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**Political Parties in Canada: What Determines Their
Entry, Exit and the Duration of Their Lives?**

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Political Parties in Canada:

What determines their entry, exit and the duration of their lives?

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Abstract

In this paper we consider two margins of individual political party life in Canada since Confederation—the extensive margin governing existence (the entry and exit decisions, together with party turnover or churning) and the intensive margin determining lifespan or survival length. The results on the extensive margin confirm in a more formal way many of the individual hypotheses advanced in the political literature for entry and exit—the importance of voter heterogeneity, minority governments, world wars, number of competitors and economic circumstances. What stands out most strongly in the data is the introduction of public funding for established political parties following 1974 and recent immigration flows. The intensive margin is explored using a number of hazard models before narrowing choice to semi-parametric models. Potential endogeneity is dealt with by using a discrete hazard model with discrete finite mixtures. This form best captures the empirical hazard, allowing for the detection of party type heterogeneity while being agnostic with respect to the correlation between observables and this specific type of heterogeneity. The results suggest the presence of two distinct political party types and, more generally, mirror the results found on the extensive margin.

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1. Introduction

While political science has long been interested in the features of new political parties that have achieved political success (Rochon, 1985; Berrington, 1985; Lucardie, 2007), articles by Pedersen (1982) and those in the special issue summarized in Harmel (1985) served to stimulate interest in the emergence of short lived parties that have often been considered as marginal to the political process or even worse. In the emerging country literature, for example, the continuous arrival of new parties is often seen as a threat to the stability of democracy (Tavits, 2007). However more recently and in relation to established democracies, the entry of new parties has been viewed more favourably with some authors arguing that entry is central to the maintenance of effective political competition (Aldrich, 1995). From this perspective the arrival of distinctively different ideas and policies as embodied in new political parties and the potential threat they present to established parties helps to ensure the responsiveness of the political process to the evolving wishes of the electorate.¹ In general new parties form to promote parts of the political spectrum that are not represented by existing parties or to break away from existing parties whose platforms, leadership and/or regional representation are insufficiently representative of sub-group aspirations. But while the reasons for the formation of new parties may be diffuse and idiosyncratic (as are often the reasons for their ultimate success or failure),² the times and circumstances under which new parties choose to enter the political area may exhibit greater commonality. In this paper we explore whether the lives of new political parties in Canada have exhibited any such pattern. More particularly, we ask whether the entry, exit and duration of new political parties respond systematically to measurable characteristics of the political and/or economic environment.³

¹ Bruns (2011) models fringe candidates/parties as arising to take advantage of the inertia established parties have in registering changes in voter preferences. By attracting votes away from their closest ideological rival, entrants serve to speed the adoption of new ideas and programs by more established political parties.

² See Lucardie (2007) for a detailed examination of the many ideological and organizational reasons underlying the entry of new parties in Canadian federal elections between 1972 and 2006.

³ What is meant by a political party has always been problematic (Harmel, 1985). In this paper we consider all parties that named as such in the election results as registered political parties. This excludes independents as a class (unless identified as Independent Liberal etc.) and the groupings of all candidates whose affiliation was unknown.

The successful co-existence and electoral dominance of the two founding political parties in Canada — the early coalitions that evolved into the current Liberal and Conservative Parties of Canada — may suggest that the entry of new parties into the Canadian electoral process has been both infrequent and unsuccessful. Indeed Canada's adoption of a first-past-the-post plurality voting system is often thought to make the emergence of new parties largely problematic.⁴ However while the success of new parties is often fleeting, virtually all Canadian elections have experienced one or more political entrant, with some entrants having had considerable success. Over the post Confederation period there have been over one hundred attempts by newly registered parties to gain a foothold on the Canadian political landscape, an average of roughly three per election. As significantly, many of these entrants have achieved moderate success and three succeeding as far as forming the official opposition.⁵

The motivation for new party entry is perhaps too easily explained. The dimensionality of the issue space relative to the set of policies that any political party can hold at any particular point in time means that it is unlikely that existing party platforms can generate the optimal policy mix desired by all groups within the electorate. What is more difficult to explain is the choice to pursue political and economic goals outside the existing structure of political parties. That is, with the arrival of new ideas, new variations in older grievances, new political agents and always changing social and economic circumstances, groups wishing to pursue change face the choice of merging their proposals and policies within existing political structures or starting their own party based on these ideas. This choice will in turn be a function of the receptivity of the established parties and the attention they can bring to the proposed cause versus the cost and likelihood of achieving success as a party dedicated to these new/old ideas.

