of an election outcome.

Equation 5 assumes that all winning parties behave similarly once in power. If there is heterogeneity in θ across parties, our estimator identifies the average of θ_p among parties with close elections (Imbens and Angrist, 1994). But we can further interact $b^l_{pc,t-\tau}$, $b^s_{pc,t-\tau}$, $l_{pc,t-\tau}$ and $s_{pc,t-\tau}$ with dummies for each of the Brazilian parties, in order to test if parties adopt different personnel decisions while in office. We also interact the variables $b^l_{pc,t-\tau}$, $b^s_{pc,t-\tau}$, $l_{pc,t-\tau}$ and $s_{pc,t-\tau}$ with measures of federal transfer, city size, accountability, party size, and party ideology in order to understand some of the mechanisms driving the patronage effects.

Finally, we also estimate a specific θ_3 for each city in the country, by interacting a complete set of city indicators with the terms $b^l_{pc,t-3}$ and $b^s_{pc,t-3}$.[17] Subsequently we estimate how the composition of public expenditures is a function of these city-specific patronage effects.

4. Data

4.1 Public Employees

We use a comprehensive longitudinal matched employer-employee administrative data set which takes the form of an annual census of all formal workers in Brazil (Menezes-Filho et al., 2008). RAIS (Relação Annual de Informações Sociais) is a mandatory database assembled and managed by the Brazilian Ministry of Labor every year since 1976. It includes individual information on earnings, occupations and other aspects of the job (tenure, weekly working hours, features of the employment contract), current and past employers, along with their identification numbers, locations and industries. It is widely recognized as a high-quality Census of the Brazilian formal labor market (Dix-Carneiro, 2014; Dix-Carneiro and Kovak, 2017).[18] Apart from the

[17] The parameter θ_3 refers to the effect of the leading party election on political public employment in the third year after the election. It accounts for the leading party's patronage effect in one of the last years of the term and also the peak effect (as we show in Section 5).

[18] RAIS is the main tool used by the government to enable the payment of the "abono salarial" to eligible workers. "Abono salarial" is a government program that pays one additional minimum wage at the end of the year to workers

informal sector workers, RAIS covers almost all public and private sector jobs, except for very few categories of workers (a subset of self-employed individuals and elected politicians) which are not required to report information to the Ministry of Labor.[19]

The data consist of job entries identified by worker identification number (PIS), worker full name, and firm-plant taxpayer identification number (CNPJ). These identifiers are unique and do not change over time. This allows us to track individual over time and across formal employers. Additionally, RAIS comprises a set of variables which are particularly important for our investigation: individual specific data on occupation and employment contract details. In RAIS, every worker is assigned an occupation specific to his/her current performing job, which is categorized according to the CBO (Classificação Brasileira de Ocupações). Based on the performing job of each public employee, we can establish if he/she is working in administrative tasks, or in the final delivery of public goods/services. Additionally, we can identify which sector of public administration a public employee was assigned to work for: education, health, public works, sanitation, security, transportation and others. These occupational categories also allow us to classify workers according to the hierarchy level of their occupations in public administrations and firms (for instance, directors/managers vs. other employees). RAIS employment contract detail data contain for every worker information on reasons for hiring/firing, dates of employment, type of work contract (regular, temporary, short-term, apprenticeship), and, most importantly, information on how a worker was hired by the public sector—as a permanent civil servant, an appointee or a temporary worker. Based on the RAIS employer-employee data, Panel A in Table 1 presents descriptive statistics by city-year from 1995 to 2013 for the 5,412 municipalities used in our final sample.

4.2 Party Affiliation

The party affiliation data contain individual-level information on all party members in Brazil. It was obtained from the Superior Electoral Tribunal (TSE) which actively tracks party affiliation of all registered voters in the country through an electronic platform named FiliaWeb.[20]

whose average monthly wage was below two times the minimum wage, and whose job information was correctly declared in RAIS - among other minor requirements. For this reason, workers have an incentive to be counted in RAIS since they want to be eligible to receive the government benefits they are entitled. Given that employers (private and public organizations) are subject to severe fines if they do not regularly submit to the Ministry of Labor the information about their workers, employers also have incentives to precisely provide workers information in RAIS.

[19] Because RAIS is a census of the Brazilian formal labor market only, we cannot follow individuals that always have been working for the informal sector. We also lose track of workers who do not hold a job in the formal sector in a given year, but we can keep tracking them once they return to a job in the formal sector.

[20] FiliaWeb was launched in 2009 and, in 2010, it became an official electronic platform through which parties submit information about their members to the Superior Electoral Tribunal (TSE). Before 2009, parties used to submit digital

TSE keeps records of all past and current members of every party, and updates FiliaWeb twice a year (in April and October) based on the information about new and removed party members provided by every party. For each party, the affiliation data contain the full name of all party members, voter registration number, the municipality where each member registered, the date when every member affiliated with a party, and the date when an individual voter cancels its party affiliation (if applicable). Based on this information, we can identify every party member at any point in time. Based on the party affiliation data, Panel B in Table 1 shows descriptive statistics by city-year for the number of parties and party members in our final sample.

We merged RAIS with the party affiliation data based on each person's name, year of employment and affiliation, and location (metropolitan area). The match quality highly benefits from the fact that Brazilians usually have several surnames, since a common family tradition is for children to keep all surnames of both father and mother. The matching procedure allowed us to identify the party affiliation (if any) of every public employee from all Brazilian municipalities.[21] The largest share of matches, 80%, are 1 to 1 matches.[22]

4.3 Public Finances

The "Finanças do Brasil - Dados Contábeis dos Municípios" (FINBRA) dataset is our primary source of information on Brazilian municipal finances. It is organized by the Brazilian National Treasury Secretariat (STN) and it is produced by each municipal government annually. FINBRA includes information such as revenues from municipal taxes (property and services taxes), transfers revenue from state (ICMS) and central (FPM, PAB, FUNDEF/FUNDEB) governments, and expenditures to personnel or investment. It also presents expenditures disaggregated by functions like administration, janitorial services, public education and public health. Panel C in Table 1 presents basic descriptives by city-year for government expenditure, share of government expenditure devoted to personnel, and population size of the cities in our final sample.

files to TSE containing information about their affiliates. In 2010, TSE integrated the previous party digital files to the information about affiliates submitted by parties through FiliaWeb to construct a unified dataset containing historical data of all party members in the country. This is the dataset used in this paper.

[21] We conduct the match in five steps. In Step 1 observations are matched by exact full name. Step 2 matches use a "soundex" code of the surnames. Step 3 converts all middle names (not first and not last names) to middle initials. Step 4 all prepositions are eliminated (e.g. Da, De, Dos), and finally in Step 5 all prepositions are eliminated and middle names are converted to initials.

[22] The rest are split into 1:m, m:1, and m:m matches – see online appendix for details. Robustness tests show that our main estimates are unaffected by using a subsample that only includes 1:1 matches. Those results are available upon request.

4.4 Elections

Electoral data were obtained from the Superior Electoral Tribunal (TSE), which oversees national and local elections in Brazil. TSE records information on characteristics of candidates, political affiliation, and electoral results for all political offices in Brazil. Our dataset contain information on all municipality elections for mayors in 1996, 2000, 2004, 2008, and 2012, comprising data on pre-election characteristics of all candidates (gender, education background, marital status, wealth, and occupation), their respective parties and electoral coalitions, and the number of votes that each candidate received. We dropped from our data politicians that had their candidacy withdrawn or canceled. Table 2 presents basic descriptives by city-year for electoral years used in our final sample.

4.5 Final Data

Our final data combine information from all the four separate aforementioned sources: RAIS employer-employee, party affiliation, public finance and election data. Because our estimated model, described in equation (5), specifies the outcome variables by party, city and calendar-year, we structured our data set at party-city-year to estimate the parameters of interest (i.e., θ_τ and φ_τ). Table 3 presents summary statistics of the final sample that we use to implement our empirical strategy.

5. Results

5.1 Validity of the RD design

Two conceptual concerns may invalidate our RD application. The first is the possibility that coalition characteristics change at the threshold, including pre-treatment outcome variables. Figure 3 tests for discontinuous changes around the margin of victory threshold, by plotting averages for the following variables in the year of the election: number of parties in the coalition, number of public employees affiliated with the leading parties, and the share of public employees affiliated with leading and supporting parties. Even though coalitions that win (lose) with large margins are indeed politically more (less) powerful, coalitions that win or lose by small margins are very similar to each other, on average.

The second concern is related to political coalitions having different pre-trends. Figure 4 presents estimates for a version of equation 5 that includes a number of relative years prior to the election. The year of the election is omitted. These pre-trend estimates show no differences in outcomes for winners and losers in the years leading up to an election.

5.2 Winning coalition dynamic treatment effects

Figure 5 plots the estimated dynamic patronage effects on the total number of employees affiliated with a party, along with 95% confidence intervals.[23] The effects are split into θ_τ for the party leading the winning coalition, and $\varphi_\tau$for the other parties supporting it, as defined in equation (5). In the first year of the term, the winning party adds 17 additional affiliated public employees relative to the losing coalition. That estimate reaches a peak of 24 by the end of the first term, drops to 17 in relative year 5, and then stays relatively flat during the remaining years. Estimates for all winning supporting parties peak at 15 extra affiliated employees in years three and four, and never get below 8 even twelve years after an election.

The next outcome we analyze is the share of affiliated public employees. This metric has several advantages over the number of affiliated workers such as minimizing the importance of the largest cities and adjusting the estimates for the changing number of total public workers (affiliated or not) in the city over the years. Figure 6 shows that the leading party's share of employees increases almost 1.5 percentage points in the first year of the mayoral term—a very large proportional increase given that both 1st and 2nd place candidates had a 5.2% share of public workers in the year of the election (see Figure 3). The gain increases to about 3 percentage points in relative years 3 and 4. At year 5, we observe the consequence of modelling the impact of other election cycles, as the benefits of winning an election drop to 1.2 percentage points. Subsequent magnitudes from the patronage effect wane after that, but never go to zero, with the winning party still enjoying a 0.4 percentage point gain even twelve years after the election. In Figure 6 we also show the shares of employees for the other parties in the leading coalition. The supporting parties increase their shares in the public sector by a little bit more than 1.3 percentage points during the first term and then drop to half-percent in the long term.[24]

Figure 7 shows that the importance of winning elections is even larger when considering the share of total wages devoted to party affiliates; not just the share of employees.[25] While the dynamic patterns are relatively similar, the magnitudes of the effects for wages are almost 80% larger in the first year of a mayoral term, and 50% larger by relative year 4. After that period, both effects—for share of wages and employees—become almost identical, indicating that the winning party loses certain leadership positions that pay more but becomes entrenched in many other sectors

[23] These estimates are also reported in Columns (5) and (6) of Table 4. Columns (1) and (2) show an unconditional model, while columns (3) and (4) control for third degree polynomial of vote shares and its interactions.
[24] The estimated coefficients plotted in Figure 6 are also reported in Columns (5) and (6) of Table 5.
[25] These estimates are also reported in Columns (5) and (6) of Table 6.

and occupations of the public administration. Overall, about 2/3 of the patronage effect during the first term is due to the leading party of the coalition, while 1/3 is due to the supporting parties. In the long run the split becomes 60/40.

The point estimates above hide some of the dynamics of occupation of the local public sector in Brazil by the winning coalitions. To understand the process through which winning parties occupy local governments, we decompose these dynamic effects in four dimensions: (i) new hires without an affiliation prior to the election (new employees affiliated after elections), (ii) old hires without an affiliation prior to the election (old employees affiliated after elections), (iii) new hires affiliated prior to the election (hiring old party members), and (iv) old hires affiliated prior to the election (firing opposing party employees).[26] Panels A and B in Table 7 present the decomposition of the estimated effects in those four dimensions for the first four years after an election. The party occupation process starts with hiring party members affiliated before elections and with firing opposing party employees, accounting for 58 percent and 28 percent of the first year effect, respectively. Later on, party members affiliated after the election are recruited by local governments, and old public employees join the parties of the wining coalition. These new and old employees affiliated after elections account for only a small percentage of the first-year effect, while in the third year they account for 40 percent of the patronage. Note that losing coalitions face a reduction in the share of employment and wage, but those effects do not offset the disproportional hiring of winning parties.

5.3 Dynamics by type of labor contract and occupation

Given Brazil's legal context, it is no surprise that a small fraction of the total effect of winning an election on the share of wages earned by affiliates of the party is due to differential attrition. As explained above, public workers—especially civil servants—have a number of labor law protections that prevent them from being fired. We further explore this issue by splitting the wage share outcome into two components: wages assigned to civil servants and wages assigned to political appointees. Figure 8 presents the estimated effects for leading parties, while Table 8 shows all estimates.[27]

Even though political appointees are, on average, a small fraction of the public workforce, they correspond to about 50% of the total treatment effect on wage shares in relative year 1. Over

[26] A tiny fraction of the total effect is due to affiliates switching parties after the election, so we do not consider them here.
[27] Similar results were found for the employee share.

time though, the share of the total effect due to political appointees declines as the winning party starts to fill up a disproportional number of civil servant positions. That trend becomes more obvious in year 5, when the effect on the share of political appointees becomes quite small. The remaining differential wage share enjoyed by the winning party becomes entirely attributable to civil servants by the year 12.

