Political bureaucratic cycles:
How politicians' responses to electoral incentives and anti-corruption policies disrupt the bureaucracy and service delivery around elections*

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Abstract

A vast literature has studied political cycles in economic outcomes and economic policy tools (political business and political budget cycles, respectively). I identify a related phenomenon, which I call *political bureaucratic cycles*: electoral cycles in the hiring and firing of bureaucrats and in the activities of public employees, which emerge as a result of the combination of electoral incentives and legal rules imposed to limit the use of public employment for electioneering. Empirically, I leverage administrative, identified, contract-level data on the universe of municipal employees in Brazil between 2002 and 2016 to measure political bureaucratic cycles. Hires and dismissals of municipal personnel show markedly cyclical patterns around elections, which are shaped by both incumbents' electoral incentives and their reaction to well-meaning anti-corruption policies that constrain hiring and firing around elections. Cycles are most pronounced for temporary bureaucrats but are also detectable for civil service bureaucrats, which counters the received wisdom that civil service regimes isolate bureaucrats from political dynamics. Hiring and firing around elections are targeted at less educated people, which is consistent with political bureaucratic cycles partly responding to clientelistic strategies. Consistent with the clientelistic use of public employment, and the legal rigidities imposed on hiring around elections, pre-natal check-ups (a key output of the healthcare bureaucracy) are systematically lower around elections. Findings are grounded on, and complemented with, in-depth interviews with prosecutors, politicians and bureaucrats conducted in 7 states. The paper contributes to bridging the gap between the literatures on political budget/business cycles and on clientelism, two fields that have rarely been linked before.

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1 Introduction

For decades, political scientists and economists have studied how politicians' manipulation of economic policy around elections leads to cycles in economic outcomes and/or economic policy. The basic idea is that, in order to increase their chances of re-election, politicians change their economic policy right before the election, in what are often seen as economically suboptimal policy choices that un-smooth government spending and economic activity. This results in what are called political business cycles (related to economic output) or political budget cycles (related to government policy tools like spending).[1] Studying these cycles is useful not only because they have the potential to shape economic policy and outcomes, but also because they provide a window through which to study broader questions of accountability, democracy, and representation.

While this established research agenda has accumulated a significant body of formal models and empirical results – essentially showing that politicians manipulate economic policy variables in advance of elections, at least when they have both the incentives and the ability to do so–,[2] there are three significant gaps in the literature that this paper contributes to fill in. First, we still do not know much about the temporal dynamics of these cycles, largely because existing studies have used annual, bi-annual or at most quarterly data to measure cycles. Second, little is known about the strategic targeting of policy tools around elections (namely, who the winners and losers of political cycles are). Last but not least, few studies have established a connection between cycles in inputs or policy tools (such as spending or hiring), on one hand, and cycles in outputs and outcomes (such as public service delivery or human development). By leveraging administrative, contract-level data for the universe of municipal employees in Brazil, this paper contributes to filling these three gaps in the literature on political business/budget cycles, and to bridging the gap between this field to studies of clientelism.

I propose the concept of *political bureaucratic cycles* to refer to politically-produced cycles in both bureaucratic inputs (public sector jobs) and bureaucratic outputs (public employees' production). Jobs are one of the most important spending categories for governments around the world, and are one of the main distributive tools used by governments in developing countries. In fact, to try and constrain the use of public jobs as a clientelistic tool in general and especially around elections, several countries (including Brazil, the Philippines, and Colombia) have imposed legal

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[1]I focus on cycles caused (at least partly) by politicians' actions around elections, but there are also electoral cycles that are not driven by politicians' actions (Block and Vaaler, 2004), and political cycles that are not driven by elections (Guo, 2009).

[2]A detailed literature review is included in Appendix A.

constraints on governments' discretion to hire in the period immediately preceding an election. A fourth key contribution of this paper is to examine the relationship between cycles and these bans on hiring around elections.

My argument about political bureaucratic cycles (PBCs)[3] has four main elements. First, I retrieve an idea found in early formal models of PBCs but rarely addressed empirically if at all: that rules designed to contain PBCs may simply displace or even exacerbate them. I argue that PBCs are the result of the combined pressures of electoral incentives and legal constraints. In contexts where elections are competitive (such that electoral incentives are strong enough), legal constraints shape and displace, rather than contain, the cycles. From that basic idea and from the institutional design of the country I study – Brazil –, I deduce a number of hypotheses about the cyclical behavior of hires and dismissals in electoral years. Second, and in line with the traditional literature on PBCs, I argue that political bureaucratic cycles are stronger where politicians have the incentive and the ability to manipulate public employment. From that idea I deduce some hypotheses about how and why PBCs intensify in certain types of localities and for temporary contracts. Third, I propose a theoretical framework to examine the clientelistic nature of PBCs, bridging the gap between the literatures on PBCs and clientelism. From that exercise I deduce some hypotheses about the targeting of jobs during the electoral cycle. Fourth and last, I argue PBCs are best understood when we connect political inputs (such as public employment) and outputs (such as public service delivery). I hypothesize that because of the combined effects of electoral incentives, legal constraints, and clientelistic targeting, bureaucratic outputs and outcomes worsen around elections.

Empirically, I study political bureaucratic cycles in Brazilian municipalities, a context with extraordinarily detailed data on public employment. I exploit restricted-access, identified, contract-level data on the universe of municipal employees between 2002 and 2016 (a period with four election cycles), as well as administrative municipality-and-month-level data on bureaucratic outputs in the healthcare sector. I use time-series cross-section regressions of over 1 million municipality-month observations. The exogenous timing of municipal elections (which are held on the first Sunday of October every four years) and the inclusion of over 70,000 fixed effects to finely control for local conditions allow me identify the dynamics of political bureaucratic cycles. This empirical

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[3]Throughout the paper, I use the acronym PBCs to refer to the broad concept of political cycles, be it in economic outputs (political business cycles), economic policy tools (political budget cycles), or my proposed concept of cycles in bureaucratic inputs and outputs (political bureaucratic cycles).

strategy allows for much more disaggregated analyses that have been possible until now.[4] In fact, this is, to my knowledge, the first examination of PBCs using municipality-month data. The data also allow for a close examination of the strategic targeting of PBCs, which I start addressing by examining the educational and political background of those hired ahead of elections. These quantitative analyses are grounded on 121 in-depth interviews with prosecutors and with municipal secretaries of education, healthcare, social assistance, management, and finance across 7 states in Brazil conducted over 18 months of fieldwork. Interviews were critical for understanding how politicians' incentives and constraints interact to generate political bureaucratic cycles, to develop hypotheses, and to probe some of the mechanisms.

Regression results show that there are significant cycles in the hiring and firing of municipal bureaucrats around elections, which are consistent with politicians responding to *both* the electoral incentives and the legal constraints they face. The inflation of the bureaucracy does not take place in the months immediately before the election (when laws heavily constrain politicians' discretion in hiring) but earlier, in the months leading to the beginning of the personnel freeze. This suggests that rather than eliminating the cycles, the legal constraints shape them. Political bureaucratic cycles in hiring and firing appear much stronger where incumbents have the ability and the incentive to manipulate hiring, i.e. for temporary (rather than tenured) contracts, and where incumbents are exposed to higher levels of electoral competition. Some preliminary evidence of the targeting of jobs suggests political bureaucratic cycles are clientelistic in nature: low-education (and thus in expectation low-income) workers are more likely to be hired and fired around elections. Political insiders (measured as those who run for city council) are not more likely to be hired in the pre-electoral period. Finally, evidence shows that the production of healthcare bureaucracies (measured with the number of pre-natal checkups, a key output in the healthcare sector) worsens around elections. This is consistent with the legal constraints on hiring around elections and the use of hiring for electoral purposes jointly disrupting public service delivery, in a way that can hurt human development.

The rest of the paper is organized as follows. Section 2 describes Brazil's institutional context and explains why it is a particularly useful setting in which to study political bureaucratic cycles. Section 3 outlines a theory of political bureaucratic cycles, explains how it applies to the Brazilian context, and lists a number of testable hypotheses. Section 4 presents an empirical strategy to test

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[4]Most of the literature has traditionally used yearly time-series cross-section regressions. Labonne (2016) shows, using quarterly and yearly data from the Philippines, that the level of aggregation can make a dramatic difference in our ability to observe PBCs.

those hypotheses, including research design and data sources. Section 5 presents my quantitative results. Section 6 concludes by discussing the findings' implications and by outlining the next analytical steps.

2   Institutional setting

The political use of public employment is ubiquitous (Grindle, 2012; Kopecky et al., 2012; ?), and political cycles in public employment have been identified in contexts as diverse as the Philippines (Labonne, 2016), Indonesia (Pierskalla and Sacks, 2019), Greece (Chortareas et al., 2017), Scandinavia (Dahlberg and Mörk, 2011) and the United States (Cahan, 2019). Nonetheless, Brazil offers an unparalleled setting in which to measure the temporal dynamics and targeting of political bureaucratic cycles.

Brazil's 1988 constitution established a three-level federal system and gave significant fiscal autonomy to municipal governments. Among other things, municipalities are responsible for providing primary education and healthcare, two areas in which they are obliged to spend at least 40% of their revenue, as well as basic social assistance. Municipal governments, however, depend heavily on inter-governmental transfers and raise only a small fraction of the revenue they spend (Arretche, 2004). As per the constitution, municipal, state and federal elections are held every four years on the first Sunday of October, with municipal elections taking place two years after state and federal elections.[5] Importantly, this means that the timing of municipal elections is strictly exogenous. Since 1997, mayors are eligible for a second term only. The electoral system for mayoral elections is majoritarian, with a runoff election if no candidate obtains an absolute majority of the valid votes only in municipalities with over 200,000 inhabitants.[6]

Partly as a result of their obligations in the delivery of public services, municipal governments hire large numbers of bureaucrats. In fact, they spend in average about 60% of their income in salaries, and the average municipality has 5% of its overall population and 38% of the formal sector workforce employed by the local government.[7] Municipalities can hire bureaucrats essentially under three types of contracts: civil service positions (tenured positions for which candidates must pass a

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[5]The constitution of 1988 established that elections had to take place in the last 90 days of a mayor's mandate, but a 1997 constitutional amendment imposed the rule of first Sunday of October.

[6]Only 92 municipalities (less than 2%) reached that threshold in the 2016 municipal elections. When runoff elections do take place, they are held on the last Sunday of October, as per the 1997 constitutional amendment.

[7]My own calculations using administrative data on the universe of municipal employees in 2016.

competitive examination), temporary positions (positions typically for one year, which are supposed to be assigned after some selection process but are often assigned ad hoc), and positions of trust (for which politicians have most discretion, but which must be used only for advisory, direction, and leadership positions). As per the constitution, civil service hiring must be the default for any permanent staffing needs, such as teachers or doctors, but in practice this varies widely. However, the laws allow politicians to hire even for such positions using temporary contracts when there are reasons of extraordinary public interest – a somewhat vague constraint that is often abused. Other important constraints on hiring are a limit on personnel expenses (which are not to go over 54% of revenue for any executive government), the need to do some selection procedure for temporary hires, and the ban on any person holding more than two government jobs.

Two laws constrain municipal government's discretion for hiring around elections: the Fiscal Responsibility Law and the Electoral Law. These laws, which were all approved before 2001, have correlates in similar legal provisions in other countries like Colombia or the Philippines. The Fiscal Responsibility Law (LRF, *Lei de Responsabilidade Fiscal*) was approved as a response to pressures for monetary and fiscal discipline, and problems of fiscal asymmetry between the three levels of the federation (Loureiro and Abrucio, 2004). The most important provision for the purposes of PBCs is that it mandates personnel expenses not to increase during the 180 days before the end of a government's mandate, i.e. roughly three months before and after the elections. The goal was to limit the potential fiscal costs of governments' electioneering through the hiring of bureaucrats. The electoral law, on the other hand, forbids hiring, firing or transferring bureaucrats 3 months before and after the election, with the exception of positions of trust, and forbids salary adjustments that exceed inflation during the whole election year. The intention of the law is to prevent behaviors that would hurt the equality of opportunity of candidates running for office. The result of these two laws, which act from different rationales (one fiscal and one electoral) is a period of roughly 3 months before and after the elections in which it is significantly harder for municipalities to hire and fire, with few exceptions. Additionally, the Ineligibilities law mandates that no public employee can run for office, such that employees who wish to run for office need to take paid leave (if they are tenured) or simply abandon their jobs (if they are not tenured) 3 or 6 months before the election, depending on their post. The candidacy of people who are still government employees during the said period can be challenged before electoral courts.[8]

The Fiscal Responsibility Law and the Electoral law establish tough penalties for violation

[8]A more detailed description of the legal limits on hiring and firing is included in Appendix **??**.

Figure 1: Timeline of election cycles in Brazil
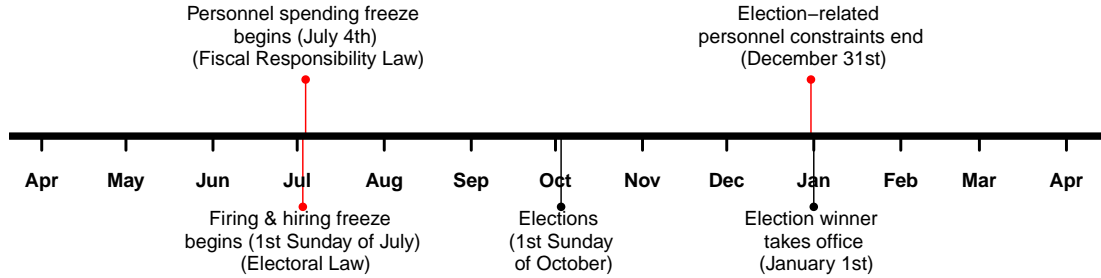
of these rules, sometimes referring to the penalties in other pieces of legislation.[9] For example, mayors who do not comply with the constraints on hiring around elections are subject to penalties of 1-4 years of prison, losing their post, and being disqualified for election for 5 years. Mayors and other local officials are held accountable by multiple instances, including the state audit court and the state prosecutor's office (*Ministério Público*), which was prosecutors deployed throughout the territory. For example, a secretary of management in a municipality in Rio Grande do Norte said that prosecutors "are very well informed [of government abuses] because the opposition is strong and they often report. [Prosecutors] receive reports from opposition city councilors."

Recent examples demonstrate that these laws are enforced. For example, the former mayor of Chupinguaia in the northern state of Rondônia was condemned in July of 2017 to 18 months of prison for increasing personnel expenses during the last 180 days of his mandate. The former mayor of Marília in the southeastern state of São Paulo, who happens to be the brother of the current President the Brazilian Supreme Court, was recently condemned also for increasing personnel expenses towards the end of his mandate. As a result, his political rights were suspended for 8 years, he was stripped of any public jobs he may had held, he was forbidden from contracting with public governments for 5 years, and he was imposed a fine equivalent to twice the financial loss to the municipality resulting from the increases in personnel. The mayor of Maragogipe in the northeastern state of Bahia was condemned in October 2017 to pay a fine of over USD16,000[10] for dismissing 104 temporary workers shortly after the election.[11] Politicians I interview often complain about the large amounts of time and energy they spend responding to requests from the state audit court and, especially, the prosecutor's office. It is common for them to complain that prosecutors

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[9]Including a decree from 1967, the penal code, the 1992 administrative dishonesty law, and the 2002 fiscal crimes law.

[10]BRL 53,000 in October 2017.

[11]Judicial decisions for these three cases are available here.

exceed their powers in controlling public officials. For instance an secretary of administration in Rio Grande do Norte said: "sometimes they fall short of taking the mayor's pen", as a metaphor for taking executive authority.

3 Theory and hypotheses

I view political bureaucratic cycles as resulting of the strategic behavior of politicians who are election-motivated and who have their choices constrained (significantly but not completely) by legal and fiscal limits. The theory applies especially to low- and middle-income contexts, where the returns to the political use of public employment are likely to be higher for two main reasons. In less developed contexts, where there are fewer job opportunities in the private labor market, the value of public jobs as a political currency increases. Second, governments in less developed contexts have less state capacity to distribute other benefits (such as human development services or infrastructure works) that may be valued by citizens but require more planning, more implementation capacity, and more coordination with higher levels of government and with the private sector. In these settings, therefore, the political value of public is also higher. Nonetheless, my theory could also apply high-income countries, and there is indeed evidence of political cycles in employment in OECD countries (Dahlberg and Mörk, 2011; Chortareas et al., 2017; Cahan, 2019). The theory and hypotheses emerged jointly from my reading of the literature (which I review in more detail in Appendix A) and my interviews with prosecutors, politicians and bureaucrats.

My theory is innovative in two respects. First, I build on an early contribution of the formal literature that has rarely been empirically tested and argue that legal limits aimed at constraining PBCs simply displace them (and may even exacerbate them). I argue that when electoral incentives are sufficiently powerful and politicians have administrative capacity to manipulate policy (two conditions that usually hold in settings of competitive elections, some state capacity, and legal constraints that "freeze" a policy instrument during a determined period of time around the election), legal constraints shape but do not remove PBCs. Simply put: if the incentives are strong enough, politicians will anticipate the freeze and manipulate policy when they are allowed to. Second, I connect theories of PBCs with theories of clientelism – two fields that have rarely been linked before. I argue that whether PBCs are clientelistic depends on three dimensions of public employment: *who* is being hired, *when*, and for *what* tasks. I develop each of these points below, while spelling out testable hypotheses for the empirical analysis.

3.1 Political bureaucratic cycles as a product of electoral incentives and legal constraints

Most if not all of the literature on political business/budget cycles sees them as being suboptimal policy choices, and assumes that fiscal constraints imposed to contain them are welfare enhancing. I argue however that these limits may simply displace or even exacerbate PBCs, at least in contexts where politicians both the incentive and the ability to manipulate policy around elections. With sufficiently powered electoral incentives, and competence in the use of public resources that experience gives, incumbents will work around the legal limits to engage in PBCs to boost their re-election chances. While the idea of fiscal limits having undesirable consequences was already present in one of the most cited formal contributions in the literature, it has not received much attention since. Rogoff (1990) noted that PBCs may be a socially efficient mechanism for diffusing information about the government's competence. For instance, by boosting spending or employment, an incumbent may signal his ability to govern the economy. In his own words, "efforts to curtail the cycle can easily reduce welfare, either by impeding the transmission of information or by inducing politicians to select more socially costly ways of signaling" (Rogoff, 1990, 22).[12] Rogoff goes on to note (and argue formally) that "in practice, an incumbent has a wide array of fiscal actions with which he can signal, and it is not realistically possible to constrain him in all dimensions. If this is the case, then attempts to block signaling in one set of fiscal policy instruments will tend to exacerbate distortion in others. Indeed, attempts to suppress the political budget cycle may actually reduce the welfare of the representative citizen by inducing competent types to signal inefficiently" (Rogoff, 1990, 31).

My first high-level hypothesis is that, despite the strong constraints imposed by the Fiscal Responsibility Law and the Electoral Law, there are political bureaucratic cycles in Brazilian municipalities, which are in fact partly shaped by those constraints. While I do not directly test for the effect of legal constraints in this paper, since they are stable during the period I study, I test a number of hypotheses about cycles that do stem from this idea that rules to control PBCs can have unintended consequences. In particular, I expect to find that the size of the bureaucracy expands in the second quarter of an electoral year (*hypothesis 1a*), ahead of the personnel freezes, because of incumbents' desire to use municipal employment to maximize their chances of re-election, and their anticipation of the legal limits. I expect hiring and firing to decrease in the third quarter, in line with the constraints imposed by the law (*hypothesis 1b*). Following interviews, I expect the

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[12]A similar idea was put forward by Tufte (1978, 149).

bureaucracy to contract further in the fourth quarter of the year (*hypothesis 1d*), after the elections are held, as a result of incumbents' preoccupation with complying with fiscal discipline rules.

The second high-level hypothesis I advance is that political bureaucratic cycles are most pronounced where politicians have both the ability and the incentives to manipulate hiring. In particular, I hypothesize political bureaucratic cycles to be more intense where the incumbent mayor is eligible for re-election (*hypothesis 2a*) and exposed to higher electoral competition (*hypothesis 2b*), since incumbents will have more electoral incentives to manipulate hiring. I also hypothesize that cycles will be more pronounced for temporary than for tenured contracts (*hypothesis 2c*), since politicians face less legal constraints for manipulating temporary employment, as explained in Section 2.

