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# The petit effect of campaign spending on votes. Using political financing reforms to measure spending impacts in multiparty elections

Abel François\*      Michael Visser†      Lionel Wilner‡

January 5, 2023

## Abstract

This paper explores the relation between campaign spending and votes, in France, relying on political financing reforms as a quasi-natural experiment to assess if and how spending affects votes, for both incumbent and challenger candidates in multiparty legislative elections. The French reforms were adopted in the mid-1990s, modifying the fundraising rules in three important ways: (i) spending limits were reduced, (ii) legal entities no longer were allowed to fund candidates, and (iii) the maximal amount of candidates' personal campaign spending reimbursed by the State was raised. We study observations on two consecutive legislative elections, one before and one after the reforms. The difference in campaign expenses across elections turns out to be affected strongly by the reforms: candidates from the extreme parties (far-left and far-right) increased their expenditures substantially, while the candidates fielded by moderate parties reduced them considerably. Focusing on politicians running in both elections, we estimate the impact of spending using first-difference panel data methods and TSLS. Our instrumental variables for the difference in spending are constructed from the regulatory reforms. We find that spending by incumbents did not have statistically significant effects on their vote shares. Spending by challengers is statistically significant but the impact nevertheless is economically small.

Keywords: Campaign Spending; Elections; Political Financing Reforms.

JEL-codes: C23; D72.

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# 1 Introduction

The relationship between campaign spending and election outcomes always has been a hotly debated topic in both the media and the academic world. Press articles, radio programs and TV shows abound with stories about the huge amounts of campaign money collected by some political candidates, along with the presumed major impact of those large sums on electoral success. Social scientists have studied the subject over the past few decades extensively.<sup>1</sup> From the very beginning, the literature has acknowledged the fundamental issue in establishing a causal link between spending and votes, namely the problem that campaign money potentially is an endogenous variable in vote regression functions. Such endogeneity can be a consequence of simultaneity since the two variables are likely to be determined jointly: the number of votes received by candidates is a function of campaign spending, but spending itself plausibly depends on (expected) vote outcomes. Endogeneity also can arise if hidden characteristics of candidates and electoral districts determine both vote outcomes and spending levels, which results in a classical omitted-variable bias when standard empirical models are estimated.

Most studies have tried to circumvent the endogeneity concern by adopting an instrumental variable (IV) approach. [Jacobson \(1978\)](#), for instance, proposed to instrument challenger’s spending by challenger’s party and district party strength, and incumbent’s spending by a dummy variable indicating whether the incumbent ran in a primary election. [Gerber \(1998\)](#) relied instead on the wealth of candidates as an instrument for spending, [Stratmann \(2006\)](#) the cost of media advertisement, and [Rekkas \(2007\)](#) lagged campaign spending at the constituency level. [Foucault & François \(2005\)](#) and [Milligan & Rekkas \(2008\)](#) instrumented the endogenous variable by entering the spending limit in each constituency. Unfortunately, relatively little consensus has emerged from the extant studies. The IV-based literature has produced very different and conflicting empirical results, especially in a series of studies that allow spending effects to differ for incumbents and challengers. Depending on the specific choice of IVs, and on which of those two variables is assumed to be endogenous, some studies find that challenger spending matters but incumbent spending does not (e.g., [Jacobson \(1978\)](#)), while others either conclude that the return on campaign money is approximately equally effective for both types of candidates (e.g., [Green & Krasno \(1988\)](#)), or that spending actually is more effective for incumbents

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<sup>1</sup>The large majority of the relevant literature analyzes data from US elections to the House of Representatives or the Senate. See, for example, [Glantz et al. \(1976\)](#), [Jacobson \(1978\)](#), [Welch \(1981\)](#), [Abramowitz \(1988\)](#), [Abramowitz \(1991\)](#), [Levitt \(1994\)](#), [Erikson & Palfrey \(1998\)](#), and [Gerber \(1998\)](#). Some examples of studies based on elections outside the United States are [Rekkas \(2007\)](#) and [Milligan & Rekkas \(2008\)](#) (Canadian federal elections), [Pattie et al. \(1995\)](#) (British general elections), [Cox & Thies \(2000\)](#) (Japanese House elections), [Da Silveira & De Mello \(2011\)](#) (gubernatorial elections in Brazil), [Durante & Gutierrez \(2014\)](#) (Mexican presidential elections), [Palda & Palda \(1998\)](#), [Foucault & François \(2005\)](#), [Epstein & Franck \(2007\)](#), and [Farvaque et al. \(2020\)](#) (French National Assembly elections).

than for challengers (e.g., [Benoit & Marsh \(2008\)](#)). The IVs themselves likewise have been the subject of much criticism from other researchers (see, for example, the debate between [Green & Krasno \(1990\)](#) and [Jacobson \(1990\)](#)). All of the criticism has raised skepticism about the possibility of finding credible IVs and led some academics to call for alternative approaches. For instance, [Jacobson \(2006\)](#) argues that “it has become increasingly clear that progress on the question requires new research strategies... Despite more than 20 years of research, we still have plenty to learn.”

An alternative strategy for uncovering the causal effect of spending is proposed in a series of recent papers and consists in using field or natural experiments. [Da Silveira & De Mello \(2011\)](#) exploit a natural experiment to study the influence of TV advertising on elections of governors in Brazil. They obtain identification by relying on the fact that, in the first round of gubernatorial elections, candidates’ TV advertising shares are determined by their coalitions’ shares of seats in the national parliament (the two candidates who make it to the second round share TV advertising time equally). [Durante & Gutierrez \(2014\)](#) also make use of a natural experiment. They estimate the effect of TV and radio advertising on voting intentions during presidential elections in Mexico. The variation in voters’ exposures to political advertising is exogenous since the time of the day at which the campaign spots of different parties are aired is assigned randomly. [Gerber et al. \(2011\)](#) organized a field experiment designed to investigate the impact of political advertising on voting intentions in a gubernatorial election in Texas. The causal effects are identified therein because the launching dates and volumes of advertising in the different experimental markets are determined randomly.

The present paper belongs to that branch of the literature by exploiting a natural experiment: we rely on political campaign financing reforms to measure the impact of candidates’ campaign spending on votes in French legislative elections. We analyze data on two successive elections for the French National Assembly, the ones of 1993 and 1997, and take advantage of the reforms that were introduced in France between the two of them. The reforms were adopted following several highly publicized scandals in the 1980s involving a series of kickback schemes and excessive campaign contributions from the private sector. Three major changes were implemented. First, the spending limit was reduced in each electoral constituency. Second, legal persons (e.g. firms, corporations, unions, non-governmental organizations) no longer were allowed to finance the campaigns of political candidates. Third, to compensate for the disappearance of previous sources of funding, the maximal amount of candidates’ personal contributions reimbursable by the state was increased from 10% to 50% of the spending limit in each constituency.

Our empirical analysis adopts a three-step approach. First, we assess how the new regulations changed spending patterns between the 1993 and 1997 elections. As it turns out, candidates from the moderate left and moderate right clearly were hurt by the new laws, but the reforms favored those from the far-left and far-right. The second step consists

in estimating campaign spending effects in the context of the competition model introduced by [Berry \(1994\)](#). In his model, consumers select from a number of differentiated products and purchase the one that maximizes their utility (they also may decide not to purchase at all, i.e., choose the outside option). That model can be applied straightforwardly to an electoral setting by letting voters play the role of consumers, candidates the role of products, and electoral districts the role of markets. Given the distributional assumption on the error terms adopted by Berry, the resulting vote share of a candidate (the analogue of the product market share) divided by the share of the outside option (the fraction of registered individuals who abstain from voting for a candidate) depends only on characteristics of that candidate. Those analogues render a framework *à la* Berry well adapted to our setting because in France many candidates generally run at legislative elections (in our data around 10 candidates on average compete in the first round,<sup>2</sup> in contrast to most US elections that have been studied in the literature and which typically are two-candidate contests). [Rekkas \(2007\)](#) was the first to adopt such framework to analyze the determinants of election outcomes. She applied it in an analysis of a single election: the 1997 Canadian federal elections. We will adopt the same framework to study two successive elections, focusing primarily on estimating a first-difference transformation of the model.

In the same spirit as [Levitt \(1994\)](#) who studies US House elections in which the same two candidates competed with one another on multiple occasions, statistical inference is based on the subsample of candidates who ran in the first rounds of both elections. Our first-difference (FD hereafter) estimation results indicate that spending has a statistically significant effect only for challengers, not for incumbents. The impact for challengers is, however, economically speaking quite small. For instance, by adding FFr 10,000 to a campaign spending, a representative challenger (with around 5.5% of the vote share) can increase his vote share by just 0.07 of a percentage point, and a strong candidate (30% of the vote share) by 0.28 of a percentage point. Another way to interpret the small effect for challengers is to calculate how much they need to spend to compensate for not being an incumbent. Using our estimate of the incumbency effect, we find that a challenger needs to have a campaign budget of about FFr 200,000 to offset that disadvantage, roughly three times what they spend on average.

Finally, our third step considers IV estimation of the transformed vote model. IV estimation appears to be required because a standard endogeneity test indicates that the difference in spending of incumbents and challengers is endogenous. Such endogeneity can be explained as follows. While the reforms of the mid-1990s clearly are associated with observed changes in campaign spending across the two elections, they cannot explain *all* of the variation. Unobserved factors responsible for the remaining variation also potentially

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<sup>2</sup>As detailed in the next section, French legislative elections are conducted in two rounds. Most of our empirical results are based on first-round outcomes, but in a section devoted to robustness checks we also analyze second-round ones.

can affect changes in candidates' election prospects between 1993 and 1997, resulting in a violation of the mean-independence assumption. To account for the endogeneity problem, we thus estimate the parameters of our transformed vote model using IV.<sup>3</sup> Unlike the studies summarized above –in which IVs primarily are based on characteristics of candidates or constituencies– we construct our instrumental variables using the variation in spending differences induced by the reforms. More precisely, the spending differences for both incumbents and challengers is instrumented using three IVs, each of them corresponding to one of the regulatory modifications.

We could construct the instruments since our data record not only the amount of money spent by each candidate (required to define the first IV), but also, quite unusually, the sources of campaign funding (required to define the last two ones). We present and discuss TSLS estimates for combinations of our IVs that pass the usual battery of diagnostic tests (of underidentification, overidentification, and weak instruments). Applying the IV method leads in most cases to even smaller estimates of spending effects, although the impact for challengers remains statistically significant. Put differently, we confirm with the IV method the absence of a spending impact for incumbents, and we observe a slightly smaller but significant impact for challengers. In addition to our main empirical findings, the online appendix presents several robustness checks. In particular, we report estimation results for alternative definitions of campaign spending (spending per voter and per square kilometre), and estimates based on the second round of both legislative elections.

To the best of our knowledge, [Hall \(2016\)](#) is the only paper that explicitly uses modifications in campaign financing laws as a way of identifying the spending effect. He exploits the variation across US states over time in both the implementation and withdrawal of campaign contribution bans on corporations, a restriction that is reminiscent of the second legal reform introduced in France. He considers a model relating the Democratic Party's vote share in the lower or upper chamber of a state, to the total amount of money spent by all Democratic candidates. That ratio is instrumented by a variable indicating the introduction of a ban on corporation contributions in the state. Hall's study differs from ours in that his analysis is at the level of the state, not at the more disaggregated level of the candidate. Furthermore, unlike Hall, we have multiple instrumental variables at our disposal since we construct IVs based on France's two other legal reforms as well.<sup>4</sup>

Our paper also is related to a literature studying the effects of legal reforms on electoral outcomes. [Stratmann \(2006\)](#) relies on cross-state variation in limits on campaign

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<sup>3</sup>We thereby also address a concern raised by [Da Silveira & De Mello \(2011\)](#), who criticized the Levitt approach arguing that the source of variation in the spending difference across elections is not clear in his case, and that the exogeneity assumption therefore may be questionable.

<sup>4</sup>While [Bekkouche et al. \(2020\)](#) analyze French legislative and UK general elections (over a long period), they adopt at some point our second IV (measured differently) to instrument the spending differences between 1993 and 1997. Like [Hall \(2016\)](#), they rely on a single IV, and unlike us they therefore do not exploit the full range of regulatory reforms in their IV-based strategy.

contributions from individuals and tests whether spending by state House candidates is more effective when they face contribution limits. Klumpp et al. (2016) and Abdul-Razzak et al. (2018) both explore the effects of *Citizens United v. FEC*, a ruling issued by the US Supreme Court in 2010 stating that then current restrictions on independent political campaign expenditures (by corporations or labor unions) implemented by some American states were unconstitutional. Those papers show that lifting restrictions on so-called outside spending led to an increase in Republican election probabilities in state House races. Note that while the literature studies how changes in campaign financing laws affect vote outcomes, it does not explicitly exploit legal reforms to determine the causal effects of campaign spending.

