Campaign spending on local elections: the more the merrier?*

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Abstract

We propose a probabilistic voting model to discuss how campaign spending affects electoral outcomes. In our model, private donations are restricted and campaigning is funded by a statutory allowance provided by the central government and by party contributions. Campaign spending increases exposure and thus the popularity of the candidates. We show that, when the variance of voter ideology is high, candidates that are *ex-ante* more popular or candidates with lower restrictions in the access to party contributions spend more in campaigning and win with a higher probability.

To provide empirical support for our analysis, we compile a novel dataset about campaign spending covering all candidates (12 parties, independent candidates and coalitions) in 306 municipalities for 3 elections (2005, 2009 and 2013). Our identification strategy relies on the rules that define the statutory allowance provided by the central government to fund campaigning expenditures. Our results show that although the spending of the winner (often the incumbent) is not significant, campaign spending accounts for 8pp of the vote share of the runner-up in the election. We also show that spending of the two biggest parties in Portugal accounts for 6 to 9pp of their vote share.

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1 Introduction

The practice of campaigning to inform the voters and hopefully gather their votes is as old as the Roman empire, as discussed in Morstein-Marx (2012). Pompei conserves many wall paintings – the so-called *dipinti*, nothing less than the ancestors of modern political outdoors – of the elections held one month before the Vesuvius erupted, with plenty of messages about the honour of the candidates and electoral promises of "good bread". In those days candidates had to be wealthy, not the least because the political office did not entail any wage and usually funded their own campaingns, which mostly included rallies and *dipinti*. However, private money in politics may come with strings attached (Stratmann, 1991, Chamon and Kaplan, 2013, Kalla and Broockman, 2016), or it may limit competitiveness in elections, as discussed by in Jacobson (1978) or Abramowitz et al. (2006).¹ In this context, the support for some sort of public financing for political activities has been amply debated, for instance by Theodore Roosevelt, that stated: "the need for collecting large campaign funds would vanish if Congress provided an appropriation for the proper and legitimate expenses of each of the great national parties, an appropriation ample enough to meet the necessity."²

Modern democracies vary in the extent to which public funding is used by political candidates. In Europe, according to an European Parliament (2015) report all the 28 member states of the European Union, except from Malta and recently Italy, provide some kind of direct public funding to parties.³ The vast majority also provides some sort of direct or indirect funding to elections. In the United States, by contrast, currently only 14 states provide (optional) public funding for political parties.⁴ Opting for public funding restricts the amount of donations candidates can collect and generally establishes campaign spending limits. Surprisingly, there is very little theoretical and empirical evidence about campaign spending when part of the funding comes from public sources, with the notable exceptions of Jones (1981) and Malhotra (2008) for

the U.S case.

¹Morton (1992) and Stratmann (2005) provide discussions about the role of private money in politics and discuss the real world (and research) implications.

²Theodore Roosevelt's Seventh State of the Union Address, December 3rd 1907.

 $^{^{3}}$ Malta is implementing measures towards providing public funds, while Italy is moving towards a completely private system.

⁴According to the National Conference of State Legislatures, an NGO that represents local and state government in the US.

We contribute to this literature by explicitly modelling the candidate's strategic campaign decisions which is partly funded from public sources. We setup a model where candidates strategically use campaign spending to influence their popularity level and thus affect the probability of being elected. We then test the model with a new dataset constructed for the purposes of this research, based on the reports of campaign spending (and funding sources) of candidates in local elections in Portugal. Since 2005, parties and independent candidates are required to submit a comprehensive report of campaign funding and expenditures to the Portuguese Constitutional Court. These reports should reflect as accurately as possible the geographic allocation of spending and are then audited and certified by the court. This previously unused dataset covers 308 municipalities, 3 local elections (2005, 2009 and 2013) and includes the 12 national parties that typically run (at least in some municipalities) in local elections, as well as all the coalitions between these parties and the independent candidates.

There is an extensive literature on the effects and funding of campaign spending, including both theoretical and empirical contributions, with mixed results. In some cases, like Gerber (1998) or Morton and Myerson (1992), studies argue that campaign spending matters, while in others it seems to have no effect (Levitt, 1994). Some authors even suggest that banning spending could be welfare improving (Prat, 2002).

In a theoretical framework, Coate (2004) develops a political competition model where (private) campaign contributions help voters produce more informed choices and provide parties with an inventive to select the best candidates and thus contribution limits only increase welfare of members of interest groups. In Meirowitz (2008), candidates select levels of effort and the marginal asymmetries in costs of effort explain why advantaged candidates, like incumbents, often get elected, which is reinforced by very tight campaign or effort limits. Wittman (2008), on the other hand, derives the optimal behaviour of voters not targeted by campaign advertising and shows that the effect of campaign spending could be negligible for electoral outcomes. From another perspective, Herrera et al. (2008) shows, by including turnout in a model of electoral competition, that increases in the volatility of voter preferences lead to increases in polarisation and campaign spending.

Empirical studies about the effects of campaign spending face essentially three issues. First, available data may be incomplete or inaccurate, as parties may have an incentive not to fully disclose information. Second, even if data is available, in many cases, for subnational elections, it is not geographically disaggregated, which requires that assumptions are made about the allocation of expenditures. Finally, there is an endogeneity issue to be addressed when estimating causal impacts of spending on electoral results. In fact, if higher spending can lead to higher vote shares, it may also be the case that spending is higher (or lower) precisely because the political capital of the candidates is higher *ex-ante*.

Researchers have either taken advantage of the institutional features of the elections (repeated elections, proportional systems) or used instrumental variable approaches to deal with this endogeneity issue. Silveira and Mello (2011), for instance, perform an empirical analysis to show that there is a large causal effect of TV advertising on election outcomes in repeated Gubernatorial elections in Brazil. Fink (2012) finds mixed support for the effectiveness of campaign spending in the proportional representation system of German federal elections. Ben-bassat et al. (2015), on the contrary, argue that campaign spending is unable to affect substantially electoral outcomes, based on an empirical study for repeated elections in Israeli municipalities.

On the other hand, Green and Krasno (1990), for instance, isolate exogenous campaign spending decisions using lagged campaign spending as an instrument. Other instrumental variable approaches include: using candidate quality (Gerber, 1998 and Green and Krasno, 1988), the tightness of the race (Erikson and Palfrey, 2000) or the population size of the constituency (Gerber, 1998).

Most studies are conducted in the context US (congress) elections. Aside from the aforementioned studies, other exceptions include Palda and Palda (1998) in France, Maddens et al. (2006) in Belgium, Benoit and Marsh (2008) in Ireland, Samuels (2001) in Brazil, or ? and Rekkas (2007) in Canada, for the case of general elections and Benoit and Marsh (2003) in the local Irish election of 1999. Several studies also cover United Kingdom elections (Johnston et al., 2012, Pattie et al., 2011, Foos and de Rooij, 2017), particularly in exploring the role of local campaigning in affecting general election outcomes like in Pattie et al. (1995), Whiteley and Seyd (2003), Fisher et al. (2011), Fieldhouse and Cutts (2009) and Fisher et al. (2016).

We propose a two-period probabilistic voting model, following Persson and Tabellini (2002), in which campaign spending is funded through (costly) party contributions and a statutory allowance provided by the central government. Before the election, candidates decide how much to spend in campaigning, however the amount of the statutory allowance depends on election results and thus is only determined after the election. Candidates differ on their ideology, on their access to party contribution funds to finance campaigning and on their *ex-ante* popularity.

We show that campaign spending decisions depend crucially on the rate at which candidates expect to get funds from the central government, which in turn depends on the variance of voter's ideological preferences. If that rate is low, the candidate with an *ex-ante* popularity advantage spends more than the disadvantaged candidate and wins the election with higher probability. The result is the opposite if campaign spending entails a high potential statutory allowance. Similarly, the candidate with a higher cost to access party contributions to fund campaigning will only spend more (and win with a higher probability) if he believes campaign spending will entail a higher portion of statutory allowance after the election.

To provide validation to these findings, we perform an empirical analysis using local elections in Portugal. Our empirical exercise has twofold objective. First, to check whether our theoretical modelling assumptions are realistic and second to evaluate whether our main theoretical findings are validated empirically.

We analyse the data in two perspectives, i) the winner and runner up perspective, which emphasises the two biggest contenders in each municipality, and ii) the individual party level, focusing on the four biggest local parties in Portugal, irrespective of their placement in the electoral race. This dual analysis encompasses the approaches of other empirical studies. Most studies focus on electoral contests between the two top contenders, irrespectively that is the incumbent and challenger (Banaian and Luksetich, 1991, Ansolabehere and Gerber, 1994, Moon, 2006) or the winner and the runner-up in the first stage of an election, as Silveira and Mello (2011) or Ben-bassat et al. (2015). Others, like Fink (2012), Rekkas (2007) or Fisher et al. (2011) use the individual party perspective to evaluate to identify specific patterns across different parties.

We deal with the potential endogeneity using an instrumental variable approach. The choice of the instrumental variable is framed by the legal restrictions in place in Portugal. In fact, as donations are very limited, public funding is a key determinant of campaign spending. Thus, we instrument campaign spending with the expected statutory allowance that candidates think they may receive after election, which we compute based on the rules in place at the moment of the election and their best guess about their performance in the election.

Results show that campaign spending actually matters. In the winner/runner-up perspective we find that a $\leq 1\ 000$ increase in spending of the runner-up leads to a increase of 0.14pp of his vote share and a decline of 0.35pp of the winning margin. Although a 0.14pp impact may seem small, for the average runner-up, who spends around ≤ 58 k, this accounts for 8.12pp of the vote share. Winner spending, seems to be less efficient, particularly when we account for incumbency advantage, which has also been observed in comparable literature. For the individual party perspective, we find that an increase of spending of $\leq 1\ 000$ leads to a increase in the vote share between 0.08 and 0.19pp for the two biggest Portuguese parties. Again, for the average candidate of these parties this accrues to an impact between 6 and 9pp. These findings are robust to the exclusion of campaign spending outliers and flagship municipalities, where the campaign spending decisions could be driven by non-local factors.

The empirical results support our theoretical conclusions and stress that campaign spending is actually a relevant tool to affect electoral results. In fact, it is reasonable to assume that candidates use spending to increase their visibility and overall popularity, which conveys information to voters and in turn affects voting decisions.

This paper is structured as follows. We start by presenting our model in Section 2, where we discuss the formulation and the baseline predictions. The following section describes the legal framework of local campaigning in Portugal. The data used is described in Section 4. We then discuss the estimation issues and present our OLS estimates. Section 6 discusses our identification strategy and Section 7 implements it, presenting our main results and robustness checks. Finally, Section 8 concludes.

2 A model of strategic campaigning decisions

We follow Persson and Tabellini (2002) and develop a two-period probabilistic voting model to evaluate the role of campaigning in electoral competition, in a context where public funding is the main revenue source of campaigning. The set-up is stylised and provides the baseline framework for the empirical discussion that follows.

In our model, voters decide on whom to vote based on the welfare derived from the exogenous political platforms proposed by two candidates $(W(g_j))$, on their individual ideologicy (σ^i) and on the overall popularity shock of the election (δ) . The uniform distributions of the random variables σ^i and δ are common knowledge.

Each candidate decides his campaign spending, which increases his exposure and therefore has a positive impact on his popularity. Campaign spending in financed through party contributions (PC_j) and a public statutory allowance (SA_j) , provided by the central government. We impose that the campaign budget is balanced, meaning that when spending exceeds the statutory allowance, it must be paid off by the party supporting the candidate. The novelty of our approach is that we explicitly model campaign funding obtained throught public resources. Most literature about campaign spending effects is framed, as discussed, on the US context, where private donations assume a pivotal role.⁵

Although the rules that determine the statutory allowance each candidate receives are publicly known, the actual value depends on electoral results and thus can only be determined after the election occurs. In this context, candidates decide campaign spending strategically based on its expected effect on their probability of winning, and their expectation about the statutory allowance to be received in the next period.

Candidates differ in their ideology, which cannot be credibly changed for the purposes of the election. However, we assume that one of the candidates may have an *ex-ante* popularity advantage (x). This popularity wedge could be because the candidate is better known in the municipality (maybe he held local office before) or because voters in the municipality traditionally favour candidates from a given party. We also allow for differentiated access of candidates to the resources from the parties backing them in the election (k_j) . In reality, some parties have deeper pockets and even if that is not the case, they need not give the same priority to all municipalities.

⁵There is an extensive literature about political competition when campaigning if financed through party contributions. Recent examples include Meirowitz (2008) or Chamon and Kaplan (2013).

2.1 Set-up

Timing of the game. Our model has three phases that occur in two periods. (i) In t = 1, knowing voters' preferences and the distributions of σ^i and δ , candidates decide simultaneously the level of campaign spending (C_A and C_B). (ii) At the end of t = 1, the actual value of δ is realised and the election takes place. (iii) In t = 2, uncertainty about the vote share is realised, pinning down the statutory allowance (SA_i). Then, parties spend PC_i to balance the budget.

Voters. The economy is populated by a continuum of citizens, with identical preferences over the policy platforms implemented by local governments (g_j) , that provide welfare $W(g_j)$. These policy platforms are general enough to include a vector of spending and taxes, as well as nonfiscal policies such as affirmative action or environmental protection.

Voters must decide on whom to vote in the upcoming election, i.e., we do not model abstention. A voter *i*, with ideology σ^i , supports candidate A if

$$W(g_A) > W(g_B) + \sigma^i + \delta \tag{1}$$

where σ^i represents voter *i*'s ideology and δ is the popularity shock.

