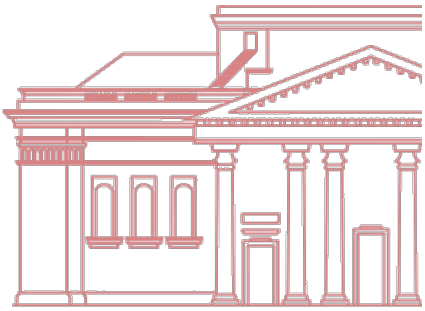

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The petty effect of campaign spending on votes. Using political financing reforms to measure spending impacts in multiparty elections

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

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Abstract

This paper studies the impact of campaign spending of candidates on votes in a multiparty system. We exploit the political financing reforms which were adopted in France in the mid-1990s as identification strategy. Under the new regulations, spending limits were reduced, legal persons were no longer allowed to fund candidates, and the maximal amount of personal expenditures reimbursed by the State was augmented. We have data on two consecutive legislative elections, one before and one after the reforms. The difference in campaign expenses across elections turns out to be strongly affected by the reforms: candidates from the extreme parties (far-left and far-right) substantially increased their expenditures, while candidates of moderate parties strongly decreased them. Focusing on politicians running for 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 regulation reforms. The results clearly show that there is a differentiated effect: spending of incumbents does not have a statistically significant impact on their votes share, but spending of challengers does. The latter impact is, however, 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 has always 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, and the presumed impact of these large sums on electoral success. Social scientists have extensively studied the subject over the past few decades.[1] From the very beginning, this literature has acknowledged the fundamental issue in establishing a causal link between spending and votes, namely the problem that campaign money is potentially an endogenous variable in vote regression functions. This endogeneity can be a consequence of simultaneity since the two variables are likely to be jointly determined: the number of votes received by candidates is a function of campaign spending, but spending itself is likely to depend on (expected) vote outcomes. Endogeneity can also 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 estimation methods are used.

Most papers have tried to circumvent the endogeneity concern by adopting an instrumental variable (IV) approach. Jacobson (1978), for instance, instrumented 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) used instead the wealth of candidates as instrument for spending, Stratmann (2006) the cost of media advertisement, and Rekkas (2007) the lagged campaign spending at the constituency level. Foucault and François (2005) and Milligan and Rekkas (2008) instrumented the endogenous variable by the spending limit in each constituency. Unfortunately, relatively little consensus has emerged from these 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 these two variables is considered as endogeneous, 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 efficient for both types of candidates (e.g., Green and Krasno (1988)), or that spending is actually more effective for incumbents than for challengers (e.g., Benoit and

[1] The large majority of this literature analyzes data from the U.S. on elections for 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 and Palfrey (1998), and Gerber (1998). Some examples of studies based on elections outside the U.S. are Rekkas (2007) and Milligan and Rekkas (2008) (Canadian federal elections), Pattie et al. (1995) (British general elections), Cox and Thies (2000) (Japanese House elections), Da Silveira and De Mello (2011) (gubernatorial elections in Brazil), Durante and Gutierrez (2014) (Mexican presidential elections), Palda and Palda (1998), Foucault and François (2005), Epstein and Franck (2007), and Farvaque et al. (2020) (French National Assembly elections).

Marsh (2008)). The IVs themselves have also been the subject of much criticism from other researchers (see for example the debate opposing Green and Krasno (1990) and Jacobson (1990)). All this has raised skepticism about the possibility to find 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 to uncover the causal effect of spending is proposed in a series of recent papers and consists in using field or natural experiments. Da Silveira and De Mello (2011) exploit a natural experiment to analyze the influence of TV advertising on elections of governors in Brazil. They obtain identification by using the fact that, in the first round of gubernatorial elections, candidates' TV advertising shares are determined by their coalitions' share of seats in the National Parliament (the two candidates who make it to the second round equally share TV advertising time). Durante and Gutierrez (2014) also make use of a natural experiment. They estimate the effect of TV and radio advertising on vote intentions during presidential elections in Mexico. The variation of voters' exposure to political advertising is exogenous since the time of the day at which campaign spots of the different parties are aired is randomly assigned. Gerber et al. (2011) organized a field experiment designed to investigate the impact of political advertising on vote intentions in a gubernatorial election in Texas. The causal effects are identified in this paper because the launch date and volume of advertising in the different experimental markets are randomly determined.

Our paper belongs to this branch of the literature by exploiting a natural experiment: we use political financing reforms to measure the impact of candidates' campaign spending on votes in French legislative elections. We have data on two successive elections for the French National Assembly, the ones of 1993 and 1997, and take benefit of the reforms that were introduced in France between the two of them. These reforms were adopted following several highly mediatized 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 (firms, corporations, unions, non-governmental organizations, etc.) were no longer allowed to finance the campaigns of political candidates. Third, to compensate for the disappearance of the previous source of funding, the public maximal reimbursable amount of personal contributions from candidates was increased from 10 to 50% of the spending limit in each constituency.

Our empirical analysis adopts a three-steps 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 were clearly hurt by the new laws. For many of these candidates, campaign expenses in 1993 were close to the spending limit prevailing in that election, and hence they were affected by the first law reform. They

were also generously financed by firms in 1993, a source of financing on which they could no longer rely in 1997 because of the second reform. Although many of these candidates increased their personal contributions between 1993 and 1997 (benefiting thereby from the third reform), their overall spending level strongly decreased between the two elections. On the other hand, the reforms favored candidates from the far-left and far-right. While most of these candidates spent much less than the limit that prevailed in 1993, and received little or nothing from firms in that election, they considerably augmented their personal expenditures in 1997.

Our second step consists in estimating campaign spending effects using a competition model introduced by Berry (1994). In his model, consumers face a number of differentiated products and purchase the one that maximizes their utility (they may also decide not to purchase at all, i.e., choose the outside option). This model can straightforwardly be applied 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 made by Berry, the resulting vote share of a candidate (the analogue of the product market share) divided by the share of the outside option (fraction of registered individuals who do not vote) only depends on characteristics of that candidate. This renders 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,[2] contrasting with most U.S. elections that have been studied in the literature and which are typically two-candidate elections). Rekkas (2007) was the first to adopt this kind of 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 use the framework to analyze two subsequent elections and primarily focus on estimating a first-difference transformation of the model.[3]

In the same spirit as Levitt (1994),[4] statistical inference is based on the sub-sample of candidates who ran in the first round of both elections. A major advantage of the first-difference version of the model is that it no longer depends on unobserved candidate-specific variables that are fixed across time, and consequently first-difference (FD hereafter) estimation produces satisfactory results even when spending and unobserved time-constant candidate characteristics are related. Basically, the only requirement for this estimator to be unbiased is that the difference in error terms is mean-independent of the difference in spending. Our FD estimation results indicate that spending has a statistically significant

[2] 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 analyse second-round ones.

[3] Cross-sectional estimation results based separately on the elections of 1993 and 1997 will also be presented as benchmark results.

[4] Levitt (1994) studies U.S. House elections in which the same two candidates competed with each other on multiple occasions.

effect only for challengers, not for incumbents. The impact for challengers is, however, economically speaking quite small. For instance, when a representative challenger doubles his/her campaign expenses, the corresponding vote share increases by only half a percentage point.

Finally, our third step considers IV estimation of the transformed vote model. IV estimation appears necessary because a standard endogeneity test indicates that the difference in spending of incumbents and challengers are endogenous variables. This endogeneity can be explained as follows. While the reforms of the mid-1990s are clearly associated with observed changes in campaign spending across the two elections, they cannot explain *all* the variation. Unobserved factors responsible for the remaining variation can potentially also 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.[5] Unlike the papers described above –in which IVs are primarily 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 difference of both incumbents and challengers is instrumented using three IVs, each of them corresponding to one of the regulation modifications: our first one is defined as the difference between actual spending by a candidate in 1993 and the spending limit in 1997; our second IV is the amount of money donated by firms and other organizations to a candidate in 1993; our third IV is similar in spirit as the first one and corresponds to the difference between the maximal reimbursable limit of personal spending in 1997 and actual personal spending in 1993.[6] We could construct these 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, with the IV method we confirm the absence of a spending impact for incumbents, and we observe a lower but significant impact for challengers.