Cox (1997) provides the methodology most often used to explain the entry of new parties. In this approach a new party will enter the electoral arena if the expected benefit of gaining

⁴ Berrington (1985, 446) writes, "(u)ndoubtedly the British electoral system is the largest single obstacle to the rise of new parties. MPs are chosen by single-member constituencies, and the first-past-the-post formula is used for finding the winner. For simple mechanical reasons, therefore, a party is unlikely to gain much representation unless its following is geographically concentrated or unless it is strong enough to extort some kind of electoral arrangement with one of the established parties." Perhaps for regional reasons, Canada is one of the important exceptions to this general rule (Harmel and Robertson, 1985, Table 12 p.518; Chhibber and Kollman, 2004).

⁵ These are: the Bloc Quebecois in 1993, the Reform/Alliance Party in 2000 and the New Democratic Party in 2011.

sufficient electoral support exceeds the expected cost of entry. Here variables that can proxy participation benefits, entry costs and likelihood of achieving threshold political support are used to test the entry/exit hypothesis. Most often empirical work on new party entry and party durability has been applied across countries (Hamel and Robertson, 1985; Hug, 2001; Travits, 2007; Nishikawa; 2010; and Bolleyer, 2011) where varying institutional detail—cross country differences in electoral rules, threshold petition requirements, other entry conditions and registration costs/subsidies—provide the observables to explain why viable entry occurs more often in one country rather than others.⁶ Here we follow authors like Pinard (1975), Happy (1989), Carty (2002), Lucardie (2007) and apply the analysis to party entry/exit within a single country that has had an institutional framework for elections and governance that has remained fundamentally unchanged—in our case over the entire post-Confederation period. Our analysis then combines and compares the strength of individual hypotheses that have had different academic focus over the long 140 year period of post-Confederation Canadian federal government democracy.

In what follows we ask whether variations in Canada's political and economic environment help to explain the extensive and intensive margins of federal political party life. The following two sections we consider the extensive margin--the party's decision whether to enter or exit the political process and whether these factors in combination increase or decrease political party turnover through the competitive process of churning.⁷ In the fourth section we turn our focus to the intensive margin to examine whether the same factors affect the lifespan or duration of political party life. Here the analysis is complicated by the co-existence of two distinct party types: the small number of parties that have dominated federal elections from Confederation onward and the larger majority that have experienced variable lengths of stay. To highlight some of our more significant findings: the introduction of the public funding of established federal political parties from 1974 onwards and the average immigration rate in the period

⁶ It is well known, for example, that democracies with proportional representation as opposed to first-past-the-post majority or plurality voting generate larger numbers of new political parties (Harmel and Robertson, 1985).

⁷ Exit from the electoral process need not signal the failure of the ideas motivating shorter-lived parties. Failure is often a sign that such innovative ideas and policies have been absorbed into one or more of the platforms of mainstream parties.

leading into a federal election have had significant effects on both margins; the average rate of inflation and the average growth rate of government size in the period leading into the current election have been additional significant influences on the intensive margin; while the number of incumbent competitors, the electoral participation rate, periods of minority government and world war periods have had additional significant effects on at least one dimension of the extensive margin—entry, exit or churning.

2. A micro model of new party entry and minor party exit

Following Cox (1997), a potential political party can be viewed as choosing to enter into the electoral process if the expected benefit from its electoral participation exceeds its cost; that is, if the net benefit of its entering an election as a new political party, $NB(\text{entry})$, is positive. More formally, a potential party will be formed and enter the political process if

$$\begin{aligned}
 NB(\text{entry}) &= \text{Expected benefit from entry} - \text{expected costs} \\
 &= \text{Prob}(\text{successful entry}) \times \text{Present Value of benefits of political party participation} - \\
 &\quad \text{Party setup costs} - \text{Present Value of expected participation costs} > 0. \quad (1)
 \end{aligned}$$

Then if in each election there are a number of potential party entrants for whom the values of participating as a party in the political process and the probability of successful entry differ, the existence of similar setup and participation costs will divide the number of entrants into two sets where the marginal entrant will be the entrant whose expected benefit just exceeds its expected costs. It follows that if there were an overall increase (decrease) in the likelihood of electoral success and/or fall (rise) in the cost of participation, the number of entrants would be expected to rise (fall). This is the basis of the empirical test setup in the following section.