Ideological bias (σ^i) . The ideological bias can be positive or negative, depending on whether the voter favours candidate B or A, respectively.

We let $\sigma^i \sim U\left[-\frac{1}{2\phi}, \frac{1}{2\phi}\right]$, with $\phi > 0$, i.e., $f_{\sigma_i} = \phi > 0$ is the density function.⁶ If ϕ is higher, the distribution gets narrower, reducing the dispersion of the ideological bias. The following graph illustrates the density functions for $\tilde{\phi} > \phi$:

⁶Note that $E[\sigma_i] = 0$, so the ideological bias is centred around zero.



Figure 1: Density function of voter ideology for $\tilde{\phi} > \phi$.

Popularity shock (δ). The shock can be positive, neutral or negative, depending on whether candidate B is respectively more, equally or less popular than candidate A. We introduce an exante popularity wedge, x, which provides candidate B a popularity advantage, whenever x > 0, which may result from candidate B being well-known in the municipality, due to a previous political or entrepreneurial career, for instance. It may also be the result of the candidate being supported by a party which is typically strong in the municipality.

Campaign spending decisions affect the overall *ex-post* popularity of the candidates. Specifically, we assume that the *campaign spending gap*, $\Delta C = C_A - C_B$, changes the upper and lower bounds of the the distribution of δ , i.e., when A spends more than B, the distribution shifts in favour of candidate A. The following distribution of δ incorporates these effects:

$$\delta \sim U\left[-\frac{1}{2\psi} - \Delta C + x, \frac{1}{2\psi} - \Delta C + x\right],$$

where $\psi > 0$ is a measure of the dispersion of the popularity of candidates. Notice that $E(\delta) = -\Delta C + x$, i.e., we allow the campaign to overcome the *ex-ante* popularity advantage. Figure 2 illustrates these impacts:



Figure 2: Effect of campaign spending and popularity wedge on overall popularity.

Candidates. Candidates chose the amount of campaign spending (C_j) to boost the probability of being elected, knowing that all campaign spending not covered by the statutory allowance has to be paid off using party contributions (PC_j) . In practice, candidates choose the amount of campaign spending to maximise their payoff, i.e.,

$$U_j = p_j \chi - k_j \frac{E \left[PC_j \right]^2}{2}$$

where χ is a (positive) ego rent, p_j is the probability of candidate j being elected and PC_j is the amount of the party contributions (or the candidate's own resources) used in campaigning. We assume a quadratic cost for PC_j for tractability, with candidate B, without loss of generality, facing a higher marginal cost of own funds, i.e., we assume $k_B = k > k_A = 1$. The budget constraint of political campaigns is

$$C_j = PC_j + SA_j$$

Each candidate is entitled to a public statutory allowance (SA_j) determined *after* the election, proportional to his vote share, i.e., in t = 2, candidate j receives $SA_j = \pi_j T$, where T is the total amount of public funds available to all the candidates in the municipality.⁷

⁷By definition, $\sum_{j} \pi_{j} T = T$.

In this set-up, candidates decide the level of campaign spending in t = 1 based on their expectation of the statutory allowance to be received in t = 2, i.e., $E[PC_j] = C_j - E[SA_j]$

2.2 Equilibrium

We solve the model backwards. (i) In t = 2, based on the realisation of δ candidates find out SA_j and PC_j . (ii) In t = 1, the election period, candidates choose C_j to maximise their payoff. Our equilibrium is characterised by a swing voter who is indifferent between the two candidates, which, using (1) satisfies $\sigma^S = W(g_A) - W(g_B) - \delta = \Delta W(g) - \delta$. All voters with $\sigma^i \leq \sigma^S$ (resp., $\sigma^i > \sigma^S$) vote for candidate A (resp., B), as depicted in Figure 3.



Figure 3: Swing voter and vote shares.

Thus, the vote share of candidate A, π_A , is

$$\pi_A = \int_{-\frac{1}{2\phi}}^{\sigma^s} \phi du = \phi\left(\sigma^s + \frac{1}{2\phi}\right) = \phi\left(\Delta W(g) - \delta + \frac{1}{2\phi}\right) \tag{2}$$

where the last equality is obtained using the definition of swing voter, σ^S . Notice that as σ^S depends on the realised value of δ , π_A is also a random variable. Since the statutory allowance obtained by the party is given by $\pi_A T$, it is instructive to use the expectation of δ to write the expected vote share,

$$E[\pi_A] = \phi \left(\Delta W(g) + C_A - C_B - x + \frac{1}{2\phi} \right)$$
(3)

It follows from (3) that, for each euro invested in the campaign, the expected statutory allowance increases by ϕT ⁸. Intuitively, ϕT is the marginal financial return of getting one voter through campaign spending, as ϕ is the density function of voters' ideological bias and T the total amount of statutory allowance available in the municipality. Notice also that ϕ governs the limits of the ideological bias of voters, therefore, for a given T, a lower ϕ leads to higher dispersion in voter ideology. We assume hereafter that $\phi T < 1$, in order to rule out the unreasonable case in which campaign spending is over-compensated by the central government contribution.

The probability of candidate A winning the election can be obtained from equation (2) and is given by:

$$p_A = P\left(\pi_A \ge \frac{1}{2}\right) = P\left(\delta \le \Delta W(g)\right) = \psi\left(\Delta W(g) + \Delta C - x\right) + \frac{1}{2} \tag{4}$$

where the last equality is obtained using the cumulative distribution function of δ .⁹

The probability of A wining the election is increasing in the voters' welfare derived from the candidates' policy platforms, and his own campaign spending, and decreasing in the campaign spending of B and the *ex-ante* popularity wedge.

Given that the statutory allowance is only determined after the election, we solve the model starting in t = 2. After the election, δ is realised and thus the vote share of A, π_A , is determined. Therefore, using the amount of total statutory allowance available, T, the amount of party contribution for campaigning, PC_A is given by:

$$PC_A = C_A - SA_A = C_A - \pi_A T = C_A - \left[\phi\left(\Delta W(g) - \hat{\delta} + \frac{1}{2\phi}\right)T\right]$$
(5)

where $\hat{\delta}$ is the realised value of δ , and we use the vote share of candidate A in (2).

Using the value of PC_A , from equation (5), and the probability of A winning the election, p_A in (4), the optimal level of C_A solves

⁸In fact for candidate j it holds that: $\frac{\partial E[\pi_j]}{\partial C_j} = \phi T$. ⁹Given the distributional assumptions of δ , the cumulative distribution function is given by $F_{\delta} =$ $\psi \left(\delta + \Delta C - x\right) + \frac{1}{2}.$

$$\psi\chi - \left[(1-z)^2 C_A + (1-z)zC_B + (1-z)z(x-\Delta W(g)) - (1-z)\frac{T}{2} \right] = 0$$

where $z = \phi T < 1$.

Conversely, the first order condition for candidate B is

$$\psi \chi - k \left[(1-z)^2 C_B + (1-z)zC_A - (1-z)z(x - \Delta W(g)) - (1-z)\frac{T}{2} \right] = 0$$

The first term is the marginal benefit of investing in campaign and is proportional to the ego rent χ . The term in square brackets represents the marginal cost of campaign spending, which results from its impact on the expected statutory allowance, compound with the quadratic formulation of the cost of party contributions. The behaviour of the marginal cost is related to the expected vote share of candidate A, π_A . The campaign spending of party B increases the marginal cost of C_A because it has a negative impact on the vote share, π_A , and therefore forces A into a higher party contribution. The same is true for $x - \Delta W(g)$, the exogenous advantage of candidate B.

Notice also that the impact of own spending on the marginal cost is $(1-z)^2$, while the cross impact is (1-z)z. Therefore, when $z < \frac{1}{2}$, own spending has a higher impact on the marginal cost that the opponent candidate's spending, while the reverse happens when $z > \frac{1}{2}$. As it will become clear, this fact plays an important role in the nature of the equilibrium.

The best response of candidate A is given by:

$$C_A = \frac{\psi}{(1-z)^2} \chi - \frac{z}{1-z} C_B + \frac{z}{1-z} [\Delta W(g) - x] + \frac{1}{2(1-z)} T$$
(6)

Solving the maximisation problem of Candidate B, we obtain the best response

$$C_B = \frac{\psi}{k(1-z)^2} \chi - \frac{z}{1-z} C_A - \frac{z}{1-z} [\Delta W(g) - x] + \frac{1}{2(1-z)} T$$
(7)

The best responses show that the equilibrium depends on the sign of the overall exogenous advantage of candidate B, $\Delta W(g) - x$; therefore, we simplify matters by assuming that $\Delta W(g) = 0$.

The equilibrium levels of spending solve equations (6) and (7):

$$C_A^* = \frac{(1-z)k-z}{k(1-z)(1-2z)}\psi\chi - \frac{z}{1-2z}x + \frac{T}{2}$$
$$C_B^* = \frac{(1-z)-zk}{k(1-z)(1-2z)}\psi\chi + \frac{z}{1-2z}x + \frac{T}{2}$$

As a result the equilibrium campaign spending gap, ΔC^* , is given by:

$$\Delta C^* = C_A^* - C_B^* = \frac{k-1}{k(1-z)(1-2z)}\psi\chi - \frac{2z}{1-2z}x\tag{8}$$

Replacing equation (8) on equation (4) yields the equilibrium probability of A being elected:

$$p_A^* = \psi\left(\frac{k-1}{k(1-z)(1-2z)}\psi\chi - \frac{1}{1-2z}x\right) + \frac{1}{2}$$
(9)

It follows that when x = 0, the party making the highest campaign spending wins the election with a higher probability; however, with, say x > 0, it is possible that B is the favourite even if he spends less than A.

In order to better grasp strategic effects, we shut down in turn the *ex-ante* popularity wedge, x, and the difference in the measure of tightness in access to party contributions to finance campaigning, k.

We start by assuming that both candidates have the same access to their respective parties contributions to fund campaigning, i.e., k = 1. In this case, the sign of equation (8) depends on the value of x and z. Results are summarised in Proposition 1.

Proposition 1. Suppose that both candidates face the same marginal cost of contributions, i.e., k = 1 and that one of the candidates enjoys an ex-ante popularity advantage, i.e. $x \neq 0$; then

- i) if $0 < z < \frac{1}{2}$, the candidate with an ex-ante popularity advantage spends more and wins with a higher probability.
- ii) if $\frac{1}{2} < z < 1$, the candidate with an ex-ante popularity advantage spends less and wins with

a lower probability.

In order to understand the result in Proposition 1, let us concentrate on the case x > 0, when candidate B has an *ex ante* popularity advantage, which makes him face a lower marginal cost of campaign spending than his opponent. When $z < \frac{1}{2}$, the own effect on the marginal cost of spending is higher than the cross effect and we have the expected result that the candidate with an *a priori* advantage outspends the other. Conversely, when $z > \frac{1}{2}$, recall that the cross effect is more important than the effect of own spending on the marginal cost. That is, each candidate has a very productive tool to manipulate his opponent's marginal cost, more so than the opponent's own tool. This allows the under-dog candidate A to spend a very high amount, with a sizeable impact on the marginal cost of B, such that it becomes too costly for B to outbid him. Notice that it is not optimal for B, the *a priori* favourite candidate, to follow a similar strategy, since given A's a cost disadvantage, the value of C_B needed to cause a similar increase in A's marginal cost would be lower, and therefore A could more easily outbid it.

Proposition 2, on the other hand, summarises the results for the case of no *ex-ante* popularity difference, and different costs of party contributions.

Proposition 2. If none of the candidates enjoys an ex-ante popularity advantage and a candidate bears a higher cost of party contributions,

- i) if $0 < z < \frac{1}{2}$, then the candidate with lower marginal cost of party contributions spends more and wins with a higher probability.
- ii) if $\frac{1}{2} < z < 1$, then the candidate with higher marginal cost of party contributions spends more and wins with a higher probability.

This result resembles that of Proposition 1 in that the candidate with an exogenous disadvantage – which in this case stems from the cost of contributions, instead of popularity – outbids the other when $z > \frac{1}{2}$, i.e., when the cross effect is stronger than the own contribution one.

Based on the model, all our empirical specifications include the following controls. The dispersion in voters' ideology, ϕ , is proxied by measures of the competitiveness of the election, such as the number of parties running or the size of the municipality. *Ex-ante* popularity advantages, x, on the other hand, are controlled for using a dummy that is equal to one whenever the incumbent is running for reelection, a variable that accounts for the number of terms the mayor has been in power, or a dummy for alignment of candidates with the central government. Finally, the benefit of winning the election, χ , which can be different across time and municipalities, can be accounted for with fixed effects at the municipal level or time dummies.

The empirical analysis will also allow us to establish the validity of our theoretical model by testing the following assumptions.

Hypotesis 1. Own campaign spending increases own vote shares and opponents campaign spending decreases own vote share.

Hypotesis 2. Campaign spending is positively correlated with the expected statutory allowance to be received from the central government.

Hypotesis 3. Ex-ante popularity advantages increases vote share.

Finally, and most importantly, we can also test the following results in Propositions 1 and 2.

Hypotesis 4. Candidates with an ex-ante popularity advantage spend more in campaigning than their opponents and win the election with higher probability, whenever the expected financial return of campaigning is low (or the voters are ideologically disperse).

Hypotesis 5. Candidates that face higher restrictions in access to party contribution funds spend less in campaigning, whenever the expected financial return of campaigning is low (or the voters are ideologically disperse).