Finally, our study is connected to a series of papers investigating how changes in campaign financing laws influence other types of electoral outcomes. Stratmann & Aparicio-Castillo (2006) examine whether contribution limits have affected the number of candidates in a race. Barber (2016) analyzes how limits on campaign contributions affect the ideologies of office-holding legislators. Avis et al. (2017) take advantage of a reform in Brazil that imposed limits on campaign spending for mayoral elections and find that those limits strengthened political competition. Other scholars have examined the impact of campaign finance regulations on voter participation, political efficacy, and lobby formation (see the survey by Stratmann (2005)).

The remainder of the paper is organized as follows. Section 2 gives institutional background information about legislative elections in France, its campaign financing laws, and the reforms introduced between 1993 and 1997. Section 3 describes the data; Section 4 shows how the reforms affected difference in spending levels across time. In Section 5 we present our model of voting behavior and the resulting vote estimating equations. Section 6 is devoted to the empirical results; Section 7 concludes.

## 2 Institutional background

### 2.1 Legislative elections in France

The representatives of the French National Assembly (the lower House of the bicameral parliament of France) are elected by direct universal suffrage.<sup>5</sup> France is divided into separate electoral constituencies, and the candidates standing for election in a given constituency compete for one Assembly seat. Since 1986 until today, 577 constituencies have been created and their precise geographical boundaries have changed only once, in 2009. Hence, for the legislative elections studied herein, the ones of 1993 and 1997, the constituencies are geographically fully identical. Out of the 577 constituencies, 555 are situated in metropolitan

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<sup>5</sup>This section partly draws on information obtained from the French National Assembly's website: <http://www.assemblee-nationale.fr/english>.

France and 22 in France’s overseas territories.

Elections are conducted on a two-round plurality voting rule. To be elected in the first round, a candidate must receive more than 50% of the regular votes (i.e., all votes except those invalidated by the electoral authorities or blank votes), and be supported by more than 25% of the registered voters in the constituency. If no candidate is elected in that manner, a second-round vote is held. Each candidate favored by more than 12.5% of the registered voters is allowed to run in the second round, held one week after the first round. If no candidate is supported by more than 12.5% of the registered votes, the two candidates with the largest numbers of votes go through to the second round. If just one candidate exceeds the 12.5% threshold, then that candidate and the second-ranked candidate go through. The winner of the second round is the candidate who receives the most regular votes.

The legislative election of 1993 was held on March 21st (first round) and March 28th (second round), near the end of François Mitterrand’s presidency. The election of 1997 was held on May 25th and June 1st, following the dissolution of the National Assembly by President Jacques Chirac (that early election was held one year before the planned end of the Assembly’s mandate). Both elections were dominated by the same five parties. Listed from the far-left to the far-right, the names of those parties are: *Parti Communiste* (henceforth abbreviated as PC), *Parti Socialiste* (PS), *Union pour la Démocratie Française* (UDF), *Rassemblement pour la République* (RPR), and *Front National* (FN). Table A1 in the online appendix reports for both elections the first-round scores at the national level obtained by each of the five main parties, along with the number of representatives elected to the National Assembly. The socialist party PS was beaten severely in 1993, managing to win only 57 seats out of 577. The communist party PC won 23 seats in that election, and the far-right party FN no seat at all. The winners were the two moderate-right parties, UDF and RPR, who obtained 215 and 257 seats, respectively. In 1997, PC won 35 seats, PS 255, UDF 112, RPR 139, and FN 1. The total number of parliamentary seats filled by the five main parties was 552 in 1993, and 542 in 1997.

## 2.2 Political financing system

### 2.2.1 Laws of the 1980s and 1990s

Prior to 1988, no precise legal regime was in place to regulate and monitor the financing of political life in France. A series of laws were passed in the late 1980s and the 1990s following public outrage (and a lot of press coverage) over several politico-financial scandals concerning abusive campaign funding in the mid 1980s. The laws were intended to increase the transparency of political financing and to promote equal access to the political process. The laws were introduced successively in a series of legislative statutes, each new text gradually tightening and restricting campaign financing rules. The most relevant laws for



our paper are the ones adopted in 1988, 1990, and especially in 1993 and 1995.

The laws of 11 March 1988 and 16 January 1990 laid down the first foundations of the current political financing system. They first of all introduced limits on campaign spending. Candidates for legislative elections could no longer spend unlimited amounts; expenses were instead bound by precise limits. The spending limits were fixed by adopting a simple step function for constituency populations (as measured by the latest census). Second, the new laws determined precisely what kinds of campaign expenses were allowed and which ones not. Television and radio advertising were banned at all times and, in the three months prior to a legislative election, telephone and press advertising also were forbidden. A variety of basic campaign expenses were covered automatically by the State: it printed the ballots used on Election Day, sent to all registered voters the candidates' political pamphlets, and displayed posters with photos of candidates in the vicinity of voting centers. Other expenses, such as setting up meetings, receptions, telephone and press advertising, traveling, payment of staff, as well as the printing and distribution of additional pamphlets, were to be paid for by the candidates themselves. Third, all candidates were required to appoint a financial representative. The representatives were in charge of collecting funds and paying all campaign expenses through unique bank accounts. The *Commission Nationale des Comptes de Campagne et du Financement des Partis Politiques* (CNCCFP), a newly created regulatory body, was charged with controlling and verifying those bank accounts, and making campaign spending information for all candidates publicly available. Fourth, the legislators introduced a reimbursement scheme for candidates' personal campaign expenditures. Candidates whose accounts were approved by CNCCFP, and who in addition received at least 5% of the first-round votes, were eligible for reimbursement by the state of personal expenses up to 10% of the spending limit. Finally, the laws of 1988 and 1990 established how political parties were financed by the state.<sup>6</sup>

At the heart of the present paper are the laws adopted on 29 January 1993 and 19 January 1995, since they mark a sharp distinction between the campaign finance rules prevailing during the 1993 election, on the one hand, and the 1997 election on the other. Even if the law of 1993 was passed a few months before the legislative election of 1993 (recall that that election was held on 21 and 28 March), it applied only to the following election of 1997 (and the elections thereafter). The first change introduced was that spending limits no longer were a step-function of constituency-population but a continuous affine function of it (see *infra*). The second change was that legal persons (i.e., firms, corporations, unions, political committees or associations with economic interests) no longer were allowed to

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<sup>6</sup>A first fraction of aid was allocated to parties that fielded candidates in at least 75 constituencies in the most recent elections to the National Assembly. A second fraction was paid to parties whose candidates actually were elected (financing being proportional to the precise number of elected candidates).

finance candidates.<sup>7</sup> To compensate for the loss of funding, the legislator introduced a third change: the maximal reimbursement of personal campaign expenses was raised from 10% of the spending limit of 1993 to 50% of the spending limit of 1997; the eligibility conditions for state reimbursement remained unchanged throughout our sample.

## 2.2.2 Modifications between the elections of 1993 and 1997

The series of laws summarized above imply the following modifications in campaign financing rules between the two elections:

- Modification 1: *Spending limit.*

In 1993, candidates standing for election in a constituency with fewer than 80,000 inhabitants (as counted by the 1990 census) were not allowed to spend more than FFr 400,000; the expenditures of candidates in constituencies with more than 80,000 inhabitants could not exceed FFr500,000.<sup>8</sup> In 1997, each spending limit was determined as an affine function of population (again as measured by the 1990 census).<sup>9</sup> More precisely, within constituency  $c$ , the 1997 spending limit in French Francs was

$$Limit_{c,97} = (250,000 + population_c) \times 1.05 \text{ FFr} \quad (1)$$

where the term after the multiplication operator is a cost-of-living adjustment.

- Modification 2: *Funding by legal persons.*

In 1993, candidates were allowed to finance their own campaigns in four ways: personal wealth; donations from natural persons (i.e., individual voters); donations from parties; and donations from legal entities (e.g. firms, corporations). In 1997, legal entities no longer were allowed to finance candidates, i.e., the fourth channel was eliminated.

- Modification 3: *Public reimbursement of personal expenditures.*

In 1993, the part of campaign expenditures financed by candidates themselves could be reimbursed by the state up to 10% of the spending limit applicable in 1993. In 1997, the maximal reimbursable amount of personal expenditures was increased to 50% of the spending limit applicable in 1997.

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<sup>7</sup>Legal entities also were no longer allowed to finance political parties, which resulted in smaller party budgets. Before the financing reforms of 1993 and 1995 were implemented, contributions from legal entities amounted on average to 15% of political parties' budgets; see [François & Sauger \(2006\)](#).

<sup>8</sup>On January 1, 2002, the French Franc was replaced by the Euro at the conversion rate 1 Euro = FFr 6.55957.

<sup>9</sup>In both elections, population is defined according to the same census because the first census after 1990 was conducted only in 1999.

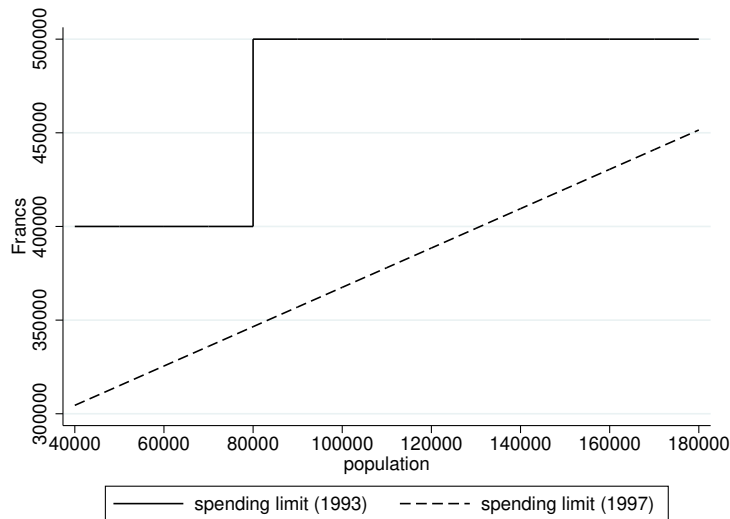


Figure 1: Spending limits in 1993 and 1997

The first modification is illustrated in Figure 1. For the relevant range of populations (according to the 1990 census, the number of inhabitants across the 555 constituencies of metropolitan France varied between 35,000 and 165,000—see Table A2 in the online appendix), the limit function for 1997 always is below the one for 1993. The difference between the two functions implies that the reduction in the spending limit varied across constituencies, between FFr 50,000 and FFr 150,000.<sup>10</sup>

The second modification was the most discussed law reform. It had strong consequences because legal entities contributed generously to election campaigns prior to the reform. They donated FFr 210 million to the approximately 5,000 candidates standing for election in 1993. Those contributions represented the primary source of financing for candidates, representing, on average, 35% of their campaign budgets (François & Sauger, 2006). As shown in Sections 3 and 4, the reform especially affected candidates with *a priori* close business connections (incumbents, mayors, government members, and candidates from parties of the moderate left and moderate right).

The third modification made the reimbursement scheme for candidates’ personal contributions more generous by raising the maximal reimbursable amount by the state from 10% of the spending limit in 1993 to 50% of the spending limit in 1997.<sup>11</sup> Since the spend-

<sup>10</sup>The discontinuity in the 1993 limit function at 80,000 unfortunately cannot be exploited in our analysis of the relationship between campaign spending and votes since only 5.2% of the constituencies have populations below that threshold. See Avis et al. (2017) who adopt a Regression Discontinuity (RD) design strategy to analyze the impact of spending limits on candidate entry and electoral competition using a discontinuity in the limit function imposed on candidates standing for municipal elections in Brazil.

<sup>11</sup>The reimbursement scheme of 1997 is more generous since 50% of the 1997 limit exceeds 10% of the 1993 limit for all population sizes (and, hence, for all constituencies).

ing limits differ across constituencies, the maximal reimbursable amounts –respectively  $Limit_{c,93}/10$  for 1993 and  $Limit_{c,97}/2$  for 1997–, vary across constituencies as well. The eligibility conditions for reimbursement of personal expenses remained the same in the two elections we study: only candidates whose accounts accorded with CNCCFP criteria, and who passed the 5% hurdle of first-round votes, potentially could be reimbursed.

## 3 Data

### 3.1 Data sources

Our dataset is constructed by combining information from four sources. The different sources could be linked by unique identifiers for each constituency and by the candidates’ names. The first source reports outcomes of legislative elections in France, collected by the French Internal Affairs Ministry, and is publicly available on its website.<sup>12</sup> For each election and constituency we observe the number of individuals who registered to vote,<sup>13</sup> the numbers of actual voters in the first and second round, the family names and first names of all candidates, whether they are challengers or incumbents, the numbers of votes received by the candidates in both rounds, and their party affiliations.

The second source contains data on campaign spending and the candidates’ different campaign funding sources. These data have been collected by the CNCCFP since the election of 1993. For the elections of 1993 and 1997, the information is available only in paper format, so we had to digitize the datasets ourselves. Thanks to that source, we observe, for each candidate and election, the total amount of campaign spending, along with candidates’ various types of campaign funding.

Our third source provides information on the populations of all constituencies. These data are drawn from the population census of 1990, collected by the *Institut National de la Statistique et des Études Économiques* (Insee). We extracted from the census the number of inhabitants for each constituency, which, as explained in Section 2.2, determines the campaign expenditure limits in both elections.

