Abstract
The impact of candidate campaign spending on votes and abstention in multiparty elections is estimated from the specification of a structural model of voter behavior. This model accounts for the endogeneity of campaign spending as well as the heterogeneity in voter preferences. Empirical results are estimated from aggregate (actual) election data. The results demonstrate the importance of spending during the campaign period and voter heterogeneity with respect to these expenditures. The own- and cross-expenditure vote share elasticity estimates reveal that political campaign spending not only redistributes voters across parties but also decreases the size of the abstaining group of the electorate.

JEL classification: C10; D72; L10
1 Introduction

In recent years, policymakers in democratic countries have come under increased pressure to understand and react to electoral players with greater resources. As political power in these countries rests in the amassed support of the electorate, it is of crucial importance to assess the impact that these resources exert on election outcomes. To this end, this paper develops a model from which the effect of campaign spending on votes is estimated in the context of multiparty democracies, allowing for voter abstention, an increasingly important yet often overlooked empirical issue. This model accounts for the endogeneity of campaign expenditures as well as the heterogeneity of voter preferences.

Recent contributions in the literature that have attempted to estimate this effect for elections in the United States, a country whose political arena is dominated by two parties, include: Erikson and Palfrey (2000, 1998), Gerber (1998), Levitt (1994), Green and Krasno (1988), Nagler and Leighley (1992). The general form of the models presented in these studies expresses the candidate’s expected vote share as a function of campaign expenditures and various other relevant measures. While this existing empirical work is tremendously useful, the models therein are difficult to generalize and estimate for systems with greater than two parties. The ability of a model to easily handle multiparty elections is advantageous as the majority of democratic countries are not characterized by two-party legislatures.

In terms of the statistical modeling of multiparty elections, Katz and King (1999) propose an innovative model to analyze aggregate data. For fully contested elections, their approach involves a multivariate logistic transformation of the data followed by the maximization of a multivariate Student $t$ likelihood. For partially contested elections, the effective vote of parties, that is, the vote that parties would have obtained had all parties contested the riding, must first be computed. While theoretically attractive, the method is difficult to implement and computationally impractical for elections with more than three parties. Katz and King apply this model to estimate the incumbency advantage in British elections but do not include campaign spending in their model; it is not clear how the added complexities associated with the endogeneity of this variable would further hinder the feasibility of their approach. Recognizing the computational limitations of this model, Honaker et al. (2002) provide a tractable alternative using a $t$-based regression model implemented through iterative weighted least squares on multiply imputed data. While faster than the original Katz and King procedure, the method requires the handling and computation of imputed data sets. Further, it is not immediately clear how this model could be extended to handle endogeneity in the regressors. Tomz et al. (2002) provide an alternative model to that of Katz and King’s based on seemingly unrelated regression using first a multivariate logistic transformation of the dependent variable. As a consequence, the user is required to run a separate estimation for each type of partially contested race. This could be problematic with a high dimension of partially contested race combinations. The model presented in this paper accommodates any number of parties without imposing burdensome technical complications. The model easily allows for the entry and exit of candidates in addition to handling an unbalanced number of parties across electoral districts.
Although these more recently-advanced statistical models are promising, it may be too early to determine the extent of their impact on empirical research. Multiparty empirical studies to date include those by Pattie et al. (1995), Pattie and Johnston (1996) and Johnston and Pattie (1998) for British elections, by Eagles (2004) for Canadian elections and by Palda and Palda (1998) for French elections. Pattie et al. (1995) examine the impact of constituency campaign spending for elections in Great Britain. Through a series of regression analyses, their general findings indicate that local campaigning is effective in terms of garnering vote share and that this effect is stronger for challenging parties. The model presented in their study expresses each party’s vote share as a linear function of campaign expenditures (both the party’s and the rivals’) and various other controls. A regression is then carried out separately for each party. If however, there is reason to believe that the vote share equations are linked in their unobservables then a more efficient estimation strategy would be based on the seemingly unrelated regression model. To control for potential simultaneity in the spending variables the authors also estimate the parameters of interest using a two step procedure. It is not clear however if the analysis was carried out using two-stage least squares, thus leaving the user to question the actual method used and its associated efficiency. Pattie and Johnston (1996) directly augment the model by including the residuals from the first stage regressions as regressors in the second stage. Spending is decomposed into predicted and unpredicted levels and both these components are included in the model. The results demonstrate that parties that spend more than expected are rewarded in terms of vote share. Johnston and Pattie (1998) pursue a similar decomposition approach in examining the effectiveness of campaign activities and advertising on the relative vote share of two parties. A measure of advertising is constructed from the residuals of a regression of campaign spending on campaign activity, relative vote share is then regressed on campaign activity and the advertising measure. Similar to their previous findings, in certain cases campaign advertising is found to increase relative vote share, with challenging parties having more effective campaigns. The handling of multiparty elections in this context is through estimating separate regressions to explain the ratio of two party vote percentages.

Eagles (2004) examines local campaign spending in Canadian federal elections. Separate regressions for each of the main parties in the system are estimated individually for three election years; the panel structure of the data is not exploited. The dependent variable is the party’s vote share and the control variables include the party’s own campaign spending, the campaign funds raised and the total spending by the party’s opponents. Two-stage least squares is used to estimate the model where own spending and campaign funds raised are treated as endogenous variables. Candidate campaign spending is generally found to be effective, where increases in own spending are associated with increased vote share while increases in opponents’ spending are associated with decreased vote share. The following instruments used in the study are open to question: measures of the riding’s education, affluence, and social integration in addition to two variables that capture the competitiveness of the race. It is not clear that education, affluence and social integration are valid instruments. It is not difficult to imagine a case where these variables are correlated
with a candidate’s vote share. Further, the two measures of competitiveness are the margin between the winner and the second place candidate and the absolute difference between the candidate’s vote share and the winner’s in the current election. Using current election results as instruments may be problematic. While the measures are certainly likely to be correlated with the spending and fundraising abilities of the candidate, they are also likely to be correlated with the candidate’s unobservables. As first stage results are not provided, the validity of the instruments remains questionable.

Palda and Palda (1998) examine the impact of campaign spending in the legislative elections of 1993 in France. The French multiparty system is reduced to a two-party system by considering incumbent vote share and challenger vote share as the quantities of interest. Ordinary least squares is conducted using own party expenditures, challenger expenditures, source of party financing and party dummies as control variables. The findings reveal that spending matters for both challengers and incumbents with the former reaping higher benefits at the margin. The endogeneity of campaign spending is not considered in their model.

The general consensus of the preceding models is that local campaigns matter and spending matters more at the margin for challengers than incumbents. However, their shortcomings present opportunities for new research to underscore their conclusions. In addition, the models have a common fundamental drawback in that they do not accommodate individual voter preferences and consequently, inferences emanating from internally consistent voter behavior are not possible. In other words, the loss of underlying internal structure in these models makes it impossible to discern how party and candidate level variables impact on the individual voter’s decision. The ability of a model to account for such impacts is important especially with respect to campaign spending. In this paper, a model that balances structural foundations with inherently aggregate election results is developed and estimated using district level data from a multiparty election. The individual voter’s utility maximization problem is specified using a partial random coefficients logit model that addresses the endogeneity of campaign spending levels and allows for heterogeneity in campaign spending sensitivity across voters. The endogeneity of candidate campaign spending is accounted for by specifying a set of instrumental variables to disentangle the true expenditure effect. The impact of electoral spending, incumbency status, and other candidate-specific variables on the individual’s utility level is analyzed. Additionally, vote share elasticity measures with respect to campaign expenditures are constructed to assess a party’s vote share responsiveness to a change in one’s own, or one’s opponent’s, expenditures.

