Campaign spending limits and electoral competition in a floating two-party system*

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Abstract

Our paper deals with the influence of campaign spending in Quebec elections for the last decade. Based on an empirical analysis of 2300 candidates, our contribution is twofold. First, we provide an estimation of the relation between money and vote. Second, we propose an alternative to the dominant (single) instrumental estimation of votes by focusing on the determinants of the distance between the individual campaign spending and the constituency's spending limit. To address the remaining endogeneity of the probability that the spending ceiling binds, we propose an empirical strategy that exploits exogenous shocks to electoral competition.

Keywords: Campaign spending, spending limits, vote, electoral competition, Quebec.
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1 Introduction

In a provocative paper, Ansolabehere, de Figueiredo and Snyder (2003) wondered why there was so little money in US politics. Their main argument rests on the power of money to reveal

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political preferences of candidates towards ill-informed voters. At the opposite, some countries (France, Canada, and Ireland) have restricted the use of money during electoral campaign by enacting some laws for regulating the nature and amount of money in politics. Beyond the rationale for regulating money in politics, scholars have mainly focused on the relation between campaign spending and electoral outcomes. To date, a majority of studies show that campaign spending provides a positive but weak electoral advantage for incumbents, but for the same dollar invested the challenger receives more votes than the incumbent. To a large extent, scholars have focused their attention on the US - a system where traditionnaly only two candidates compete. The Canadian (at the federal level), Irish and French cases offer alternative perspectives with some institutional differences. For instance, no spending limit exists in Ireland, and the two-round system in France leads candidates to make a strategic use of money depending on whether they expect to be present at the second round or win the election at the first round. In Canada, the incumbency rate is weaker than in US and France (Miligan & Rekkas 2008, Foucault & François 2005, Gerber 2004).

All in all, this positive advantage for incumbents must be analyzed more accurately by taking into consideration the dynamic of electoral competition, especially the arrival of new players in campaigns. A good example of such an institutional change is given by the Quebec elections during the last decade. Indeed, the traditional two-party system in Quebec has recently evolved into a three-party system in 2007 and 2008. Consequently, no paper has studied the impact of such a change on campaign spending patterns of candidates.

The theoretical background of money in politics is divided into two avenues (micro and macro perspectives).

On the one hand, scholars have investigated the influence of individual campaign spending on votes. A recurrent result indicates that incumbent candidates receive, *ceteris paribus*, fewer votes than their first challengers for the same amount of money spent. An econometric problem was initially raised by Green and Krasno (1988) and suggested that campaign expenditures may suffer from endogeneity and make OLS results biased. Since this seminal paper, much of the academic literature has used instruments to correct endogenity of campaign spending. Once the endogeneity of candidate spending levels is properly taken into account, Gerber (1998) shows that the marginal effects of incumbent and challenger spending are roughly equal. In contrast to previous research showing that, because of higher marginal returns to challenger spending, the incumbent's spending advantage cannot explain high incumbent reelection rates, this article shows that in an average Senate election the incumbent's spending advantage yields a 6% increase in the incumbent's vote share. A last piece of research on this econometric issue was provided by Rekkas and Milligan (2008) who find that the campaign spending limits were binding mostly for incumbent candidates. Higher spending is found to lead to greater vote

share, with an endogeneity-corrected estimate higher than the OLS estimate. This may suggest that unobservable lower quality incumbents spend more to compensate for their shortcomings. They also find that higher spending limits lead to fewer close races, lower voter turnout, and fewer candidates running. This Canadian result is narrowly linked with the empirical investigation of the economic logic of spending limits initiated by Stratmann (2006).

On the other hand, some scholars have developed political economy models to understand how money could affect the content of public policies once candidates are elected. The main theoretical background is derived from the interest group literature where the origin of contributors could be associated with some favorable regulation policies. It means that campaign contributions are seen as a political investment who could force legislators to favor some groups or threaten regulation or harassing oversight unless interest groups contribute (Grier and Munger, 1991; Romer and Snyder, 1994; Ansolabehere and Snyder, 1999). In a context of public regulation of political financing where private firms can no longer finance candidates or parties, the interest groups theory does not seem adequate to understand the influence of money in politics. Lastly, Campanate (2011) formalized a voting model in which initial inequalities could affect the individual contributions to American parties by supporting empirically that inequality increases contributions to Republicans, but not to Democrats.

Our paper makes two contributions. First, it provides an estimation of the relation between money and vote in Quebec by distinguishing the two-party system from the three-party system. Second, it suggests an alternative to the dominant (single) instrumental estimation of votes by campaign spending by focusing on the determinants of the distance between the individual campaign spending and the constituency's spending limit. Spending limits should tend to be binding for candidates likely to face the closest elections. Conversely, as we move away from close races, sure-losers and sure-winners have a weaker incentive to spend. Our empirical strategy will exploit the consequences of rapid increases in the popular support for a third party on the degree of electoral competition faced by candidates. In this paper, we follow the first-generation theoretical perspective by exploiting new data (Quebec campaign spending) and discussing the quality of instruments usually used. Our argument consists in using a 2SLS estimation to simultaneously take into account the endogenous campaign spending but also the endogenous spending limit in each district through the rising a third party in a traditionnal two-party system.

Section 2 presents the main patterns of political financing in a floating two-party system between 1998 and 2008. Section 3 describes the empirical strategy for properly assessing the impact of campaign spending on vote shares. Section 4 states the main results and provides some empirical evidence.

2 A floating two-party system: the case of Quebec in 2007

So far, the literature has relied on estimates of the return on campaign spending based either on two-party systems (chiefly the US) or on multi-party systems (chiefly in Europe). Yet the results from both cases capture the effect of institutional features that inevitably limit their comparability. How would changes in the number of major parties contending in a given electoral jurisdiction affect the return to campaign spending on voting outcomes? We attempt to answer this question by exploiting a quasi-natural experience provided by the sudden rise and demise of a third party in Quebec (the Canadian province with the second-largest population). We will term such a situation a 'floating two-party system.' Qu.

2.1 Quebec's partisan politics

As is customary in British parliamentary systems, Quebec's political context is historically characterized by clear-cut bipartism. Today's two main parties, the Quebec Liberal Party (QLP) and the Parti Quebecois (PQ) have sent the two largest delegations of members in the National Assembly after each general election since 1973. Between the 1973 and the 2003 election, their combined delegations never made up for less than 88.2% of seats, a low mark attained in 1976. Except for 1976, when the PQ first took office, the combined PQ and QLP delegations made up for more than 95% of seats. That number was 96.8% in 2003, with the Action démocratique du Québec (ADQ) holding four seats in the 125-seat provincial assembly.