3 An application to Portuguese municipalities: background

The Portuguese territory is organised into three administrative layers. The first level comprises the continental territory and the Autonomous Regions, the islands of Azores and Madeira. The second layer includes 278 mainland municipalities and 30 municipalities in the Autonomous Regions. Municipalities are then divided in a total of 3092 Parishes.

The central government is responsible for the general policy in the country and it is the highest body of public administration.¹⁰ Regional governments, from the Autonomous Regions, are hierarchically below the central government, although they possess legislative autonomy in specific

 $^{^{10}\}mathrm{Constitution}$ of the Portuguese Republic.

pre-defined areas.

Local power is split between the municipal and the parish level, with the overall goals of improving the well-being of inhabitants, promoting social and economic development, managing territorial planning and providing local public goods.¹¹ Local government representatives are elected in all the 308 municipalities simultaneously in a nationwide local election, that occurs every four years.

At the municipal level, the representative bodies are the Town Council and the Municipal Assembly. Town Council is the executive branch and its members are elected using the d'Hondt method, depending on the number of votes of each list. The lead candidate in the list with most votes is appointed as the Mayor. The Municipal Assembly, the deliberative branch, is composed of members directly elected by the voters and by the presidents of the Parish councils. The Parish councils, in turn, are also elected directly by voters in the same election. Therefore, voters are asked to cast three separate votes in each election, one for each representative body.

As all local policymakers are elected in the same day, the attention and effort of political agents regarding these elections is very sizeable. The political campaign period officially starts two weeks before the election date and ends two days prior to the election, as defined by the Law 1/2001, that regulates the electoral procedures for the local government bodies.

Between pre-campaign and campaign actions political candidates seeking office spend a substantial amount in campaigning. In the 2005 election, for instance, the five main parties spent $\in 62$ 223 511 in campaign spending, or around $\in 7.04$ per eligible voter in that election. Such figures include administrative/logistical costs associated with campaigning, but also the amounts spent in political promotion events, outdoors, flyers and merchandise.

The baseline rules that currently regulate the funding of political parties, as well as funding and spending in electoral campaigning are defined by Law 19/2003.¹² This law enforced strict limits on revenue sources (namely private donations) and expenditure levels for each type of election. Section A.1, in Appendix A, details this legal framework and provides additional information about the spending limits in place in the elections included in our analysis.

 $^{^{11}}$ As defined by Law 159/99.

 $^{^{12}}$ Law 19/2003 was subsequently altered by Law 64-A/2008, Law 55/2010, Law 1/2013 and Organic Law 5/2015, however these were mostly incremental changes.

Law 19/2003 also implemented tighter regulatory mechanisms. Since then, candidates are required to submit a comprehensive report of campaign funding sources and spending activities to the Portuguese Constitutional Court. This report is evaluated by an independent body that assesses any deviations from the rules, supporting the Constitutional Court which can then sanction the political agents.

The regulatory framework and the detailed information available (both in terms of funding and spending) for the panel of 308 municipalities in 3 elections (2005, 2009, 2013) makes Portugal an interesting case study for the impact of spending on election outcomes. Moreover, as the Portuguese political party system is dominated by five parties that run both at central and local level, it is relatively easy to track campaign spending and election outcomes across time and municipalities.¹³

3.1 The Public Statutory Allowance

The most important sources of funding in campaigning in Portugal are Statutory Allowances (SA) paid by the central government and determined, based on the electoral results, after the election. In the 2005 election, for instance, the five main parties reported a total revenue of around \in 59M associated with the election, of which 16.9% came from donations and fundraisers, 23.7% from party contributions and 59.3% from the statutory allowance.

The amount of the statutory allowance (SA) to be received by each candidate depends on the total allowance available for the municipality, TMSA, and the performance of candidates in the current election. The procedure to determine its amount is shown in Figure 4.

 $^{^{13}}$ Independent candidates running for local elections have gained increased relevance across time, but they still represent a relatively small share of overall mayor appointments. In 2001, Independent candidates gathered a total of 84 010 votes in the Town Council election, while in 2017 this figure amounts to 351 327 (6.79% of all the votes). Even so, out of 82 candidates to the Town Council in the 308 municipalities, only 17 independent candidates managed to be elected as mayors.



Figure 4: Statutory allowance for local election campaigning.

The total allowance available per municipality (total municipal statutory allowance - TMSA) corresponds to 150% of the spending limit (SL) defined for the municipality, determined as shown in Table 9, in Appendix A.1. To be entitled to a portion of TMSA, a candidate must run for both the Town Council and the Municipal Assembly and manage to either elect one candidate or get, at least, 2% of votes in both bodies. The TMSA is then distributed for the candidates in the municipality that fulfil these criteria: 25% is distributed equally between candidates, while the remaining 75% is distributed in proportion to the electoral results for the Municipal Assembly (MA).

In practice, assuming that the criteria are fulfilled and taking the adequate TMSA, the statutory allowance (SA) received by party j, in municipality i, in period t is given by:

$$SA_{j,i,t} = fixed_component_{j,i,t} + variable_component_{j,i,t}$$
$$= \frac{1}{\sum_{j} parties_{j,i,t}} \times 0.25 \times TMSA_{i,t} + \frac{vshare_MA_{j,i,t}}{\sum_{j} vshare_MA_{j,i,t}} \times 0.75 \times TMSA_{i,t} \quad (10)$$

The statutory allowance received, $SA_{j,i,t}$, depends positively on the total allowance available for the municipality, $TMSA_{i,t}$, and on the vote share of the party at the Municipal Assembly. On the other hand, if more parties run in the municipality (and fulfil the qualification criteria), every party gets a smaller portion of the fixed component of the SA. Nonetheless, the SA is capped by the actual amount spent in campaigning, so that parties cannot keep any portion of the SA that was not effectively spent.

The rules of SA attribution imply that candidates do not know *ex-ante*, with certainty, the amount of statutory allowance that they are entitled to. Parties can use their own resources to fund the campaign before receiving the SA. However, in principle they would want to spend a value close to their expected SA, to avoid spending their own money.

As we discuss on Section 6, in this work we isolate exogenous changes in campaigning spending taking advantage of the particularities in the allocation of the TMSA amongst the parties running in a municipality. In particular, we use a modified version of equation (10) to construct our instrumental variable.

4 Data and statistical evidence

To test our theoretical findings we resort to data on campaign expenditure of the parties running for office in local elections in Portugal in 2005, 2009 and 2013.

This database was compiled using the reports submitted by parties and independent candidates to the Accounts and Political Funding Entity, an independent auditing body of the Portuguese Constitutional Court. An example of the information available in such reports is presented in Figure 9 and 10, in Appendix A.2. Based on the reports, we built and compiled a new database that comprises a total of 20 variables regarding actual and forecasted revenue, and expenditure items associated with campaigning in local elections. We cover three nationwide elections, in 308 municipalities and for all the parties running in each municipality (between 2 and 10 parties per municipality).

We also gathered a set of political variables, associated with election results, using data provided by the National Elections Commission: vote shares, number of seats won per party and number of eligible and actual voters, per municipality, for each municipal body. Based on these variables we also constructed a set of control variables that are relevant for our analysis, namely whether the incumbent mayor decided to run for reelection, for how many terms has the current mayor been in power (a proxy for incumbency advantage), how many parties are running in that election (a proxy for contestability of the election), dummies for the political spectrum of the candidates/winners and dummies of alignment with the central government (to capture eventual spillovers between central and local voting behaviour).

Although our database comprises a lot of information, using it to estimate the effects of campaign spending in local elections raises some technical issues. The data about a candidate/party can only be effectively used if the party runs for office, in the same circumstances, in the same municipality for the three elections.

However, this is not always the case. First, parties, particularly small parties, may decide not to run in a municipality in a given year. Second, it may be that the party runs in the municipality, but in a coalition. Coalitions of parties are commonly decided locally, in a caseby-case fashion. If in a particular municipality there is a contender expected to have a high vote share in the election (perhaps the incumbent), parties that previously run separately may decide to join efforts and enter a coalition. In such cases, spending and vote shares are reported for the coalition, so it is impossible to follow the individual parties across time. Finally, following independent candidates, which candidacy is not supported directly by a party, is generally not possible, as there is no municipality where the same independent candidate runs for the whole time span of our analysis.

In the end, these limitations condition greatly the actual number of usable observations for estimation purposes. To minimise this issue and to enrich our analysis, we organise the database in two ways: i) the winner/runner-up perspective and ii) the individual party perspective.

Focusing on the top contenders for office is very common in the literature. In some cases they are the incumbent and the challenger, as in Jacobson (1978), Gerber (1998) or Moon (2006), in others they are the top contenders in the second stage of a repeated election, like in Levitt (1994) or Ben-bassat et al. (2015). The *winner/runner-up* perspective restricts the analysis to the candidates that finished the electoral race in first and second places, which are likely to be the ones that compete the most in terms of campaign spending. As in this case we focus on the position in the race and not the party, we can virtually include all municipalities in our analysis, which allows for a high the number of observations effectively used. Moreover, in this set-up we

can also include independent candidates, smaller parties and coalitions, provided that they are representative enough to end the electoral race in the top places, in a given municipality.

The *individual party* perspective, as in Fink (2012), Rekkas (2007) or Fisher et al. (2011), allows us to follow spending patterns of the same party across time. In this approach, we can distinguish campaign spending effects of parties, irrespective of their placing in the electoral race. This is important as some parties may spend different amounts, in a different way, and may even be better at converting campaign spending in votes. We restrict the analysis to the four main Portuguese parties. This selection includes the two biggest national parties, the Socialist Party (PS), which is the main centre-left party in Portugal, and the Social Democratic Party (PSD), the centre-right analogue. The other two are further away from the centre of the political spectrum, one is the Portuguese Communist Party (PCP), left-wing, and the other the People's Party (CDS), right-wing.¹⁴

Table 1 shows descriptive statistics of the main variables used. Panel A shows that the two main parties (PS and PSD) have a consistently higher vote share than the other two, both in the Town Council and the Municipal Assembly. Panel B provides similar information, while focusing on the winner/runner-up in the election. Notice that the average winning margin (difference between the vote share of the winner and the runner-up in the Town Council) is 19.75pp, although it can go as high as 72pp. Left wing parties represent 51% of winners while only 2% are independent candidates. Coalitions of parties win in 16% of the cases covered by our sample.

	Obs.	Mean	S.D.	Min.	Max.
Panel A: Election Results - Party Level					
$vshare_TC_{PS}$	1 211	39.47	13.75	5	76.6
$vshare_MA_{PS}$	1 209	38.8	11.89	6.7	71.6
$vshare_TC_{PSD}$	946	39.99	17.9	1	83
$vshare_MA_{PSD}$	942	39.08	16.09	2.3	75.9
$vshare_TC_{CDS}$	688	6.06	8.52	0.4	64.4
$vshare_MA_{CDS}$	603	7.4	8.56	0.5	61
			(Continued or	n next page

 14 We exclude the Left Bloc (BE), a left-wing party that was founded only in 1999. Although the national relevance of this party has been increasing throughout time, its local importance is still relatively small. Besides, there are several municipalities in our sample where BE ran in one year and not in the others, which makes it harder to perform an analysis across time.

	Obs.	Mean	S.D.	Min.	Max.
$vshare_TC_{PCP}$	1 199	11.06	15.49	0.1	67.7
$vshare_MA_{PCP}$	$1 \ 203$	11.71	14.58	0.3	64.8
Panel B: Elections Results - Rank in election	on				
$vshare_TC_{winner}$	1 232	52.1	8.68	26.8	83
$vshare_AM_{winner}$	$1 \ 232$	49.44	7.99	26	75.9
$vshare_TC_{runner-up}$	1 232	32.35	8.13	9.6	48.9
$vshare_AM_{runner-up}$	1 232	32.81	7.37	12.6	48.4
win_margin	$1 \ 232$	19.75	13.97	0.02	72.04
$D.CM_winner_left$	1 232	0.51	0.5	0	1
$D.CM_winner_right$	$1 \ 232$	0.46	0.5	0	1
$D.CM_winner_coalition$	$1 \ 232$	0.16	0.37	0	1
$D.CM_winner_independent$	$1 \ 232$	0.02	0.15	0	1
Panel C: Campaign Spending Variables					
$crevenue_total_{PS}$	916	74 993.72	66 695.22	646.7	565 893.5
$cspending_total_{PS}$	916	$73\ 644.52$	67 206.66	$1 \ 081.6$	557 111.8
$crevenue_total_{PSD}$	679	$41 \ 409.54$	51 776.89	$1 \ 230.5$	$609\ 284.2$
$cspending_total_{PSD}$	679	48 623.99	$55\ 528.4$	$1 \ 417.2$	$555\ 526.1$
$crevenue_total_{CDS}$	494	$11\ 159.54$	$19 \ 328.41$	0	$268 \ 204.7$
$cspending_total_{CDS}$	493	$9\ 574.39$	$19\ 168.58$	0	307 758.7
$crevenue_total_{PCP}$	902	$21\ 287.7$	39 991.52	0	418 164.6
$cspending_total_{PCP}$	904	$15\ 189.82$	$27 \ 384.27$	0	211 409.1
$crevenue_total_{winner}$	915	$72\ 287.61$	$70\ 656.36$	1 525.8	609 284.2
$cspending_total_{winner}$	915	$74\ 404.4$	72 098.96	1466	638 744.5
$crevenue_total_{runner-up}$	908	60 818.5	$98\ 275.04$	503.3	232 5565
$cspending_total_{runner-up}$	912	$58\ 563.57$	$65 \ 303.84$	1202.9	$557 \ 111.8$
$cspending_gap$	905	$15\ 740.52$	41 803.91	-176 390	223 957.7
$cspending_marketing_{municipality}$	924	$137\ 047.5$	$145\ 031.9$	$11 \ 450.4$	$1 \ 198 \ 516$
$cspending_other_{municipality}$	924	$23\ 186.52$	$42 \ 460.08$	889.7	$734 \ 993.4$
$cspending_total_{municipality}$	923	$159 \ 152$	$171 \ 994.5$	$16\ 163.5$	$1 \ 842 \ 405$
Panel D: Controls					
population	$1\ 232$	33 984.48	$55\ 298.99$	418	564 657
$D.incumbent_running$	$1 \ 202$	0.72	0.45	0	1
$D.incumbent_reelected$	$1 \ 202$	0.61	0.49	0	1
$incumbent_num_terms$	$1 \ 202$	2.45	1.72	1	10
$TC_aligned_cgov$	$1 \ 160$	0.53	0.5	0	1
$TC_num_parties$	$1 \ 232$	4.24	1.11	2	10
AM_num_parties	1 232	4.08	1	2	9

Table 1: Descriptive Statistics

Monetary values in euros (constant prices - 2010), shares in a scale of 0-100.