Further, the model developed in this paper allows for the inclusion of abstention into the voter’s choice set. Vote share elasticities are calculated to assess the effect that a party’s expenditures have on the abstaining share of the population. The existing models in the literature may be described as being incomplete in their assessment of campaign spending as they ignore its effect on the abstaining share of the electorate. The use of campaign spending is not confined to influencing voters and ensuring the turnout of party supporters, it is also undertaken to encourage dropouts to vote and therefore may have important
expansionary market implications.

The empirical analysis uses district level data from the 1997 Canadian federal election. The results demonstrate the importance of both a candidate’s spending during the campaign period and voter heterogeneity with respect to these expenditures. Candidates that held incumbency status were found to benefit compared to their challengers. The gender of the candidate, however, was generally not found to be a significant determinant of Canadian voters’ choice of candidate. Positive economic performance as captured by the change in the unemployment rate and personal disposable income were found to have significant effects for the incumbent governing party. The own- and cross-expenditure elasticity estimates revealed interesting findings. The estimated own-expenditure elasticities were greatest for the Liberal and Bloc Québécois parties. The cross-expenditure elasticities suggested that extra spending by the Reform, the Progressive Conservative, the New Democratic Party and Bloc Québécois parties increased their vote shares, to a large extent, at the expense of the Liberal party. On the other hand, spending by Liberal party candidates increased vote share at the expense of the Progressive Conservative and Reform parties. The elasticity analysis further shows that political campaign spending not only redistributes voters across parties but also induces nonvoters to vote and thus raises policy issues with respect to expenditure ceilings and their impact on voter participation.

The paper is structured as follows. Section 2 provides a brief overview of the Canadian electoral political system. Model specifications are given in Section 3. Section 4 contains a description of the data as well as the estimation results. Conclusions and future research directions are provided in Section 5.

2 Background

The electoral system in Canada is a plurality or first-past-the-post process. A seat in Parliament is won by the candidate who receives the most votes in a riding or district. Federal elections are called by, and are up to the discretion of, the Prime Minister, as such there are no coordination opportunities for elections amongst various levels of government; each voter is faced with casting a ballot containing a single set of candidates vying for the Member of Parliament seat. The Canada Elections Act restricts the amount of election expenses that candidates and registered parties may incur during the election. These restrictions or limits are calculated on a riding-by-riding basis and are a function of many factors, including the number of electors in the particular riding. Additionally, third-party spending on election advertising is subject to restrictions on a riding as well as a total basis. In the Canadian system, monetary contributions to candidates and registered parties are not limited although the Income Tax Act restricts tax credits to a maximum amount of $500. Following the election, candidates and registered parties are required under the Canada Elections Act to submit an audited return disclosing all election expenses as well as contributions exceeding a given amount.

Among federal parties, strategic coordination does not feature prominently in the Canadian context for a number of reasons. First, in countries with proportional representation, strategic behavior at the
constituency level during the election may be advantageous for parties hoping to secure a place in a coalition government. Under the plurality rule system in Canada however, approximately 80% of the general elections have resulted in a single-party majority government. Even if a federal party was interested in such a strategy, the highly decentralized party system makes it virtually impossible for a party leader to coordinate and form alliances at the riding level during the campaign period. Second, the amount of information available for such cooperation during the short 36 day election period is limited, since riding polls are extremely rare. Candidates during the campaign do not have precise information as to how they are faring against their opponents. As such, it is very difficult for candidates to dynamically adjust their expenditure strategies during the campaign. Finally, a substantial portion of the riding-level fundraising activities are typically completed early in the campaign period, thus, a scaling-back of the campaign implies that the candidate would “waste” donations already made, an outcome sure to be met with scorn by the donors. Further, the national party’s strategic targeting of funds to candidates is not likely to change during the period, presumably because a mid-campaign transfer of funds from one candidate to another would create logistic and coordination problems for both the party and the riding executives.

The 1997 Canadian general election was held on June 2, 1997 for which 19,663,478 electors were registered. A total of 12,985,964 valid ballots were cast. Ten political parties were registered for this election: Canadian Action Party, Bloc Québécois, Christian Heritage Party of Canada, The Green Party of Canada, Liberal Party of Canada, Marxist-Leninist Party of Canada, New Democratic Party of Canada, Natural Law Party of Canada, Progressive Conservative Party of Canada, and Reform Party of Canada. Candidates not affiliated with a registered political party ran under the “Independent” or “No Affiliation” banner. There were a total of 1,672 candidates on election day and 301 electoral districts. No riding had less than three candidates, and, in fact, 212 ridings had five or more candidates and 132 ridings had six or more candidates.

The Liberal Party received 38.5% (155 seats) of these votes, the Reform Party received 19.4% (60 seats), the Progressive Conservative Party received 18.8% (20 seats), the New Democratic Party received 11% (21 seats) and the Bloc Québécois received 10.7% (44 seats). The Progressive Conservative and Reform parties are the established Canadian right-wing parties with platforms promoting the involvement of the business sector over the direct action of government. The New Democratic Party and Bloc Québécois are left-wing parties that advocate the intervention of government over the unrestrained conduct of market forces in the economy as well government solutions to socio-economic issues affecting the Canadian economy. Both these parties have significant labor union participation in the conduct of the party and in the development of the policy platform. The Bloc Québécois party, however, nominates candidates only in Québec and caters largely to francophone sovereigntist voters. The Liberal party aims to strike a balance between business and government intervention and hence tries to capture the ideological middle ground. Notice that the Liberal Party secured a majority government without winning the popular vote.

It is important to note that political contributions to individual candidates within a riding may have
significantly less impact on their individual political agendas in Canada as compared to in the United States. In the Canadian setting, party discipline is important and enforced by sanctions. Individual Members of Parliament are effectively committed to vote the party line, in contrast to American congressmen who have considerable latitude in their legislative voting conduct. Further, through restrictions, the impact of third-party expenditures on elections is limited in Canada compared to the United States. In the United States, presidential candidates are not subject to spending limits (unless they choose to accept public funds) but are rather subject to contribution limits. Before the passage of the McCain-Feingold-Cochran Campaign Finance Reform Bill, however, it was commonly perceived that these contribution limits could be avoided as interest groups could still typically contribute hundreds of thousands of dollars (not to be used for electioneering purposes) to candidates.

3 Model Specification

3.1 Voter’s Utility Function

The individual voter’s problem is specified using a discrete choice model of consumer behavior in the context of a differentiated products market. A market is defined as an electoral district or riding and a product is defined as a political party which is represented by a candidate. The size of the market is specified as the number of registered voters in a given riding. Voters and candidates are assumed to observe all of the party characteristics whereas the econometrician is assumed to observe only a subset of these characteristics. The utility from party \( j \) for individual \( i \) residing in riding \( r \) is denoted as \( U(x_{jr}, exp_{jr}, z_r, \nu, \xi_j, \xi_r; \theta) \) and in particular these preferences are represented by a linear utility function

\[
 u_{ijr} = x_{jr}\beta + \gamma_1 exp_{jr} + \gamma_2 (exp_{jr} \times inc_{jr}) + z_r \alpha + \xi_j + \epsilon_{ijr},
\]

where \( \theta \) is the full vector of unknown parameters, \( x_{jr} \) is a \( 1 \times k \) dimensional vector of party \( j \)’s observable characteristics in riding \( r \), this vector contains dummy variables for the candidate’s incumbency status (where an incumbent is defined as a winning candidate in the previous federal election in a given riding), gender and occupation.