In the 2007 election, the ADQ modified the electoral landscape in most electoral districts – including districts only recently believed to be unshakable strongholds for one of the two dominant parties – and managed to finish second with 41 members of the National Assembly (MNAs). They outscored the PQ by five seats to form the Official opposition to the Liberal government. The swift rise of the ADQ (from four to 41 seats) affected both the PQ (down nine seats at 36) and the QLP (down 28 seats at 48), the latter forming the first minority government in the province since the XIX$^{\text{th}}$ century. Together, the ADQ and the ruling QLP held a record-low 71.2% seat share.

Premier Jean Charest's minority Liberal government did not last long and a snap election was held the following year. With the 2008 election, the province reverted back to 'normal,' with the two-party system back in full swing. The number of seats won by the ADQ went back down to seven and the combined PQ and QLP delegations totalled 93.6%.

The 2007 election, with its three-party outcome, is thus an anomaly in Quebec's recent history. After the 1970 election, four parties had won seats in the National Assembly but, unlike in 2007, the QLP still managed to clinch to a majority government and the combined delegations of the first two parties made up 82,4% of the assembly members. The 1970 election

can be seen as a transition between two bipartisan eras, as the PQ replaced the Union nationale (UN), who governed for most of the 1936-1960 period, as Quebec's main rival to the QLP.

What triggered a floating two-party system in Quebec in the second half of the 2000 decade? By 2007, Jean Charest's Liberal government was experiencing record-low popularity levels. The PQ, with an unpopular newly elected leader, could not benefit from the Liberals' weakness. Together, the unpopularity of the two main parties paved the way to the unexpected performance of the ADQ in 2007, leading to the election of many rookie candidates. Forming the Official opposition put the spotlight on these inexperienced MNAs and eventually led to the widespread disappointment crystallized in the outcome of the 2008 election.

2.2 Campaign spending: descriptive patterns and financing regulation

Fundraising and campaign spending in Quebec are closely regulated activities. Financing rules of the political market in Quebec have evolved around two principles: the control of campaign spending and the public financing of political parties and candidates. From 1932 to 1963, no legislation was enacted to control campaign spending. From 1963 to 1977, the Electoral Law defined a restrictive setting to promote both equity and transparency. The basic advances of this law were the individual contribution limit of $3,000 per voter, the obligation for any party to declare revenues exceeding $100, the public financing based on a fixed rule of $0.25 per registered voter and some sanctions against offenders. This law strictly defined campaign spending, allowed advertising spending, implemented limits of spending for each constituency and authorized public refund for both candidate and party spending after the election. Finally this law created the *Directeur général du financement des partis politiques*, a public authority in charge of supervising the respect of the new regulations and acting as the only regulator of political financing in Quebec. Meaning that any political organization recognized by this public authority is able to run for elections and receive public money through two channels: yearly subsidies directly transferred to parties and provisions for any candidate running for provincial elections[1].

The equity principle should have implied an inflation of candidates whose cost of engaging in the political market is reduced by public financing. Between 1977 and 2011, the number of political parties remained similar. In average, 10 political parties competed with each other. For a more recent period (where data are available), we observe that the number of political parties has remained stable since 1998. Table *a* provides an overview of all candidates by distinguishing the number of political parties, the number of candidates and average spending. Since 2003, the share of money in provincial elections is still decreasing suggesting that the emergence of a

[1]Initially a 20% threshold of votes was compulsory to claim for public reimbursement. Since 1993, this threshold has been reduced to 15%.

three party system in Quebec is not necessarily linked with an inflation of campaign spending. It reveals then that electoral competition, if driven by campaign spending, forces candidates to make the best use of money for winning extra voters. Thus, there are good reasons to investigate with scrutiny the marginal impact of campaign spending.

Another important piece of the Quebec regulation concerns the minimum score (15 per cent) required for a candidate to be eligible to a public refund, i.e. at maximum half of campaign expenses. It creates therefore two varieties of candidates who compete each other in a quasi two-party system: candidates from the two main parties (which share about 90% of vote shares) and "marginal" candidates from other parties. The former ones are likely to receive publicly 50 per cent of what they spend within the constituency spending limit. The latter have a different outlook since without public refund they are forced to use not strategically but rationally any dollar they spend. More generally, this means that any change of the political competition in Quebec is able to lead candidates to revise their spending strategy. In fact, the threat of a third party (as experienced in 2007 with the ADQ) not only may jeopardize some seats for incumbents or push the "natural" challenger in a third position but mostly force candidates to formulate accurate expectations about the reliability of the threat.

Table *a* displays other interesting information about the nature of political competition. About half of the candidates received at least 15 per cent of votes and then could claim public reimbursement. The number of safe constituencies (no change for the winning party) has decreased by about 20 per cent between 2003 and 2007 illustrating the electoral success of the third party, namely the ADQ. Finally, the magnitude of campaign spending in Quebec is as high (St. Dev = $15,000) as observed for the rest of Canada (Milligan & Rekkas, 2008).

Table a: Descriptive statistics

	1998	2003	2007	2008
Political Parties	11	10	12	11
Candidates	657	642	678	649
Safe constituencies	-	84	66	62
Canditate per district	5.25	5.13	5.42	5.19
Candidates (score > 15%)	261	311	344	291
Spending ($ mean)	31,175	32,763	37,041	33,101
Spending (St. Dev.)	15,630	15,861	16,827	15,351
Spending per district ($ mean)	75,122.5	105,498.6	91,050.8	79,793.2

Source: Elections Quebec, authors' calculations.

2.3 Descriptive data for electoral outcomes and campaign spending

Data were collected for the 1998, 2003, 2007 and 2008 provincial elections in Quebec. We gathered political data (electoral outcomes, party affiliation, the amount and nature of campaign spending, spending limits, incumbency) and individual data on candidates (age, gender). Campaign spending is computed according to the nature of spending (advertising, transport, services, representation).