Panel C summarises the variables related to the campaigning revenues/spending. Notice that the higher spender is the Socialist Party with an average of $\in 75$ k. Standard deviations are very high in general, stressing that spending varies significantly across municipalities.¹⁵ The winner spends on average $\in 15$ k more than the runner-up, although the variability of spending is higher for the runner-up. The average total spending in campaigning per municipality is $\in 159$ k, of which $\in 137$ k are directly associated with marketing expenditures (billboards, flyers, events, etc.).

Finally, Panel D describes some of the controls used. In 72% of the cases incumbents in power run for reelection, and in 85% of the cases they are reelected. The average number of terms that the incumbent is in power in our sample is 2.45. The number of parties running for office varies between 2 and 10, with an average of 4.

To get further insight from the data, we can check whether some of the hypothesis defined in the end of section 2.2 have support in our descriptive analysis.

First, as stated in *Hypothesis 1*, we want to explore whether there is a relationship between campaign spending and the electoral results. Figure 5 plots the gap between the vote shares of the winner and the runner up (winning margin), against the gap between their campaign spending (campaign spending gap).



Figure 5: Campaign spending gap versus winning margin

The positive correlation is clear, meaning that outspending your competitor is associated with

¹⁵The Social Democrat Party (PSD) seems to spend less than the Socialist Party, however the former often runs in a coalition with the People's Party (CDS), which may bias the average of this variable downwards.

a higher winning margin.

Second, we want to evaluate if there is empirical evidence that campaign spending across competitors in the same municipality is correlated. Figure 6 plots the campaign spending per capita of the winner and the runner up of the election.



Figure 6: Campaign expenditure of Winner and Runner-up

There is a strong positive correlation between the levels of spending of the top political competitors, meaning that when/where the winner spends more, the runner-up also spends more. Therefore, there is evidence that when deciding the level of campaign spending, politicians consider the expected spending of their competitors. The positive relation is not surprising, as several determinants of campaign spending decisions are common to both candidates, like the ego-rent (χ), the total amount of statutory allowance available in the muncipality (T), or even the volatility of the popularity and voter ideology distributions (δ and σ^i).

Third, we also want to investigate the descriptive evidence that a higher *ex-ante* popularity advantage could drive both the campaign spending decisions and the probability of being elected. As shown in Table 1, around 61% of the mayors in our sample are reelected incumbents, this could be evidence in support of the assumption stated in *Hypothesis 3*, if we take incumbency advantage as a measure of *ex-ante* popularity advantage. However, this does not mean that incumbents running for reelection spend less in campaigning. In fact, a means test on the campaign spending of the winner rejects the null that campaign spending of incumbents that are reelected is smaller than the campaign spending of first-time winners at 5% significance level. If advantaged candidates spend more in campaigning and win elections more often there is preliminary empirical support for the result stated in *Hypothesis 4*.

Finally, we want to explore whether potential restrictions in the access to party contributions to fund campaigning activities may condition spending decisions. According to Table 1, the two biggest parties, PS and PSD, spend on average more than the two smaller parties considered, PCP and CDS. If bigger parties (who have on average higher vote shares) have deeper pockets, then this higher level of spending can provide preliminary evidence that *Hypothesis 5* established in our theoretical model holds. Note however, that the lower average campaign spending levels comes with a higher standard deviation (in relative terms) of campaign spending for the smaller parties. The coefficient of variation for CDS and PCP is above 1.8, meaning that these parties actively spend in campaigning, but target specific municipalities (where voter ideological dispersion might be smaller).

5 Estimating campaign spending effects

To evaluate the effects of campaign spending in local elections, we would like to find the elasticities of an election outcome variable (vote share, probability of winning or probability of being reelected) with respect to a variable measuring the level of campaign spending of the candidates. In a two party set-up (j = A, B) and focusing on the vote share of candidate A, this would be equivalent to estimating the following equation:

$$vshare_{A,i,t} = \beta_1 cspending_{A,i,t} + \beta_2 cspending_{B,i,t} + \eta X_{i,t} + \varepsilon_{i,t}$$
(11)

where β_1 and β_2 are the coefficients of interest and $cspending_{j,i,t}$ is the total amount spent in campaigning by candidate j, in municipality i, at time t, $X_{i,t}$ is a vector of controls and $\varepsilon_{i,t}$ is the error term.

Based on the results of our theoretical model and on the preliminary statistical evidence presented earlier, we would expect that the vote share of candidate A is positively affected by candidate A's campaign spending ($\beta_1 > 0$) and negatively affected by candidate B's spending $(\beta_2 < 0)$. In fact, when candidate A spends more, he increases his average popularity and by consequence he decreases the average popularity of his opponents.

The estimation of such coefficients, however, is cumbersome because of endogeneity issues, that could lead to biased OLS estimates. From a theoretical perspective, the bias could arise in two confounding directions. If a politician that already thinks he is going to win (lose) decides to spend a lot (very little), the bias would be upwards. If on the contrary, he is so confident about the victory that he finds it useless to spend in campaigning, or if he spends a lot because he is afraid to lose, the bias would be downwards. This bias could be even more severe when considering that in a local election political parties may allocate campaign spending funds strategically across municipalities, by focusing their efforts in municipalities where they believe they could win.

Even so, OLS estimates can deepen our understanding of the relationship between campaign spending and the vote shares. In the next sections we present these results for the two empirical approaches: the winner/runner-up and the individual party perspectives.

5.1 OLS estimates: winner and runner-up

In this scenario, we formulate a variant of model (11), following Ben-bassat et al. (2015), where the outcome variables are the vote share of the winner, the vote share of the runner-up and the winning margin. If the outcome variable is the vote share of the winner we estimate:

$$vshare_{winner,i,t} = \beta_1 cspending_{winner,i,t} + \beta_2 cspending_{runner-up,i,t} + \eta X_{i,t} + \varepsilon_{i,t}$$
(12)

where $cspending_{winner,i,t}$ is the campaign expenditure of the candidate that won the election, in thousand euros, and $cspending_{runner-up,i,t}$ is defined analogously and $\varepsilon_{i,t}$ is the error term. The vector of controls, $X_{i,t}$ includes municipal fixed effects, time dummies and a set of political controls, as well as the population level and variable to account for the total campaign spending of parties that ran in the municipality but ended up in third place or lower, $cspending_{mun,i,t}$. Results are shown in Table 2.

	$vshare_{winner}$	$vshare_{runner-up}$	win_margin
	(1)	(2)	(3)
$cspending_{winner}$	0.015	-0.005	0.020
$cspending_{runner-up}$	[0.011] -0.035***	[0.009] 0.055***	[0.016] -0.090***
$cspending_{mun}$	[0.009] -0.021**	[0.011] -0.017***	[0.018] -0.004
	[0.008]	[0.005]	[0.010]
N	903	903	903
R^2	0.288	0.174	0.179
F	19.723	11.211	11.897
р	0.000	0.000	0.000

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Table 2. ULS estimates	- 11SINØ	spending	Ot	winner	and	runner	11D
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Campaign spending variables in thousands. All regressions include fixed effects, time dummies and controls. Robust and clustered standard errors at municipal level. * p < 0.10, ** p < 0.05, *** p < 0.01

In the first column, we see that although the spending of the winner has virtually no effect on its vote share, the spending of the runner-up has a negative effect. On the contrary, column (2) shows that the spending of the runner-up seems to affect positively his vote share, while the effect of the spending of the winner is not significant. In both cases, campaign spending of other parties has a negative effect on the vote shares. The effects of spending in the winning margin are analogous. In terms of magnitudes, an increase of 1000 euros in campaign spending of the runner-up leads to a boost of 0.06pp in his own vote share and a decline of 0.04pp in the vote share of the winner. Therefore, particularly for the runner-up the assumptions embodied in *Hypothesis 1* seem to have empirical support.

Notice that this approach covers virtually all the 308 municipalities in the three elections ($308 \times 3 = 924$). Table 13, in Appendix B, shows that contestability reduces both the vote shares and the winning margin, as in the party level specification. When the incumbent mayor runs for reelection the vote share of the winner increases, with a corresponding reduction the vote share of the runner-up. The number of terms that the incumbent has been is power seems to have a relatively small effect on the vote share. Together, these findings provide support to our model assumptions, namely as stated in *Hypothesis 3*.

5.2 OLS estimates: individual parties

When analysing the campaign spending effects of individual parties, following Fink (2012), for each of the four main parties we estimate:

$$vshare_{A,i,t} = \beta_1 cspending_{A,i,t} + \eta X_{i,t} + \gamma_i + \lambda_t + \varepsilon_{i,t}$$
(13)

where $cspending_{A,i,t}$ represents total campaign spending of party A, measured in thousand euros. The vector of controls is defined as before, including a variable that accounts for the total amount spent in campaigning in the municipality by parties other than A, $cspending_mun_{i,t}$. Results are shown in Table 3.

	$vshare_{PS}$	$vshare_{PSD}$	$vshare_{CDS}$	$vshare_{PCP}$
	(1)	(2)	(3)	(4)
$cspending_{PS}$	0.083***			
$cspending_{PSD}$	[0.015]	0.090***		
$cspending_{CDS}$		[]	0.135^{**}	
$cspending_{PCP}$			[0.061]	0.057***
$cspending_{mun}$	-0.046*** [0.007]	-0.059*** [0.019]	-0.007 [0.006]	-0.016*** [0.004]
N	914	675	464	892
R^2	0.141	0.353	0.120	0.107
F, Þ	$10.837 \\ 0.000$	$20.579 \\ 0.000$	$3.376 \\ 0.001$	$7.010 \\ 0.000$

Table 3: OLS estimates, using spending by 4 biggest parties.

Campaign spending variables in thousands. Each column represents a separate regression, where the vote share of each of the four biggest party is used as outcome variable. All regressions include fixed effects, time dummies and controls. Robust and clustered standard errors at municipal level. * p < 0.10, *** p < 0.05, *** p < 0.01

All the coefficients in the main diagonal are positive and statistically significant, meaning that each party's own spending is positively correlated with its vote share. Campaign spending of other parties in the same municipality, in turn, decreases the vote share of the party analysed. Again, the correlation of campaign spending and vote shares supports *Hypothesis 1*.

Notice that, in this case, by construction, our estimates include only municipalities where the party which vote share we use as outcome variable runs individually, with no pre-electoral coalition with another party in the three elections. Consequently, in Table 3 the number of included observations for each regression ranges between 464, for CDS, and 914 for PS.

Instead of using the total spending of other parties in the municipality, $cspending_mun_{i,t}$, we could explore the interactions between the campaign spending of these four parties separately. Table 12, in Appendix B, shows these effects. Again, the coefficients in the main diagonal show a positive effect of own campaign spending on the vote shares. Also, the off-diagonal elements show that spending of competitors negatively affects your own vote share.¹⁶

Tables 11 and 12 detail the effects of the controls included in the regressions. In both cases, the set of controls seems to tell the same story. Contestability (a higher number of candidates) reduces the vote shares. Incumbency advantage also matters, although the direction of the effect seems to differ depending on the party. Finally, the alignment of the mayor in power before the election with the central government seems to have mixed effects.

Although these estimates seem to support that campaign spending is relevant, it is important to address potential endogeneity issues. If they are present, the coefficients may be biased and, as discussed, the direction of the bias is not obvious.

6 Identification Approach: Expected Statutory Allowance

Literature has dealt with the inherent endogeneity of estimating the effects of campaign spending on electoral results mainly by using the particularities of the elections or by resorting to instrumental variable estimation. Silveira and Mello (2011) and Ben-bassat et al. (2015) focus on repeated elections, while Fink (2012) argues that the characteristics of a partisan proportional representation system minimise the simulaneity issues. Green and Krasno (1990), on the other hand, use lagged campaign spending as an instrumental variable to access the contemporaneous effects of campaign spending. Other instrumental variables include candidate quality (Gerber, 1998 and Green and Krasno, 1988), the tightness of the race (Erikson and Palfrey, 2000) or the population size of the constituency (Gerber, 1998).