3.2 Political bureaucratic cycles as a clientelistic phenomenon: A two-dimensional framework

At face value, political bureaucratic cycles may appear as a clientelistic phenomenon. Scholars of clientelism have long studied the critical role that jobs pay in clientelistic equilibria (Wilson, 1961; Chubb, 1982; Auyero, 2001; Golden, 2003; Stokes et al., 2013). In fact, jobs have been argued to be a particularly valuable clientelistic exchange since they are a targetable and reversible channel for redistributing income (Robinson and Verdier, 2013). I argue however that jobs are a unlike any other benefit, given the potential of the labor force being used in a programmatic way. In this section I develop a framework distinguishing two dimensions of the distribution of public jobs around elections: who is hired, and for what tasks. This two-dimensional framework allows for a more nuanced understanding of the clientelistic nature of political bureaucratic cycles, and can guide its empirical assessment in different contexts. In so doing, this section links the literatures on PBCs and on clientelism, two fields that have rarely been connected before.[13]

The first dimension of the clientelistic nature of PBCs is the mechanism through which jobs are distributed, along a continuum between more and less meritocratic criteria. The second dimension is the way in which the government uses that newly acquired labor force, where there is a continuum between more programmatic work and pure rent extraction. On one end, if hires increase ahead of the election but their distribution is meritocratic and employees are being asked to deliver public services to the whole population, PBCs may be a rent seeking phenomenon (in that politicians are using public employment to increase their chances of re-election) but not clientelistic (in as

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[13]To my knowledge, the only studies of PBCs that establish a direct dialogue with the clientelism literature are Hanusch and Keefer (2014) and Pierskalla and Sacks (2019).

much the public bureaucracy is expanding to the benefit of all). On the other extreme of the spectrum, if hires increase ahead of the election merely to put public money into the pockets of political supporters and/or to boost their campaigning abilities, PBCs would be closer to pure rent seeking. An intermediate scenario would be one where political supporters are hired for delivering public services, thus mixing clientelistic and programmatic strategies. Table 1 offers a typology of political bureaucratic cycles based on these two dimensions of clientelism around jobs.[14]

Table 1: A two-dimensional typology of political bureaucratic cycles

		Main criterion for allocating job:	
		Merit / ability	Political support
Main use of labor force:	Public service delivery	*Programmatic PBC*	*Hybrid PBC*
	Politically selective service delivery and/or political campaign		*Political machine PBC*

Further connecting the literatures on clientelism and PBCs is useful in at least two fronts. First, given the importance of elections to clientelism, examining political bureaucratic cycles can help us understand the reasons for the persistence of patronage systems (Grindle, 2004) and their decay (Weitz-Shapiro, 2012). Second, the conceptual and theoretical tools of the clientelism literature can be mobilized for examining who benefits from PBCs.[15] In particular, micro-level data like the one available in the Brazilian context can be leveraged to study whether PBC-driven new hires are targeted at mobilizing core supporters or at activating those who would not otherwise support the government, an issue that has received both theoretical and empirical attention in the clientelism literature (Nichter, 2008; Stokes et al., 2013). Third and last, examining the clientelistic nature of political bureaucratic cycles allows for better normative, political, and developmental assessments of the phenomenon in different countries. For example, one may hypothesize that the political bureaucratic cycles identified in Scandinavia (Dahlberg and Mörk, 2011) are closer to the programmatic ideal type than those identified in the Philippines (Labonne, 2016). Testing that hypothesis however requires an examination of how the jobs are targeted and how the labor force is used, which the Brazilian data enables to some extent.

[14]This typology builds on, and departs from, the conceptualization of distributive politics put forward by Stokes et al. (2013, 7). The authors differentiate non-programmatic politics targeted at individuals by whether benefits are contingent on individuals' political support (if not, they call it nonconditional benefits) and, if they are, by whether benefits are targeted at party members (which they call patronage) or at voters at large (which they call vote buying or turnout buying).

[15]The issue of who benefits from PBC's is rarely addressed in the literature, with one rare exception being Khemani (2004).

In Brazil, public employment in small and medium municipalities has long been seen as a clientelistic phenomenon. This is reflected in old and new academic literature (Leal, 1948; ?), and commonly emerges in interviews. The adviser to a judge in a municipality of Ceará told me that "at the time of elections, these small municipalities of the interior turn into two sides [...] because of people's need for municipal contracting of services and hiring of personnel." A secretary of education in another municipality of the state said "in municipalities in this area, politics is very influential [on hiring], since [the municipal] government is the largest employer." Following this idea, I hypothesize that political bureaucratic cycles in Brazil are eminently clientelistic. Now, what kind of clientelistic strategy do political bureaucratic cycles follow? ? propose a two-dimensional framework based on whether the receipient of a good is a supporter or not, and whether they are inclined to vote or not. As a first empirical approximation, I hypothesize that if PBCs are aimed mostly at buying votes or turnout, we should observe that those hired before the elections have lower levels of education (*hypothesis 3a*), since clientelistic efforts are rationally targeted to poorer voters (Stokes et al., 2013). If PBCs are aimed at mobilizing core supporters, we should observe that people who previously ran for city councilor are more likely to be among those hired ahead of elections (*hypothesis 3b*). [16]

3.3 Political bureaucratic cycles in bureaucratic outputs and outcomes

Electoral incentives for manipulating the bureaucracy ahead of elections, legal constraints to do so, and clientelistic strategies could all contribute to a decline in service delivery around elections. First, if the legal constraints reduce politicians' discretion at hiring and firing around elections, it may be harder to manage bureaucracies effectively. Second, elections may draw political and labor resources away from the normal running of bureaucratic activities, with efforts of politicians, bureaucrats, or both, focused on electioneering. Third and last, to the extent that PBCs are clientelistic the induction of core supporters into the bureaucracy may make it harder for professionals to work and decrease their motivation to exert effort. On the other hand, if PBCs are programmatic in nature, one would observe an improvement of service delivery ahead of elections, at least in areas that are highly visible and/or salient to voters. Following interviews, I hypothesize that bureaucratic outputs (*hypothesis 4a*) and outcomes (*hypothesis 4b*) contract, instead of expand, ahead of elections.

[16]In the future I will also test the targeting of jobs by previous labor market experience, by type of job, and by family ties to political supporters.

4   Research design

To test these hypotheses on political bureaucratic cycles, I leverage time-series cross-section regressions using micro-level data of all municipal employees between 2002 and 2016 described in Section 4.2. Hypotheses were developed based on the literature, Brazil's institutional environment (and in particular a close reading of the relevant laws), and dozens of in-depth interviews with agents in the field, in a variety of economic and political contexts. In particular, I interviewed municipal secretaries of healthcare, education, management,[17] and finance; street-level managers in healthcare, education, and social assistance;[18] and state prosecutors, in municipalities across seven states in Brazil (Ceará, Rio Grande do Norte, Paraíba, Goiás, Rio de Janeiro, Minas Gerais and São Paulo).

4.1   Identifying political bureaucratic cycles

I follow the common practice in the PBC literature and estimate time-series cross-section models with indicators for the periods before and after the election, and controlling for a lag of the dependent variable. I improve on existing approaches in the literature by controlling quite flexibly for seasonality and local shocks by including month and municipality-year fixed effects, which is made possible by my highly disaggregated data at the municipality-month level in the period 2002-2016. I estimate the following equation leveraging over 1 million municipality-month observations:

$$Y_{iym} = \sum_{j=2}^{J} \alpha_j \mathbf{I}[j = iy] + \sum_{n=2}^{12} \theta^n \mathbf{I}[n = m] + \sum_{p=1}^{12} \beta^p D_{iym}^p + \gamma Y_{iym-1} + \varepsilon_{iym} \qquad (1)$$

Y_{iym} is a given outcome (for example, the number of new contracts or dismissals) for municipality i in year y in month m. $\sum_{j=2}^{J} \alpha_j \mathbf{I}[j = iy]$ is a set of municipality $\times$ year fixed effects, which flexibly control for municipality-and-year-specific characteristics (such as levels of economic or political development), as well as for municipality-specific yearly shocks that may affect hiring, such as variations in municipal government revenue or local labor markets. $\sum_{n=2}^{12} \theta^n \mathbf{I}[n = m]$ is a set of month fixed effects, which control for monthly shocks common to all municipalities and thus account for underlying seasonality in public employment (for example, due to fiscal-year trends).[19]

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[17]Municipal secretaries of management (*administração* are in charge of human resource management.

[18]By street-level managers (Gassner and Gofen, 2018) I refer to leaders of street-level service provision organizations like schools, health clinics, and social assistance centers. My interviews and survey with them are more fully described in Toral (2019a).

[19]I take January as the baseline category, so the January fixed effect θ_1 drops from the estimating

D_{iym}^p is an indicator for whether observation iym belongs to electoral cycle period p, where electoral cycle periods are defined as the 12 months between April of an election year and March of the post-election year, i.e., roughly 6 months before and after the first round municipal elections. β^p are the coefficients corresponding to those 12 electoral cycle periods. Y_{iym-1} is a lag of the dependent variable.[20] Finally, ε_{iym} is an idiosyncratic error term. I cluster standard errors at the municipality level to allow for arbitrary serial correlation and heteroskedasticity.

The coefficients for the electoral cycle periods, β^p, identify the presence of PBCs as long as the timing of elections is independent of the potential outcomes of observation iym or, more formally, $D_{iym} \perp\!\!\!\perp \{Y_{iym,1}, Y_{iym,0}\}$, where $Y_{iym,1}$ is the potential outcome of observation iym under elections and $Y_{iym,0}$ its potential outcome without elections. The fact that since 1998 elections in Brazil always take place on the first Sunday of October, as per the constitution, makes treatment exogenous in this setting. On the other hand, the treatment is not probabilistic, since elections take place at the same time for all municipalities. This would be particularly worrying if we did not have data for multiple electoral cycles, such that we could not separate seasonality and election effects – in that case, for example, we would not be able to tell whether public employment decreases in the fall due to elections or to an idiosyncratic shock that coincided with elections. One might still worry about confounding, but with four municipal election cycles in the period I study (2002-2016), it is hard to think of a confounder that would be unrelated to elections but would systematically alter patterns of bureaucratic inputs and outputs every four years, coinciding with the municipal electoral season.[21]

I estimate Equation 1 with a number of dependent variables. For my baseline models, I use the flow of contracts (new contracts and dismissals) and the stock of contracts, for all contracts, for tenured contracts, and for non-tenured contracts. These are count variables with a skewed distribution, so I use a natural log transformation, adding 1 in order to keep the observations with zeroes since the log of 0 is undefined.[22] I also examine political bureaucratic cycles in numbers not equation.

[20]While the inclusion of a lagged dependent variable and fixed effects may raise concerns about Nickell bias (Nickell, 1981), this sort of bias is proportional to $1/T$, where T is the number of periods in the panel, and is thus negligible in this setting, with over 179 periods in baseline models. Moreover, Beck and Katz (2011) show that, with a large T, OLS outperforms the usual instrumental-variable corrections such as the one proposed by Arellano and Bond (1991).

[21]Nonetheless, I am exploring the possibility of exploiting supplementary elections, which are called at other points in time in a small fraction of municipalities, for example where October elections have over 50% of null votes, or when the winner's candidacy is declared invalid ex post.

[22]I then show robustness to alternative solutions such as not logging the dependent variable, logging it

of contracts but of unique individuals and of Brazilian reais corresponding to contracts (as per their mean salary). Finally, I switch from examining bureaucratic inputs (jobs) to studying bureaucratic outputs and outcomes. I do so by exploiting municipality-month data on healthcare outputs and outcomes available from the Ministry of Healthcare, from 1995 to 2016. Here I focus on pre-natal checkups[23] and on child and infant deaths due to avoidable causes.[24]

To measure heterogeneity in PBCs, I expand the regression in Equation 1 to include covariates that the literature suggests condition PBCs, including the level of electoral competition (measured by the fragmentation of mayoral votes in the previous election, using a Herfindahl index),[25] whether the mayor is in their first term (and thus eligible for re-election), the mayor's partisanship (using the three-categories classification of parties of Power and Zucco Jr (2009)), whether the mayor is a co-partisan of the President, and whether the mayor is re-elected. In the case of electoral competitiveness, which is the only continuous variable, and in order not to impose linearity (Hainmueller et al., 2018), I generate a dummy variable based on whether an observation is at or above the median. To examine heterogeneity in PBCs, I interact contextual variables with both the electoral-cycle period dummies and the month fixed effects, as per the equation below:

$$
\begin{aligned}
Y_{iym} = & \sum_{j=2}^{J} \alpha_j \mathbf{I}[j = iy] + \sum_{n=2}^{12} \theta^n \mathbf{I}[n = m] + \sum_{p=1}^{12} \beta^p D_{iym}^p + \gamma Y_{iym-1} + \\
& + \sum_{k=1}^{K} \left(\sum_{n=2}^{12} \phi_n^k C_{iym}^k \mathbf{I}[n = m] + \sum_{p=1}^{12} \delta_p^k C_{iym}^k D_{iym}^p + \lambda_k C_{iym}^k \right) + \varepsilon_{iym}
\end{aligned}
\tag{2}
$$

Where C_{iym}^k is the value that observation iym takes on the kth covariate, either 1 or 0. Coefficients δ_p^k correspond to the difference in the association between each election cycle period dummy and the outcome of interest for units where the kth contextual variable is present and those where it is not. Note that the base term of the contextual variables C_{iym}^k drops out of the estimating equation in most cases because it is perfectly collinear with the municipality $\times$ year fixed effects.[26]

and dropping observations with zeroes, and using a non-linear model.

[23]Data for pre-natal checkups is only available until 2015.

[24]In the future I plan to examine other healthcare variables, especially home visits of nurses and doctors.

[25]The Herfindahl index is a common metric of market fragmentation, defined as $H = \sum_{n=1}^{N} v_n^2$, where N is the number of candidates for mayoral elections and v_n is their vote share.

[26]The exception being alignment with the President, the only contextual variable that has within-year, within-municipality variation.

4.2 Data

I exploit three sources of administrative data. First, micro-level data of the universe of municipal jobs, obtained from the Ministry of Labor. Second, administrative data on elections and candidates' characteristics, from the Supreme Electoral Court (TSE). Third, data on healthcare outputs and outcomes at the municipality-month level, from the Ministry of Healthcare.

The main data source is the Ministry of Labor's RAIS dataset (*Relação Anual de Informações Sociais*), which includes the universe of formal labor market contracts, from 1985 to 2016, with employer and individual identifiers. All employers, including municipal governments, are legally obliged to enter data for all their employees in RAIS. Nowadays this is typically done by generating a file at the end of the year, using human resources management software, and submitting it to the Ministry of Labor. As bureaucrats at the Ministry of Labor and at two secretariats of management explained to me, politicians are pressured to enter contracts into RAIS because without that report to the federal government the employee's eligibility for a public pension or for PASEP (a transfer for low-paid public employees) is compromised.

For each contract, the data contain among other variables the employer and the employee's unique identifiers; the date of hire and fire;[27] the contract's type, the job's professional category, hours, and salary; and the employee's age and level of education.[28] I use municipal government employer ID's[29] to identify municipal employees. As shown in Table 2 in the Appendix, for each year RAIS contains data on millions of contracts in municipal employment, roughly two thirds of which correspond to tenured civil servants. The table also illustrates two important limitations of the dataset. First, between 1 and 5 percent of the municipalities do not show up as having any employee. Second, unique identifiers for employees are very low quality in 2002, and unavailable before that date. I thus focus my analyses in the period 2002-2016. In order to keep panels balanced, I exclude from the analyses observations corresponding to the 661 municipalities that, in at least one of the years between 2002 and 2016, showed up as having 0 employees in the month of January, including municipalities that did not exist in the beginning of the period.[30] This leaves me with a balanced panel of 4,909 municipalities, 73,647 municipality × year and month fixed effects,

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[27]For some years the data reports the day, month and year, while for others only the month and year is reported. This determines the need to analyze data at the monthly level.

[28]There is more information about RAIS on http://www.rais.gov.br/.

[29]Municipal employer ID's (CNPJ, *Cadastro Nacional da Pessoa Jurídica*) were obtained from the Ministry of Finance's National Secretariat of the Treasury (STN, *Secretaria do Tesouro Nacional*).

[30]The number of municipalities has grown from 4,491 in 1991 to 5,570 today.

and 878,711 observations for baseline models.[31]

For bureaucratic outputs I use data from the Ministry of Healthcare at the municipality-month level. First, as a measure of bureaucratic outputs I look at the number of pre-natal checkups done by doctors or nurses, at clinics or at home.[32] As a measure of bureaucratic outcomes I look at the number of deaths for children aged 1-4 due to avoidable causes, namely those attributable to weaknesses in the healthcare system.[33] While in the future I plan to examine other existing measures of healthcare outputs and outcomes, pre-natal, infant and child health are meaningful variables to start with since they are critical for human development and have significant variation in Brazil.[34] Despite significant improvements over the past few decades, child health figures continue to be alarming in some areas of Brazil. By 2010, child mortality rates was still 1.72% for the whole of Brazil (compared to 0.5% in high-income countries), with some municipalities having rates around 5%. Similarly, maternal mortality is still relatively high, at about 64 deaths for every 100,000 live births in 2016 (compared to 4 in Finland). Adequate pre-natal care is considered by the World Health Organization as a critical ingredient of effective healthcare systems and in particular to reduce maternal and infant mortality. Recent guidelines recommend 8 pre-natal checkups (WHO, 2016).

5 Results

I present give sets of results. First, I present results from estimating Equation 1 with different outcomes, which show that present results showing that municipal employment has marked patterns of political bureaucratic cycles, consistent with politicians responding to both legal constraints and electoral incentives. Second, I present results about conditional bureaucratic cycles stemming from

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[31]See Appendix C for a characterization of municipalities failing to report employment data to RAIS, and a discussion of the implications of this missing data issue. In essence, these are less developed municipalities where (for reasons of capacity, corruption, or both) PBCs should be more pronounced. To the extent that is true, their omission from my data biases my results towards zero.

[32]The data are collected by municipal secretariats of healthcare, consolidated by state governments, and cleaned by the federal government's Basic Healthcare Information System (SIAB, *Sistema de Informação da Atenção Básica*). More information is available here.

[33]The data are collected by municipal secretariats of healthcare using official death records, and reported to the federal government. The data are then aggregated in the Mortality Information System (SIM, *Sistema de Informações sobre Mortalidade*). More information can be found here.

[34]The inclusion of child and maternal mortality as highly visible indicators in the United Nations' Millennium Development Goals and the Sustainable Development Goals speaks to their relevance for the quality of healthcare systems and human development globally.

estimating Equation 2 on the logged number of contracts, by contract type. These results show that cycles are more pronounced in contexts of higher electoral competition, consistent with the hypothesis that cycles are most pronounced where politicians have the incentive to manipulate hiring. I also show that cycles are more pronounced for temporary contracts (where politicians have more discretion) than for civil service contracts. Third, I estimate Equation 1 with the share of employees with below-median education, thus showing that the pre-electoral expansion in hiring is targeted at less educated people. This is consistent with politicians targeting jobs in a clientelistic manner to low-income citizens. Next, I estimate Equation 1 with the share of employees who are core political supporters (measured as whether they run for city council), and find that they are more likely to be fired before the election and to be hired after it. Fifth and last, I present results from estimating Equation 1 with data on the number of pre-natal check-ups and the number of avoidable child deaths, respectively. Results show that outputs (but not outcomes) of the healthcare bureaucracy worsen before and after the election. This is consistent with PBCs having a negative correlate in public service delivery.

5.1 There are political bureaucratic cycles in hiring and firing, shaped by both electoral incentives and legal constraints

My baseline models examine the existence of political bureaucratic cycles in the inflow and outflow of the logged absolute number of contracts, by contract type (all, tenured, and non-tenured), following Equation 1 in page 12.[35] Figure 2 plots the coefficients of interest, namely the monthly election-cycle period fixed effects (the vector of β coefficients in Equation 1) together with their 99% confidence interval. I join each coefficient by a line that differs by contract type, with each line corresponding to a separate regression. Table 3 in page 49 in the Appendix presents the results of these nine regressions.[36] The results show that, net of overall seasonality and of highly granular local conditions (thanks to the inclusion of municipality $\times$ year fixed effects), hires and dismissals have cyclical patterns around elections, consistent with hypotheses 1a-1e. As expected, these patterns are significantly more pronounced for temporary contracts (for which politicians have higher degrees of discretion) than for tenured contracts (although these show cyclical patterns as well), which is consistent with hypothesis 2c.

Looking at the results for hires first (Figure 2a), we see that municipal governments expand

[35]Appendix E shows results for stock variables as well.
[36]For the sake of brevity, for all other models I only show results in figures.