Table *b* describes the three main parties' per-district average electoral scores and campaign spending. Liberal candidates systematically spend more than their PQ and ADQ counterparts. High average spending by Liberal candidates is a constant throughout all four elections, regardless of a candidate's status as an incumbent or a challenger. Interestingly, Liberal spending reached a peak in 2007, the election for which the Liberal average vote share was the lowest (33.7%). PQ spending reached a low in 2008, when the party clinched back the second place lost in 2007. There is some evidence of heterogenous spending patterns between the PQ and the QLP. Indeed, PQ incumbents spend more, on average, than PQ challengers, a pattern that is not apparent for the Liberals. Consistent with the party's rising popularity over the 1998-2007 period, both ADQ average scores and spending increased importantly between 1998 and 2007. While spending continued to rise between the 2007 and 2008 elections, the ADQ average electoral score dropped sharply from 29.4% to 15.2%. With the exception of 1998, there is no clear pattern with respect to spending by incumbents vs. challengers.

Table b: Electoral outcomes and campaign spending (in $)

	1998		**2003**		**2007**		**2008**	
	Score	Spending	Score	Spending	Score	Spending	Score	Spending
PLQ	.431	39,526	.439	41,781	.337	47,593	.433	43,455
Incumbent	.587	38,760	.611	44,423	.399	48,645	.571	43,222
Challengers	.381	39,767	.375	40,689	.283	46,653	.370	43,560
PQ	.438	35,522	.317	37,375	.285	35,196	.348	27,088
Incumbent	.515	37,270	.412	40,841	.392	42,001	.486	39,226
Challengers	.366	33,886	.273	35,239	.248	32,855	.318	24,363
ADQ	.116	3,029	.178	25,317	.294	29,307	.152	33,041
Incumbent	.463	25,125	.572	24,156	.598	37,646	.261	32,272
Challengers	.113	2,068	.175	25,327	.284	28,231	.114	35,347

Source: Elections Quebec, authors calculations.

When candidates from all parties are considered (see Figure 1), a clear dichotomy appears

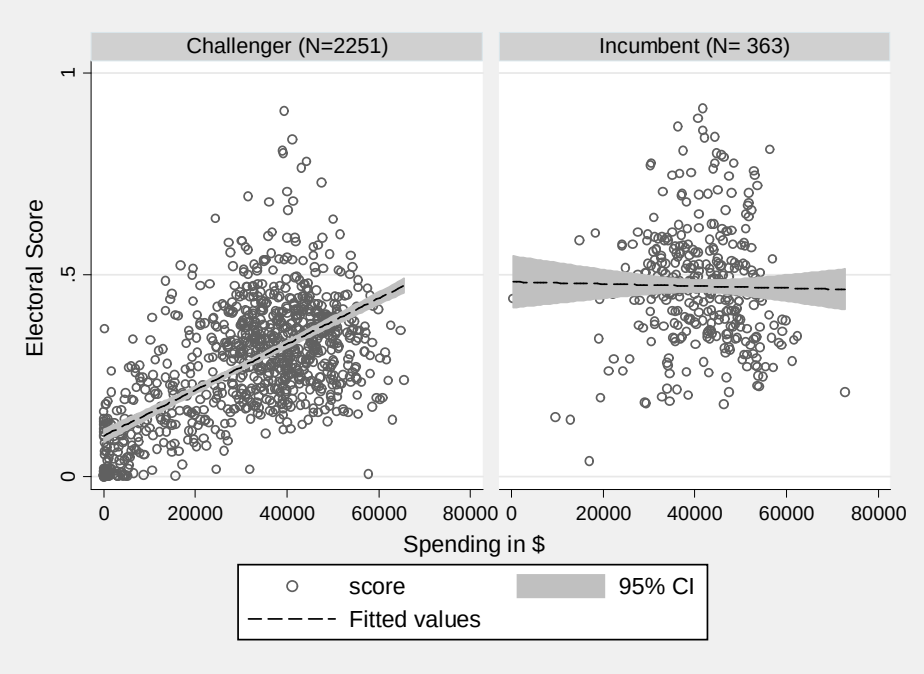


Figure 1: Electoral Score and Campaign Spending

in the relationship between spending and vote shares for incumbents vs. challengers. The positive correlation between challenger spending and votes indeed disappears for incumbents.

3 Empirical Strategy

In line with the debate briefly discussed in the introduction about the consistent estimation strategy for assessing the impact of campaign spending on votes, the degree of bias of the 2SLS estimates depends on how successful it is in finding the true instrumental variables that (i) directly affect the endogenous regressor but (ii) do not directly affect the dependent variable (Moon, 2006). By using a 2SLS approach, we do not assume immediately that the vote affects spending but rather the vote of threatening challengers. We are confident that is not the vote, which is a result of the election, but the candidate's expectations of electoral outcomes that affect their incentive to change their spending. Consequently, we do not believe that we should keep the OLS estimation strategy by finding omitted variables "*that hinder incumbents from winning more votes even when they spend more*" (Moon, 2006). By capturing the conditions under which a candidate may revise his expectations of both personal outcome and challenger outcome, we consider that such expectations affect only the spending strategy

without directly affecting the vote share. And the 2007 election in Quebec offers this quasi-natural experiment where a safe incumbent has to formulate accurate expectations about the reliable threat accounted by a third challenger. Such an instrument will be discussed in the second subsection. Before that, we have to test how OLS estimates deliver results which hide the determinants of spending strategy underlined by the institutional setting and the electoral competitiveness.

3.1 Modeling the effect of campaign spending on vote share: OLS estimation

The first step of our empirical strategy rests on a classical approach where campaign spending act as an input into the production function of the candidate. We start by regressing inputs (candidate campaign spending, challenger campaign spending, political capital) on individual output (vote score). As we are concerned with the dynamics of the Quebec political market between 1998 and 2008, we first estimate a simplified model where the dependent variable is the vote share for all candidates. We seek to identify to what extent the arrival of a new comer (ADQ party) in 2007 has affected the return of campaign spending for all candidates.

The first estimated equation is as follow:

$$\begin{aligned} Vote_{i,t,c} &= cst + \beta_1 Spend_{i,t,c} + \beta_2 Chal\_Spend_{i,t,c} + \beta_3 Incumbency_{i,t,c} \\ &\quad + \beta_4 Party_{i,t,c} + \beta_5 Loyalty_{i,t,c} + \theta_{t,c} + \varepsilon_{i,t} \end{aligned} \tag{1}$$

where *Spend* is the campaign spending for candidate i during the election t in the district c, *Chal_Spend* is the campaign spending of the direct challenger of the candidate i, *Incumbency* is the incumbent status of the candidate i, *Party* captures the partisan effect of the three main political parties in Quebec, *Loyalty* is a characterization of "safe" vs. "non safe" constituencies[2], θ is a fixed-effect for any district c, and ε an error term.