We also split the wage share point estimates into bureaucratic and service-oriented occupations. Figure 9 shows that they follow a similar pattern observed in the political appointee vs civil servant split partly because a large fraction of the bureaucratic jobs are performed by appointees, while most of the service-oriented occupations, such as teachers and nurses, are performed by civil servants. The disproportional hiring of party members to service-oriented occupations is a practice that could lower the quality of services offered to the local population (Akhtari, Moreira, and Trucco, 2016).

6. Mechanisms

6.1. Intergovernmental Transfers

A potential explanation for the high levels of patronage observed in Brazilian local governments relates to the local tax system, which is largely based on federal and state transfers.[28] However, empirically evaluating the casual effect of transfers on municipal employment of party members is not an easy task. An unbiased estimator of that effect would require a comparison of the employment of party members in two sets of municipalities with similar characteristics, where one set randomly receives more intergovernmental transfers than others. We use a research design that mimics this ideal design by exploiting discontinuous changes in federal transfers (FPM) to municipalities at given population thresholds. While municipalities belonging to a particular population bracket receive the same amount of federal and state transfers in a given year, municipalities slightly above (below) the upper (lower) bound of each bracket receive, on average, 20 percent more (less) revenues. Therefore, small variations in city population around pre-determined thresholds provide exogenous variation in transfers received by municipalities which allows us to identify casual effects of transfers on the amount of patronage.[29]

To that end, we augment the econometric model described in equation (5) to account for the discontinuous changes in federal transfers (FPM) to municipalities at given population thresholds.

[28] Federal transfers are the main source of funding for municipalities (85 percent), while local taxes (property and service taxes, building permits fees) represent only 6 percent of the budget, on average.

[29] Other examples of research using FPM transfers include Brollo, Nannicini, Perotti and Tabellini (2013), Litschig and Morrison (2013), Gadenne (2017), and Corbi, Papaioannou and Surico (2018).

In practice we estimate interaction effects with the winning coalitions, comparing patronage effects on both sides of a population threshold.[30] The results reported in Figure 10 reveal that more FPM transfers (for cities on the right side of each population threshold) generally increase the share of wages of winning coalition affiliates. Note the effect is only significant for the cities around the first threshold with population close to 10,000, where the importance of transfers is much higher on a per capita basis.

Those findings are not only interesting per se, but also because they show how the design of local public finance based on transfers can deliver negative consequences to public expenditures related to personnel decisions. Local expenditures financed by local revenues may be a more appropriate way to bind politician's opportunistic behavior.

6.2 Accountability Channels

Many researchers report large discrepancies in the quality of governments across countries, with corruption and rent-seeking type behavior being more prevalent in the public sectors of less developed regions. In this sub-section, we test if similar patterns can be detected across cities in Brazil, by directly estimating heterogeneity in the magnitude of the occupation of the public sector by winning parties according to different measures of accountability and quality of governance.

City Size. Our first test splits our final sample in four quartiles by city size, with city size based on year 2000 population. Smaller towns in Brazil are generally poorer, have less private sector options, and parties are close-knit clubs where party membership usually coincides with family and friendship ties. Figure 11.A shows the dynamic treatment effect of winning an election on party wage share varying by quartile of city size. Estimates for the 1st quartile are about 4 times larger than the magnitude of estimates for the large cities in the 4th quartile, in the third year of a mayoral term.

Media Presence. Recent studies on media have shown that the presence of newspapers and radio amplifies citizens' knowledge of public policies and of politics, which affect voters' perception of politicians and turnout.[31] In Brazil, Ferraz and Finan (2008) find that the release of

[30] A detailed description of the methodology used in those estimations are in the Online Appendix. It also presents tests that guarantee the validity of regression discontinuity design.

[31] Besley and Burgess (2002), for instance, show that governments in India are more responsive in their relief of shocks to places with higher newspaper circulation and where voters are more informed. Stromberg (2004) finds that U.S. counties with more radio listeners received more relief funds from the New Deal program. Gentzkow (2006) discusses how the introduction of television in the United States resulted in a sharp drop in newspaper and radio consumption,

the audit outcomes has a significant impact on incumbents' electoral performance, and that these effects are more pronounced in municipalities where local radio is present to divulge the information. Thus, empirical evidence suggests presence of media in a municipality is good proxy for accountability and quality of governance at the local level.

To obtain information on the presence of media in a municipality, we rely on a survey from the Brazilian Institute of Geography and Statistics IBGE), named as Perfil dos Municípios Brasileiros, which contains information of key measures of the availability of media in every Brazilian city. This city-level survey provides information on the presence of local press (newspapers, magazines), local radio, existence of TV coverage and availability of internet connection in a municipality.

We then estimate equation (5) with the interaction of winning coalitions with the presence of local radio, local press, TV coverage, and availability of internet in a municipality. Results are presented in Figure 11.B. The presence of local media significantly reduces the allocation of wages to party members of the winning coalition. We find the wage share of individual affiliated to the elected party (in the third year after an election) is about 1.3 percent points smaller in cities with local press, 2 percent points smaller in cities with radio, 2.3 percent points smaller in cities with TV coverage, and 1.4 percent points smaller in cities with availability of internet. These results suggest that the presence of local media limits patronage practices in local Brazilian governments.

Audits. Government audits of public resources in Brazil affect incumbents' electoral performance of corrupt politicians (Ferraz and Finan, 2008, 2011), and reduce corruption (Avis, Ferraz and Finan, 2018). Following Avis, Ferraz and Finan (2018), we investigate whether government audits of public resources can affect personnel hiring decisions in Brazilian local governments, considering that audits increase the perceived non-electoral costs of engaging in misuse of public funds.

The anti-corruption program targeted at municipal governments was launched in 2003 by CGU (Controladora Geral da União), Brazil's controller's office. The program, named Programa de Fiscalização por Sorteios Públicos (Monitoring Program with Public Lotteries), randomly audits municipalities' use of federal funds. Its initial audits were performed on 26 randomly selected municipalities across different states, and then the program grew towards auditing 60 municipalities per lottery. The lotteries are held publicly in conjunction with the national lottery in Brasília, and

which reduced citizens' knowledge of politics and consequently led to lower voter turnout. Gentzkow, Glaeser, and Goldin (2006) demonstrate that changes between 1870 and 1920 in the U.S. newspaper industry are related to the reduction of corruption in U.S. politics in the same period.

all municipalities with a population of up to 500,000 inhabitants are eligible for selection. As of February 2015, there have been 2,241 audits across 40 lotteries in 1,949 municipalities. Once a municipality is chosen, the CGU gathers information on all federal funds transferred to the municipal government during the previous three to four years and issues a random selection of inspection orders. Each one of these orders stipulates an audit task for a specific government project (e.g. school construction, purchase of medicine, etc.) within a specific sector. Once these inspection orders are determined, 10 to 15 auditors are sent to the municipality for one to two weeks to examine accounts and documents, inspect for the existence and quality of public work construction, and verify the delivery of public services. After the inspections are completed, a detailed report describing all identified irregularities is submitted to the central CGU office in Brasília. The central unit compiles all information and publishes a report on the internet.[32]

We create an indicator for whether a city had an audit in the previous mayoral term, and also interact the indicator with the winning coalition terms. As a placebo test, we also estimate similar models that specifies if a city had an audit in the current term, or if the audit will happen in the next term. The results presented in Figure 11.C show that having a future audit does not change the current behavior of all parties and of the winning coalitions. The same conclusion is reached for audits in the current term, as presumably the winning coalition did not have enough time to potentially react to the federal audits. However, the last set of estimates shows the existence of audit in city in the term before an election significantly reduces allocation of public jobs to party members of the elected coalition. The wage share of individuals affiliated with the elected party is about 0.8 percent smaller in municipalities that had an audit.

6.3 Political Economy Channels

Party ideology. Another potential explanation for the disproportional occupation of the public sector by winning coalitions is ideology. The political economy literature gives many examples of left-leaning parties with strong preferences for bigger and more redistributive governments. These parties may decide to even control lower levels of the bureaucracy with party members, in order to allegedly better carry out their mission. We test this assumption by first estimating a version of equation (5) that interacts the winning party terms with dummies for each of the 33 parties in Brazil. This model produces party-specific estimates of the wage share, all of

[32]These reports are also sent to the Federal Courts of Accounts (TCU), the Federal Prosecutors' Office (MPF), the local judiciary, the Federal Police, and to the municipal legislative branch. For more details about the CGU's government audits, see Ferraz and Finan (2008, 2011), Brollo, Nannicini, Perotti and Tabellini (2013), and Avis, Ferraz and Finan (2018).

them shown in Figure 12.A. It is noteworthy that the top 3 parties with respect to patronage of the leading parties, PP (right leaning), PMDB (center leaning), and PT (left leaning) were also the parties engulfed in the corruption scandal of Petrobras, that ultimately led to the impeachment of former president Dilma Rousseff in 2015.

Next, we assign the ideology index from Power and Zucco (2009, 2012, 2018) to fifteen of those parties. This index varies from -2.5 to 2.5, with parties closer to -2.5 being more left leaning, while a score close to 2.5 means right leaning. A score around 0 indicates a centrist party. We then interact the treatment dummies in equation (5) with party ideology – left, center, and right, following the 2017 ideology index constructed by Power and Zucco (2018). The results presented in Figure 12.B reveal little difference on dynamic treatment effects of winning an election by party ideology.

Rent-seeking pressure. The allocation of public jobs to party members indicates a quid pro quo relationship between the party in power and its political supporters, in which public jobs are used as a reward to supporters for their votes and/or campaign efforts (Calvo and Murillo, 2004; Stokes 2009, Folke, Hirano and Snyder, 2011). Accordingly, the higher the number of political supporters of party, the higher should be the effect of a party election on the wage share of public employees affiliated to the winning party.

In order to more carefully investigate whether party size determines the dynamics of government occupation, we further interact treatment dummies in equation (5) with a pre-election measure of party size that varies by city (i.e., the share of party affiliates in each city in the year before an election). Figure 12.C shows the interaction effect for quartiles of party size. Our results reveal that the dynamic patronage effects do increase with the pre-election size of competing parties, consistent with rent-seeking pressure exerted by political supporters.

7. Consequences for Public Expenditures

Having measured the short and long run effects of government personnel decisions based on the political affiliation of individuals, we can now estimate the impact of such patronage on the public finances. As reported above, cities have little discretion with respect to total revenues, so any potential consequence would be observed on the composition of public expenditures. We use two methods to estimate the effect of patronage on expenditures with affiliated employees: i) model predictions, and ii) heterogeneity in patronage by city.

Model predictions. To estimate the distortion caused by patronage, we first estimate the share of city employees with party affiliation in absence of patronage effects, and then we compare that with the estimated share of city employees with party affiliation predicted by our complete model, which contains political patronage (this prediction is very similar to the descriptives in Figure 1). The difference between these figures will reveal the consequences of government personnel decisions based on party affiliation.

To obtain our estimate of the share of city employees with party affiliation in the presence of patronage, we proceed as follows. First, we predict the estimated equation (5) for the share of public employees associated to each party. This procedure generates the share of city employees affiliated to every Brazilian in every city in all years of our sample. Next, we sum those shares across all parties for every year from 1995 to 2013 to obtain the share of city employees affiliated with a party for every city and year of our sample. To estimate the share of city employees with party affiliation in absence of patronage effects, we repeat the same procedure described above, but turn off the coefficients associated to the variables $b^{l}_{jc,t-\tau}$ and $b^{s}_{jc,t-\tau}$ (which indicate the leading and supporting parties of a winning candidate, respectively). This generates the time evolution of the predicted share of city employees in every city in our sample without a patronage effect.

Figure 13 plots the predicted share of city employees with party affiliation with and without patronage. The continuous line in Figure 13 reveals that the predicted share of city employees with party affiliation in the presence of patronage spans from 20.73 percent in 1996, the year of first election in our sample, to 30.8 percent in 2013, the last year in our sample. The dashed line in Figure 13 shows the estimated share of city employees with party affiliation in the absence of patronage effects. Note that our model predicts an increase of the share of city employees with party affiliation during our period of analysis, disregarding any patronage effect. The share of city employees with party affiliation without patronage range from 20.73 percent in 1996 to 24.9 percent in 2013. Finally, the dashed-dotted line plots the difference between the share of city employees with party affiliation (predicted in our complete model) and the estimated share of city employees with party affiliation in the absence of patronage. This figure reveals that over the course of nearly two decades, patronage is responsible for an increase of 5.85 percent of share of city employees with party affiliation, corresponding to 56 percent of the increase of the share of city employees with party affiliation since 1996.

Patronage by city. We use our model from equation (5) to estimate a specific patronage effect for each city in the country, by interacting a complete set of city indicators with the terms

$b^{l}_{pc,t-3}$ and $b^{s}_{pc,t-3}$. The patronage effects by city represent the average patronage over the course of all elections in our sample, accounting for all other factors in equation (5). Figure 14 shows a map of each city in Brazil, color coded by quintiles of the distribution of this patronage index by city.[33] From this image, it is clear that high levels of patronage by city are not solely concentrated in select regions, but rather are dispersed across the country.

Subsequently, we estimate the composition of public expenditures as a function of these city-specific patronage indexes. The first variable we analyze is the share of expenditures devoted to employees affiliated with winning coalitions.[34] Figure 15A plots the relationship between this share of expenditures and the patronage index by year, using a kernel regression. The slope was flat in the first year of our sample, and then becomes steeper over the years, especially for patronage indexes between 0 and 25, which contains the majority of the cities in our sample. Interestingly, the slope barely changes from 2007 to 2011, perhaps indicating that, on average, city budgets are reaching a limit with respect to this practice.