Here, \( exp_{jr} \) is the level of party \( j \)’s expenditures per registered voter in riding \( r \). These candidate expenditures enter the utility function as they are a channel through which information may be disseminated to voters, by, for example, activities such as advertising. For instance, visual exposure to candidate signs on lawns may signal a candidate’s popularity and induce a voter response; a voter may condition her own preferences on the preferences revealed by those spatially nearby. If the advertising has informational content, such as a pamphlet outlining the platform of a particular candidate, then the voter may derive useful information from that advertisement and react to it. Further, expenditures during the campaign period can also serve to mobilize apathetic voters by informing them of issues and platforms
that candidates and parties represent. As not all voters possess the same level of political knowledge, it is conceivable that campaign expenditures will impact voters differently depending on their degree of sophistication. To account for differences between incumbent and challenger spending, an interaction term between a candidate’s campaign spending and incumbency status, \( \text{exp}_{jr} \times \text{inc}_{jr} \), has been included in (1).

To allow for heterogeneity in the electorate, parameter variation across voters is characterized through the expenditure effects \( \gamma_{1i} \) and \( \gamma_{2i} \), which are defined as

\[
\begin{bmatrix}
\gamma_{1i} \\
\gamma_{2i}
\end{bmatrix}
= \begin{bmatrix}
\gamma_1 \\
\gamma_2
\end{bmatrix} + \Sigma
\begin{bmatrix}
\nu_{1i} \\
\nu_{2i}
\end{bmatrix},
\]

(2)

where \( \Sigma \) is a matrix of unknown parameters and \( \nu_i = (\nu_{1i}, \nu_{2i}) \) is a purely random component distributed as standard multivariate normal.

As voters may assess the incumbent party’s performance by using information that reflects the state of the economy, the \( z_r \) term includes interaction terms containing an incumbent (governing) party dummy variable and province-specific measures of the economy, specifically the change in the average unemployment rate and the change in average personal disposable income. These changes are computed as the difference between 1997 levels, the year of the election, and 1993 levels, the beginning of the Liberal party’s four year term. Positive performance is then characterized by a positive difference in average personal disposable income, representing an increase in income in 1997 relative to 1993, and a negative difference in the unemployment rate, reflecting a decrease in the rate in 1997 relative to 1993. Positive economic performance is expected to help candidates from the governing party and hurt all other candidates. The riding’s population density is included in this vector as a control given the significant variation in density in Canada’s ridings. As regional differences are important in Canadian elections, regional dummy variables as well as regional dummy variables interacted with party fixed effects are also included in this vector.

To absorb a riding’s predisposition towards a specific political party, the one period lagged 1993 federal election vote share is further included. Ansolabehere et al. (2002) use the average presidential vote share to obtain a measure of the normal vote for U.S. House elections. A comparable variable is not available for federal elections in Canada as the electoral systems are very different. Ansolabehere et al. indicate that the lagged vote share variable used by Cox and Katz (1996) and Gelman and King (1990) may not be an adequate measure of the normal vote due to issues of collinearity. All three papers however, focus on estimating and understanding the incumbency advantage in U.S. House elections. The focus of the present paper does not lie on decomposing the incumbency effect, the criticism of collinearity does not arise in this context. Further, there is no direct interest in the lagged vote share coefficient. Lagged vote share is included in the model to control for predisposition at the riding level.

The \( \xi_j \) term in the model represents the unobservable characteristics common to party \( j \), \( \xi_r \) represents the unobservable characteristics common to riding \( r \), and \( \Delta \xi_{jr} \) represents the unobservable candidate-specific deviations net of party and riding mean components. The \( \epsilon_{ijr} \) term is the stochastic error term.
distributed iid Type I extreme value across parties and voters. In effect, the unobservable components, $\xi_j$, $\xi_r$ and $\Delta \xi_{jr}$, capture the party, riding, and candidate-specific variables that have not been included in the model. If these unobservables determine, in part, the candidate’s expenditure level, instrumental variable methods need to be used to identify the true expenditure effect.

Using (2) and (1), with structure on the $\Sigma$ matrix, the utility function is written as:

$$u_{ijr} = x_{jr} \beta + \gamma_1 exp_{jr} + \gamma_2 (exp_{jr} \times inc_{jr}) + z_r \alpha + \sigma_1 exp_{jr} \nu_{1i} + \sigma_2 (exp_{jr} \times inc_{jr}) \nu_{2i} + \xi_j + \xi_r + \Delta \xi_{jr} + \epsilon_{ijr},$$

where $\delta_{jr} = x_{jr} \beta + \gamma_1 exp_{jr} + \gamma_2 (exp_{jr} \times inc_{jr}) + z_r \alpha + \xi_j + \xi_r + \Delta \xi_{jr}$ captures the average voter’s utility. The average voter’s utility from challenger expenditure is given by $\gamma_1 exp_{jr}$ and by $(\gamma_1 + \gamma_2) exp_{jr}$ for incumbent expenditure. The terms, $\sigma_1$ and $\sigma_2$ represent the standard deviation in utility associated with each of these expenditures, for instance, $\sigma_1 \nu_{1i} exp_{jr}$ is voter $i$’s specific deviation from the $\gamma_1 exp_{jr}$ mean. At this point, an “outside good” ($j = 0$) is introduced to capture the preferences of the those individuals who choose not to vote. For identification purposes, this outside alternative is normalized such that $u_{i0r} = \epsilon_{i0r}$.

An individual votes for her preferred party such that if voter $i$ in riding $r$ chooses party $j$, it is assumed that this choice yields the individual the maximum utility $u_{ijr}$, among all $J_r + 1$ alternatives. All individuals in the same riding are faced with the same choice set, while individuals in different ridings face different choice sets. The assumption that individuals vote sincerely is considered a reasonable one as Nevitte et al. (2000) estimate that only 4% of voters in the 1997 Canadian federal election voted strategically. The probability that this choice is made, assuming the probability of a tie is zero, is

$$Prob(u_{ijr} > u_{ilr}), \forall l \neq j.$$  

(4)

Given individual choices are not observed, aggregate party-riding level vote shares are derived. To derive party $j$’s vote share in riding $r$, a summation over all voters who choose to vote for party $j$’s candidate in this riding is necessary. Assuming independence between the candidate unobservables and the heterogeneity in expenditure responses, the vote share for party $j$ in riding $r$ is

$$s_{jr}(x_r, exp_r, exp_r \times inc_r, z_r, \delta_r; \sigma_1, \sigma_2) = \int_{A_{jr}} \frac{\exp(\delta_{jr} + \sigma_1 exp_{jr} \nu_{1i} + \sigma_2 (exp_{jr} \times inc_{jr}) \nu_{2i})}{1 + \sum_{l=1}^{J_r} \exp(\delta_{lr} + \sigma_1 exp_{rl} \nu_{1i} + \sigma_2 (exp_{rl} \times inc_{rl}) \nu_{2i})} \phi(\nu_{1i}, \nu_{2i}) d\nu_{1i} d\nu_{2i},$$  

(5)

where in general, $b_r = (b_{1r}, \ldots, b_{J_r})'$. $A_{jr}(x_r, exp_r, exp_r \times inc_r, z_r, \delta_r; \sigma_1, \sigma_2) = \{\nu_i : u_{ijr} > u_{ilr}, \forall l \neq j\}$ which represents the region that defines the individuals for whom (4) holds for candidate $j$. The vector $\nu_i = (\nu_{1i}, \nu_{2i})$ is distributed as bivariate normal, represented by $\phi(\nu_i)$, with mean zero and covariance matrix equal to the identity matrix.