Figure 2: Monthly election cycle effects on logged absolute number of contracts
Dots correspond to election cycle effects ($\hat{\beta}$ in Equation 1)
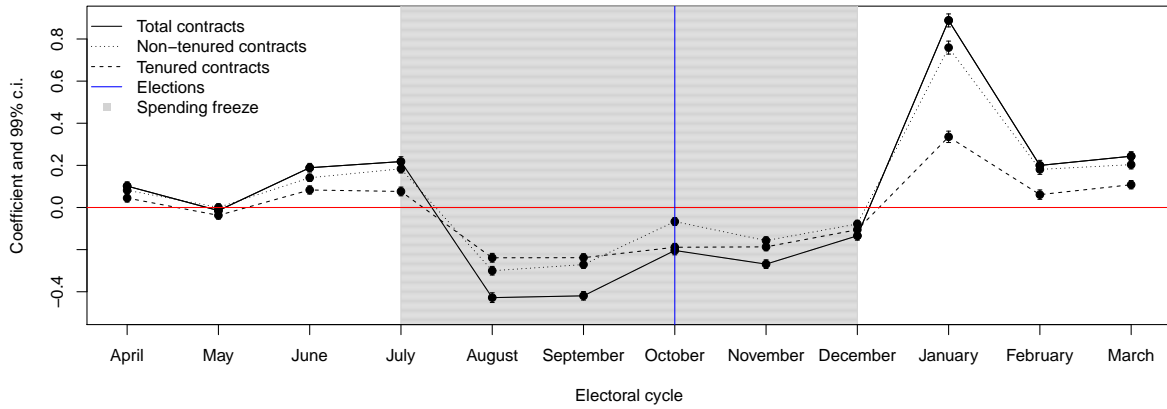
(a) Inflow of contracts
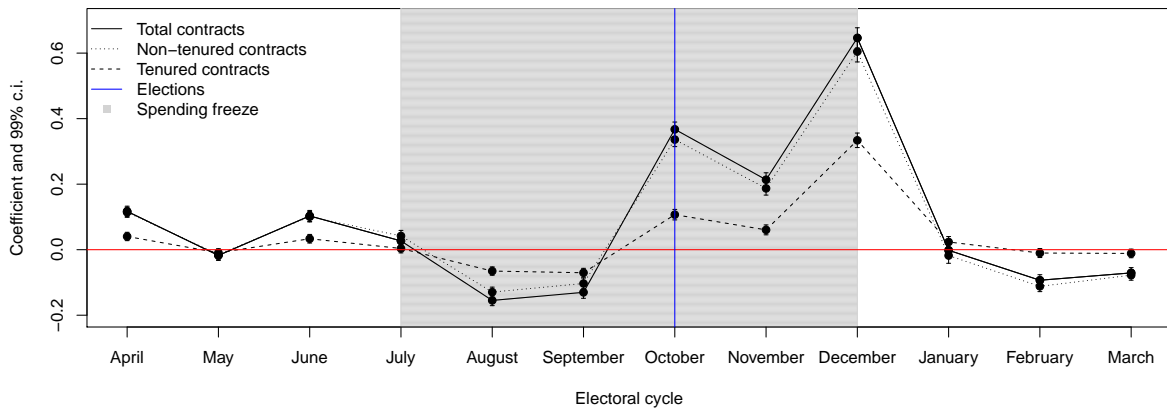
(b) Outflow of contracts

hiring in the months leading up to the legally binding personnel freeze, particularly in June and July.[37] Hires are then lower than in off-election years for the months under the personnel freeze, especially before the election but even after the election in October. This is consistent with politicians responding to legal constraints, especially at a time when horizontal accountability institutions (like state prosecutors and audit courts), media outlets, and opposition parties are likely to be particularly attentive to potential irregularities. Finally, there is a large peak of hires in the first few months of

[37]The spending freeze in the Fiscal Responsibility Law starts 180 days before the end of the mayor's mandate, i.e. on July 4th. The hiring and firing freeze in the Electoral Law starts 3 months before the election, i.e. on the first Sunday of July. Hires on the first of the month (which is the date when contracts tend to start) do not fall under the freeze period.

the post-election year, particularly in January, right after the spending freeze ends. These effects are statistically significant, in most cases with p-values below 2×10^{-16}.

The magnitude of these monthly election-cycle effects is large. Since the dependent variables are in the logged scale, coefficients are to be interpreted as follows: other things being equal, a municipality sees its outcome (e.g. hires) changed by $100e^{\hat{\beta}} - 100$ % in a given month of an electoral cycle. These effects are netted out of seasonality in municipal contracts (controlled for by month fixed effects) and of any municipality-specific effects that vary from one year to the next such as levels of economic or political development (controlled for by municipality $\times$ year fixed effects). For small coefficients (roughly, between -0.2 and 0.2), it is a fair approximation to interpret the coefficient, when multiplied by 100, as the percentage change in the dependent variable corresponding to that month in the election cycle.

To be specific, the results show that the number of new municipal contracts in June of an electoral year is, other things being equal, about 20.8% higher than in June of a non-electoral year $(p < 2 \times 10^{-16})$. This effect is stronger when we look only at non-tenured contracts (15.1%) than when we look at tenured contracts (8.6%). In contrast, hires in August are 34.8% lower in an electoral year than in a non-electoral year, other things being equal $(p < 2 \times 10^{-16})$. In December, hires are lower than in non-electoral years by about 12.6% $(p < 2 \times 10^{-16})$. In January of an election cycle (i.e. the first month of the post-election year, when the hiring freeze is no longer in place), hiring is, other things being equal, 143% higher than in a January that does not follow elections $(p < 2 \times 10^{-16})$. This major increase makes sense since it follows a 6-month period of personnel spending freeze and intensified vigilance over municipal finances. The expansion in the post-electoral year continues in February and March, with 22.1 and 27.6% more hiring than in the same months of non-post-electoral years respectively $(p < 2 \times 10^{-16})$.[38]

Contract outflows also show cyclical patterns, as can be seen in Figure 2b. Outflows increase in the months leading up to the freeze, which is consistent with politicians anticipating the prohibition to fire in the last 6 months of the year. Outflows then decrease in the pre-electoral half of the freeze period, in line with the legal constraint. Outflows however increase massively after the election, in line with interviewees that suggested politicians compensate for the pre-electoral inflation by

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[38]Temporary contracts in the education sector (the most important policy area in Brazilian municipal governments, both in terms of budget and of personnel) are often made later on, since the school year goes from March to December. Month fixed effects for all employees, healthcare employees and education employees are shown in Figures 21, 22 and 23 respectively, in Appendix J. That is probably another reason why why we see significant increases in hiring in February and March of post-electoral years.

terminating contracts in the last quarter of the year. To be specific, results show that in August of an electoral year there are 14.3% less outflows than in August of a non-electoral year, other things being equal ($p < 2 \times 10^{-16}$). On the other hand, outflows increase by 44.4 and 90.9 % in October and December of an electoral year respectively ($p < 2 \times 10^{-16}$), which is consistent with the hypothesis that municipal governments use the post-electoral months to adjust their finances for the fiscal year, after the pre-electoral expansions.

A few clarifications are due here. First, as noted in Section 2, positions of trust are not subject to the prohibition to fire contained in the Electoral Law. Second, some of these outflows may respond not to dismissals or ends of contracts, but rather to bureaucrats retiring or dying. These outflows however should not follow a cycle aligned with elections. Some of the outflows could however be due to bureaucrats' own decisions to leave before the end of a lame-duck mayor's term. Moreover, some of the outflows in April and July may be due to the restrictions of the Ineligibilities Law, which forces any municipal employees who are running for office to take leave of absence (if tenure) or renounce their post (if un-tenured). Nonetheless, as shown in Appendix F, the cycle of outflows is similar when subsetting only to outflows due to dismissals or dismissals and end of contract. While more work is needed analyzing outflows by reason, evidence suggests these political bureaucratic cycles in outflows are due mostly to actions of employers.

The effects shown in Figure 2 effects are irrespective of the outcome of the municipal elections held in October. In a separate paper (Toral, 2019b), where I use a close-races regression discontinuity design to show that an electoral defeat of the mayor exacerbates the contraction of the bureaucracy during the months before they leave office, and the expansion of the bureaucracy during the first few months of the incoming administration (partly to compensate for the previous contraction).

To sum up, results show that hires increase in spending years before the spending freeze, decrease during its duration, and increase again after the end of the freeze, while dismissals increase heavily in the months between the election and the end of the year. Results are robust to different operationalizations of the dependent variable.[39]

[39]To make sure that the cyclical patterns uncovered in Figure 2 are not driven by the particular way in which I operationalize the dependent variables, I replicated the analyses with different operationalizations. Results included in Appendix E show similar patterns when we look at the logged number of hires and dismissals as a share of the stock in that given month (Figure 9), the logged number of unique employees (Figure 10), the logged number of Brazilian reais corresponding to contracts' mean salaries (Figure 11), the un-logged absolute number of contracts (Figure 12), or the logged absolute number of contracts excluding

5.2 Political bureaucratic cycles are intensified where politicians have the ability and the incentives to manipulate employment

As shown in Figure 2, cycles are more pronounced for temporary than for tenured contracts, consistent with politicians concentrating efforts where employment is easier to manipulate. It may seem surprising that tenured contracts follow cyclical patterns, since civil service is often seen as isolating bureaucrats from political influence.[40] My quantitative results and my interviews in the field suggest that while tenured bureaucrats are more protected from political influence than non-tenured ones, they are not exempt from political dynamics. First, calls for hiring tenured bureaucrats are usually made by politicians, and thus the timing of hiring responds partly to political dynamics, also in high-income countries. Second, while hiring of tenured bureaucrats is usually more rule-bound than the hiring of temporary ones, the openings can still be targeted, for instance through general education or experience requirements. Third, exams for tenured bureaucrats are not immune to fraud and manipulation. Fourth, and this is not unique to the Brazilian context, the government is not obliged to hire those who pass a competitive examination for a tenured position. The government is legally obliged to hire in the order of performance in the exam, and to hire those approved for tenure before hiring temporary workers for the same job, but the timing of when those approved are made effective bureaucrats is often politically influenced (and may even depend on the relative placement of candidates in the exam). In fact, in a face-to-face survey of street-level managers I did representative of urban areas of all but the 17 largest municipalities in Rio Grande do Norte (n=926), over 33% of them said that politics influences quite a lot or a lot the hiring of tenured professionals.[41] As for dismissals, the constitution allows for the dismissal of tenured bureaucrats under certain conditions (e.g. judicial sentence, bad performance), although in practice most dismissals of tenured bureaucrats happen during the probationary period.

Beyond contract type, how do political bureaucratic cycles vary with the political context? A long literature on conditional PBCs has examined how factors such as political competition, partisanship, political alignment, or term limits affect the existence and magnitude of cycles. Despite the endogeneity problems that these kind of analyses have (noted in Section 4), here I present correlational evidence stemming from estimating Equation 2 with the following contextual variables interacted with the month fixed effects and the electoral-cycle month dummies: electoral com-

observations without adding 1 and thus omitting observations with a zero (Figure 13).

[40]In fact, some studies examine PBCs in tenured bureaucrats as a placebo test, e.g. Pierskalla and Sacks (2019).

[41]Survey details are discussed in Toral (2019a).

petition (as measured by whether a municipality had a Herfindahl index below the median in the previous election), whether the mayor is in their first term and thus eligible for re-election, whether the mayor belongs to a left-wing, center, or right-wing party, whether the mayor belongs to the party of the President, and whether the mayor is re-elected in October.[42] I run separate regressions for hires and dismissals, and for tenured and non-tenured contracts.

Figure 3: Conditional monthly election cycle effects on logged absolute number of non-tenured, municipal employees
Dots correspond to the interaction between election cycle effects and an indicator for municipalities with above-median levels of electoral competition ($\hat{\delta}$ in Equation 2)
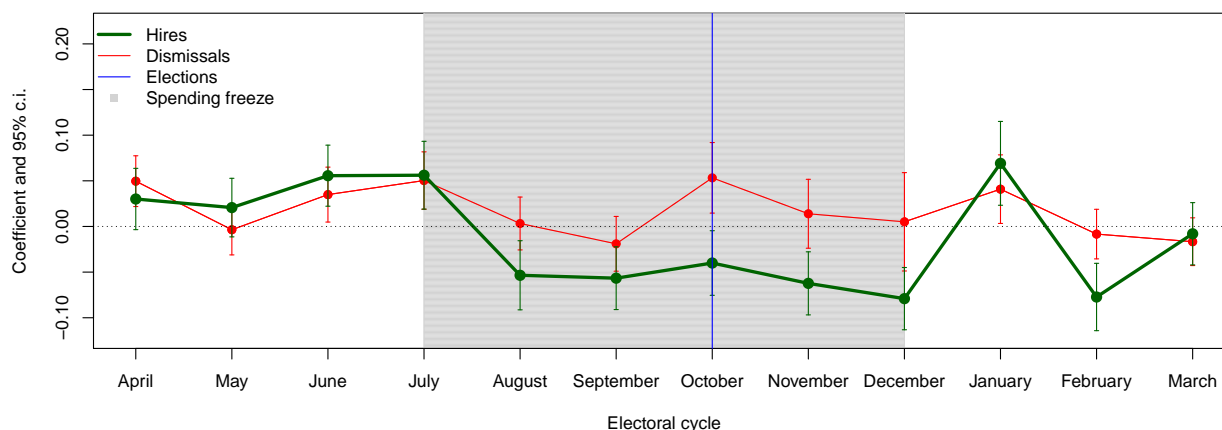
Of these seven variables, only three show somewhat consistent results: electoral competition, re-eligibility, and an electoral defeat of the mayor.[43] Results are, as expected, much more pronounced for temporary contracts (shown in Figure 19 below) than for tenured contracts (shown in Figure 20 in Appendix I), where red and green lines stem from different regressions. Results shown in Figure 19 suggest that incumbents who were elected under higher degrees of competition take – other things being equal – more pro-cyclical employment decisions, expanding both hiring and firing in June and July, and contracting hiring between August and December, more than in

[42]The choice of contextual variables included here responds to the literature and to data availability. In the future I will include other variables such as alignment with state government, poverty, and size of the municipal labor market as a share of the overall formal labor market.

[43]Results for re-eligibility and electoral defeat are included in the Appendix. Results for re-eligibility are quite imprecise. Results for electoral defeat are best measured using a close races regression discontinuity, as I do in an accompanying paper (Toral, 2019b). Results for the partisan variables are not included here for brevity, but are available from the author.

those same months off the electoral cycle when compared to incumbents elected under low levels of competition. This supports hypothesis 2b, and suggests that electoral incentives are associated to political bureaucratic cycles. While we cannot rule out these results respond to unobserved, time-varying confounders, the inclusion of the above-mentioned 7 contextual variables, together with month and municipality $\times$ year fixed effects, lends support to the hypotheses that electoral motivations boost political bureaucratic cycles.

5.3 The inflation and contraction of the bureaucracy around elections are targeted at less educated people

How do politicians target public employment decisions around the elections? And what can the data tell us about the clientelistic (versus programmatic) nature of such employment decisions? As a first approximation to these question, I examine PBCs in the share of municipal employees (hires, dismissals, and stock) with an education level above the median, i.e. more than a high school diploma. Results are shown in Figure 4.[44] Figure 4a shows that hires in June and July tend to have lower education levels on election years than off-cycle years, higher education levels between August and November, and again lower in January and February. This suggests that the pre-electoral inflation of the bureaucracy is targeted at individuals with low-education levels. This is consistent with hypothesis 3a and with these efforts being clientelistic, but could respond as well to politicians' desire to boost low-skill bureaucratic activities ahead of the election.[45]

On the other hand, considering that hires contract during the second semester of an electoral year, it is perhaps not surprising that those who get hired in that period tend to have higher educational backgrounds (for example, it may be easier to justify the need to hire a teacher than a cleaner during the duration of the legal freezes on personnel). Figure 4b suggests that the contraction of the bureaucracy between the election and the end of the year is at the expense of less educated workers, who may be the more dispensable ones and the ones who are more easily fired. This also helps understand why in the beginning of the post-electoral year hires tend to concentrate in the low-education spectrum. Overall, this examination of the education levels of those hired and fired during election cycles suggests that PBCs may be clientelistic in that they are targeted at low-education (and thus, in expectation, low-income) individuals. This pattern might however also be consistent with programmatic PBCs where low-education employees are hired to

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[44]Note than in these regressions observations with 0 contracts drop from the estimating equation since division by 0 is undefined.

[45]In the future, I will test this hypothesis analyzing the occupation-adjusted schooling of the contracts.

Figure 4: Monthly election cycle effects on the share of contracts corresponding to workers with more than a high school diploma
Dots correspond to election cycle effects ($\hat{\beta}$ in Equation 1)
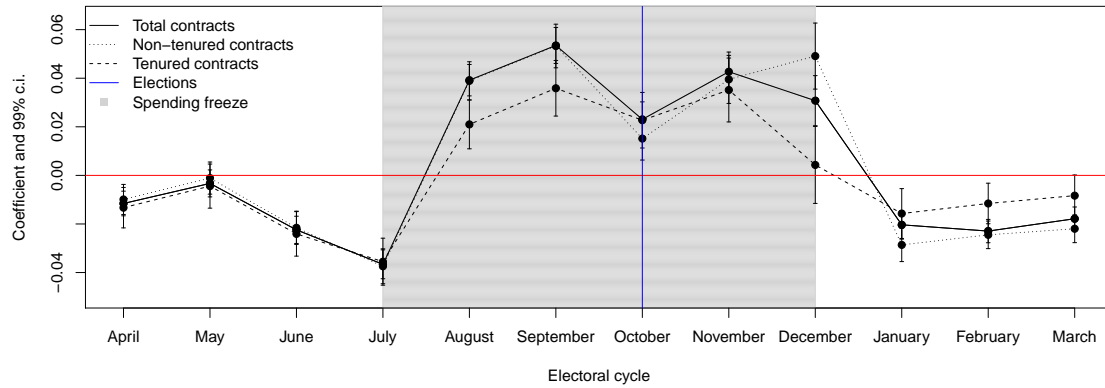
(a) Inflow of contracts
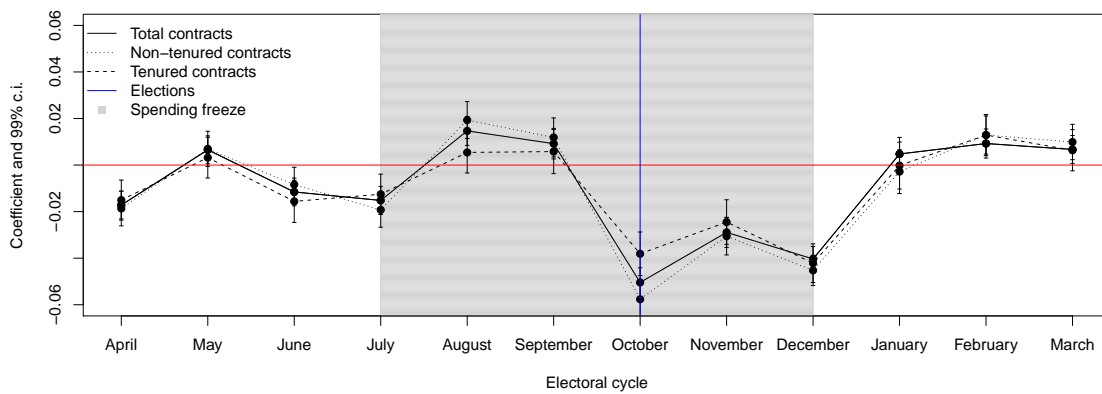
(b) Outflow of contracts

boost low-skill activities that may be important for the provision of public services.

Qualitative evidence in general points towards the clientelistic use of public employment ahead of elections. An anti-corruption prosecutor in a municipality in Rio Grande do Norte said: "hiring always have a political bias, the trade of favors. The big problem starts with the election. [...] They hire a lot in the eve of the election." This is an overwhelming opinion among the prosecutors I interviewed. Another one in a municipality in Ceará referred to all temporary contracts as "political currency trading."

5.4 Core political supporters are more likely to be dismissed before the electoral period, and to be hired after the election

If PBCs are clientelistic, the next question is whether they are targeted at mobilizing core supporters or swing voters. One possible strategy would be to use the expansion of the bureaucracy to hire political supporters, and thus enable them to engage in political campaigns, or at least give them some income to pay for their support in the electoral period. I do this by examining the relative presence of city council candidates in the municipality payroll. People who run for city council are generally political insiders – while only a minority of them will be elected at any given election, parties usually propose long lists of candidates, not least because an open list proportional electoral system makes it possible for candidates to get elected with few votes. Indeed, Colonnelli et al. (2019) have shown that electoral candidates are rewarded by incoming governments when their party wins office. A clear advantage of this measure of political support is that there is reliable, identified data for all candidates. An alternative would be to use data on partisanship, but party membership data, while public, is not as reliable and is identified by name and not by a unique identifier.

Results are shown in Figure 5. This considers people who ran in the previous election or in the upcoming one, but patterns are similar when considering only candidates in the current election. Panel 5b shows that candidates are more likely to leave the bureaucracy in the April, June, and July. This coincides with the period in which civil servants must leave their posts if they are to run, but the patterns survive when looking not only at bureaucrats who choose to leave but also at dismissals decided by the employer. One possible explanation is that some bureaucrats reveal their allegiance to other candidates when running for city council, and incumbents retaliate by firing them. Hiring before the election, on the other hand, is not targeted at candidates of either the past or the upcoming election. After the election, however, candidates are more likely to be hired, not only once the new government is sworn in (as shown in (Colonnelli et al., 2019)) but even during the transition period between October and December. This calls for further research into how core supporters are rewarded, and by whom.