The fourth source contains additional information on candidates that we found in election supplements published by the French newspaper *Le Monde* (right after each legislative election), and several issues of *Le Guide du Pouvoir*, a document that contains up-to-date biographical information on France’s leading persons in both the private and public sectors. The newspaper supplements indicate whether, at the time of the election, candidates were the mayor or deputy mayor of a city or town, a member of the National Senate (the upper house of Parliament), a member of the current national cabinet (we distinguish senior

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<sup>12</sup><http://www.interieur.gouv.fr/Elections/Les-resultats>.

<sup>13</sup>Registration is for both rounds of the election. The number of registered voters in the two rounds may differ slightly because of people turning 18 (the minimum voting age in France) or dying between the rounds.

members, called *ministres* in French, from junior members, called *secrétaires d'Etat*), a former member of the National Assembly,<sup>14</sup> and whether or not they held an elected office at a local level: we observe whether a candidate was seated in a regional council (as an ordinary member, or vice-president, or president), departmental council (as an ordinary member, vice-president, or president), or municipal council.<sup>15</sup> From the issues of *Le Guide du Pouvoir* we know whether candidates occupied a position in their party's national governing body. All of the variables that we collected from the fourth source capture whether candidates belonged to an elite group of people with strong political networks and connections. Members of that group are, as we will see in Section 4, privileged in the sense that they received much more funding from parties, individual donors, and legal persons, than other candidates.

In the remainder of the paper we restrict our analysis to the 555 constituencies located in metropolitan France. We drop the 22 overseas constituencies from the analysis because the voting patterns and campaign spending profiles there tend to differ from what is observed in metropolitan France.<sup>16</sup> Furthermore, we focus primarily on the first round of each legislative election. The reason for that choice is that candidates in the first round come from *all* parties, whereas in the second round we typically observe candidates only from the moderate-left (PS) and moderate-right (RPR, UDF). Second round data therefore do not enable us to study candidates of the two extreme parties (FN, PC) and of the small parties adequately. In the online appendix, however, we incorporate second-round outcomes to check for the robustness of our main results.

### 3.2 Descriptive statistics

Table 1 reports, for each election and type of candidate, the number of first-round competitors. Overall, 5,138 candidates ran in 1993, and 6,197 in 1997.<sup>17</sup> François & Phélippeau (2018) attribute that increase to the laws on state financing of parties passed in 1988 and 1990 (see Section 2.2), which made it financially attractive for parties to field more candidates. After the introduction of the new laws, the number of candidates not only increased between the elections of 1988 and 1993, but also between 1993 and 1997. Table 1 shows

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<sup>14</sup>A candidate is defined as a former representative if he/she was elected two or more elections ago. Incumbents therefore are not automatically former representatives since they are elected in the previous election, and not necessarily in an election prior to the previous one.

<sup>15</sup>At the time of the elections of 1993 and 1997, metropolitan France contained 22 regions, 96 departments, and approximately 36,000 municipalities. Each region, department or municipality was headed and managed by an elected local assembly (called councils) and an executive body appointed by its assembly.

<sup>16</sup>Voting patterns differ because candidates in overseas constituencies are affiliated less frequently with national parties, and the political issues that are debated even more typically are local ones. Spending profiles are not the same mainly because some campaign financing rules differ slightly for overseas candidates.

<sup>17</sup>We had to drop 11 candidates from the 1997 election because of missing observations on campaign spending (initially, 6,208 candidates contested elections in metropolitan France in 1997).

Table 1: Characteristics of first-round candidates

	1993	1997
Challenger	4,676 (91%)	5,718 (92%)
Incumbent	462 (9%)	479 (8%)
Local elected office:		
Member of Municipal Council	631 (12%)	581 (9%)
Deputy Mayor	261 (5%)	213 (3%)
Mayor	725 (14%)	709 (11%)
Member of Departmental Council (DC)	574 (11%)	473 (8%)
VP or President of DC	26 (0.5%)	25 (0.4%)
Member of Regional Council (RC)	614 (12%)	431 (7%)
VP or President of RC	12 (0.2%)	10 (0.2%)
Former member of Assembly	130 (3%)	141 (2%)
Member of Senate	5 (0.1%)	8 (0.1%)
Senior member of national cabinet	21 (0.4%)	21 (0.3%)
Junior member of national cabinet	11 (0.2%)	3 (0.05%)
Political party leadership	432 (8%)	334 (5%)
Party affiliation:		
FN	554 (11%)	553 (9%)
PC	555 (11%)	531 (9%)
PS	522 (10%)	479 (8%)
RPR	303 (6%)	289 (5%)
UDF	293 (6%)	265 (4%)
Small party	2,911 (57%)	4,080 (66%)
Total	5,138	6,197

Notes: Entries give the number of candidates of each type in the first round of the two legislative elections. Figures in parentheses correspond to the percentages of the total number of candidates. VP stands for Vice-President. Sources: Internal Affairs Ministry; election supplements of *Le Monde*; *Le Guide du Pouvoir*.

that the small parties<sup>18</sup> primarily are responsible for that phenomenon: while the total number of candidates fielded by the five main parties together (FN, PC, PS, RPR, and UDF) is fairly stable across the two elections (around 2,150), the small ones expanded their pools of candidates from about 2,900 in 1993 to 4,100 in 1997. The number of incumbents has risen slightly (from 462 in 1993 to 479 in 1997), and the numbers of other types of *a priori* strong and influential candidates has declined moderately. While the number of constituencies in which an incumbent ran is large, a potential concern is that the decision of an incumbent to be a candidate is related to unobserved determinants of vote shares. In the online appendix, we provide both factual and statistical evidence (based on comparisons of constituencies with and without incumbents along a number of characteristics) suggesting that that concern is not a major one.

Table A2 in the online appendix contains summary statistics on the population per constituency as measured by the census of 1990, and the spending limits per constituency in 1993 and 1997. Those statistics are based on the 555 constituencies in metropolitan France. On average, constituencies comprise around 100,000 inhabitants, with a minimum of 35,000 and a maximum of 165,000. In 1993, the average spending limit per constituency was about FFr 495,000 and in 1997 was around FFr 370,000, a drop of 125,000 French Francs, resulting from the first law modification discussed above.

Table 2 reports summary statistics on campaign spending per candidate and the sources of campaign contributions, separately for challengers, incumbents, and the two elections. All 1997 amounts are converted into 1993 French Francs using Insee’s consumption price index. In 1993, a challenger spent on average roughly FFr 80,000 and an incumbent spent FFr 313,000. In 1997, both types of candidates reduced their campaign expenses to, respectively, FFr 57,000 and FFr 231,000.<sup>19</sup> In 1993, legal entities donated on average approximately FFr 21,000 to a challenger, and more than six times more to an incumbent (FFr 136,000).<sup>20</sup> The second modification of the campaign financing law thus clearly affected incumbents more than challengers. In 1993, the personal contributions of challengers and incumbents are comparable, but during the 1997 campaign the former spent much less than the latter. Incumbents increased their personal contributions substantially following the introduction of the more generous public reimbursement scheme since they

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<sup>18</sup>We call all parties other than the five main ones (FN, PC, PS, RPR, and UDF) “small”. In both elections more than 15 small parties participated, representing the full political spectrum from the extreme left to the extreme right.

<sup>19</sup>By comparison, in the US House elections between 1972 and 1990, incumbents spent \$293,000 and challengers \$136,000 (see Levitt (1994)); in the Canadian federal elections of 1997 and 2000, incumbents spent \$52,520 and challengers \$17,516 (see Milligan & Rekkas (2008)). It therefore appears that campaign expenditures in France are less than in the United States, but comparable to Canada.

<sup>20</sup>The reported means are based on *all* challengers and incumbents, including those who did not receive any money from legal persons. Among the 1,232 challengers who did get aid from legal entities (26% of the 4,676 challengers running in 1993), the average amount received was FFr 81,556; similarly, among the 400 incumbents who received donations (87% of 462), the average amount was FFr 157,629.

Table 2: Campaign spending and sources of campaign contributions (FFr)

	1993	1997
	Mean (sd)	Mean (sd)
Campaign spending:		
Challenger	82,832 (110,638)	60,675 (85,966)
Incumbent	313,301 (109,041)	246,512 (68,381)
Donations from legal persons:		
Challenger	21,488 (62,128)	Prohibited
Incumbent	136,476 (121,539)	
Personal contributions from candidates:		
Challenger	25,376 (33,636)	46,643 (68,964)
Incumbent	31,471 (39,491)	111,378 (61,174)
Contributions from parties:		
Challenger	23,688 (48,233)	4,460 (17,217)
Incumbent	97,715 (94,987)	76,041 (53,831)
Donations from voters:		
Challenger	9,282 (21,073)	5,263 (18,669)
Incumbent	36,907 (42,518)	36,681 (40,836)
Other sources:		
Challenger	2,562 (9,197)	449 (2,581)
Incumbent	10,156 (24,318)	6,703 (12,741)

Notes: Main entries are means and figures in parentheses are standard deviations. Statistics are based on the number of observations listed in Table 1. All monetary amounts of 1997 are converted into French Francs of 1993. Data on donations from legal persons are not available in 1997, since funding from legal persons was forbidden in this election. Source: CNCCFP.

safely could expect their first-round scores to exceed 5%. On the other hand, many challengers (especially those from the small parties) could not expect with much confidence to pass that threshold, and it consequently was too risky for them to spend more personally. Contributions from parties constitute an important source of funding in the election of 1993. In 1997, parties were less generous primarily because of their tighter budgets (see footnote 7). The average amount donated by individual voters remains stable over time for incumbents, but a drop for challengers in 1997 is observed (the new challengers observed in 1997 primarily were affiliated with the small parties and those candidates received few donations from voters). Finally, we see that the other funding sources clearly constitute the least important form of campaign finance in both election years.

Table 3 reports statistics on a variety of first-round election outcomes. The average number of candidates per constituency increased from around 9 in 1993 to 11 in 1997. The number of registered voters, the number of regular voters, and turnout, on average changed little across the two elections. As in Section 5, a candidate's vote share is defined as the number of votes received by the candidate divided by the number of individuals who registered to vote. The statistics on the Herfindahl-Hirschman index, and the gap in vote shares between the first-round winner and the runner-up suggest that competition among candidates has strengthened somewhat. The average vote share of challengers fell



Table 3: First-round election outcomes

	1993	1997
	Mean (sd)	Mean (sd)
Number of candidates per constituency	9.3 (2.2)	11.2 (3.5)
Number of registered voters per constituency	68,243 (11,148)	68,483 (12,069)
Number of voters per constituency	47,285 (8,790)	46,940 (9,486)
Turnout rate per constituency	0.691 (0.039)	0.683 (0.043)
HHI of vote share concentration	1,063 (334)	971 (223)
Vote share challenger	0.055 (0.061)	0.045 (0.058)
Vote share incumbent	0.227 (0.089)	0.213 (0.053)
Vote share gap (first candidate minus second)	0.114 (0.088)	0.056 (0.048)

Notes: Main entries are means and figures in parentheses are standard deviations. Statistics on vote shares of challengers and incumbents are based on the number of observations listed in Table 1. Statistics on all other variables are calculated over the 555 metropolitan constituencies. The Herfindahl-Hirschman index (HHI) is the sum of the squares of votes shares of all candidates in a constituency, multiplied by 10,000. Source: French Internal Affairs Ministry.

slightly from 5.5% in 1993 to 4.5% in 1997, a mechanistic consequence of the larger cohort size observed in 1997. Average vote shares for incumbents have also declined modestly, from 23% in 1993 to 21% in 1997. Overall, Table 3 suggests that the aggregate first-round election outcomes changed little between the two elections.

## 4 Impact of the reforms on campaign spending and funding

This section analyzes the determinants of campaign spending and we show in particular how the financing reforms of the mid-1990s affected the changes observed in spending over time. It is convenient to introduce some notation. The scalar variable  $s_{jct}$  represents the amount of money spent by candidate  $j$  in district  $c$  during the election campaign of year  $t$ . The vector  $X_{jct}$  contains the candidates' characteristics (the variables listed in Table 1) which may affect spending in a given district and election. Furthermore,  $s_{jct}^{firms}$  is the total funding received by candidate  $j$  from legal persons,<sup>21</sup>  $s_{jct}^{personal}$  the personal contribution of the candidate,  $s_{jct}^{party}$  the donation received from the party to which  $c$  belongs,  $s_{jct}^{voters}$  the donations from voters, and  $s_{jct}^{other}$  the 'other sources' (see Table 2). Since campaign spending is the sum of those different sources of contributions, we have  $s_{jct} = s_{jct}^{firms} + s_{jct}^{personal} + s_{jct}^{party} + s_{jct}^{voters} + s_{jct}^{other}$ .<sup>22</sup> Note that  $s_{jct97}^{firms} = 0$  for all  $j$  and  $c$ , since legal entities were forbidden to contribute in the 1997 election. Finally,  $\Delta$  represents

<sup>21</sup>Most legal entities in the data actually are business firms (see François & Sauger (2006)), and therefore that source of campaign funding is labelled 'firms'.