Next, Figure 15B plots a similar relationship for the share of expenditures with non-affiliated employees. Again, the plot for year 1995 is reasonably flat. Over time though, cities with less patronage increasingly spend a much larger share of the budget with non-affiliates. By 2011 the slope is clearly negative. Lastly, Figure 15C plots changes in expenditures with affiliates and non-affiliates during our sample period. Clearly, cities with increasing levels of patronage substitute expenditures from non-affiliate workers to affiliated ones.

Table 9 estimates how the city-specific patronage influenced changes in the composition of local finances from 1995 to 2012. Columns (1) and (2) show estimates for the total share of personnel expenses using two different data sources (FINBRA and RAIS, respectively). Both estimates are small and not statistically different from zero. Column (3) reaffirms that increases in patronage lead to increases in the share of affiliated employees. A 10-point increase in the patronage index leads to a 1.5 percent increase in the share of affiliated employees. Column (4) shows a symmetrically opposite estimate for the share of public employees that are not affiliated to political parties, indicating a practically one-to-one crowed out effect. Column (5) shows that the share of expenditures devoted to capital investments does not statistically vary with patronage practices.

[33] Our final patronage index adds the effects for both leading and supporting parties.

[34] The denominator of this shares comes from the total expenditure data from FINBRA. The numerator is a proxy based on RAIS. This proxy underestimates total expenditures with personnel because RAIS only reports expenditures with direct wages, not with other benefits such as pension plans, health plans, bonuses, etc.

8. Conclusion

Our analysis shows that public sector personnel decisions can be heavily influenced by democratic election outcomes. Using a comprehensive data set of local elections, public employees, party affiliations, and public finances from almost all Brazilian cities, we find that winning parties (leading and supporting) increase their shares of public employees by 4 percentage points after an election. They seize an even larger share of wages, 6 additional percentage points compared to pre-election means. These patronage effects can last longer than a decade, with winning coalitions occupying not only political appointee bureaucratic positions but also civil servant jobs in service-oriented occupations. The increase in political occupation of governmental jobs is not correlated with political ideology though. Instead, it is correlated with the level of city development and party size. Moreover, lack of accountability is a key factor in the process of governmental occupation. Finally, the impact of patronage in the composition of public expenditures is quite large, explaining more than half of the increase in the share of affiliated public workers since the re-democratization.

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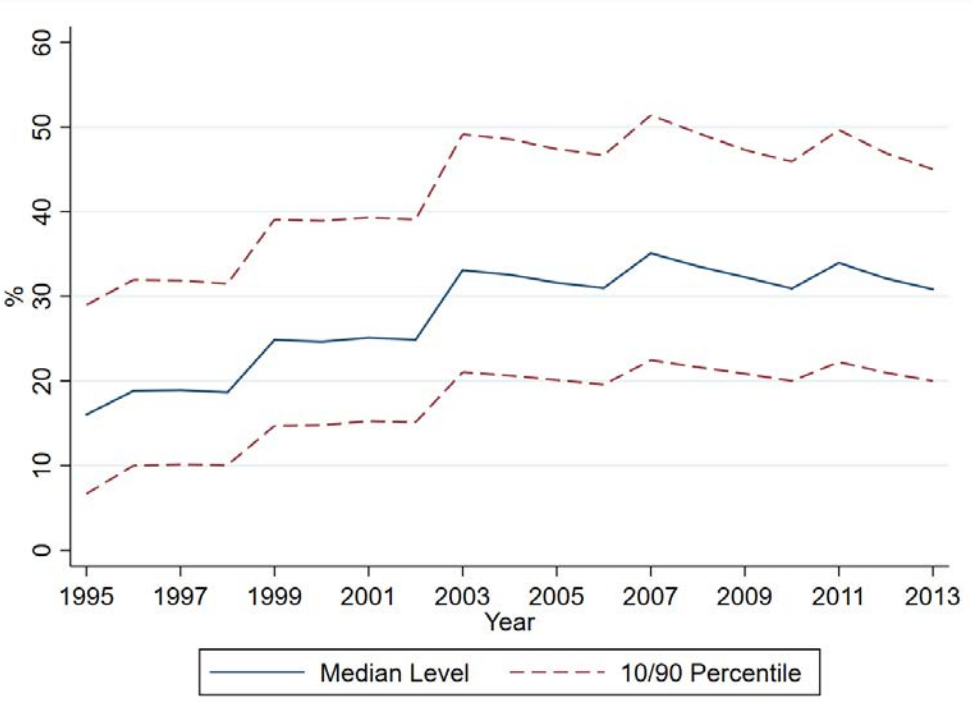
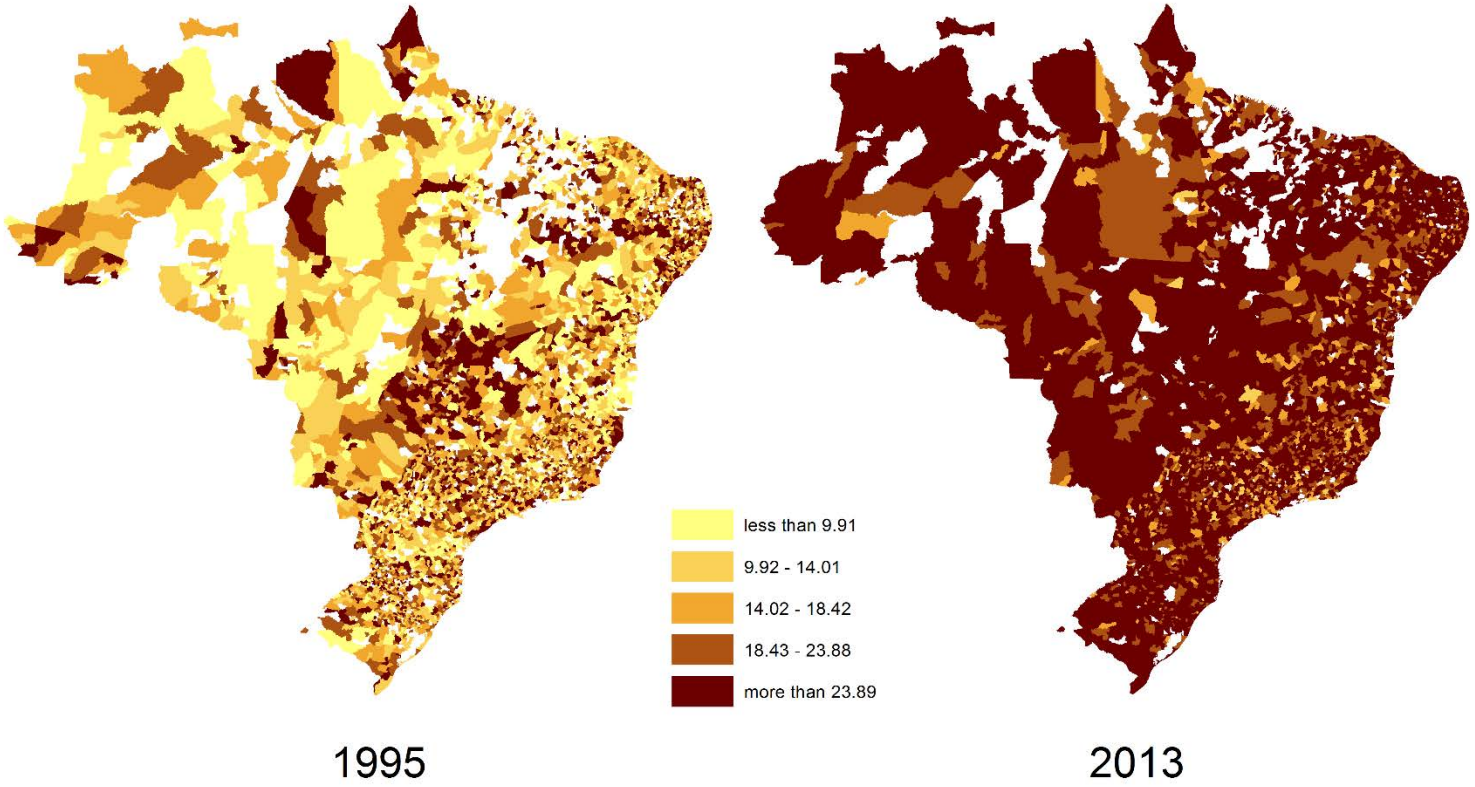
Figure 1: Share of City Employees Affiliated with a Party



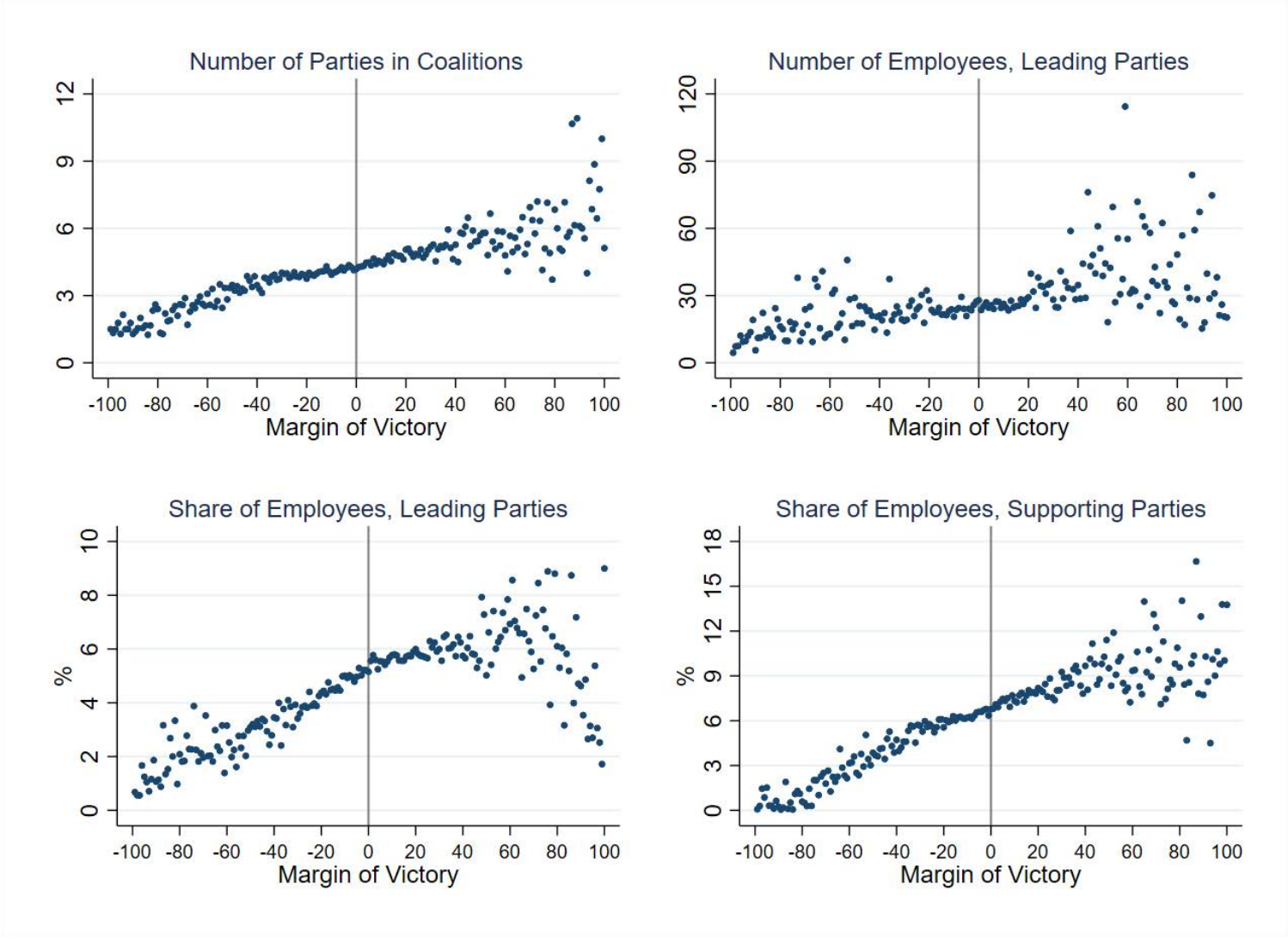
Notes: The figure plots the share of city employees with party affiliation for every year between 1995 and 2013. The share is created by combining public employment records from RAIS with party affiliation data using a matching on person's name. See Section 4.2 for a detailed description of the matching procedure.