5.5 Public service delivery declines before and after the election

Do political bureaucratic cycles have a correlate in bureaucratic outputs and outcomes? I examine this by looking at two particularly relevant measures of bureaucratic results in the context of Brazilian municipalities: pre-natal check-ups and avoidable child deaths. Healthcare is the second

Figure 5: Monthly election cycle effects on the share of contracts corresponding to workers who ran for city councilor in the preceding or in the upcoming election
Dots correspond to election cycle effects ($\hat{\beta}$ in Equation 1)
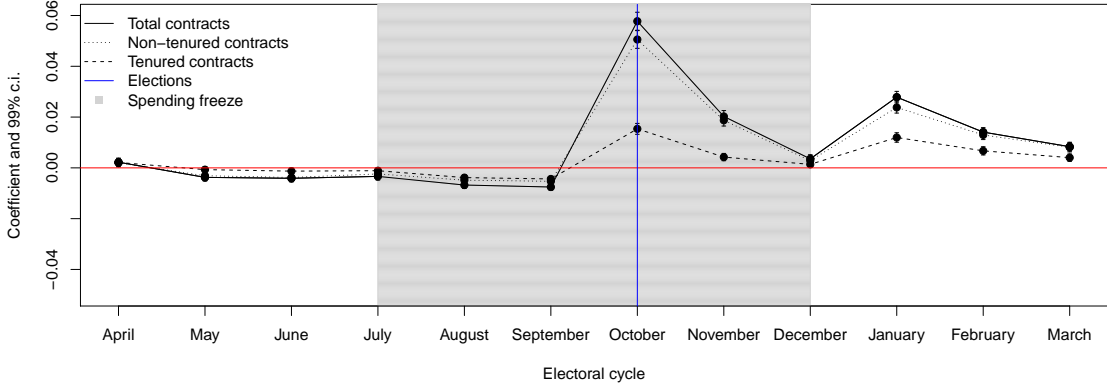

(a) Inflow of contracts
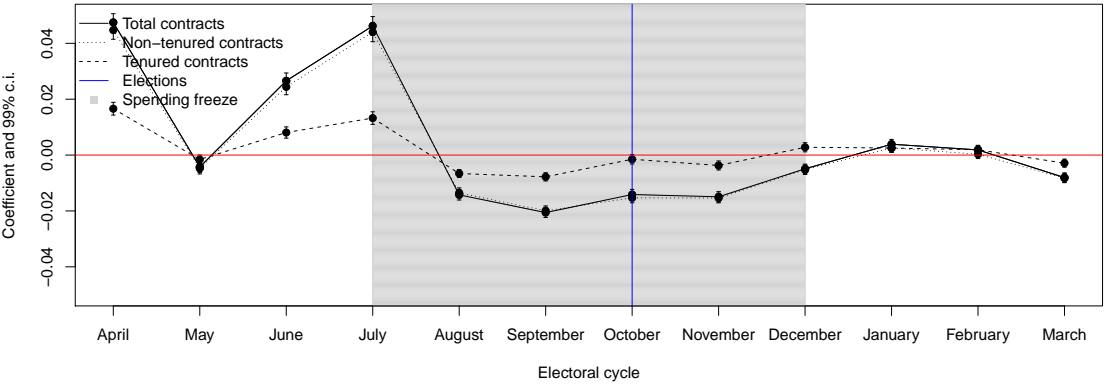
(b) Outflow of contracts

most important policy area in municipal spending after education, and it comes up first among voters' priorities for municipal politics (Boas et al., 2019). Unlike education, the healthcare sector allows administrative monthly data on outputs and outcomes. Examining healthcare results allows me to examine whether the combined effects of the elections and the LRF limits on bureaucratic inputs have a correlate on bureaucratic outputs. If the expansion of the bureaucracy ahead of elections were programmatic, we would expect to see an improvement in bureaucratic outputs.

Results, shown in Figure 6 suggest cycles in bureaucratic inputs shown in Figure 2 are indeed associated with cycles in the results of the healthcare bureaucracy. First, Figure 6a shows that the number of pre-natal checkups decreases in the months around the election, from -2.6% in

Figure 6: Monthly election cycle effects on outputs and outcomes of the healthcare bureaucracy
Dots correspond to election cycle effects ($\hat{\beta}$ in Equation 1)
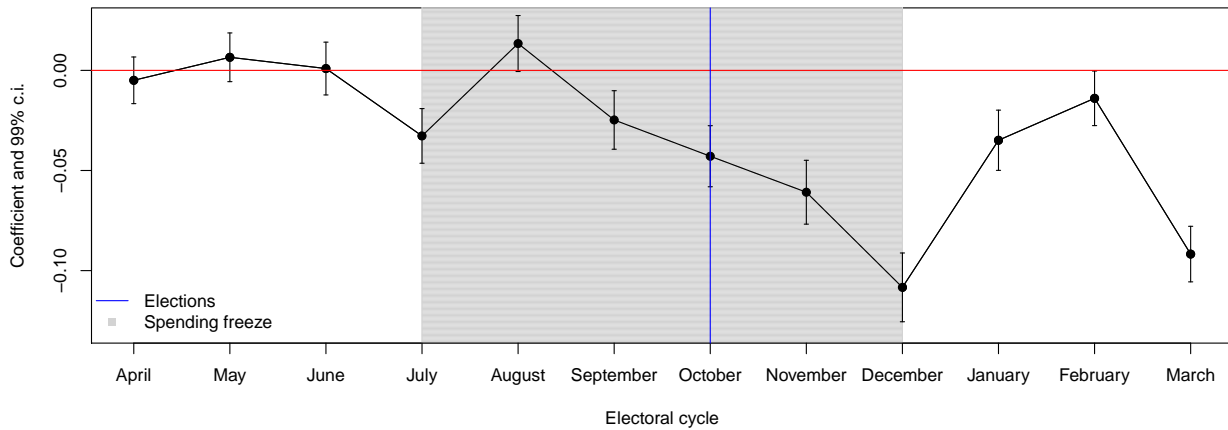
(a) Number of pre-natal check-ups conducted (logged)
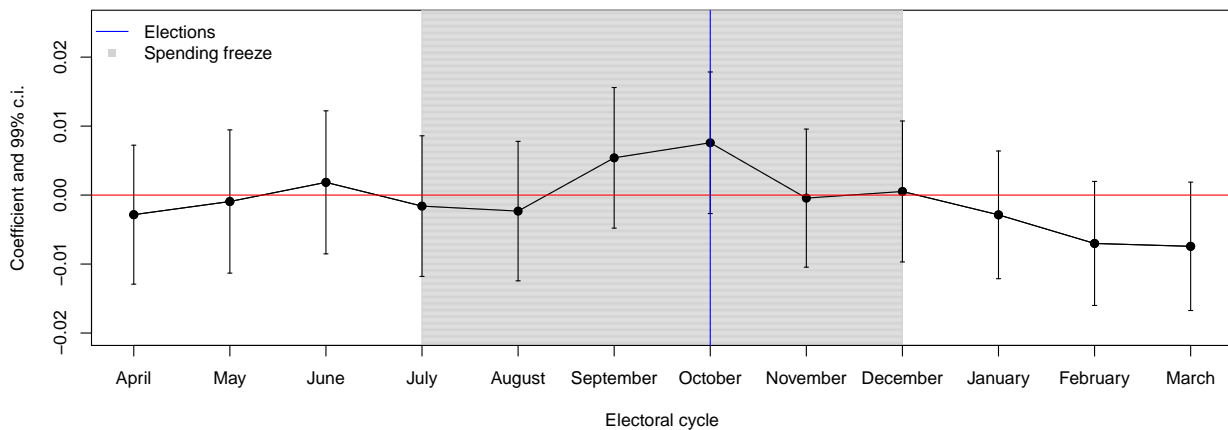
(b) Avoidable deaths of children aged 0-4 (logged)

September to -10% in December, with $p < 9.5 \times 10^{-7}$). Decreases are less pronounced but still significant for the first few months of the post-electoral year. While these results are not necessarily driven (exclusively) by the drop in hires and the increase in fires in the last few months of the year, it is reasonable to expect that they are at least partly related to them, and interviews with bureaucrats indeed suggest so. Moreover, I find very similar patterns of PBCs in jobs to those shown in Figure 2 when subsetting to healthcare professionals only, as shown in Figure 16 in the Appendix.[46]

[46]Appendix G shows the results of replicating the analyses in Figure 2 when examining contracts of healthcare or education professionals only. Results are consistent with the overall patterns shown in Figure 2.

Figure 6b examines political bureaucratic cycles in one of the most important outcomes of a healthcare system, child deaths due to avoidable causes. This outcome is likely less elastic to the effects of hires and fires and, to the extent it responds to cycles in bureaucratic inputs, it does so with a lag. That is possibly the reason why we do not observe the same cyclical behavior in this outcome variable as we do in bureaucratic inputs and outputs. In fact, most of the electoral-cycle month coefficients are small and statistically indistinguishable from zero, except for the positive coefficient in October (significant at the 90% confidence level) and the negative effects for February and March (significant at the 95% level). Interestingly however, these results suggest that the outcomes of the healthcare system may worsen on the month of the election, and improve shortly after the beginning of the post-electoral year. Results for infant deaths (babies of less than one year) instead of child deaths, reported in Appendix K show a similar pattern.

To sum up, the evidence suggests that the results of the healthcare bureaucracy (at least those more directly measuring bureaucratic activity) worsen in the months around elections, which lends support to hypothesis 4a. This is consistent with PBCs in hiring and firing making it more difficult for local bureaucracies to deliver public services. It is possible that other public services (especially those that are more easily targeted and that constitute mostly one-off transactions) are actually expanded in the electoral period. In fact, Nichter (2011) finds that female sterilizations are more common on electoral years. The evidence presented here, however, suggest that transaction-intensive public services (Pritchett and Woolcock, 2004), like preventive healthcare, suffer as a result of the combined effect of legal rigidities and electoral incentives.

6 Conclusion

This paper advances a theory of political bureaucratic cycles (namely, political cycles in the hiring and firing of bureaucrats, in the activities bureaucrats do, and in the results they achieve), and presented a number of empirical tests using data from Brazilian municipalities. In low- and middle-income environments, with limited private sector employment opportunities and limited government capacity for implementation, the distribution of public jobs is a critical political resource, particularly around elections. Building on decades of research on political business and budget cycles and on clientelism, I put forward a framework where political bureaucratic cycles emerge as the result of combined pressures of electoral incentives and well-meaning anti-corruption policies. I then present a number of testable hypotheses, which are grounded on dozens of interviews with municipal politicians and bureaucrats as well as state prosecutors across seven Brazilian states.

I test these hypotheses using time-series cross-section regressions of over 1 million municipality-month observations to identify cycles in bureaucratic inputs and outputs, built with restricted-access administrative data on the universe of municipal bureaucrats from 2002 to 2016.

First, I hypothesized that municipal employment shows marked cyclical patterns around elections, shaped but not removed by the strong limits imposed on hiring in the electoral period by two major laws (the Fiscal Responsibility Law and the Electoral Law). In time-series cross-section regressions controlling for municipality-and-year specific factors (with municipality $\times$ year fixed effects) and for overall seasonality (with month fixed effects), I find strong evidence of political bureaucratic cycles in the hiring and firing of municipal bureaucrats. Specifically, I find that hiring expands in the second quarter of an electoral year (when compared to those same months in non-electoral years), contract in the last two quarters of an electoral year (when the personnel spending freeze is in effect), and expand in the first quarter of the post-electoral year. These effects, which are large and statistically significant at high levels of confidence, support the idea that, as a result of the combined incentives of elections and the LRF constraints, politicians manipulate hiring around election time.

Second, I hypothesized that cycles are more pronounced where politicians are able and motivated to manipulate public employment. Political bureaucratic cycles are significantly more pronounced in non-tenured contracts than in tenured ones, although there is evidence of cycles in hires and dismissals of tenured bureaucrats as well, which calls into question the common assumption that tenured bureaucrats are *completely* isolated from political influence. I also interact the monthly election cycle effects with a number of political covariates in order to identify some correlates of PBCs. Results suggest that higher levels of electoral competition in the preceding election are associated with stronger PBCs.

Third, I hypothesized that political bureaucratic cycles are clientelistic phenomena. I argue that the extent to which PBCs are clientelistic depends on the way jobs are distributed as well as on the use that governments make of their labor force. While much more work is needed to analyze the targeting of jobs, I find some preliminary evidence consistent with political bureaucratic cycles being clientelistic. On one hand, workers with an education level above the median (namely, more than a high school diploma) are less likely to be hired during the expansions of June and July, and less likely to be fired during the contraction period between October and December. This is consistent with politicians targeting short-term, electoral-period jobs to low-education (and thus, in expectation, low-income) workers. This could however also be consistent with programmatic

political bureaucratic cycles, for instance if politicians chose to boost low-skill bureaucratic activities ahead of the election.

Last but not least, I hypothesized that as a result of both the rigidities imposed by the LRF during the last 6 months of a mayor's mandate and their clientelistic use of public employment, bureaucratic outputs and outcomes would decrease around elections, when compared to non-electoral years. Using administrative healthcare data at the municipality-month level, I find that the number of pre-natal check-ups is systematically lower during the second half of electoral years (starting before the election). On the other hand, the number of avoidable deaths of children (a good measure of outcomes in the healthcare sector) does not systematically increase in electoral years.

The paper makes a number of contributions, both theoretical and empirical. First, the paper advances our understanding of the temporal dynamics of PBCs, partly thanks to the use of administrative, micro-level data. Second, the paper questions the common assumption that legal and fiscal limits aimed at constraining PBCs are effective and welfare-enhancing, by showing that in fact, under the strict limits of Brazilian legislation, cycles persist and in fact are shaped to those constraints. Third, by linking data on bureaucratic inputs (jobs) to bureaucratic outputs (results of how that labor force is used), the paper advances our understanding of how politicians' resource allocations and policy outcomes are connected. While other papers have examined cycles in policy outputs (e.g. Baskaran et al. (2015)), this is to my knowledge the first paper examining both bureaucratic inputs and outputs in the same empirical setting. Fourth, by using identified, contract-level data instead of the macro-level yearly or quarterly data commonly found in the literature, the paper opens a whole set of theoretical and empirical questions about who is targeted by hires and fires in electoral cycles. This characterization, which I have only started here by examining the education level of those who are hired and fired around elections, allows us to better understand the strategies used by politicians, and in particular how they relate to clientelistic and programmatic rationales. By doing so, I hope to strengthen the dialogue between the literatures on PBCs and clientelism, two fields that I believe have a lot to gain from cross-fertilization.

Future work will have to look more systematically at how jobs are targeted (by education, experience, party membership, and other socioeconomic variables for which there is data) and analyze political bureaucratic cycles in a wider range of healthcare services, including less transaction-intensive ones. The paper nonetheless opens up a research agenda looking at political bureaucratic cycles as a dependent variable. In an accompanying paper I look at the effect of election results on PBCs through a close-races regression discontinuity design (Toral, 2019b), and other projects

will causally identify the effect of incumbent characteristics such as partisanship,[47], re-eligibility, gender,[48] and alignment with state governments. Other stream of work should causally identify the effect of special fiscal limits on PBCs;[49] and exploit those stronger LRF limits to identify the effect of PBCs on electoral outcomes and bureaucratic outputs.

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[47]Including parties' ideologies and whether they are more programmatic or clientelistic (Cruz and Keefer, 2015).

[48]Brollo and Troiano (2016) show that female mayors engage less in patronage ahead of elections.

[49]In particular, I will test the hypotheses that PBCs are more pronounced when municipal finances are not close to or above the limits on personnel expenses imposed by the LRF, and where municipal employment represents a larger share of total formal employment. I expect these two variables to increase politicians' maneuver for engaging in cyclical policies and the returns to doing so, respectively.

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Appendices

A   Literature review

A brief intellectual history of political budget/business cycles (PBCs) could be split between formal and empirical contributions. The formal contributions, which prevailed during the 1970s and 1980s, moved in three directions. First, the literature moved from examining cycles in economic outcomes (output, employment, inflation) to examining cycles in economic policy tools (spending, taxes, deficit), thus moving from political business cycles to political budget cycles. Second, scholars went from assuming myopic voters who were fooled by politicians to assuming rational voters and politicians in a situation of information asymmetry, with PBCs facilitating signaling at a cost in economic distortion (which would be observed by voters, although with a lag). Finally, the formal literature moved from discussing the rationale for PBCs to examining the institutional and political contexts in which they are likely to arise. The empirical literature has generally used national and subnational time-series cross-section data from around the world to measure PBCs on a wide range of outcomes, including economic outcomes like unemployment, economic policy tools like spending, and also (although rarely) public employment. This has resulted in an impressive accumulation of evidence about the existence of PBCs around the world, and the conditions under which they are more likely to emerge. All in all, the literature suggests that politicians manipulate economic policy variables in advance of elections, at least when they have both the incentives and the ability to do so.

A.1   The foundations: Formal models of PBCs

Among the early models of PBCs, perhaps the most influential contribution was that of Nordhaus (1975). His model basically posits that democratically-elected governments will aim at increasing their chances of re-election by manipulating the Phillips curve, with higher unemployment and lower inflation at the beginning of the mandate and a reverse pattern at the end. The result, then, would be political business cycles and deviations from policies along the Phillips curve that are optimal on the long run. In the model, voters are rational in their retrospective assessment of the government, but myopic and ignorant of the macroeconomic trade-off, and thus "fooled" by the government time after time.

Later models questioned this assumption of irrational voters who are not able to anticipate the government's behavior as elections approached, and modeled PBCs as fully rational equilibria.

Rogoff and Sibert (1988) modeled electoral cycles in spending, taxes, and the money supply as a signaling equilibrium driven by temporary information asymmetries. In their model, voters observe government competence only with a lag, and thus incumbents of medium level of competency have an incentive to signal the effectiveness of their policies by setting a policy at a suboptimal level. In their model, PBCs occur even with fully rational voters who recognize incumbents' incentive to temporarily distort the economy before elections. Similarly, Rogoff (1990) argues that temporary information asymmetries push incumbents to switch fiscal policies before the election towards easily observed consumption expenditures (and away from investment).

Starting in the late 1980s, a number of models started considering how political and economic factors influence or constrain PBCs. A large number of contextual features have been considered here. Because their treatment has been more empirical than formal, I synthesize this literature on conditional PBCs below. A separate stream of work looked into partisan (as opposed to opportunistic) PBCs driven by differences in government parties' preferences over unemployment and inflation, moving away from the assumption of homogeneous government preferences (Hibbs, 1977; Alesina, 1987).

To sum up, formal models of PBCs generally moved in three directions in the 1970s and 1980s. First, the literature moved from examining cycles in economic outcomes (output, employment, inflation) to examining cycles in economic policy tools (spending, taxes, deficit), thus moving from political business cycles to political budget cycles. Second, scholars went from assuming myopic voters who were fooled by politicians to assuming rational voters and politicians in a situation of information asymmetry, with PBCs facilitating signaling at a cost in economic distortion (which would be observed by voters, although with a lag). Finally, the literature moved from discussing the rationale for PBCs to examining the institutional and political contexts in which they are likely to arise.

A.2   The empirical approach: Panel-data studies of PBCs

Since the 1970s a vast number of empirical studies examining the existence and drivers of PBCs have been published . These studies typically use time-series cross-section regressions with election-year periods (sometimes together with dummies for pre- and post-electoral periods) to measure the effect of electoral periods on a wide range of economic variables. A first generation of studies examined cycles in unemployment and inflation, in line with the model put forward by Nordhaus

(1975), and found mixed results (McCallum, 1978; Beck, 1987; Keil, 1988; Haynes and Stone, 1989).

A second generation of dozens (if not hundreds) of papers has examined PBCs in economic policy instruments, generally finding evidence of cycles although with significant heterogeneity. In the words of a recent review on the subject, "empirical tests of the PBC in instruments are much more convincing so that nowadays, tests in relation to outcomes are scarce" (Dubois, 2016, 242). The most common policy tools examined by these studies are government spending and revenue variables, such as overall level of spending (Besley and Case, 1995; Block et al., 2003; Khemani, 2004; Alt and Rose, 2009), level of spending by category (Akhmedov and Zhuravskaya, 2004; Veiga and Veiga, 2007; Saez and Sinha, 2010; Pierskalla and Sacks, 2018), share of government spending by category (Khemani, 2004; Drazen and Eslava, 2010; Brender and Drazen, 2013), tax rates (Besley and Case, 1995; Alesina and Paradisi, 2017), government deficit (Brender and Drazen, 2005; Shi and Svensson, 2006; Veiga and Veiga, 2007; Veiga et al., 2017), government revenue (Brender and Drazen, 2005; Alt and Lassen, 2006; Veiga and Veiga, 2007; Covre and de Mattos, 2016), and government debt (Khemani, 2004).[50] A third generation of studies has started to look into economic outputs such as road construction (Khemani, 2004), electricity provision (Baskaran et al., 2015) and even non-investment GDP (Canes-Wrone and Park, 2012).

Public employment has also received some empirical attention, but results are pretty mixed. Drazen and Eslava (2010) find that Colombian municipalities contract payments to temporary workers in election years. Similarly, Tavares (2017) finds that non-tenure public employment and personnel expenditures fall in electoral years in Brazilian municipalities. On the other hand, Dahlberg and Mörk (2011) show that Finish and Swedish municipalities increase employment in electoral years. Labonne (2016) finds that both private and public sector employment increase in pre-electoral quarters in the Philippines. Pierskalla and Sacks (2019) find that Indonesian municipalities inflate the teaching force in election years. Cahan (2019) finds that state governments in the United States have higher levels of public employment in the quarter leading to state elections.

A significant part of the recent literature is concerned with identifying the institutional, political, and economic contextual features that mediate PBCs.[51] This has generally been done either by splitting the sample by a variable of interest, or by interacting the election-period dummies with

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[50]Some studies have looked at cycles in other policy tools such as the money supply and exchange rates (Block et al., 2003).

[51]For a review of this literature on conditional PBCs see De Haan and Klomp (2013).

indicators for such contextual features. The proliferation of papers using one of these empirical strategies may be understood as a way of exploiting PBCs to address issues of representation and accountability. As expressed by a recent review of this literature, "context-conditional political budget cycles provide a lens through which to study the extent to which voters are able to select, monitor, sanction, and control politicians – and the extent to which politicians serve their own interests at the expense of voters' interests – in different political and institutional environments" (Alt and Rose, 2009).