9
Simple Monte Carlo methods are used to approximate the integral in (5) by

\[
S_{jr}(x_r, exp_r, exp_r \times inc_r, z_r, \delta_r; \sigma_1, \sigma_2) = \frac{1}{M} \sum_{i=1}^{M} \exp(\delta_{jr} + \sigma_1 \exp_{jr} \nu_{1i} + \sigma_2 (\exp_{jr} \times inc_{jr}) \nu_{2i}) \cdot I\{(\nu_{1i}, \nu_{2i}) \in A_{jr}\},
\]

where \((\nu_{1i}, \nu_{2i})\) are \(i = 1, ..., M\) draws from \(\phi(\nu_i)\) and \(I\) is the usual indicator function. The econometric procedure given in Berry (1994), Berry et al. (1995) and Nevo (2000) is used to estimate the parameters of the model. Before discussing this estimation procedure however, the issue of endogeneity is addressed.

### 3.2 Endogeneity

The endogeneity of candidate campaign spending may pose less of a problem in Canada relative to the U.S. due to the different electoral systems in place in each country; there are important differences between a congress and a parliament. For the present purpose, the key distinction between the two systems is the difference in control the party has over candidates. Congressional candidates are independent from the party leader, they run campaigns focused largely on local issues and face considerable pressure from local interest groups. The electorate in this type of system votes for the candidate more than the party. In contrast, parliamentary candidates are inextricably linked to the national party, candidates are expected to tow the party line, they are representatives of party ideology with very little power and independence.

As a consequence of this system, the electorate votes primarily for the party and not the candidate. As such, the potential endogeneity between a candidate’s unobservables and his campaign spending may be moderated given the amount of money that can be raised in contributions (to spend on the campaign) is tied primarily to the party label and not the individual. In other words, contributors may principally make donations to the party irrespective of the candidate’s characteristics. While this may also be the way in which contributions are made in the U.S. system, there is certainly greater scope to posit that a large group of contributors takes the candidate’s political positions and characteristics more seriously when donating funds.

In terms of the model in (3), with regard to the party unobservables \(\xi_j\), the panel structure of the data allows for the inclusion of party level fixed effects to absorb the political party unobservable characteristics that are constant across ridings. Such characteristics include the party’s reputation and, importantly, its ability to raise campaign funds through political contributions. General ideological beliefs and the party’s position on economic and political issues reflected in the campaign platform are also components of this term. Note further that this term controls for national party spending. It is highly unlikely that national party spending such as television advertising expenditures will be unequally targeted across ridings, though the distribution may occur at the provincial level. If this is the case then these fixed effects will not pick up this variation. However, as there is no strong reason to believe that a candidate’s spending decision is tied to the national party’s provincial spending distribution patterns, there will not be systematic behavior.
that will bear on the candidate’s campaign spending estimate. The inclusion of riding fixed effects absorbs
the unobservable component that is constant within ridings, thus allowing for the estimation of the $\xi_r$
term and reducing the endogeneity problem to the unobservable and unmeasurable $\Delta\xi_{jr}$ term. As $\Delta\xi_{jr}$
represents the candidate-specific unobservable deviations such as the quality or ability of the candidate as
well as the specific expectations the candidate has about the electoral outcome, the term will influence the
individual candidate’s expenditure decision.

The following excluded identifying instrumental variables are used for the endogenous expenditure vari-
ables: the riding level average (per elector) campaign expenditures in the previous election and a measure
of the closeness of the race. Two additional instruments are created using these two variables interacted
with the incumbency dummy. These four variables are used as they characterize the competitiveness of
the electoral race. The validity of these variables as instruments depends on the extent to which they
are correlated with the candidate’s expenditure decision and uncorrelated with the error term. The av-
erage per elector expenditures in the previous election is similar to the instrument used in Gerber (1998)
for Senate elections in the United States. This variable provides insight into the competitiveness of the
riding, and as such, will be correlated with the current candidate’s spending decision but, as an average
is used, it is unlikely to be correlated with a specific candidate’s unobservables for at least two reasons.
First, since approximately 70% of the sample contains candidates who did not run in the 1993 election, the
candidate level unobservables cannot be carried over. Second, for the candidates that ran in the previous
election, the correlation is mitigated to the extent that a portion of their spending decision is based on
their assessment of their quality relative to their opponents, which is not expected to be constant across
elections. Thus the instrumental variable affects a candidate’s relative vote share only through its effect on
the candidate’s campaign spending. Further, the riding fixed effects included in the model will condition
out any riding-specific time-invariant effects.

To the extent that the candidate’s (unobservable) absolute quality is constant through time, an argu-
ment may be made that the variation in spending across incumbents in safe seats reflects the candidate’s
unobserved quality component and thus the lagged expenditures instrument is not justified for these can-
didates. The variation in campaign expenditures by incumbents in safe seats, however, is very low relative
to the variation in contributions raised by incumbents in safe seats. For instance, for incumbents who won
by at least a 25% vote share margin, the variance in their spending was approximately 2 cents per elector
while the variance in their contributions was approximately 12 cents per elector. It is more likely that the
variance in contributions across incumbents in safe seats is reflective of the unmeasured quality component
rather than the variance in their expenditures. As candidates in the Canadian system do not face limits
on how much they can raise (contributions), higher quality candidates may attract more funds than lower
quality candidates but may spend relatively similar amounts on their safe campaigns, and any remaining
funds may be banked by their riding association.

The candidate’s expectation of the electoral outcome, or more precisely, of the closeness of the race,
will be reflected in the candidate’s expenditure decision. It is plausible to expect, for instance, that the candidate will spend more when the race is believed to be close and less when the race is believed to be either safe or a lost cause. Issues surrounding the correlation between expenditure levels and the expected closeness of a race have received much attention in the literature. The riding-by-riding results from the 1993 federal election are used to construct a “closeness” variable, $c_{jr}$, in an attempt to control for these expectations. For party $j$ in riding $r$ this variable is defined in terms of the vote distance the party was away from the winner and for the winning party this variable is defined as the number of votes (%) the party won by:

$$c_{jr} = \begin{cases} \frac{\text{max}\{V_{1r}, \ldots, V_{Jjr}\} - V_{jr}}{V_r}, & \text{if } V_{jr} \neq \text{max}\{V_{1r}, \ldots, V_{Jjr}\} \\ \frac{V_{jr} - \text{max}\{V_{1r}, \ldots, V_{(j-1)r}, V_{(j+1)r}, \ldots, V_{Jjr}\}}{V_r}, & \text{if } V_{jr} = \text{max}\{V_{1r}, \ldots, V_{Jjr}\} \end{cases}$$