In addition to our main empirical findings, we perform several robustness checks. In particular, we present estimation results based on the second round of both legislative elections. The advantage of using second-round outcomes is that the number of candidates

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

[6] As explained below, additional instruments will be introduced by interacting the three IVs with a dummy indicating whether a candidate is an incumbent or challenger in 1993.

competing at this stage is small (there are typically only two or three of them). This makes it feasible to estimate (transformed) vote models including opponents' characteristics as regressors, and thereby verify whether our results are robust to dropping the 'independence of irrelevant alternatives' restriction which implicitly underlies Berry's model. Restricting the sample to constituencies wherein exactly the same two candidates opposed each other in the second round, we account, like Levitt (1994), for candidate-pair fixed effects and include opponent's spending as an additional regressor. FD estimation of this extended vote model (which allows candidate-pair fixed effects to be eliminated) gives results that are similar to our first-round results.

To the best of our knowledge, Hall (2016) is the only paper that explicitly uses modifications in campaign financing laws as a source to identify the spending effect. He exploits the variation across US states over time in the both implementation and withdrawal of campaign contribution bans on corporations, a restriction that is reminiscent of the second law modification introduced in France. He considers a model relating the Democratic vote share in the lower or upper chamber of a state, to the total amount of money spent by all Democratic candidates. This amount is instrumented by a variable indicating the presence of a ban on corporation contributions in the state. Hall's paper 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 the other two law modifications as well.[7]

Our paper is also related to a literature studying the effects of law reforms on vote outcomes. Stratmann (2006) uses cross-state variation in limits on campaign contributions from individuals and tests whether spending by state House candidates is more efficient when they face contribution limits. Klumpp et al. (2016) and Abdul-Razzak et al. (2018) both analyze the effects of *Citizens United v. FEC*, a ruling issued by the US Supreme Court in 2010 stating that the restrictions on independent political campaign expenditures (by corporations or labor unions) implemented by some American states were unconstitutional. These papers show that lifting restrictions on this so-called outside spending led to an increase in Republican election probabilities in state House races. Note that while this literature analyzes how law changes affect vote outcomes, it does not explicitly exploit law reforms to obtain 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 and Aparicio-Castillo (2006) examine whether contribution limits have an impact on the number of candidates in the race. Barber (2016) analyzes how limits on campaign contributions af-

[7] While Bekkouche et al. (2020) analyze French legislative and UK general elections (over a long period), they use at some point our second IV (measured differently) to instrument the spending difference between 1993 and 1997. Like Hall (2016), they use a single IV, and unlike us they therefore do not exploit the full range of regulation reforms in their IV-based strategy.

fect the ideologies of legislators in office. Avis et al. (2017) take benefit of a reform in Brazil that imposed limits on campaign spending for mayoral elections and find that these limits increased political competition. Other articles have examined the impact of regulation on voter participation, political efficacy, and lobby formation (see the survey by Stratmann (2005)).

The paper is organized as follows. Section 2 gives institutional background information about legislative elections in France, the political financing laws, and the reforms introduced between 1993 and 1997. Section 3 describes the data, and Section 4 shows how the reforms affected the difference in spending levels across time. In Section 5 we present our model of voting behavior and the resulting vote equations. Section 6 is devoted to the estimation results and the robustness checks, and 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.[8] The Assembly is in principle renewed every five years, but the French President has the right to call an early election, i.e., before the five-year term of the Assembly has fully expired. France is divided into separate electoral constituencies, and the candidates standing for election in a given constituency compete for one seat in the Assembly. Since 1986 there have been 577 constituencies and until today their precise geographical boundaries have changed only once, in 2009. This means that for the legislative elections studied in this paper, the ones of 1993 and 1997, the constituencies are geographically fully identical. Out of the 577 constituencies 555 are situated in metropolitan France and 22 in France's overseas areas.

The electoral rule is a two-round plurality voting rule. To get elected in the first round, a candidate should receive more than 50% of the regular votes (i.e., all votes except those invalidated by the electoral authorities or blank votes), and more than 25% of the registered voters in the constituency. If no candidate is elected in this manner, there is a second round. Each candidate with more than 12.5% of the registered voters is allowed to run in the second round,[9] organized one week after the first round. The winner of the second round is the candidate who gets the highest number of 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 (he served as president

[8] This section partly draws on information obtained from the French National Assembly's website: http://www.assemblee-nationale.fr/english.

[9] If there is no candidate with more than 12.5% of registered votes, the two candidates with the highest number of votes go through to the second round. If there is just one candidate above the 12.5% threshold, then this candidate and the second-ranked candidate go through.

between 1981 and 1995). The election of 1997 was held on May 25th and June 1st, following the dissolution of the National Assembly decided by President Jacques Chirac (this early election was held one year before the planned end of the Assembly's mandate). Both elections have been dominated by the same five parties. Listed from the far-left to the far-right, the names of these 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 A2 in the Appendix gives for both elections the first-round scores at the national level obtained by each of the five main parties, and the number of representatives elected in the National Assembly. The socialist party PS was severely beaten in 1993, managing to win only 57 seats out of 577. The communist party PC obtained 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 seats obtained by the five main parties was 552 in 1993, and 542 in 1997. The table shows that the number of seats won by each party and the associated first-round scores do not really match. This reflects that some parties (FN, PC, PS) fielded many candidates, while other parties (RPR, UDF) fielded relatively few of them. This has a tendency to push up the scores of the former group of parties and push down those of the latter. It also reflects the non-proportionality of the French voting system. In 1993, for instance, although FN received 12.4% of the first-round votes, none of its candidates got more than 50% in his or her constituency (i.e., no FN candidate managed to win a seat right away in the first round). The far-right party had 100 candidates running in the second round but none of them dominated the second round. Hence, despite a relatively large first-round score share, FN did not win a single seat in the 1993 election.

2.2 Political financing system

2.2.1 Laws of the 1980s and 1990s

Prior to 1988 there was no precise judicial regime which regulated and monitored 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 coverage in the press) over several politico-financial scandals concerning abusive campaign funding in the mid 1980s. The new laws were intended to increase the transparency of political financing and to promote equal access to political mandates. They were successively introduced through a series of legislative texts, each new text gradually tightening and restricting the 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

expenses. Candidates for legislative elections could no longer spend unlimited amounts but expenses were instead bounded by precise limits. These spending limits were fixed through a simple step function of the constituency populations (as measured by the latest census). Candidates in constituencies with less than 80,000 inhabitants faced a limit of FFr400,000, those in constituencies with more than 80,000 inhabitants faced a limit of FFr500,000.[10] Second, the new laws determined precisely which kind 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 were also forbidden. A variety of basic campaign expenses were covered automatically by the State: it printed the ballots used at 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 covered 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 a unique bank account (candidates were prohibited from handling any of the financial matters themselves). They also had to register all received funds and expenses in a campaign account, and after the election these accounts had to be submitted to the newly created *Commission Nationale des Comptes de Campagne et du Financement des Partis Politiques* (CNCCFP). This commission was in charge of controlling and verifying the accounts, and making the campaign spending information of all candidates publicly available. Fourth, the legislators introduced a reimbursement scheme of candidates' personal campaign expenditures. Candidates whose accounts were approved by CNCCFP,[11] 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 the State financed political parties.[12]

At the heart of this 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

[10] On January 1st 2002 the French Franc was replaced by the Euro at the conversion rate 1 Euro=FFr6.55957.