Some of the contextual variables that have received theoretical and/or empirical attention in the conditional PBCs literature are electoral competitiveness (Schultz, 1995; Block et al., 2003), level of development (Shi and Svensson, 2006), level of democracy (Gonzalez, 2002), parliamentary versus presidential system (Persson and Tabellini, 2004), age of democracy and voters' experience with elections (Brender and Drazen, 2005), media freedom (Veiga et al., 2017), transparency (Alt and Lassen, 2006; Vicente et al., 2013), partisanship (Kneebone and McKenzie, 2001; Sakurai and Menezes-Filho, 2011), partisan polarization (Alt and Lassen, 2006; Canes-Wrone and Park, 2012), party characteristics (Hanusch and Keefer, 2014; Pierskalla and Sacks, 2019), the electoral system (Persson and Tabellini, 2004), term limits (Klein and Sakurai, 2015), fiscal rules (Rose, 2006; Alt and Rose, 2009; Cioffi et al., 2012),[52] alignment with other levels of government (Chortareas et al., 2017; Sakurai and Menezes-Filho, 2011), the flexibility of different policies (Beck, 1987), and the returns to manipulating a given policy tool (Schultz, 1995; Treisman and Gimpelson, 2001).

Econometrically, this literature uses time-series cross-section datasets of either countries or subnational units, typically with country-year observations. The last decade has seen a marked move from national to subnational units, which allows researchers to keep many institutional features fixed. It has become increasingly common to use quarterly or monthly data, since – as noted by Labonne (2016)– using yearly data makes it harder (and may even obstruct) cyclical patterns.[53] With regards to causal identification, researchers typically assume that the timing of elections is exogenous. This assumption is reasonable in cases where the electoral schedule is enshrined in the constitution, but remains problematic in cases (such as parliamentary democracies) where governments decide on the timing of elections. There is a whole literature on the endogenous timing of elections and PBCs,[54] but since the work of Khemani (2004) it has become commonplace

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[52]The fiscal rules that have received most attention are balanced budget requirements, budget targets, and specific rules on spending around elections.

[53]I take this logic further by using contract-level data, aggregated at the month level.

[54]I do not review these debates here because the timing of elections is not endogenous in Brazil.

to instrument for election timing with the originally scheduled calendar. A couple of recent studies however take issue with the assumption of exogeneity even in the case of constitutionally scheduled elections, and have exploited the phase-in of elections (Pierskalla and Sacks, 2019, 2018) or special elections held after the death of an incumbent (Baskaran et al., 2015). In general, the identification of causal effects from the contextual variables has not been dealt with, and researchers often uncritically split their sample by, or interact the election-period dummies with, theoretically relevant variables. As for the estimation strategy, most studies include in their regressions lagged dependent variables, unit fixed effects, time-period fixed effects, and some control variables. To avoid Nickell bias (Nickell, 1981) resulting from the inclusion of fixed effects and lagged dependent variables, many papers use a GMM estimator (Arellano and Bond, 1991). Standard errors are usually corrected for serial and spatial correlation with one- or two-way clustering.[55]

A.3 Research frontiers

I identify three large frontier directions where the literature on PBCs seems to be moving, and to which my study of political bureaucratic cycles in Brazil contributes. First, more is to be gained from the use of increasingly disaggregated data. While recent studies have moved from the traditional yearly time-series cross-sections into biannual or quarterly data, I present analyses that exploit contract-level data. This not only allows for much more detailed analyses that finely address the temporal dynamics of PBCs, it also opens a whole research agenda on how hires and dismissals are targeted. This characterization of employees, both in terms of labor market experience and political connections, helps us bridge the gap between the literatures on PBCs and clientelism. Second, more can be done to analyze how political cycles in inputs or policy tools relate to cycles in policy outputs and outcomes. This, which requires detailed outcome data like the healthcare data I leverage here, can be critical for understanding the welfare implications of PBCs. Third and last, more progress can be done to causally identify heterogeneity in PBCs. The Brazilian context has a number of institutional and data features that make it a favorable environment to make progress in these three areas.

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[55]Some papers have also tried to explicitly model the spatial dynamics between municipal governments in Brazil, be them driven by either spillovers or yardstick competition (Videira and Mattos, 2011; Covre and de Mattos, 2016).

B Details on legal constraints on hiring around elections

B.1 Rules in the Fiscal Responsability Law (LRF) concerning personnel expenses

The Fiscal Responsibility Law (LRF, Complementary Law 101, approved on May 4, 2000) includes seven main rules designed for controlling personnel expenses and their use as patronage in electoral years.[56] First, no municipal government can spend more than 60% of the net liquid revenue in personnel expenses, with 6 points being reserved for the legislative and 54 for the executive (article 20). Second, personnel expenses cannot increase during the 180 days before the end of the government's mandate (article 21). Third, compliance with this limit is verified at the end of every quadrimestre or four-month period. If personnel expenses are over 90% of the limit (i.e. over 51.3%), the municipality cannot create new posts or give out salary increase (article 22). Fourth, if the limits are surpassed, the government must comply in the next two quadrimestres, with at least one third of the reduction in the first quadrimestre. However if the limits are surpassed during an electoral year, the government cannot receive so-called voluntary transfers,[57] or get credit or guarantees (article 23). Fifth, up to 30 days after the end of every quadrimestre the government must issue a Fiscal Management Report (RGF, *Relatório de Gestão Fiscal*), which must be open to the public and contain a comparison of actual personnel expenses and the legal limits (articles 54 and 55). Sixth, if personnel expenses reach 90% of the limit (i.e., 48.6% for executive governments), audit courts will alert the legislature and the prosecutor's office (article 59). Finally, municipalities with less than 50,000 inhabitants can issue their RGFs every semester instead of every quadrimestre, and were only obliged to issue some of the other fiscal reports starting 2005 (article 63). While the LRF became an inflection point in the fiscal control of state and municipal governments, some of its rules, especially those concerning the control of personnel expenses were already enshrined in federal legislation (Kerches and Peres, 2010).

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[56]The whole law can be found at http://www.planalto.gov.br/ccivil_03/leis/lcp/lcp101.htm.

[57]Voluntary transfers are transfers from other levels of government that are not related to the healthcare system or mandated by the constitution.

B.2 Rules in the Electoral Law concerning the hiring and firing of bureaucrats

Brazil's Electoral Law (Law 9,504, approved on September 30, 1997)[58] establishes a number of rules constraining the behavior of public officials in order to ensure the fair competition of candidates. These rules include a number of provisions regarding the hiring and firing of bureaucrats. First, bureaucrats cannot be hired, dismissed with no fair cause (*sem causa justa*), or transferred, from 3 months before the election up to January 1st, with the exception of positions of trust, the hiring of people who passed a civil service examination before the beginning of the period (article 73.V), or hiring of positions necessary for the delivery of *essential* services (which the jurisprudence of the Supreme Electoral Court has clarified do not include education). Second, wages cannot be increased beyond adjustments that allow employees to recover any purchasing power lost during the election year (article 73.VIII). Municipalities cannot receive voluntary transfers from the federal or state government during the 3 months before and the 3 months after the period, with the exception of those destined to emergency situations (article 73.VI.a).

The law also establishes a number of strong penalties for breaches, including fines (to be paid by the candidate and/or their party), the suspension of the electoral candidacy of those benefited by the decision, the loss of access to the party financing system (*Fundo Partidário*), and the penalties established in the Law of Administrative Improbity (including the loss of any public position, the suspension of political rights between 3 and 5 years, and payment of a fine up to 100 times the wage received as official).

B.3 Rules in the Law of Ineligibilities concerning the incompatibility of holding a bureaucratic position and running for election

Brazil's Law of Ineligibilities (Complementary Law 64, approved on May 18, 1990),[59] establishes certain limits on who can run for office, and allows for some time windows before the election in which "incompatibilities" can be fixed. The limits vary by the office a person is running for and the position they hold, but for city councilor art. 1.V establishes that public employees (with or without tenure) should be removed from their post up to 3 months before the election, except those

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[58] The whole law can be found at http://www.planalto.gov.br/ccivil_03/leis/l9504.htm.
[59] The whole law can be found at http://www.planalto.gov.br/ccivil_03/leis/lcp/lcp64.htm.

involved in tax collection who should be removed from their posts 6 months before the election. Those who are tenured can simply leave their posts until the election, with pay. Those who are hired with temporary contracts or in positions of trust must leave their jobs.[60]

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[60]The supreme electoral court has a varied jurisprudence on the issue, which can be consulted at http://www.tse.jus.br/eleicoes/desincompatibilizacao/desincompatibilizacao.

C   Administrative labor market data: Descriptive statistics and missing data issues

Table 2: Micro-data of municipal employees, 2002-2016 – Descriptive statistics

Year	# municipal employers	# contracts (millions)	Non-tenure contracts (%)	# individuals hired (millions)	Invalid employee IDs (%)
2016	5449	5.98	32.20	5.44	0.00
2015	5496	6.04	33.32	5.46	0.55
2014	5507	6.08	34.03	5.52	0.54
2013	5486	6.10	35.21	5.50	0.54
2012	5483	5.86	34.41	5.35	0.53
2011	5480	5.70	35.25	5.21	0.55
2010	5496	5.53	35.44	5.06	0.53
2009	5469	5.36	35.26	4.93	0.52
2008	5472	5.16	34.05	4.73	0.55
2007	5475	4.81	33.58	4.46	0.57
2006	5481	4.57	33.36	4.25	0.62
2005	5431	4.24	32.76	3.97	0.77
2004	5366	3.90	29.83	3.66	0.87
2003	5350	3.76	30.29	3.53	0.98
2002	5309	3.61	32.35	0.21	94.06

Municipal governments are legally required to report all employment data to the Ministry of Labor through the RAIS system. As pointed above, however, a minority of them (between 1 and 5%, depending on the year) fail to submit employment data. Technical staff at the Ministry of Labor confirmed that some municipalities indeed fail to report employment data to RAIS, and associated it to capacity issues and/or corruption.

To understand the kind of municipalities that are not reporting employment data to the Ministry of Labor, I examine the 123 municipalities which show as having no employees in January of 2016, and compare them to the whole set of municipalities on a number of outcomes from UNDP's Municipal Human Development Atlas.[61] Figure 7 shows the results, with the thick blue lines corresponding to municipalities without RAIS data in 2016, and the dashed black lines corresponding to all municipalities. As can be seen in the plots, municipalities failing to report employment data tend to be smaller, less developed, more unequal, poorer, and more rural. This is consistent with both capacity and corruption mechanisms behind the missing data.

[61]Source: http://www.atlasbrasil.org.br.

A couple of important conclusions stem from this descriptive analysis. First, missing data is not missing at random, with municipalities without data in RAIS being systematically different. Second, these municipalities seem poorer and less developed, in average. Therefore, to the extent that municipal development correlates with political bureaucratic cycles their exclusion from the data is biasing the results. This bias, however, is likely to be in the direction of attenuating results (i.e. bringing them closer to zero) in as much the cycles are a clientelistic phenomenon, as results shown in Section 5 suggest. In any case, results are not representative of the overall population of municipalities, but rather of those complying with the RAIS reporting requirement.

Figure 7: Characterization of municipalities not reporting employment data for 2016
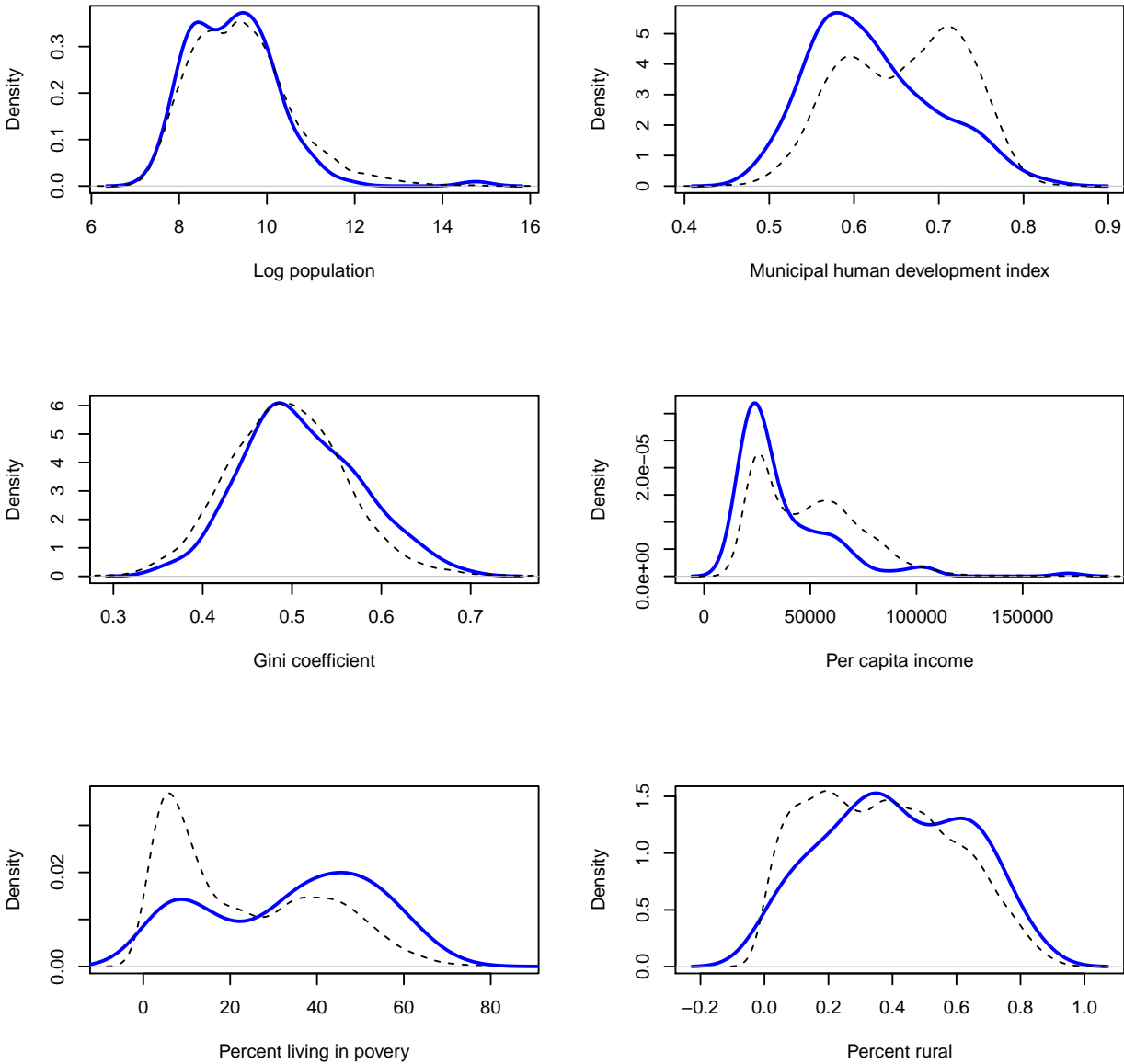
D Regression table for main results

The following table presents regression results plotted in Figure 2. Regression tables are not included for other models for brevity, but are available via email.

Table 3: Political bureaucratic cycles in absolute number of contracts, with monthly effects

	Hires			Fires			Stock		
	Total	Temp.	Tenured	Total	Temp.	Tenured	Total	Temp.	Tenured
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
April EY	0.102***	0.082***	0.045***	0.117***	0.114***	0.040***	0.0004	−0.016***	0.006***
	(0.008)	(0.007)	(0.007)	(0.006)	(0.006)	(0.005)	(0.001)	(0.001)	(0.001)
May EY	−0.015	0.001	−0.037***	−0.017*	−0.015*	−0.009	0.0001	−0.020***	0.007***
	(0.008)	(0.007)	(0.007)	(0.006)	(0.006)	(0.005)	(0.001)	(0.002)	(0.001)
June EY	0.189***	0.141***	0.083***	0.103***	0.101***	0.033***	0.003***	−0.020***	0.009***
	(0.008)	(0.007)	(0.008)	(0.007)	(0.006)	(0.005)	(0.001)	(0.002)	(0.001)
July EY	0.218***	0.184***	0.076***	0.027***	0.042***	0.004	0.008***	−0.012***	0.013***
	(0.009)	(0.008)	(0.008)	(0.007)	(0.007)	(0.005)	(0.001)	(0.002)	(0.001)
Aug. EY	−0.428***	−0.300***	−0.239***	−0.155***	−0.129***	−0.065***	0.003***	−0.024***	0.011***
	(0.009)	(0.008)	(0.008)	(0.006)	(0.006)	(0.005)	(0.001)	(0.002)	(0.001)
Sep. EY	−0.419***	−0.271***	−0.238***	−0.130***	−0.103***	−0.070***	−0.001	−0.034***	0.009***
	(0.008)	(0.007)	(0.007)	(0.007)	(0.006)	(0.005)	(0.001)	(0.002)	(0.001)
Oct. EY	−0.204***	−0.067***	−0.189***	0.367***	0.336***	0.107***	−0.014***	−0.073***	0.004***
	(0.008)	(0.007)	(0.007)	(0.009)	(0.008)	(0.006)	(0.001)	(0.002)	(0.001)
Nov. EY	−0.269***	−0.157***	−0.187***	0.214***	0.187***	0.060***	−0.021***	−0.100***	0.001
	(0.008)	(0.007)	(0.007)	(0.008)	(0.008)	(0.006)	(0.001)	(0.003)	(0.001)
Dec. EY	−0.134***	−0.078***	−0.105***	0.646***	0.605***	0.334***	−0.071***	−0.484***	−0.021***
	(0.008)	(0.007)	(0.007)	(0.012)	(0.012)	(0.009)	(0.002)	(0.008)	(0.002)
Jan. post-EY	0.888***	0.759***	0.335***	−0.002	−0.018	0.024**	−0.036***	−0.115***	−0.015***
	(0.012)	(0.012)	(0.010)	(0.010)	(0.009)	(0.006)	(0.001)	(0.004)	(0.002)
Feb. post-EY	0.200***	0.181***	0.061***	−0.093***	−0.112***	−0.010	−0.016***	−0.079***	−0.003*
	(0.009)	(0.009)	(0.009)	(0.007)	(0.006)	(0.005)	(0.001)	(0.003)	(0.001)
Mar. post-EY	0.243***	0.203***	0.108***	−0.071***	−0.078***	−0.011	−0.005***	−0.031***	0.00000
	(0.008)	(0.008)	(0.008)	(0.006)	(0.006)	(0.005)	(0.001)	(0.002)	(0.001)
Observations	878,711	878,711	878,711	878,711	878,711	878,711	878,711	878,711	878,711
R^2	0.677	0.703	0.618	0.704	0.702	0.685	0.996	0.987	0.999

Dependent variable: logged number of municipal employees, by contract type

Standard errors clustered at the municipality level; *$p<0.01$; **$p<0.001$; ***$p<0.0001$
All models include a lagged dependent variable, month fixed effects, and municipality × year fixed effects

49

E Political bureaucratic cycles using alternative measures of employment

Figure 8: Monthly election cycle effects on logged absolute number of contracts
Dots correspond to election cycle effects ($\hat{\beta}$ in Equation 1)
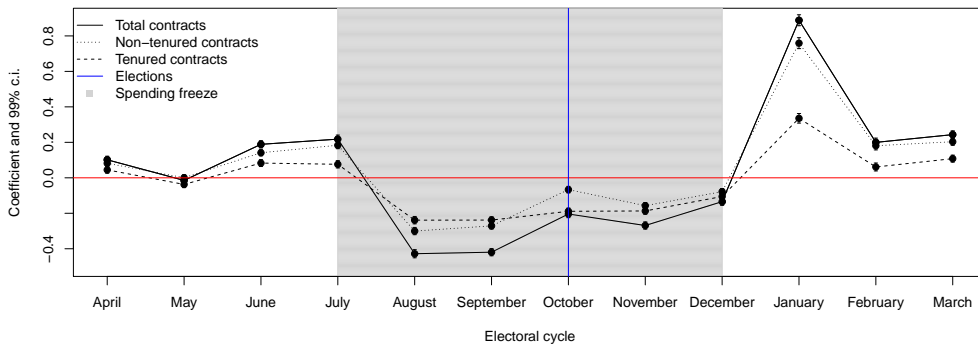
(a) Flow of new contracts (reproduced from main text)
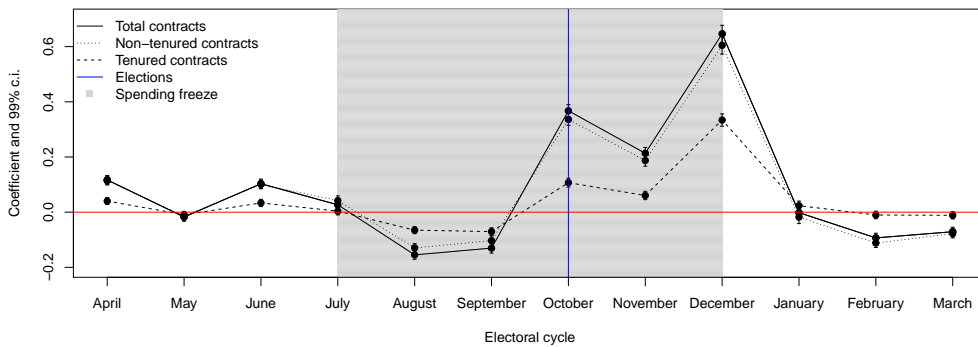
(b) Flow of dismissals (reproduced from main text)
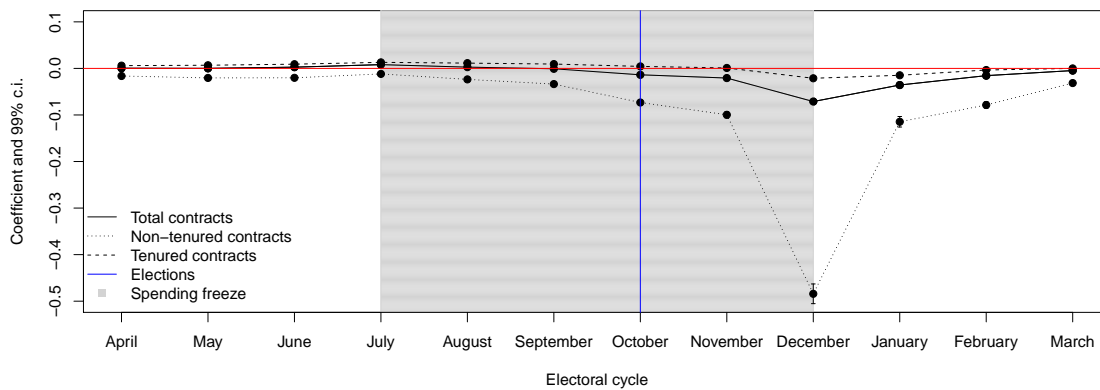
(c) Stock of contracts