Figure 2: Share of Public Employees Affiliated with a Party by City and by 1995 Quintile Thresholds



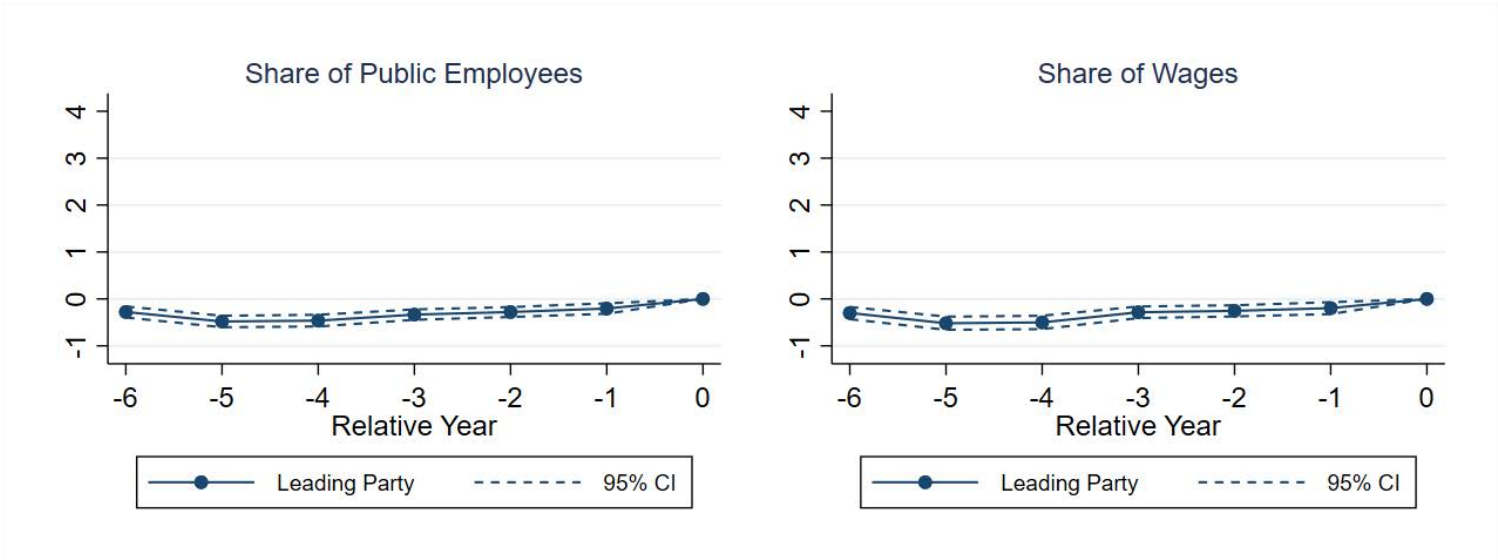
Notes: This figure presents a map of Brazil with the distribution of share of public employees with party affiliation in 1995 and 2013 by city. Color scheme for both maps are based on 1995 quintile thresholds of the share of public employees with party affiliation, holding constant the 1995-quintile thresholds for the shares in 2013. Cities without data as displayed in white.

Figure 3. Coalition Characteristics Around Margin of Victory Threshold



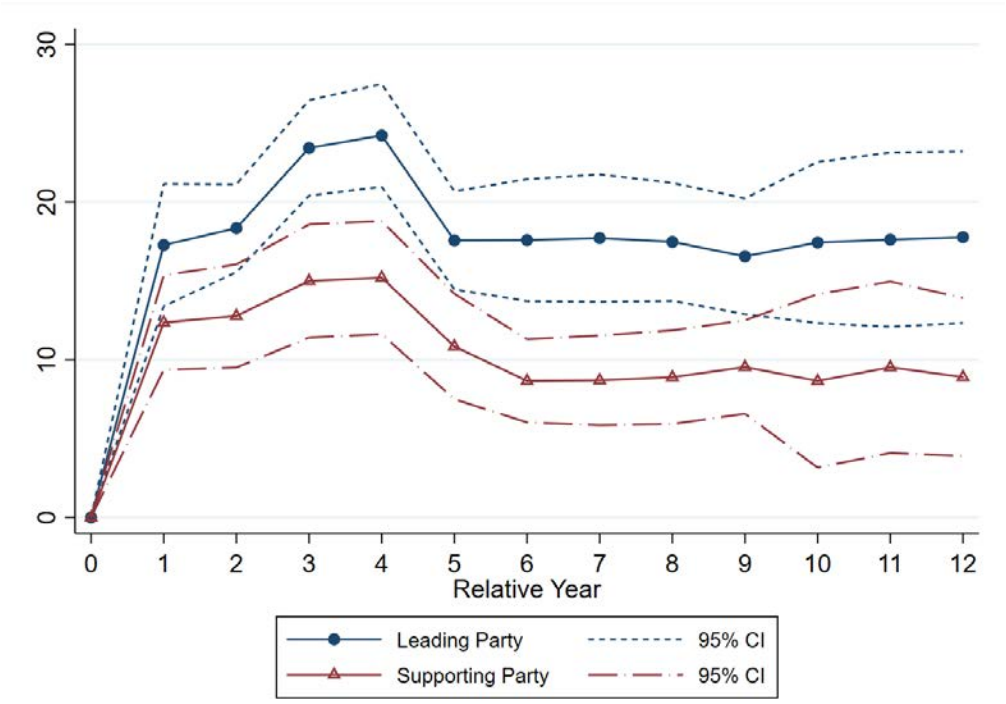
Notes: Each dot represents the average of the corresponding variable in the year of the election for each percentage point of margin of victory. Only the top two coalitions, in terms of vote shares in the first round of the election, are plotted.

Figure 4: Pre-Trends in Share of Public Employees and Wages of Leading Parties



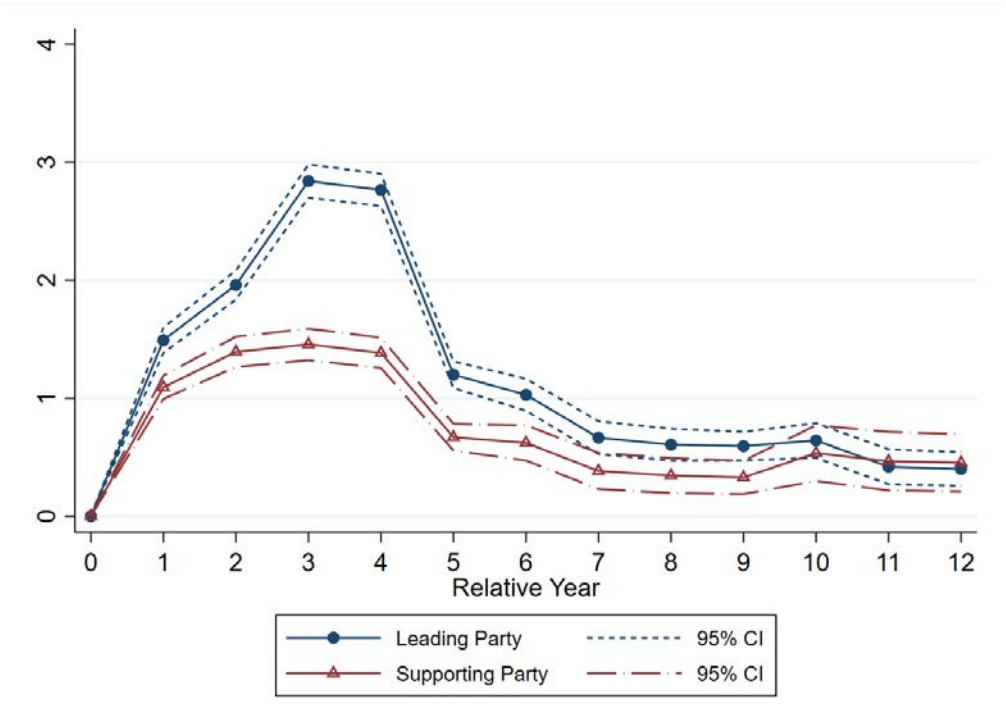
Notes: Figure plots the trend of corresponding variables for years before the election year. The relative year -6 combines the trends for observations that are more than 5 years prior to the election.

Figure 5: Dynamic RD Patronage Effects on the Total Number of Public Employees Affiliated with Winning Coalitions



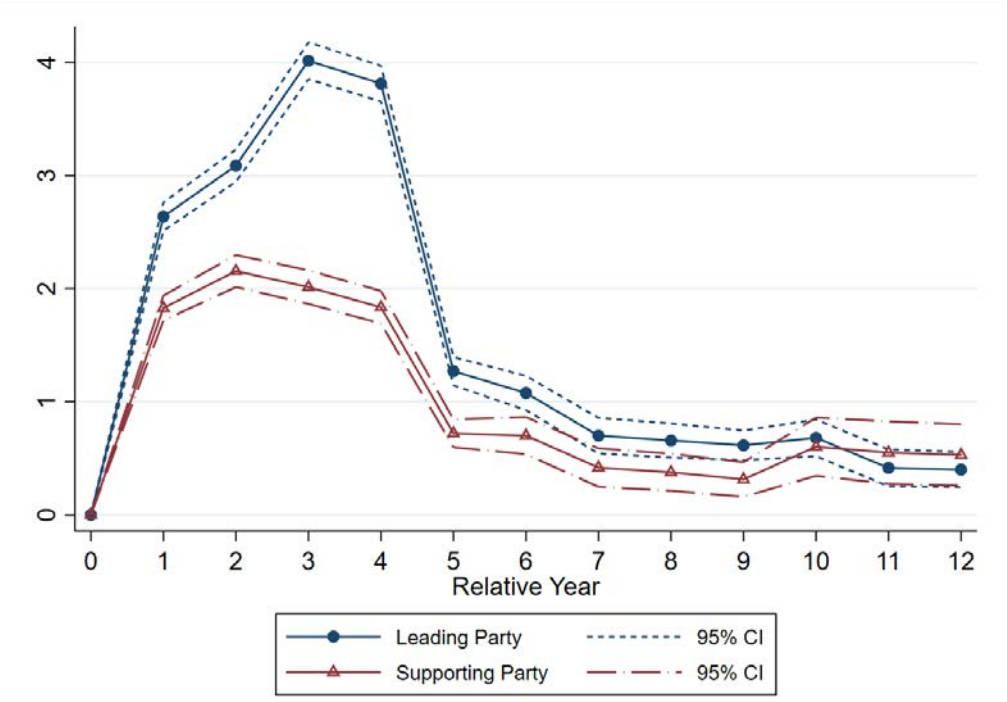
Notes: Figure plots the estimated patronage coefficients and 95 percent confidence intervals reported in columns (5) and (6) of Table 4.

Figure 6: Dynamic RD Patronage Effects on the Share of Public Employees Affiliated with Winning Coalition Parties



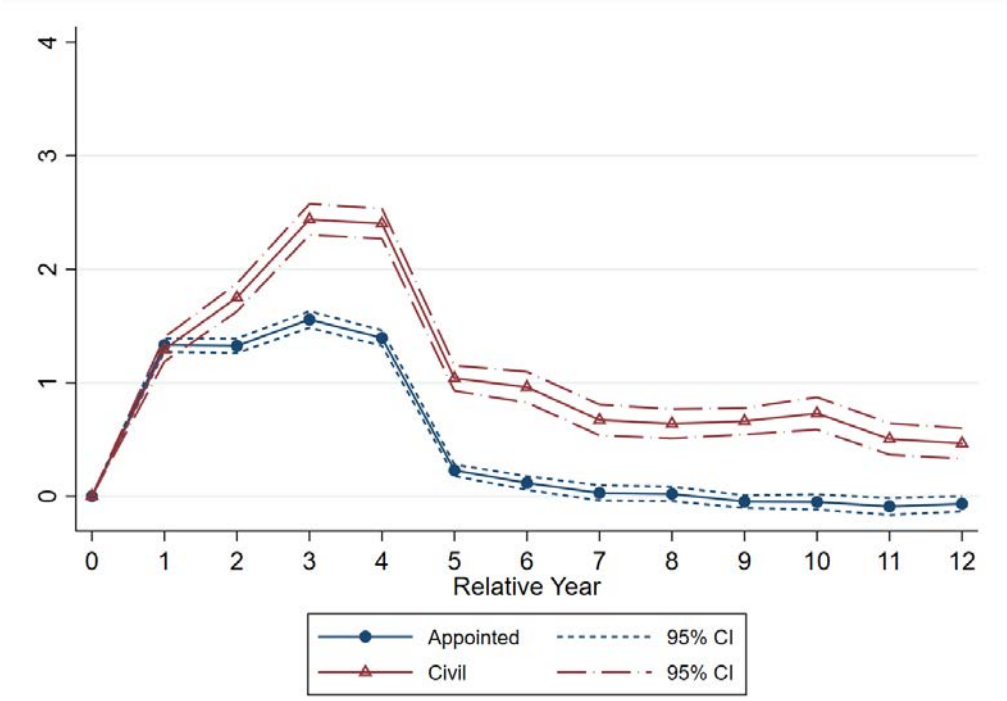
Notes: Figure plots the estimated patronage coefficients and 95 percent confidence intervals reported in columns (5) and (6) of Table 5.