[11] Accounts are either approved directly, approved after revision, or rejected. Revisions are required if some expenses are thought of as not reflecting proper campaign expenses. In these cases the expenses are adjusted downwards. Accounts may be rejected if total expenditures exceed the spending limit, if some financial transactions have been made by candidates themselves, if no financial representative has been appointed, or if other irregularities are observed.

[12] A first fraction of aid was allocated to parties that fielded candidates in at least seventy-five constituencies in the most recent elections to the National Assembly. A second fraction was attributed to parties whose candidates were actually elected (the attribution being proportional to the precise number of elected candidates).

the 1993 election on the one hand, and the 1997 election on the other.[13] The first change was that spending limits were no longer a step-function of constituency-population but a continuous affine function (see *infra*). The second change was that legal persons (i.e., firms, corporations, unions, political committees or associations with economic interest groups) were no longer allowed to finance candidates.[14] To compensate for this loss of funding, the legislator introduced a third change: the maximal reimbursement of personal expenses was augmented from 10% of the spending limit of 1993 to 50% of the spending limit of 1997; the eligibility conditions for State reimbursement remained unchanged though.

2.2.2 Modifications between the elections of 1993 and 1997

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

- Modification 1: *Spending limit.*
  In 1993, candidates standing for election in a constituency with less than 80,000 inhabitants (as measured by the 1990 census) were not allowed to spend more than FFr400,000; the expenditures of those in constituencies with more than 80,000 inhabitants could not exceed FFr500,000. In 1997, each spending limit was determined as an affine function of population (again measured by the 1990 census).[15] More precisely, within constituency c, the 1997 spending limit in French Francs was

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

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

- Modification 2: *Funding by legal persons.*
  In 1993, candidates were allowed to finance their campaigns through four channels: their personal wealth; donations from natural persons (i.e., individual voters); donations from parties; and donations from legal persons (firms, corporations, etc.). In 1997, legal persons were no longer allowed to finance candidates, i.e., the fourth channel was excluded.

- Modification 3: *Public reimbursement of personal expenditures.*
  In 1993, the part of campaign expenditures financed by candidates themselves could

[13] Even if the law of 1993 was passed a few months before the legislative election of 1993 (recall that this election was held on 21 and 28 March), it was applied only to the following election of 1997 (and the elections thereafter).

[14] Legal persons were also no longer allowed to finance political parties, which resulted in lower budgets for political parties. Before the financing reforms of 1993 and 1995 were implemented, contributions from legal persons amounted on average to 15% of political parties' budgets; see François and Sauger (2006).

[15] In both elections population is defined according to the same census, because the first census after 1990 was held only in 1999.

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.

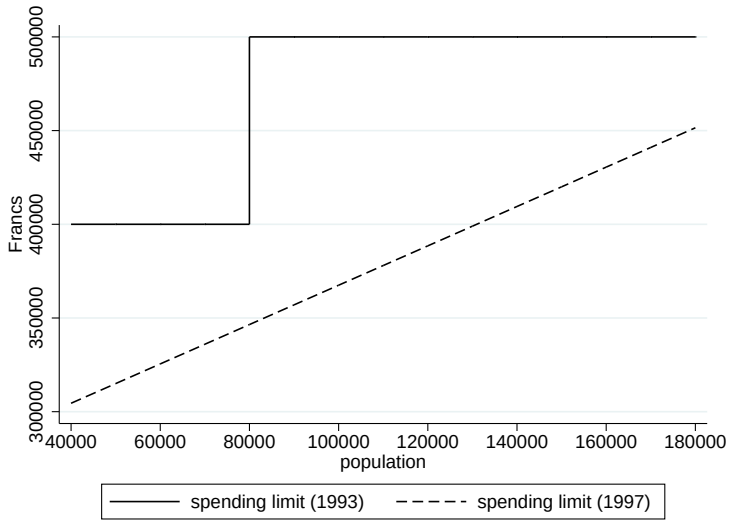

Figure 1: Spending limits in 1993 and 1997

The first modification is illustrated in Figure 1. For the relevant range of population (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 A1), the limit function of 1997 is always above the one of 1993. The difference between the two functions shows that the reduction in the spending limit varied across constituencies, between FFr50,000 and FFr150,000.[16]

The second modification was the most discussed and mediatized law reform. It had strong consequences as legal persons vastly contributed to the election campaigns prior to the reform. They donated FFr210 million to the approximately 5,000 candidates standing for election in 1993. These contributions constituted the primary source of financing for candidates, representing, on average, 35% of their campaign budgets (François and Sauger, 2006). As shown in Sections 3 and 4, this reform especially affected candidates with *a priori* close business connections (incumbents, mayors, government members, and candidates from parties of the centre-left and center-right).

The third modification made the reimbursement scheme of candidates' personal contributions more generous by augmenting the maximal reimbursable amount by the State from

[16]The discontinuity of the 1993 limit function at 80,000 can unfortunately not be exploited in our analysis of the link between campaign spending and votes since only 5.2% of the constituencies have a population below this threshold. See Avis et al. (2017) who adopt a RDD strategy to analyze the impact of spending limits on electoral competition and entry using a discontinuity in the limit function imposed on candidates standing for municipal elections in Brazil.

10% of the spending limit of 1993 to 50% of the spending limit of 1997.[17] Since the spending limits are different 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: only candidates whose accounts were in accordance with CNCCFP criteria, and who passed the 5% hurdle of first-round votes, could potentially be reimbursed.

3 Data

3.1 Data sources

Our data set is constructed by combining information from four sources. The different sources could be linked through unique identifiers for each constituency and through the candidates' names. The first source contains outcomes of legislative elections in France, collected by the French Internal Affairs Ministry, and publicly available on its web site.[18] For each election and constituency we observe the number of individuals who registered to vote,[19] the number 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 number of votes received by the candidates in both rounds, and their party affiliations.

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

Our third source contains information on population in 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 this 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 guide that contains up-to-date biographical information on French leading persons in both the private and public sector.

[17] The reimbursement scheme of 1997 is more generous since 50% of the 1997 limit is above 10% of the 1993 limit for all values of the population (and hence for all constituencies).

[18] http://www.interieur.gouv.fr/Elections/Les-resultats.

[19] Registration is for both rounds of the election. The number of registered voters in the two rounds may slightly differ because of people turning 18 (the minimum voting age in France) or dying between the rounds.

The newspaper supplements indicate whether, at the time of the election, candidates were mayor or deputy mayor of a city or town, member of the National Senate (the upper house of Parliament), member of the current national cabinet (we distinguish senior members, called *ministres* in French, from junior members, called *secrétaires d'Etat*), former member of the National Assembly,[20] and whether they held an elected mandate at a local level: we observe whether a candidate seated in a Regional Council (as ordinary member or vice-president or president), Departmental Council (as ordinary member or vice-president or president), or Municipal Council.[21] From the issues of *Le Guide du Pouvoir* we know whether candidates occupied a position in their party's national governing body. All the variables that we obtained from the fourth source capture whether candidates belonged to an elite group of people with strong political networks and connections. Members of this group are, as we will see in Section 4, privileged in the sense that they received much more funding from parties, individual donators, 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.[22] Furthermore, we primarily focus on the first round of each legislative election. The reason for this choice is that candidates in the first round come from *all* parties, whereas in the second round we typically only observe candidates from the moderate-left (PS) and moderate-right (RPR, UDF). Second round data would therefore not enable us to adequately study candidates of the two extreme parties (FN, PC) and of the small parties. In Section 6.3, however, we use second-round outcomes to check for the robustness of our main results.