In this work, we follow an instrumental variable approach, based on the exogenous rules that

 $^{^{16}}$ We prefer the former specification because the number of observations included is considerably higher, particularly for the bigger parties. In fact, by assessing the individual effects of spending of all parties in the vote shares, we are constraining the sample to include only municipalities where the four parties run individually diria and simultaneously in the three election episodes.

govern local political campaigns in Portugal, described in Section 3.1 and in Appendix A. Particularly, we focus on the value of the statutory allowance candidates expect to get from the central government.

The choice of the instrument is framed in our theoretical model and justified by its suitable properties. On one hand, being the main source of funding for political campaigns, its value (or the expectation of it) is likely to be a key determinant of the actual amount spent in campaigning. On the other hand, the rules that determine the exact amount of SA received are out of the scope of candidates' control is several dimensions. This is apparent upon closer inspection of equation (10).

First, candidates do not know how many opponents they are going to face in each election, nor whether these opponents are going to fulfil the criteria to be entitled to public funding, which affects directly the fixed component of the SA received. Second, they do not know how well they are going to perform, compared to the other candidates, which influences directly the variable component of the SA. Finally, the actual amount of money available to be distributed as the SA, the TMSA, also varies across elections, depending on the spending limit threshold where the municipality is placed and the actual indexing value used to convert these thresholds into a spending limit in euros.¹⁷

In principle, a candidate would be willing to spend exactly the amount of the public spending that he is entitled. Otherwise, either he spends more and will need to find additional resources (like party contributions) to cover the campaign costs, or he spends less and will be "wasting" potential campaigning resources he could be entitled to.

Our approach is precisely to compute the expected statutory allowance (ESA) each candidate anticipates to get in a given election. If the election occurs at t, the ESA is determined considering the rules in place at t and the figures that describe the electoral competition stance from the previous election, in t - 1 (which includes the electoral results and the number of parties running for office in t - 1).

¹⁷The number of eligible voters that defines the spending threshold of a municipality is published by the Ministry of Internal Affairs in the months prior to the election, this could affect the campaign spending decisions, particularly for municipalities near the threshold limits. Additionally, the indexing value in place in every election is defined by the central government and its value changed throughout our sample, leading to different spending limits for municipalities in the same threshold across time (as shown in Table 10).

In particular, we adapt the statutory allowance (SA) formula, given by equation (10), to reflect the best possible information available when candidates are deciding the level of campaign spending. For party j, in municipality i, in period t the ESA is given by:

$$\begin{split} ESA_{j,i,t} &= fixed_component_{j,i,t} + variable_component_{j,i,t} \\ &= \frac{1}{\sum_{j} parties_{j,i,t-1}} \times 0.25 \times TMSA_{i,t} + \frac{vshare_MA_{j,i,t-1}}{\sum_{j} vshare_MA_{j,i,t-1}} \times 0.75 \times TMSA_{i,t} \end{split}$$

Notice that by using the TMSA of period t we assume that candidates known the legal framework in place when they define the campaign spending level for the election. To account for the political stance, we assume that the best guess for each individual candidate is to assume what happened in the previous election. This justifies the use of the number of parties that ran in t-1 $(\sum_j parties)$ and the Municipal Assembly vote shares of the previous period $(vshare_MA)$. To illustrate, consider the case of the Socialist party (PS), in the municipality of Aveiro in the 2009 election. The data necessary to determine the ESA is given in Table 4.

Table 4: ESA for PS in the 2009 election.

year	SL	TMSA	num_parties	$vshare_{TC}$	vshare_MA	\sum vshare_MA
2005	€370 934	€556 401	4	29.81%	31.2%	94.5%
2009	€385867	€578 801	5	34.65%	33.99%	96.3%

Values at constant prices (2010).

The ESA is obtained based on the TMSA for Aveiro in 2009 and the electoral results of the 2005 election in Aveiro. The fixed component is obtained dividing the fixed proportion of the TMSA of 2009 by the number of parties that fulfilled the criteria to receive the allowance in the 2005 election [4]. The variable portion of the TMSA that PS receives receives depends on the vote share (in the Municipal Assembly) that PS got in the 2001 election [31.2%] in Aveiro, as a proportion of the share of total valid votes in the election [94.5%]. Using the formula, the ESA amounts to $\leq 179 \ 497.^{18}$ In reality, the Socialist party spent in the 2009 election $\leq 178 \ 492.71$ in campaigning and received a statutory allowance of $\leq 175 \ 463.14$ from the central government.

Note that our main outcome variable of interest is the vote share in the Town Council, as this is what determines who is the Mayor of the municipality. The instrument, although, is calculated

¹⁸That is, $ESA_{PS,Aveiro,2009} = \frac{1}{4} \times 0.25 \times 556401 + \frac{31.2}{94.5} \times 0.75 \times 556401 = 179497$

according to the votes casted for the Municipal Assembly in the prior election (as these are the results used to distribute the statutory allowance in reality). Although these shares are strongly correlated, they do not coincide in most cases.¹⁹

We use the ESA to instrument campaign spending in a two stage least squares set-up:

(1st stage)
$$cspending_{j,i,t} = \theta_1 ESA_{j,i,t} + \eta X_{i,t} + v_{i,t}$$

(2nd stage) $vshare_{j,i,t} = \beta_1 \widehat{cspending_{j,i,t}} + \eta X_{i,t} + \varepsilon_{i,t}$
(14)

where $vhare_{j,i,t}$ may refer, depending on the specification, to the vote shares of the winner/runnerup or the vote shares of the four main parties in municipality *i* and time *t*. $X_{i,t}$ is a set of controls, that include municipal dummies, time dummies, political and demographic variables, as well as measures of campaign spending done by other parties in the municipality.

Again, we construct the instrumental variable to encompass the two perspectives of our analysis. First, we create a variable to measure the ESA for the winner and the runner-up of the election. Second, we proceed similarly for the four most relevant parties in local Portuguese elections (PS, PSD, CDS and PCP).

The summary statistics for our instrumental variables are presented in Table 15, for both approaches described. The expected statutory allowance computed shows the relative differences between the parties, with the two biggest parties having significantly higher average values. The averages for the winner and the runner-up are also high. It is also important to note that the variability of the instrumental variable is high, shown by high standard deviations (in particular for the smaller parties, relative to the average) and by the large ranges in all cases.

6.1 ESA: winner and runner-up

To compute the ESA in the winner and runner-up perspective we start by identifying the top two contenders in the election occurring in t. We then use the electoral results of the election in t - 1 as their best possible guess about their performance in t. Importantly, when we look backwards for the electoral results, we use the one's corresponding to the parties identified in

¹⁹The correlation for the four main parties is above 0.98. However the difference between the vote share obtained in the Town Council and the Municipal Assembly differs depending on the party and spans between -7.9 and 21.6 for the Socialist Party, for instance. More details about the difference in the vote shares are available in Table 14.

the first step, irrespective of their ranking in the prior election. If, for instance, party A won the election in t, but ended in third place in the prior election, this is the vote share that we use to compute the ESA (not the vote share of the winner in t - 1).

As discussed before, an important advantage of this approach is that it includes coalitions of parties and independent candidates, whenever they end up in the top two places. As a result, the computation of this variable is somehow complex, requiring a set of technical assumptions when we measure backward performance. These assumptions are presented in detail in Appendix C.1.



Figure 7: ESA vs. actual campaign spending (winner and runner-up).

Figure 7 exhibits the high correlation between our expected statutory allowance and the actual campaign spending, for the winner and the runner-up.

6.2 ESA: individual parties

In the individual parties' specification, as discussed, we focus on the four biggest local parties running for local office. Recall that in this approach we are, by construction excluding all parties that do not run consistently in a municipality. Consequently, tracking the record of those parties is relatively simple, which is reflected on the construction of the ESA.

To compute the ESA for each party in election t, we use the rules in place at t, while using

the lagged performance of the party in the previous election as the best possible guess of its performance in the election at t.

In Figure 8 we show the correlation of the ESA of each party with their actual spending in campainging.





Again, there is a clear positive correlation, particularly for the Socialist party and for the cases where both campaign spending (and the ESA) are lower (excluding the top outliers).

The positive correlations found both in Figures 7 and 8 highlight how the expectation about the amount of public statutory allowance to be received influences spending, which supports both our theoretical modelling assumptions (as stated in *Hypothesis 2*) and our empirical identification.

7 Causal Effects of Campaigning

7.1 IV estimates: winner and runner-up

In the winner and runner-up perspective we estimate the model described by equation (12), using the 2SLS method, as shown in equation (14). Depending on the specification, we instrument campaign spending with the ESA, computed as explained in Section 6.1, for the winner, the runner-up, or both. Table 5 shows the results.

	$vshare_TC_{winner}$		$vshare_T$	$C_{runner-up}$		win_margi	n
	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage	1^{st} Stage	1^{st} Stage	2^{nd} Stage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$cspending_{winner}$		0.036	0.069	-0.015			0.198
		[0.026]	[0.068]	[0.012]			[0.147]
ESA_{winner}	0.548^{***}				0.518^{***}	0.169	
	[0.136]				[0.144]	[0.113]	
$cspending_{runner-up}$	0.090	-0.038***		0.139^{***}			-0.350**
	[0.088]	[0.009]		[0.045]			[0.168]
$ESA_{runner-up}$			0.448^{***}		0.302^{**}	0.441^{***}	
-			[0.095]		[0.131]	[0.096]	
$cspending_{mun}$	-0.031	-0.019**	0.001	-0.018***	-0.040	0.007	0.009
	[0.065]	[0.009]	[0.030]	[0.006]	[0.062]	[0.033]	[0.019]
N	903	903	903	903	903	903	903
R^2	0.283	0.282	0.220	0.066	0.300	0.226	-
F	11.021	18.927	12.848	9.562	12.956	14.060	7.993
р	0.000	-	0.000	-	0.000	0.000	-
F-test excl.	16.31	-	22.10	-	13.27	11.8	-
р	0.000	-	0.000	-	0.000	0.000	-

Table 5: Campaign Spending effects on vote shares, winner and runner-up. (IV Estimation)

Campaign spending variables are measured in thousand euros (at 2010 prices), vote shares are between 0-100 and the winning margin is measured in percentage points. All regressions include fixed effects, time dummies and controls. Controls include the population level, a dummy variable equal to 1 if the incumbent is running for reelection, the number of terms that the mayor in power at the time of the election has been in power, as well as a variable that accounts for the number of candidates running for the election. We also include a dummy whenever the candidate is aligned with a party in the central government. Standard errors are robust and clustered at municipal level. * p < 0.10, ** p < 0.05, *** p < 0.01

In columns (1) and (2) the outcome variable is the vote share of the winner candidate. The first stage, in column (1), shows that the expected statutory allowance is a good predictor of the level of campaign spending of the winner and that the spending of the runner-up has positive (albeit not significant) impact on the spending of the winner. Even so, only the spending of the runner-up (and to a smaller extent the spending of the remaining parties in the municipality) seem to affect the vote share of the winner. The coefficient of the spending of the winner has the expected sign, but it is not statically significant.²⁰

A similar specification is applied using the vote share of the runner-up as the outcome variable, reported in columns (3) and (4). The first stage shows that the expected statutory allowance explains fairly well the campaign spending level, with both the spending of the winner and of the remaining parties in the municipality having a positive (not significant) effect. In this case, the second stage shows a strong effect of the instrumented campaign spending (of the runner-up) in his own vote share. An increase of $\leq 1\ 000$ leads to an increase of the vote share of 0.14pp,

 $^{^{20}}$ In this specification we only instrument the spending of the winner with the corresponding expected statutory allowance. The spending of the runner-up is not instrumented.

this effect is significant at the 1% level. Although this effect may seem small, for the average runner-up, who spends $\in 58$ k, this effect means that campaign spending accounts for 8.12pp.

Finally, we evaluate the impact of campaign spending in the winning margin. We do so by instrumenting both the spending of the winner and the runner-up with their expected statutory allowance. The results of the corresponding first stages are consistent with the previous specifications. In the second stage, we observe that the spending of the winner increases the size of the winning margin, while the opposite happens for the spending of the runner-up (significant up to the 5% level). In practice, an increase of a ≤ 1000 of the spending of the runner-up has a combined effect over the vote share of both the winner and runner-up that translates to the reduction of the winning margin by 0.35pp.

In all cases, the F-test for excluded instruments is above 10 meaning that our instrument is relevant in explaining the campaign spending decisions of the winner and the runner-up. The under identification test and the multivariate test of excluded instruments also point in the same direction. The exogenous variation in spending that we capture with our IV approach seems to indicate that the OLS estimates, shown in Table 2, have a downward bias.

Overall, Table 5 seems to show that while most of the coefficients of campaign spending have the expected signs, only the spending of the runner-up can have actual effects on the vote share. Several studies, like Jacobson (1990), Palda and Palda (1998), Moon (2006) or Benoit and Marsh (2008), showed that incumbent (the majority of our winners) spending may have smaller effects than spending of challengers (the majority of our runner-ups).²¹

In our case, as Table 16 in Appendix D shows, campaign spending of the winner affects his vote share in a significant manner up to the introduction of the political controls. Specifically, the coefficient of the dummy variable that is equal to one whenever the incumbent is running for re-election seems to affect the vote share in an important manner, both in terms of size and statistical significance. Interestingly, this does not mean that the winner spends less in campaigning.²² The same variable is also significant in explaining the amount spent in campaigning,

 $^{^{21}}$ In fairness, the debate about the relevance of incumbent vs challenger is long lasting, and there is also evidence in that spending of incumbent also matters Gerber (1998), Erikson and Palfrey (2000), Samuels (2001) and Benoit and Marsh (2003).

