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Do Political Parties Matter? Evidence from Brazilian Municipalities

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Dissertação para obtenção do grau de mestre apresentada à Escola de Pós-Graduação em Economia

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Orientador: Carlos Eugênio Ellery Lustosa da Costa

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JOSÉ EDUARDO GONÇALVES DE SOUSA

"DO POLITICAL PARTIES MATTER? EVIDENCE FROM BRAZILIAN MUNICIPALITIES".

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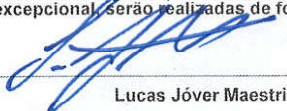
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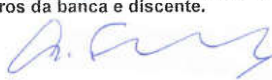André Garcia de Oliveira
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Abstract

This article aims to empirically analyze whether political parties matter in terms of economic outcomes. To do so, we rely on a regression Discontinuity Design (RDD) estimation strategy, which exploits elections in Brazilian municipalities decided by a narrow margin. Comparing cities where left-wing parties barely won and barely lost the elections, we are able to identify the causal effect of partisanship on the size of government and public goods provision. Empirical results show that party control does not impact municipal outcomes such as the patterns of expenditures, revenues and the number of public employees, and also does not affect the budget allocation in several important areas. Considering the link between theoretical mechanisms and the results, constraints arising from shared authority with upper levels of government and limited room for engaging in strategic extremism most likely drives this lack of party importance at the local level.

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1 Introduction

Do parties matter in terms of economic outcomes? Do incumbents belonging to different ideological platforms perform differently while in office? This article aims to contribute to the literature which tries to answer this question.

There has been a recurrent interest in the Political Economy literature whether political parties do or not play a significant role in determining economic outcomes. This query is interesting itself because of its practical relevance. However, it attracts even more attention among economists because it relates both to a few theoretical and empirical studies reaching divergent conclusions.

Theoretical models vary mainly in their hypothesis concerning the motivations of the politicians and their parties, and also their considerations wheater people can affect or merely elect policies, and how this changes according to the level of government. Models such as the Median Voter (Downs 1957) implies no partisan effects, while on the other hand, the citizen-candidate model (Besley and Coate 1997; Alesina 1988) attests for the importance of such.

Empirical evidence heterogeneity arises because there are numerous ways to tackle this problem. Different levels of government (national, state or local) may observe different partisan effects. Furthermore, each country posses a different political framework and results supporting or not partisanship importance may arise. In addition, there are a variety of works relying on different identification strategies and different types of database, from time-series approaches to panel data.

The main challenge in estimating the party effect is the possible presence of selection bias in a simple comparison of outcomes between localities governed by different parties. Because the parties are chosen to govern by the people, party control is thus an endogenous variable, which is probably correlated with other elements that affect economic performance, such as voters preferences and the economic situation prior to voting.

The ideal case for the researcher would be to randomize party control, because this balances the observed and unobserved characteristics between political entities, eliminating the bias and allowing simple comparisons. However, since this is not possible, we are left with the option to apply quasi-experimental methods, which try to emulate the properties of perfect randomization.

In this paper, we tackle the main question of interest relying on a Regression Discontinuity Design (RDD) identification strategy and using data from elections at Brazilian municipalities. Following the RDD framework applied to elections detailed in Lee (2008) and applying this methodology to analyze partisan effects as in Pettersson-Lidbom (2008) and Ferreira and Gyourko (2009), we are able to identify the causal effect of party control on fiscal and economic policies.

The results of this study show that party control does not have a causal effect on measures of size of government such as number of public employees, expenditures and taxation and in the resource allocation in most of the important categories analyzed. Only for education, we find that left-wing administrations allocated up to 2.8 percentage points higher budget share for that function. At least at the local level, evidence suggests that partisan importance is reduced. Relating our findings with the literature, we informally discuss possible mechanisms responsible for this lack of party importance municipal administrations. Constraints arising from upper levels of government limit the mayor discretionary for pursuing his desired level of taxation and expenditures, and the limited space for engaging in strategic extremism at the local level appears to reduce the ideological importance in the determination of public goods provision.

We intend to contribute to the literature in some ways. First, most of the research so far is based on evidence from countries with very simple political environments, like bipartisan or multiparty with very well defined and stable left and right-wing parties. Second, extend the literature of party effects to a context of a developing country, to verify if the results here are consistent with previous empirical evidence.

This essay is organized as follows: section 2 exposes the related literature and shows how the present research fits into it; section 3 describes the data sources and the Brazilian political and institutional context; section 4 details the empirical strategy; section 5 exposes the results of the RD estimates; section 6 presents validity tests to assure the credibility of our estimates; section 7 discusses the presented evidence and how it relates with the literature; and section 8 concludes.

2 Related Literature

2.1 Theory - Are partisan effects expected?

The Median Voter Model proposed by Downs (1957) implies no partisan effects considering two-party election competition. This is one of the most influential papers in this area. The author starts with two key assumptions: 1) the motivation of politicians is only to hold office. They do not have governmental preferences, and thus act in a way solely to maximize votes; 2) Candidates are able to commit to credible policy directions ahead of the elections, and govern aligned with these pre-determined promises. The basic implication of this setting is that the winner in a two party election is the candidate who most commit with the preferences of the median voter. Consequently, Downs predicts a party competition to the center, such that the identity of the office holder will not cause policies to vary. Although Downs' conclusion emerges from a bipartisan framework, the discussion brought by Osborne (1995) points out that convergence is a more general aspect of political competition and not exclusive to a two-candidate model. Down's model points to a conclusion of strict convergence. So, if the implications of

this model are valid, we should observe no significant party effects when running empirical estimations.

An alternative theoretical approach, known as the citizen-candidate model (Alesina 1988; Besley and Coate 1997), describes a framework in which the identity of candidates and parties affects outcomes. This framework considers that political agents do not only care about holding office. They care about the quality of the policies being implemented, and thus see the elections as a mean to put into practice their ideas over society. This results in a lack of credibility about the commitment of candidates, because of dynamic inconsistency: after being elected with a central agenda, incumbents have an incentive to deviate towards their preferred platforms. Rational voters account for that incentive, and so commitment becomes not credible, and consequently parties do matter. In this sense, the elections are an instrument for the people to choose between a set of policies offered by each candidate. In contrast to the previous model, a context where the citizen-candidate hypothesis are satisfied would imply unconstrained politicians to yield statistically significant impacts over economic outcomes.

In an article which debates a possible non-political solution to the free rider problem, Tiebout (1956) builds a model that leads to the prediction that partisanship is not important (or at least less important) at the local level. The Tiebout Hypothesis conjectures that at the local level, individuals possess higher mobility between communities, and those have expenditures and revenue settings more or less given. In this context, consumer-voter citizens tend to move to the communities whose local governments better satisfies their set of preferences (in terms of tax burden and public goods provision). In this sense, each municipality's policies should reflect its citizens preferences, diminishing the role of the incumbent in office. One of the most important messages sent by this reflection is that the expected party effects may not be the same among different levels of government. Hence, each case must be assessed separately. Another point of interest is that the relationship between Tiebout's implications and empirical evidence should not be so straightforward, however. The estimated party effect tends to be smaller at the local level, but conditional to jurisdictional competition being observed. The more intense is the Tiebout competition mechanism, less estimated party effects are expected at the city level. Alternatively, if jurisdictional competition is low, Tiebout's model is still compatible with partisanship.

One aditional piece of theoretical work that expects relevant partisan effects is the Strategic Extremism Model proposed by Glaeser et al. (2005). The authors describe a model where extremism occurs for purely vote-maximizing reasons (differing from Citizen-Candidate Model in so). The basic assumptions are: 1) parties play effort not only in competing for voters against the rival party, but as well need to concern in motivating his own voters (e.g. turnout and/or raising financial contributions); and 2) a move away from the center must increase turnout (or donations) among a politician's own supporters more than among his opponent's supporters. They model that a party's supporters are more aware of their preferred political group's actions than of actions of political opponents. And thus, when a politician's policies deviate from those preferred by the median voter, he energizes his own supporters (who are more likely to be

aware of this deviation) more than he energizes his opponent's supporters (who are less likely to be aware of this deviation). Of course, the model's implications are conditional to a context where the behavior of strategic extremism is feasible, that is, people's preferences must be sufficiently heterogeneous so that there is a significant share of voters belonging to different extreme political positions, and where politicians do find means to target messages to their specific supporting groups. Hence, it is important that any empirical test concerning the model be aware of this warning.

2.2 Empirical Evidence

Regarding empirical studies, the literature's main concern is in applying credible identification strategies so as to identify causal effects of party affiliation over economic outcomes. Moreover, there is an attempt to conciliate the evidence with theory predictions.

When it comes to the measurement of party effects at national or state levels, authors find that partisanship plays an important role in the determination of outcomes. In a United States state level analysis, Besley and Case (2003) apply an identification strategy based on multivariate regressions controlling for state and year fixed effects, and estimate that a higher fraction of democratic party seats in the state legislature yields higher state spending per capita and higher amount of resources allocated to family assistance. Considering the national level, Lee, Moretti, et al. (2004) exploit elections decided by a narrow margin at the U.S. Congress House in a Regression Discontinuity Design and conclude that party affiliation significantly explains congressional voting behavior.

Turning to empirical evidence at the municipality level, the conclusions reached among studies are more heterogeneous. The analysis of Ferreira and Gyourko (2009) focus on elections at the municipal level in the United States between 1950 and 2000, which is a simple case due to the bipartisan arrangement (democrats vs republicans) in this country. Based on a RDD estimation, they measure partisan effects on government size (tax burden and expenditures), allocation of local public spending and crime rates, finding no effects. In addition, they empirically assess the mechanisms responsible for their results, and show that Tiebout competition between nearby jurisdictions is the process most likely to explain the lack of partisan importance at the local level, compared to arguments of limited space for strategic extremism in small towns and homogeneity of voters at the local level.