3.2 Descriptive statistics

Table 1 gives, for each election and type of candidate, the number of first-round competitors. Overall there are 5,138 candidates in 1993, and 6,197 in 1997.[23] François and Phélippeau (2018) attribute this 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

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

[21] In metropolitan France there are 22 regions, 96 departments, and approximately 36,000 municipalities. Each region, department or municipality is headed and managed by an elected local assembly (called councils) and an executive body which is appointed by the assembly.

[22] Voting patterns are different because candidates in overseas constituencies are relatively less frequently affiliated to the national parties, and the political issues that are debated are even more typically local ones. Spending profiles are not the same mainly because some campaign financing rules slightly differ for overseas candidates.

[23] We had to drop 11 candidates from the 1997 election because of missing observations on campaign spending (initially there were 6,208 candidates 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*.

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

	1993 Mean (sd)	1997 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.

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 that the small parties[24] are primarily responsible for this 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 augmented the size of their pool of candidates from about 2,900 in 1993 to 4,100 in 1997. The number of incumbents has slightly increased (from 462 in 1993 to 479 in 1997), while the number of other types of *a priori* strong and influential candidates has moderately decreased.

Table A1 in the 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. There are on average around 100,000 inhabitants per constituency, with a minimum of 35,000 and a maximum of 165,000. In 1993 the average spending limit per constituency is around FFr495,000 and in 1997 around FFr370,000, a drop of 125,000 French Francs resulting from the first law modification discussed above.

Table 2 shows summary statistics on the campaign spending per candidate and the sources of campaign contributions, separately for challengers, incumbents, and the two

[24]We call all parties other than the five main ones (FN, PC, PS, RPR, and UDF) the "small parties". In both elections more than 150 small parties participated, representing the full political spectrum from the extreme-left to the extreme-right.

elections. All monetary amounts of 1997 are converted into French Francs of 1993 using INSEE's consumption price index. In 1993, a challenger spent on average around FFr80,000 and an incumbent FFr313,000. In 1997, both types of candidates reduced their campaign expenses to respectively FFr57,000 and FFr231,000.[25] In 1993 legal persons donated on average approximately FFr21,000 to a challenger, and more than six times as much to an incumbent (FFr136,000).[26] 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 could safely expect their first-round scores to exceed 5%. On the contrary, many challengers (especially those from the small parties) could not expect with much confidence to pass this threshold, and it was consequently too risky for them to augment personal expenses. Contributions from parties constitute an important source of funding in the election of 1993. In 1997 parties were less generous primarily because of parties' tighter budgets (see footnote 14). The average amount received from voters remains stable over time for incumbents, but there is a drop for challengers in 1997 (the new challengers observed in 1997 are primarily from the small parties and these candidates received few donations from voters). Finally, we see that the 'other sources' clearly constitute the least important form of funding in both election years.

Table 3 reports statistics on a variety of first-round election outcomes. The average number of candidates per constituency has increased from around 9 in 1993 to 11 in 1997. The number of registered voters, the number of regular voters, and turnout, have on average little changed across the two elections. The statistics on the Herfindahl-Hirschman index, and the gap in vote shares[27] between the first-round winner and the runner-up suggest that competition among candidates has somewhat increased. The average vote share of challengers has slightly decreased from 5.5% in 1993 to 4.5% in 1997, a mechanic consequence of the larger cohort size observed in 1997. Average vote shares for incumbents have also somewhat decreased, from 23% in 1993 to 21% in 1997. Overall Table 3 suggests that the aggregate first-round election outcomes have changed little between the two elections.

[25] By comparison, in the U.S. 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 and Rekkas (2008)). It appears therefore that campaign expenditures in France are lower than in the U.S., but comparable to Canada.

[26] The reported means are based on *all* challengers and incumbents, including those who did not receive money from legal persons. Among the 1,232 challengers who did get aid from legal persons (26% of the 4,676 challengers present in 1993), the average amount received is FFr81,556; similarly, among the 400 incumbents who got aid (87% of 462), the average amount is FFr157,629.

[27] As in Section 5, a candidate's vote share is defined here as the number of votes received by the candidate divided by the number of individuals who registered to vote.

Table 3: First-round election outcomes

	1993	1997
	Mean (sd)	Mean (sd)
Number of candidates per constituency	9.3 (2.2)	11.1 (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-Hirschan 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.

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 observed changes over time in spending. 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 candidate characteristics (the variables listed in Table 1) which may affect spending in this district and election. Furthermore, s_{jct}^{firms} is the total funding received by j from legal persons,[28] $s_{jct}^{personal}$ 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 these different sources of contributions, we have $s_{jct} = s_{jct}^{firms} + s_{jct}^{personal} + s_{jct}^{party} + s_{jct}^{voters} + s_{jct}^{other}$.[29] Note that $s_{jc97}^{firms} = 0$ for all j and c, since legal persons were forbidden to contribute in the 1997 election. Finally, Δ represents the first-difference operator, so $\Delta s_{jc} = s_{jc97} - s_{jc93}$, etc.

4.1 Overview

Column 1 in Table A3 reports the OLS estimates from the regression of s_{jc93} on X_{jc93} together with standard errors clustered at the district level. Estimation is based here on

[28] Most legal persons in the data are actually firms (see François and Sauger (2006)), and therefore this source of campaign funding is labelled 'firms'.

[29] For a fraction of candidates in our data, the sum of contributions exceeds campaign spending. This 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 of such candidates so that their sum is equal to s.

all participants of the 1993 election (5,138 observations). Practically all variables are significant at usual levels. Incumbents, (deputy) mayors, cabinet members, former members of the 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 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). The highest spenders were candidates from the moderate-right (RPR, UDF), followed by those of the moderate-left (PS), and finally the candidates of the far-left (PC) and far-right (FN).

Column 2 contains OLS results from the regression of s_{jc97} on X_{jc97} based on all candidates of the 1997 election (6,197 observations). Most variables are again significant and positive. The coefficients associated with the candidate characteristics are now, however, often smaller in magnitude, suggesting that in 1997 the elite candidates still outspent other types of candidates, but by less compared to 1993. Interestingly, the estimates of the party dummies are very different from those reported for 1993. For instance, the FN (far-right party) coefficient has increased from 8,303 to 142,220, and the RPR (moderate-right party) coefficient has decreased from 226,072 to 141,234. While the estimates for 1993 are very dissimilar, those for 1997 are relatively comparable. On average, the spread in spending patterns of candidates across the five main parties was much larger in the first election than in the second one.

Column 3 reports the results of the OLS regression of Δs_{jc} on X_{jc93}. This regression is based on the 1,644 candidates who competed in both elections and in the same constituency, and enables us to analyze which politicians changed their expenditures between the two elections. The incumbents in 1993 fall in the latter category: compared to challengers they decreased their campaign expenses by slightly more than FFr15,000. Mayors and deputy mayors, senior cabinet members, and candidates with a position in their party's governing body also reduced their spending levels in a statistically significant manner. Candidates holding a local elected office increased their expenses but the corresponding coefficients are not significant. The most remarkable finding concerns the party dummies: all five parameters are highly significant. Relatively to the small parties, FN and PC candidates drastically increased their expenses (on average by FFr127,000 and FFr63,000, respectively), while those from the moderate parties reduced campaign expenditures (varying from -FFr24,000 for PS to -FFr64,000 for RPR). Put differently, candidates from the two extreme parties (both left and right) have substantially augmented their expenditures compared to mainstream candidates. Those from FN, for instance, have on average increased their expenditures by FFr190,000 compared to moderate-right candidates from RPR.

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, are often

not statistically significant). Also, the R^2 hardly changes when the other variables are dropped from the model (its value is 0.453 when they are dropped, and 0.495 when they are included). We conclude from this that party affiliation is key in explaining the variation in Δs. In the remainder of this section we will therefore analyze the difference in spending separately for each party, and document how the impact of the reforms varies with the candidate's political color. We do this in particular by adding three suitably defined explanatory variables to the analysis, each variable reflecting a law modification.