where $V_{jr}$ represents party $j$’s lagged vote share in riding $r$ and $V_r$ represents the total number of votes cast in riding $r$. The 1993 electoral boundaries, however, were not a one-to-one match for the 1997 electoral boundaries; 264 of the 295 ridings in the 1993 election were changed and 6 ridings were added to form a total of 301 ridings in the 1997 election. Elections Canada’s Transposition of Votes was used to reconcile this redistricting. Further, as not all political parties sponsored a candidate in the same electoral districts across elections, a dummy variable $I_{93}$ was defined that was set equal to one if the 1997 party of interest sponsored a candidate in the particular riding in the 1993 election. This variable was used to construct the closeness measure, $I_{93} \times c_{jr}$, which was used in the estimation. This measure is a valid instrument as it is uncorrelated with the candidate’s unobservable characteristics, again as approximately 70% of the sample contains candidates who did not run in the 1993 election. Further, and perhaps more importantly for exogeneity considerations, the model controls for the performance of the candidate (through lagged vote share) and therefore, the closeness measure effectively captures how well the candidate’s rivals are expected to do, again ruling out the potential correlation the riding-specific time-invariant component may otherwise induce.

### 3.3 Estimation

The dataset contains information at the riding level, individual voting decisions are not observed. Several measures are observed at the candidate level including party affiliation, expenditure and the number of votes received. A total of 301 markets form the sample. Market share is calculated as the percentage of votes received and as abstention is incorporated into the model, this market share can be thought of as an unconditional measure where the size of the market is defined as the number of registered voters in the market and not the number of votes cast. The parameters of the model are estimated using the procedure developed by Berry et al. (1995) and Nevo (2000), and is described below.

A fundamental identifying assumption is the uncorrelatedness of the model unobservables with the model observables. As this assumption is not satisfied with respect to the observed expenditure variable, instrumental variables are used to restore the structure of the empirical model in order to obtain consistent...
parameter estimates. The nonlinear GMM estimator is the \( \hat{\theta} \) that minimizes

\[
\omega(\hat{\theta})' W^{-1} Z' \omega(\hat{\theta}),
\]

where \( \omega \) is the model error, \( Z \) is the instrument set, and \( W \), the weighting matrix, is a consistent estimate of \( E[Z' \omega \omega' Z] \). The matrix \( W \) is computed in a two step process as explained in Nevo (2000). In the first step, it is set as \( Z' Z \), minimization of the GMM objective function then gives an initial estimate of \( \theta^o \) which is used to construct the new weighting matrix \( Z' \omega(\theta^o)\omega(\theta^o)' Z \). This new matrix is subsequently used to solve for the final parameter estimates in the second step. The error term is defined as the candidate-specific unobservables

\[
\Delta \xi_{jr} = \delta_{jr} - x_{jr}\beta - \gamma_1\exp_{jr} - \gamma_2(\exp_{jr} \times \text{inc}_{jr}) - z_r \alpha - \xi_j - \xi_r.
\]

In terms of observables (and parameters), this error term is computed as

\[
\omega_{jr} = \delta_{jr}(\hat{s}_{jr}; \sigma_1, \sigma_2) - x_{jr}\beta - \gamma_1\exp_{jr} - \gamma_2(\exp_{jr} \times \text{inc}_{jr}) - z_r \alpha - \xi_j - \xi_r \equiv \Delta \xi_{jr},
\]

where \( \delta_{jr}(\hat{s}_{jr}; \sigma_1, \sigma_2) \) is solved from the implicit inversion of the system

\[
\hat{s}_{jr} = s^*_{jr}(\delta_r; \sigma_1, \sigma_2), \quad r = 1, ..., R
\]

where \( \hat{s}_{jr} \) is the observed vote share and \( s^*_{jr}(\delta_r; \sigma_1, \sigma_2) \) is the vote share function given by (6). The linear structure of (9) permits the use of familiar linear instrumental variable techniques. Berry et al. (1995) show that \( \delta_{jr} \) can be solved for market-by-market by computing

\[
\delta^{k+1}_{jr} = \delta^k_{jr} + ln(\hat{s}_{jr}) - ln(s^*_{jr}), \quad k = 1, ..., K
\]

where \( \delta^{K+1}_{jr} \) approximates \( \delta_{jr} \) when \( \|\delta^{K+1}_{jr} - \delta^K_{jr}\| \) satisfies a specific convergence criterion. In fact, for computational purposes, Nevo (2000) suggests working with an exponential version of (11):

\[
w_{jr}^{k+1} = w_{jr}^k \frac{\hat{s}_{jr}}{s^*_{jr}}, \quad k = 1, ..., K
\]

where \( w_{jr} = \exp(\delta_{jr}) \). This contraction mapping is used to solve for \( w^{K}_{jr} \) which uniquely determines \( \delta^K_{jr} \).

An important special case is considered when the randomness of the coefficients is removed (i.e. \( \gamma_{1i} = \gamma_1, \gamma_{2i} = \gamma_2 \)). Under these constraints, the model reduces to a standard logit form

\[
s_{jr}(x_r, \exp_r, z_r, \delta_r) = \frac{\exp(\delta_{jr})}{1 + \sum_{k=1}^{J_r} \exp(\delta_{kr})}.
\]

For this specification, Berry (1994) showed the inversion of the system in (10) has the analytic form

\[
\delta_{jr}(\hat{s}_{jr}) = \log \hat{s}_{jr} - \log \hat{s}_{0jr}, \quad r = 1, ..., R, \quad j = 1, ..., J_r.
\]

The GMM procedure described above reduces to a two-stage least squares (2SLS) procedure when an appropriate weighting matrix is chosen. The resulting regression equation used for 2SLS estimation is then

\[
\delta_{jr}(\hat{s}_{jr}) = x_{jr}\beta + \gamma_1\exp_{jr} + \gamma_2(\exp_{jr} \times \text{inc}_{jr}) + z_r \alpha + \xi_j + \xi_r + \Delta \xi_{jr}.
\]

Results from this model are likewise provided in the empirical section.
3.4 Campaign Spending Elasticities

Once the utility function parameters have been estimated the own- and cross-expenditure elasticities can be estimated. The own vote share expenditure elasticity or the responsiveness of party \( j \)'s expected vote share to a unit percentage change in its expenditure is represented by \( \eta_{jjr}^* \) and is computed in the familiar way:

\[
\eta_{jjr}^* = \frac{\partial s_{jr}^*}{\partial \exp_{jr}} \cdot \frac{\exp_{jr} \cdot s_{jr}^*}{\exp_{jr}} \cdot \frac{1}{M} \sum_{i=1}^{M} \left[ (\gamma_1 + \gamma_2 \text{inc}_{jr} + \sigma_1 \nu_{1i} + \sigma_2 \text{inc}_{jr} \nu_{2i}) s_{ijr} (1 - s_{ijr}) \right] \cdot \frac{\exp_{jr}}{s_{jr}^*},
\]

where

\[
s_{ijr} = \exp(\delta_{jr} + \sigma_1 \exp_{jr} \nu_{1i} + \sigma_2 (\exp_{jr} \times \text{inc}_{jr}) \nu_{2i}) \quad \text{and} \quad \sum_{k=1}^{J} \exp(\delta_{kr} + \sigma_1 \exp_{kr} \nu_{1i} + \sigma_2 (\exp_{kr} \times \text{inc}_{kr}) \nu_{2i}).
\]