In a more recent study of the American context, Gerber and Hopkins (2011) explain that mayoral ideology effects depends on the autonomy he has to rule, which is determined by the level of shared authority between local, state, and federal administrations, that is, how strongly the mayoral discretion is constrained by laws and rules mandated by upper government spheres.[1]

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[1]For instance, the constitution may determine which categories of public spending are under local, state or federal responsibility, making the mayor unable to decide the allocation of resources in areas not under his jurisdiction. Also, there may exist rules that determine some upper or lower bounds to the budget share aimed

In particular, they hypothesize that the influence of partisanship on local policy will be stronger in areas like public safety, where overlapping authority is less, and weaker in areas like taxation and social policy where overlapping authority is greater. As well based on a RDD strategy, they find that cities that elect a democratic mayor spend a smaller budget share on public safety. On the other hand, they find no differences on tax policy, social policy and other areas that are characterized by significant overlapping authority.

As mentioned above, the literature that examine the U.S context[2] have the ease of counting with the simplicity of the bipartisan political scheme present in the country, due to the extreme polarization between the Democratic and Republican sides. Studies aimed to evaluate other countries usually face more complex backgrounds. In multi-party contexts, party affiliation effects are not so straightforward to identify. Hence, recent research is developing towards a way to credibly identify causal effects when electoral competition is broader.

For instance, Pettersson-Lidbom (2008) assesses the multi-party Swedish context. To overcome possible issues related to this setup, the author's strategy is to measure party effects aggregating parties according to two ideology categories: left-wing and right-wing. He argues that the Swedish political map has a clear dividing line between socialist and non-socialist parties, leading to a quite stable two-bloc system. Thus, the Swedish electoral system can be seen as bipartisan. Applying a RDD strategy to a panel data set of local elections between 1974 and 1994, he estimates party control impacts on measures of government expenditures and revenues, unemployment rate and local government employees. The conclusion points that parties do matter: left-wing parties spend and tax 2-3% more, employ 4% more workers and have 7% lower unemployment rates compared to right-wing parties.

Subsequently, this left-right ideology aggregation became commonly used to adress multi-party contexts. For instance, Solé-Ollé and Viladecans-Marsal (2013) apply analogous close race RDD strategy to spanish municipalities data, and find significant party control effect over land use policies, especially in places with greater population heterogeneity; Basile et al. (2014), in turn, consider that there is only one ideal outcome variable capable of measuring the net effects of governmental action, which is the real estate market. Thus, that is their focus to evaluate the partisan importance in Italy.

Alternately, one slightly different approach to deal with identification in multi-party systems is the one proposed by Freier and Odendahl (2015). The authors examine the political power effect on proportional elections in German municipalities by building an index that measures political power, and using close races as an *instrument* for this endogenous variable. This leads them to conclude that political power does matter for policies, and surprisingly that the center-left party of the country is found to lower all locally controlled taxes.

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to some areas. Yet, federal and/or state governments are often responsible for transferring large amounts to municipalities. In this sense, the mayoral ability to control the municipal budget may be reduced.

[2]There are still more examples of studies in the United States. Beland and Unel (2018) applies an RDD strategy to evaluate partisan impacts on immigrants' labor market outcomes. Leigh (2008), in turn, focuses in crime and educational outcomes.

This article consists of an empirical attempt to asses the party importance for the context of Brazilian municipalities. The present analysis is an interesting contribution for the literature as it tries to evolve the investigation of party effects in multi-party systems to a context where party's creeds are considered less stable and the left and right-wing aggregation may not be so obvious. In addition, the Brazilian case is of interest *per se* due to the country's size and large amount of quality data availability[3]. It is one of the biggest multi-party democracies in the world, counting with data on elections in more than 5 thousand municipalities in the last decades.

3   Institutions and Data

3.1   Brazilian municipalities

In order to assess if parties with different ideologies perform differently while in office, we focus on analyzing municipal governments. This is useful in two ways. First, it makes us able to evaluate the theoretical predictions of the Tiebout Hypothesis, which refers to the local level. And second, it allows us to work with a larger amount of data, since there are currently 5570 municipalities in Brazil. As will be discussed later, sizeable datasets are especially important for identification in a Regression Discontinuity estimation.

Brazilian municipalities are federative units corresponding to the lowest layer of administrative division. The autonomous local government is ruled by a mayor (Prefeito) and a city council (Câmara de Vereadores), both directly elected by citizens to a four-year term. In municipalities above 200.000 voters, mayoral elections are based on a majority run-off rule, whereas in municipalities below this limit, elections are taken under a simple plurality rule. Before 1998, mayors could not run for reelection. But since then, they are allowed to run to a second and final term. In this study, we focus on four different local elections: 2000, 2004, 2008 and 2012, with tenure periods in 2001-2004, 2005-2008, 2009-2012 and 2012-2015, respectively.

Regarding the expenditures, local government is the authority level responsible for the provision of public goods and services in the areas of education, health, transportation, and local infrastructure. The federal government imposes some constitutional mandates that allocate some fractions of the budget to certain sectors[4]. However, most of the funds are available for the mayor and local legislators to decide how to spend. Every year the mayor proposes a detailed budget (Annual Budget Law - LOA) listing spending on all relevant fields. This document is

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[3]Regarding the Brazilian context, Brollo and Troiano (2016) have also exploited a Regression Discontinuity Design using the same electoral data considered in this study. The authors rely on close races to analyze weather women in office perform differently from men.

[4]For instance, the Brazilian Constitution rules that municipalities spend at least 25% of their total revenues (including state and federal transfers) on education and 15% on health. In these categories of expenditures, the mayoral fiscal liberty lies in spending more than the mandated lower bound, if desired.

then analyzed by the local legislature, which may interpose in some items. After receiving back the revised budget, the mayor finally decides how much to spend on all of the approved items.

When it comes to resources, municipalities have two main sources of income: (i) transfers from federal or state level; and (ii) local revenues, such as residential property taxes (IPTU, ITBI) and service taxes (ISS). The former might reflect non-discretionary municipal decisions, but the latter are directly ruled by mayoral discretion. Thus, local taxes are possibly a more reliable measure for investigating partisan effects over the governmental revenues.

Given the discussion above, it is then clear the considerable role exercised by the mayor in determining both economic outcomes and the size of the local government. It remains the issue of assessing if political parties and the coalition ideology are important enough factors to determine the way mayors rule. We start by describing the Brazilian political system.

3.2 Political Setting

Brazil is a multiparty democracy marked by high level of political fragmentation. Currently, there are 35 officially registered parties, and coalition governments are common in all three levels of government (federal, state and municipal). Besides, the country's political environment is inherently in continuous change: parties are often created while others dissolved, and political alliances have been constantly modified.

Such electoral volatility results in low levels of party identification in the electorate. In a context with excess number of parties, voters often cannot recognize strong ideological platforms in the different affiliations. This is a context that parallels the theoretical environment of the Median Voter Model, because with so many parties, it becomes more plausible to expect that the primary objective of a few of them would be just reaching public office. As discussed in the previous section, a condition like this is likely to result in small party effects. In this sense, the Brazilian case brings in additional motivation to empirically assess the importance of parties to economic outcomes.

For the empirical analysis, we need to precisely define what is the treatment group, or in terms of our context, what defines party control. In a multiparty system, though, there is not a straightforward definition. Therefore, we follow Pettersson-Lidbom (2008) approach of aggregating political entities in two major ideological groups: left-wing and right wing blocs. We define then the treatment status T_i as equal to 1 for left-wing administrations and zero otherwise. In this setting, the party effect we are able to identify can be more specifically defined as a party coalition effect, and this has become the standard identification strategy in the literature when dealing with large number of parties.

Separating parties on the left-right scale is a traditional attempt of ideological ranking in a way that summarizes many kinds of beliefs and political positions. But simplifying the most,

this arrangement compiles the beliefs in the role and degree of intervention of the state on society. Left-wing ideologies are thought to defend a sizable and interventionist state, focused in social welfare. While on the other hand right-wing philosophies support less importance for the role of the state, which should be the minimum possible, and focus solely on the most basic functions a government can do, like supplying public goods and intervening only when facing market failures.

Aggregating Brazilian parties according to their political orientation is not a simple task, though. Because of such political fragmentation discussed above, the classification of entities on the left-right line is a bit more complicated compared to the Swedish context discussed in Pettersson-Lidbom (2008). There are many parties whose ideological position is unclearly defined, parties that were gathered to form a new one, and parties whose ideas experienced changes over time.

To deal with that, we apply a more careful strategy of classification based on some points. First, we rely on a few studies from the political science literature that investigate this issue and label Brazilian parties using different methodologies. Second, we recognize a party as belonging to the left or right-wing ideology only if it has been *unanimously* considered as so among all authors examined. Parties considered to possess a central position by any author are labeled as center parties, and parties classified as left and right-wing by different authors are considered as undefined parties. Third, we ignore undefined parties for the empirical analysis and run the statistical models both accounting for centrist parties or not.

The political science studies considered here are Fernandes (1995), focused in the parliamentary voting behavior during the Brazilian constituent assembly (1987-1988); Mainwaring et al. (2000), who analyzed congress votes and parliamentary opinion polls; Rodrigues (2002), which listed the labels common to political analysts; Power (2000), which applied questionnaires to party elites; and Power and Zucco (2009), that studied ideology based on interviews with parliamentarians, and adopts a different numeric classification scheme, ranging from 1 (extreme left) to 10 (extreme right). Furthermore, in Tarouco and Madeira (2013) we find an interesting literature review of the above mentioned authors. Table 1 summarizes this literature review and presents the final classification to be used in the empirical models, following the rules mentioned earlier.