4.2 Effects for far-right candidates

Let us first study Δs for the far-right party.[30] As Table A4 in Appendix shows, there is not a single FN candidate whose campaign expenditures in 1993 was above the spending limit of 1997; i.e., there are no observations situated between the two spending limit functions in Figure 1. The first modification of the campaign financing rules (namely, the change in spending limit) had therefore no impact on candidates of the far-right. Implicitly, we are assuming here that, in the absence of the reforms, candidates would have spent roughly the same in both elections.

Table A5 in the Appendix indicates that only around 11% of the 249 FN candidates present in both elections were financially supported by legal persons, and on average they received just around FFr1,700 from firms (among the 554 candidates present in 1993, about 10% received donations and the average donation is FFr1,200). For the vast majority of these FN candidates, the second modification (namely, the prohibition of funding by firms) did not have an effect either (assuming that firms would have given similar amounts had the reforms not been implemented).

The difference in their personal expenditures is, however, substantial: on average, $\Delta s_{jc}^{personal}$ equals slightly more than FFr107,000. Looking at the upper-left plot in Figure 2 (in the 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.[31] At the same time, in both elections they received little

[30] The FN campaign expenditures of 1993 and 1997 are not suspected of being fraudulent, contrary to those of 2012. The far-right party has been accused of running an illegal enrichment scheme during the 2012 legislative elections. According to the *Financial Times*, October 6th 2016, the scheme involved a company (run by a member of Ms Le Pen's inner circle) overbilling campaign kits sold to FN candidates, which were then reimbursed by public funds.

[31] First-round scores of FN candidates were generally well above the 5% threshold in both elections (on average they received about 12% of the votes in 1993, and 15% in 1997 – see Table A2), so they could anticipate without too much risk that their personal expenditures would be reimbursed by the State.

support from voters and their party,[32] and the difference in these two sources of campaign money is relatively small: for the average FN candidate we have $\Delta s_{jc}^{voters} = -\text{FFr}2,756$ and $\Delta s_{jc}^{party} = -\text{FFr}741$. Putting all these findings together, we find 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 affected their spending evolution.

This is confirmed by the results of a regression of Δs_{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 for FN candidates. The last two variables are intended to capture the impact of the second and third law modifications on campaign spending evolution between 1993 and 1997.[33] The estimate of the slope coefficient corresponding to the third modification is 0.774 with a standard error equal to 0.112, so this change in the finance laws indeed has a statistically significant effect. The estimate is positive, implying that a larger potential increase in reimbursable personal contributions (relatively to 1993) is associated with a larger increase in spending levels across elections. The contribution of firms in 1993 is also strongly significant and the parameter estimate takes a negative sign: 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

Next we focus on PC candidates. Table A4 shows that 2.5% of those present 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 (this 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 present in both elections, the figures are slightly higher, at 3.3% and FFr2,158 respectively. Clearly, the first modification had an impact only on a small fraction of communist candidates. The second modification did have a strong effect though: almost 30% of PC candidates present in both elections received money from firms, and the average donation is around FFr24,000 (see Table A5 in the Appendix).[34]

PC candidates have, like those of FN, considerably increased their personal campaign investments across the two elections (on average by about FFr76,000). Unlike the far-right

[32] 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. This is congruent with the more general results obtained by Bichay (2020). Based on an international comparison, he shows that "... increasing the degree to which public funding drives political campaigns disproportionately aids radical-right parties" (page 1).

[33] The variable $max(0, Limit_{c,97}/2 - s_{jc93}^{personal})$ is positive if personal spending in 1993 is below the maximal reimbursable limit of 1997, and zero otherwise. Later on in the paper this variable will be used as an instrumental variable for the difference in spending across elections, and has the advantage (relatively to the variable $Limit_{c,97}/2 - Limit_{c,93}/10$) of varying across candidates in the same electoral constituency.

[34] This average is calculated over all PC candidates present in both elections. Among those who received financial help from legal persons, the average donation amounts to FFr81,000.

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 **	-1.110 ***	-0.442 **	-1.031 ***
		(0.302)	(0.098)	(0.195)	(0.069)
Contribution firms in 1993	-1.653 ***	-0.595 ***	-0.333 ***	-0.561 ***	-0.370 ***
	(0.253)	(0.072)	(0.033)	(0.057)	(0.023)
Pers. contr. below 1997-limit/2	0.774 ***	-0.347 **	0.368 ***	0.394 ***	0.305 ***
	(0.112)	(0.140)	(0.089)	(0.062)	(0.048)
Constant	622	92,746 ***	-69,807 ***	-84,884 ***	-67,972 ***
	(14,887)	(22,023)	(15,079)	(10,907)	(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 Δs_{jc} on a constant, $max(s_{jc93} - Limit_{c,97}, 0)$, s_{jc93}^{firms}, $max(Limit_{c,97}/2 - s_{jc93}^{personal}, 0)$, 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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

politicians, however, the personal contributions are now frequently far below the maximal reimbursable amounts (see the top-middle plot in Figure 2 in the Appendix). Performing the same kind of regression as above (except that we have now added to the model a variable reflecting the first modification, namely $max(s_{jc93} - Limit_{c,97}, 0)$), we see that the variable capturing the third modification is significant but has a negative effect. Although PC candidates have thus increased their personal expenditures, the third modification has an unanticipated effect in the sense that an increase in the reimbursable amount *reduces* the spending level across elections. The variables associated with the first and the second law-reforms are also statistically significant and their coefficients take, as expected, negative signs. This means that candidates whose campaign expenditures in 1993 exceed the limit of 1997 decrease their spending across the two elections (relatively to those not exceeding this limit), and the difference in spending also decreases with the amount of donations from firms in 1993.

4.4 Effects for moderate and small parties' candidates

The candidates of the centre-left (PS) and centre-right (UDF, RPR) can be analyzed together since their spending profiles Δs are comparable. The first law modification influenced them much more than candidates of the extreme-left and extreme-right. As indicated in Table A4, 26% of PS candidates present 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 these candidates, and donated

substantial amounts of money. The politicians of the moderate parties also benefited from the third modification since their personal contributions increased on average by about FFr88,000. As Figure 2 shows, many of them spent well below or above the maximal reimbursable amounts. Pooling all observations of the three parties together, our third law reform variable has, however, a significant and positive effect on Δs_{jc} (see column 3 of Table 4). The other two reform variables are also significant and take the expected signs.

Finally let us look at the candidates of small parties. The first modification had a small impact since only 4% of those present in both elections spent above the limit of 1997 (Table A4 in Appendix). As Table A5 shows, the second modification had a stronger effect as around 18% of candidates received financial help from firms (with an average donation equal to FFr16,000). Many politicians abstained from investing personal money in the two election campaigns (see Figure 2), most likely because for a lot of them the 5% threshold was out of reach. The difference in personal expenditures across the two elections is consequently also small, around FFr2,500 on average. Column 4 of Table 4 shows, however, that the variable capturing the third modification has a statistically significant and positive effect on Δs_{jc}. Our two other reform variables are also significant and have, again, a negative effect.

4.5 Conclusions and implications

One takeaway from this section is that the finance reforms introduced between 1993 and 1997 are clearly associated with the observed changes in campaign spending across these two elections. Indeed, the results reported in Table 4 show that all reform variables are statistically significant and have the expected effects on Δs in practically all regressions discussed so far. This is confirmed by column 5 of the table, which gives the estimates of the same regression model but based on all candidates pooled together: the dummies with our reform variables are again significant and all estimates take the correct signs. Note that these last results correspond to the model estimates presented in column 3 of Table A3 in the Appendix, except that the regression equation now also 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 these variables turn out to be strong determinants of Δs.