The cross-expenditure elasticity, \( \eta_{jlr}^* \), is computed in a similar fashion and represents the effect a 1% change in the expenditure of party \( l \) has on the expected vote share of party \( j \):

\[
\eta_{jlr}^* = \frac{\partial s_{jr}^*}{\partial \exp_{lr}} \cdot \frac{\exp_{lr} \cdot s_{lr}^*}{\exp_{lr}} \cdot \frac{1}{M} \sum_{i=1}^{M} \left[ (\gamma_1 + \gamma_2 \text{inc}_{lr} + \sigma_1 \nu_{1i} + \sigma_2 \text{inc}_{lr} \nu_{2i}) s_{ijr} s_{ilr} \right] \cdot \frac{\exp_{lr}}{s_{jr}^*}, \quad j \neq l.
\]

The independence of irrelevant alternatives assumption which refers to the independence of the ratio of any two probabilities with a third possibility is not imposed by the model. The own- and cross-expenditure elasticities derived above allow for some substitutability to exist amongst the candidate choices with respect to this variable.

4 Data and Estimation Results

4.1 Data

The empirical analysis focuses on the 1997 Canadian General Election. The data set is constructed from the 1997 Official Voting Results database maintained by Elections Canada as well as from the 1996 Canadian Census database maintained by Statistics Canada. There are 1,672 candidates in the sample spanning 301 electoral districts. All candidates and parties are included in the analysis. The fringe party candidates are not dropped for several reasons. First, the number of parties being modeled does not impose additional computational complications given voter choices are projected on a set of candidate and party level variables. Second, the fringe candidates represent 28% of the voters’ choice set and although these candidates did not win a significant vote share, they nonetheless represented choices for the voters and the fact that voters did not vote for these candidates is valuable information. Further, fringe candidates
are weighted less in the GMM weighting matrix. Third, had the fringe party candidates been dropped, issues surrounding the interpretation of the outside good would arise. Instead of the now abstention share interpretation, the outside good would represent the fringe candidate vote as well as the abstention choice. This is not an attractive interpretation as interest lies in assessing the impact of campaign expenditure on the abstaining share of the electorate.

The data from Elections Canada contains the candidate-specific variables that are used in the analysis. In particular, and as mentioned earlier, the following characteristics are used: expenditure records the candidate’s expenditure per registered elector in dollars, incumbency indicates whether the candidate is an incumbent (taking a value of 1 when the candidate is an incumbent and 0 otherwise), and gender records a male or female candidate (a value of 1 represents a male candidate, a 0 represents a female candidate). The interaction term between expenditure and incumbency is constructed and denoted by the variable expenditure \times incumbency. The occupation of the candidate listed in the elections database is categorized following the classification system used by Statistics Canada; dummy variables are then constructed to account for the different categories. A candidate’s riding, party affiliation and vote share are also included in this database. The riding fixed effects are constructed from the information on the candidate’s riding. The candidate’s party lagged vote share (lagged vote share) is also obtained from this database. In addition to these variables, the following two measures obtained from Statistics Canada are used to capture the performance of the Liberal party: change in pdi \times governing party records the change in average personal disposable income (in dollars) from 1997 to 1993 and change in ue \times governing party records the change in the average unemployment rate (in percent) from 1997 to 1993. Positive economic performance is associated with a positive change in the income variable, representing an increase in income in 1997 relative to 1993, and a negative change in the unemployment variable, representing a decrease in the unemployment rate in 1997 relative to 1993. Both these variables are obtained at the provincial level and enter the utility function as interaction terms with the incumbent (governing) party dummy variable. Population density (population density) is recorded at the riding level and represents the population (in 10,000s) per square kilometer.

Party level fixed effects are included for all parties. A candidate belongs to one of the following political affiliations: Canadian Action Party (action), Bloc Qu´ eb´ ecois (bq), Christian Heritage Party of Canada (christian), The Green Party of Canada (green), Independent (independent), Liberal Party of Canada (liberal), Marxist-Leninist Party of Canada (marxist), New Democratic Party of Canada (ndp), No affiliation (no affiliation), Natural Law Party of Canada (natural), Progressive Conservative Party of Canada (pc), Reform Party of Canada (reform).

Five regional dummy variables (bc, prairies, qc, maritimes, territories) are used to capture the inherent differences in voting patterns across the country. The variable bc takes on the value 1 if the candidate’s riding is in British Columbia, prairies takes on the value 1 if the candidate’s riding is in Alberta, Saskatchewan or Manitoba, qc takes on the value 1 if the candidate’s riding is in Qu´ eb´ eco, maritimes takes on the value

15
1 if the candidate’s riding is in New Brunswick, Newfoundland, Nova Scotia or Prince Edward Island, and territories takes on the value 1 if the candidate’s riding is in the Yukon or the Northwest Territories. Ontario is used as the reference category. Table 1 contains a breakdown of the total party vote share by these regional variables. The other category includes all parties not explicitly considered in the table. Clear patterns emerge from this table. The Reform party’s strongest support was in the west and its weakest support was in the east. The Liberal party captured its largest share of votes in Ontario and to a lesser extent in Québec. The Conservatives’ strongest support was in Ontario and eastern Canada with relatively poor support in the west. The NDP’s share of votes was strongest in Ontario and relatively strong across the rest of Canada except in Québec where it’s performance was poor. Correspondingly, to capture the regional vote, party-region interaction terms are included in the model.

Mean expenditures per registered voter by party and region are provided in Table 2 for the five main parties. These expenditures do not include national party spending, these types of expenditures are however controlled for by the party fixed effects included in the model. The Liberal and BQ parties spent the largest amount, approximately 74 cents for every elector. The Conservative and Reform parties spent similar amounts, 46 and 45 cents per elector, respectively. The NDP spent approximately 30 cents per elector. It is noted that these observed expenditure levels do not account for the nonremunerative contributions, in particular, reported expenditures do not capture the effects of volunteer labor and door-to-door campaigning. Recall, the endogeneity of the expenditure variable is treated with the following excluded instrumental variables: a closeness variable which is used to indicate the tightness of the race, the sum of the previous election’s expenditure at the riding level, and the interaction of these two variables with the incumbency dummy variable.