Table 1: Ideological Classification of Brazilian Parties.

Author:	Fernandes (1995)	Mainwaring, Power and Meneguello (2000)	Rodrigues (2002)	Power (2000)	Power and Zucco (2009)	Final
Method:	Voting in congress during constituent	Congress votes and parliamentary opinion polls	Interviews with political analysts	Questionnaires Applied to Party Elites	Interviews with parliamentarians	
Party:				-		
PCB/PPS	L	-	L	-	4.8	Left-Wing
PCdoB	L	-	L	-	2.6	Left-Wing
PDT	L	-	L	L	4	Left-Wing
PSB	L	-	L	-	3.7	Left-Wing
PT	L	-	L	L	3.6	Left-Wing
PV	L	-	L	-	4.5	Left-Wing
PSOL	-	-	-	-	1.6	Left-Wing
PPS	-	-	-	L	-	Left-Wing
PDC/PSDC	-	CR	-	R	-	Center
PMDB	C	-	C	C	5.9	Center
PSC	R	CR	R	-	-	Center
PSDB	C	-	C	C	5.8	Center
PSL	-	CR	-	-	-	Center
PST	-	CR	R	-	-	Center
PTB	R	CR	C	R	6.5	Center
PTR	C	CR	-	-	-	Center
PDS/PP	R	R	R	R	7.6	Right-Wing
PFL/DEM	R	R	R	R	7.8	Right-Wing
PJ/PRN/PTC	-	R	-	R	-	Right-Wing
PL	R	R	R	R	-	Right-Wing
PRONA	R	R	R	-	-	Right-Wing
PRP	R	-	-	-	-	Right-Wing
PSD	R	R	R	-	-	Right-Wing
PR	-	-	-	-	6.9	Right-Wing
PMN	E	CD	E	-	-	Undefined

Notes: L = Left, CL = Center-left, C = Center, CR = Center-right, R = Right.

Present Brazilian parties not listed if not observed in the elections analyzed.

3.3   Data Sources

Information on elections come from *Tribunal Superior Eleitoral.* (TSE), the Superior Electoral Court, which is the highest body of the Brazilian electoral justice[5]. Data from TSE include information on the the results of elections, including the vote share, party and coalition of each candidate in mayoral elections. In this study, we focus on municipal races ran at 2000, 2004, 2008 and 2012. We consider only municipalities below the limit of 200.000 voters, in order to avoid two round elections. Moreover, for identification purposes, we further restrict the sample to races between two candidates, where both hold deferred applications by TSE and belong to different ideological groups. When considering elections where a left-wing candidate faces a center/right-wing candidate, we observe 3909 contests. And when considering elections where a left-wing candidate faces a right-wing candidate, there are 1357 observations left. The main quality of this dataset is that we observe several different elections for more than 5 thousand localities. This large amount of observations is crucial for the RD design, which requires as many close races as possible. Also, the information on status of application (deferred or not) makes us confident that the chosen candidate was in fact in charge during the subsequent years.

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[5]In Brazil, the Judiciary Power holds a ramification designated to organize the electoral process. This entity is named Electoral Justice and its highest court is the *Tribunal Superior Eleitoral* (TSE)

Data on municipal government public finance come from *Secretaria do Tesouro Nacional* (STN), an office linked to the Brazilian Ministry of Economics. STN provides a dataset named FINBRA (*Finanças do Brasil*), that gathers expenditures and revenues information reported by the municipalities, detailed by category. From this source the main outcome variables are defined. To measure the size of government, we use total expenditures, total revenues and revenues from local taxes, measured both per capita and as a share of the local income. To analyze the allocation of resources, we select the local expenditures on a broad set of categories, such as health, education, social assistance, urbanism and transportation. All measured as the share of the total expenditures of the municipality. Furthermore, all monetary variables are expressed as 2016 R$, deflated using the IPCA price index[6].

Another outcome variable of interest in this analysis is the number of public employees in the municipal administration. This information is obtained from the survey *Perfil dos Municípios Brasileiros* (Brazilian Municipalities Profile) organized by *Instituto Brasileiro de Geografia e Estatística* (IBGE), the Brazilian Institute of Geography and Statistics. There are both permanent public employees, who are selected through civil exams and enjoy job stability, and temporary employees, who work in comissioned positions (*cargos comissionados*). The mayoral administration only holds autonomy to directly hire and dismiss the former group[7], and thus we focus on this kind of position for our purposes.

One last group of variables that are important for the presented model is of baseline characteristics defined prior to the treatment assignment. This kind of variables are useful for including in the model to improve precision and to be exploited for robustness checks, as will be discussed later. From the Brazilian Census (IBGE), we collect demographic characteristics of municipalities, like population[8], income, literacy rates, proportion of infant and elder people, among others.

As a further description of the data, Table 2 presents summary statistics for the sample consisting of races ran by left-wing candidates versus center or right-wing opponents. There are a few remarks after observing the statistics. First, local tax revenues are limited compared to total revenues. This happens mainly because our sample is constituted mostly by small towns (average population under 15 thousand), which faces more difficulties in raising funds locally and depends more strongly on transfers from upper government levels. In addition, we can observe that the average budget shares spent in both education and health are considerably above the lower bounds mandated by the Constitution (25% and 15%, respectively), indicating that this constraint may be not binding in several municipalities.

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[6]IPCA (Índice Nacional de Preços ao Consumidor Amplo) is the official price index in Brazil used to calculate the inflation rate. It is produced by IBGE.

[7]As a matter of fact, the local administration is able to request the execution of civil exams for hiring new employees. However, they are constitutionaly not allowed to discharge these workers, as they enjoy job stability.

[8]Population in each year is obtained from the IBGE inter-census population estimates.

Table 2: Summary Statistics (Left, Center and Right-wing parties sample)

Variables	Mean	Std. Dev.	Min	Max
Economic Outcomes				
Total Expeditures per capita	2648.74	1286.62	648.38	12948.98
Total Expeditures as a share of income (%)	21.85	11.52	1.97	77.24
Total Revenues per capita	2718.96	1385.37	656.10	16484.98
Total Revenues as a share of income (%)	22.16	11.49	1.95	77.26
Tax Revenues per capita	137.40	158.08	0.02	3250.97
Tax Revenues as a share of income (%)	0.86	0.58	0.0004	12.37
Comission Employees (per 1000 residents)	5.21	4.99	0.00	86.41
% spent on Education	29.46	8.17	5.24	62.30
% spent on Health	21.51	4.43	5.83	53.05
% spent on Social Assistance	3.97	1.94	0.00	18.71
% spent on Urbanism	7.65	4.59	0.00	34.73
% spent on transportation	5.01	5.23	0.00	38.30
Assignment Variable				
Left Vote Share Margin of victory (%)	-3.76	22.79	-98.53	100.00
Control Variables:				
Income per capita	16929.61	16298.28	2350.75	275554.70
Population Size	14015.06	20949.65	822	314272
Proportion of young (0-15) (%)	25.06	4.99	12.07	51.26
Proportion of old (65+) (%)	8.83	2.46	1.98	20.42
Proportion Male Population (%)	50.71	1.53	47.12	72.78
Proportion Urban Population (%)	58.11	21.06	4.87	100.00

Notes: Total expenditures per capita, total revenues per capita, tax revenues per capita and income per capita are expressed as 2016 prices, deflated by the IPCA price index.

4 Empirical Strategy

4.1 Identification: Regression Discontinuity

The main econometric issue to estimate a true causal effect of party control on economic outcomes is the possible endogeneity of the independent variable. Since party control is a choice citizens make through elections, a simple comparison of outcomes between localities governed by different parties is probably plagued by selection bias. The major confounding factors which may bias the naive analysis are omitted variables and reverse causality.

Omitted variables bias may occur because, even controlling for observable covariates, party

control is probably correlated with other elements that affect economic performance, such as voter preferences, a hard measuring attribute. The reverse causality problem, in turn, can be described as the difficulty in separating partisan effects on economic outcomes from the effects in the reverse way. It is possible that the economic situation affects the party chosen in elections. For example, it might be that people trust more left-wing governments when unemployment rates are high, or demand a liberal government when public debt is significant. This could yield a positive correlation between left-wing administrations and unemployment or right-wing administrations and high public debt. However, this correlation probably would not be suitable for a causal interpretation.

The ideal case for the researcher would be to randomize party control, because this balances the observed and unobserved characteristics between political entities, eliminating the bias and allowing simple comparisons. However, since this is not possible, we are left with the option to apply quasi-experimental methods, which try to emulate the properties of perfect randomization. Thus, a credible non-experimental identification strategy is needed if the researcher wants to assess the true causal effect as precisely as with a randomized control trial (RCT).

In this study, we focus on a Regression Discontinuity Design (RDD). This approach is useful when there is precise knowledge of the rules determining treatment. More specifically, the *sharp* RDD is the framework where the treatment variable, T_i, is a deterministic and discontinuous function of an observable assignment variable[9], X_i:

$$T_i = I[X_i \geq c]$$

Where $I[\cdot]$ is an indicator function and c is a known cutoff value which determines the assignment for treatment. The primary idea of this approach is to compare outcomes between units just above and below the threshold. This yields an unbiased estimate of the causal treatment effect because, as shown by Lee (2008), the treatment status is as good as randomized in a local neighborhood of the the threshold c. That is, in a sufficiently small neighborhood of the the cutoff value, units will have similar observable and non-observable characteristics, except for the treatment. Thus, any "jumps" in outcomes at $X = c$ can be interpreted as a causal effect of the treatment.