Another takeaway is that the legal changes of the mid-1990s cannot explain *all* the observed variation in spending. This is in particular revealed through Figure 2 which clearly shows that the maximal reimbursable limits are non-binding for many candidates. Similarly, as shown in Table A4, the spending ceilings are often non-binding as well. Finally, only a fraction of candidates has received financial help from firms (Table A5). There are therefore other, unobserved, determinants of Δs, and these hidden variables may affect the difference in votes at the same time. Hence we cannot exclude that in an equation relating differences in votes to differences in spending, the latter variable is potentially

endogenous. To avoid a bias resulting from this 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 formally test 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 are also discussed here. We adopt a model *à la* Berry (1994), a typical framework from the IO literature and originally designed to estimate demand models of differentiated goods. The analogy between a differentiated goods market and an electoral setting is strong. Consumers in a goods market can be seen as voters in an election. While consumers choose between goods that differ in product-features and publicity spending –amount of money spent by producers to advertise their goods–, voters can vote for candidates who differ in their characteristics and amounts of campaign spending. The equivalent of the outside option in a goods market (i.e., the possibility for consumers not to purchase any of the available products) is the option to abstain from voting.[35] Given this strong analogy, it is thus natural to apply Berry (1994)'s framework to analyze elections.

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

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

where δ_{jct} is the "mean utility level" of candidate j, and ϵ_{ijct} is an idiosyncratic error term affecting the utility of choice j. The mean utility will be parameterized as the sum of four components:

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

[35] Registered individuals also have a "blank vote" option, i.e., they can cast a vote without choosing any candidate. In our data such voters are not distinguished from individuals who abstained from voting altogether. The number of blank votes is very small in France, so not observing them as a separate category does not seem restrictive.

- ξ_{jct} is an unobserved local demand shock affecting candidate j in constituency c at time t. Unlike the component μ_{jc}, the term ξ_{jct} accounts for the impact of unobserved popularity determinants that do change over time. It may for instance indicate whether the candidate was involved in a scandal prior to the election, or measure the candidate's campaign promises.

- $\beta s_{jct} + \gamma X_{jct}$ is an index of covariates that may enhance or depreciate popularity. Here s_{jct} and X_{jct} represent, as above, the campaign spending by candidate j and the vector of other variables characterizing this candidate, respectively. The latter are assumed to be independent from the unobserved error terms μ_{jc} and ξ_{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 these two groups of politicians. For notational simplicity, this is not formally expressed in equation (2).

- α_{ct} is a constituency and election specific fixed effect which accounts for any conjunctural and contextual factor affecting district c and election t (rate of unemployment, level of local taxes, quantity and quality of local public decisions, etc.).

When i abstains from voting the utility is

$$U_{i0ct} = \delta_{0ct} + \epsilon_{i0ct} = 0 + \epsilon_{i0ct}, \tag{3}$$

where ϵ_{i0ct} is the idiosyncratic error term affecting the utility of voter i when opting for the outside option, and δ_{0ct} has been normalized to zero for identification purposes.

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

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

and

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

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

An inconvenient feature of equation (4) is that v_{jct} depends not only on the vote determinants of candidate j, but also on the determinants of all opponents. Taking the logarithm of the ratio of vote share over abstention rate enables, however, to eliminate all opponents' determinants:

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

The parameters β, γ, and α_{ct} can be estimated by applying OLS to this equation using data on candidates competing in election t, or using pooled data on all candidates from both elections combined. The error term in the regression equation (6), $\mu_{jc}+\xi_{jct}$, is potentially correlated with the spending amount s_{jct}. Spending can be linked to μ_{jc} because, for instance, charismatic candidates can collect more money from their party or from voters. There may be also a correlation between s_{jct} and ξ_{jct} because, for instance, candidates implicated in scandals can have more difficulties in raising money, or because those promising new policies can get more funding from the voters' targeted groups. If indeed spending is correlated with the error term, both the cross-section and pooled OLS estimates are biased.

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

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

and then estimating the parameters β, γ, and $\Delta\alpha_c$ using OLS applied to model (7). This FD estimator is based on data on the set of candidates observed in the same constituency in both elections. Since μ_{jc} has disappeared from this equation, the FD estimator is unbiased even when there is a correlation between this unobserved term and s_{jct}. The only requirement for unbiasedness is now 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 may be a restrictive assumption, we shall now rewrite our model by taking the incumbency indicator out of the vector X, and by explicitly indicating that spending s is actually interacted with challenger and incumbency indicators. Transformed model (7) becomes

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

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 (8) and the indicator $chal_{jct}$ are analogously defined, and ΔX_{jc} still stands for the difference in the vector of characteristics between the two elections (except that X_{jct} no longer includes the incumbency indicator inc_{jct}).

The first two terms in (8) are potentially correlated with $\Delta\xi_{jc}$ because, as shown in Section 4, changes in campaign spending are only partially determined by the campaign financing reforms.[36] Consequently we cannot rule out the possibility that candidates choose Δs_{jc} partly in an endogenous manner. For example, candidates who manage to improve

[36] Admittedly, these conclusions are drawn based on a regression of Δs on ΔX and our reform variables. The conclusions remain similar, however, when instead we separately regress $\Delta(s \times inc)$ and $\Delta(s \times chal)$ on the same set of explanatory variables.

their prospects of victory by introducing new and appealing political promises may benefit from relatively larger increases (or lower decreases) in campaign money. Similarly, politicians involved in a scandal between the two elections reduce their chances of success in the second one and will also find it harder to get funded by voters or by their party. As a solution, we propose to use 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 $z_{3jc} = max(Limit_{c,97}/2 - s_{jc93}^{Perso}, 0)$.

These instruments are valid in particular if they are uncorrelated with the error term $\Delta\xi_{jc}$. There are reasons to believe that this may be the case insofar as z_{1jc} and z_{3jc} are partially defined by the number of inhabitants in constituency c –through the spending limit prevailing in 1997–, a variable that is *a priory* unrelated to this error term. The two instruments are also defined by s_{jc93} and s_{jc93}^{Perso}, and since these variables measure spending and personal contribution in 1993, we believe that they are not related to $\Delta\xi_{jc}$ either. 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 only depends on this candidate's (expected) success determinants prevailing in 1993 , that is to say characteristics X_{jc93} and unobserved determinants μ_{jc} and ξ_{jc93}. However, there is no reason to think that the generosity of firms in 1993 is related to a shift in unobserved popularity determinants across the two elections, as captured by $\Delta\xi_{jc}$. Our intuition is confirmed in the next section since the Sargan-Hansen test of over-identifying restrictions indicates the validity of these instruments (together with some other IVs defined just below).

Another source of endogeneity may come from the variable Δinc_{jc}. While it may seem credible to assume that ξ_{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 that ξ_{jc93} is uncorrelated with inc_{jc93} (similarly, no correlation with a shock in 1993 and incumbency status in 1993), ξ_{jc93} is likely to affect 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 run as incumbent in 1997. This would invalidate the strict exogeneity assumption on inc_{jct}, which in turn would imply that Δinc_{jc} and $\Delta\xi_{jc}$ are correlated. A common solution to this problem (see for example Wooldridge (2002), chapter 11) is to instrument Δinc_{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 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 Δinc_{jc}, on ΔX_{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 present in both elections. Reported are the OLS estimates of β and γ 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 strongly 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 only matters for challengers. The estimate of the coefficient on challenger spending implies that a challenger with a vote share of 30% who increases spending by FFr100,000 can expect his share to increase by 7.7 percentage points.[37] Column 1 also shows that there is a significant increase in the vote share for incumbents and candidates occupying a seat in a municipal, departmental, or regional council. There is a strong premium 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 also not significantly different from zero for former members of the Assembly, members of the Senate, national cabinet members, and candidates occupying a position in their party's national governing body. The five party indicators are significant though, confirming that candidates from the five main parties indeed receive more votes than those from the small parties.