By running regressions of Equation 1 (for $t = 1998, 2003, 2007, 2008$) , we do not deal with a potential endogeneity bias. In fact, we assume that all explanatory variables are exogeneous. It means that the candidate i may decide to spend without constraints and independently of the spending decision of other candidates. In line with some first-generation models, our OLS estimates (table 1) confirm the positive relationship between campaign spending and vote for all elections. With a significant coefficient (0.61) in 2003, it means that the increasing campaign

[2]We perform separately estimations with and without the *Loyalty* variable which captures the advantage that should receive incumbent candidates from running in loyal constituencies. For every election, we found about half constituencies do not experience electoral change. What is surprising is that such a pattern does not strongly affect the spending on the vote share (all coefficients remain positive). The main change concerns the 2007 election where β_2 losses in significancy confirming that challengers are not really prone to invest more money in a known safe constituency.

spending of a candidate i entails an increasing vote. As campaign spending is measured in thousands of dollars, an extra $1,000 in campaign spending brings an extra 0.61 vote share. As we specify at this stage a linear relation, we can interpret this result by saying that an increase of $15,861 (one standard deviation) brings an extra of 9.67 points of percentage of vote. For any extra $1,000 spent by the candidate i, the return remains however weaker than received by the incumbent (16.7). In other words, the incumbency advantage is again verified for Quebec elections as is the case for other mature democracies[3]. At the opposite, a consistent result comes from the negative point estimates for challengers. A negative sign is found with a stronger magnitude in 2003 compared with the three other elections. It means that challenger's campaign spending affects negatively the winning candidate. This pattern is weakened for the two last elections confirming our suspicion about the changing rules of the bipartisan system. Indeed, the success of ADQ. candidates in 2007 (23.2) has reduced the impact of campaign spending for all candidates but not necessarly reinforced the negative impact of challenger's campaign spending (-0.023). Other controls for political parties inform us about the partisan effect on vote share with some comparable estimate points for the two main parties in Quebec (PQ and QLP).

By looking at Figure 3, we may suspect that the relationship between campaign spending and vote is not linear. We observe a net reverse point for both challenger candidates when they reach a 0.42 electoral score and incumbent candidates when they reach a 0.37 score. This pattern suggests than some marginal decreasing returns exist in Quebec campaigns. The concave shape for incumbents is consistent with other empirical studies and poses the famous marginality problem when it comes more costly for an incumbent to win extra votes once a minimum electoral score is reached. For all these reasons, we decided to specify our relation by including campaign spending through a logarithmic expression. Table 1 displays pairs of OLS estimate with both linear and ln specifications. The main difference concerns the number of observations that have been dropped with the ln specification due to the high level of candidates who did not spend.

These first results must be read with caution given the endogeneity bias discussed in the first section. Indeed, such results do not address the institutional constraints with which candidates have to comply, specifically the spending limit enforced in every constituency. A second reason for considering our OLS results as suspicious rests on the nature of the political competitiveness. Indeed, the decision to spend in a context where only one challenger is expected (1998 and 2003 elections) is not similar to a context where two competitive challengers will run to be elected (2007 and 2008 elections). These two main arguments force us to assume that the campaign spending is definitively not exogenous. It is generally believed that these issues bias OLS

[3] In 1998, β_1 fails to meet the conventional 0.05 level of statistical significance (p-value=0.075).

estimates upward for challengers and downward for incumbents (Levitt, JPE 1994). This bias is especially problematic given that the literature generally finds a positive effect of spending on outcomes for challengers and no effect for incumbents. We turn also on the second empirical strategy by defining relevant instruments for a 2SLS estimation.

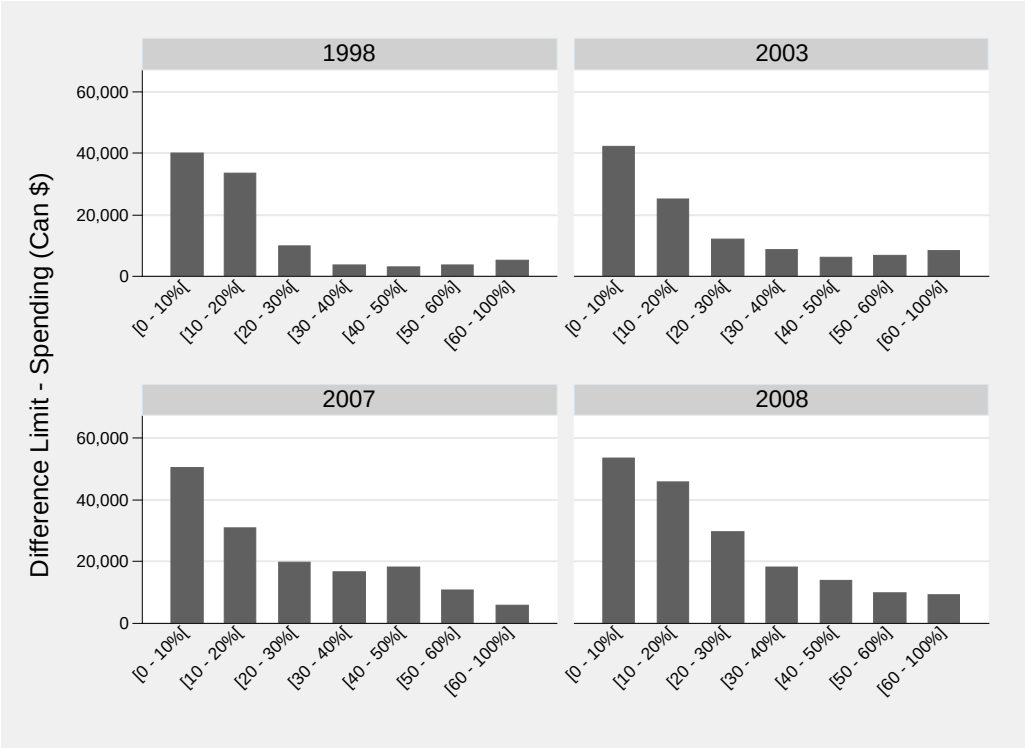
Before running a 2SLS estimation, it is worth explaining why we adopt a different strategy from that of second-generation models (Rekkas 2007, Milligan & Rekkas 2008, Benoit & Marsh 08). Milligan and Rekkas (2008) have used the peculiarities of Canada's spending limits as instruments for campaign spending. Contrary to the previous literature, they find a positive effect of spending by incumbents and no effect for challengers after controlling for endogeneity. While their analysis has brought the literature one step ahead methodologically by exploiting a convincing exogenous instrument, two features of their identification strategy remain problematic. First, their use of two pooled cross-sections abstracts from the time dimension of the data. However, identification from such cross-sectional data has been fiercely critiqued by Levitt (1994). Second, even if the spending limits are exogenously determined, the probability that the limit will bind for a given candidate is not exogenous. For example, senior candidates are both more likely to hit the limit (given a better revenue-raising capacity) and to attract more votes (regardless of spending).