Figure 9: Monthly election cycle effects on logged relative number of municipal contracts (as a share of stock in that same month)
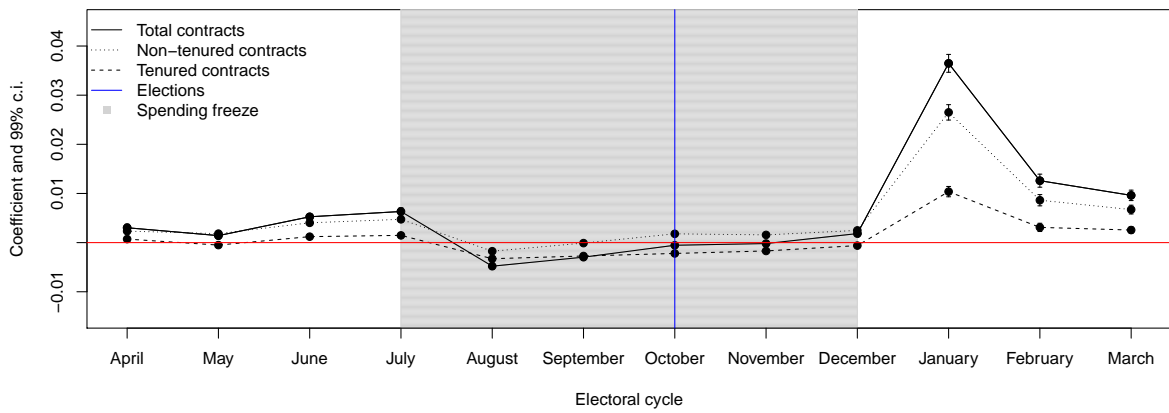
(a) Flow of new contracts (relative to stock)
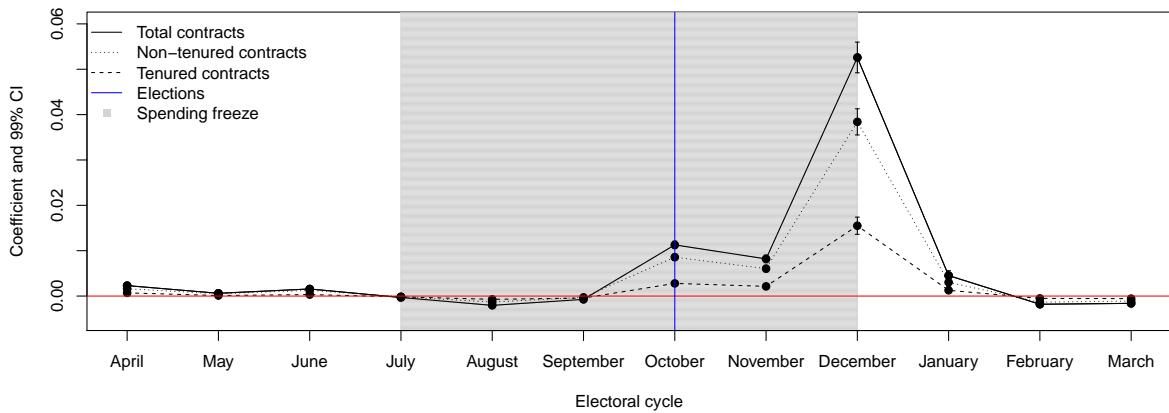
(b) Flow of dismissals (relative to stock)

Figure 10: Monthly election cycle effects on logged absolute number of municipal workers (using unique personal identifiers)
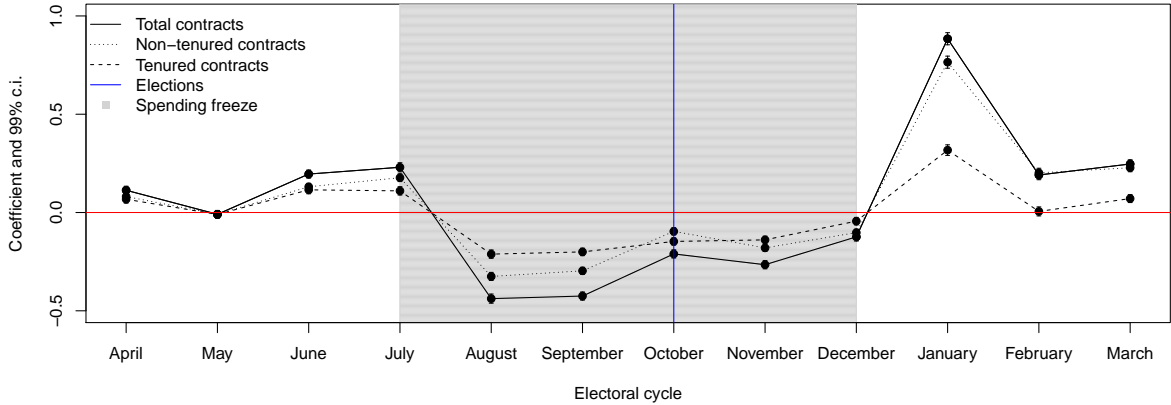
(a) Flow of new people hired
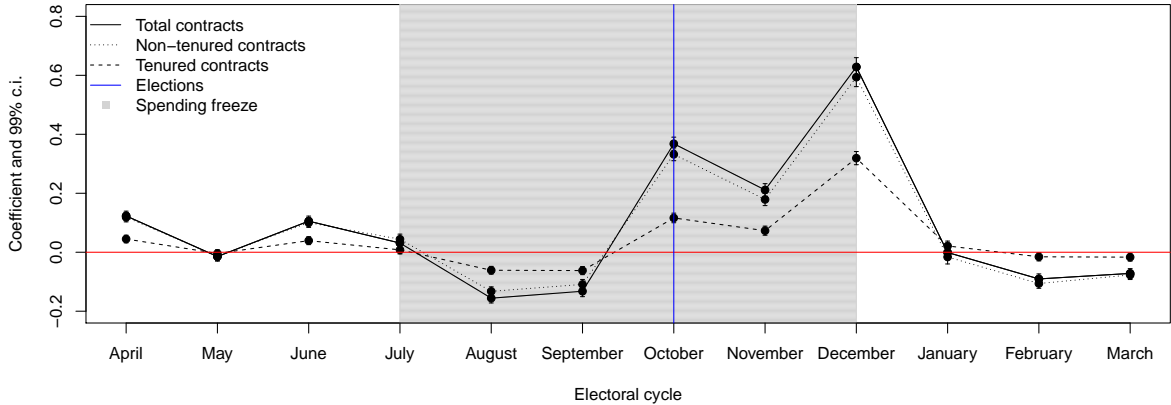
(b) Flow of people dismissed
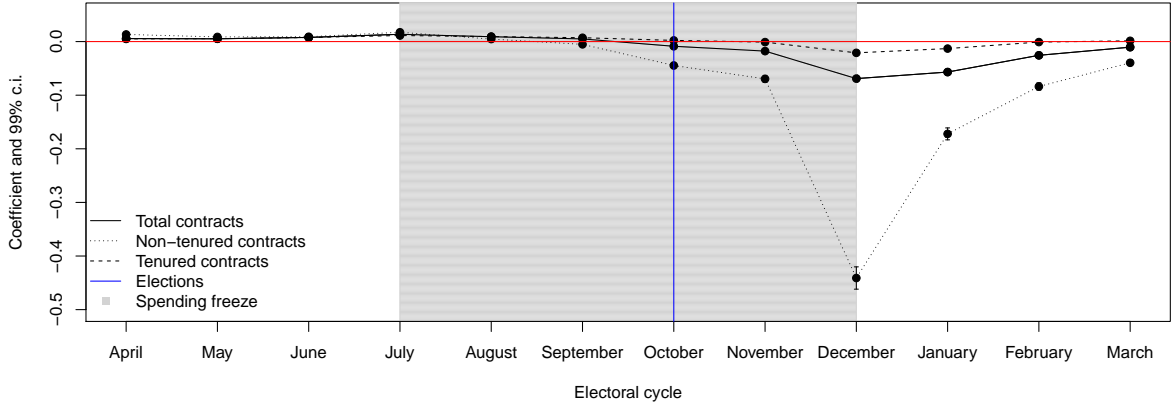
(c) Stock of people hired

Figure 11: Monthly election cycle effects on logged absolute number of Brazilian reais corresponding to the sum of municipal workers' average salary
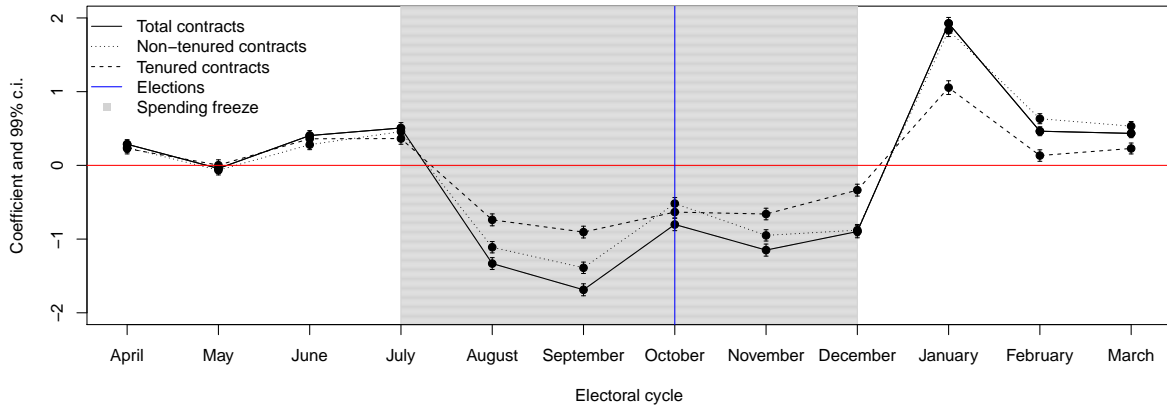
(a) Expenditures on flow of new contracts
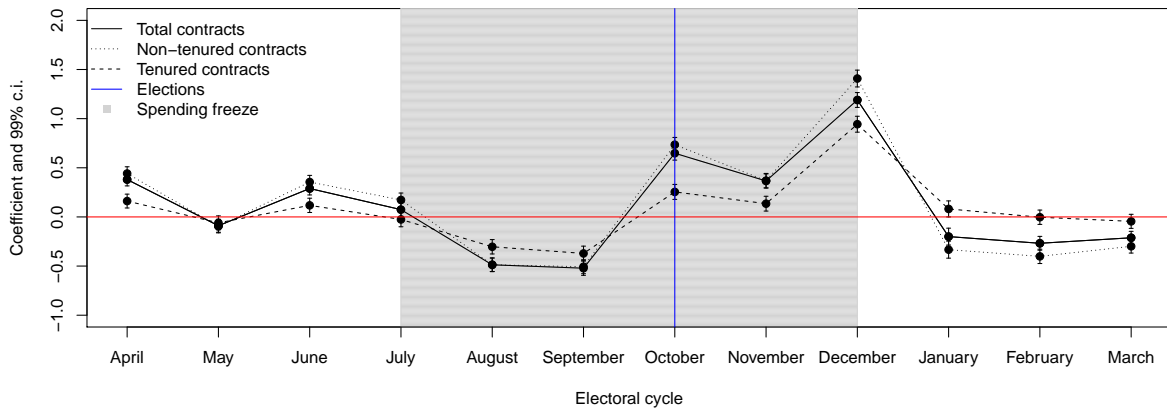
(b) Savings on flow of dismissals
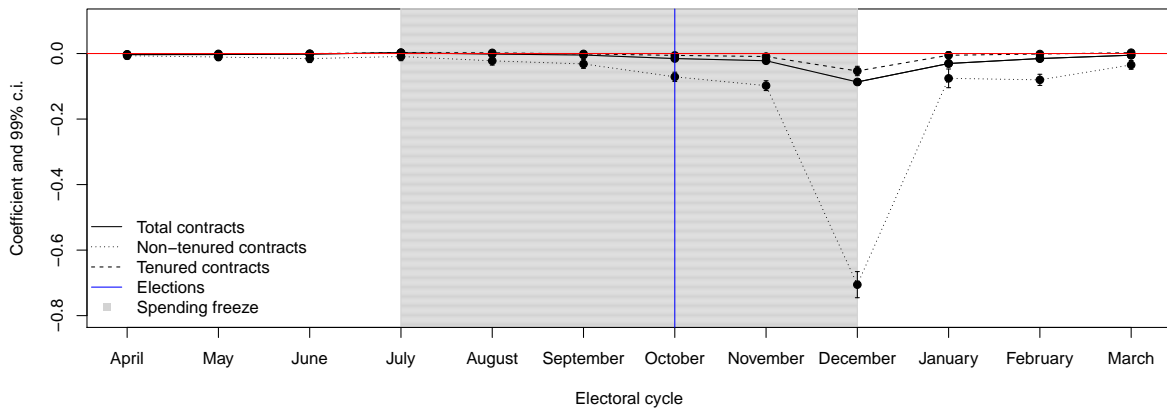
(c) Expenditures on stock of contracts

Figure 12: Monthly election cycle effects on absolute number of contracts (no logging)
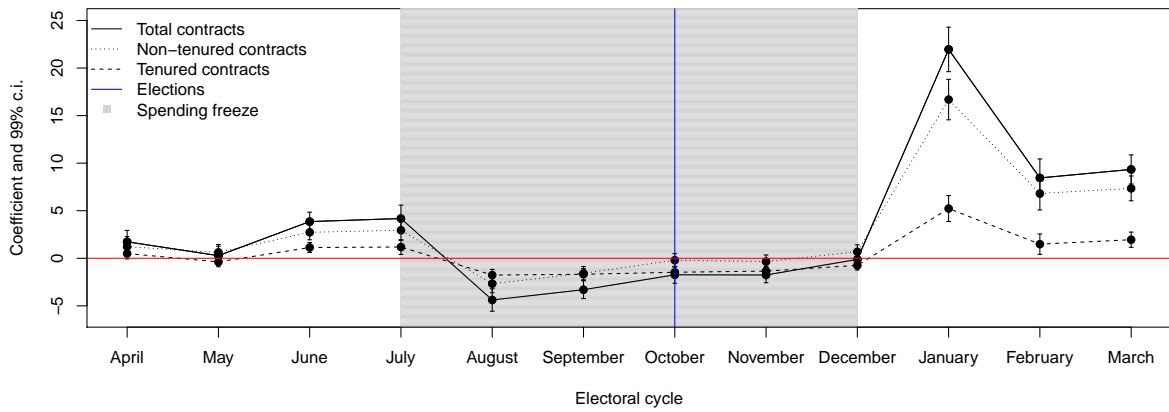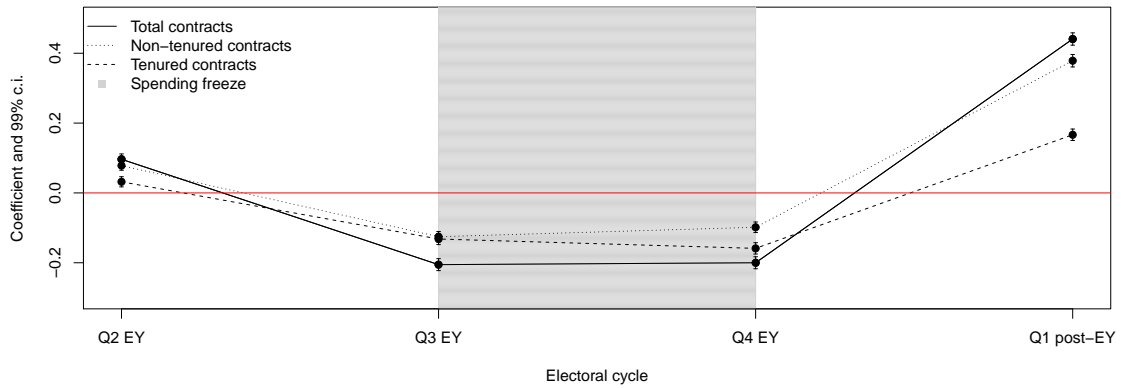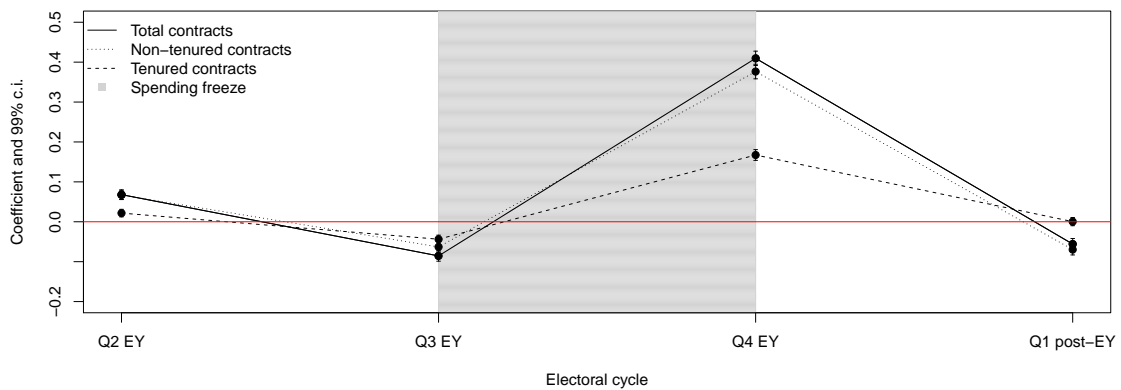

(a) Flow of new contracts
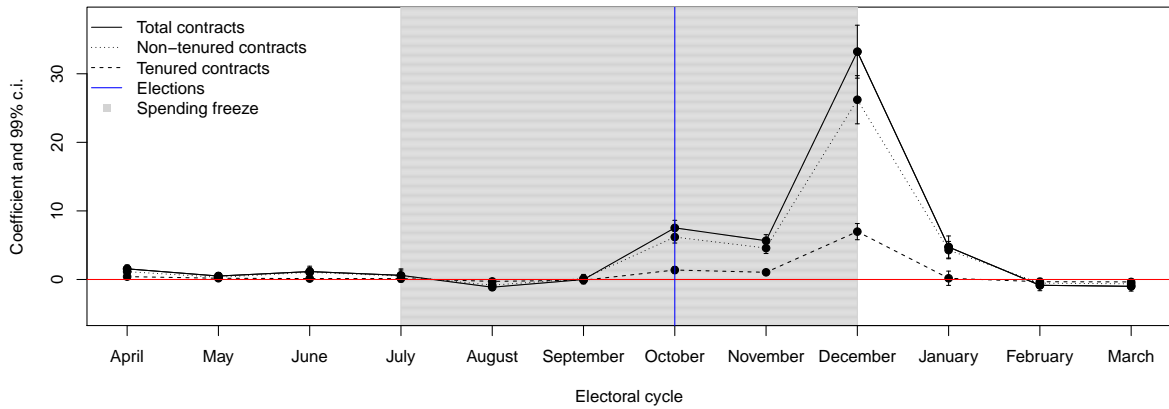
(b) Flow of dismissals
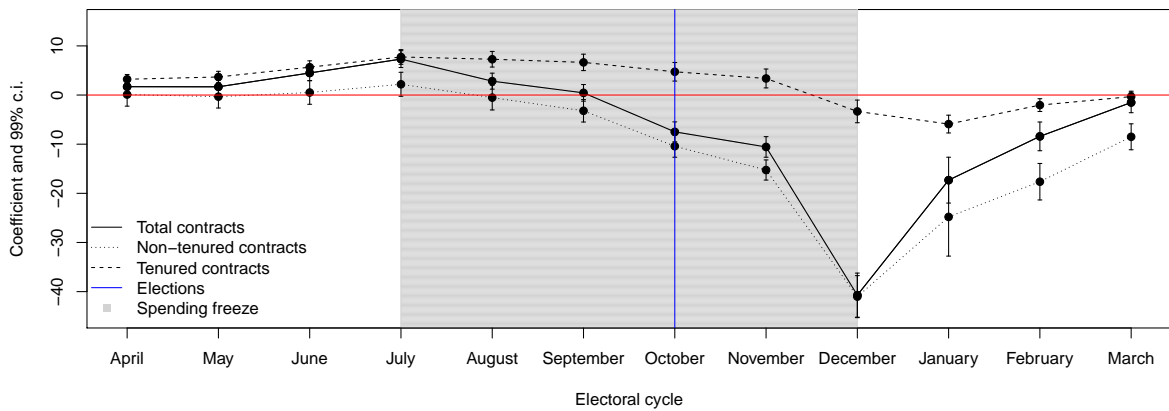
(c) Stock of contracts