Column 2 of Table 5 reports the results for the 1997 election, again based on the sample of candidates present in both elections. As for 1993, spending is significant for challengers but not for incumbents. The estimated effect of challenger spending is now 0.710, almost twice the value obtained for 1993. This estimate implies that by adding FFr100,000 to campaign spending, a challenger who has initially 30% of the vote share can augment this score by almost 15 percentage points. The significance and magnitudes of the coefficients associated with our control variables sometimes differ from those estimated for 1993 as well, but the implications of the point estimates are roughly the same for both elections.

Column 3 contains the estimation results of model (8) using again the sample of can-

[37] The marginal effect of campaign spending is given by $\frac{\partial v}{\partial s} = \beta v(1-v)$, where v is the vote share and β the coefficient associated with spending. For a challenger with $v = 0.3$ and $\Delta s = 1$ (spending is measured in hundred thousands of French Francs), and using that the estimate of β for challengers is 0.365, we get $\Delta v = 0.365 \times 0.3 \times 0.7 = 0.077$, so the share of this challenger increases from 30% to 37.7%. The effect mentioned in the introduction is based on a representative challenger with $v = 0.05$ (see Table 3), who doubles expenditures ($\Delta s = 0.8$, see Table 2), and for whom $\beta_2 = 0.12$ (the average of IV estimates reported in Table 6).

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***	0.710***	0.133***
	(0.028)	(0.050)	(0.022)
Spending if incumbent	0.029	0.053	0.013
	(0.042)	(0.051)	(0.027)
Incumbent	1.343***	1.711***	0.276***
	(0.158)	(0.146)	(0.096)
Local elected office:			
Member of Municipal Council	0.349***	0.237***	0.115**
	(0.058)	(0.052)	(0.048)
Deputy Mayor	0.402***	0.319***	0.151**
	(0.084)	(0.076)	(0.073)
Mayor	0.356***	0.270***	0.145**
	(0.063)	(0.060)	(0.059)
Member of Departmental Council (DC)	0.259***	0.150***	-0.030
	(0.063)	(0.058)	(0.094)
VP or President of DC	0.091	0.016	0.254
	(0.197)	(0.140)	(0.223)
Member of Regional Council (RC)	0.241***	0.090	0.050
	(0.050)	(0.056)	(0.069)
VP or President of RC	0.232	-0.107	-0.360*
	(0.333)	(0.234)	(0.205)
Former member of Assembly	0.063	0.333***	0.110*
	(0.107)	(0.110)	(0.061)
Member of Senate	-0.120	0.021	0.186
	(0.137)	(0.132)	(0.117)
Senior member of cabinet	-0.062	0.048	-0.312***
	(0.223)	(0.232)	(0.084)
Junior member of cabinet	-0.144	-0.183	-0.283**
	(0.186)	(0.129)	(0.137)
Political party leadership	0.054	0.068	0.007
	(0.061)	(0.063)	(0.050)
Party affiliation:			
FN	1.227***	0.675***	
	(0.066)	(0.080)	
PC	0.586***	0.445***	
	(0.062)	(0.071)	
PS	0.589***	0.851***	
	(0.098)	(0.089)	
RPR	0.939***	0.607***	
	(0.107)	(0.091)	
UDF	0.956***	0.606***	
	(0.103)	(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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

didates present in both elections.[38] We report FD estimates of β_1, β_2, γ_1, and γ_2, together with standard errors clustered at the district level. The five party indicators are omitted from the regression since there is too little variation across time in these dummies to estimate their effects with sufficient precision. The campaign spending of challengers is still significant at the 1% level, but the effect is now smaller relatively to the cross-section estimates reported in columns 1 and 2: the FD estimate of β_2 is 0.133, implying that an extra FFr100,000 in spending now only adds 2.8 percentage points to the vote share. This suggests that the estimates that do not control for the unobserved candidate characteristics μ_{jc} are upwards biased. The effect of incumbent spending is, as in the cross-sectional setting, insignificant both in a statistical and economic sense. Moreover, we see that the effects of the control variables are broadly speaking comparable to what we found in columns 1 and 2. The only exceptions are the effects for junior and senior national-cabinet members, which are now strongly significant and negative.[39]

In a nutshell, these first results indicate that campaign spending matters for challengers but not for incumbents. Moreover, our cross-sectional estimates of the impact of challenger spending differ considerably from the FD estimate, suggesting that the unobserved popularity component μ plays an important role in determining vote shares. The fact that the FD estimate is relatively lower is intuitive because it hints, as expected, at a positive correlation between spending decisions and μ.[40] While the FD method is robust to a correlation between μ and the regressors in (8), it nonetheless produces misleading estimates if the latter are related to $\Delta\xi_{jc}$. This is confirmed in our data: for all IV combinations used in the TSLS procedure, the null hypothesis that the regressors $\Delta(s_{jc} \times inc_{jc})$, $\Delta(s_{jc} \times chal_{jc})$, and Δinc_{jc}, are exogenous, is strongly rejected.[41] To handle this problem we now turn to IV estimation.

6.2 IV results

Table 6 reports TSLS estimates (together with heteroskedastic-robust standard errors) of our two key parameters, γ_1 and γ_2, and several diagnostic tests. We report Kleibergen-Paap's statistic (associated with the underidentification test), Hansen's J statistic (overi-

[38] One candidate has a vote share equal to 0 in 1993 and another one in 1997, and they are removed from the samples, explaining why there are 1,643 observations instead of 1,644 in the first and second column, and 1,642 observations instead of 1,644 in the third.

[39] Cabinet members standing for election in 1993 (resp. 1997) all belonged to the PS (resp. RPR and UDF), and the difference in vote share Δv tends to be positive for PS candidates and negative for RPR and UDF candidates (see Table A2). The difference in cabinet membership dummies thus equal -1 for PS minister, +1 for RPR or UDF minister (and 0 in the majority of other cases), thereby explaining the negative effects we find for cabinet members.

[40] As is well known, in a regression model with a single endogenous variable (and no other regressors), the OLS estimator is upward biased if this variable is positively correlated with the error term.

[41] To test for endogeneity we use the `endog` option in the Stata module `ivreg2`.

dentification test), and Cragg-Donald's statistic (weak instrument test). Below the first two test statistics are the corresponding p-values, and below the last one is Stock-Yogo's 5% critical value for the weak instrument test. The table gives results only for combinations of our seven excluded instruments such that both the underidentification and overidentification tests go in the right direction. Put differently, 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 exogeneous regressors in (8) are uncorrelated with the error term. From the table we see that this 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 are thus sufficiently correlated 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 does have a significant effect. The estimate of β_2 varies between 0.086 and 0.168, meaning that a challenger with initially 30% of the vote share can expect to increase it by between 1.8 and 3.5 percentage points after adding an additional FFr100,000 to the campaign budget. As our previous results, we thus find that vote outcomes do no react to changes in spending by incumbents. Spending by challengers does influence their election prospects, but only marginally. Our IV estimation strategy suggests that this impact is even smaller than what we found in Section 6.1 (the average IV estimate of β_2 over all eight combinations is 0.123, slightly below the FD estimate reported in Table 5).