The key assumption for identification in an RD setting is that units must not possess perfect control over their forcing variable, that is, there is no flawless manipulation of X_i. Entities are allowed to affect that variable, but not precisely. This is the element which guarantees that, even exerting to influence their probability of being treated, there is a random process determining the assignment to treatment near the threshold. In the present context, the RD key assumption will be satisfied if candidates in elections are not able to precisely manipulate their vote share to be just above the margin of victory, which would result in sorting of the vote share in either side of the cutoff for a particular party or coalition.

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[9]The assignment variable is also referred to in the literature as the "forcing" variable or the "running" variable.

One interesting aspect of the RD approach is that the researcher can test for validity of such design. It is possible to assess the validity of the key assumption by examining the density of the forcing variable (especially at the cutoff), and also the researcher is able to test if the RD design is "as good as randomly assigned" by checking weather there are or not discontinuities in any pre-determined variables at the RD threshold, a procedure analogous to checking for balance of characteristics between treatment and control groups in an RCT.

In our context, the treatment is party control, and the assignment variable is the vote share. Party control is assigned to a candidate if his vote share is above the cutoff of 50%. For practical reasons, we define and alternative forcing variable as being the "left-wing party vote share margin of victory", MV_i, defined as the left-wing party vote share minus the vote share of the strongest opponent. This helps address the issue that because of third parties, the vote share cutoff that determines victory may not be exactly 50%. In this sense, party control will be assigned when the margin is above the cutoff $MV_i = 0$. Such design based on close races have increasingly been used in the political economy literature after introduced by Lee (2008) and Pettersson-Lidbom (2008).

4.2   Estimation

The simplest way to estimate the treatment effect would be to just compare mean outcomes on both sides of the threshold. However, this approach is subject to large sample variability, and consequently requires very large sample sizes in order to be precise. Therefore, to estimate the causal effect, we apply both parametric and nonparametric regressions. In order to assess the robustness of the results, it is useful to check if different techniques yield similar results or not.

Parametric regressions have been widely used in empirical RD work, like in Pettersson-Lidbom (2008) and Ferreira and Gyourko (2009). This method is characterized by using observations from the entire sample, and employing polynomial functions to address the deterministic relation between treatment and the assignment variable. More specifically, we have regression models of the form:

$$Y_{it} = \rho_0 + \pi_0 T_{it} + \theta f(\text{MV}_{it}) + \beta W_{it} + \mu_i + \lambda_t + \varepsilon_{it} \tag{1}$$

Where Y_{it} represents the outcomes of interest, MV is the forcing variable "vote share margin of victory", $T_{it} = I[\text{MV} > 0]$ the treatment indicator (party control), and $f(\cdot)$ a polynomial function of MV, including interaction terms with T. The parameter of interest is π_0, which represents the party effect, and controlling for $f(\cdot)$ is sufficient to get an unbiased estimate of such parameter. Nevertheless, additional terms may be included in order to increase precision in estimates. These are covariates W_{it}, and municipality and time fixed effects[10], μ_i and λ_t,

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[10]Lee and Lemieux (2010) argue, however, that there are more efficient ways of enhancing efficiency in panel data conxtexts, such as using clustered errors instead. Thus, we follow this approach in subsequent RD estimates.

respectively. In this setting, a p-order polynomial regression model can be represented by:

$$Y_{it} = \sum_{k=0}^{p} (\rho_k \mathrm{MV}_{it}^k) + T_{it} \sum_{k=0}^{p} (\pi_k \mathrm{MV}_{it}^k) + \beta W_{it} + \mu_i + \lambda_t + \varepsilon_{it} \tag{2}$$

One drawback of parametric models is that the validity of the RD estimates turns on whether polynomial models provide an adequate description of $E[Y_i|X_i]$. Misspecification of the functional form typically generates bias in the treatment effect, π_0. Therefore, we also employ nonparametric regression models, which have the advantage of not depending on the correct specification of the model.

This additional estimation procedure we implement is called Local Linear Regression. Formalized in Hahn et al. (2001) and recommended by Imbens and Lemieux (2008), it consists in fitting linear regression functions to the observations within a small distance δ on either side of the discontinuity point, that is, municipalities such that $X_i \in [c - \delta,\, c + \delta]$[11]. The causal effect can then be estimated from the following equation:

$$Y_{it} = \rho_0 + \rho_1 \mathrm{MV}_{it} + \pi_0 T_{it} + \pi_1 T_{it} \cdot \mathrm{MV}_{it} + \mu_i + \lambda_t + \epsilon_{it} \tag{3}$$

Here, the estimated parameter $\hat{\pi}_0$ identifies the Average Treatment Effect (ATE) at the threshold $\mathrm{MV}_{it} = 0$. One important issue when estimating such a model is the choice of the bandwidth δ, which involves the typical trade-off between precision and bias. On the one hand, larger bandwidths allow the researcher to deal with more sizable amount of data, which tends to increased precision (low variance) of the estimates. On the other hand, larger bandwidths makes the assumption of linear specification less likely to be accurate, which may bias the estimate of the parameter of interest. A bandwidth selection procedure is ideally an algorithm capable of finding the optimal balance between these two discussed effects. To deal with that, we apply the selection procedure described in Calonico et al. (2014). Moreover, we use a triangular kernel for estimation of the local linear regression[12].

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[11]Analogously, municipalities such that $\mathrm{MV}_i \in [-\delta,\, +\delta]$

[12]Using a triangular (instead of rectangular) kernel, the data selected for estimation is not symmetrical around the cutoff. But, as argued by Lee and Lemieux (2010), the kernel choice typically has little impact in practice.
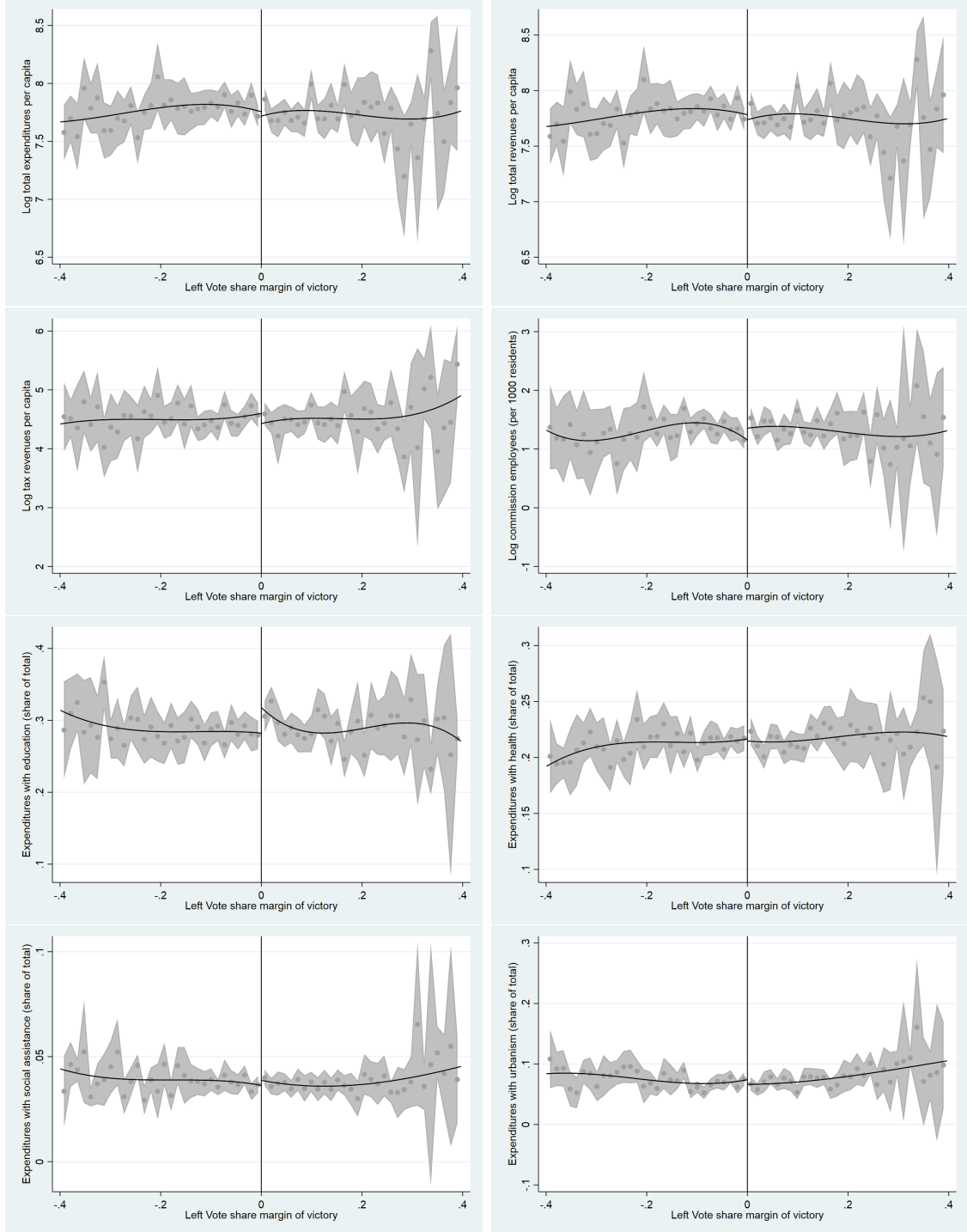
5 Results

In this section, we present the estimates of party control effect over several economic outcomes. We analyze measures of the size of government, such as total expenditures, total revenues, local tax revenues (all measured both per capita and as a share of income), and temporary public employees (per 1000 residents). All size of government variables are modeled in logarithmic form, so that the party effects have a percentage change interpretation. In addition, measures of allocation of resources in key areas are also evaluated, such as the percentage budget spent in areas of health, education, social assistance, urbanism, and transportation.