4.2 Voter’s Utility Function

Estimation was done in Splus and Matlab. Table 3 reports the estimation results for three models. Model A is an ordinary least squares (OLS) regression of (15) with \( \log s_{jr} - \log s_{0r} \) as the dependent variable. This model does not account for endogeneity or heterogeneity in the campaign expenditure variable. Model B uses the same dependent variable but the analysis is two-stage least squares (2SLS) which accounts for the endogeneity but not the heterogeneity of expenditures. This is the estimated model given in (15). The high \( R^2 \)’s of 0.96 and 0.95 reported for these models are not being driven by the inclusion of the lagged vote share control. The respective \( R^2 \)’s for the models without this term are 0.95 and 0.94. Model C reports the GMM results from the full model that captures both the endogeneity and heterogeneity of the expenditure variable. For this model the simulation size (for each riding) was set at \( M=100 \), with the individual random shocks drawn from a normal distribution. To ensure the expected shares summed to one the same draws were used in each electoral district. Included in all three models (but not reported) are occupational dummy variables, riding fixed effects, as well as party and region fixed effects and their interactions. Robust standard errors are provided.
From the OLS regression (Model A) the results indicate that increasing campaign spending increases vote share (relative to the outside good). A challenger candidate who increases his per registered voter expenditure by $0.10, increases his vote share, on average, by 13.32%. Similar campaign expenditures by an incumbent candidate increases his vote share by 7.44%. Although incumbent spending is not as effective as challenger spending, it is nonetheless substantial. To address the potential bias from using OLS, Model B provides the results from 2SLS. The use of instrumental variables results in an expenditure coefficient of 2.49, almost double the value of the OLS estimate of 1.33. A challenger who increases campaign spending by $0.10 increases vote share by 24.89% while an incumbent can expect an average increase of 18.04%. This result supports the recent findings in the literature that document larger marginal spending effects for challengers. Of course, these causal implications of the spending estimates must be interpreted in the context of the model. In particular, two observations must be noted. First, as the model does not include campaign activities other than campaign spending, the estimated spending effects may be overestimated as spending may be correlated with these other activities. Second, candidates may be endogenously selected; for instance, parties may run weaker candidates in unwinnable ridings. Sayers (1999) terms these types of candidates stopgap candidates and explains that the campaign teams of these types of candidates lack both funding and volunteers. These types of candidates would also bias the spending coefficient away from zero as the observed lower spending may be picking up weak candidates (i.e. it is not the spending that is increasing vote share but the fact that the candidate has no effective competition). However, this bias is tempered as the candidate’s unsuccessful campaign is not so much the result of the candidate being weak as it is the riding itself being unwinnable.

The incumbency coefficient estimate for this model was positive and statistically significant suggesting that it proves beneficial to be an incumbent candidate as it induces a positive effect on a voter’s utility level with a coefficient estimate of 0.71. Voter response to recognition is conceivably an important component of this advantage. Further, past electoral success may be linked to competency and thus provide the incumbent candidate with an advantage. Additionally, incumbent candidates may be more successful in generating contributions to finance their campaigns as they have a broader scope of resources available to them. The gender of the candidate, on the other hand, seems to play no significant role in the electoral success of the candidate, as the estimated coefficient was not found to be statistically significant. The consideration that gender was not significant suggests that the business of government is sufficiently broad that gender provides little or no human capital in the capacity to govern. However, the number of women in the House of Commons and the number who represent political parties may be important to the components of the economy and to signaling in the labor markets. Hence, the insignificance of this coefficient does not imply any policy implications separate from the overall context of Canadian society. It is interesting to note that approximately one-fourth of the total number of candidates running in this election were women and of the 301 elected candidates, approximately one-fifth were women. Turning to the economic performance variables change in pdi × governing party and change in ue × governing party, were found to be significant.
suggesting that voters hold the incumbent government directly responsible for their personal disposable income and unemployment levels. A $1,000 increase in average personal disposable income in 1997 relative to 1993 increased the Liberal vote share by 0.6%, while a 1% decrease in the average unemployment rate in 1997 relative to 1993 increased the Liberal vote share by 0.17%. These estimated coefficients suggest that voters hold the incumbent government responsible for prevailing economic conditions. The party’s vote share from the previous election was included in the model as a control to soak up the predisposition of the riding. The estimated coefficient is positive and significant. The population density of the riding was further included as a control, the estimated coefficient suggests a positive relationship between density and vote share.

To assess the instruments used in Model B, first stage regression statistics are also provided in Table 3. The validity of the instruments is assessed through Hansen’s J test, the value of 3.04 (p-value = 0.2184) from this over-identification test indicates that the instruments are exogenous in the second stage. The F-statistics (not reported) associated with the excluded instruments for the expenditure equation are 56.43 (p-value = 0.0000) and 64.39 (p-value = 0.0000) for the expenditure × incumbency equation. These values suggest that the set of instruments used for both equations are jointly highly significant predictors in the first stage. The Hausman statistic of 105.90 (p-value = 0.0000) provides further support for the 2SLS procedure.

The last two columns of Table 3, labeled Model C, report the full GMM model results that allow for both heterogeneity and endogeneity in candidate expenditures. Caution must be taken when interpreting this model since the estimated coefficients have larger standard errors than their Model B counterparts and thus less precision. The estimated mean and variance for each of the marginal utility distributions of expenditures is provided in this table. The mean of expenditure is estimated as positive and significant. A $0.10 increase in per registered voter campaign expenditures, increases vote share, on average, by 27.27%, a larger effect than that estimated from using OLS and 2SLS. The standard deviation of this distribution is estimated as 3.30 and is significant at conventional levels. The magnitude then of the variance of the marginal utility distribution is consistent with a model in which not all voters derive a positive utility from increased campaign expenditures. The mean utility associated with expenditure × incumbency, while estimated to be negative, is not statistically significant. The standard deviation of this distribution is likewise not precisely estimated. Based on these results, the estimates of the mean and standard deviation of the marginal utility distribution of expenditure apply to all candidates, incumbents and challengers alike. That is, there is no difference associated with the mean utility level of expenditures by incumbents and challengers nor is there a difference in the variance of the marginal utility distribution across individuals.

Further research is required to explore and understand this variation through richer modeling of the heterogeneity parameter. Incorporating Census demographic information into the taste parameters may provide a reasonable starting point. Although the incumbency variables were qualitatively similar to the 2SLS estimates, they were imprecisely estimated making it difficult to draw strong conclusions. Additional
data spanning multiple general elections is highly desirable. The rest of the coefficients were qualitatively similar to those of Model B.

4.3 Campaign Spending Elasticities

The own- and cross-expenditure elasticities implied by the full model are presented in Table 4. As elasticities are not constant across ridings, it is not feasible to report the own- and cross-expenditure elasticities for each riding, instead the mean elasticities across relevant ridings for each political party are reported. Table 4 gives the percentage change in the expected vote share of the row party resulting from a 1% increase in the expenditure (per registered voter) of the column party. Consider the Reform party for example. A 1% increase in its per registered elector expenditure results in a 1.05% increase in its own vote share, a 0.72% decrease in the Liberal party’s vote share, a 0.24% decrease in the PC’s vote share, a 0.20% decrease in the NDP’s vote share, and a 0.01% decrease in the Bloc’s vote share. The row labeled “abstention” refers to the outside good, or to the abstention category. A 1% increase in Reform expenditures, reduces the share of nonvoters by 0.11%.

Examination of Table 4 reveals important observations. First, the own-expenditure elasticity is the largest for the Liberal party at 1.87% followed by the BQ (1.70%), the PC party (1.23%), the Reform party (1.05%), and the NDP (0.78%). These elasticity estimates are consistent with the expenditure levels for these parties. The BQ party’s own-expenditure elasticity may be unexpectedly low compared to the Liberal party’s estimate as the two parties spent nearly identical per registered voter dollars and given the BQ party targets a very narrow portion of the electorate. In particular, one would expect the BQ party to be more effective than the Liberal party in using its campaign resources to generate votes since this party focuses on a tighter target band and is thus able to avoid the diminishing returns associated with trying to capture votes from a broader electorate base. The fact that this result is not supported leads one to question the general efficiency of campaign spending by this party. However, the effect of the Liberal and BQ expenditures on their own vote shares was the largest impacts of all the parties. The Liberal party represents the incumbent and so this may represent an incumbency effect, meaning that the party has to spend less in order to gain the same or greater credibility as the other parties. The BQ also seems to benefit from a similar incumbency effect in relation to political activities within Québec, where its candidates were confined. The incumbency effect and the own-elasticity results suggest that challengers to the incumbent in political ridings must spend more to gain votes. This result would tend to support a war-chest type model.