<sup>22</sup>For a fraction of candidates in our sample, the sum of contributions exceeds campaign spending, which can occur, for instance, if candidates receive unanticipated donations from voters or firms towards the end of the campaign. As explained in the Appendix, we truncated the contributions received by such candidates so that their sum is equal to  $s$ .

the first-difference operator, so that  $\Delta s_{jc} = s_{jc97} - s_{jc93}$ , etc.

## 4.1 Overview

Column 1 (resp. column 2) in Table A3 of the online appendix reports the OLS estimates from the regression of  $s_{jc93}$  on  $X_{jc93}$  (resp.  $s_{jc97}$  on  $X_{jc97}$ ) together with standard errors clustered at the district level. Estimation is based here on all participants in the 1993 election (resp. 1997 election). In both cross-sections, incumbents, (deputy) mayors, former members of the National Assembly, current members of the Senate, candidates who held a local elected office (except vice-presidents and presidents of the regional and departmental councils), and candidates who occupied a position in their party’s governing body, spent (statistically significantly) more money than politicians without such influential positions. All party dummies are positive and significant, implying that candidates from the five main parties spent more than those from the small parties (the omitted category).

Column 3 reports the results of the OLS regression of  $\Delta s_{jc}$  on  $X_{jc93}$ . That specification is based on all candidates who competed in both elections in the same constituency, and enables us to identify politicians who changed their expenditures between the two elections. The most remarkable finding concerns the party dummies. Relative to the small parties, FN and PC candidates increased their expenses dramatically, while those from the moderate parties spent less. Put differently, candidates from the two extreme parties raised their campaign spending substantially in comparison with mainstream candidates. The estimated effects of the party indicators reported in column 3 tend to be larger (in absolute values) than the effects of the other variables (which, in addition, often are not statistically significant). Also, the  $R^2$  hardly changes when the other variables are dropped from the model. We conclude from that evidence that party affiliation is key in explaining the variation in  $\Delta s$ . In the remainder of this section, we therefore will examine the differences in spending separately for each party, and document how the campaign financing reforms vary with the candidate’s political color.

## 4.2 Effects for far-right candidates

As Table A4 in the online appendix shows, not a single FN candidate spent more on campaign in 1993 than the spending limit of 1997, i.e., no observations lie between the two spending limit functions in Figure 1. The first modification of the campaign financing rules therefore had no impact on candidates from the far-right. Implicitly, we are assuming here that, in the absence of the reforms, candidates would have spent roughly the same amounts in both elections. Table A5 in the online appendix indicates that only around 11% of the 249 FN candidates active in both elections were supported financially by legal persons and, on average, they received just around FFfr1,700 from firms. For the vast majority of the FN candidates, the second modification did not have an effect either (assuming that firms would

have given similar amounts had the reforms not been implemented). The differences in their personal expenditures are, however, substantial: on average,  $\Delta s_{jc}^{personal}$  equals slightly more than FFr107,000. Looking at the upper-left plot in Figure A1 (in the online appendix), we see that in both elections the personal contributions of most FN candidates are close to the maximal reimbursable amounts: 10% of the 1993 spending limit, and 50% of the 1997 limit. At the same time, in both elections they received little support from voters and their party,<sup>23</sup> and the differences  $\Delta s_{jc}^{voters}$  and  $\Delta s_{jc}^{party}$  are negligible. Putting all such findings together, we deduce that, for many FN candidates,  $\Delta s_{jc} \simeq \Delta s_{jc}^{personal} \simeq Limit_{c,97}/2 - Limit_{c,93}/10$ , suggesting that the third modification did influence their spending evolutions. That conclusion is confirmed by the results of a regression of  $\Delta s_{jc}$  on a constant,  $X_{jc93}$ ,  $s_{jc93}^{firms}$ , and  $\max(0, Limit_{c,97}/2 - s_{jc93}^{personal})$ , reported in column 1 of Table 4. The last two variables are intended to capture the effects of the second and third legal modifications on campaign spending changes between 1993 and 1997.<sup>24</sup> The estimate of the slope coefficient corresponding to the third modification is statistically significant and positive, implying that a larger potential increase in reimbursable personal contributions (relative to 1993) is associated with a larger increase in spending across elections. The contribution of firms in 1993 also is significant and the parameter estimate is negative: more generous help from firms is associated with a stronger reduction in spending by FN candidates between 1993 and 1997.

### 4.3 Effects for far-left candidates

Table A4 in the online appendix shows that 2.5% of PC candidates running in 1993 spent more in that election than the spending cap of 1997. On average, the amount in excess of the 1997 limit is FFr1,384 (the average is calculated over all candidates of 1993 – for each candidate whose spending is below the cap, the amount is fixed to zero). For those candidates running in both elections, the spending figures are slightly higher. Clearly, the first reform had an impact only on a small fraction of communist candidates. The second reform did have a strong effect, though: almost 30% of PC candidates contesting in both elections received money from firms, and the average donation was around FFr24,000 (see Table A5 in the online appendix).

PC candidates have, like those of FN, increased their personal campaign spending considerably across the two elections (on average by about FFr76,000). Unlike the far-right politicians, however, candidates' personal contributions are now frequently far below the maximal reimbursable amounts (see the top-middle plot in Figure A1 in the online

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<sup>23</sup>Leaders of the far-right quickly understood the incentive nature of the public reimbursement scheme, and urged FN candidates to self-finance their campaigns and not to rely on help from the party.

<sup>24</sup>In Section 6.2,  $\max(0, Limit_{c,97}/2 - s_{jc93}^{personal})$  will be relied on as an instrumental variable to capture the differences in spending across elections; it has the advantage (relative to  $Limit_{c,97}/2 - Limit_{c,93}/10$ ) of varying across candidates in the same electoral constituency.

Table 4: Effect of reforms on difference in spending according to candidates party

	FN	PC	PS, RPR, UDF	Small party	All
Spending above 1997-limit		-0.715 ** (0.302)	-1.110 *** (0.098)	-0.442 ** (0.195)	-1.031 *** (0.069)
Contribution firms in 1993	-1.653 *** (0.253)	-0.595 *** (0.072)	-0.333 *** (0.033)	-0.561 *** (0.057)	-0.370 *** (0.023)
Pers. contr. below 1997-limit/2	0.774 *** (0.112)	-0.347 ** (0.140)	0.368 *** (0.089)	0.394 *** (0.062)	0.305 *** (0.048)
Constant	622 (14,887)	92,746 *** (22,023 )	-69,807 *** (15,079 )	-84,884 *** (10,907)	-67,972 *** (8,392 )
Observations	249	242	623	530	1,644
$R^2$	0.332	0.542	0.487	0.463	0.705

Notes: The table lists the results of OLS regressions of  $\Delta s_{jc}$  on a constant,  $\max(s_{jc93} - \text{Limit}_{c,97}, 0)$ ,  $s_{jc93}^{firms}$ ,  $\max(\text{Limit}_{c,97}/2 - s_{jc93}^{personal}, 0)$ , and the control variables  $X_{jc93}$  as detailed in Table A3. Regressions are based on candidates present in both elections, and are performed separately for those of FN (far-right), PC (far-left), the three moderate parties (PS -main party of the left-, RPR, UDF -main parties of the right), the small parties, and for all candidates together. The first regressor is not included for FN candidates since it always equals zero for them. Main entries are the estimates and in parentheses are the standard errors. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

appendix). Estimating the same kind of regression as above (except that we now have added to the model a variable reflecting the first campaign financing reform, namely  $\max(s_{jc93} - \text{Limit}_{c,97}, 0)$ ), we see that the variable capturing the third modification is significant but has a negative effect. Although PC candidates thus have increased their personal expenditures, the third rule change has an unanticipated effect in the sense that an increase in the reimbursable amount *reduces* spending across elections. The variables associated with the first and the second campaign-law reforms also are statistically significant and their coefficients take, as expected, negative signs.

#### 4.4 Effects for moderate and small parties' candidates

The candidates of the moderate left (PS) and moderate right (UDF, RPR) can be studied together because their spending profiles  $\Delta s$  are comparable. The first reform influenced them much more so than candidates of the extreme left and extreme right. As indicated in Table A4, 26% of PS candidates running in both elections spent more in 1993 than the 1997 spending limit. For RPR and UDF candidates, the fractions are 31.7% and 37%, respectively. The average amount in excess of the limit ranges between FFr17,000 for PS to FFr28,000 for RPR. The second modification had a strong impact as well. As shown in Table A5 in Appendix, the fraction of recipients (resp. the average amount received from firms per candidate) ranges from 81% for PS (FFr121,000 on average) to 93% for RPR (FFr141,000). Firms thus financed the vast majority of those candidates, and donated substantial amounts of money. The politicians of the moderate parties also benefited from the third legal reform since their personal contributions increased on average by about FFr88,000. As Figure A1 shows, many of them spent well below or well above the maximal reimbursable amounts. Pooling the observations of the three parties together, the third law reform variable has, however, a significant and positive effect on  $\Delta s_{jc}$  (see column 3

of Table 4). The other two reform variables likewise are significant and take the expected signs.

Finally, let us look at the candidates of small parties. The first reform had a small impact since only 4% of those candidates active in both elections spent above the limit of 1997 (Table A4 in Appendix). As Table A5 shows, the second reform had a stronger effect because around 18% of candidates received financial help from firms (with an average donation of FFr16,000). Many politicians abstained from spending their own monies in the two election campaigns (see Figure A1), most likely because for large numbers of them the 5% threshold was out of reach. The difference in personal expenditures across the two elections consequently also is small. Column 4 of Table 4 shows, however, that the variable capturing the third campaign finance reform has a statistically significant and positive effect on  $\Delta s_{jc}$ . Our two other reform variables likewise are significant and, again, have a negative effect.

## 4.5 Implications

One takeaway from the material in this section is that the campaign finance reforms introduced between 1993 and 1997 clearly are associated with the observed changes in campaign spending across those two elections. Indeed, the results reported in Table 4 show that all reform variables are statistically significant and produce the expected effects on  $\Delta s$  in practically all regressions discussed thus far. Those conclusions are confirmed by column 5 of Table 4, which reports the estimates of the same regression model but based on all candidates pooled together: the reform variables again are significant and all estimated coefficients take the expected signs. Note that the last results correspond to the model estimates presented in column 3 of Table A3 in the online appendix, except that the regression equation now includes the reform variables. We see that the  $R^2$  increases from 0.495 (column 3 of Table A3) to 0.705 (column 5 of Table 4), so that these electoral reform variables turn out to be strong determinants of  $\Delta s$ . The effects of reform also turn out to be heterogeneous across the political spectrum. Candidates representing the far-left and the far-right benefited from the rule changes (they were able to raise more money thanks to the more generous public reimbursement scheme),<sup>25</sup> while those from the parties of the center were harmed (in particular because the new laws prohibited legal entities from financing candidates). The heterogeneous reform effects identified fit with the predictions of a simple framework based on a contest success function (e.g., Epstein (2000)) wherein candidates determine their campaign expenditures by taking into account the decisions made by their opponents. In such a framework, any change in campaign finance regulations modifies the equilibrium. If the regulation reduces the relative advantages of the strongest candidates (as a consequence of a new or a more generous reimbursement policy), the best strategy of

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<sup>25</sup>The finding aligns with the cross-country investigations led by (Bichay, 2020).

the weakest candidates is to spend more on their campaigns.

Another takeaway is that the legal changes of the mid-1990s cannot explain *all* observed variations in spending. That implication is in particular revealed by Figure A1 which clearly shows that the maximal reimbursable limits are non-binding for many candidates. Similarly, as shown in Table A4, the spending ceilings often are non-binding as well. Finally, only a fraction of candidates received financial help from legal entities in the election of 1993 (Table A5). Other unobserved determinants of  $\Delta s$  are at work, and those hidden variables may affect the difference in votes at the same time. Hence, we cannot rule out that in an equation relating differences in votes to differences in spending, the latter variable potentially is endogenous. To avoid a bias resulting from such endogeneity, Section 5 discusses how an IV-based strategy can be implemented. We will argue there why our reform indicators can be seen as plausible IVs for the difference in spending, and then test formally for their validity as instruments in Section 6.

## 5 Vote model and estimation methods

This section presents our vote equations, i.e., the equations relating shares of votes obtained by candidates to their amounts of campaign spending and a set of control variables. The different estimation strategies that we employ also are discussed here. We adopt a model *à la* Berry (1994), a typical framework from the IO literature, designed originally to estimate demands for differentiated goods. As argued in the introduction, a strong analogy exists between a differentiated goods market and an electoral setting. Given that analogy, it thus is natural to apply Berry’s (1994) framework in studying elections featuring multiple candidates.