Figure 7: Dynamic RD Patronage Effects on the Share of Total Wages of Public Employees Affiliated with Winning Coalition Parties



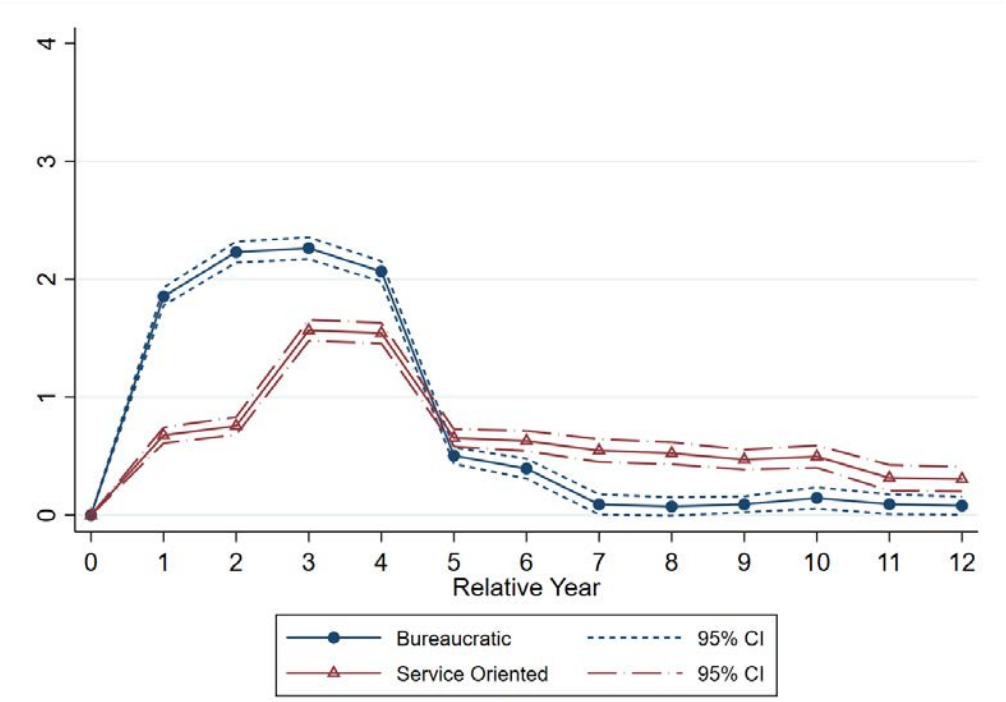
Notes: Figure plots the estimated patronage coefficients and 95 percent confidence intervals reported in columns (5) and (6) of Table 6.

Figure 8: Dynamic RD Patronage Effects on the Wage Shares by Type of Labor Contract



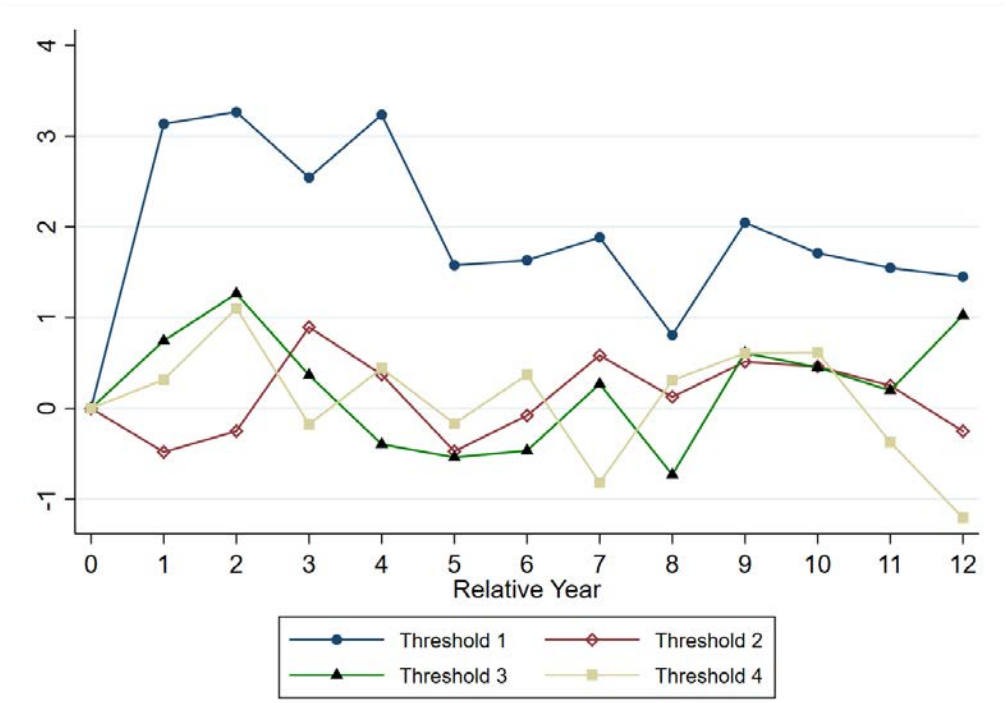
Notes: Figure plots the estimated patronage coefficients and 95 percent confidence intervals reported in columns (1) and (3) of Table 8.

Figure 9: Dynamic RD Patronage Effects on Wage Shares by Type of Occupation



Notes: Figure plots the estimated patronage coefficients and 95 percent confidence intervals reported in columns (5) and (7) of Table 8.

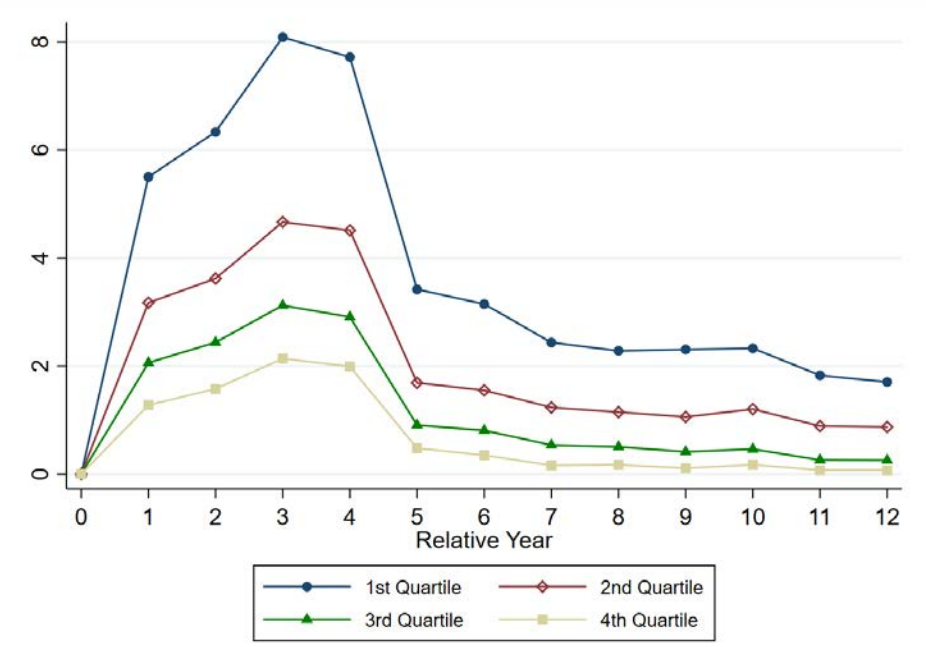
Figure 10: Differential Patronage Effects at Population Thresholds of Intergovernmental Transfers



Notes: Figure plots the estimated coefficients for leading parties of the winning coalitions in cities with population within 2% around 10,188 (threshold 1), 13,584 (threshold 2), 16,980 (threshold 3), and 23,772 (threshold 4) inhabitants, comparing cities that receive more or less transfers.

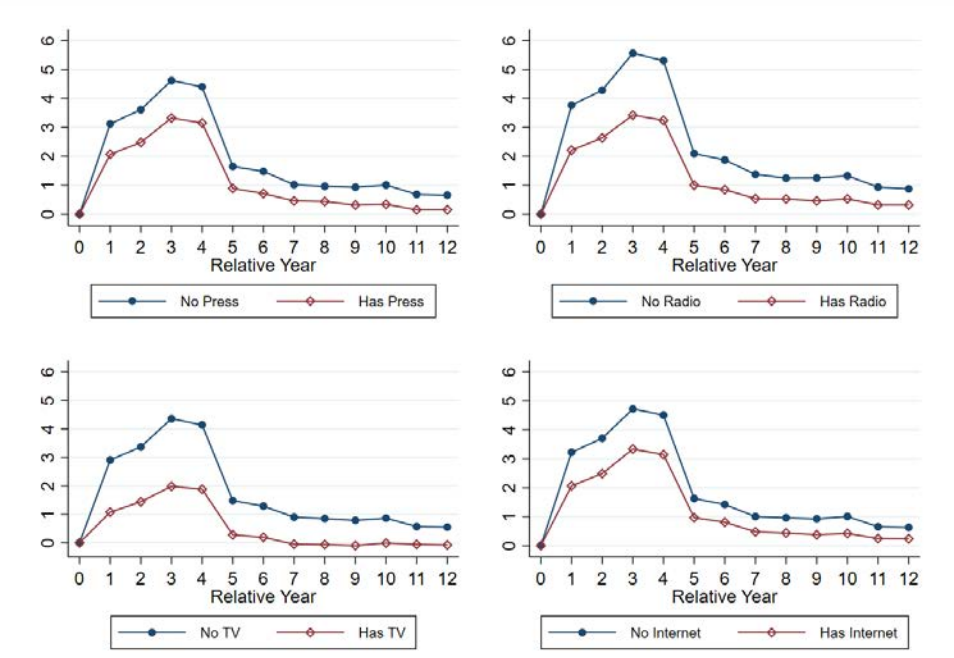
Figure 11: Accountability Channels: Effect on Patronage Share of Total Wages

A. City Size Interactions



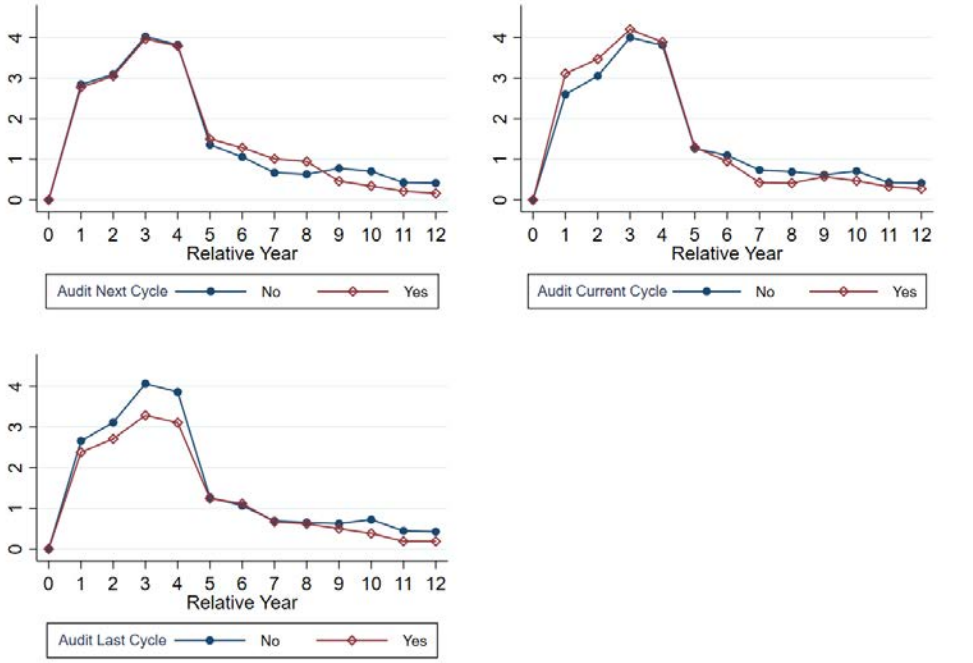
Notes: Figure plots the estimated coefficients for leading parties of the winning coalitions in cities with different sizes. Cities are classified into different groups (time invariant) based on its average population between 1995 and 2013.

B. Media Interactions



Notes: Figure plots the estimated coefficients for leading parties of the winning coalitions in cities with or without certain type of media. Each city is assigned a time invariant dummy for a given type of media based on data from a survey by the Brazilian Institute of Geography and Statistics.

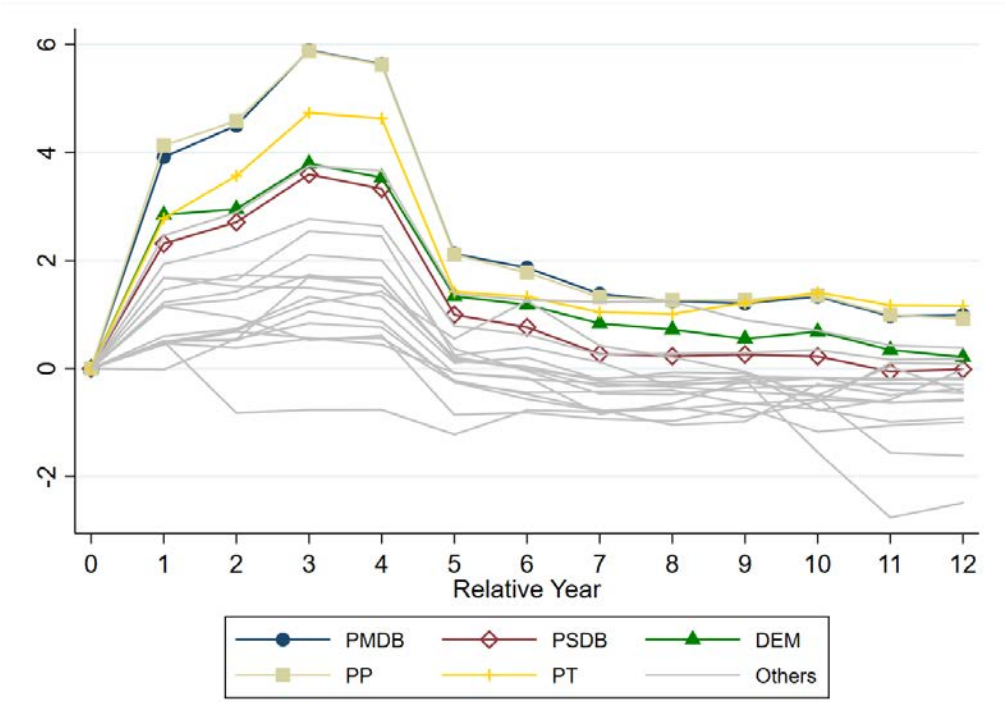
C. Audit Interactions



Notes: Figure plots the estimated coefficients for leading parties of the winning coalitions in cities with or without an audit in the next, current or last election cycle. Each election cycle begins with the year after an election and ends with the year of another election. If an audit happens in any year in an election cycle for a given city, then the currently (previously/next) elected party experiences an audit in current (last/next) cycle.