Once the party has entered the electoral arena, however, the continuation decision will involve an optimal stopping rule.⁸ That is the party will continue to participate in elections as long as the expected benefit of continuing exceeds the cost of participating in an additional election. Hence the optimal stopping point is to exit if

⁸ See Lippman and McCall (1976) for a general treatment applied to job search or Ferris and Voia (2009) for its application to the duration of parliamentary governments.

MB from continuing to participate – the period cost of continued participation < 0. (2)

Note that the entry decision differs from the continuation/exit decision not only in the sense that perceptions of the benefits/costs of further participation may be more fully clarified upon entry but also because entry involves an additional set of once-and-for-all costs associated with the initial party setup. Hence once the entrant achieves some electoral success, entry costs become sunk and this implies that continuation into the next election will involve a lower marginal cost that could support continued electoral presence even if the benefits realized are somewhat lower than those that motivated entry.

While the two decision rules set out above seem intuitively plausible, the hypotheses become testable only if we can identify a set of factors that represent changes in the probability of electoral success, the expected benefit of continued party participation, setup and continuation costs. Moreover, the perceived benefits of electoral participation are typically unobservable. This implies that operationalizing the theory requires finding a suitable set of variables that exist for our entire time period and that can measure changes in the other three components (ideally, with unchanged perceptions of the benefit of participating). To do so we utilize the political science literature to suggest factors affecting party entry and/or exit.

We begin with a set of factors that affect the likelihood of a potential entrant achieving some minimum level of electoral support. Here perhaps the most obvious factor affecting the likelihood of achieving electoral success is the degree of competition facing the potential entrant in the electoral environment as represented by the number of already established competitors. Holding other factors constant, the larger is the number of incumbent parties the less likely it is that entry can be successful. Similarly, the larger the number of competing parties, the more likely it is that a marginal party will exit. Second, given the number of competitors, an increase in voter heterogeneity will broaden the viable policy space available to potential parties and increase the demand for more types of representation. Hence greater voter heterogeneity would be expected to support a larger number of political parties. One suggested metric of voter heterogeneity has been the proportion of the population with the right to vote (Berrington, 1985). In Canada the voting franchise has been widened successively

from Confederation (1867) onward with each expansion creating opportunities for new parties to cater to voter interests not reflected in the programs of existing parties.⁹ A similar measure of voter heterogeneity is the voter turnout rate, where increases in the proportion of those eligible to vote will typically increase voter diversity. In the empirical work that follows we then measure voter heterogeneity as the electoral participation rate, defined as the fraction of the population registered to vote (the franchise) times the fraction of eligible voters who choose to vote (the turnout rate). Higher participation rates would then be predicted to produce more party entrants and fewer exits. Another feature that has also been used to measure greater heterogeneity in an electorate is the proportion of the population that are recent immigrants (Ordeshook and Shvetsova, 1994).¹⁰ Under this hypothesis a larger inflow of immigration would be expected to result in a greater diversity of ideas and interests of the electorate and hence open more space for the participation of new parties (Carty, 2002).¹¹

Berrington (1985) amongst others has pointed to institutional or organizational features that make the electoral process more or less conducive to new party entry and/or exit. One such institutional characteristic of Westminster parliamentary governments is the possible election of minority governments that are typically conservative in nature and short in longevity (Ferris and Voia, 2009). Because such periods reflect the lack of consensus among voters for existing parties, a bigger window of opportunity will be opened for new parties to enter at the same time that then continued lack of electoral success encourages marginal parties to exit. This is tested by including a dummy variable (1 for elections featuring minority outcomes and 0 otherwise). A second convention that has governed elections in Canada has been the suspension or relaxation of electoral competition between the two main political parties during the two world wars (see Berrington, 1985, p.447). This relaxation of regular party completion

⁹ In Canada the voting franchise grew from 8.3% of the population in 1867 to 76.7% by 2011, the single biggest jump being the extension of the franchise to women in 1917.

¹⁰ The acquisition of Canadian citizenship takes three consecutive years of residence and confers voting rights at the municipal, provincial and federal level. One need only be a resident to have the right to vote and run in local school board elections.

¹¹ We also used the proportion of the labour force in agriculture and the inverse of a Herfindahl index of individuals by religious affiliation (over the preceding governing period) as another measure of voter heterogeneity but found it to be consistently insignificant and so did not include it in the results presented. See however their effect on duration in section 3.

would then be expected to give greater opportunities to potential new parties. We test for this wartime effect on entry by including a dummy variable (1 versus 0) for those elections held surrounding the two world wars.