Let  $M_{ct}$  denote the number of individuals who registered to vote for the election held in year  $t$  and constituency  $c$ . That variable corresponds to market size in Berry’s setup. Unlike many product markets, the advantage of an election setting is that  $M_{ct}$  is measured precisely and defined. Each registered individual  $i$  chooses between  $N_{ct}$  candidates indexed by  $j$ . The utility obtained by  $i$  when voting for candidate  $j$  is assumed to be:

$$U_{ijct} = \delta_{jct} + \epsilon_{ijct} = \beta s_{jct} + \gamma X_{jct} + \alpha_{ct} + \mu_{jc} + \xi_{jct} + \epsilon_{ijct}, \quad (2)$$

where  $\delta_{jct}$  is the “mean utility level” of candidate  $j$ , and  $\epsilon_{ijct}$  is an idiosyncratic error term affecting the utility of choice  $j$ . Mean utility will be parameterized as the sum of four components:

- $\mu_{jc}$  is the unobserved popularity of candidate  $j$  in constituency  $c$ . Note that the term is not indexed by  $t$ . It thus is assumed to capture the combined impact of unobserved popularity determinants that do not change over time (e.g., gender, education level, personality traits of the candidate).

- $\xi_{jct}$  is an unobserved local demand shock affecting candidate  $j$  in constituency  $c$  at time  $t$ . Unlike the component  $\mu_{jc}$ ,  $\xi_{jct}$  accounts for the impact of unobserved popularity determinants that vary over time. It may, for instance, indicate whether the candidate was involved in a scandal prior to the election, or capture the candidate’s campaign promises.
- $\beta s_{jct} + \gamma X_{jct}$  is an index of covariates that may enhance or degrade popularity. Here,  $s_{jct}$  and  $X_{jct}$  represent, as above, campaign spending by candidate  $j$  and the vector of other variables characterizing that candidate, respectively. The latter are assumed to be independent of the unobserved error terms  $\mu_{jc}$  and  $\xi_{jct}$ . In our empirical application,  $s_{jct}$  will be interacted with a dummy indicating whether a candidate is an incumbent and a dummy indicating whether he/she is a challenger, allowing the impact of campaign spending to differ for those two groups of politicians. For notational simplicity, the candidate’s status is not expressed formally in equation (2).
- $\alpha_{ct}$  is a constituency and election specific fixed effect, which accounts for any conjunctural and contextual factor affecting district  $c$  and election  $t$  (e.g., rate of unemployment, level of local taxes, quantity and quality of local public decisions).

When  $i$  abstains from voting for one of the candidates (because  $i$  casts a blank vote or an invalid vote, or because the voter does not show up at the polling station), utility is

$$U_{i0ct} = \delta_{0ct} + \epsilon_{i0ct} = 0 + \epsilon_{i0ct}, \quad (3)$$

where  $\epsilon_{i0ct}$  is the idiosyncratic error term affecting the utility of voter  $i$  when opting for the outside option;  $\delta_{0ct}$  has been normalized to zero for identification purposes.

Under the assumption that idiosyncratic error terms are i.i.d. (across all voters and choices) and follow the extreme value distribution, we have

$$v_{jct} = \frac{e^{\beta s_{jct} + \gamma X_{jct} + \alpha_{ct} + \mu_{jc} + \xi_{jct}}}{1 + \sum_{k=1}^{N_{ct}} e^{\beta s_{kct} + \gamma X_{kct} + \alpha_{ct} + \mu_{kc} + \xi_{kct}}}, \text{ for } j = 1, \dots, N_{ct}, \quad (4)$$

and

$$v_{0ct} = \frac{1}{1 + \sum_{k=1}^{N_{ct}} e^{\beta s_{kct} + \gamma X_{kct} + \alpha_{ct} + \mu_{kc} + \xi_{kct}}}. \quad (5)$$

Here,  $v_{jct}$  is the vote share of candidate  $j$ , i.e., the number of votes received by  $j$  divided by market size  $M_{ct}$ , and  $v_{0ct}$  the share of registered individuals not voting for any candidate, i.e.,  $v_{0ct} = 1 - \sum_{j=1}^{N_{ct}} v_{jct}$ . Share  $v_{0ct}$  thus is the sum of the abstention rate in constituency  $c$  at election  $t$  (one minus the turnout rate in the district) and of the fraction of individuals opting for “blank votes”.

In equation (4),  $v_{jct}$  depends not only on determinants of the vote for candidate  $j$ , but also on the determinants of voting for all opponents. Taking the logarithm of the ratio of



vote share to the share of the outside option enables the elimination of the determinants of all opponents' votes:

$$\log v_{jct} - \log v_{0ct} = \beta s_{jct} + \gamma X_{jct} + \alpha_{ct} + \mu_{jc} + \xi_{jct}. \quad (6)$$

The parameters  $\beta$ ,  $\gamma$ , and  $\alpha_{ct}$  can be estimated by applying OLS to equation (6) using observations on candidates competing in election  $t$ , or relying on pooled data for all candidates from both elections combined. The error term in the regression equation (6),  $\mu_{jc} + \xi_{jct}$ , potentially is correlated with campaign spending  $s_{jct}$ . Spending can be correlated with  $\mu_{jc}$  because, for instance, charismatic candidates can receive more money from their party or from voters. A correlation between  $s_{jct}$  and  $\xi_{jct}$  also may arise because, for instance, candidates implicated in scandals can face more difficulties in raising money, or because promises of new policies attract more funding from voters' receiving targeted benefits. If spending indeed is correlated with the error term, both the cross-sectional and pooled OLS estimates will be biased.

The bias originating from a correlation between  $s_{jct}$  and  $\mu_{jc}$  can be circumvented by applying a first-difference (FD) transformation to model (6):

$$\Delta \log v_{jc} - \Delta \log v_{0c} = \beta \Delta s_{jc} + \gamma \Delta X_{jc} + \Delta \alpha_c + \Delta \xi_{jc}, \quad (7)$$

and then estimating the parameters  $\beta$ ,  $\gamma$ , and  $\Delta \alpha_c$  by OLS. The FD estimator is based on data on the set of candidates competing in the same constituency in both elections. Since  $\mu_{jc}$  has disappeared from the FD model, estimates are unbiased even when the unobserved term and  $s_{jct}$  are correlated. The only requirement for unbiasedness now is that the difference in error terms  $\Delta \xi_{jc}$  satisfies the zero conditional mean assumption:  $E(\Delta \xi_{jc} | \Delta X_{jc}, \Delta s_{jc}) = 0$ .

To see why mean independence with respect to our explanatory variable may be a restrictive assumption, we shall now rewrite our model by eliminating the incumbency indicator from the vector  $X$  and by indicating explicitly that spending  $s$  actually is interacted with challenger and incumbency indicators. Transformed model (7) becomes

$$\begin{aligned} \Delta \log v_{jc} - \Delta \log v_{0c} = & \beta_1 \Delta(s_{jc} \times inc_{jc}) + \beta_2 \Delta(s_{jc} \times chal_{jc}) + \gamma_1 \Delta inc_{jc} \\ & + \gamma_2 \Delta X_{jc} + \Delta \alpha_c + \Delta \xi_{jc}, \end{aligned} \quad (8)$$

where  $\Delta(s_{jc} \times inc_{jc}) = s_{jc97} \times inc_{jc97} - s_{jc93} \times inc_{jc93}$ , and  $inc_{jct} = 1$  if candidate  $j$  is an incumbent in constituency  $c$  and year  $t$ , and 0 otherwise. The second term in (8) and the indicator  $chal_{jct}$  are defined analogously, and  $\Delta X_{jc}$  still stands for the difference in the vector of characteristics between the two elections.

The first two terms in (8) potentially are correlated with  $\Delta \xi_{jc}$  because, as shown in Section 4, changes in campaign spending are influenced only partially by the relevant cam-



campaign financing reforms.<sup>26</sup> Consequently, we cannot rule out the possibility that candidates choose  $\Delta s_{jc}$  partly in an endogenous manner. For example, candidates who manage to improve their prospects of victory by introducing new and appealing political promises may benefit from larger increases (or smaller decreases) in campaign finance money. Similarly, politicians involved in a scandal between the two elections reduce their chances of success in the second one and also will find it harder to attract funds from voters or their parties. As a solution, we propose to adopt our three reform variables, defined in the previous section, as instruments for  $\Delta(s \times inc)$  and  $\Delta(s \times chal)$ , namely  $z_{1jc} = \max(s_{jc93} - Limit_{c,97}, 0)$ ,  $z_{2jc} = s_{jc93}^{firms}$ , and  $z_{3jc} = \max(Limit_{c,97}/2 - s_{jc93}^{Perso}, 0)$ .

The instruments are valid if they are uncorrelated with the error term  $\Delta\xi_{jc}$ . Reasons can be found for believing that that may be the case insofar as  $z_{1jc}$  and  $z_{3jc}$  are defined partially by the number of inhabitants in constituency  $c$  – through the spending limit prevailing in 1997 – a variable that is *a priori* unrelated to the error term. The two instruments likewise are defined by  $s_{jc93}$  and  $s_{jc93}^{Perso}$ . Because those variables measure spending and personal contribution in 1993, we believe that they are unrelated to  $\Delta\xi_{jc}$  too. Regarding our instrument  $z_{2jc}$ , it is defined as the amount of money given by firms to  $j$  for the 1993 election. The decision to donate most likely depends only on the candidate’s (expected) success in 1993, that is, characteristics  $X_{jc93}$  and unobserved determinants of votes  $\mu_{jc}$  and  $\xi_{jc93}$ . No reason exists for thinking that the generosity of firms in 1993 is related to a shift in unobserved popularity across the two elections, as captured by  $\Delta\xi_{jc}$ . Our intuition is confirmed in the next section because the Sargan-Hansen test of over-identifying restrictions supports the validity of those instruments (together with some other IVs defined just below).

Another source of endogeneity may be associated with the variable  $\Delta inc_{jc}$ . While it may seem credible to assume that  $\xi_{jc97}$  is uncorrelated with both  $inc_{jc93}$  and  $inc_{jc97}$  (no correlation between a demand shock in 1997 and current and past incumbency indicators), and, moreover, that  $\xi_{jc93}$  is uncorrelated with  $inc_{jc93}$  (similarly, no correlation with a shock in 1993 and incumbency status in 1993),  $\xi_{jc93}$  likely affects  $inc_{97}$ : a candidate whose unobserved time-varying vote determinants are such that his/her vote share in 1993 is for some reason large, has a high chance of winning that election and running as an incumbent in 1997. Such effects would invalidate the strict exogeneity assumption on  $inc_{jct}$ , which in turn would imply that  $\Delta inc_{jc}$  and  $\Delta\xi_{jc}$  are correlated. A common solution to this problem (see for example Wooldridge (2002), chapter 11) is to instrument  $\Delta inc_{jc}$  by  $inc_{jc93}$ .

Altogether, our full set of excluded instruments contains the following variables:  $z_{1jc}$ ,  $z_{2jc}$ , and  $z_{3jc}$ ; these three IVs interacted with  $inc_{jc93}$ ; and the indicator  $inc_{jc93}$  itself. In Section 6.2 we will present TSLS (Two Stage Least Squares) results for several combinations

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<sup>26</sup>Admittedly, the foregoing conclusions are drawn from a regression of  $\Delta s$  on  $\Delta X$  and the campaign finance reform variables. The conclusions nevertheless remain similar when we instead regress  $\Delta(s \times inc)$  and  $\Delta(s \times chal)$  separately on the same set of explanatory variables.

of these instruments. The first stage amounts to regressing each of the three endogenous variables appearing in (8), that is to say  $\Delta(s_{jc} \times inc_{jc})$ ,  $\Delta(s_{jc} \times chal_{jc})$ , and  $\Delta inc_{jc}$ , on  $\Delta X_{jc}$ , constituency-specific fixed effects, and the combination of instrumental variables. The second stage consists in estimating model (8) after replacing endogenous variables by their first-stage predictions.

## 6 Campaign spending and election outcomes

### 6.1 OLS and FD results

Column 1 of Table 5 reports the estimation results of model (6), for the 1993 election, based on candidates active in both elections. Reported are the OLS estimates of  $\beta$  and  $\gamma$  together with standard errors clustered at the constituency level. We allow the effect of spending to differ for challengers and incumbents. The variable interacting campaign spending with the dummy for challengers is positive and significant (at the 1% level). Campaign spending interacted with an indicator for incumbents is, however, not significant. The amount of money spent during the 1993 campaign thus matters only for challengers. The point estimate of the coefficient on challenger spending, 0.365, can be used to compute the marginal effect of campaign spending. The latter is given by  $\frac{\partial v}{\partial s} = \beta v(1 - v)$ , where  $v$  is the vote share and  $\beta$  the coefficient associated with spending. The marginal effect increases with the candidate’s vote share for  $v \leq 0.5$  and is maximal at  $v = 0.5$  (the observed vote share is below 0.5 for the vast majority of candidates except for those elected in the first round). Given that the impact of spending varies with the vote share, we calculate the marginal effect for a “representative” candidate and a “strong” one. We find that (i) the average representative challenger whose vote share is about 0.055 (see Table 3), and who increases spending by FFr10,000 ( $\Delta s = 0.1$  since spending is measured in hundred thousands of French Francs) can expect his/her vote share to increase by  $\Delta v = 0.365 \times 0.055 \times (1 - 0.055) \times 0.1 = 0.19$  percentage point, and (ii) a strong challenger with a vote share of 30% who also increases spending by FFr10,000 can expect his/her vote share to increase by  $\Delta v = 0.365 \times 0.3 \times (1 - 0.3) \times 0.1 = 0.77$  percentage point. For both types of challengers the spending effect thus is quite modest.