As a first step for the analysis of RD results, it is useful to visually analyze the data. In a Regression Discontinuity context, the visualization of the data is a key step for a transparent empirical analysis. Visual inspection helps taking account of the causal effect by checking whether there is or not a "jump" in the outcome variable right at the forcing variable's cutoff. Also, it gives support for the investigation of the polynomial order in a parametric estimation.

Therefore, we plot the results for several economic outcomes in figure 1. Each dot in the graphs represents the average of the underlying outcome variable for each mandate period and city, given the left-wing margin of victory in the corresponding election, that is, the sample average within each bin. The solid line represents the predicted values from a third order global polynomial model[13] and the shaded region represents the 95% confidence interval. Visual inspection illustrates some patterns worth mentioning. First, for several variables we notice very low correlation between the outcome and the margin forcing variable. This suggests that OLS point estimates may be not statistically different from zero. Even when there is some correlation present, though, there are no visual discontinuities in the predicted outcome variable around the cutoff in almost all graphs. This, in turn, indicates a lack of causal party effects, and suggests that RD point estimates may yield statistically insignificant coefficients. The only exception in the figure is the RD plot for the education expenditures, in which there is a noticeable jump of the polynomial fit right at the discontinuity between left and right-wing administrations. For this variable, visual inspection indicates that RD estimates are expected to yield statistically significant coefficients.

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[13]analogous to equation (2) with the parameter p equal to 3, and no use of covariates.

Figure 1: Party effects on size of government and resource allocation measures.

After visually presenting the data, we focus on presenting results of the point estimation. To achieve a more robust empirical analysis, we employ four different specification models for estimation: an OLS, a linear parametric RD, a third-order parametric RD and a non-parametric local linear regression RD. All specifications present standard errors clustered at the municipality level and include covariate variables that are assumed to be not affected by the treatment, such as population size, income per capita, percentage of male population and percentage of urban population. In addition, the OLS model controls for municipality and mandate period fixed effects.

Table 3 reports the estimated coefficients of all models discussed above, where the sample analyzed consists of electoral races between a left-wing candidate against an opponent from a central or right-wing political spectrum. Each entry corresponds to a different regression, showing the coefficient of regressing an outcome dependent variable against the common independent variable that is an indicator of left-wing party control, and omitting any other coefficients left in the models.

Column (1) reports the results from the OLS model, which simply regress the outcomes of interest on a dummy variable that indicates if a left-wing party candidate won the last elections in town. All estimated coefficients for size of government outcomes are not statistically significant. When it comes to allocation of resources, the OLS model indicates more intense left-wing spending on social assistance, with a 0,4% coefficient significant at the 1% level, but only smaller insignificant estimates for the other variables. However, as argued before, due to the endogeneity of the dependent variable, this model is likely to be biased and hence even the sign of the estimates may be misleading.

The second column presents the results for the Linear parametric RD model, a model that follows equation (2) with the parameter p equals to 1. In this case, estimates suggest smaller left-wing size of government. More specificaly, this model estimates both significant (at 5%) coefficients of -5.1% and -5.3% for total expenditures and total revenues as a share of income, respectively. No significant effects are found for resource allocation or other measures of size of government, in turn.

Caution is recommended when analyzing the linear RD results, though, because the linear specification may not be flexible enough[14] to fit the relation between the assignment variable and the economic outcomes. For this reason, column (3) represents a more flexible third-order parametric RD, equivalent to equation (2) with the parameter p equals to 3. The results in this specification point a few differences from the previous models. In this case, the estimates do not attest for smaller size of government in left-wing headed towns. Actually, the estimated coefficients for total expenditures per capita and total revenues per capita are 0.8% and 0.6%, respectively. The estimates regarding allocation of resources are quite similar from the ones yielded by column (2). One important aspect now is that all estimates are not significant at the usual levels.

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[14]As can be noticed when analyzing the visual evidence presented in fugure 1

Table 3: Estimates of the impact of left-wing parties (left vs center/right sample)

Dependent Variables	OLS	Parametric RD Linear	Parametric RD Cubic	Local Linear Regression
	(1)	(2)	(3)	(4)
Size of Government				
Total expenditures (per capita)	-0.007	-0.025	0.008	0.005
	(0.012)	(0.020)	(0.032)	(0.035)
Total expenditures (share of income)	-0.013	-0.051**	-0.017	-0.030
	(0.013)	(0.025)	(0.040)	(0.036)
Total Revenues (per capita)	-0.002	-0.027	0.006	0.010
	(0.011)	(0.021)	(0.033)	(0.036)
Total Revenues (share of income)	-0.008	-0.053**	-0.019	0.010
	(0.013)	(0.025)	(0.039)	(0.036)
Tax Revenues (per capita)	-0.043	-0.005	-0.037	0.001
	(0.037)	(0.040)	(0.065)	(0.068)
Tax Revenues (share of income)	-0.052	-0.030	-0.064	-0.013
	(0.036)	(0.025)	(0.042)	(0.054)
Comission Employees	0.099*	-0.075	-0.059	0.116
	(0.057)	(0.061)	(0.098)	(0.083)
Allocation of resources				
% spent on Education	0.004	0.004	0.003	0.011
	(0.004)	(0.004)	(0.006)	(0.008)
% spent on Health	-0.004	0.0005	0.001	-0.005
	(0.003)	(0.002)	(0.003)	(0.005)
% spent on Social Assistance	0.004***	-0.0001	0.002	0.001
	(0.001)	(0.001)	(0.001)	(0.002)
% spent on Urbanism	0.002	-0.003	-0.004	-0.000
	(0.003)	(0.002)	(0.003)	(0.005)
% spent on transportation	-0.001	-0.002	-0.00004	-0.001
	(0.003)	(0.002)	(0.004)	(0.005)
Covariates	Yes	Yes	Yes	Yes
Forcing Variable Polynomial Order	-	1	3	-

Notes: Standard errors in parenthesis. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. Each cell reports coefficients from regressions of each dependent variable on an indicator variable for left-wing party mayor, and other controls. Size of government variables are expressed as logarithms. Parametric RD specifications includes controls for margin of victory, as described in equations (1) and (2). The OLS specification includes municipality and mandate fixed effects. Standard errors are clustered at the city level. Used covariates include income per capita, population size, and fraction of population that is male and urban. Sample contains 3909 observations.

Finally, column (4) presents the estimates supplied by the Local Linear Regression non parametric model, as discussed in equation (3). Most of coefficients are considerably similar to those observed in column (3), sharing the same sign of the effect. We observe that for almost every outcome of interest, the estimated party effect is limited, most of them not bigger than 1%. In agreement with the third-order parametric RD, for all estimates we cannot reject the null hypothesis of zero party effect.

Comparing the four models presented, columns (3) and (4) are the most reliable specifications for causal inference, since the simple OLS does not account for endogeneity and the linear parametric RD is overly simple to properly model the relation between the margin of victory in elections and the economic outcomes. When we focus on the main results from the last two columns, we observe that for most dependent variables, the estimated party effects are similar for both specifications. Also, because of the considerable sample size used, the precision of the Local Linear Regression (even looking at less data points) shows no substantial difference from the parametric model. Moreover, it is positive to notice that both models yield exactly the same conclusion in terms of causal inference for every each outcome analyzed, that is, no significant party effects apparent.

In order to more carefully assess the causal effect of left-wing coalition in control, we further implement a slightly different analysis. Table 4 presents the results of the regression of the same models as in table 3, but with the important difference that the sample used excludes for empirical analysis elections where centrist parties were involved. With this kind of approach, we intend to avoid some parties with quite undefined ideological platforms[15]. Consequently, the sample adopted becomes only elections between two candidates, where a left-wing candidate faces a right-wing opponent.

We focus on the estimates in columns (3) and (4) in table 4, as these are of main interest for causal inference, as discussed before. Compared to table 3, the estimates are of a more considerable size. That is, when considering the subsample of close races ran by opponents more credibly identified through the left-right spectrum, the party effect becomes more noticeable. Even though, the main results from table 3 remain: almost all estimated coefficients are not statistically different from zero. There is one exception, though. In this setting, the estimates of party control effect over the budget allocated to education are highly similar between columns (3) and (4), which yield a causal effect of 2.7 and 2.8 percentage points, respectively, and both statistically significant at the 5% level. The similarity of the estimates across these two different specifications is a positive detail which makes the causal estimate quite more credible for the analysis of the party effects on education. Compared to the results obtained from table 3, this might be interpreted as an upper bound for the left-wing party control effects, because we are refining the elections to be the ones with most intense level of political polarization.

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[15]For example, parties that constantly alternate between left and right-wing coalitions, or whose parliamentarians behavior often differ from the group's creeds. As a matter of fact, important groups like PMDB have long been seen by the Brazilian electorate as such an undefined party.