When we turn from factors that influence the likelihood of success (for the potential entrant and/or continuing minor party) to the cost side of the entry/exit calculus, significant effects on entry and exit can be expected from changes in election funding that favour or disadvantage entrants relative to incumbents.¹² One institutional change stands out in particular. In 1974 Canada introduced public funding for established federal political parties, eliminating party reliance on both corporate and union contributions and substituting a per-vote subsidy to parties, direct subsidization of election expenses and the granting of tax credits to individual contributors. However, to qualify for public support, a political party had to be registered and to have received at least 2% of the valid votes in the preceding general election or at least 5% of the valid votes in the electoral districts in which it had a candidate. In addition, political parties could receive research and staffing support in parliament but only if they maintained party status, i.e., held a minimum of 12 seats in the House of Commons. It follows that by subsidizing the continued presence of established political parties, public funding implicitly discriminated against potential entrants (MacIvor, 1996) and promoted the continued existence of those that were able to achieve moderate size. In this sense Canada's substitution of public for private organizational forms of party funding would be expected to have produced a decline in both the number of new parties entering and those exiting in the post 1974 time period.

Finally, it is often hypothesized that poor economic conditions arising during a governing term will reduce the incumbent party's chances of victory in the upcoming election by increasing the desire for change (see, for example, Happy, 1989; Voia and Ferris, 2013). This in turn would improve the electoral success of rivals, including that of potential entrants (Lewis-Beck and Stegmaier, 2000; Tavits, 2007). Similarly, if giving political support is a normal good, then the raising funds for relatively unsuccessful political activity will be increasingly difficult in times of

¹² We also used the size of the federal government (relative to GNP) as a measure of a benefit to entry--the size of the economy over which a governing party would have control. This had no significant effect on the entry decision but did have an effect on the expected duration of party life (see Section 3 below).

economic distress. Hence exits should increase. We test for these effects of the economic environment on entry and exit by using the growth rate of per capita income and inflation rate averaged over the previous governing interval.¹³

3. Party entry and exit: data and results

To test these hypotheses data is needed on the arrival and departure of registered political parties in each election, the number of competitors, institutional detail and economic circumstances. The data on the number of political parties used as the dependent variable in our study comes from the Parliament of Canada web site. Because the data set begins with Confederation in 1867, all the parties in our study were at one time new so that the dependent variables in our study consist of the population of newly registered parties in each federal election, the elections in which they entered and exited, and the duration of their active lives. In our database there were 108 different named parties that ran for Canada's federal parliament between Confederation and 2011.¹⁴ The timing of their entrance and exit over the 41 federal elections since Confederation is shown in Figure 1.

-- insert Figure 1 about here --

Because the number of new parties that arrive in any election is always a discrete number, the entry/exit analysis that follows uses a Poisson count regression to test for the significance of the proposed set of political, institutional and economic conditions expected to affect the likelihood of entry/exit. The economic conditions used in the analysis were collected from the Statistics Canada database (Cansim II) and averaged over the time period of the government immediately prior to the current election. A complete list of variables and their sources is

¹³ Most studies test for this effect by using unemployment rates. However in Canada unemployment rates are available only from 1919. It is for this reason that we used both the growth rate of real per capita income and inflation rates. Because the growth rate was insignificant in all our regressions we present only the results for the average inflation rate over the previous election period.

¹⁴ In some cases the same party name appears intermittently across elections (e.g., The Nationalist Party first appeared in the 1887 - 1917 period and then reappeared between 1949 and 1965). These occurrences may reflect time intervals when the party became inactive or instances when a new party adopted an abandoned party name. In our work the reappearance of a party name was treated as a new party if that party name had not been used for five or more consecutive elections. This results in the 108 political parties used.

presented as a Data Appendix at the end of the paper.¹⁵ Finally, to assist in the comparison of empirical results with the model's predictions, we include the predicted sign associated with each variable's marginal effect as the first item in brackets in the appropriate Poisson entry or exit equation.