To address the remaining endogeneity of the probability that the spending ceiling binds, we propose an empirical strategy that exploits exogenous shocks to electoral competition. Our strategy thus explicitly accounts for both the panel nature of the data and the heterogenous effect of spending limits.

3.2 Modeling the simultaneous effect of campaign spending

Our objective is now to instrument campaign spending. Contrary to other empirical studies, we do not directly use spending limit as instruments but rather rebuild our main independent variable as follows: $Spendlim_{i,c} = Limit_c - Spending_i$. The spending limit is publicly defined by the Electoral Law and yearly updated according to the evolution of population in constituencies. This cap is decisive in the candidate's decision to spend because the public refund is based on half of this limit. It means, for instance, that in a constituency where the limit is fixed at $ 50,000, a candidate is able to receive from the State exactly $ 25,000 if he has spent the maximum authorized (i.e. $50,000). In average, we observe a strong variance for spending limits in Quebec, ranging from $17,619 (Iles de la Madeleine) to $ 73,226 (Masson). By ploting (Figure 2) the distribution of this variable, for each election in our sample, according to candidates' vote shares, an interesting pattern emerges: there exists a consistent negative correlation between the limit-spending gap and a candidate's electoral score. Whether spending causes electoral strength or the reverse is unclear, an issue that the following regression analysis will

help clarify.



Electoral Score and Spending Limit

First, we observe a regular decreasing pattern regarding the relationship between the difference between *Limit* and *Spending* and the electoral score over the four elections. Not surprisingly, the more a candidate is close to the spending limit, the higher the score is. Nevertheless, in 1998 and 2003, winning candidates with a score higher than 60 per cent continued to spend with a magnitude higher than for candidates elected with a score ranging from 50 to 60 per cent. Then the first effect consists in capturing to what extent the candidate seeks to converge towards the limit and respect it. In this way, we prefer this measure because we suspect that the spending limit is not fully satisfying as an instrument. Indeed, we observe in our dataset that some candidates do not spend as much as permitted in their constituency even if the constituency appears to be a safe constituency (i.e. without alternative), whereas other candidates (with a low probability to be elected) are more likely to spend at the maximum authorized limit. To some extent, we are convinced that a better approach for tackling endogeneity bias is to reason in terms of likelihood of reaching the spending limit. By building a dependent variable representing the difference between the candidate spending and the authorized spending limit, we may estimate the determinants explaining the political conditions under which some

candidates spend more or less than other.

A second effect tackled with this measure concerns the financial revenues that a candidate (and therefore his party) may draw from his spending decision. Indeed, as reminded above, candidates may receive half of the spending limit from the public authority in charge of elections at the beginning of the campaign. Consequently, it means that a candidate who expects to obtain a bad (but at least superior to 15 per cent) score can receive public funds to anticipate a better use of expenses for the next election. Obviously, in a (bipartisan) electoral system, the management of public resources could lead some parties to allocate some extra resources to new or weak (probability to win is weak) candidates in order to receive the 50 per cent counterpart from the State. Such strategy could be easily implemented as political parties are free to transfer funds raised by popular candidates or candidates elected in safe constituencies to candidates running in contested constituencies.

In general, we should expect that incumbent candidates could benefit from their last mandate to reduce their spending since they are relatively well-known by their electorate and can use other means of communication to anticipate their reelection. In Quebec, incumbent candidates have spent about 85 per cent of the legal limit, and only 68 per cent in 2008. A significant difference is observed among parties : 26 % for ADQ; 70% for PQ and 88% for QLP confirming our assumption about the strategic use of money in politics in Quebec when a third actor emerges.

The last OLS estimation consists in regressing the final specification including robust clusters for all constituencies (125) and interactive terms for party and years as follows:

$$\begin{aligned} Vote_{i,t,c} &= cst + \beta_1 Spendlim_{i,t,c} + \beta_{22} Chal\_Spendlim_{i,t,c} + \beta_3 Incumbency_{i,t,c} \\ &\quad + \beta_4 Party_{i,t,c} + \beta_5 Party_{i,t,c} \times Years_{i,t,c} + \beta_6 Years_{i,t,c} + \theta_{t,c} + \varepsilon_{i,t} \end{aligned} \tag{2}$$

3.3 2SLS estimation : simultaneous reaction

The main challenge in 2SLS estimation is to find viable instruments for explaining the campaign spending. As we have partially endogenized the institutional setting (with the spending limit), we have turned on the political competition and driving forces for spending decision. For the last Quebec elections, a quasi-natural experiment enables us to analyze how the emergence of a third party during the 2007 campaign has modified the use of money by "safe" candidates. We build a measure of electoral progress for this party, named $ADQgap$, which is the difference between the ADQ score in time t and time $t-1$. Such a variable is a viable instrument for explaining the spending decision of other candidates since a candidate is supposed to react

to the expected progress of ADQ candidates. More precisely, it offers a good opportunity to capture both effects mentioned above since the decision to spend more dollars in a contested district should push candidates to increase their campaign spending (or converge towards the spending limit) as long as the *ADQgap* variable is increasing.

A second series of instruments, useful to satisfy the over-identifying restrictions in 2SLS (instruments must be superior to instrumented variables, Baltagi 2008), takes into consideration the number of registered voters and the intensity of competition measured by the number of candidates running for election in each constituency. The number of voters is a proxy for the size of the constituency as we did not succeed in collecting data on the socio-economic characteristic of constituencies (income, education,...).