Column 1 also shows a significant increase in the vote shares of incumbents and candidates occupying a seat on a municipal, departmental, or regional council. Strong premiums are observed for mayors and for deputy mayors as well. Surprisingly, we find no effect for vice-presidents or presidents of departmental or regional councils, but this may be due to the relatively small number of such candidates in the estimation sample. Vote shares are not significantly different from zero for former members of the Assembly, members of the Senate, national cabinet members, and candidates occupying positions in their party’s national governing body. The five party indicators are significant, though, confirming that

candidates from the five main parties not surprisingly receive more votes than those from the smaller parties.

Column 2 of Table 5 reports the results for the 1997 election, again based on the sample of candidates running in both elections. As for 1993, spending is significant for challengers but not for incumbents. The estimated effect for challengers now is 0.710. That estimate implies that by adding FFr10,000 to campaign spending, a strong challenger can raise her vote share by 1.5 percentage points, while the average challenger can improve it by 0.37 percentage point. The significances and magnitudes of the coefficients associated with our control variables sometimes differ from those estimated for 1993, but the implications of the point estimates are roughly the same for both elections.

Column 3 contains the estimation results for model (8), again using the sample of candidates active in both elections.<sup>27</sup> We report FD estimates of  $\beta_1$ ,  $\beta_2$ ,  $\gamma_1$ , and  $\gamma_2$ , together with standard errors clustered at the district level. The five party indicators are omitted from the regression owing to too little variation across time to estimate their effects with sufficient precision. Campaign spending by incumbents is, as in the cross-sectional setting, insignificant both in statistical and economic senses. Challenger spending remains significant at the 1% level, but the effect is now smaller relative to the cross-section estimates reported in columns 1 and 2: the FD estimate of  $\beta_2$  is 0.133, suggesting that the estimates that do not control for unobserved candidate characteristics  $\mu_{jc}$  are biased upwards. The FD estimate implies that spending an extra FFr10,000 adds only 0.07 percentage point to the vote share for a representative challenger, and 0.28 percentage point for a strong one. Another way of interpreting the point estimate of  $\beta_2$  is to calculate how much a challenger needs to spend to compensate for not being an incumbent. Using the estimate of the incumbency effect of 0.276, challengers need to amass campaign budgets of about FFr200,000 ( $0.276/0.133$ , spending being measured in hundred thousands of French Francs) to compensate for the disadvantage of not being the incumbent. That is a substantial amount of money given that on average challengers spent between FFr60,000 and FFr80,000 (see Table 2), stressing the advantages that incumbents enjoy.

We offer a final interpretation of  $\beta_2$  based on a counterfactual exercise in which we compute the number of constituencies in which first-round results would have been altered, had the runner-up spent more money. To do so, we simulate counterfactual vote shares

$$\tilde{v}_{jct} = \frac{e^{\tilde{\delta}_{jct}}}{1 + \sum_{k=1}^{N_{ct}} e^{\tilde{\delta}_{kct}}},$$

for all constituencies wherein the candidate ranked second in the first round (the runner-up denoted by  $j$  in the formula above) is a challenger, while the leading candidate is an

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<sup>27</sup>One candidate has a vote share equal to 0 in 1993 and another one does so in 1997; they are removed from the samples, explaining why we have 1,643 observations instead of 1,644 in the first and second columns, and 1,642 observations instead of 1,644 in the third.

Table 5: Estimating the effect of campaign spending on vote shares (OLS and FD)

	Cross section		First Difference
	1993 election	1997 election	1997 minus 1993
Spending if challenger	0.365*** (0.028)	0.710*** (0.050)	0.133*** (0.022)
Spending if incumbent	0.029 (0.042)	0.053 (0.051)	0.013 (0.027)
Incumbent	1.343*** (0.158)	1.711*** (0.146)	0.276*** (0.096)
Local elected office:			
Member of Municipal Council	0.349*** (0.058)	0.237*** (0.052)	0.115** (0.048)
Deputy Mayor	0.402*** (0.084)	0.319*** (0.076)	0.151** (0.073)
Mayor	0.356*** (0.063)	0.270*** (0.060)	0.145** (0.059)
Member of Departmental Council (DC)	0.259*** (0.063)	0.150*** (0.058)	-0.030 (0.094)
VP or President of DC	0.091 (0.197)	0.016 (0.140)	0.254 (0.223)
Member of Regional Council (RC)	0.241*** (0.050)	0.090 (0.056)	0.050 (0.069)
VP or President of RC	0.232 (0.333)	-0.107 (0.234)	-0.360* (0.205)
Former member of Assembly	0.063 (0.107)	0.333*** (0.110)	0.110* (0.061)
Member of Senate	-0.120 (0.137)	0.021 (0.132)	0.186 (0.117)
Senior member of cabinet	-0.062 (0.223)	0.048 (0.232)	-0.312*** (0.084)
Junior member of cabinet	-0.144 (0.186)	-0.183 (0.129)	-0.283** (0.137)
Political party leadership	0.054 (0.061)	0.068 (0.063)	0.007 (0.050)
Party affiliation:			
FN	1.227*** (0.066)	0.675*** (0.080)	
PC	0.586*** (0.062)	0.445*** (0.071)	
PS	0.589*** (0.098)	0.851*** (0.089)	
RPR	0.939*** (0.107)	0.607*** (0.091)	
UDF	0.956*** (0.103)	0.606*** (0.094)	
Observations	1,643	1,643	1,642
$R^2$	0.855	0.858	0.370

Notes: Columns 1 and 2 report OLS estimation results of model (6) for 1993 and 1997, respectively, and column 3 FD estimation results of model (7). All estimations are based on candidates present in both elections. Main entries are the estimates and in parentheses are the standard errors clustered at the constituency level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

incumbent; 262 (resp. 344) such constituencies are observed in 1993 (resp. 1997). We assume that the runner-up spends counterfactual amount  $\tilde{s}_{jct}$  instead of the amount  $s_{jct}$ , actually observed, i.e., the candidate enjoys the counterfactual mean utility  $\tilde{\delta}_{jct} = \delta_{jct} + \hat{\beta}_2(\tilde{s}_{jct} - s_{jct})$ .<sup>28</sup> In a first thought experiment, we consider  $\tilde{s}_{jct} = s_{jct} + 0.1$ , meaning that the runner-up spends an extra FF10,000; we hold the other candidates' spending fixed (i.e.,  $\tilde{s}_{kct} = s_{kct}$  implying  $\tilde{\delta}_{kct} = \delta_{kct}$ , for all  $k \neq j$ ). We find that in only five (resp. five) of the 262 (resp. 344) constituencies would the runner-up have beaten the incumbent. That small effect (1.9% and 1.5% of constituencies switch, respectively) is consistent with marginal effects reported above. In the second thought experiment, which places an upper bound on the effect, we consider  $\tilde{s}_{jct} = \bar{s}_{jct}$ , where  $\bar{s}_{jct}$  is the campaign spending limit in the constituency, i.e., the maximal amount of money authorized by law. In that case, we find that the election outcome would have been overturned in 46 (resp. 144) of the constituencies in 1993 (resp. 1997), i.e., in 17.6% (resp. 41.8%) of the total number of constituencies in our sample. We emphasize that for many runner-up candidates the counterfactual spending amount is very large relative to the observed amount, and for that reason we do not wish to put too much weight on our second counterfactual exercise.

In a nutshell, the results presented in this section indicate that campaign spending matters for challengers but not for incumbents. Moreover, our cross-sectional estimates of the electoral impact of challenger spending differ considerably from the FD estimate, suggesting that the unobserved popularity component  $\mu$  plays an important role in determining vote shares. The fact that the FD estimate is smaller is intuitive because it hints, as expected, at a positive correlation between spending decisions and  $\mu$ . While the FD method is robust to a correlation between  $\mu$  and the regressors in (8), it nonetheless produces misleading estimates if the latter are related to  $\Delta\xi_{jc}$ . That conclusion is confirmed in our data: for all IV combinations entered into the TSLS model: the null hypothesis that the regressors  $\Delta(s_{jc} \times inc_{jc})$ ,  $\Delta(s_{jc} \times chal_{jc})$ , and  $\Delta inc_{jc}$ , are exogenous, is rejected strongly. To handle that problem, we now turn to IV estimation.

## 6.2 IV results

Table 6 reports TSLS estimates (together with heteroscedastic-robust standard errors) of our two key parameters,  $\beta_1$  and  $\beta_2$ , along with several diagnostic tests. We report Kleibergen-Paap's statistic (associated with the underidentification test), Hansen's J statistic (overidentification test), and Cragg-Donald's statistic (weak instrument test). Shown below the first two test statistics are the corresponding p-values, and shown below the last one is Stock-Yogo's 5% critical value for the weak instrument test. The table displays results only for combinations of our seven excluded instruments such that both the underidentification and overidentification tests are in the right direction. Put differently,

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<sup>28</sup>Note that  $\delta_{jct}$  can be calculated directly from the data using the equality  $\delta_{jct} = \log v_{jct} - \log v_{0ct}$ .

we retain only those combinations such that (i) the excluded instruments are valid (correlated with our three endogenous variables), and (ii) the excluded instruments and all exogenous regressors in (8) are uncorrelated with the error term. From the table we see that that is the case for eight combinations. For each of them except the first, the weak instrument hypothesis is rejected since Cragg-Donald’s statistic exceeds the 5% critical value. Apart from column 1, our excluded instruments thus are correlated sufficiently with the endogenous variables. The TSLS results indicate that incumbent spending does not have a statistically significant effect on vote shares. On the other hand, for all eight IV combinations, challenger spending is significant. The estimate of  $\beta_2$  varies between 0.086 and 0.168, and the mean over all combinations is 0.123, slightly below the FD estimate reported in Table 5). Taking this mean IV estimate as the value for  $\beta_2$ , we find that that a representative challenger with  $v = 0.055$  would be able to raise his/her share of votes (following a budget increase of FF10,000) by just 0.06 percentage point, and that a strong challenger (whose initial share is 0.3) by 0.26 percentage point. Our IV estimation strategy suggests that the marginal effect of spending is smaller than what we found using the FD method.

## 7 Summary and concluding remarks

This paper has addressed an old question in the political economics literature by applying a novel empirical approach. Our strategy for identifying and estimating the impact of campaign spending on election outcomes exploits the campaign financing reforms introduced in France in the mid 1990s. Relying on data from two consecutive French legislative elections, one held before the introduction of the new laws (1993) and one afterwards (1997), we find that candidates from the far-left and far-right increased their campaign budgets substantially between 1993 and 1997. Their campaign expenses comparatively were small in 1993 essentially because voters and legal entities were not willing to finance their campaign activities. The candidates running in 1997 increased spending substantially thanks to the more generous reimbursement of out-of-pocket contributions to their own campaigns. Candidates from the moderate left and moderate right, however, were harmed by the reforms. In the first election, they disposed of large campaign budgets because of high spending caps and generous contributions from legal persons (businesses and other entities). In the second one, they spent more personally but not enough to make up for the reductions in spending caps and the loss of donations from legal persons.