Figure 13: Monthly election cycle effects on logged absolute number of contracts (without adding 1, omitting observations with 0 in the dependent variable or its lag)
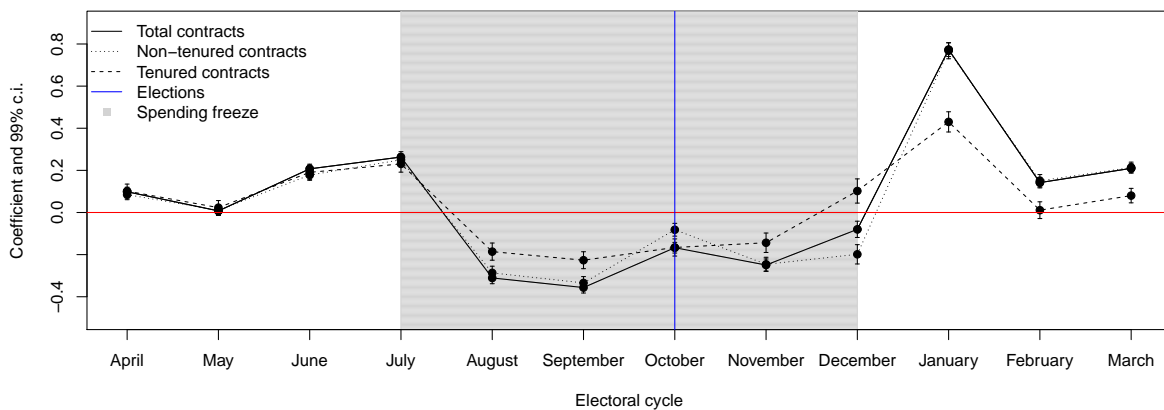
(a) Flow of new contracts
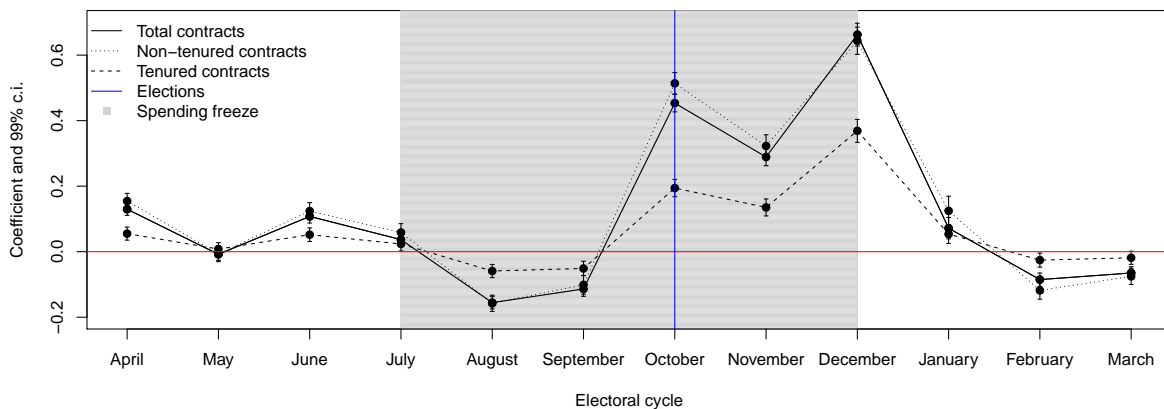
(b) Flow of dismissals
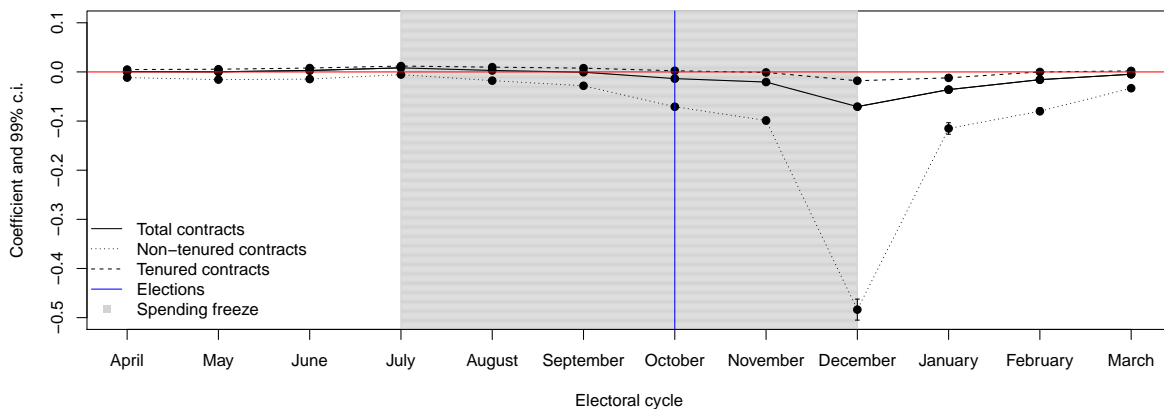
(c) Stock of contracts

F Political bureaucratic cycles with alternative measures of outflows

Figure 14: Monthly election cycle effects on logged absolute number of dismissals, excluding all those that are not done on the initiative of the employer (with or without "fair cause") or due to the end of the contract
Dots correspond to election cycle effects ($\hat{\beta}$ in Equation 1)
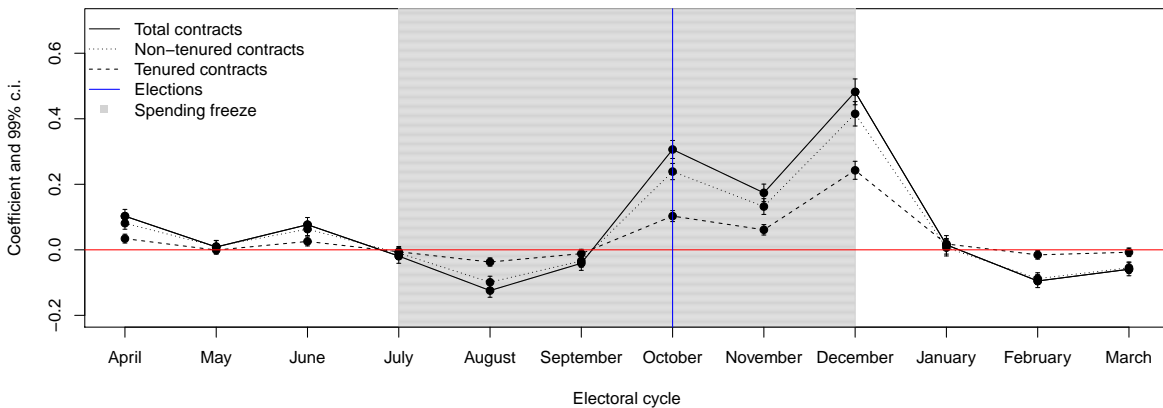
Figure 15: Monthly election cycle effects on logged absolute number of dismissals, excluding all those that are not done on the initiative of the employer (with or without "fair cause")
Dots correspond to election cycle effects ($\hat{\beta}$ in Equation 1)
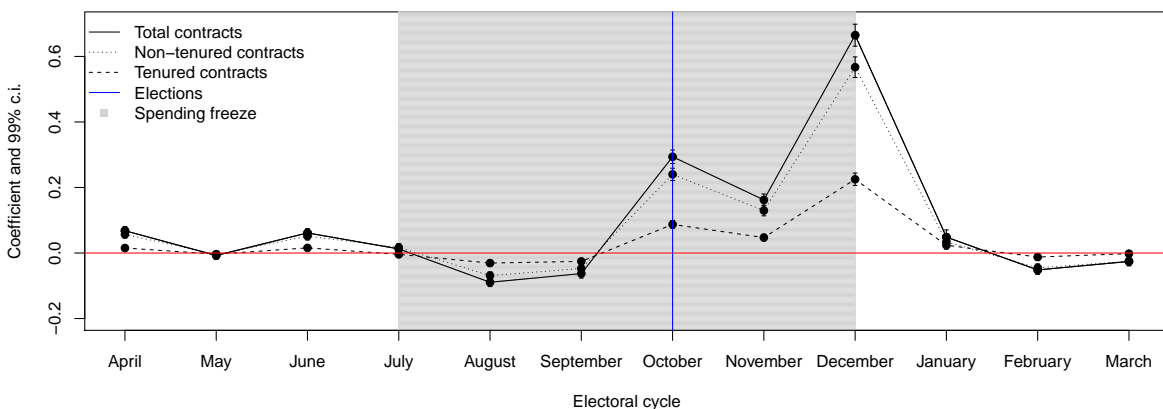
G Political bureaucratic cycles among healthcare and education professionals

RAIS includes occupation classifications using the federal government's Brazilian classification of occupations, detailed at http://www.mtecbo.gov.br/cbosite/. Using this classification, I select those municipal employees with occupational categories that clearly correspond to healthcare workers, such as doctors, nurses and nursing technicians of different specialities, healthcare agents, pharmacists, etc. This classification however does not allow me to select more general workers (such as cleaners or general administrative staff) who also work in the healthcare sector. Results show very similar patterns, although the size of the coefficients is smaller, possibly due to the reduced elasticity of this mid-to high-skill workers. The Figures below show that the patterns uncovered overall hold also for the education and healthcare bureaucracies.

Figure 16: Monthly election cycle effects on logged absolute number of contracts, healthcare professionals
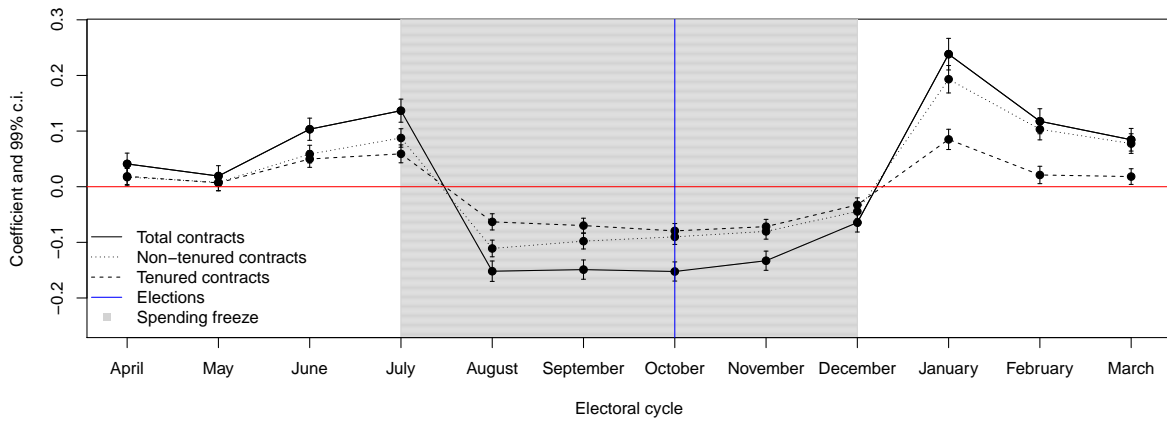
(a) Flow of new contracts
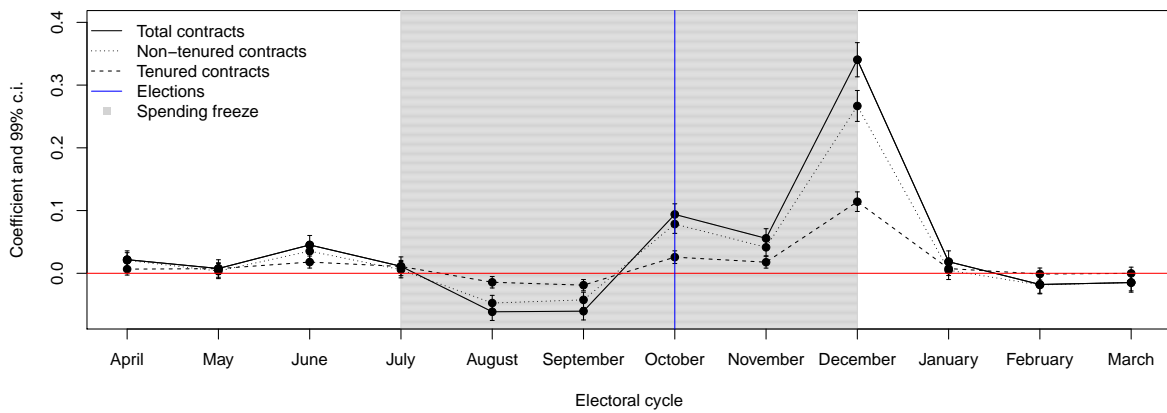
(b) Flow of dismissals
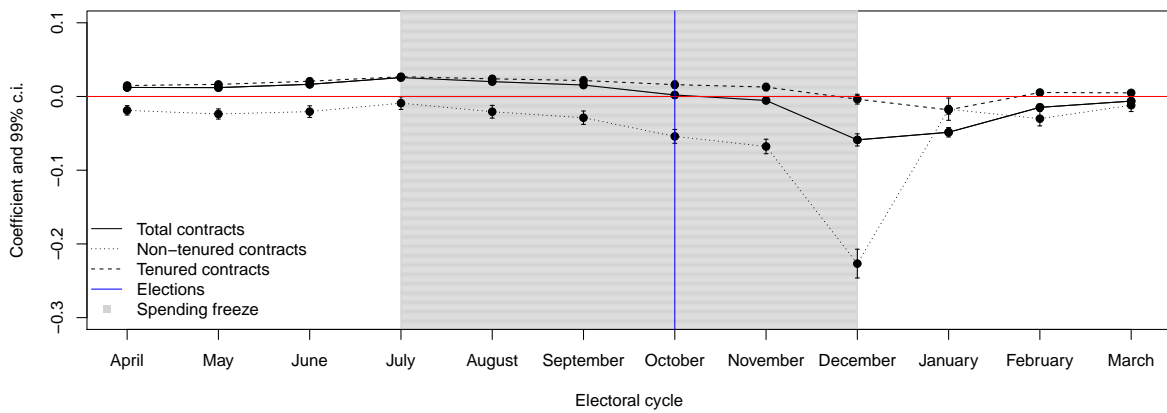
(c) Stock of contracts

Figure 17: Monthly election cycle effects on logged absolute number of contracts, education professionals
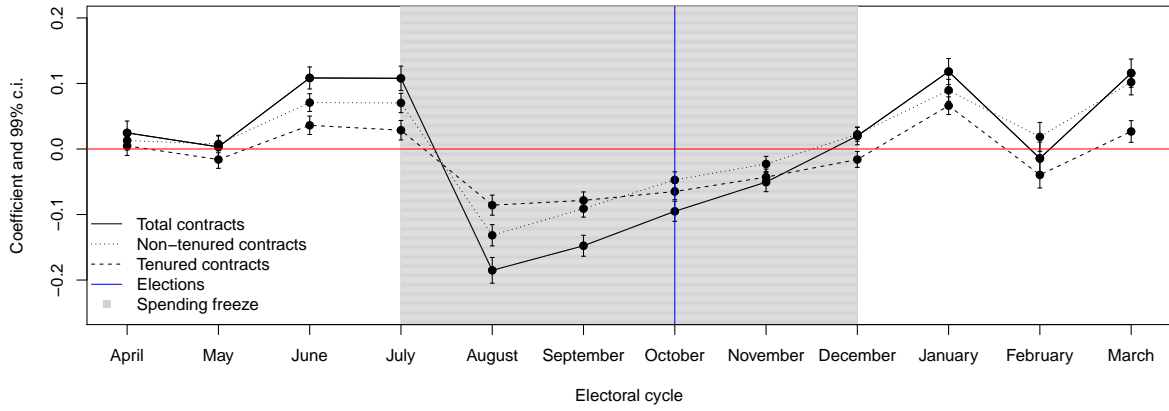
(a) Flow of new contracts
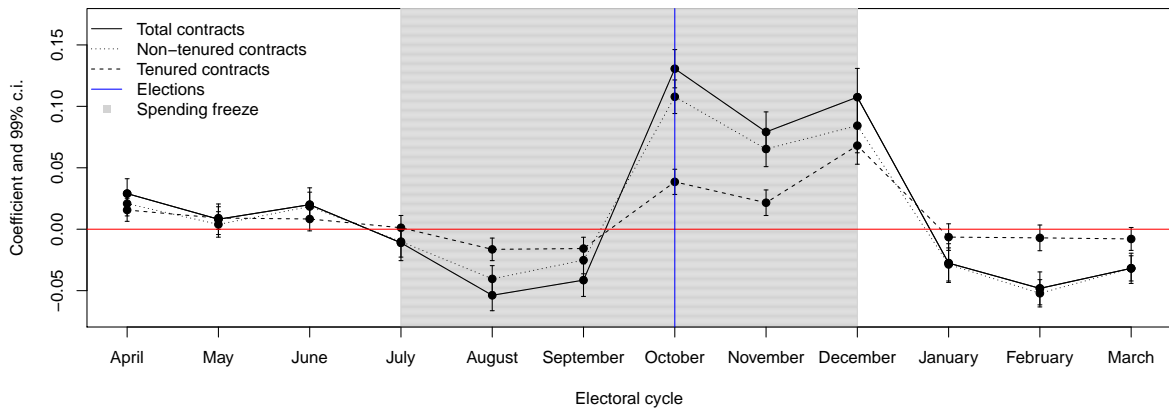
(b) Flow of dismissals
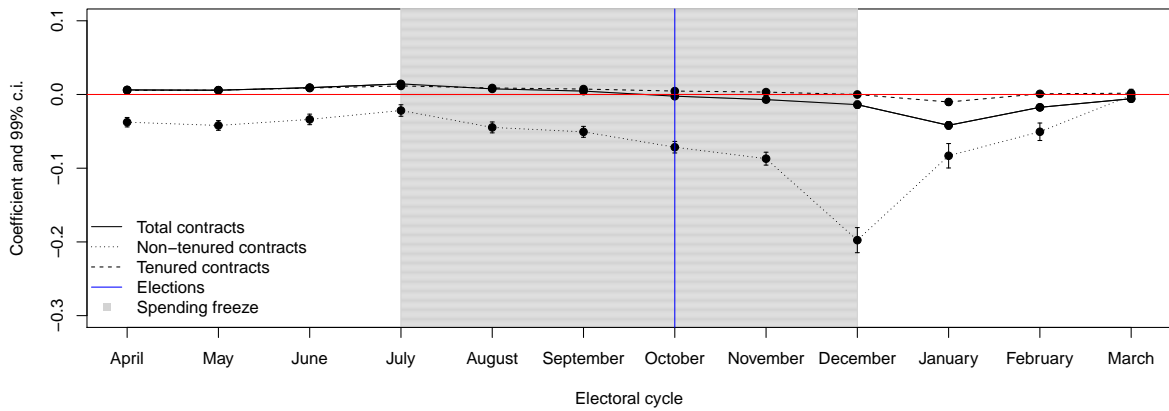
(c) Stock of contracts

H Political bureaucratic cycles using quarterly data

Figure 18: Quarterly election cycle effects on logged absolute number of contracts

(a) Flow of new contracts

(b) Flow of dismissals
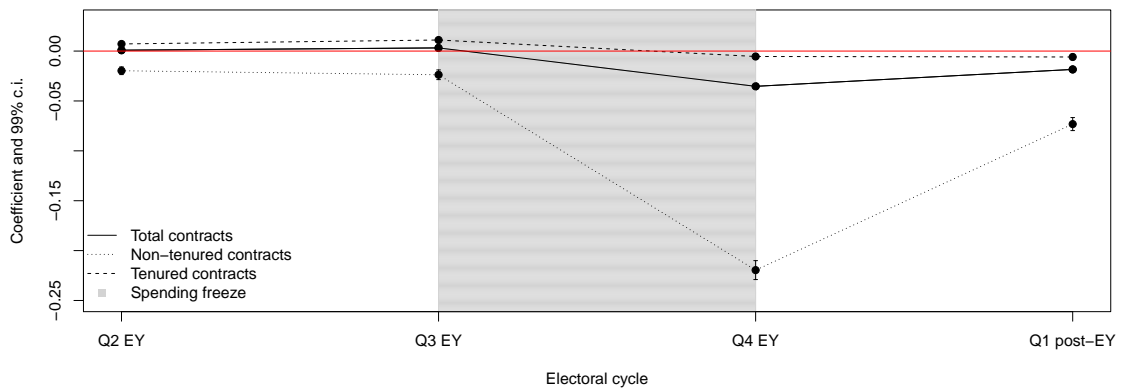
(c) Stock of contracts