Consider now the simultaneous equation including the second stage (*equation 2*) and the first stage where the difference between the spending of candidate i and the spending limit is instrumented by three instruments, i.e. the progress of the ADQ score ($ADQgap$), the individual lagged score ($Score_{t-1}$) and the number of registered voters ($Voters$). We have the following estimation:

$$\begin{cases} Vote_{i,t,c} = cst + \beta_1 Spendlim_{i,t,c} + \beta_2 Chal\_Spendlim_{i,t,c} + \beta_3 Incumbency_{i,t,c} \\ +\beta_4 Party_{i,t,c} + \beta_5 Loyalty + \theta_{t,c} + \phi_t + \varepsilon_{i,t} \\ Spendlim_{i,t,c} = cst + \gamma_1 ADQgap + \gamma_2 Score_{i,c,t-1} + \gamma_3 Voters_{c,t} + \theta_{t,c} + \mu^1_{i,t} \\ Chal\_Spendlim_{i,t,c} = cst + \gamma_1 ADQgap + \gamma_2 Score_{i,c,t-1} + \gamma_3 Voters_{c,t} + \theta_{t,c} + \mu^2_{i,t} \end{cases} \tag{3}$$

The two last relations correspond to the first stage estimation and are run according to the specified models (Table 6). Indeed, the complete model (for all candidates) does not include challenger spending (as we are not able to discriminate who is the challenger of a candidate ranked fifth for instance). For all other models, we include challenger spending and then we have no good reasons to not assume the challenger spending as exogenous. That is why we run a first-stage estimation with two instrumented variables (Spending and Challenger spending) and the three instruments.

Usual tests have been performed to test endogeneity bias and over-identifying restrictions. Once verified that ε and $\widehat{\mu}$ are correlated (and then *Spendlim* is endogenous), we test the quality of our instruments by checking that $cov(Spendlim_i, \varepsilon) = 0$ and $cov(Spendlim_i, ADQgap) \neq 0$. The minimum Eigenvalue statistic combined with the F statistic reject the null hypothesis that our instruments are weak. A second characterization of potential weak instruments consists in displaying a rejection rate from a 2SLS Wald Test or a LIML Wald test. Any test informs us

that we can again reject the null hypothesis of weak instruments meaning that we can tolerate a relative bias of 5% and less. The over-identifying restriction is tested through a Sargan test to verify if instruments are uncorrelated with the error term. In fact, this test consists in verifying whether our instruments are potentially endogenous at their turn[4]. We obtain an interesting result where the specification with our instrument *Scorelag* does not succeed in validating the exogenity condition. Consequently, we have excluded this instrument for the subsequent 2SLS estimations. Table 4 and Table 5 provide an overview of how results are affected by the inclusion of this "endogenous" instrument.

Finally, all estimations have been clustered by constituencies to get a robust variance and eliminate potential dependency between constituencies. Another econometric reason for using clusters deals with the problem of decreasing degrees of freedom if we had specified our *equation 3* with fixed effects.

4 Results and discussion

Tables 5 & 6 show respectively the results of the effect of ADQ on the campaign spending and the effect of campaign spending on candidate vote shares.

As our main argument rests on the idea that the campaign limit is not a perfect instrument for explaining vote share, we present in table 5 the first stage of our 2SLS estimation. Our instrument, ADQ score, is relatively consistent with our expectations. We find a negative sign for all estimations confirming then that the more the ADQ party has increased its score, the more (all) candidates have reacted by increasing their spending and mostly by converging towards the legal limit. The incumbent advantage remains a strong predictor of spending as incumbent candidate are likely to spend more dollars up to the limit. It probably means that the cost of spending is not the same for incumbents and challengers. Here this result tends to confirm one of the peculiarities of the public financing system where incumbent candidates can raise funds more easily than challengers and then may spend without searching necessarily new voters. Such a pattern is linked to the famous marginality problem whose consequences make incumbent spending less effective than the challenger spending (Benoit & Marsh, 2008).

Other controls for this first-stage were not at the core of our argument but provide interesting results for parties. Indeed, it is not surprising that the richest party, Quebec Liberal Party, encourages its candidates to spend closer to the limit since the cost of spending is likely to be lower for candidates of other parties due to its capacity for raising funds. Concerning the time fixed effects, we lost information due to the measure of our instrument and only two years

[4]We perform successively the Sargan test by assuming that the errors are i.i.d. and then by requesting heteroskedasticity-robust standard errors.

can be interpreted with regards to 2008. Only the year 2007 is significant with a positive sign, meaning that the year when the ADQ performed well, all candidates converged less towards the limit than in 2008. But, if we restrict our sample to incumbents, we find as expected a negative sign (but non significant). The number of registered voters is highly significant for all samples suggesting that high-populated constituencies reduce the odds of spending. This effect must be linked to the urban/rural cleavage that underlines this variable. Most of urban constituencies gather a high level of registered voters and favor economies of scale for reaching voters through communication means (which account for about 50 per cent of overall spending).

Table 5 and 6 display the second-stage estimations by comparing five pairs of estimates (with standard errors in parentheses). Each pair contents OLS vs. 2SLS estimates. In all models, Limit-spending ($\succ 0$) and incumbency ($\prec 0$) present statistically significant effects in the expected directions. Indeed, we find that the more candidates converge towards the spending limit, the higher the vote share is. An exception of this result concern two samples of our population: challenger candidates and non safe constituencies. Indeed, we do not find significant effect for the Limit-spending variable, suggesting that (1) challengers do not necessarly pay as much attention to spending as incumbent candidates and (2) surprisingly candidates running for election in non safe constituencies tend to increase their spending to win (negative OLS point estimates). However this result is not confirmed once we have instrumented this relationhip. Both results remain puzzling because our main instrument (ADQscoregap) is significant for the first stage estimation in the case of challengers whereas it is strongly non significantly different from zero in the case of non safe constituencies. A better specification should be investigated in the future.

All in all, 2SLS estimations support evidence for effective campaign spending on vote share for the pooled sample, incumbent candidates and safe constituencies. With a negative sign, our results suggest that the more candidates are threatened by a third party (ADQ), the more they react by increasing their spending close to the spending limit. Such a strategic use of campaign spending tend to confirm what scholars have emphasized in the literature. Nevertheless, our results mitigate the supposed positive and stronger effect of challenger spending on vote share. Secondly, as reminded by Gerber (2004) in his review, the incumbency advantage is not only a strong predictor of electoral score but also a significant determinant of the high level of spending, especially for candidates reaching the spending limit. In a sense, our result go further than the current literature by proposing a new instrument for multi-party systems which acts as a thermostatic measure of spending decisions. The more a third party threatens in a reliable fashion the two main political parties in Quebec, the more their candidates are willing to invest more dollars during the campaign even for safe candidates.