-- Insert Table 1 about here --

The marginal effects of the covariates of our poisson regression model of political party entry across the 41 elections since Confederation in 1867 are presented as the first column of Table 1.¹⁶ From the regression equation statistics reported at the end of the column it can be seen that the overall hypothesis performs reasonably well with the variables as a group explaining 24 percent of the variation in the number of entrants. Moreover the equation passes the link specification test and produces a fit with the entry data that is consistent with the assumed shape of the Poisson distribution.¹⁷

Virtually all of the predicted marginal effects appear with their expected sign. The number of entrants rise in elections taking place about the two world wars, increase when the electoral participation rate increases and fall following a period of high inflation and after public funding is introduced for established political parties. All of these estimated effects are significantly different from zero. In addition, the data are supportive of a number of the other hypotheses. An increase in the number of incumbent competing parties tends to reduce entry while a minority government is associated with increases in entry. However the coefficients corresponding to these effects are statistically significant only if we extend the standard level of acceptance to 10% or slightly beyond. The only clear exception is the effect produced by recent immigration on entry. Here the data indicate that a higher immigration flows in the period leading into an election is more likely to be associated with a decrease rather than an increase

¹⁵ Research assistance in compiling the data was given by Derek Olmstead, Haizhen Mou, Beatriz Peraza, Alexandre Couture Gagnon and Denise Ledoux of the Library of Parliament. Their help was greatly appreciated.

¹⁶ More specifically, the Table 1 coefficients represent not the regression coefficients themselves but the more informative marginal effect. That is, the marginal effect on the predicted outcome of a marginal change in the covariate if the covariate is continuous and the discrete change produced if the regressor is a dummy variable.

¹⁷ If, for robustness, the model is rerun after excluding the first election (that includes the entry of the two parties that dominated the entire period) virtually identical results are obtained, with most regression coefficients becoming somewhat larger (absolutely) and more significant.

in the number of party entrants. The entry effect, however, is insignificantly different from zero.

In column (2) we present the marginal effects of the variables affecting the exit decision of existing political parties. Here the set of variables work somewhat better as an explanation of party exit than they do for entry, with a higher pseudo R^2 of .419 and a link test indicating no evidence of misspecification. The Pearson goodness-of-fit measure also indicates conformity of the data with the assumed Poisson distribution of exits. The individual hypotheses work largely as expected with two earlier suggested effects now standing out more strongly. First the number of incumbent competitors is now found to have a significant positive effect on exit, whereas the negative effect on entry was only marginally significant. Second, recent immigration flows are inversely correlated with party exits but now significantly so. In combination with the entry result, however, the data now appear to be inconsistent with the hypothesis that increases in voter diversity support more political parties. Rather by reducing the net number of parties, the data suggest that recent immigration flows increase rather than decrease the electoral strength of the established parties relative to parties on the margins (of entry and exit).

For most of the remaining hypotheses, the signs of the marginal effects are consistent with those expected but with estimated values that are insignificantly different from zero. Hence minority governments tend to increase exit rates while the public funding of established parties tends to decrease exit rates, but neither effect is significantly different from zero. On the other hand economic circumstances continue to exert a significant effect, with higher inflation rates associated with significantly higher exits.

While the entry and exit decisions focus on the choices made by individual parties, what may be more important for the political process as a whole is the rate at which parties turnover across elections. In the industrial organization literature, for example, Schumpeter's hypothesis of creative destruction has been used to explain the role of churning—the aggregate of firm entry and exit in an industry. In the associated empirical literature, increased churning has been found to be associated with higher rates of product innovation, productivity growth and

improved performance (Bartelsman and Doms, 2000). And even though research shows that much of productivity growth arises from incremental innovations adopted by industry incumbents, the 'more radical' ideas and innovations have tended to come from entrants who survive by driving out more complacent incumbent rivals (Acemoglu and Cao, 2015). Thus to the extent that significant innovation arises through a similar process of creative destruction in the political arena, the greater churning of political parties may stand as a proxy for the degree of productivity growth in and the competitiveness of the political process.

In column (3), then, we present the marginal effects of the covariates in our Poisson regression on the churning of political parties in Canada since Confederation. This allows us to test not only whether churning itself responds to our highlighted variables but also to explore whether the combined effects on entry and exit can be significant even when the individual subcomponents are separately insignificant. Once again the set of variables as a whole provides a reasonable explanation of party churning with a pseudo $R^2 = .386$. The equation passes the specification test satisfactorily and the Pearson goodness-of-fit measure indicates data conformity with the assumed Poisson distribution.