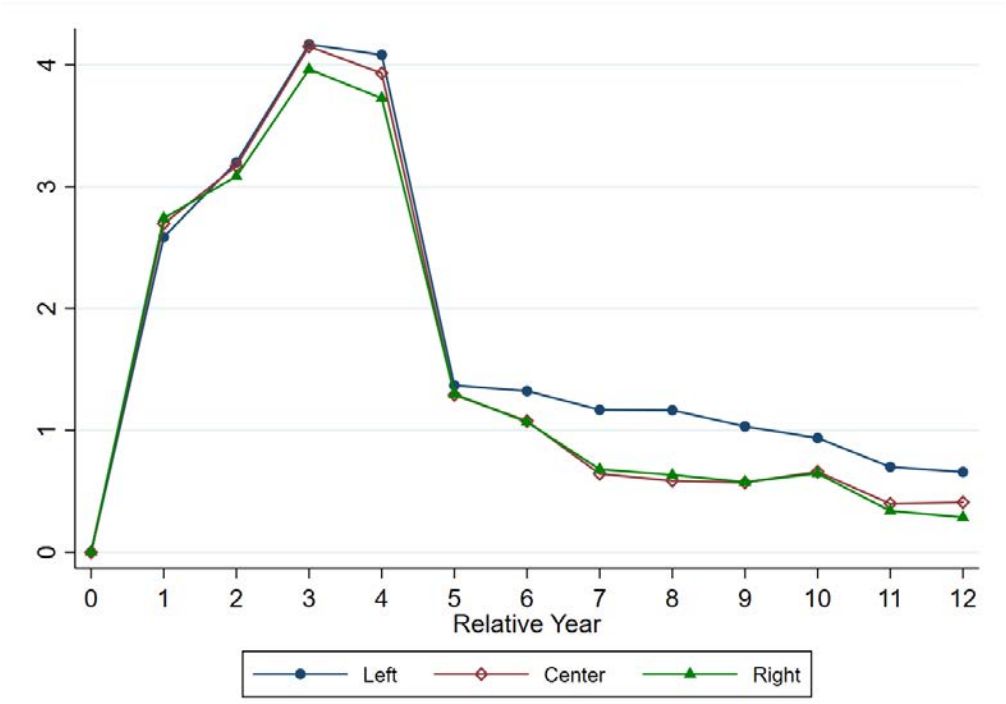
Figure 12: Political Economy Channels: Effect on Patronage Share of Total Wages

A. Party Interactions



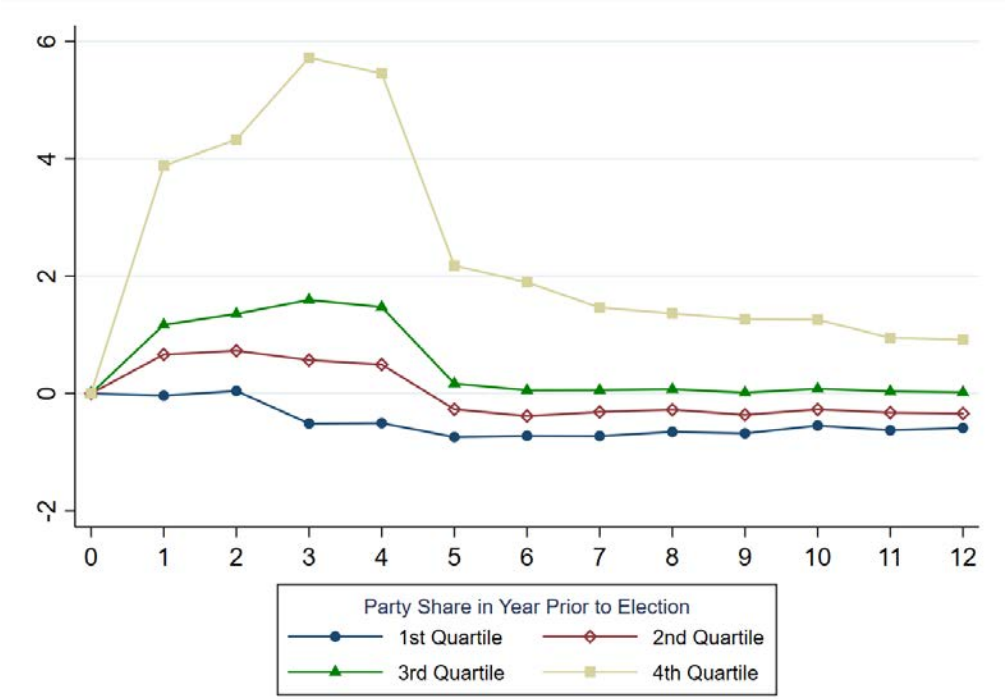
Notes: Figure plots the estimated coefficients for different parties being the leading in winning coalitions.

B. Ideology Interactions



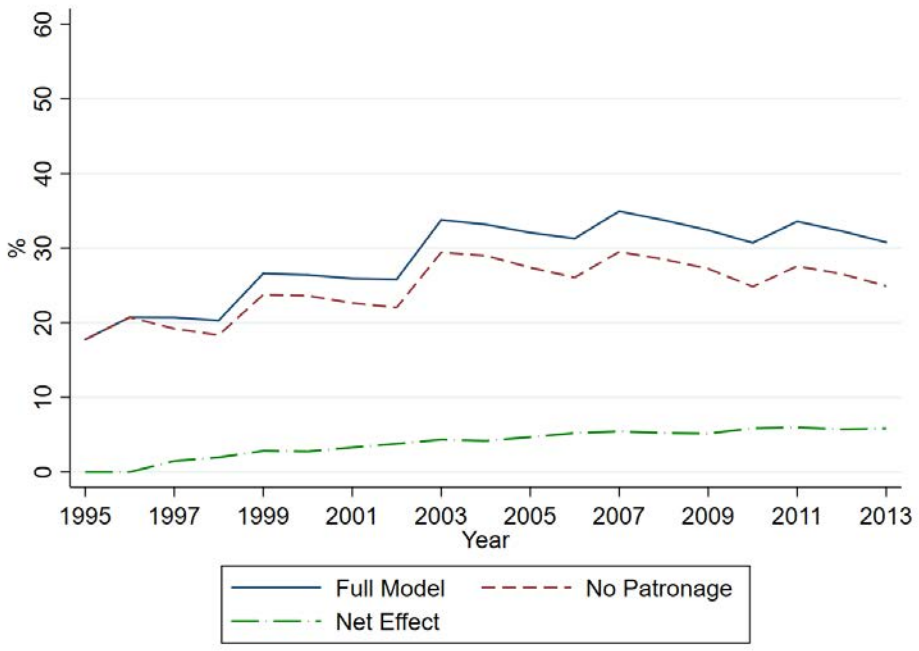
Notes: Figure plots the estimated coefficients for parties with different type of ideology that leads the winning coalitions. The ideology is based on Power and Zucco (2009, 2012, 2018) and remain constant 1995 and 2013.

C. Party Size Interactions



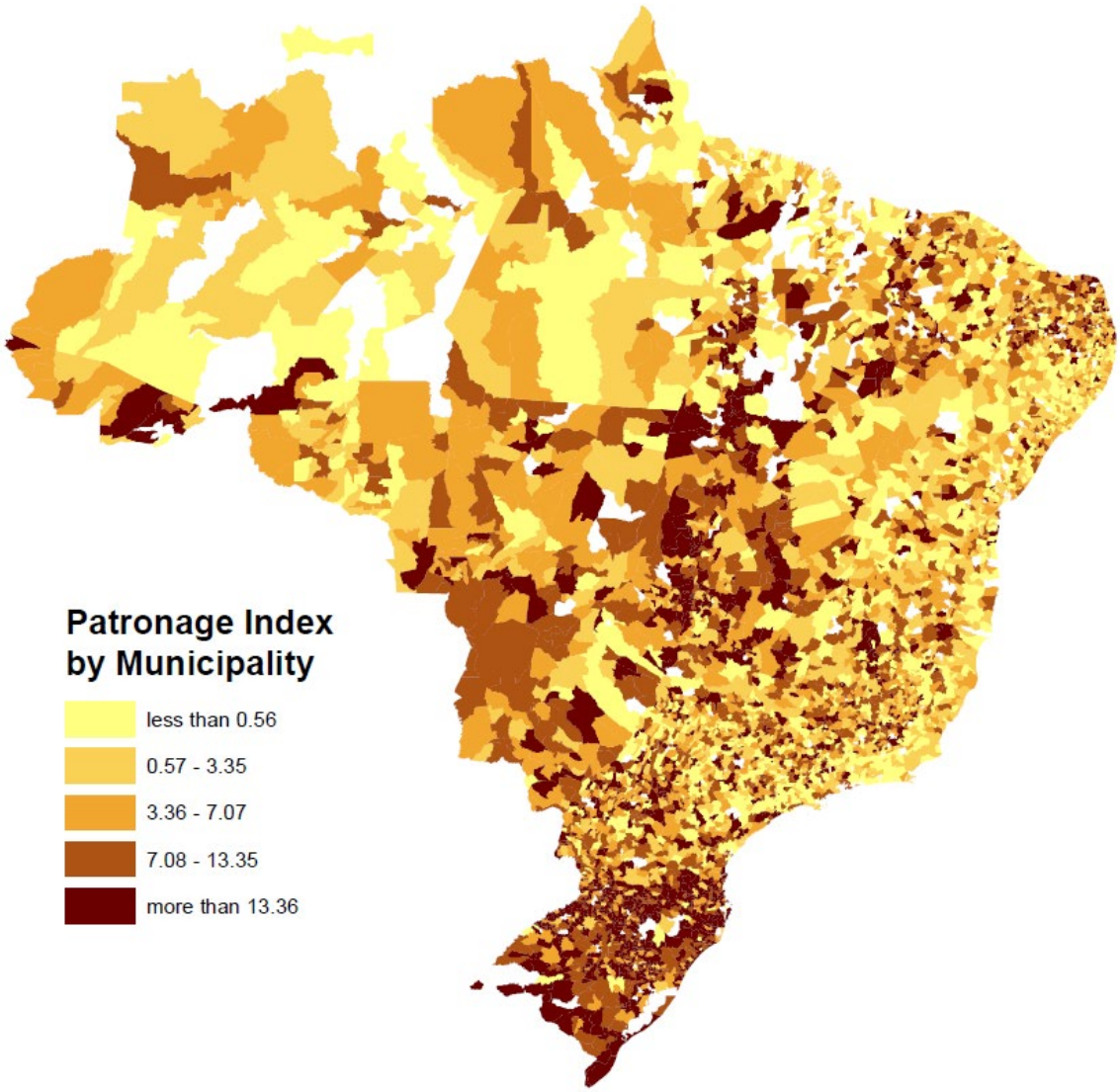
Notes: The figure plots the estimated coefficients for patronage effects for leading parties of different sizes. The size of a party is determined by its share of affiliates out of people with any party affiliation in the city for the year prior to an election.

Figure 13: Predicted Share of Public Employees with Party Affiliation - Prediction With and Without Patronage Variables



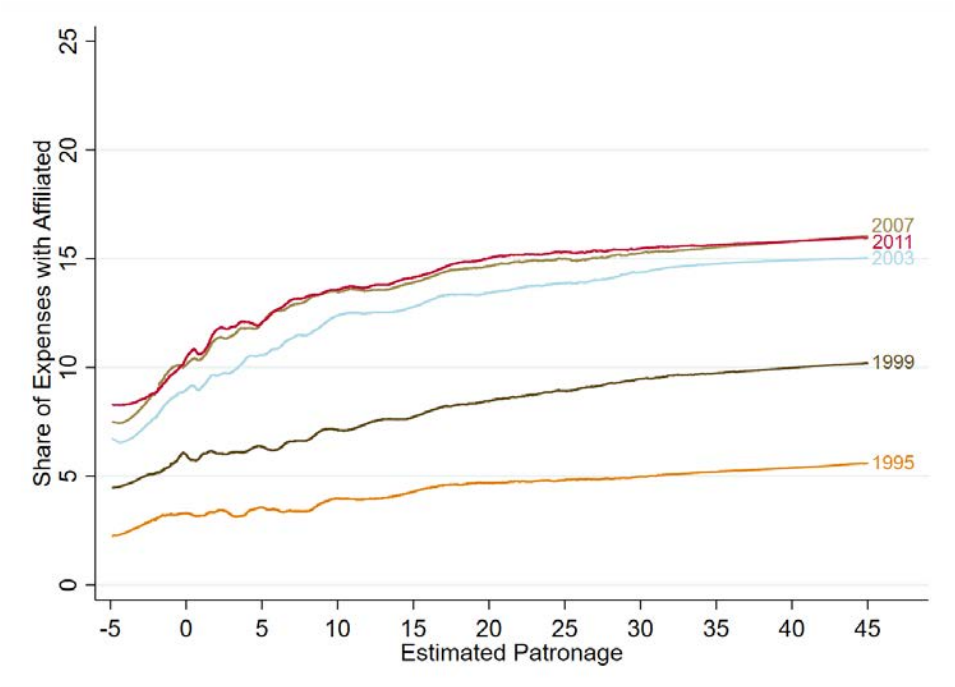
Notes: The full model refers to prediction of the regression presented in Column (5) and (6) of Table 4. No patronage refers to the prediction of the same regression but removing all patronage effect (relative year dummies). The net effect is the difference between the two predictions.