In conclusion, our paper aimed to evaluate the influence of campaign spending on vote share in Quebec. Most studies have already investigated such a relationship. But we address the same question in a peculiar political setting where the traditionnal two-party system in Quebec evolved towards a three-party systems. As is customary in British parliamentary systems, Quebec's political context is historically characterized by a clear-cut bipartism. In the 2007 Quebec provincial election, the ADQ altered the electoral landscape in most electoral districts – including districts only recently believed to be unshakable strongholds for one of the two dominant parties, the PQ and the QLP. Therefore we implemented an empirical strategy by exploiting this quasi-natural experience provided by the sudden rise and demise of a third party in Quebec, the Canadian province with the second-largest population. We suggest that the lagged change in ADQ electoral outcomes between elections t and t-1 provides a valid instrument for the expected closeness of election t. By doing this, we were able to assess the impact of campaign spending on electoral outcomes by tackling the endogeneity concerns:

- Reverse causation: expected electoral outcomes drive campaign spending (candidates expecting close races tend to spend more).

- Unobserved heterogeneity: high quality candidates may both tend to spend more and, regardless of campaign spending, have more favorable electoral outcomes.

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Table 1: OLS estimates

	1998		2003		2007		2008	
	(linear)	(ln)	(linear)	(ln)	(linear)	(ln)	(linear)	(ln)
Spending	.19	1.56**	.614***	5.23***	.297***	2.81*	.299***	5.54***
	(.106)	(.52)	(.0536)	(.772)	(.0562)	(1.35)	(.0513)	(1.29)
Chal. Spending	-.0237	-2.25	-.187***	-2.94***	-.0235*	-3.79	-.0592***	-2.81**
	(.0312)	(1.4)	(.0269)	(.793)	(.00914)	(1.95)	(.0131)	(.972)
Incumbent	16.7***	16.8***	16.7***	17.5***	11.8***	8.74***	13.7***	13.1***
	(1.77)	(1.79)	(1.64)	(1.66)	(1.53)	(1.3)	(1.29)	(1.52)
Loyalty	.309	1.71**	.596	-.397	.942*	3.96**	.382	.737
	(.29)	(.646)	(.489)	(.663)	(.371)	(1.36)	(.333)	(.942)
Parti Quebecois	28.5***	29***	1.89	1.4	11.8***	13.9*	21.8***	12.3*
	(4.15)	(3.4)	(2.17)	(2.98)	(2.2)	(6.37)	(1.79)	(4.75)
Quebec Liberal Party	30.8***	31.9***	12.6***	14***	11.4***	13.4*	23.2***	13.3*
	(4.08)	(2.78)	(2.56)	(3.24)	(2.74)	(6.27)	(2.22)	(5.56)
A.D.Q.	10.8***	14.2***	1.49	-3.31	23.2***	29.6***	5.98***	-5.17
	(.432)	(1.44)	(1.6)	(2.79)	(1.16)	(5.92)	(.812)	(4.89)
Constant	1.26	8.21	8.12***	17.4***	3.39***	15.4	4.47***	13.2**
	(1.19)	(5.4)	(1.2)	(3.2)	(.336)	(8.2)	(.54)	(4.1)
Observations	621	288	642	401	678	216	649	289
Adjusted R^2	0.883	0.707	0.839	0.690	0.741	0.572	0.838	0.638

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2: Instruments quality (2SLS, first stage)

	(1) All candidates	(2) Incumbents	(3) Challengers	(4) Safe Const.	(5) Non safe Const.
ADQ gap	-.00571**	-.0152	-.00543**	-.00996***	.000446
	(.00208)	(.00842)	(.00196)	(.00244)	(.00299)
Registered Voters	.0000348***	.0000393**	.0000312***	.0000327***	.000031***
	(3.54e-06)	(.000012)	(3.01e-06)	(5.00e-06)	(4.52e-06)
Limit-Chal. Spending (ln)		.215**		.144***	
Incumbent	-.596***			-.575***	-.59***
Y_2003	-.0144	.327	.000415	-.0353	-.156
Y_2007	.131*	-1.18	.12*	0	0
Y_2008	0	0	0	-.177**	.0434
Quebec Liberal Party	-1.66***	-.0283	-2.07***	-1.69***	-1.79***
2003_QLP	0	0	.297*	.184	0
2007_QLP	-1.44***	.461	-1.31***	-1.06***	-1.63***
2008_QLP	-.206	0	0	0	-.244
A.D.Q.	-.164*	1.63***	-.0623	-.539***	-.341*
2003_ADQ	-.613***	0	-.751***	0	-.641***
2007_ADQ	-.109	0	-.154***	.474***	-.135
2008_ADQ	0	-.559	0	.555***	0
Parti Quebecois	-.921***	1.1	-1.7***	-.787***	-1.45***
2003_PQ	-.478***	-.895	.258	-.542**	0
2007_PQ	-.874***	0	0	-.738***	-.617**
2008_PQ	0	-.857	.902***	0	.394
Constant	9.16***	4.64***	9.33***	7.97***	9.38***
Observations	1964	270	1694	1020	944
Adjusted R^2	0.644	0.354	0.648	0.701	0.628

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: 2SLS estimates (second stage)

	(1) All candidates		(2) Incumbents		(3) Challengers		(4) Safe Const.		(5) Non safe Const.	
Limit-Spending	-8.11***	(1.22)	-10.1*	(3.95)	-15.6***	(2.01)	-12.8***	(2.65)	-11.4***	(2.14)
Chal. Limit-Spending			4.6***	(1.34)	3.48***	(.72)	3.63***	(.897)	2.98***	(.669)
Loyalty	2.24**	(.845)	10***	(2.62)	-1.29	(1.02)				
Incumbent	12.4***	(1.25)					15***	(2.27)	5.32**	(1.76)
2003	16.6	(11.6)	-16.2*	(6.54)	10.1	(9.22)				
2007							7.77**	(2.86)	-11.2	(10.1)
2008	2.8**	(.913)	-21.2**	(6.52)	3.15*	(1.4)	11.1***	(2.42)	-9.97	(9.34)
Qc Liberal Party	-.459	(3.8)	8.82	(6.31)	2	(4.04)	27.7***	(4.03)	-16.9*	(7.68)
QLP_2003	7.56	(12)	.844	(7.12)	-4.48	(8.99)			18.5	(11.8)
QLP_2007			-43.4***	(5.74)	-26.6***	(4.37)	-33.6***	(5.41)		
QLP_2008	19.6***	(2)					-16.1***	(3.46)	27.4***	(4.27)
A.D.Q.	25.3***	(1.21)			25.1***	(1.38)	19.9***	(1.26)	30.1***	(2.34)
ADQ_2003	-32.6**	(11.5)	18***	(5.29)	-31.8***	(9)	-5.46*	(2.77)	-34.7***	(9.59)
ADQ_2008	-19.6***	(1.22)			-19***	(1.59)	-14.1***	(1.31)	-22.9***	(3.1)
Parti Quebecois	20.6***	(1.77)	-3.96	(2.08)	15.1***	(2.24)	15.2***	(3.21)	18***	(3.14)
PQ_2003	-25.5*	(11.7)			-23.3**	(8.86)			-23*	(9.52)
PQ_2007	-12.4***	(1.68)	-26***	(7.72)	-16.5***	(2.43)	-13.3***	(2.31)	-16***	(3.33)
PQ_2008			10.6	(7.19)						
Constant	87.7***	(12.8)	104***	(27.1)	137***	(16.8)	95.8***	(19.5)	110***	(17.6)
Observations	1269		265		1004		638		631	
Adjusted R^2	0.558		0.086		0.169		0.574		0.279	