To study the link between campaign spending and vote outcomes, we adopt a model proposed by [Berry \(1994\)](#). Originally designed to study consumer purchases in differentiated-product markets, the model easily can be transposed to multiple-candidate elections as is the case of in the French legislative elections examined herein. We first estimate vote share models separately for 1993 and 1997, using the sample of candidates who participated in

Table 6: Estimating the effect of campaign spending on vote shares (FD-IV)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Spending if challenger	0.152*** (0.0475)	0.0930** (0.0412)	0.150*** (0.0515)	0.0906* (0.0546)	0.142*** (0.0474)	0.168*** (0.0526)	0.0864** (0.0414)	0.101*** (0.0444)
Spending if incumbent	-0.00547 (0.0347)	0.0235 (0.0329)	-0.00452 (0.0350)	0.0255 (0.0438)	0.00692 (0.0370)	-0.0238 (0.0412)	0.0355 (0.0353)	0.0126 (0.0376)
Observations	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642
Underidentification test	68.17	83.17	53.65	59.00	65.02	60.14	82.47	74.12
P-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Overidentification test	0.813	4.260	0.812	4.094	0.0954	0.0888	3.372	4.046
P-value	0.846	0.235	0.666	0.129	0.953	0.957	0.185	0.132
Weak instrument test	11.12	13.78	11.05	10.06	12.50	11.51	16.10	14.21
5% critical value	12.20	12.20	9.53	9.53	9.53	9.53	9.53	9.53
Excluded IVs	$z_1; z_2; z_3$	$z_1; z_2$	$z_1; z_2$	$z_1; z_2$	$z_1; z_3$	$z_2; z_3$	$z_1; z_2$	$z_2$
	$z_1 \times inc_{93}$	$z_1 \times inc_{93}$	$z_1 \times inc_{93}$	$z_2 \times inc_{93}$	$z_1 \times inc_{93}$	$z_1 \times inc_{93}$	$z_1 \times inc_{93}$	$z_1 \times inc_{93}$
	$z_2 \times inc_{93}$	$z_2 \times inc_{93}$	$z_2 \times inc_{93}$	$z_3 \times inc_{93}$	$z_2 \times inc_{93}$	$z_2 \times inc_{93}$	$z_2 \times inc_{93}$	$z_2 \times inc_{93}$
	$inc_{93}$	$z_3 \times inc_{93}$	$inc_{93}$	$inc_{93}$	$inc_{93}$	$inc_{93}$	$z_3 \times inc_{93}$	$z_3 \times inc_{93}$
							$inc_{93}$	$inc_{93}$

Notes: The upper panel reports TOLS estimates (heteroskedasticity-robust standard errors in parentheses) of  $\beta_1$  and  $\beta_2$  (model (8) is estimated). The lower panel reports diagnostic tests: the line ‘‘Underidentification test’’ (resp. ‘‘Overidentification test’’) gives Kleibergen-Paap’s (resp. Hansen’s J) statistic to test for underidentification (resp. overidentification), and just below the corresponding p-value; the line ‘‘Weak instrument test’’ gives Cragg-Donald’s statistic to test for weak instruments, and just below the 5% critical value. The excluded instruments are combinations of  $z_{1jc} = \max(s_{jc93} - Limit_{c,97}, 0)$ ,  $z_{2jc} = s_{jc93}^{firms}$ , and  $z_{3jc} = \max(Limit_{c,97}/2 - s_{jc93}^{Per,so}, 0)$ , these variables interacted with  $inc_{j,c93}$  (the dummy indicating whether  $j$  is an incumbent in constituency  $c$  and year  $t$ ), and  $inc_{j,c93}$  itself. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



both elections. Those estimates represent our benchmark results. Next, we considered a first-difference version of the vote equation which is convenient, because all time-fixed unobserved popularity determinants are eliminated from the model. FD estimation indicates that the effect of spending is statistically significant only for challengers but not for incumbents. The effect for the former is, economically speaking, rather small however: if the average challenger in our sample increases her campaign expenditures by FF $\epsilon$ 10,000, her vote share increases only by 0.07 percentage point. As in [Levitt \(1994\)](#), our FD estimate of the challenger effect is substantially smaller than our cross-sectional estimates, suggesting that unobserved heterogeneity across candidates plays an important role in determining vote shares.

Although the reforms of the mid-1990s clearly have affected candidates' campaign activities over time, our empirical analysis shows that they do not explain all of that variation. Hence, it cannot be ruled out that the changes in spending between 1993 and 1997 are influenced partly by unobserved variables that determine changes in voting outcomes as well. That possibility is confirmed in the data: a standard exogeneity test indicates that the differences in campaign expenditures are endogenous in the first-difference version of our vote model. We therefore proceed to IV estimation. Unlike the large majority of IV-based empirical studies that rely on characteristics of either candidates or electoral districts as instruments, we construct a new set of IVs based on differences in candidates' spending induced by the reforms. Our IV results confirm that incumbent spending has no effect on vote outcomes. Although the effect of challenger spending varies slightly with the chosen combination of instruments, the effect tends to be even smaller overall than the one estimated by FD.

Our finding that spending matters only for challengers but not for incumbents is in line with the very earliest works on the same question (e.g., [Jacobson \(1978\)](#); [Abramowitz \(1988\)](#); [Ansolabehere & Gerber \(1994\)](#)) and with more recent results obtained for multi-party systems (e.g., [Benoit & Marsh \(2003\)](#); [Benoit & Marsh \(2010\)](#); [Pattie et al. \(2017\)](#); [Shin et al. \(2005\)](#)). It would be particularly welcome to see new studies investigating precisely how candidates finance their campaigns (through personal contributions, donations from their parties or voters, and so on), and what they actually do with those funds (e.g., cover travel expenses, finance political rallies). Such studies may shed light on the still puzzling question why spending does not matter for incumbents, and why campaign spending's effects are so marginal for challengers.

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Online appendix for  
The petit effect of campaign spending on votes. Using  
political financing reforms to measure spending impacts in  
multiparty elections

Additional figures and tables

Figure A1: Personal spending of candidates in 1993 and 1997 (by party)

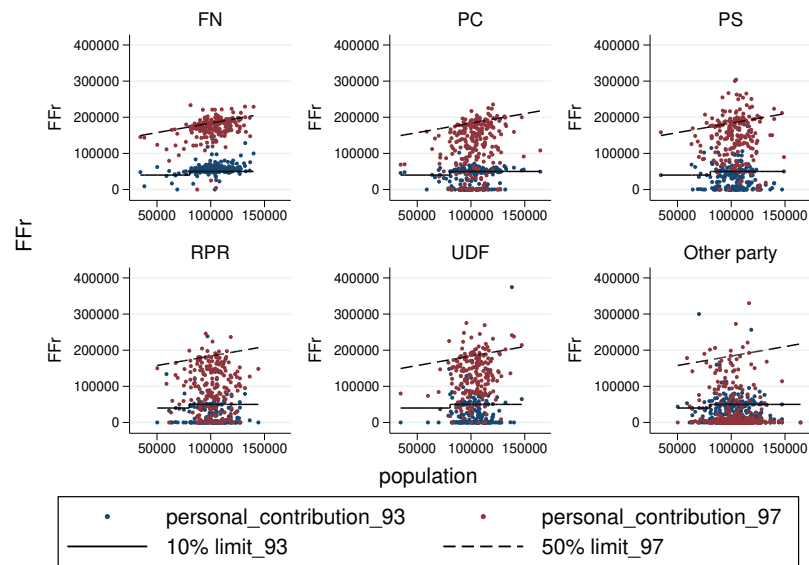


Table A1: First-round score and number of representatives

Party	1993		1997	
	Score (%)	Representatives	Score (%)	Representatives
FN	12.42	0	14.94	1
PC	9.19	23	9.94	35
PS	17.40	57	23.53	255
RPR	19.83	257	15.70	139
UDF	18.64	215	14.21	112

Notes: The columns headed 'Score' give the sum of first-round votes received by each party across all 577 constituencies, divided by the total number of first-round votes at the national level. The columns headed 'Representatives' give the number of seats obtained by each party in the National Assembly. Source: French Internal Affairs Ministry.

Table A2: Population and spending limit per constituency

	Obs.	Mean	S.D.	Min	Max
Population in 1990	555	102,009	15,091	34,577	164,472
Spending limit in 1993	555	494,775	22,274	400,000	500,000
Spending limit in 1997	555	369,610	15,845	298,806	435,196

Notes: Population in 1990 corresponds to the number of inhabitants per constituency as measured by the census of 1990, and is used to determine the spending limits in 1993 (as explained in the main text) and 1997 (through formula (1)). Sources: CNCCFP; Insee.

Table A3: Determinants of campaign spending

	(1) 1993	(2) 1997	(3) 1997 minus 1993
Incumbent	50,460*** (6,958)	42,329*** (5,798)	-15,394* (8,038)
Local elected office:			
Member of Municipal Council	19,415*** (3,775)	21,058*** (2,770)	1,345 (5617)
Deputy Mayor	55,753*** (6,462)	34,967*** (4,647)	-20,015** (8,798)
Mayor	72,519*** (6,241)	41,458*** (3,883)	-29,905*** (7,269)
Member of Departmental Council (DC)	25,824*** (6,250)	26,401*** (4,053)	908 (7,282)
VP or President of DC	-30,483 (31,626)	-10,863 (16,033)	11,088 (27,070)
Member of Regional Council (RC)	24,222*** (4,474)	19,381*** (3,241)	1,001 (5,430)
VP or President of RC	20,847 (30,357)	57,696*** (20,037)	42,723 (26,641)
Former member of Assembly	31,538*** (10,230)	18,035** (7,233)	-17,026 (11,072)
Member of Senate	61,937* (32,609)	39,773** (16,681)	9,787 (13,260)
Senior member of cabinet	131,573*** (28,977)	-28,885 (18,799)	-82,454*** (29,026)
Junior member of cabinet	53,936** (27,235)	19,698 (46,469)	-23,335 (27,479)
Political party leadership	34,165*** (5,939)	28,419*** (4,461)	-29,788*** (6,773)
Party affiliation:			
FN	8,303*** (2,011)	142,220*** (1,499)	127,045*** (3,434)
PC	12,782*** (3,269)	89,601*** (3,107)	62,629*** (5,283)
PS	104,325*** (5,682)	119,813*** (3,869)	-23,769** (9,228)
RPR	226,072*** (7,987)	141,234*** (6,399)	-63,789*** (9,357)
UDF	191,402*** (8,669)	137,163*** (6,052)	-37,322*** (9,660)
Constant	36,389*** (981)	11,681*** (479)	-20,784*** (1,907)
Observations	5,138	6,196	1,644
$R^2$	0.671	0.770	0.495

Notes: Columns 1 and 2 report the OLS results from the regression of the campaign spending of a candidate on the variables listed in Table 1, for 1993 and 1997 respectively. Column 3 gives the OLS results obtained from regressing the difference in spending of a candidate between 1997 and 1993 on the same explanatory variables, as measured in 1993. Main entries are the estimates and in parentheses are the standard errors clustered at the constituency level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



Table A4: Campaign spending in 1993 above the 1997 limit

	FN	PC	PS	RPR	UDF	Small party
<u>Candidates present in 1993</u>						
Fraction above limit	0.0%	2.5%	16.7%	47.9%	37.9%	1.6%
Average amount above limit	0	1,384	9,971	30,810	22,271	1,095
Observations	554	555	522	303	293	2,911
<u>Candidates present in 1993 and 1997</u>						
Fraction above limit	0.0%	3.3%	26.0%	31.7%	37.0%	4.3%
Average amount above limit	0	2,158	16,529	27,800	23,172	2,045
Observations	249	242	215	213	195	531

Notes: For each party, the table lists the fraction of candidates whose 1993 spending exceeds the 1997 limit and the mean amount spent in excess of the 1997 limit (for a candidate with 1993 spending below the limit, the amount is defined to be zero). Upper panel corresponds to candidates present in 1993, lower panel to candidates present in both 1993 and 1997. Source: CNCCFP.

Table A5: Donations from legal persons

	FN	PC	PS	RPR	UDF	Small party
<u>Candidates present in 1993</u>						
Fraction of recipients	9.7%	25.2%	71.5%	93.1%	87.4%	18.1%
Average donation	1,220	16,822	86,319	143,129	121,776	10,103
Observations	554	555	522	303	293	2,911
<u>Candidates present in 1993 and 1997</u>						
Fraction of recipients	10.8%	29.2%	80.9%	92.5%	87.2%	18.3%
Average donation	1,736	23,806	121,174	140,808	123,008	16,036
Observations	249	242	215	213	195	531

Notes: For each party, the table lists the fraction of candidates who received donations from legal persons and the mean donation per candidate. Upper panel corresponds to candidates present in 1993, lower panel to candidates present in both 1993 and 1997. Source: CNCCFP.

Table A6: Alternative definitions of spending (FD estimation, 1997-1993)

	Spending (FFr100,000 per km <sup>2</sup> )	Spending (FFr per voter)
Spending if challenger	1.063** (0.421)	0.080*** (0.014)
Spending if incumbent	0.596 (0.398)	0.017* (0.017)
Controls	Yes	Yes
Observations	1,642	1,642
$R^2$	0.343	0.367

Standard errors clustered at the constituency level in parentheses. Same controls as in column 3 of Table 5. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A7: Effect of campaign spending on vote shares (OLS estimation, 1993 and 1997) by incumbent majority status at the national level and excluding small parties

	1993 election	1997 election
Spending if challenger (nationwide)	0.118*** (0.033)	0.327*** (0.058)
Spending if incumbent (nationwide)	-0.013 (0.039)	0.036 (0.046)
Controls	Yes	Yes
Observations	1,114	1,109
$R^2$	0.887	0.855

Notes: Columns 1 and 2 report OLS estimation results of model (6) for 1993 and 1997, respectively. All estimations are based on candidates of PC, PS, UDF, RPR and FN present in both elections. Same controls as in columns 1 and 2 of Table 5. Spending variables are defined in the text. Main entries are the estimates and in parentheses are the standard errors clustered at the constituency level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A8: Estimation of model (6) using complete samples

	1993	1997
Spending if challenger	0.440*** (0.018)	0.864*** (0.022)
Spending if incumbent	0.064*** (0.024)	0.118*** (0.036)
Incumbent	1.366*** (0.089)	1.749*** (0.097)
Local elected office:		
Member of Municipal Council	0.447*** (0.038)	0.290*** (0.032)
Deputy Mayor	0.457*** (0.047)	0.346*** (0.044)
Mayor	0.392*** (0.037)	0.338*** (0.033)
Member of Departmental Council (DC)	0.257*** (0.035)	0.154*** (0.036)
President of DC	0.309*** (0.089)	0.142 (0.088)
Member of Regional Council (RC)	0.271*** (0.036)	0.173*** (0.034)
President of RC	0.309 (0.189)	-0.214 (0.150)
Former member of Assembly	0.086 (0.072)	0.130** (0.059)
Member of Senate	0.164 (0.178)	0.113 (0.155)
Senior member of cabinet	-0.284* (0.149)	0.197 (0.129)
Junior member of cabinet	-0.070 (0.213)	0.163 (0.217)
Political party leadership	0.098** (0.040)	0.128*** (0.043)
Party affiliation:		
FN	1.352*** (0.030)	0.669*** (0.038)
PC	0.677*** (0.030)	0.464*** (0.033)
PS	0.658*** (0.042)	0.922*** (0.046)
RPR	0.838*** (0.058)	0.609*** (0.061)
UDF	0.759*** (0.060)	0.618*** (0.064)
Observations	5,104	6,113
$R^2$	0.708	0.733