Figure 14: Estimated Patronage Index by Municipality by Quintile



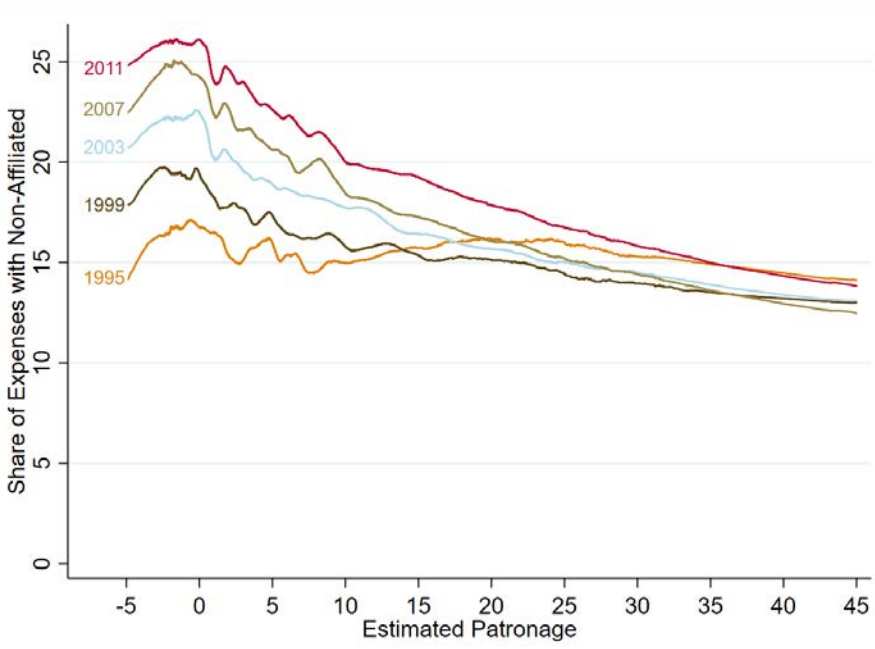
Notes: The map shows the estimated patronage effect by city in relative year 3, using the share of total wages of public employees affiliated with leading parties. Color scheme based on thresholds of quintiles of the index. White cities did not have enough data to estimate the index.

Figure 15A: Share of City Expenses with Affiliated Employees by Estimated Patronage



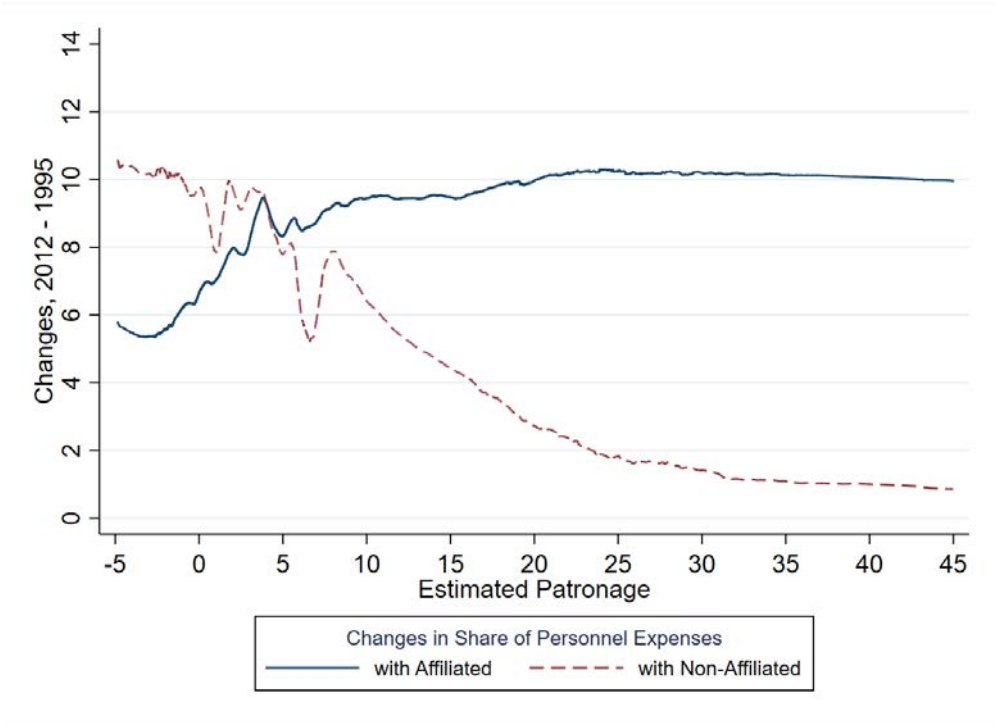
Notes: The figure plots the estimation of the relationship between the share of public expenses with affiliated public workers and the city-specific patronage indexes by year, using a kernel regression.

Figure 15B: Share of City Expenses with Non-Affiliated Employees by Estimated Patronage



Notes: The figure plots the estimation of the relationship between the share of public expenses with non-affiliated public workers and the city-specific patronage indexes by year, using a kernel regression.

Figure 15C: Long Changes in Share of City Expenses with Affiliated and Non-Affiliated Employees by Estimated Patronage



Notes: The figure plots the estimation of the relationship between the change, from 1995 to 2012, in share of expenses with affiliated and the and the city-specific patronage indexes (blue line), and relationship between the change in the share of non-affiliated public workers and the city-specific patronage indexes (red line). In both estimations we use a kernel regression approach.

Table 1: Summary Statistics by City-Year

	Mean	SD	Min.	Median	Max.	No.
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A - RAIS Employer-Employee						
Number of Public Employees	751	2,620	5.0	326	153,866	100,464
Number of Public Employees with Party	186	557	0.0	98.0	35,248	100,464
Share of Public Employees with Party (%)	29.1	11.5	0.0	28.0	80.0	100,464
Share of Appointed (%)	14.9	21.3	0.0	5.8	100	100,464
Share of Civil (%)	84.4	21.5	0.0	93.4	100	100,464
Share of Bureaucratic (%)	39.7	18.9	0.0	37.9	100	100,464
Share of Service Oriented (%)	53.9	18.4	0.0	54.9	100	100,464
Share of Wages to Public Employees with Party (%)	31.2	11.9	0.0	30.4	100	100,463
Share of Wages to Appointed (%)	15.8	21.1	0.0	7.7	100	100,463
Share of Wages to Civil (%)	83.6	21.4	0.0	91.7	100	100,463
Share of Wages to Bureaucratic (%)	37.0	18.5	0.0	34.2	100	100,463
Share of Wages to Service Oriented (%)	55.4	19.0	0.0	56.6	100	100,463
Panel B - Party Affiliation						
Number of Parties	12.55	5.95	0	12.00	32.00	100,464
Number of Party Members	2,040	8,476	0.0	890	544,676	100,464
Panel C - City Characteristics						
Total Population	32,690	194,853	696	10,841	11,821,873	100,436
Total Expenditure	1,472	1,819	1	1,249	287,100	90,287
Share Devoted to Personnel (%)	43	10	0	43	100	90,287

Notes: This table presents descriptive statistics for the Brazilian municipalities regarding their public employees, individuals party affiliation, population size and their public finances. Observations are collapsed to the city-year level and ranges from 1995 to 2013. *Total Expenditure*, and *Share Devoted to Personnel* in Panel C are based on the 2012 BRL, which are missing for 2013. Column (6) shows the number of city-year units used in the calculation.

Table 2: Summary Statistics of the Elections Data

	Mean	SD	Min.	Median	Max.	No.
	(1)	(2)	(3)	(4)	(5)	(6)
Number of Candidates	2.83	1.17	1.00	3.00	16	26,191
Average Number of Parties in Each Coalition	3.27	2.66	1.00	2.00	23	74,158
Vote Share of the First Coalition (%)	55.41	12.62	22.72	53.63	100	26,191
Vote Share of the Second Coalition (%)	38.86	8.47	0.02	40.69	50	25,359
Vote Share of the Third Coalition (%)	12.11	9.13	0.01	10.50	33	12,445
Mayor Re-elected (%)	31.11	46.30	0.00	0.00	100	20,632
Leading Party Re-elected (%)	32.83	46.96	0.00	0.00	100	20,632

Notes: This table presents descriptive statistics by city-year for all electoral years, with the exception of the variable *Average Number of Parties in Each Coalition*, shown at city-year-coalition level. Coalition information is not available in 1996. All parties that participated in the 1996 election were classified as a coalition with only one party. "Vote Share" is defined as (Each candidate's 1st round vote count / Sum of any available 1st round vote count)*100. Candidates are defined to be a "mayor-elected" if their final election status is elected. The 1996 data is not used in calculating re-elections variables because we don't have 1992 election data.

Table 3: Summary Statistics for Estimation Sample, Party-City-Year Level Data

	Mean	SD	Min.	Median	Max.	No.
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A - RAIS Employer-Employee						
Public Employees with Party Affiliation	5.58	35.86	0	0	8,115	3,315,312
Share of Public Employees with Party Affiliation	0.88	2.34	0	0	77.78	3,315,312
Share by Contract Type - Appointed	0.14	0.71	0	0	76.83	3,315,312
Share by Contract Type - Civil	0.73	2.04	0	0	77.78	3,315,312
Share by Occupation Type - Bureaucratic	0.37	1.17	0	0	50.59	3,315,312
Share by Occupation Type - Service Oriented	0.46	1.31	0	0	55.56	3,315,312
Share Wages of Public Employees with Party Affiliation	0.94	2.61	0	0	94.29	3,315,312
Share Wages by Contract Type - Appointed	0.17	0.86	0	0	68.08	3,315,312
Share Wages by Contract Type - Civil	0.77	2.23	0	0	94.29	3,315,312
Share Wages by Occupation Type - Bureaucratic	0.40	1.36	0	0	83.76	3,315,312
Share Wages by Occupation Type - Service Oriented	0.49	1.43	0	0	59.62	3,315,312
Panel B - Party Affiliation						
Number of Party Affiliates	61.48	549.26	0	0	129,712	3,315,312
Share of Party Affiliates (%)	3.03	6.50	0	0	100	3,315,312

Notes: This table presents descriptive statistics by party-city-year for the estimation sample. The denominator of the variable *Share of Party Affiliates* is anyone with a party affiliation within the city for a given year.

Table 4: Dynamic RD Effects of Winning Election on Total Number of Public Employees Affiliated with Coalition Parties

Winning Coalition	Leading	Supporting	Leading	Supporting	Leading	Supporting
	(1)	(2)	(3)	(4)	(5)	(6)
Relative Year: +1	21.377***	28.811***	18.417***	17.175***	17.273***	12.359***
	(0.699)	(0.799)	(0.409)	(0.838)	(1.980)	(1.532)
Relative Year: +2	22.518***	30.406***	19.354***	16.257***	18.342***	12.775***
	(0.615)	(0.786)	(0.458)	(1.033)	(1.421)	(1.667)
Relative Year: +3	28.057***	36.578***	24.439***	18.472***	23.430***	14.996***
	(0.707)	(0.885)	(0.458)	(1.033)	(1.543)	(1.832)
Relative Year: +4	28.740***	36.582***	25.260***	18.793***	24.227***	15.208***
	(0.768)	(0.888)	(0.458)	(1.033)	(1.663)	(1.829)
Relative Year: +5	20.309***	28.128***	18.172***	14.066***	17.568***	10.844***
	(0.574)	(0.776)	(0.459)	(1.033)	(1.587)	(1.703)
Relative Year: +6	19.373***	29.768***	18.048***	12.857***	17.585***	8.659***
	(0.690)	(0.931)	(0.532)	(1.327)	(1.971)	(1.344)
Relative Year: +7	19.584***	31.508***	18.181***	12.745***	17.716***	8.695***
	(0.712)	(0.990)	(0.531)	(1.327)	(2.061)	(1.449)
Relative Year: +8	19.321***	31.171***	17.935***	12.983***	17.476***	8.890***
	(0.658)	(1.023)	(0.532)	(1.330)	(1.908)	(1.515)
Relative Year: +9	20.326***	30.511***	17.052***	13.514***	16.556***	9.537***
	(0.756)	(1.112)	(0.532)	(1.330)	(1.872)	(1.512)
Relative Year: +10	19.753***	34.396***	18.212***	17.588***	17.437***	8.652**
	(0.883)	(1.485)	(0.662)	(2.123)	(2.608)	(2.806)
Relative Year: +11	19.379***	35.766***	18.367***	18.522***	17.613***	9.523***
	(0.932)	(1.555)	(0.662)	(2.123)	(2.820)	(2.773)
Relative Year: +12	18.909***	32.667***	18.538***	17.951***	17.776***	8.899***
	(0.915)	(1.416)	(0.662)	(2.123)	(2.777)	(2.558)
Vote Share	N		Y		Y	
Leading/Supporting Party	N		Y		Y	
Leading X Vote Share	N		Y		Y	
City, Year, Party FE	N		N		Y	
R-sq.	0.045		0.075		0.087	
No. Obs	3,315,312		3,315,312		3,315,312	

Notes: Columns 1 and 2 show estimates for a version of Equation 5 that only includes indicators for leading and supporting parties (of the winning coalitions) by years relative to the election. The model in columns 3 and 4 additionally includes a third degree polynomial of vote shares, leading and supporting party indicators, and the leading indicator interacted with the polynomial. Columns 5 and 6 refer to the complete model described by Equation 5 which also includes fixed effects for party, city, and calendar year. The coefficients for supporting parties are multiplied by 3.301, which is the average number of supporting parties with marginal victory/loss < 5%. Standard errors are clustered at city level.