Table 4: Estimates of the impact of left-wing parties (left vs right sample)

Dependent Variables	OLS	Parametric RD Linear	Parametric RD Cubic	Local Linear Regression
	(1)	(2)	(3)	(4)
Size of Government				
Total expenditures (per capita)	-0.002	-0.053	-0.063	-0.024
	(0.022)	(0.033)	(0.052)	(0.057)
Total expenditures (share of income)	-0.030	-0.008	0.016	0.033
	(0.019)	(0.043)	(0.070)	(0.060)
Total Revenues (per capita)	-0.010	-0.052	-0.070	-0.030
	(0.025)	(0.034)	(0.054)	(0.060)
Total Revenues (share of income)	-0.037	-0.006	0.009	-0.030
	(0.024)	(0.042)	(0.068)	(0.060)
Tax Revenues (per capita)	0.012	-0.060	-0.102	-0.016
	(0.075)	(0.070)	(0.114)	(0.126)
Tax Revenues (share of income)	-0.001	-0.010	-0.020	0.075
	(0.069)	(0.047)	(0.078)	(0.099)
Comission Employees	-0.063	-0.148	-0.203	0.232*
	(0.085)	(0.105)	(0.194)	(0.138)
Allocation of resources				
% spent on Education	0.003	0.012*	0.027***	0.028**
	(0.009)	(0.006)	(0.011)	(0.014)
% spent on Health	-0.006	-0.001	-0.002	0.004
	(0.006)	(0.003)	(0.006)	(0.009)
% spent on Social Assistance	0.007**	-0.002	0.002	0.003
	(0.003)	(0.001)	(0.002)	(0.004)
% spent on Urbanism	0.000	-0.002	-0.004	0.000
	(0.008)	(0.004)	(0.006)	(0.008)
% spent on transportation	0.006	-0.003	-0.003	-0.015
	(0.010)	(0.004)	(0.007)	(0.011)
Covariates	Yes	Yes	Yes	Yes
Forcing Variable Polynomial Order	-	1	3	-

Notes: Standard errors in parenthesis. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. Each cell reports coefficients from regressions of each dependent variable on an indicator variable for left-wing party mayor, and other controls. Size of government variables are expressed as logarithms. Parametric RD specifications includes controls for margin of victory, as described in equations (1) and (2). The OLS specification includes municipality and mandate fixed effects. Standard errors are clustered at the city level. Used covariates include income per capita, population size, and fraction of population that is male and urban. Sample contains 1357 observations.

It is reassuring to notice that the results presented in tables 3 and 4 corroborate the visual evidence presented in the graphs in figure 1. As suggested by the low correlation between the margin of victory and economic outcomes, the OLS results yield statistically insignificant coefficients. And as suggested by the visual smoothness of the predicted outcomes near the threshold, almost all RD estimates indicated no party effects. However, both figure 1 and table 4 evidence the same exception of party importance for the resource allocation in Education. This harmony between visual and numeric results is a very positive aspect, and brings additional confidence to the credibility of the empirical strategy adopted.

One last point regarding the results needs to be mentioned. It can be argued that the empirical analysis present in tables 3 and 4 may be problematic as it accounts for each year of mayoral term in office, because the actions of a new elected mayor possibly could take some time to the reflected on economic outcomes[16]. To deal with this concern, we rerun all preceding models using an alternative sample, which retains only observations of the last year of each mayoral mandate. The results yielded by this different sample are shown in tables 6 an 7 in the appendix and show little differences compared to the results obtained from the main sample. Most of the outcomes show no estimated party effect, but the result of more percentage points allocated for education by left-wing administrations (opposed only by right-wing opponents) remains, with RD estimates from 3,2 to 4 percentage points, both significant at the 1% level.

6 Validity Checks

In this section, we perform some tests to assess if the Regression Discontinuity Design is appropriate in this context for causal inference.

As discussed in subsection 4.1, the key RD assumption that ensures the researcher of local randomization around the cutoff is that parties are not able to precisely manipulate the forcing variable (vote-share) in order to determine their electoral outcomes. To investigate that hypothesis, we analyze the density of the running variable "left vote share margin of victory". Any evidence of discontinuities of the density near the cutoff are interpreted as evidence of precise manipulation and would thus cast serious skepticism about the appropriateness of the RD design.

To formally check that, we employ a density test presented in Cattaneo et al. (2018), which is a more recent alternative to the density test proposed in McCrary (2008). We test the null hypothesis of continuity of the density against the alternative hypothesis of sorting on some side of the cutoff, and consequent invalid RD estimates. The results of the test are presented

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[16]For instance, there is in Brazil a law named *Plano Plurianual* (PPA) that defines goals and guidelines for the local government for each period of four years. A new approved PPA starts to be followed in the second year of mayoral tenure and extends until the first year of the mandate of the next mayor. Because of that, the fiscal freedom of a mayor in his first year in term may be limited by some contents of the PPA.

in Figure 1, where the solid line represents the density and the shaded region represents a confidence interval of 95%. Visual inspection shows that there is no bumping of the running variable at either side of the cutoff, and the p-value of 0.77 indicates that we cannot reject the null hypothesis of continuity. This result is a strong evidence of the appropriateness of the estimates presented in last section.

Figure 2: Density Test of the running variable
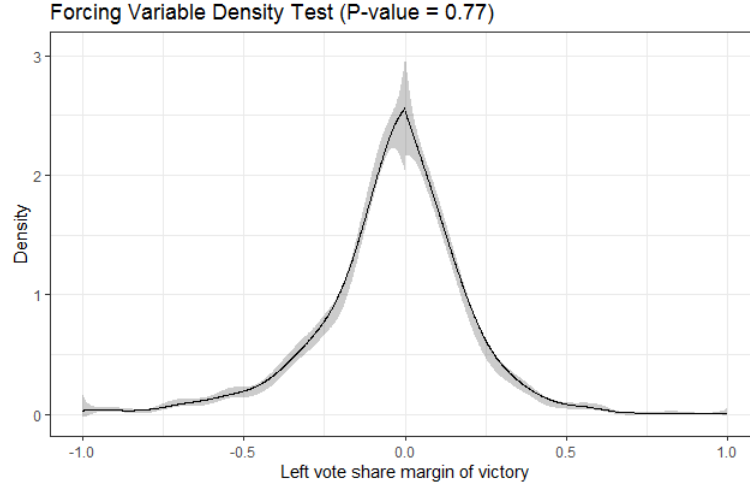
Another important validity test is to verify if predetermined covariates are balanced between both sides of the cutoff. This procedure is the RD analogous of checking balance of covariates between control and treatment groups in a randomized control trial. If the discontinuity design is well suited to the context, we might expect party control to have no effect on the covariates. On the other side, if some effects are detected, this is an evidence that the model is not perfectly suitable, and consequently that the RD estimates are not credible, because the party effect on economic outcomes may be confounded with some effects due to these jumps in covariates.

In order to address this question, we run non-parametric Local Linear Regressions in similar fashion as in equation (3), but using the control variables as dependent variables, instead of outcomes of interest. We assess weather there are party effects on variables such as income per capita, and fractions of the population which are young (0-15), old (65+), male, urban and white. Results are reported on table 5, and show that there is no significant party effect for all covariates considered, when adopting a 5% significance level. With all observable covariates balanced around the threshold, it is likely that the same happens for other unobservable confounders, making our RD suitable for reaching unbiased estimates for the causal effects of interest.

To sum up, both validity checks indicate that we cannot reject the hypothesis that party control is randomized in a neighborhood of the cutoff point. Hence, we have gathered additional evidence pointing for the credibility of a causal interpretation of the previously estimated party effects.

Table 5: The effects of the Chinese demand shock on Land Use

	Income per capita	Percentage Young (0-15)	Percentage Old (65+)	Percentage Male	Percentage Urban	Percentage White
Party Effect	-871.309	0.006	-0.001	0.002	-0.049*	-0.025
	(1351264)	(0.008)	(0.004)	(0.002)	(0.025)	(0.040)
Obs	3898	1081	1081	2097	2095	1081

Notes: Standard errors in parenthesis. * Significant at 10%, ** Significant at 5%, *** Significant at 1%. Columns (1)-(6) report coefficients from a local linear regression of each covariate variable indicated in the table on an indicator variable for left-wing party mayor. Standard errors are clustered at the city level.

7 Discussion

In this section, we analyze and interpret the results presented in section 5, in order to fit our findings into the literature and to speculate about which theoretical mechanisms most likely explain what is observed for the Brazilian data. The results discussed here refer to the main specifications, which are the third order parametric approach and the local linear regression.

With respect to the party control estimates over size of government measures, all coefficients in tables 3 and 4 indicate that a incumbent being affiliated to a left-wing coalition does not impact the administration patterns of taxation and spending. The same is observed for the estimates regarding the number of public temporary employees. When it comes to the analysis of resource allocation, the results are similar: there is no estimated party effect for most of the measures of municipal budget allocation such as Health, Social Assistance, Urbanism and Transportation. The only outcome affected by partisanship is education spending: municipalities where a left-wing candidate won a right-wing candidate by a narrow margin show up to 2.8 percentage points higher budget share spent in education. To sum up, the conclusion is that partisanship does not play an important role among Brazilian municipalities.

Our results are similar to those presented in Ferreira and Gyourko (2009) and Gerber and Hopkins (2011), in the sense that our empirical evidence indicate reduced effects of partisanship at the local level. In contrast, our results differ from the conclusion of party importance presented in state and national level studies such as Besley and Coate (1997) and Lee, Moretti, et al. (2004), and in local level analyses such as Pettersson-Lidbom (2008) and Freier and Odendahl (2015).

Given the observed lack of partisan impact at local public sector outcomes, a natural question that emerges is: what makes party control such an unimportant matter for municipalities throughout the country? The presented empirical evidence points to two alternative explanations. One possibility is that politicians and parties do not have governmental preferences, and care only about maximizing votes to hold office, so that we are in a Downsian Median Voter setting. Another alternative is that incumbents and political groups do have well defined preferences, that is, we have outcome-motivated politicians as in a citizen-candidate framework,

but for some reason they are constrained and cannot act in their desired manner while holding office.