Notes: The columns headed 1993 and 1997 report OLS estimation results of model (6) using data on candidates present in both elections, for 1993 and 1997 respectively. Main entries are the estimates and in parentheses are the standard errors clustered at the constituency level. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## Additional details on data

The raw data on the different sources of campaign funding (personal contributions, donations from legal persons, contributions from parties, donations from voters and other sources), obtained from the CNCCFP, had to be corrected when the sum of these sources exceeds campaign spending. We did this by truncating the sources in such a manner that their sum is again equal to spending. The following algorithm was implemented:

- If personal contributions are higher than total campaign spending, then they are set to campaign spending, the other remaining sources being set to zero.
- Else if the sum of personal contributions and contributions from parties is higher than campaign spending, then contributions from parties are set to campaign spending minus personal contributions, the other remaining sources being set to zero.
- Else if the sum of personal contributions, contributions from parties and donations from voters is higher than campaign spending, then donations from voters are set to campaign spending minus personal contributions minus contributions from parties, the other remaining sources being set to zero.
- Else if the sum of personal contributions, contributions from parties, donations from voters and donations from legal entities is higher than campaign spending, then donations from legal entities are set to campaign spending minus personal contributions minus contributions from parties minus donations from voters, the other remaining sources being set to zero.
- Else if the sum of all sources is higher than campaign spending, the other sources being pivotal, then other sources are set to campaign spending minus personal contributions minus contributions from parties minus donations from voters minus donations from legal persons.

## Additional elements about constituencies with and without an incumbent candidate

In this appendix we compare the constituencies with and without an incumbent. The dummy indicating the incumbency status is an important regressor in our empirical analysis. A potential issue of concern is that this dummy may be correlated with unobserved determinants of vote shares. We have two main arguments why this is likely not the case.

First of all, we must remind that the 1997 French legislative elections were totally unexpected and unanticipated. It was the discretionary decision of the French President (Jacques Chirac) to move the electoral schedule forward (1997 instead of 1998): on April 21st he announced that the first round of the legislative election would be held barely a month later (on May 25th). Both political parties and potential candidates were highly surprised by this decision, and parties had little time to nominate their candidates, and the candidates themselves had just one month to campaign. As a result, both parties and candidates acted in haste. Parties automatically nominated a lot of 1993 incumbents as candidates, because it was the easiest and fastest way of selection, possibly explaining why we observe slightly more incumbents in 1997 than in 1993 (Table A9). The early and unanticipated election of 1997 suggests that the decision of incumbents to run for this election was less strategic than for an ordinary election (planned long in advance).

Second, Table A9, in which we compare constituencies with and without an incumbent for both elections, shows that for most characteristics there is no statistically significant difference across the two types of constituencies. The most statistically significant difference concerns the number of candidates running, both in 1993 and 1997 (there were slightly more candidates in constituencies without an incumbent). We also observe that some spending variables differ significantly across the two types of constituencies: overall spending is slightly higher in constituencies without an incumbent (in 1993 but not in 1997), while spending per candidate is slightly lower in constituencies where the incumbent is absent (in 1997 but not in 1993). By contrast and more importantly, we do not observe any differences between the constituencies in terms of victory margin observed in 1993. In other words, the decision of the incumbent to be candidate at the 1997 election does not seem to depend on his electoral advantage four years earlier.

To sum up, both our factual description regarding the context of the 1997 election and descriptive statistical comparisons provide some indirect evidence that incumbents are not endogenously selected into constituencies.

Table A9: Constituency characteristics by incumbency status

Is the incumbent candidate?	1993		1997	
	Yes	No	Yes	No
General characteristics:				
Observations	462 (83%)	93 (17%)	479 (86%)	75 (13%)
Registered Voters	68,194	68,489 <sup>NS</sup>	68,402	69,005 <sup>NS</sup>
Spending Ceiling	494,805	494,624 <sup>NS</sup>	369,111	372,704 <sup>NS</sup>
Candidate characteristics:				
Number of candidates	9.18	9.64*	10.94	12.45***
Number of local mandates	1.94	2.06*	1.77	1.88 <sup>NS</sup>
Number of NC members	0.058	0.054 <sup>NS</sup>	0.042	0.053 <sup>NS</sup>
Campaign spending:				
Overall spending	362,807	385,900**	264,536	271,052 <sup>NS</sup>
Spending per RV	5.48	5.77 <sup>NS</sup>	3.99	4.08 <sup>NS</sup>
Spending per candidate	40,794	41,717 <sup>NS</sup>	26,103	23,060***
Previous elections characteristics:				
Raw victory margin	-	-	7,889	7,888 <sup>NS</sup>
Victory margin (per RV)	-	-	0.19	0.19 <sup>NS</sup>

Notes: Main entries are the means except for the first line. NC stands for national cabinet, and RV for registered voters. <sup>NS</sup> means the difference between the two groups of constituencies is not statistically significant (two-tailed test), where \*\*\*, \*\*, and \* means significant at respectively the 1%, 5% and 10% threshold. All monetary amounts of 1997 are converted into French Francs of 1993. The raw victory margin in 1993 is measured as follows. If either the election ends in the first round or there is a single candidate in the second round, it is the spread between the number of votes of the incumbent and his main challenger. If there is a second round with at least two candidates, we calculate the spread in this round. The victory margin per RV is the previous variable divided by the number of registered voters.

## Robustness analysis

Here we present three robustness checks. First, we estimate the effect of campaign spending using second-round election outcomes, instead of first-round outcomes that have been discussed so far. Second, we produce additional estimates using alternative definitions of the spending variable. Third, we investigate whether endogenous sample selection is an important issue.

The advantage of our transformed vote equation (8) is that only characteristics of candidate  $j$  appear as determinants of the dependent variable  $\log(v_{jct}/v_{0ct})$ . It does not depend on the (unobserved) characteristics of  $j$ 's opponents in district  $c$ . This makes the model particularly convenient to analyze first-round elections because, as we have seen, they involve many candidates. We will now use data from second-round elections because they are typically composed only of two or three candidates. This enables us to address the limitations of the model considered so far by accounting for observed and unobserved opponent characteristics. More precisely, we now specify  $\log(v_{jct}/v_{0ct})$  as follows:

$$\log v_{jct} - \log v_{0ct} = \beta_1 s_{jct} + \beta_2 s_{kct} + \gamma X_{jct} + \alpha_{ct} + \mu_{jkc} + \xi_{jct}.$$

Compared to specification (6), spending by  $j$ 's unique opponent –we restrict ourselves to constituencies  $c$  wherein exactly two candidates faced each other–, denoted  $s_{kct}$ , is added as a regressor. Hereby we relax the IIA assumption, which requires that  $\log(v_{jct}/v_{0ct})$  only depends on variables relating to candidate  $j$ . The above specification also includes the error term  $\mu_{jkc}$ , which captures the impact of unobserved characteristics of *both*  $j$  and  $k$ , while our previous specification controlled for unobservable variables of  $j$  only. For simplicity we assume here that the effect of spending by candidates are the same regardless of whether they are challengers or incumbents.

Applying the first-difference operator to the above equation we get

$$\Delta \log v_{jc} - \Delta \log v_{0c} = \beta_1 \Delta s_{jc} + \beta_2 \Delta s_{kc} + \gamma \Delta X_{jc} + \Delta \alpha_c + \Delta \xi_{jc},$$

which no longer depends on the pair-specific error  $\mu_{jkc}$  but, compared to equation (7), includes the difference in spending of  $k$ ,  $\Delta s_{kc}$ , as an additional regressor. We estimate this model by OLS using only constituency  $c$  wherein there were exactly two candidates present in both 1993 and 1997; in addition, the pairs of candidates had to be identical in the two elections. It turns out that 112 constituencies satisfy these conditions, implying that OLS is based on 224 observations. Our regression model includes the constituency-fixed effects  $\Delta \alpha_c$  and standard errors are clustered at the constituency level. The estimate of  $\beta_1$  equals 0.251 and the standard error is 0.215: the candidate's own spending has a slightly larger impact compared to our previous results, but is not statistically significant. The point estimate of  $\beta_2$  is 0.257 (standard error is 0.215), so opponent's spending is not significant either. At least in a two-candidate setting, our results thus appear robust to including observed (and unobserved) opponent characteristics in the model.

Next we turn to the second robustness check. As suggested by a referee, we have re-estimated some of our models using alternative definitions of our spending variables. Column 1 of Table A6 in the online appendix reports estimates of model (8) by defining  $s_{jct}$  as spending by candidate  $j$  per square kilometre (calculated as spending divided by the surface of constituency  $c$ ). The FD results are qualitatively the same as the FD results of Table 5: the new spending variable has a positive and significant effect for challengers, but is not significant for incumbents. Column 2 gives FD results by defining  $s_{jct}$  as spending per registered voter in constituency  $c$ . Again the results are qualitatively the same (however, incumbent spending is now significant, albeit only at the 10% level). Table A7 in the online appendix contains OLS estimates of (6) by defining incumbent spending (resp. challenger spending) as  $s_{jct}$  times a dummy indicating whether  $j$  is from the majority party (resp. not from the majority party) while campaigning for the election in year  $t$ . Recall that PS was the majority party prior to the election of 1993 and the coalition of RPR and UDF formed the majority party in 1997. Yet again the results remain qualitatively the same as those reported in Table 5.<sup>29</sup>

Next we turn to the issue of sample selection. In addition to the discussion dealing with the constituencies with or without an incumbent candidate (online appendix), a possible concern with our main estimation results is that they are based on candidates present in *both* elections: those who competed either only in 1993 or only in 1997 are excluded from the sample that produced our FD and IV estimates. This selection may not be random and can result in biased results. To account and test for endogenous sample selection one can for instance use the two-stage correction method introduced by Heckman (1979). However, this method cannot be implemented here because we do not have adequate data to estimate the participation decision of candidates (the first stage of Heckman’s procedure). Indeed, for candidates present in just one election we only observe, by construction, the values of  $X$  and  $s$  prevailing in that election (i.e., the values are missing in the other election). In addition, there are no natural candidate variables that could act as determinants of the participation decision while satisfying an exclusion restriction at the same time. For these reasons we will not be able to formally check the robustness of our results to endogenous sample selection. Instead, we informally investigate the question by estimating (6) using the full data sets, and compare the estimates with those obtained using the restricted sample of candidates present in both elections, which were reported in columns 1 and 2 of Table 5. Column 1 of Table A8 in the online appendix lists the OLS estimation results of model (6) using all candidates observed in the 1993 election. Compared to the restricted-sample estimates reported in column 1 of Table 5, we see that spending now has a significant effect not only for challengers but also for incumbents. The effect for the former is slightly higher than

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<sup>29</sup>We have also estimated a version of the model where voters vote for parties rather than for candidates. The results are again comparable to those reported in this paper, confirming that our main findings are robust to this change in the underlying assumption on voter behavior.



the estimate obtained using the restricted sample, while the effect for the latter remains practically as small as the one reported earlier: the point estimate is 0.064 in Table A8, and 0.029 in Table 5. The results regarding the control variables are comparable: the variables that are significant using the restricted sample remain significant when estimation is based on all candidates; some additional variables have turned significant but the magnitude of the estimates remains of the same order. Column 2 of Table A8 reports the results for the 1997 election using all candidates standing for election in that year.<sup>30</sup> Again, campaign spending is now significant for incumbents but the estimated impact remains small.<sup>31</sup> Furthermore, as for the 1993 election, some additional control variables become significant but the point estimates are in most cases similar to the ones reported in column 2 of Table 5. The overall message of Table A8 is that although estimation based on the complete samples allows to estimate most parameters with more precision –rendering some variables significant–, the conclusions do not fundamentally change relatively to those obtained with the restricted samples, suggesting that endogenous sample selection is not an important issue.

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<sup>30</sup>The sample size in column 1 drops from 5,138 to 5,104 because 34 candidates received no votes in 1993. Similarly, the sample size in column 2 is 6,113 instead of 6,197 because 84 candidates obtained no votes in 1997.

<sup>31</sup>The fact that incumbent spending is now slightly larger and significant can be explained as follows. By expanding the sample to all candidates in each election, we sharply increase the number of candidates from the small parties. Their presence is primarily explained by opportunistic behaviour created by the scheme of party funding (see section 3.2). They have little political experience, their chance of election is low, and they spend hardly any money as observed by François & Phélippeau (2018). This large bulk of low-spending-few-votes candidates pushes upwards the effect of spending in the full data sets.