Second, important cross-elasticity values are revealed in Table 4 which suggest that these measures are also important in making predictions about the effectiveness of political expenditures on expected political election outcome. A 10% increase in the Reform party’s per registered voter expenditures has the largest negative impact, 7.24%, on the Liberal party’s vote share, followed by a 2.40% impact on the PC party’s vote share. That is, the Reform party is most effective in capturing Liberal party voters with increased
campaign expenditures. The Liberal party on the other hand, has the greatest impact on the PC and Reform parties causing their vote shares to decrease by 4.20%. The BQ and NDP parties similarly have the greatest impact on the Liberal party, reducing its vote share by 10.98% and 5.94%, respectively, with a 10% increase in their campaign expenditures. The expenditure elasticities for the fringe parties were computed (but not reported) and they all had negligible effects on the main parties.

And third, of all the parties, the Liberal party has the greatest impact on the group of nonvoters. The number of electors comprising the group of nonvoters for the 1997 election was approximately 6,500,000. A 10% increase in its per registered voter expenditures induces 1.96% of nonvoters to vote for this party. The BQ’s expenditure has a similar effect on dropouts at 1.94% followed by the 1.06%, 0.67%, and 0.41% effects of the Reform, PC, and NDP party expenditures, respectively. Campaign spending then not only redistributes voters across parties but it induces nonvoters to vote and thus enlarges the vote set. This result raises important policy issues with respect to campaign expenditure ceilings and their impact on voter participation. Expenditure ceilings have generally been advocated to balance the interests of wealthy lobbyists against the interests of the general public. The results suggest that this trade-off is not two-dimensional, one must also consider the effects on voter participation. Hence, if candidates are near their campaign expenditure limits then determining these ceilings in frameworks that ignore voter participation are likely to be too restrictive on campaign expenditure limits when voter participation is desirable. If the incumbent is negatively affected by higher levels of voter participation, then the results would seem to suggest that he would desire lower expenditure limits than the challenging parties.

5 Conclusion

This paper has developed a structural model through which the impact of campaign spending on votes in multiparty elections was assessed. The model incorporates abstention and accounts for the endogeneity of campaign expenditures as well as the heterogeneity of voter preferences. The paper has provided estimation results for a random coefficients discrete choice model using Canadian data. The empirical results demonstrate the importance of candidate spending during the campaign period and the heterogeneity of voter preferences with respect to these expenditures. Candidates that held incumbency status were found to benefit substantially compared to their challengers. Gender was generally not found to be a significant determinant of Canadian voters’ choice of candidate. Positive economic performance with respect to the unemployment rate and average personal disposable income were found to have significant effects for the governing party. The own- and cross-expenditure elasticity estimates revealed interesting findings. Political campaign spending was found not only to redistribute voters across parties, but also to shrink the size of the abstaining group of the electorate, thus raising important policy issues with respect to campaign spending limits and their impact on voter participation.

An important extension to this paper would be to endogenize campaign contributions. The model presented in this paper assumes that candidates finance their campaigns largely through contributions.
These contributions, however, are taken as exogenous and important issues surrounding their impact (eg. who provides these contributions and why, and what signals they provide) are not addressed. Further, a richer model needs to focus on the modelling and understanding of the heterogeneity parameters. Incorporating demographic information into these taste parameters may provide a reasonable starting point. Additionally, research needs to be conducted in a dynamic framework using data from multiple elections in order to incorporate the candidate’s strategic entry decision.
Notes

1The information for this section is taken from two sources: the Thirty-sixth General Election 1997 Official Voting Results document and the Elections Canada website www.elections.ca.

2Spending by third-parties, or independent spending, during the election period are not considered as this data is not available at the electoral district level. In addition to institutional arrangements mitigating the influence of third-party spending on elections, Tanguay and Kay’s (1998) findings suggest that for this 1997 federal election the effects of third-party spending, in particular that by the National Citizens’ Coalition (NCC) and Campaign Life, were negligible.

3Gerber (1988) actually uses the sum of incumbent and challenger spending in the previous Senate election in the state.


5Existing Matlab code written by Aviv Nevo (see Nevo (2001, 2000)) and available on the web at www.faculty.econ.northwestern.edu/faculty/nevo/ was modified and incorporated into the estimation.
References


## Table 1: Share of Total Party Votes by Region

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<th>pc</th>
<th>NDP</th>
<th>BQ</th>
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Table 2: Mean Expenditure per Registered Voter ($'s)

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Notes: Mean expenditures per registered voter are reported in 1997 Canadian dollars.
Table 3: Model Estimates

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<thead>
<tr>
<th>Variable</th>
<th>Model A</th>
<th></th>
<th>Model B</th>
<th></th>
<th>Model C</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>No endogeneity, No heterogeneity</td>
<td>Estimate</td>
<td>Endogeneity, No heterogeneity</td>
<td></td>
<td>Endogeneity, Heterogeneity</td>
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<tr>
<td>expenditure ($/elector)</td>
<td>1.3321</td>
<td>0.0841</td>
<td>2.4886</td>
<td>0.1662</td>
<td>2.7274</td>
<td>0.6931</td>
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<tr>
<td>expenditure × incumbency</td>
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<td>0.1513</td>
<td>-0.6842</td>
<td>0.3793</td>
<td>-0.0339</td>
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<tr>
<td>standard deviation of expenditure (σ₁)</td>
<td>0.6952</td>
<td>0.1201</td>
<td>0.7080</td>
<td>0.2961</td>
<td>0.0295</td>
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<td>standard deviation of expenditure × incumbency (σ₂)</td>
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<td>0.0006</td>
<td>0.0002</td>
<td>0.0014</td>
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<td>change in pdi × governing party ($)</td>
<td>-0.1973</td>
<td>0.0441</td>
<td>-0.1657</td>
<td>0.0589</td>
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<td>change in ue × governing party (%)</td>
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<td>1.0569</td>
<td>0.2215</td>
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<td>population density (10,000/km²)</td>
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<td>0.0058</td>
<td>0.0022</td>
<td>0.0027</td>
<td>0.0038</td>
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<td>lagged vote share</td>
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<tr>
<td>Over-identification test/(p-value)</td>
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<td>3.0430</td>
<td>(0.2184)</td>
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<td>Hausman test/(p-value)</td>
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<td>105.9012</td>
<td>(0.0000)</td>
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<tr>
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<td>1,672</td>
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<td>1,672</td>
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</tbody>
</table>

Notes: Robust standard errors are reported. All specifications include the following fixed effects: riding, party, region, and party/region. Controls for candidate occupation have been included but not reported.
Table 4: Model C Mean Expenditure Elasticities

<table>
<thead>
<tr>
<th></th>
<th>reform</th>
<th>liberal</th>
<th>pc</th>
<th>ndp</th>
<th>bq</th>
</tr>
</thead>
<tbody>
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<td>-0.2247</td>
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<tr>
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<td>-0.0410</td>
<td>-0.1941</td>
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</table>

Notes: Percentage change in the expected vote share of the row party resulting from a 1% increase in the expenditure (per registered voter) of the column party.