Table 5: Dynamic RD Effects of Winning Election on the Share of Public Employees Affiliated with Coalition Parties

Winning Coalition	Leading	Supporting	Leading	Supporting	Leading	Supporting
	(1)	(2)	(3)	(4)	(5)	(6)
Relative Year: +1	4.532***	3.998***	1.419***	0.703***	1.492***	1.093***
	(0.050)	(0.046)	(0.022)	(0.046)	(0.055)	(0.050)
Relative Year: +2	4.919***	4.552***	1.869***	0.931***	1.960***	1.393***
	(0.056)	(0.056)	(0.025)	(0.056)	(0.063)	(0.066)
Relative Year: +3	6.002***	5.216***	2.748***	0.977***	2.840***	1.456***
	(0.066)	(0.063)	(0.025)	(0.056)	(0.072)	(0.069)
Relative Year: +4	5.843***	5.001***	2.675***	0.908***	2.766***	1.383***
	(0.065)	(0.059)	(0.025)	(0.056)	(0.070)	(0.066)
Relative Year: +5	3.624***	3.034***	1.023***	0.241***	1.199***	0.670***
	(0.044)	(0.043)	(0.025)	(0.056)	(0.058)	(0.059)
Relative Year: +6	3.525***	3.156***	0.813***	0.106	1.029***	0.621***
	(0.047)	(0.050)	(0.029)	(0.073)	(0.069)	(0.076)
Relative Year: +7	3.294***	3.004***	0.447***	-0.152*	0.665***	0.383***
	(0.045)	(0.050)	(0.029)	(0.073)	(0.071)	(0.079)
Relative Year: +8	3.116***	2.812***	0.389***	-0.175*	0.606***	0.343***
	(0.044)	(0.050)	(0.029)	(0.073)	(0.069)	(0.076)
Relative Year: +9	2.919***	1.964***	0.414***	-0.218**	0.593***	0.330***
	(0.042)	(0.046)	(0.029)	(0.073)	(0.062)	(0.073)
Relative Year: +10	2.902***	2.159***	0.493***	0.040	0.642***	0.535***
	(0.047)	(0.069)	(0.036)	(0.116)	(0.075)	(0.122)
Relative Year: +11	2.623***	1.921***	0.269***	-0.033	0.419***	0.465***
	(0.046)	(0.069)	(0.036)	(0.116)	(0.075)	(0.125)
Relative Year: +12	2.480***	1.783***	0.253***	-0.043	0.400***	0.452***
	(0.044)	(0.066)	(0.036)	(0.116)	(0.073)	(0.125)
Vote Share	N		Y		Y	
Leading/Supporting Party	N		Y		Y	
Leading X Vote Share	N		Y		Y	
City, Year, Party FE	N		N		Y	
R-sq.	0.300		0.361		0.475	
No. Obs	3,315,312		3,315,312		3,315,312	

Notes: Columns 1 and 2 show estimates for a version of Equation 5 that only includes indicators for leading and supporting parties (of the winning coalitions) by years relative to the election. The model in columns 3 and 4 additionally includes a third degree polynomial of vote shares, leading and supporting party indicators, and the leading indicator interacted with the polynomial. Columns 5 and 6 refer to the complete model described by Equation 5 which also includes fixed effects for party, city, and calendar year. The coefficients for supporting parties are multiplied by 3.301, which is the average number of supporting parties with marginal victory/loss < 5%. Standard errors are clustered at city level.

Table 6: Dynamic RD Effects of Winning Election on Share of Total Wages Public Employees Affiliated with Coalition Parties

Winning Coalition	Leading	Supporting	Leading	Supporting	Leading	Supporting
	(1)	(2)	(3)	(4)	(5)	(6)
Relative Year: +1	5.718***	4.608***	2.560***	1.416***	2.637***	1.829***
	(0.058)	(0.050)	(0.025)	(0.050)	(0.064)	(0.056)
Relative Year: +2	6.085***	5.140***	2.990***	1.667***	3.087***	2.156***
	(0.065)	(0.063)	(0.028)	(0.063)	(0.073)	(0.073)
Relative Year: +3	7.228***	5.767***	3.916***	1.505***	4.015***	2.014***
	(0.075)	(0.066)	(0.028)	(0.063)	(0.083)	(0.076)
Relative Year: +4	6.953***	5.463***	3.715***	1.330***	3.812***	1.835***
	(0.074)	(0.063)	(0.028)	(0.063)	(0.081)	(0.073)
Relative Year: +5	3.859***	3.057***	1.081***	0.267***	1.270***	0.720***
	(0.046)	(0.043)	(0.028)	(0.063)	(0.064)	(0.063)
Relative Year: +6	3.755***	3.199***	0.847***	0.158*	1.077***	0.700***
	(0.050)	(0.053)	(0.032)	(0.079)	(0.077)	(0.083)
Relative Year: +7	3.510***	3.027***	0.467***	-0.142	0.700***	0.419***
	(0.049)	(0.056)	(0.032)	(0.079)	(0.080)	(0.086)
Relative Year: +8	3.320***	2.869***	0.425***	-0.168*	0.657***	0.376***
	(0.047)	(0.053)	(0.032)	(0.079)	(0.077)	(0.083)
Relative Year: +9	3.061***	1.888***	0.422***	-0.261**	0.614***	0.314***
	(0.044)	(0.050)	(0.032)	(0.079)	(0.067)	(0.079)
Relative Year: +10	3.087***	2.123***	0.521***	0.079	0.680***	0.601***
	(0.050)	(0.073)	(0.040)	(0.129)	(0.082)	(0.132)
Relative Year: +11	2.755***	1.868***	0.255***	0.023	0.415***	0.551***
	(0.050)	(0.076)	(0.040)	(0.129)	(0.083)	(0.142)
Relative Year: +12	2.626***	1.779***	0.242***	0.003	0.400***	0.531***
	(0.048)	(0.073)	(0.040)	(0.129)	(0.080)	(0.139)
Vote Share	N		Y		Y	
Leading/Supporting Party	N		Y		Y	
Leading X Vote Share	N		Y		Y	
City, Year, Party FE	N		N		Y	
R-sq.	0.319		0.370		0.474	
No. Obs	3,315,312		3,315,312		3,315,312	

Notes: Columns 1 and 2 show estimates for a version of Equation 5 that only includes indicators for leading and supporting parties (of the winning coalitions) by years relative to the election. The model in columns 3 and 4 additionally includes a third degree polynomial of vote shares, leading and supporting party indicators, and the leading indicator interacted with the polynomial. Columns 5 and 6 refer to the complete model described by Equation 5 which also includes fixed effects for party, city, and calendar year. The coefficients for supporting parties are multiplied by 3.301, which is the average number of supporting parties with marginal victory/loss < 5%. Standard errors are clustered at city level.

Table 7: Decomposition of Patronage Effects by Type of Employee

	Decomposition			
	(1)	(2)	(3)	(4)
Employee status in previous year:	No party, no employment	No party, employed	Party, no employment	Party, employed
Panel A. Patronage Share, Employees				
Leading party rel. year: 1	0.074	0.062	0.582	0.282
Leading party rel. year: 2	0.113	0.080	0.539	0.269
Leading party rel. year: 3	0.261	0.144	0.379	0.216
Leading party rel. year: 4	0.284	0.145	0.373	0.198
Support party rel. year: 1	0.045	0.051	0.622	0.281
Support party rel. year: 2	0.081	0.069	0.594	0.257
Support party rel. year: 3	0.205	0.088	0.497	0.210
Support party rel. year: 4	0.236	0.092	0.487	0.184
Panel B. Patronage Share, Wages				
Leading party rel. year: 1	0.049	0.044	0.520	0.386
Leading party rel. year: 2	0.079	0.064	0.501	0.355
Leading party rel. year: 3	0.200	0.135	0.378	0.286
Leading party rel. year: 4	0.220	0.141	0.371	0.268
Support party rel. year: 1	0.029	0.036	0.532	0.403
Support party rel. year: 2	0.052	0.052	0.527	0.369
Support party rel. year: 3	0.146	0.080	0.457	0.316
Support party rel. year: 4	0.174	0.091	0.451	0.284

Notes: (1) refers to "Employees had no party affiliation and no public employment in the previous year in each city", (2) refers to "Employees had no party affiliation but had public employment in the previous year in each city", (3) refers to "Employees had some party affiliation, but no public employment in the previous year in each city", and (4) refers to "Employees had some party affiliation and had public employment in the previous year in each city.

Table 8: Dynamic RD Effects by Type of Labor Contract, Type of Occupation and Administration Function - Effect on Share of Total Wages

	Appointed		Civil		Bureaucratic		Service Oriented	
Winning Coalition	Leading	Supporting	Leading	Supporting	Leading	Supporting	Leading	Supporting
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Relative Year: +1	1.333***	0.990***	1.294***	0.829***	1.854***	1.185***	0.677***	0.548***
	(0.030)	(0.026)	(0.055)	(0.050)	(0.039)	(0.033)	(0.034)	(0.033)
Relative Year: +2	1.325***	1.023***	1.751***	1.119***	2.231***	1.545***	0.757***	0.518***
	(0.032)	(0.033)	(0.063)	(0.063)	(0.045)	(0.043)	(0.038)	(0.043)
Relative Year: +3	1.557***	0.918***	2.439***	1.086***	2.264***	1.083***	1.566***	0.812***
	(0.037)	(0.036)	(0.070)	(0.066)	(0.047)	(0.043)	(0.045)	(0.046)
Relative Year: +4	1.394***	0.792***	2.402***	1.037***	2.067***	0.914***	1.544***	0.789***
	(0.035)	(0.036)	(0.068)	(0.063)	(0.044)	(0.040)	(0.045)	(0.046)
Relative Year: +5	0.228***	0.158***	1.040***	0.558***	0.505***	0.290***	0.655***	0.327***
	(0.026)	(0.030)	(0.057)	(0.056)	(0.035)	(0.036)	(0.037)	(0.043)
Relative Year: +6	0.117***	0.122***	0.961***	0.578***	0.395***	0.241***	0.629***	0.406***
	(0.030)	(0.036)	(0.069)	(0.076)	(0.043)	(0.050)	(0.044)	(0.053)
Relative Year: +7	0.029	0.053	0.672***	0.366***	0.091*	0.109*	0.548***	0.274***
	(0.035)	(0.040)	(0.069)	(0.076)	(0.044)	(0.050)	(0.049)	(0.059)
Relative Year: +8	0.020	0.056	0.639***	0.323***	0.074	0.096*	0.525***	0.257***
	(0.033)	(0.036)	(0.066)	(0.076)	(0.040)	(0.046)	(0.047)	(0.059)
Relative Year: +9	-0.047	-0.050	0.661***	0.363***	0.092**	0.102*	0.471***	0.185***
	(0.028)	(0.033)	(0.059)	(0.069)	(0.034)	(0.043)	(0.043)	(0.056)
Relative Year: +10	-0.051	-0.036	0.730***	0.637***	0.146**	0.182*	0.497***	0.363***
	(0.034)	(0.056)	(0.073)	(0.119)	(0.046)	(0.076)	(0.048)	(0.083)
Relative Year: +11	-0.090*	-0.053	0.504***	0.597***	0.093*	0.323***	0.316***	0.155
	(0.038)	(0.059)	(0.071)	(0.122)	(0.043)	(0.069)	(0.056)	(0.109)
Relative Year: +12	-0.067	0.007	0.465***	0.522***	0.081*	0.343***	0.306***	0.119
	(0.034)	(0.056)	(0.068)	(0.122)	(0.039)	(0.069)	(0.053)	(0.106)
Vote Share	Y		Y		Y		Y	
Leading/Supporting Party	Y		Y		Y		Y	
Leading X Vote Share	Y		Y		Y		Y	
City, Year, Party FE	Y		Y		Y		Y	
R-sq.	0.195		0.418		0.356		0.401	
No. Obs	3,315,312		3,315,312		3,315,312		3,315,312	

Notes: Columns 1 and 2 (3 and 4 / 5 and 6 / 7 and 8) show estimates for the complete model described by equation 5 with share of wages to appointed (civil/bureaucratic/service oriented) public employees as the dependent variable. The coefficients for supporting parties are multiplied by 3.301, which is the average number of supporting parties with marginal victory/loss < 5%. Standard errors are clustered at city level.

Table 9: Changes in the Composition of Local Expenditures and City-Specific Patronage

	Changes in Share of Expenditures with				
	Personnel (FINBRA)	Personnel (RAIS)	Affiliated Personnel	Non-Affiliated Personnel	Investments
	(1)	(2)	(3)	(4)	(5)
Patronage Index	0.045	-0.010	0.153***	-0.178***	0.044
	(0.024)	(0.024)	(0.018)	(0.029)	(0.031)
R-sq.	0.241	0.174	0.242	0.240	0.237
State Fixed Effect	Y	Y	Y	Y	Y
Other Controls	Y	Y	Y	Y	Y
No. Obs	4,309	4,207	4,207	4,207	4,309

Notes: This table presents estimates of the 2012-1995 change in share of expenditures as a function of the estimated city-patronage index. Other controls include changes in city population and changes in total expenditures. Standard errors are clustered by state.