 $^{^{22}\}mathrm{As}$ shown in Section 4 he actually spends more.

as it is clear from the estimation of the first stage equation shown in column (7), of Table 5.²³ Thus, a possible explanation for the lack of significance of the winner's campaign spending may be associated with some particularly high incumbency advantage.²⁴ As discussed in Magee (2012), campaign spending of the incumbent is relevant mostly when he feels threatened by strong challenger, thus a high incumbency advantage may be associated with a lower effect of winner's spending.

At this point, it is useful to revisit our theoretical *Hypothesis*, defined in the end of Section 2.2 to check which of those have empirical support in our empirical exercise.

First, in all cases, the *expected statutory allowance* has a strong positive correlation with campaign spending decisions, which supports *Hypothesis 2*. Second, regarding the *effects of campaign spending* on the vote shares, all the coefficients of the runner-up have the expected sign: a positive sign for own spending and a negative for competitor's spending. This supports *Hypothesis* 1, at least for the runner-up.

The role of the *ex-ante popularity wedge*, x, is particularly evident for the case of the winner, if we take incumbency advantage as a proxy for a positive popularity wedge. As discussed, although incumbency advantage drives the campaign spending of the winner upwards it also affects directly directly the vote share in a sizeable manner reducing the scope of effectiveness of campaign spending *per se*, which supports *Hypothesis 3* and partially supports *Hypothesis 4*.

Finally, in this set-up it is not clear how the *tightness in access to party contributions* to fund campaigning, k_j , affects spending decisions and the vote shares. However, given that the top contenders for office in local Portuguese elections are often the two biggest parties in our sample, this approach may not be the best to evaluate our theoretical claims from *Hypothesis 5*. In fact, if the availability of party resources is correlated with party size, these two parties (and their candidates) would have similar k_j .

 $^{^{23}}$ The details about the impact of the controls in the case of the runner-up are also provided in Table 17. The point estimate of the effect of runner-up spending in is own vote share is stable across specifications.

 $^{^{24}}$ Recall that in our sample in 61% of the cases the winner of the election is an incumbent seeking reelection.

7.2 IV estimates: individual parties

The approach followed in the previous section does not allow for a discussion about campaign spending effects depending on the parties involved. In reality, different parties may spend in campaigning in a different manner, and that spending may affect vote shares in different ways. The individual parties' perspective enables this kind of analysis, particularly given that our sample covers four parties of different sizes, that encompass a good portion of the political spectrum.

In this case, we estimate the model described by equation (13), using the 2SLS method, as shown in equation (14). Table 6 summarizes the results of our IV estimation, where the columns (1), (3), (5) and (7) present the estimation of the first stage equations and the remaining the corresponding second stages.

	vshare	$_TC_{PS}$	$vshare_TC_{PSD}$		vshare	TC_{CDS}	vshare	TC_{PCP}
	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$cspending_{PS}$		0.082***						
ESA_{PS}	0.600***	[0.031]						
$cspending_{PSD}$	[01110]			0.188^{*}				
ESA_{PSD}			0.483^{**} [0.191]					
$cspending_{CDS}$						-0.055 [0.211]		
ESA_{CDS}					0.404^{**} [0.157]			
$cspending_{PCP}$					LJ			0.157 [0.106]
ESA_{PCP}							0.356** [0.137]	
$cspending_mun$	0.086** [0.036]	-0.047^{***}	0.069 [0.045]	-0.112^{***} [0.024]	-0.034	-0.008	0.032	-0.022*** [0.008]
N	890	890	568	568	188	188	604	604
R^2	0.260	0.1296	0.320	0.3550	0.213	0.069	0.106	0.057
F-stat	12.696	7.822	14.895	17.806	4.220	1.762	4.030	4.331
р	0.000	0.000	0.000	0.000	0.000	0.090	0.000	0.000
F-test excl.	29.64	-	6.42	-	6.57	-	6.74	-
р	0.000	-	0.012		0.012	-	0.010	-

Table 6: Campaign spending effects on vote shares, party level. (IV Estimation)

Campaign spending variables are measured in thousand euros (at 2010 prices), vote shares are between 0-100 and the winning margin is measured in percentage points. All regressions include fixed effects, time dummies and controls. Controls include the population level, a dummy variable equal to 1 if the incumbent is running for reelection, the number of terms that the mayor in power at the time of the election has been in power, as well as a variable that accounts for the number of candidates running for the election. We also include a dummy whenever the candidate is aligned with a party in the central government. Standard errors are robust and clustered at municipal level. * p < 0.10, ** p < 0.05, *** p < 0.01

In all cases, the expected statutory allowance has a positive effect on the actual spending in

the election, at least at 5% significance level. The difference in the coefficients across parties is mostly associated with the variability in spending across the different parties (Panel C of Table 1).

In the second stage, we find a positive effect of the instrumented spending in the vote share for PS, PSD and PCP, although this effect if not statistically significant for the latter. For the Socialist Party, for instance an increase of $\in 1000$ in campaign spending increases the vote share by 0.08pp, which for the average Socialist candidate accounts for around 6% of his vote share, which is a relatively sizeable portion of the Socialist party's sample average vote share (39%). On the other hand, as expected, the spending of other parties in the same municipality has always a negative (generally significant) effect on vote shares. For the Social Democrat party (PSD), the point estimate is even higher (suggesting an impact of campaign spending on the the vote share of the mean PSD candidate of around 9pp).

The F-test of excluded instruments is only above 10 for the Socialist Party, however for the remaining parties the instrument is significant at the 5% level. It is important to notice that the amount of observations captured in this approach varies significantly across parties, which may affect the significance of the results for other parties aside from the Socialist Party. In Appendix D we provide more detailed tables per party, reporting the effects of our control variables.

The results of this specification can also be connected to our theoretical assumptions and findings. For the two biggest parties, own campaign spending *increases* vote shares and competitor's campaign spending reduces it (as stated in *Hypothesis 1*). For all parties, the expected statutory allowance seems to have a high impact on campaign spending decision (*Hypothesis 2*).

Finally, in this set-up it seems clear that bigger parties, with perhaps deeper pockets not only spend more, but are more able to spend in a way that it influences the vote shares. This shows that in fact the *tightness in the access to party funds*, k_j , to finance campaigning matters for spending decisions and spending efficiency, as stated in *Hypothesis 5*.

Combined, our two specifications seem to support the choice of our empirical strategy and to provide empirical support for our modelling assumptions and main theoretical prescriptions.

It is important to note that, given the nature of our identification strategy, we are capturing effects of campaign spending that could be seen as a lower bound of the overall effects. As we are instrumenting spending with the expected statutory allowance based on prior election results, our first stage captures mostly the spending levels that are necessary to keep the same vote share that was obtained in the last election (consolidation spending). In our set-up we are not targeting changes in campaign spending strategies that could make a runner-up of a former election become a winner of the current election, for instance. In such cases, campaign spending effects could be even higher.

7.3 Excluding flagship municipalities

An important robustness check for our results is to guarantee that our findings are not driven by a small subset of municipalities.

To that extent, we replicate Table 5 and Table 6 removing the 18 district capitals and the capitals of the Autonomous Regions. In reality, the electoral results in these municipalities are more visible at the national level and spending in such municipalities could be driven by non-local reasons. Removing these flagship municipalities could thus increase the confidence in our estimates.

Results associated with the winner and runner-up perspective are quantitatively similar, as shown in Table 7. In this case, the spending of the runner-up still appears to be more relevant in affecting both the vote share of the winner and of the runner-up (columns (1) to (4)).

	$vshare_TC_{winner}$		$vshare_T$	Crunner-up		win_margi	n	
	1^{st} Stage	2^{nd} Stage	1^{st} Stage	1^{st} Stage 2^{nd} Stage		1^{st} Stage	2^{nd} Stage	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
$cspending_{winner}$		0.058	0.010	-0.010			0.331	
		[0.039]	[0.087]	[0.015]			[0.371]	
ESA_{winner}	0.449^{***}				0.398^{***}	0.165		
	[0.126]				[0.132]	[0.133]		
$cspending_{runner-up}$	0.034	-0.041^{***}		0.140^{***}			-0.471	
-	[0.098]	[0.011]		[0.051]			[0.380]	
$ESA_{runner-up}$			0.461^{***}		0.315^{***}	0.431^{***}		
-			[0.090]		[0.116]	[0.093]		
$cspending_{mun}$	0.041	-0.031**	0.050	-0.027^{*}	0.018	0.059	0.014	
	[0.065]	[0.014]	[0.046]	[0.014]	[0.054]	[0.049]	[0.037]	
N	845	845	845	845	845	845	845	
R^2	0.291	0.283	0.196	0.093	0.318	0.206	-	
F	10.173	17.816	9.973	8.446	12.717	10.709	5.878	
р	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
F-test excl.	12.73	-	26.30	-	14.59	13.58	-	
р	0.000	-	0.000	-	0.000	0.000	-	

Table 7: Campaign spending effects: winner and runner-up (No flagship municipalities)

Campaign spending variables are measured in thousand euros (at 2010 prices), vote shares are between 0-100 and the winning margin is measured in percentage points. All regressions include fixed effects, time dummies and controls. Controls include the population level, a dummy variable equal to 1 if the incumbent is running for reelection, the number of terms that the mayor in power at the time of the election has been in power, as well as a variable that accounts for the number of candidates running for the election. We also include a dummy whenever the candidate is aligned with a party in the central government. Standard errors are robust and clustered at municipal level. * p < 0.10, ** p < 0.05, *** p < 0.01

When we use the winning margin as outcome variable, however, the significance of the results disappears upon excluding the flagship municipalities. Even so, the size and the sign of the coefficients remain.

Table 8 shows that the results for the individual party specification, excluding flagship municipalities, are very similar to our baseline specification. In that, the instrument seems to work even better, as the F-test of excluded instruments is above 10 for PCP and closer to 10 for PSD.

In this case, the campaign spending of PS, PSD and PCP have a positive effect on the vote share, while competitors' spending reduces the vote share. The magnitude of the effects is also very similar, if not higher.

	$vshare_TC_{PS}$ $vshare_TC_{PSD}$ vsh		vshare	TC_{CDS}	$vshare_TC_{PCP}$			
	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$cspending_{PS}$		0.102**						
ESA_{PS}	0.520^{***}	[0.048]						
$cspending_{PSD}$	[*****]			0.156^{*}				
ESA_{PSD}			0.574^{***} [0.187]					
$cspending_{CDS}$						0.084		
ESA_{PS}					0.205 [0.133]	[0.453]		
$cspending_{PCP}$								0.197^{*}
ESA_{PCP}							0.375^{***}	[0.108]
$cspending_{mun}$	0.100***	-0.055^{***}	0.055	-0.111^{***}	0.022	-0.015	0.026	-0.026***
	[0.037]	[0.013]	[0.043]	[0.023]	[0.033]	[0.015]	[0.020]	[0.009]
Ν	834	834	538	538	168	168	553	553
R^2	0.269	0.129	0.349	0.367	0.161	0.156	0.163	0.078
F	12.105	7.001	14.184	16.992	2.571	1.473	4.251	3.691
р	0.000	0.000	0.000	0.000	0.010	0.1760	0.000	0.000
F-test excl.	22.10	-	9.41	-	2.35	-	12.01	-
р	0.000	-	0.003	-	0.1302	-	0.000	-

Table 8: Campaign spending effects on vote shares, party level. (No flagship municipalities)

Campaign spending variables are measured in thousand euros (at 2010 prices), vote shares are between 0-100 and the winning margin is measured in percentage points. All regressions include fixed effects, time dummies and controls. Controls include the population level, a dummy variable equal to 1 if the incumbent is running for reelection, the number of terms that the mayor in power at the time of the election has been in power, as well as a variable that accounts for the number of candidates running for the election. We also include a dummy whenever the candidate is aligned with a party in the central government. Standard errors are robust and clustered at municipal level. * p < 0.10, ** p < 0.05, *** p < 0.01

The fact that our baseline results survive the exclusion of the municipalities where campaign spending may be driven by different factors, supports our main conclusions. On one hand, the instrument still captures the exogenous movement in campaign spending and on the other hand, it identifies a statistically significant effect of campaign spending to ensure the consolidation of vote shares across elections.

We also conducted an additional robustness check by excluding campaign spending outliers. Given the high variability of our data, these observations could be skewing our results. Removing mild and severe outliers does not change the baseline conclusions also.²⁵ As this robustness check is highly correlated with the one presented (high levels of spending typically occur in the most important municipalities), we chose to present the former.

²⁵We define outliers as observations that lie outside the following intervals. *i*) an observation is a mild outlier when $x_i \notin [Q_1 - 1.5(Q_3 - Q_1); Q_3 + 1.5(Q_3 - Q_1)]$ *ii*) an observation is a severe outlier when $x_i \notin [Q_1 - 3(Q_3 - Q_1); Q_3 + 3(Q_3 - Q_1)]$. In practice, we calculated the boundaries of these intervals for all spending variables and then re-estimated the equations removing all the observations outside these intervals.

8 Conclusion

This paper contributes to the literature on campaign spending in a context where public funds cover a substantial part of the total spent by the political candidates.

Our theoretical model is a stylised two-period probabilistic voting model, expanded to include the effects of campaign spending. In a two party world, we assume candidates chose campaign spending levels, while trying to take as much advantage as possible from the expected statutory allowance provided by the central government. We allow candidates to differ in terms of their *exante* popularity level and their access to private (party contribution) funds to finance campaign spending.