Primarily, when reaching back the empirical literature on party importance, we notice that national and state evidence unanimously point that party effects are significant. This suggests that incumbents are indeed outcome motivated. Consequently, the city-candidate model seems to more plausibly represent the behavior of incumbents while in office, compared to Downs' Median Voter Model.

In this sense, if we consider politicians do care about policies being implemented, we shall then speculate about what kind of constraints could make citizen-candidate mayors unable to rule with total discretion, and based on that discussion point what is the most adequate link between theory and our data. Reaching back the literature described in section 2, some possible explanations may be: 1) constraints faced by local governments due to shared authority between different levels of government; 2) Tiebout competition arising from the presence of many nearby jurisdictions; 3) Relatively homogeneous population and limited number of media sources within towns, restricting the role of strategic extremism behavior.

First, we examine shared authority constraints faced by local governments. Inspecting again the summary statistics in table 2, we notice that the average local tax revenues per capita (R$ 137.40) is just a very small fraction of the average total revenues per capita (R$ 2718.96). This is a common pattern in Brazil: small towns face much more difficulty in raising local revenue sources than highly populous cities, and consequently their government's revenues rely much more intensely on transfers from state or federal levels. The average town in our sample has approximately 14 thousand inhabitants, a very small population size, which explains the observed limited role of local revenues. In a context where the majority of revenues are not a mayoral decision and there is a budget balance target, the discretion of the administrator to set the amount of expenditures also becomes seriously reduced. Therefore, arguments linked to shared authority seems to most accurately justify the lack of partisan effects over size of government measures.[17]

With respect to resource allocation, the main constraints of shared authority are those imposed by the Brazilian constitution[18] (see in subsection 3.1), which mandates municipalities to spend at least 25% of their total revenues (including state and federal transfers) on education and 15%

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[17]Brazilian cities of bigger size posses much stronger capacity of collecting revenues locally. In such cities, local tax revenues compose a significant share of total government's revenues, making the mayoral discretion indeed a significant aspect. Unfortunately, it is not feasible to count with these centers in the present empirical analysis. First, there are few observations. A more serious concern, though, is that in municipalities above 200 thousand voters elections are held in first and second rounds, which makes it difficult to compare with elections ran in most of the municipalities

[18]Besides, there is also a Brazilian law regarding fiscal responsibilities which determines that municipalities spend at most 60% of their current revenues with personnel expenses, regardless of the economic category. That is, as long as mayors do not exceed this upper bound, they are able to freely set the budget shares for each category of spending

on health. However, as mentioned before when analyzing table 2, the average budget shares spent in both education and health (29.5% and 21.5%, respectively) are considerably above these lower bounds, indicating that this constraint may not be binding in several municipalities. Therefore, mayoral discretion appears to be indeed an important determinant of this group of outcomes. As a result, shared authority arguments do not seem to explain the lack of partisan importance over resource allocation. We then extend our discussion for analyzing another possible mechanisms.

Regarding constraints related to Tiebout competition, we need to assess how strong is the degree of jurisdictional competition present in Brazilian municipalities. The stronger it is, more likely is that the Tiebout mechanism constrains mayoral discretion. For instance, this theory assumptions (like high mobility level between communities) are perfectly fit for cities located in the same metropolitan area, where distances are minimal and mobility is cheap. However, since the present sample removes municipalities above 200 thousand voters, many cities located in metropolitan areas are excluded. The great majority of the remaining municipalities are very small towns dispersed through the continental Brazilian territory. Thus, Tiebout's assumptions are not clearly valid for our sample, so that it requires caution in assuming the model's implications are indeed valid in the present context. We believe Tiebout competition may reduce partisanship at the local level, but not entirely explain the lack of its importance for the Brazilian case.

Finally, examining the strategic extremism argument, the important aspect here is again that cities included in the final sample are of really small size (median population under 8 thousand inhabitants). According to the empirical investigation presented in Ferreira and Gyourko (2009), smaller cities show more homogeneity of income and political preferences compared to the population of bigger cities or states. As discussed in section 2, more homogeneous preferences makes extreme position voters a thinner minority, and hence it becomes less feasible for a candidate to win an election by adopting extreme platforms. Moreover, even if small towns' population is not relatively homogeneous, these localities possibly count with limited number of local media sources. If there is only one main local newspaper or radio station consumed by a city's residents, it becomes harder for politicians to strategically target messages to specific groups of voters. That is, the limited size of cities reduces the ability or rationality of parties to engage in strategic extremism, which implies in little space for partisanship and in parties of different ideologies performing in similar ways. Therefore, it seems plausible that constraints to the practice of strategic extremism are the mechanism which explains the lack of party effects in economic outcomes, specially the allocation of resources.

Of course, the discussion presented above is just an informal assessment regarding the link between theoretical mechanisms and the empirical results. One possible future extension to this article is to try to empirically assess the previously discussed arguments, so that it becomes possible to more accurately measure which mechanisms drives the results of no party effects.

For example, Ferreira and Gyourko (2009) aggregates U.S municipalities according to their

metropolitan area and collect data on the number of newspapers in circulation and the adult population share of each municipality within metropolitan areas. Then, the authors build Herfindahl concentration indexes of these measures and use it in the RD regressions as interaction terms, in order to analyze heterogeneous effects and test Tiebout Competition and Strategic Extremism arguments. Upon data availability, this is an interesting extension. A simpler approach, though, would be to investigate heterogeneous effects based on measures of number of jurisdictions per resident in each state, or using a dummy indicating municipalities located in high or low population density states. Using these variables, we may try to test how the party effect varies with the degree of competition (number of jurisdictions) or the number of media sources.

8   Conclusion

This article provides new empirical evidence on the causal effect of party control on economic outcomes, using electoral and public finance data from municipalities in Brazil. To overcome problems related to the endogeneity of party control independent variable, it relies on a Regression Discontinuity Design, which attempts to compare the administration of cities where left-wing parties barely won and barely lost the elections. Based on the analysis of close elections, we measure partisan impacts over outcomes related to size of government and public goods provision. We also employ robustness tests to confirm the validity of the presented causal inference, such as a density test that assures there is no precise manipulation of election results and continuity tests for covariates.

The paper's findings point that parties do not play an important role, at least at the local level, for Brazilian municipalities. Left-wing party control does not affect the size of mayoral government, according to measures of total expenditures, total revenues, local tax revenues and number of public employees. Also, party effects are not significant over a broad set of important functions of the government, such as the budget share allocated to health, social assistance, urbanism and transportation. Only for the education category we find a small but significant party effect, indicating that municipalities where left-wing parties won right-wing opponents by a narrow margin have up to 2.8 percentage points higher budget share allocate for that function.

Further, we informally speculated about which kinds of mechanisms are more to likely explain the observed lack of partisanship at the local level in Brazil, in an attempt to link our results to the precedent literature. We suggest that party effects over size of government measures are constrained by arguments of shared authority with upper levels of government, since small towns heavily rely on state and federal transfer for raising funds. Alternatively, partisan impacts on resource allocation seem to be limited by arguments little space for engaging in strategic extremism in small cities, which tend to have more homogeneous populations and reduced number of media sources.

Of course, a more rigorous analysis is needed in order to qualify the debate on the importance of each of mechanism discussed above. As a possible extension for future work, we may attempt to empirically measure what is precisely the role of Tiebout competition, Shared authority restrictions and strategic extremism to explain the main results of this study.

Another kind of extension that may be interesting for further investigation is to analyze what is the relationship between close mayoral races and the local legislative composition. For example, is it possible that mayors elected by a narrow margin face a more balanced legislative body and consequently have its discretionary more disciplined by political opposition than mayors elected by a large margin?

The research design employed here also has its limitations. The RD approach is able to identify causal effects in close races, that is, elections marked by a high degree of competition. It does not allow for identification in situations where there is no competition between different ideologies, such as when two left-wing candidates face each other. Competition (or lack of) might *per se* enhance partisan differences. Future research could try to overcome this limitation by accounting for political competition as an endogenous variable, for example. Also, in future studies it might be interesting to analyze elections in two rounds held in larger cities, and to deal with the problem of different electoral competition involved.

References

[1] Alesina, A. "Credibility and policy convergence in a two-party system with rational voters". In: *The American Economic Review* 78.4 (1988), pp. 796–805.

[2] Angrist, J. D. and Pischke, J. *Mostly harmless econometrics: An empiricist's companion.* Princeton university press, 2008.

[3] Basile, R., Beraldo, S., and Filoso, V. *Does Local Politics Matter? Quasi-experimental Evidence from Italian Municipal Elections.* Tech. rep. 2014.

[4] Beland, L.-P. and Unel, B. "The impact of party affiliation of US governors on immigrants' labor market outcomes". In: *Journal of Population Economics* 31.2 (2018), pp. 627–670.

[5] Besley, T. and Coate, S. "An economic model of representative democracy". In: *The Quarterly Journal of Economics* 112.1 (1997), pp. 85–114.

[6] Besley, T. and Case, A. "Political institutions and policy choices: evidence from the United States". In: *Journal of Economic Literature* 41.1 (2003), pp. 7–73.

[7] Brollo, F. and Troiano, U. "What happens when a woman wins an election? Evidence from close races in Brazil". In: *Journal of Development Economics* 122 (2016), pp. 28–45.