I Conditional political bureaucratic cycles

Figure 19: Conditional monthly election cycle effects on logged absolute number of non-tenured, municipal employees – Dots correspond to the interaction between election cycle effects and an indicator for heterogeneity ($\hat{\delta}$ in Equation 2)
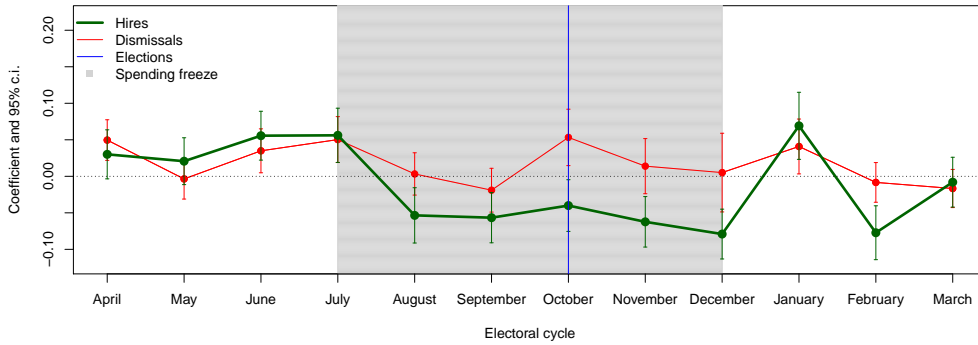
(a) Monthly election-cycle effects conditional on high electoral competition
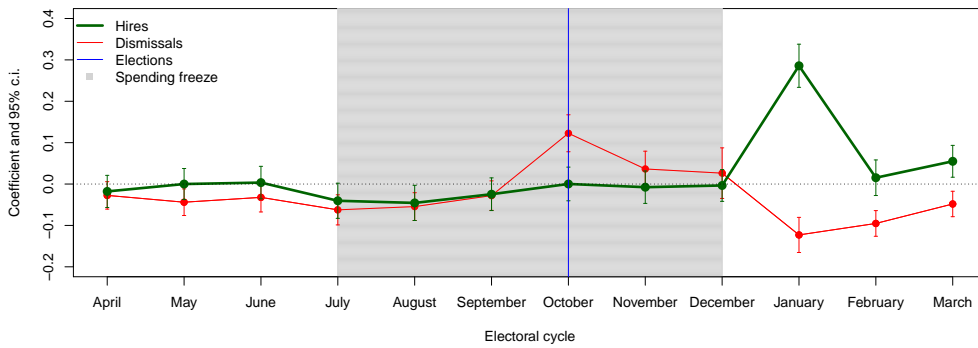
(b) Monthly election-cycle effects conditional on the incumbent mayor being on their first term
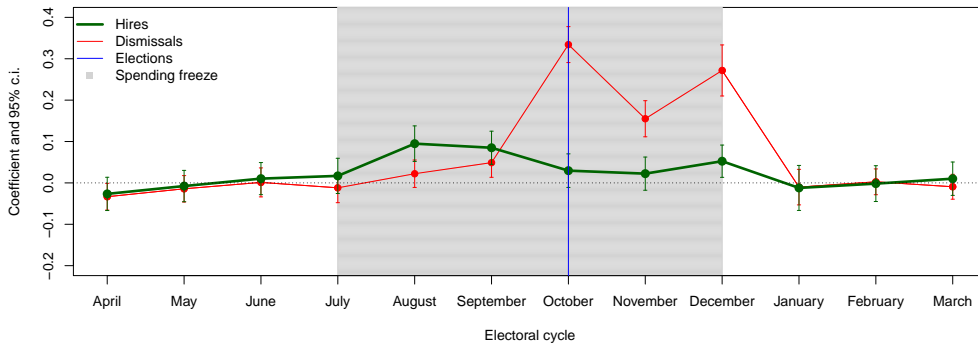
(c) Monthly election-cycle effects conditional on the incumbent losing the October election

Figure 20: Conditional monthly election cycle effects on logged absolute number of tenured, municipal employees – Dots correspond to the interaction between election cycle effects and an indicator for heterogeneity ($\hat{\delta}$ in Equation 2)
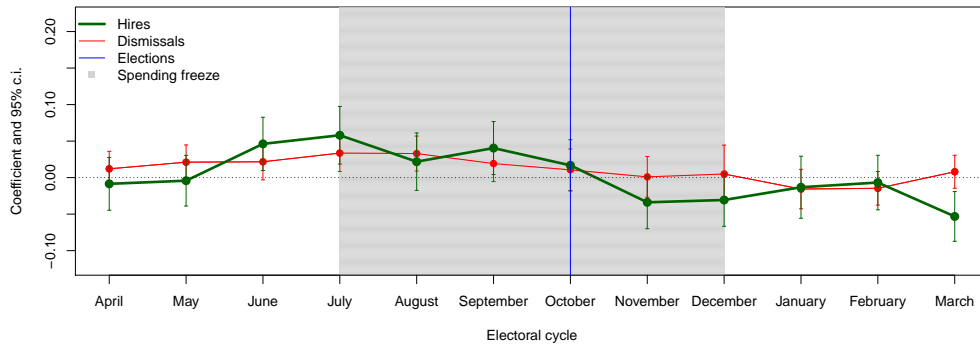
(a) Monthly election-cycle effects conditional on high electoral competition
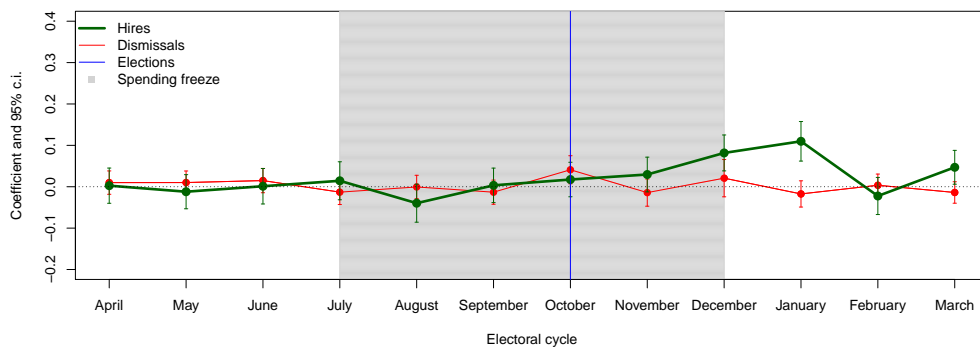
(b) Monthly election-cycle effects conditional on the incumbent mayor being on their first term
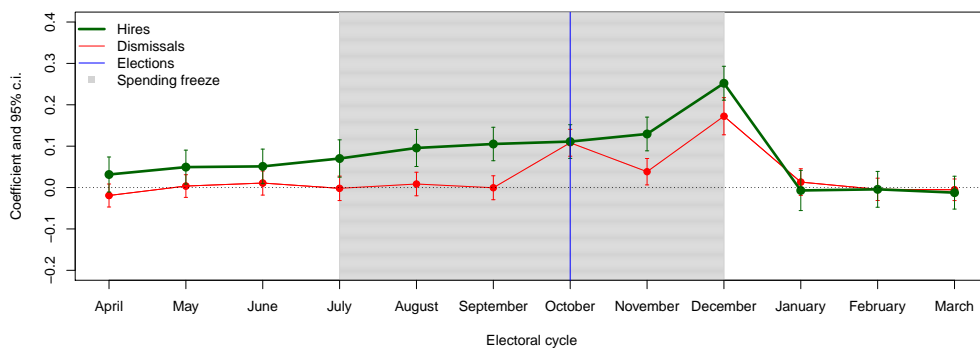
(c) Monthly election-cycle effects conditional on the mayor losing the election in October

J   Seasonality in municipal employment

Figure 21: Month fixed effects on logged absolute number of municipal contracts ($\hat{\theta}$ in Election 1)
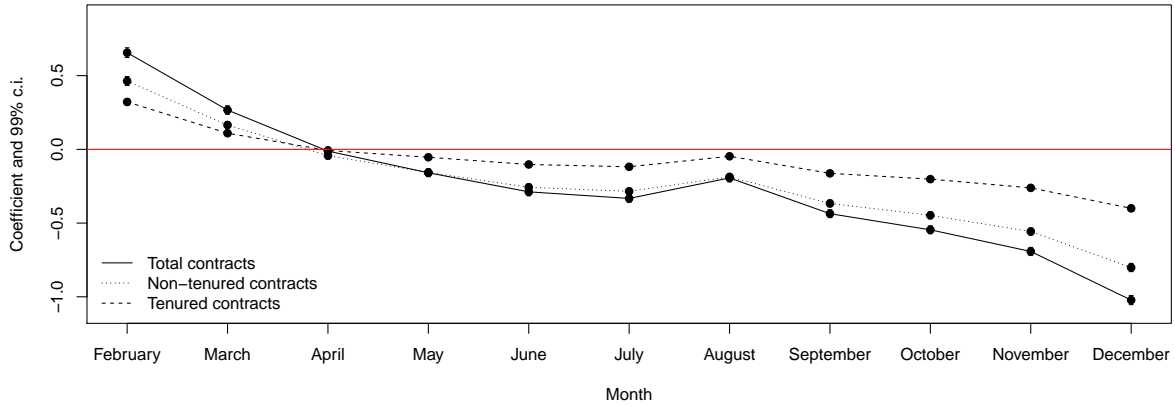
(a) Flow of new contracts
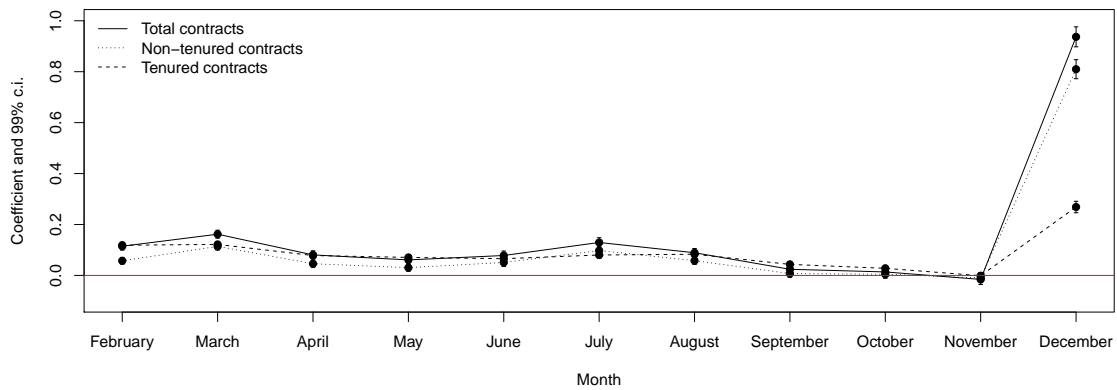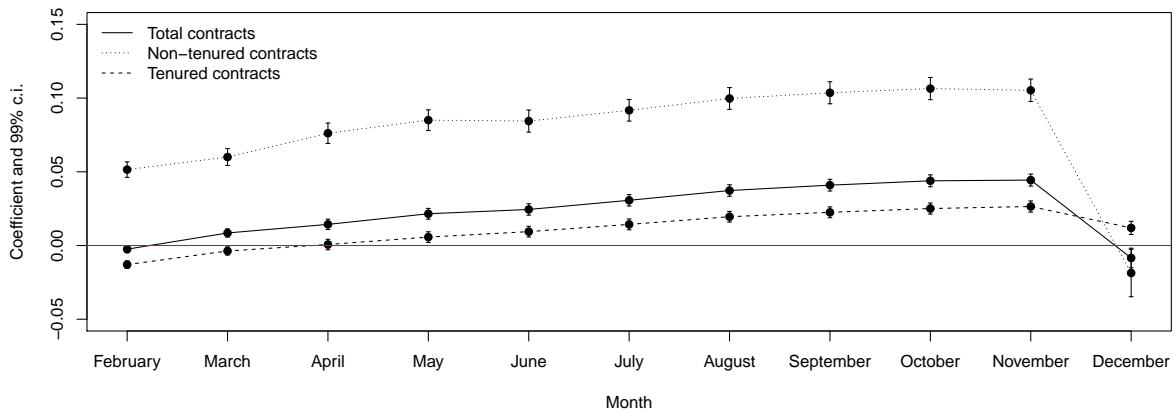

(b) Flow of dismissals
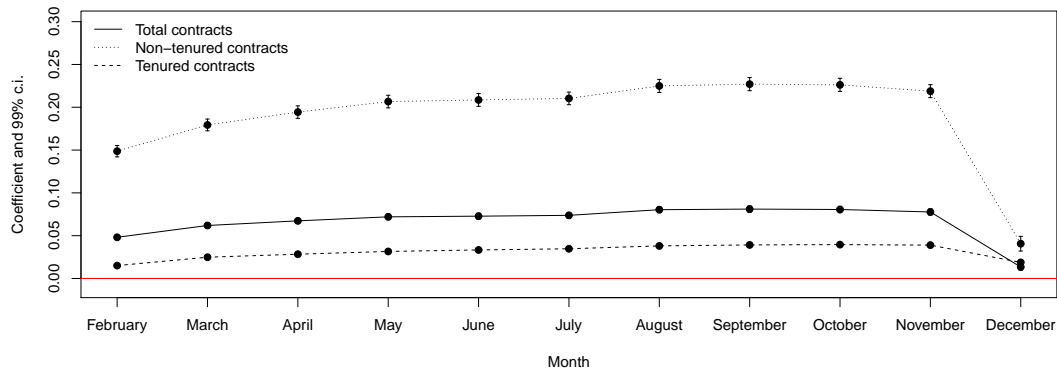
(c) Stock of contracts

Figure 22: Month fixed effects on logged absolute number of municipal contracts ($\hat{\theta}$ in Election 1)
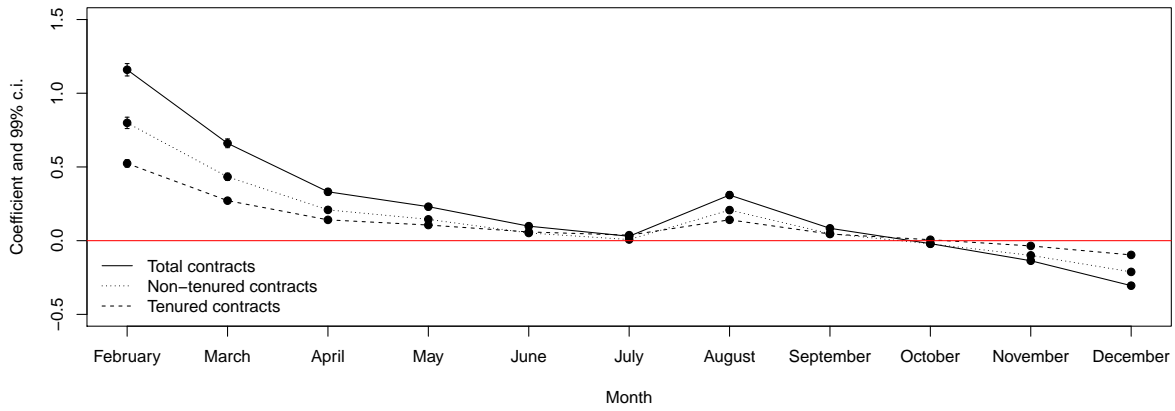Healthcare professionals
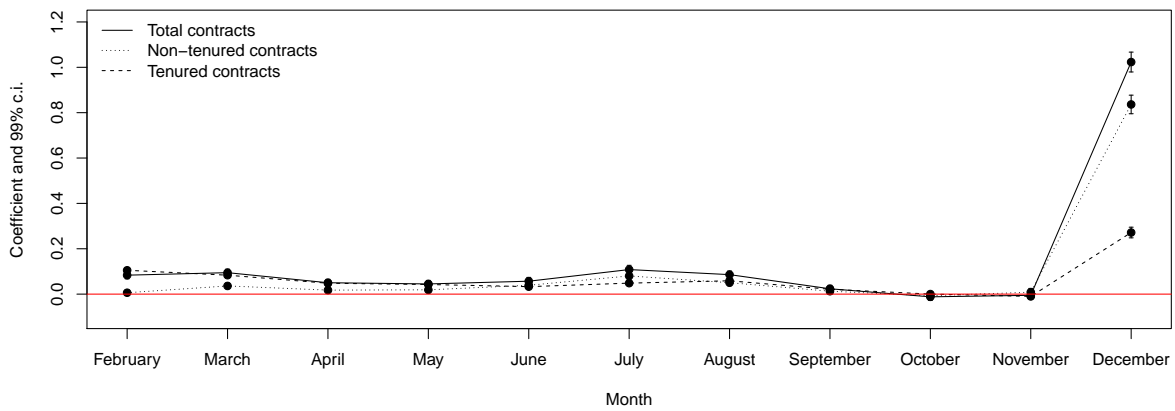

(a) Flow of new contracts
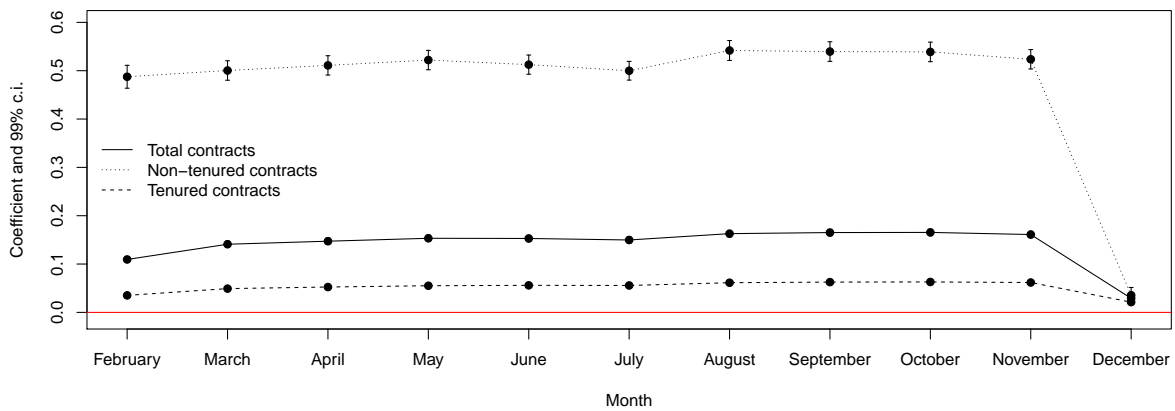

(b) Flow of dismissals

(c) Stock of contracts

64
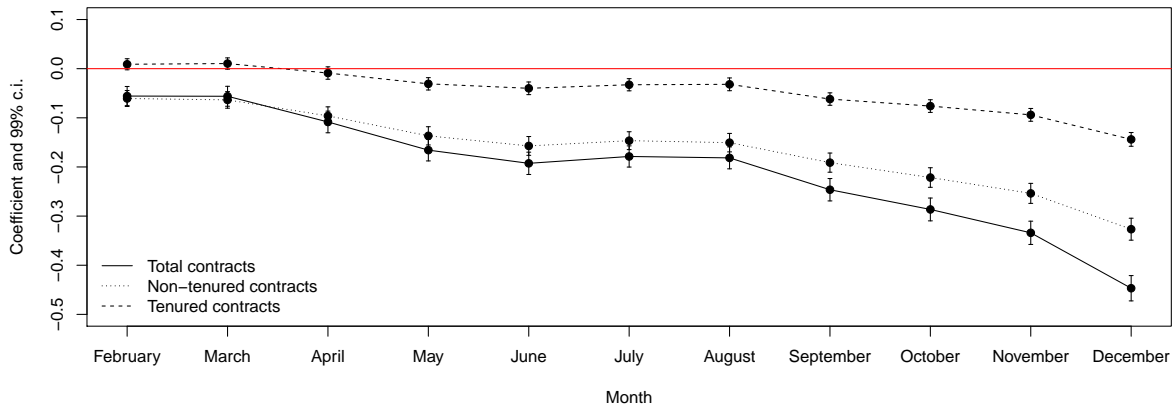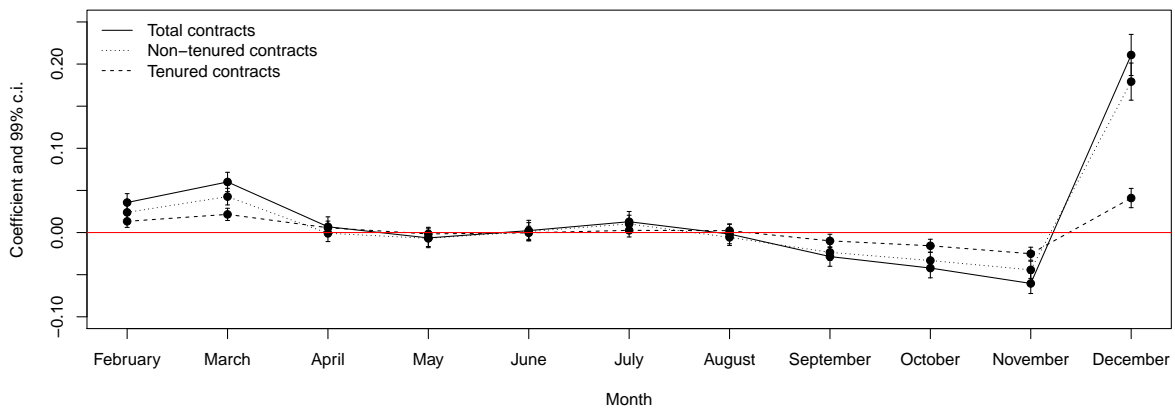
Figure 23: Month fixed effects on logged absolute number of municipal contracts ($\hat{\theta}$ in Election 1)
Education professionals

(a) Flow of new contracts

(b) Flow of dismissals

(c) Stock of contracts

K   Test for political bureaucratic cycles in infant deaths

Figure 24: Monthly election cycle effects on infant deaths
Dots correspond to election cycle effects ($\hat{\beta}$ in Equation 1)