Campaign spending can be used to influence the average popularity of the candidates in a given municipality. We argue that spending increases exposure and thus affects positively the candidate's popularity. Differences in terms of *ex-ante* popularity and access to party contributions to fund campaigning lead to different equilibrium outcomes.

We then conduct an empirical exercise using a novel database that we construct based on the campaign spending reports submitted by candidates to the Portuguese Constitutional Court. Our database includes local campaign expenditures for all the parties running in the Portuguese local elections of 2005, 2009 and 2013, covering all the 308 Portuguese municipalities.

Our empirical exercise is grounded on the theoretical part in that we use the *expected statutory allowance* candidates think they might receive after the election as an instrumental variable for the campaign spending.

We perform the analysis from two perspectives. First, in the *winner and runner-up* perspective, we focus on the two biggest contenders for office and find that, while spending of the runner-up increases his vote share and decreases the winners' vote share, campaign spending of the winner seems to be less relevant, particularly when we control for incumbency advantage. In practice, for the average runner-up campaign spending accounts for around 8pp of his vote share.

Second, we focus on the spending patterns of *individual parties*, by evaluating the impacts of the campaign spending by the four biggest parties in Portugal. In this case, we find that campaign spending effects are more robust (and sizeable) for the two biggest parties. For the average

Socialist party candidate, for instance, campaign spending accounts for around 6pp of his vote share.

Our results are more robust for bigger parties and for the runner-up of the election and are robust to the exclusion of twenty flagship municipalities, where spending decisions could be driven by non-local factors.

Finally, we contribute to a nascent literature on the campaign spending effects on local elections. Most research so far has been done for general or state elections, both focusing on national and local level campaigning. To the best of our knowledge, except for Benoit and Marsh (2003) and Ben-bassat et al. (2015) there are no other local election studies available up to this point. However, the study of campaigning in local elections, provided that the information available is reliable, could enrich substantially the knowledge of campaign spending effects.

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Appendices

A Campaigning in Portugal

A.1 The rules of campaigning in local elections

Law 19/2003 establishes the baseline set-up that regulates campaign spending and funding in Portuguese elections, depending on the election type. In what follows we summarise the rules for local elections.

Campaign spending for local elections is limited, by a spending ceiling per municipality. This ceiling is defined according to the number of eligible voters in the municipality and is binding for every candidate/party running for office. The expenditure ceiling for each municipality is defined using the reference value for social subsidies (IAS), then multiplied by a positive constant, depending on the threshold for the specific municipality.²⁶

As shown in Table 9, municipalities are divided in four thresholds that depend directly on the amount of eligible voters and a fifth that includes the two most important cities in Portugal.²⁷

	Thresholds	Num.	Municip	palities	
Level	Criteria	Limit	2005	2009	2013
$\begin{array}{c} 1 \\ 2 \\ 3 \end{array}$	\leq 10 000 eligible voters > 10 000 and \leq 50 000 eligible voters > 50 000 and $<$ 100 000 eligible voters	150×IAS 300×IAS 450×IAS	$ \begin{array}{r} 118 \\ 150 \\ 21 \end{array} $	$114 \\ 146 \\ 25$	$113 \\ 145 \\ 26$
$\frac{4}{5}$	\geq 100 000 eligible voters Lisbon and Oporto	$900 \times IAS$ $1350 \times IAS$	$\frac{17}{2}$	$\frac{21}{2}$	$\frac{22}{2}$

Table 9: Spending Limits and number of municipalities per threshold.

Table 9 also includes the number of municipalities in our sample that are associated to each threshold. Albeit the distribution is fairly stable, the number of municipalities in levels three and four has been increasing, at the expense of the two bottom levels.

Spending limits within each threshold should evolve primarily due to the yearly updates of IAS, however subsequent legislation imposed additional restrictions during the period of our analysis.

²⁶IAS, *Indexante dos Apoios Sociais*, is defined every year by the central government and is used as a reference (minimum) value for social transfers and other public spending. For reference, the value for 2017 was \in 421.32.

²⁷Lisbon and Oporto are the two biggest and most important cities in Portugal. The corresponding municipalities, albeit not necessarily the ones with the highest number of eligible voters, have a higher spending limit.

For the 2005 election the reference value was, in practice, the minimum wage of $\in 374.70$, while for the 2009 and 2013 elections the minimum wage level for 2008, $\in 426$, was used. The total spending limit for each threshold level was reduced even further by the Law 1/2013, that imposed an additional cut of 20% for each level, with immediate effects on the 2013 election.

Table 10: Spending Limits per threshold level and year.

	S	pending Limi	ts
Level	2005	2009	2013
1 2	$\begin{array}{c} 61 \ 822.32 \\ 123 \ 644.65 \end{array}$	$\begin{array}{c} 64 \ 311.18 \\ 128 \ 622.36 \end{array}$	$50 \ 321.94 \\ 100 \ 643.88$
${3 \atop 4} 5$	$\begin{array}{c} 185 \ 466.97 \\ 370 \ 933.95 \\ 556 \ 400.92 \end{array}$	$\begin{array}{c} 192 \ 933.56 \\ 385 \ 867.13 \\ 578 \ 800.69 \end{array}$	$\begin{array}{c} 150 \ 965.81 \\ 301 \ 931.63 \\ 452 \ 897.44 \end{array}$

Values reported at constant prices (2010).

The spending limits in place in each election, for each threshold, are shown in Table 10. Overall, limits increased slightly from 2005 to 2009 and declined sharply in the 2013 election. Notice also that, by construction, the 20% cut penalized municipalities in the top levels to a larger extent, in absolute terms. In Lisbon and Oporto, for instance, the reduction amounted to ≤ 126 k.

Funding for elections is also heavily regulated. Allowed revenue streams are divided in four items: the public funding for the election, parties' contributions, donations and fundraisers. Donations and fundraising in cash are limited to $\in 25$ per donor, higher donations are allowed whenever the identity of the donor can be tracked (up to a limit of $\in 22$ 482, per donor).²⁸ Parties' can use their own funds in campaign spending, provided that the funds are allocated to spending in a particular municipality.

 $^{^{28}\}mathrm{Figures}$ report to the 2005 local election.

A.2 Candidates' reports on campaign spending and revenue

Figure 9: Revenue Report of Socialist party in municipality of Amadora (2013 election).



Local Election - 2013 Party: Socialist Party District: Lisbon Municipaliy: Amadora

	Value			
Revenue	Actual	Budget	Devition	
Statutory Allowance	195 076.04	153 275.65	-41 800.39	
Party Contribution	0.00	0.00	0.00	
Fundraisers and Donations	0.00	33 137.35	33 137.35	
Sub Total	195 076.04	186 413.00	-8 663.04	
Donations (in goods)	0.00			
Loans	0.00			
Total Revenue	195 076.04			

ACCOUNT – CAMPAIGN REVENUE

Figure 10: Expenditure report of Socialist party in municipality of Amadora (2013 election).



Local Election - 2013 Party: Socialist Party District: Lisbon Municipaliy: Amadora

ACCOUNT – CAMPAIGN EXPENDITURE

Demonditure		Value	
Expenditure	Actual	Budget	Deviation
Campaign design, marketing agencies e market	6 150.00	5 000.00	-1 150.00
Campaigning, written and digital communication	98 064.63	71 888.00	-26 176.63
Outdoors, Billboards and Banners	38 216.10	38 318.91	102.81
Political events, Rallies and Entertainment	6 691.67	57 505.00	50 813.33
Merchandise and other promotional items	1068.00	1 440.00	372.00
Administrative and Operational Costs	412.81	10 100.00	9 687.19
Others	37 464.59	2 161.09	-35 303.50
Sub Total	188 067.70	186 413.00	-1 654.70
Donations (in goods)	0.00		
Loans	0.00		
Total Expenditure	188 067.70		

B OLS estimation: Additional Tables

Table 11: OLS estimates, using spending by 4 biggest parties. (with controls)

	$vshare_{PS}$	$vshare_{PSD}$	$vshare_{CDS}$	$vshare_{PCP}$
	(1)	(2)	(3)	(4)
$cspending_{PS}$	0.083***			
	[0.015]			
$cspending_{PSD}$		0.090^{***}		
		[0.022]		
$cspending_{CDS}$			0.135^{**}	
			[0.061]	
$cspending_{PCP}$				0.057^{***}
	0.040			[0.020]
$cspending_{mun}$	-0.046***	-0.059***	-0.007	-0.016***
1	[0.007]	[0.019]	[0.006]	[0.004]
population	-0.000***	-0.000	0.000	0.000
	[0.000]	[0.000]	[0.000]	[0.000]
$D.inc_run$	0.300	1.108	-0.217	-1.255***
	[0.935]	[1.133]	[1.389]	[0.448]
num_terms	-0.424	0.575	-0.199	0.432
num candidates	[0.265]	[0.323] 0.505***	0.005	[0.145]
num_cunutuutes	-1.090	-2.323	-0.905	-0.230
L D alianed a a	[0.423] _1 111**	0.033	-0.376	-0.075
L.D.ungneu _{TC}	-1.111	[0 609]	-0.570	-0.075
	[0.504]	[0.003]	[0.431]	[0.201]
N_{\perp}	914	675	464	892
R^2	0.141	0.353	0.120	0.107
F	10.837	20.579	3.376	7.010
р	0.000	0.000	0.001	0.000

Campaign spending variables in thousands. All regressions include fixed effects, time dummies and controls. Robust and clustered standard errors at municipal level. * p<0.10, ** p<0.05, *** p<0.01

Table 12: Individual campaign spending effects, by party.

	$vshare_{PS}$	$vshare_{PSD}$	$vshare_{CDS}$	$vshare_{PCP}$
	(1)	(2)	(3)	(4)
$cspending_{PS}$	0.088***	-0.059***	-0.017	0.002
	[0.029]	[0.022]	[0.011]	[0.007]
$cspending_{PSD}$	-0.043^{*}	0.066^{***}	-0.010	-0.033**
	[0.023]	[0.023]	[0.010]	[0.013]
$cspending_{CDS}$	-0.116	-0.058	0.180^{***}	-0.004
	[0.072]	[0.087]	[0.062]	[0.015]
$cspending_{PCP}$	0.043	-0.089**	-0.024	0.089^{**}
	[0.047]	[0.043]	[0.019]	[0.044]
population	-0.000	0.000	0.000	0.000^{*}
	[0.000]	[0.000]	[0.000]	[0.000]
D.inc run	-2.719^{*}	3.537**	0.248	-0.646
—	[1.446]	[1.479]	[1.368]	[0.728]
num_terms	0.221	-0.211	-0.253	0.175
	[0.459]	[0.431]	[0.391]	[0.186]
$num_candidates$	-1.829^{*}	-1.923^{**}	-0.618	-0.614
_	[0.957]	[0.876]	[0.510]	[0.434]
$L.D.aligned_{TC}$	-0.411	1.778^{**}	-0.601*	0.271
	[0.877]	[0.877]	[0.355]	[0.375]
N	463	462	438	458
R^2	0.109	0.333	0.114	0.142
F	2.198	10.329	3.384	3.519
р	0.015	0.000	0.000	0.000

Campaign spending variables in thousands. All regressions include fixed effects, time dummies and controls. Robust and clustered standard errors at municipal level. * p<0.10, ** p<0.05, *** p<0.01

	$vshare_{winner}$	$vshare_{runner-up}$	win_margin
	(1)	(2)	(3)
$cspending_{winner}$	0.015	-0.005	0.020
	[0.011]	[0.009]	[0.016]
$cspending_{runner-up}$	-0.035^{***}	0.055^{***}	-0.090***
	[0.009]	[0.011]	[0.018]
$cspending_{mun}$	-0.021**	-0.017^{***}	-0.004
	[0.008]	[0.005]	[0.010]
population	0.000	-0.000	0.000
	[0.000]	[0.000]	[0.000]
D.inc run	3.870^{***}	-2.143***	6.012^{***}
_	[0.746]	[0.703]	[1.319]
num_terms	0.247	-0.430*	0.677
_	[0.223]	[0.222]	[0.415]
$num_candidates$	-2.201^{***}	-1.220***	-0.981^{*}
—	[0.359]	[0.316]	[0.592]
$L.D.aligned_{TC}$	0.370	-0.704*	1.074
	[0.423]	[0.401]	[0.748]
Ν	903	903	903
R^2	0.288	0.174	0.179
F	19.723	11.211	11.897
р	0.000	0.000	0.000

T 11 10 OT C	· · ·	•	1.	c	•	1		
Table 13 OLS	estimates	using 9	spending	OT.	winner	and	runner	11n
10010 10. 010	countaico,	using	sponding	OI	WIIIIOI	and	runner	up.

Campaign spending variables in thousands. All regressions include fixed effects, time dummies and controls. Robust and clustered standard errors at municipal level. * p < 0.10, ** p < 0.05, *** p < 0.01

C Expected Statutory Allowance

Table 14: Difference between vote shares for Town Council (TC) and Municipal Assembly (MA).

	Obs.	Mean	S.D.	Min.	Max.
$vshare_TC_{PS} - vshare_MA_{PS}$	$1 \ 209$	0.7	2.97	-7.8	21.6
$vshare_TC_{PSD} - vshare_MA_{PSD}$	939	0.96	2.93	-9.9	15
$vshare_TC_{CDS} - vshare_MA_{CDS}$	591	-0.58	1.74	-24.9	18.6
$vshare_TC_{PCP} - vshare_MA_{PCP}$	1 196	-0.64	1.72	-10.3	9.1

Table 15: Instrumental Variables: Expected Statutory Allowances.