[8] Calonico, S., Cattaneo, M. D., and Titiunik, R. "Robust nonparametric confidence intervals for regression-discontinuity designs". In: *Econometrica* 82.6 (2014), pp. 2295–2326.

[9] Cattaneo, M. D., Jansson, M., and Ma, X. "Manipulation testing based on density discontinuity". In: *The Stata Journal* 18.1 (2018), pp. 234–261.

[10] Downs, A. "An economic theory of political action in a democracy". In: *Journal of political economy* 65.2 (1957), pp. 135–150.

[11] Fernandes, L. "Muito barulho por nada? O realinhamento político-ideológico nas eleições de 1994". In: *Dados* 38.1 (1995), pp. 107–144.

[12] Ferreira, F. and Gyourko, J. "Do political parties matter? Evidence from US cities". In: *The Quarterly journal of economics* 124.1 (2009), pp. 399–422.

[13] Freier, R. and Odendahl, C. "Do parties matter? Estimating the effect of political power in multi-party systems". In: *European Economic Review* 80 (2015), pp. 310–328.

[14] Gerber, E. R. and Hopkins, D. J. "When mayors matter: estimating the impact of mayoral partisanship on city policy". In: *American Journal of Political Science* 55.2 (2011), pp. 326–339.

[15] Glaeser, E. L., Ponzetto, G. A., and Shapiro, J. M. "Strategic extremism: Why Republicans and Democrats divide on religious values". In: *The Quarterly journal of economics* 120.4 (2005), pp. 1283–1330.

[16] Hahn, J., Todd, P., and Van der Klaauw, W. "Identification and estimation of treatment effects with a regression-discontinuity design". In: *Econometrica* 69.1 (2001), pp. 201–209.

[17] Imbens, G. W. and Lemieux, T. "Regression discontinuity designs: A guide to practice". In: *Journal of econometrics* 142.2 (2008), pp. 615–635.

[18] Lee, D. S. "Randomized experiments from non-random selection in US House elections". In: *Journal of Econometrics* 142.2 (2008), pp. 675–697.

[19] Lee, D. S. and Lemieux, T. "Regression discontinuity designs in economics". In: *Journal of economic literature* 48.2 (2010), pp. 281–355.

[20] Lee, D. S., Moretti, E., and Butler, M. J. "Do voters affect or elect policies? Evidence from the US House". In: *The Quarterly Journal of Economics* 119.3 (2004), pp. 807–859.

[21] Leigh, A. "Estimating the impact of gubernatorial partisanship on policy settings and economic outcomes: A regression discontinuity approach". In: *European Journal of Political Economy* 24.1 (2008), pp. 256–268.

[22] Mainwaring, S., Power, T., and Meneguello, R. "Partidos conservadores no Brasil contemporâneo: quais são, o que defendem, quais são suas bases". In: (2000).

[23] McCrary, J. "Manipulation of the running variable in the regression discontinuity design: A density test". In: *Journal of econometrics* 142.2 (2008), pp. 698–714.

[24] Osborne, M. J. "Spatial models of political competition under plurality rule: A survey of some explanations of the number of candidates and the positions they take". In: *Canadian Journal of economics* (1995), pp. 261–301.

[25] Pettersson-Lidbom, P. "Do parties matter for economic outcomes? A regression-discontinuity approach". In: *Journal of the European Economic Association* 6.5 (2008), pp. 1037–1056.

[26] Power, T. "The Political Right in Postauthoritarian Brazil: Elites, institutions, and democratization". In: (2000).

[27] Power, T. and Zucco, C. "Estimating ideology of Brazilian legislative parties, 1990-2005: a research communication". In: *Latin American Research Review* (2009), pp. 218–246.

[28] Rodrigues, L. M. "Partidos, ideologia e composição social: um estudo das bancadas partidárias na Câmara dos Deputados". In: (2002).

[29] Solé-Ollé, A. and Viladecans-Marsal, E. "Do political parties matter for local land use policies?" In: *Journal of Urban Economics* 78 (2013), pp. 42–56.

[30] Tarouco, G. d. S. and Madeira, R. M. "Partidos, programas e o debate sobre esquerda e direita no Brasil". In: *Revista de Sociologia e politica* 21.45 (2013), pp. 149–165.

[31] Tiebout, C. M. "A pure theory of local expenditures". In: *Journal of political economy* 64.5 (1956), pp. 416–424.

A   Appendix

In tables 6 and 7, we present results for the same models as the ones described in section 4, but filtering the sample to only account for observations of the last year of mayoral mandate. These results serve as a robustness check to the main estimates.

Analyzing the estimates above, we notice that there is no striking difference compared to the ones obtained from the main sample. There is basically no significant party effect on size of government outcomes and most categories of resource allocation. And, accordingly with the main results, there is a significant effect on the budget share allocated to education, when considering races ran by left-wing candidates against right-wing opponents.

Table 6: Party effects of left-wing coalition (left vs center/right and last year of term sample)

Dependent Variables	OLS	Parametric RD Linear	Parametric RD Cubic	Local Linear Regression
	(1)	(2)	(3)	(4)
Size of Government				
Total expenditures (per capita)	0.013	-0.020	0.007	0.040
	(0.015)	(0.021)	(0.032)	(0.037)
Total expenditures (share of income)	0.010	-0.048*	-0.031	-0.049
	(0.015)	(0.027)	(0.042)	(0.034)
Total Revenues (per capita)	0.011	-0.023	0.009	0.051
	(0.012)	(0.023)	(0.034)	(0.039)
Total Revenues (share of income)	0.009	-0.050*	-0.028	0.051
	(0.013)	(0.028)	(0.042)	(0.039)
Tax Revenues (per capita)	-0.042	0.002	-0.008	0.064
	(0.031)	(0.043)	(0.067)	(0.065)
Tax Revenues (share of income)	-0.044	-0.031	-0.046	-0.014
	(0.031)	(0.027)	(0.044)	(0.051)
Comission Employees	0.095**	0.015	-0.088	0.007
	(0.045)	(0.099)	(0.163)	(0.072)
Allocation of resources				
% spent on Education	0.003	0.004	0.006	0.007
	(0.003)	(0.004)	(0.007)	(0.007)
% spent on Health	0.002	0.001	0.004	0.002
	(0.002)	(0.002)	(0.004)	(0.004)
% spent on Social Assistance	0.002	-0.0001	0.003**	0.003*
	(0.001)	(0.001)	(0.001)	(0.002)
% spent on Urbanism	-0.003	-0.005**	-0.009**	-0.004
	(0.002)	(0.003)	(0.004)	(0.005)
% spent on transportation	-0.002	-0.003	0.0004	0.008
	(0.002)	(0.003)	(0.004)	(0.005)
Covariates	Yes	Yes	Yes	Yes
Forcing Variable Polynomial Order	-	1	3	-

Notes: Standard errors in parenthesis. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. Each cell reports coefficients from regressions of each dependent variable on an indicator variable for left-wing party mayor, and other controls. Size of government variables are expressed as logarithms. Parametric RD specifications includes controls for margin of victory, as described in equations (1) and (2). The OLS specification includes municipality and mandate fixed effects. Standard errors are clustered at the city level. Used covariates include income per capita, population size, and fraction of population that is male and urban. Sample contains 3909 observations.

Table 7: Party effects of left-wing coalition (left vs right and last year of term sample)

Dependent Variables	OLS	Parametric RD Linear	Parametric RD Cubic	Local Linear Regression
	(1)	(2)	(3)	(4)
Size of Government				
Total expenditures (per capita)	0.050	-0.044	-0.065	-0.034
	(0.037)	(0.034)	(0.052)	(0.045)
Total expenditures (share of income)	0.047	-0.007	-0.002	-0.023
	(0.041)	(0.046)	(0.073)	(0.048)
Total Revenues (per capita)	0.017	-0.047	-0.069	-0.020
	(0.023)	(0.035)	(0.055)	(0.048)
Total Revenues (share of income)	0.014	-0.008	-0.003	-0.020
	(0.026)	(0.045)	(0.073)	(0.048)
Tax Revenues (per capita)	-0.038	-0.068	-0.115	-0.079
	(0.086)	(0.070)	(0.111)	(0.089)
Tax Revenues (share of income)	-0.041	-0.030	-0.050	-0.068
	(0.088)	(0.045)	(0.073)	(0.074)
Comission Employees	-0.077	-0.086	-0.202	0.047
	(0.081)	(0.168)	(0.316)	(0.121)
Allocation of resources				
% spent on Education	0.001	0.011	0.032***	0.040***
	(0.006)	(0.007)	(0.012)	(0.015)
% spent on Health	-0.006	-0.002	0.0005	0.001
	(0.005)	(0.004)	(0.007)	(0.008)
% spent on Social Assistance	0.001	-0.001	0.002	0.002
	(0.002)	(0.002)	(0.002)	(0.003)
% spent on Urbanism	-0.002	-0.004	-0.010	-0.014*
	(0.005)	(0.004)	(0.007)	(0.008)
% spent on transportation	0.007	-0.003	-0.001	0.004
	(0.005)	(0.005)	(0.008)	(0.008)
Covariates	Yes	Yes	Yes	Yes
Forcing Variable Polynomial Order	-	1	3	-

Notes: Standard errors in parenthesis. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. Each cell reports coefficients from regressions of each dependent variable on an indicator variable for left-wing party mayor, and other controls. Size of government variables are expressed as logarithms. Parametric RD specifications includes controls for margin of victory, as described in equations (1) and (2). The OLS specification includes municipality and mandate fixed effects. Standard errors are clustered at the city level. Used covariates include income per capita, population size, and fraction of population that is male and urban. Sample contains 1357 observations.