Instruments: ADQgap, Registred Voters, Scorelag

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Elections Quebec data

Table 4: OLS vs 2SLS estimates

	All candidates		Incumbents		Challengers	
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	2SLS	OLS	2SLS	OLS	2SLS
Diff Limit-Spending (ln)	-2.01***	-1.14**	-.203	-7.71*	-2.99***	-.495
Limit-Chal. Spending (ln)	-	-	2.33***	5.04***	-	-
Incumbent	17***	17.5***	-	-	-	-
2003	2.93***	-	53.3***	7.16**	2.2***	-
2007	3.05***	.00978	3.72	1.53	3.1***	.659
2008	2.74***	-.349	-6.68***		2.84***	.263
Quebec Liberal Party (QLP)	31***	32.5***	53.9***	-1.31	25.9***	23.6***
PLQ_2003	-.0035	-	-53.5***	-	2.05	8.91***
PLQ_2007	-15.1***	-13.9***	-24.4***	-23.1***	-10.8***	
PLQ_2008	-.0883	.073	.651	-	1.95	9.43***
Action Democratique Quebec (ADQ)	10.7***	7.31***	53.4***	7.9	10.5***	8.39***
ADQ_2003	1.79	5.95***	-53.1***		1.7	5.97***
ADQ_2007	13.9***	17.6***	0		13.7***	16.3***
ADQ_2008	-3.6***		-27.5***	-27.3***	-2.45**	
Parti Quebecois (PQ)	29.4***	27.6***	50.1***	-21.4*	28.3***	22.4***
PQ_2003	-11***	-7.87***	-67.9***	2.75	-9.58***	
PQ_2007	-12.7***	-9.34***	-21.6***		-12.2***	-2.01
PQ_2008	-2.78*	-	0	19.4**	-1.95	5.97***
Constant	22.1***	15.7***	-12.8	75**	32.7***	8.09
Observations	2605	1963	357	270	2243	1693
Adjusted R^2	0.791	0.755	0.561	0.265	0.743	0.692

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Instruments: ADQscoregap, Registered Voters

Table 5: OLS vs 2SLS estimates (continued)

	Safe Constituencies		Non safe constituencies	
	(1)	(2)	(3)	(4)
	OLS	2SLS	OLS	2SLS
Diff. Limit-Spending (ln)	-2.34***	-1.97**	-2.35***	-.392
Diff. Limit-Chal. Spending (ln)	.476**	.328*		
Incumbent	21.6***	22.4***	10.3***	11.8***
2003	1.95**	-.793	3.5**	
2007	2.65***		2.55***	-1.36
2008	2.3***	-.384	2.4***	-1.65
Quebec Liberal Party (QLP)	32.7***	20.9***	25.2***	31.2***
QLP_2003	-1.1	11***	2.55	
QLP_2007	-12.5***		-13.9***	-13.4***
QLP_2008	-3.15	8.97***	4.64**	2.54
Action Democratique Quebec (A.D.Q.)	9***	18***	12.5***	11.7***
QLP_2003	.238	-8.58***	2.42	5.21**
QLP_2007	9.02***		18.9***	20.7***
QLP_2008	-2.8***	-11.8***	-1.35	
Parti Quebecois (PQ)	26.3***	24***	34.1***	22.2***
PQ_2003	-8.46***	-5.79**	-14.7***	
PQ_2007	-10.7***	-7.98***	-16.7***	-.783
PQ_2008	-2.46		-5.87**	8.32***
Constant	21.7***	21.8**	25.8***	8.6
Observations	1351	1019	1237	944
Adjusted R^2	0.826	0.809	0.804	0.741

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Instruments: ADQscoregap, Registered Voters

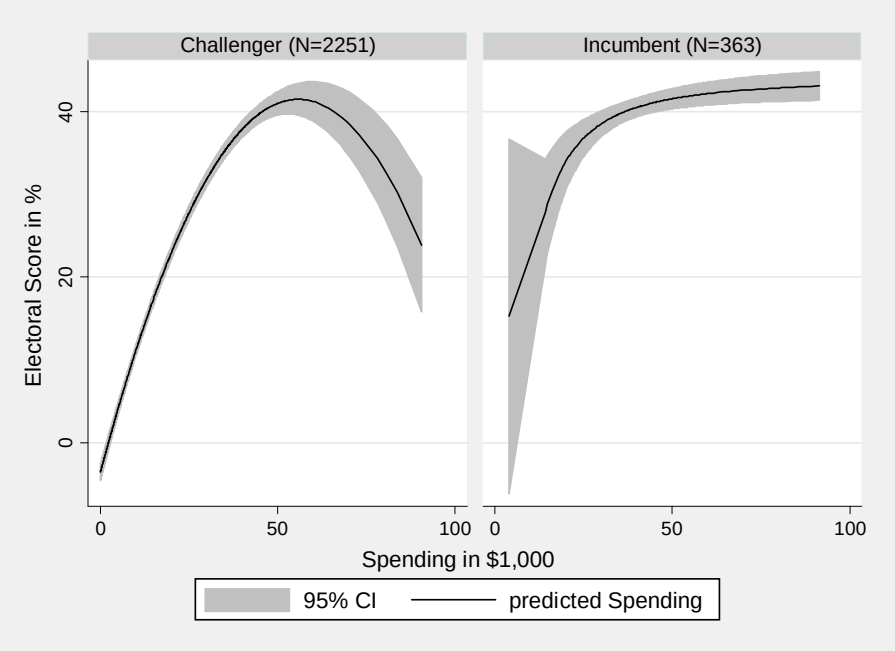

Figure 2: Relation between Votes and Spending