	Obs	Mean	SD	Min	Max
	0.00.	mean	5.D.		man.
ESA_winner	924	$77 \ 742.85$	$47\ 108.66$	$13 \ 944.7$	$349\ 607.7$
$ESA_runnerup$	924	$60\ 278.93$	$40\ 187.8$	0	$346 \ 340.6$
ESA_PS	899	$65\ 019.36$	$40\ 700.3$	11 834.5	300 708.7
ESA_PSD	614	$63 \ 835.16$	36 305.95	$7\ 240.1$	259 519.6
ESA_CDS	239	25 575.93	$17 \ 115.66$	$5\ 684.2$	97 857.9
ESA_PCP	638	$34 \ 513.38$	$31\ 798.07$	$6\ 018.1$	$237 \ 355.4$

C.1 ESA for winner and runner-up: Assumptions

To compute the ESA in the winner and runner-up perspective we need assumptions that cover the following cases: i) if the winner/runner-up is part of a coalition today, but in the previous election he run by himself; ii) if the winner/runner-up runs alone, but was part of a coalition in the former election; iii) if the winner/runner-up is an independent candidate running for the first time.

If in election t two parties run in a coalition, while they run separately in t - 1, we argue that the coalition expects to gather in t the sum of the individual vote shares in t - 1. In the second case, that is if in election t two parties run separately, but in t - 1 they run in a coalition, we infer the relative importance of the coalition members in t - 1 based on the last election where they run separately. Finally, for independent candidates we assume, preferably, the average vote share of independent candidates in the same district.²⁹ Whenever this vote share is not available (or it is made only of one observation), we take the national average instead. In both cases, this averages provide a reasonable expectation of electoral success for independent candidates, in a set-up dominated by party-candidates. If the independent candidate was associated to party in the previous election, the lagged Municipal Assembly share assumed is the simple average between the measure of the expectation of independent candidates and the vote share of that party in the same period/municipality.³⁰

²⁹Portugal is divided in 18 mainland districts. Although districts are not administrative regions, they form the electoral constituencies based on which the seats in the national parliament are allocated in general elections. Hence, they are the most relevant subnational division (above municipalities) for electoral purposes.

³⁰This assumption reflects both the particularities of independent candidacies and the potential leverage that these candidates may have as a result of being part of party in the previous election. If, for instance, the independent candidate was elected in t-1 through the Socialist Party, then part of the political capital of the Socialist Party will in principle stick to the candidate when he runs independently. In fact, there are cases where the independent candidate in t is the incumbent mayor elected by a given party in the prior election. In such situations, it is clear that albeit losing the support of the party, this candidate will gather votes from some former partisan voters.

D IV Estimation: Additional Tables

	vshare_2	TC_{winner}	vshare_2	$vshare_TC_{winner}$ $vshare_TC_{winn}$		ΓC_{winner}	$vshare_{-}$	TC_{winner}
	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$cspending_{winner}$		0.144^{***}		0.144^{***}		0.092^{**}		0.029
TS_{winner}	0.678***	[0.001]	0.678***	[0.000]	0.570***	[0.041]	0.582^{***}	[0:020]
$cspsending_{mun}$	0.020	-0.032***	0.020	-0.032***	0.002	-0.035***	0.008	-0.026***
population	[0.043]	[0.011]	[0.043]	[0.011]	[0.042]	[0.008]	-0.000	0.000
$D.inc_run$							[0.001] 5.593**	[0.000] 3.864^{***}
num_terms							[2.572] -3.082***	[0.754] 0.261
$num_candidates$							[0.889] -3.946	[0.222] -2.064***
$L.D.aligned_TC$							[2.456] -0.370	[0.364] 0.234
							[1.725]	[0.414]
N D ²	914	914	914	914	914	914	914	914
R ²	0.224	-	0.224	-	0.249	0.076	0.274	0.284
F'	28.746	7.631	28.746	6.855	24.526	13.561	11.735	21.464
p	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000
F-test excluded	30.83	-	32.00	-	16.55	-	16.91	-
p	0.000	-	0.000	-	0.000	-	0.000	-
Fixed Effects	Y	es	Y	es	Y	es	Ŋ	(es
Clust. Std. Errors	Ν	No	Y	es	Y	es	J	es
Time dummies	Ν	Чo	Ν	lo	Y	es	Ŋ	les

Table 16: Effect of campaign spending of the winner.

Campaign spending variables in thousands. Vote shares in a scale of 0-100. * p < 0.10, ** p < 0.05, *** p < 0.01

Table 17:	Effect of	campaign	spending	of the	runner-up.
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	$vshare_TC_{runner-up}$		$vshare_T$	Crunner-up	$vshare_T$	Crunner-up	$vshare_T$	Crunner-up
	1^{st} Stage	2^{nd} Stage	1 st Stage	2^{nd} Stage	1 st Stage	2^{nd} Stage	1 st Stage	2^{nd} Stage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$cspending_{runner-up}$		0.127^{***}		0.127^{***}		0.144***		0.141***
$TS_{runner-up}$	0.583^{***} [0.097]	[0.030]	0.583^{***} [0.097]	[0.030]	0.507*** [0.105]	[0.040]	0.463^{***} [0.097]	[0.044]
$cspsending_{mun}$								
population							0.001^{**}	-0.000
D.inc run							[0.001] -3.708*	[0.000] -1.867***
num_terms							[2.162] -0.753	[0.718] -0.323
$num_candidates$							[0.730] -3.772*** [1.418]	[0.236] -0.899** [0.370]
$L.D.aligned_TC$							[1.410] 3.300^{*} [1.678]	-0.973^{**} [0.417]
N	912	912	912	912	912	912	912	912
R^2	0.160	0.024	0.160	0.024	0.183	-	0.218	0.062
F	22.271	9.216	22.271	9.122	19.950	6.682	13.765	10.651
р	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
F-test excluded	32.33	-	36.15	-	23.15	-	22.64	-
р	0.000	-	0.000	-	0.000	-	0.000	-
Fixed Effects	Ŋ	es	Ŋ	es	Ŋ	es	У	es
Clust. Std. Errors	1	No	У	es	7	es	У	es
Time dummies	1	Vо	1	Nо	7	es	У	es

Campaign spending variables in thousands. Vote shares in a scale of 0-100. * p < 0.10, ** p < 0.05, *** p < 0.01

	vshare	TC_{PS}	vshare	TC_{PS}	vshare	TC_{PS}	vshare	$_TC_{PS}$
	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$cspending_{PS}$		0.094***		0.094***		0.089***		0.082***
TS_{PS}	0.737***	[0.026]	0.737***	[0.026]	0.648***	[0.031]	0.600***	[0.031]
$cspsending_{mun}$	$[0.105] \\ 0.088^{**} \\ [0.036]$	-0.049^{***} [0.010]	$[0.105] \\ 0.088^{**} \\ [0.036]$	-0.049^{***} [0.010]	$[0.117] \\ 0.073^{**} \\ [0.036]$	-0.048 ^{***} [0.010]	[0.110] 0.086^{**} [0.036]	-0.047^{***} [0.009]
population							0.001	-0.000**
$D.inc_run$							0.284	0.613
num_terms							[2.163] -0.325	[0.921] -0.474*
$num_candidates$							[0.865] -4.458***	[0.262] -0.963**
$L.D.aligned_TC$							[1.324] -0.397 [1.425]	[0.434] -1.024** [0.507]
Ν	890	890	890	890	890	890	890	890
R^2	0.240	0.101	0.240	0.101	0.250	0.110	0.268	0.130
F	27.039	14.099	27.039	13.111	24.385	10.175	12.696	7.822
р	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
F-test excluded	52.31	-	49.29	-	30.55	-	29.64	-
p	0.000	-	0.000 -		0.000 -		0.000 -	
Fixed Effects	Y	es	Y	es	Yes		7	(es
Clust. Std. Errors Time dummies	N N	lo 10	Y N	es Io	Y Y	es	Z Z	í es les

Table 18: Effect of campaign spending of Socialist Party (PS)

Campaign spending variables in thousands. Vote shares in a scale of 0-100. * p < 0.10, ** p < 0.05, *** p < 0.01

	Table 1	19:	Effect	of	campaign	spending	of Social	Democrat	Party	(PSD)
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	vshare	TC_{PSD}	vshare	TC_{PSD}	vshare	TC_{PSD}	vshare	e_TC_{PSD}	
	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
$cspending_{PSD}$		0.375***		0.375***		0.225^{*}		0.188*	
TS_{PSD}	0.643***	[0.035]	0.643***	[0.104]	0.462**	[0.134]	0.483**	[0.110]	
$cspsending_{mun}$	0.110**	-0.134***	0.110**	-0.134***	0.092**	-0.129***	0.069	-0.112***	
population	[0.052]	[0.030]	[0.052]	[0.032]	[0.040]	[0.029]	-0.000	-0.000	
$D.inc_run$							2.718	0.964	
num_terms							[2.735] -2.055**	[1.233] 0.671*	
$num_candidates$							[0.934] 1.528	[0.375] -2.541***	
$L.D.aligned_TC$							[1.703] 2.412	[0.648] 0.681	
3.7	500	500	500	F 00	200	F 00	[1.786]	[0.714]	
N D ²	806	806	806	806	208	208	208	208	
<i>R</i> - F	0.228	-	0.228	-	0.312	0.257	0.330	0.353	
F	21.454	11.201	21.434	9.393	0.000	28.008	14.895	17.800	
F test excluded	32.57	•	28.85		5.43		6.42	•	
D	0.000	-	0.000	-	0.021	-	0.012		
Fixed Effects	Y	es	Yes		Yes		Ves		
Clust. Std. Errors	Ν	lo	Y	es	Y	es	Ŋ	les	
Time dummies	Ν	lo	Ν	lo	Y	es	Ŋ	les	

Campaign spending variables in thousands. Vote shares in a scale of 0-100. * p < 0.10, ** p < 0.05, *** p < 0.01

	$vshare_TC_{CDS}$		vshare	$vshare_TC_{CDS}$		$vshare_TC_{CDS}$		TC_{CDS}
	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$cspending_{CDS}$		-0.050		-0.050		0.012		-0.055
TS_{CDS}	0.436**	[0.130]	0.436**	[0.100]	0.470**	[0.105]	0.404^{**}	[0.211]
$cspsending_{mun}$	-0.043	-0.015	-0.043	-0.015	-0.035	-0.005	-0.034	-0.008
population	[0.047]	[0.010]	[0.047]	[0.009]	[0.048]	[0.010]	-0.001	0.000
$D.inc_run$							-4.391*	-0.848
num_terms							[2.236] -0.578	[2.885] -0.380
$num_candidates$							[0.824] -4.288	[0.606] -3.031*
$L.D.aligned_TC$							[3.385] 0.339	[1.735] -0.675
	100	100	100	100	100	100	[1.372]	[0.860]
N -2	188	188	188	188	188	188	188	188
<i>R</i> ²	0.107	-	0.107	-	0.113	0.030	0.243	0.069
F	3.656	1.276	3.656	1.309	1.959	0.968	4.220	1.762
p	0.029	0.283	0.029	0.276	0.105	•	0.000	
F-test excluded	6.02 0.016	-	6.47 0.013	-	6.75	-	6.57 0.012	-
Fixed Effects	Y	es	Y	Vor		Ves		les
Clust Std Errors	N	Jo	Ŷ	'es	Vos		1	les.
Time dummies	N	lo	N	lo	Ŷ	es	Y	les

Table 20: Effect of campaign spending of People's Party (CDS)

Campaign spending variables in thousands. Vote shares in a scale of 0-100. * p < 0.10, ** p < 0.05, *** p < 0.01

Table 21. Effect of campaign spending of Communist Larty (1 CL)

	vshare	TC_{PCP}	vshare	TC_{PCP}	vshare	TC_{PCP}	vshare	TC_{PCP}
	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage	1^{st} Stage	2^{nd} Stage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$cspending_{PCP}$		0.142		0.142		0.181*		0.157
TS_{PCP}	0.301***	[0.122]	0.301***	[0.111]	0.362***	[0.101]	0.356**	[0.100]
$cspsending_{mun}$	0.028	-0.023***	0.028	-0.023***	0.033	-0.025***	0.032	-0.022***
population	[0.020]	[0.008]	[0.020]	[0.008]	[0.020]	[0.009]	0.000	0.000
$D.inc_run$							[0.000] 1.094	-2.028***
num_terms							[1.658] -0.886**	[0.675] 0.700^{***}
$num_candidates$							[0.438] -0.930	[0.212] -0.073
$L.D.aligned_TC$							[0.890] 1.225	[0.355] -0.387
							[0.918]	[0.392]
N -2	604	604	604	604	604	604	604	604
R^2	0.097	0.003	0.097	0.003	0.105	-0.031	0.119	0.056
F'	7.981	6.554	7.981	0.011	4.936	6.347	4.030	4.331
P E tost svaludad	7.04	•	8.00	0.000	7 20	0.000	6.74	0.000
D	0.004	-	0.005	-	0.007	-	0.010	-
Fixed Effects	Y	es	Ves		Yes		Yes	
Clust. Std. Errors	N	lo	Ŷ	es	Ŷ	es	Ŋ	les
Time dummies	Ν	lo	ľ	lo	Y	es	Y	les

Campaign spending variables in thousands. Vote shares in a scale of 0-100. * p < 0.10, ** p < 0.05, *** p < 0.01