In terms of individual hypotheses, three things stand out. First, while the effects produced by periods of minority government are insignificant with respect to entry and exit separately, their combined effect is significant at the five percent level. Hence significant churning can arise even when the overall number of party competitors remains more or less constant. Churning can also arise even if significant offsetting effects are produced on both entry and exit. This is the case for an increase in the number of incumbent competitors where despite the effects tending to offset, the overall result on churning has been significantly positive. Second, while greater electoral participation increases entry significantly, the combined effect with exits is to make churning insignificantly different from zero. This is consistent with greater participation by the population in an elections increases the number of choices facing the electorate rather than simply producing an unchanged number of different choices. Third, evidence of a significant negative effect from previous term inflation rates on entry is combined with a significant positive effect on exits such that the separate effects on churning cancel, implying

that a prior period of higher inflation does reduce the total number of competing political parties.¹⁸ This is not the case for the introduction of public funding of political parties in Canada. Because the individual results suggest negative effects for public funding on both entry and exit, it is not surprising to find their combined result in churning also significantly negative. In this case, public funding has produced a powerful negative effect on the turnover rate of new parties and reinforced the political position of the already established political parties at the expense of entrants. This mirrors a similar effect arising from recent immigration flows where less turnover and fewer numbers implies less competition for established political parties. It follows that the negative effects of immigration on both the entry and exit of political parties (and hence churning) are more consistent with the hypothesis that immigrants have a preference for, or are actively courted by, established parties rather than with the hypothesis that recent immigration promotes new and different types of political parties.¹⁹

--insert Figure 2 about here--

In Figure 2 we illustrate two of the model's incremental effects by illustrating the effects produced by successive increases in the number of incumbent competitors on both entry and churning. In Figure 2a the point estimates indicate that the largest marginal positive effect on entry is produced by the first appearance of an incumbent and that its effect falls by ever smaller amounts as the number of incumbents increases. The inclusion of the confidence intervals, however, adds a note of caution to this story. The inverted U shape of the lower bound of the confidence intervals in Figure 2a results in an overlapping of the confidence intervals associated with the smallest and largest number of incumbents. This implies that what appears from the point estimates to be downward sloping line may not be statistically distinguished from a horizontal line. In Figure 2b the marginal effects on churning of increases in the number incumbents is illustrated and can be seen not to need this qualification. The

¹⁸ This evidence is more consistent with the higher cost of raising the funding relatively unsuccessful political parties relative to the hypothesis that poor incumbent performance would enhance the electoral success of rivals including entrants.

¹⁹ See, for example, Joe Friesen and Julian Sher, "How courting the ethnic vote paid off for the Tories" *Globe and Mail* May 3 2011, online at www.theglobeandmail.com/news/politics/how-courting-the-immigrant-vote-paid-off-for-the-tories/article578608/.

point estimates suggest that ever larger numbers of incumbents produce ever larger increases in party churning and the non-overlapping of the confidence intervals at the two tails increases our confidence that the true relationship is increasing.

4. The duration of political party life

When we turn from the entry and exit decisions at the extensive margin to examine the intensive margin, it becomes more apparent that simple characterization of the lifespan or duration of a typical Canadian political party will be difficult. What is immediately obvious from an overview of the duration data is that we have at least two different types of political parties: the two parties that have dominated Canadian political life, entering in the first election and continuing through all later elections (the present Liberal and Conservative Parties), and the large remainder whose entry is spread across time and for whom duration has been relatively limited.²⁰ In the latter case electoral participation has varied widely with the largest majority of new parties lasting for only a very few elections.²¹ A second feature of our data is that there exist a number of parties that continue to survive beyond the end of our sample period. Hence the duration data are both heterogeneous in nature (due to the presence of characteristics that are not easily quantified) and right censored. The hazard literature provides standard modelling adjustments for the right censoring of data which we incorporate in the models considered below. However, techniques that can allow for the effects of unobserved heterogeneity on the covariates are possible for only a smaller subset of models.

To find the model that can best describe party duration we begin by allowing a party's survival time to be considered as either a discrete number or a time interval. This allows us to assess whether discrete or continuous parametric versus discrete or continuous semi-parametric specifications of the hazard function better capture the data. The hazard specifications considered here are all assumed to take the following general form:

²⁰ The two longest lasting parties following the Liberals and Conservatives have been the CCF/NDP and Communist Parties who have participated in 25 elections as of 2011.