6.3 Robustness analysis

This section presents two 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 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:

$$\log v_{jct} - \log v_{0ct} = \beta_1 s_{jct} + \beta_2 s_{kct} + \gamma X_{jct} + \alpha_{ct} + \mu_{jkc} + \xi_{jct}. \tag{9}$$

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

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***	0.0930**	0.150***	0.0906*	0.142***	0.168***	0.0864**	0.101**
	(0.0475)	(0.0412)	(0.0515)	(0.0546)	(0.0474)	(0.0526)	(0.0414)	(0.0444)
Spending if incumbent	-0.00547	0.0235	-0.00452	0.0255	0.00692	-0.0238	0.0355	0.0126
	(0.0347)	(0.0329)	(0.0350)	(0.0438)	(0.0370)	(0.0412)	(0.0353)	(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;
	$z_1 \times inc_{93}$;	$z_1 \times inc_{93}$;	$z_1 \times inc_{93}$;	$z_2 \times inc_{93}$;	$z_1 \times inc_{93}$;	$z_1 \times inc_{93}$;	$z_1 \times inc_{93}$;	$z_1 \times inc_{93}$;
	$z_2 \times inc_{93}$;	$z_2 \times inc_{93}$;	$z_2 \times inc_{93}$;	$z_3 \times inc_{93}$;	$z_2 \times inc_{93}$;	$z_2 \times inc_{93}$;	$z_2 \times inc_{93}$;	$z_2 \times inc_{93}$;
	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}	inc_{93}

Notes: The upper panel reports TSLS estimates (heteroskedasticity-robust standard errors in parentheses) of β_1 and β_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 $z_{3jc} = max(Limit_{c,97}/2 - s_{jc93}^{Perso}, 0)$, these variables interacted with inc_{jc93} (the dummy indicating whether j is an incumbent in constituency c and year t), and inc_{jc93} itself. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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 μ_{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

$$\Delta \log v_{jc} - \Delta \log v_{0c} = \beta_1 \Delta s_{jc} + \beta_2 \Delta s_{kc} + \gamma \Delta X_{jc} + \Delta \alpha_c + \Delta \xi_{jc}, \tag{10}$$

which no longer depends on the pair-specific error μ_{jkc} but, compared to equation (7), includes the difference in spending of k, Δs_{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 β_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.[42] 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 issue of sample selection. 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 A6 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

[42] The estimate of β_2 is 0.257 (standard error is 0.215), so opponent's spending is not significant either.

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 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 A6, 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 A6 reports the results for the 1997 election using all candidates standing for election in that year.[43] Again, campaign spending is now significant for incumbents but the estimated impact remains small.[44] 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 A6 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 obtained with the restricted samples, suggesting that endogenous sample selection is not an important issue.

7 Summary and concluding remarks

This paper has addressed an old question in the political economics literature using a novel empirical approach. Our strategy to identify and estimate the impact of campaign spending on election outcomes exploits the campaign financing reforms introduced in France in the mid 1990s. Using data on two consecutive French legislative elections held, one before the introduction of the new laws (1993) and one after the introduction (1997), we find that candidates from the far-left and far-right substantially increased their campaign budgets between 1993 and 1997. Their campaign expenses were relatively low in 1993 essentially because voters and legal persons were not willing to finance their campaign activities. These candidates substantially increased expenses in 1997 thanks to the more generous reimbursement of personal contributions. Candidates from the centre-left and centre-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. In

[43] 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.

[44] 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 and Phélippeau (2018). This large bulk of low-spending-few-votes candidates pushes upwards the effect of spending in the full data sets.

the second one they increased personal investments but not enough to make up for the reduction of these caps and the loss of donations from legal persons.

To study the link between campaign spending and vote outcomes, we use a model proposed by Berry (1994). Originally designed to analyze consumer purchases in differentiated-product markets, this model can easily be transposed to an electoral setting, and is ideally fitted to account for multiple-candidate elections (as is the case in French legislative elections). We first estimate the resulting vote share equation separately on the cross-sections of 1993 and 1997. These estimates are our benchmark results. Next we consider a first-difference version of the vote equation which is convenient as 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 though: if the average challenger in our sample doubles campaign expenditures, his vote share only increases by half a percentage point. As in Levitt (1994), our FD estimate of the challenger effect is substantially smaller than our cross-section estimates, suggesting that unobserved heterogeneity among candidates plays an important role in determining vote shares.

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

Our finding that spending matters only for challengers but not for incumbents is in line with the very earliest works on this question (e.g., Jacobson (1978), Abramowitz (1988), Ansolabehere and Gerber (1994)) and with more recent results obtained from multiparty systems (e.g., Benoit and Marsh (2003), Benoit and Marsh (2010), Pattie et al. (2017), Shin et al. (2005)). It would be particularly welcome to have new studies investigating how candidates precisely finance their campaigns (through personal contributions, donations from their party or voters, etc.), and what they actually do with this money (cover travel expenses, finance political rallies, etc.). Such studies may shed light on the still puzzling question why incumbents spend their money less efficiently than challengers, and why campaign spending effects are so marginal.

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A Additional figures

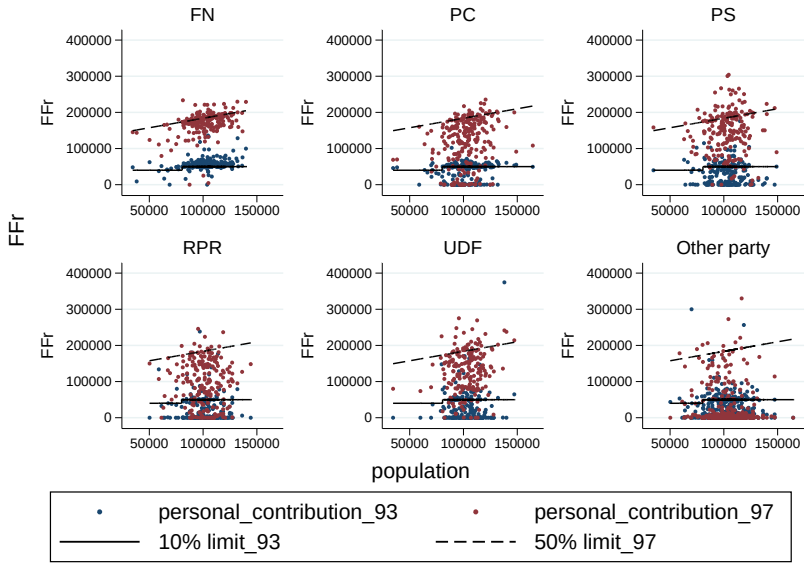

Figure 2: Personal spending of candidates in 1993 and 1997 by party

B Additional tables

Table A1: 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 A2: First-round score and number of representatives

	1993		1997	
Party	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 A3: Determinants of campaign spending

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

	1993	1997
Spending if challenger	0.440***	0.864***
	(0.018)	(0.022)
Spending if incumbent	0.064***	0.118***
	(0.024)	(0.036)
Incumbent	1.366***	1.749***
	(0.089)	(0.097)
Local elected office:		
Member of Municipal Council	0.447***	0.290***
	(0.038)	(0.032)
Deputy Mayor	0.457***	0.346***
	(0.047)	(0.044)
Mayor	0.392***	0.338***
	(0.037)	(0.033)
Member of Departmental Council (DC)	0.257***	0.154***
	(0.035)	(0.036)
President of DC	0.309***	0.142
	(0.089)	(0.088)
Member of Regional Council (RC)	0.271***	0.173***
	(0.036)	(0.034)
President of RC	0.309	-0.214
	(0.189)	(0.150)
Former member of Assembly	0.086	0.130**
	(0.072)	(0.059)
Member of Senate	0.164	0.113
	(0.178)	(0.155)
Senior member of cabinet	-0.284*	0.197
	(0.149)	(0.129)
Junior member of cabinet	-0.070	0.163
	(0.213)	(0.217)
Political party leadership	0.098**	0.128***
	(0.040)	(0.043)
Party affiliation:		
FN	1.352***	0.669***
	(0.030)	(0.038)
PC	0.677***	0.464***
	(0.030)	(0.033)
PS	0.658***	0.922***
	(0.042)	(0.046)
RPR	0.838***	0.609***
	(0.058)	(0.061)
UDF	0.759***	0.618***
	(0.060)	(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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

C 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 persons is higher than campaign spending, then donations from legal persons 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.