²¹ In our population of political parties, 62 of 104 parties participated in at most two elections.

$$\theta(t_i|x_{it}) = \mu_i\lambda(t_i)\phi(x_{it}), \quad (3)$$

where $\theta(t_i|x_{it})$, the hazard function, is the probability that party $i = 1, 2, \dots, 108$ with the characteristics given by the values of the variables described earlier, the covariates x_{it} , will exit in the following period given that party i has already survived for t election cycles (where $t = 1, 2, \dots, 41$). The hazard probability then depends upon an unobserved heterogeneity parameter, μ_i , a scaling factor that is a function of our covariates, $\phi(x_{it})$ and a time duration function, $\lambda(t_i)$. The latter is called the baseline hazard and measures the probability of exit at $t + dt$ for a political party that has all of its covariates equal to zero.

To test whether a discrete or continuous survival time model best describes the data we begin with models that are fully parametric before turning to discrete and continuous models that are semi-parametric (in the sense that the baseline hazard can be non-parametrically identified). All models tested incorporate adjustment for right censored observations. Figure 3 summarizes the results of applying the different hazard specifications and gives a visual representation of their ability to capture the shape of the actual hazard pattern indicated by the data (and shown as the solid-line empirical hazard on our graph in Figure 3).

-- Insert Figure 3 about here --

In Figure 3 the vertical axis represents the hazard, the probability that a political party with characteristics x_{it} and that has survived up to time t_i will exit during the time period $t_i + dt$. Survival time is on the horizontal axis. As that figure illustrates, the empirical hazard function (the solid line) is non-monotonic, falling dramatically at the beginning but then varying both up and down as survival time increases. This irregular form suggests that any fully parametric model specification is likely to misspecify the true hazard (true data generating process). This intuition is confirmed when we plot the continuous parametric (Gompertz) hazard model (appearing as the dotted line) and observe that it is the least able of our alternatives to capture the non-monotonicity of the data (neither its height nor its turning points). To deal with the nonlinearities present in the empirical hazard, we considered a discrete parametric alternative. However in this case convergence failed, along with the model's ability to provide estimates. For this reason we turned our attention to semi-parametric hazard models that in the case of

the continuous time model allow the baseline hazard to be estimated nonparametrically. In the case of the discrete time model, the semi-parametric feature is used to allow for unobserved heterogeneity (μ_i) to be estimated nonparametrically. The plots in Figure 3 illustrate visually that both the discrete and continuous forms of semi-parametric hazard model perform better than do their parametric counterparts.

In relative terms, the continuous semi-parametric (Cox) hazard model (appearing as the lower, large dashed line) dominates the discrete semiparametric hazard model specification (the higher, small dashed line) in terms of its ability to capture the initial sharp downturn and overall shape of the empirical hazard. Here the Cox advantage relative to the earlier parametric case is that nonparametric estimation of the baseline does not require duration dependence to take an exponential form. By allowing duration dependence to be a flexible function of time, nonparametric estimation gives a better representation of the shape of the baseline hazard. This in turn allows the model to better measure the vertical movements of the hazard coming from changes in the covariates. It should be noted, however, that even though the other models have difficulty representing the appropriate shape of the baseline, all indicate that the greatest risk of party failure is in the short term with the likelihood of failure highest in the first two elections.

Using the baseline representation generated by the Cox model as our best representation of the expectation of active participation faced by a new party entrant, the plot of the Cox baseline confirms the earlier observation that duration dependence is not monotonic. In particular it suggests that while the risk of exit is highest initially, continued survival encounters a falling hazard through the sixth election. Given that the party does survive until the sixth election, duration dependence then becomes positive (rising sharply and after a return rising more slowly) with the party facing a period of higher risk of exit. However, once the party survives into its thirteenth election, the hazard again falls. These findings suggest that to some extent success breeds success. For all parties initial acceptance is difficult, but the risk of failure tends to fall once established. However the higher hazard in the period between the sixth and thirteen elections suggests that there is an interval during which voters focus on considering

which party will be a long term survivor and/or the party itself decides whether its message has been absorbed by one or more of the major parties. The actual factors that generate this middle period rise in the hazard are among the more important unobservables needed to complement this analysis.

The effects of the covariates in shifting the baseline hazard in our three performing parametric and semi-parametric hazard models are presented in Table 2. In interpreting these results, it is important to recognize that the β_i coefficient estimates generated by the Gompertz parametric and the Cox semi-parametric procedures (those in columns (1) and (3)) measure proportional changes relative to the baseline hazard. Hence the key feature of interest for each covariate is that the coefficient estimate must be significantly greater than (less than) one to indicate an increase (decrease) in the overall hazard. The hazard ratio then describes the relative risk of exit based on a comparison of events.

-- Insert Table 2 about here --

Despite the differences in their ability to capture the shape of the empirical hazard function, the results for the effects of the covariates on the baseline hazard are broadly consistent across the three models. Perhaps unsurprisingly, the semi-parametric continuous hazard (Cox) model provides the more significant results. In particular the impact of incumbent competitors on the hazard of party exit is found to be significant. Here the hazard ratio of 0.861 indicates that the time to exit following an increase of one in the number of incumbent competitors is shortened by 16%. All three models suggest that periods of minority government, elections held during world wars, the electoral participation rate and changes in the religion index have no effect on the hazard of party exit. On the other hand, the average immigration rate (from the previous period of government) is significantly negative in all three models. This is consistent with the earlier conjecture that greater immigration flows reinforces the position of the established political parties, in this case by decreasing the hazard of established party exit and thus increasing their lifespans. Using the estimate from the continuous semi-parametric model, a unit increase in the average immigration rate is shown to reduce the hazard of party exit by 64%. Even stronger has been the impact on the risk of party exit from the adoption of public

funding for established political parties. Established political parties that were exposed to the new public funding policy (from 1974 onwards) found their risk of exit (compared to parties that were not exposed to this policy in earlier elections) reduced by 281%. A final factor that has a significant impact, but with a much lower magnitude, is the proportion of the labour force in agriculture. The .977 coefficient implies that a unit decrease in the proportion of the labour force in agriculture (reflecting a similar increase in labour force urbanization) will increase a party's hazard of exit by 2 percent.²²

While all the models above adjust for the right censoring of party duration and permit some form of heterogeneity adjustment, none of these models allow for correlations to exist between the covariates that shift the hazard function and different party types (heterogeneity in party types). As we have seen, however, there are at least two party types in the data—those entering at Confederation and lasting for the entire span of elections and those that have entered later and lasted for a much shorter number of elections. To capture these effects and to control for potential endogeneity we model this heterogeneity using nonparametric finite mixtures in a discrete hazard model. One reason for such use is suggested by Mroz (1999) who shows that discrete finite mixture approximations to a continuous unobserved variable (heterogeneity) outperform alternative estimators, especially when the unobservable components have a non-normal distribution. As is the case with hazard models, the unobserved heterogeneity here is non-normal (has positive support) making the use of finite mixtures helpful in dealing with the potential endogeneity in observed regressors. Second, by using a semiparametric discrete time proportion hazard model where heterogeneity is modelled non-parametrically and set to mimic the observed breaks in the empirical hazard, we can test for the presence of two distinct types of heterogeneity among party types. The flexibility of the nonparametric specification of heterogeneity can then be used to assess whether that heterogeneity has significance for our covariates. Hence the discrete time proportional hazard model serves to complement our analysis of the Cox continuous time model by allowing the analysis to test for the relevance of having, and incorporate if

²² It is of interest to note that the initial vote share received by a new political party added no explanatory power to the hazard. This implies that the initial reception a party received is not a good indicator of a party's lifespan.

appropriate, two distinct party types.²³ The two semiparametric discrete time hazard models that result by allowing a discrete mixture form of heterogeneity (allowing frailty) and the distinction this makes from the same model estimated without frailty are shown in Figure 4. The effect that allowing for frailty makes to the covariate analysis will be shown in Table 3 below.

--insert Figure 4 about here --

In Figure 4 the appearance of the two dashed lines, in contrast to the single solid line, captures visually the characteristic that there are two distinct hazard functions reflecting the distinctive party types present in our data. The type 1 party types have a likelihood of exit that remains low and without much variation over all 41 elections. Type 2 parties, on the other hand, face a hazard where the risk of exit given survival to that point has typically varied about 15 percent but with that risk of exit higher immediately upon entry and then rising again after election 15. What is also apparent is that the discrete time non-parametric hazard function without heterogeneity (the solid line) reflects almost entirely the pattern suggested by the 106 type 2 parties (rather than the pattern exhibited by the Liberal and Conservative Parties). The effect of combining the two types together is to mute the representation of the magnitude of hazard faced by the new parties that entered elections after Confederation.

--insert Table 3 about here--

In Table 3 we present the results of testing the two forms of the nonparametric discrete time hazard model against the data. The formal results reinforce the picture presented in Figure 4-- the model with frailty significantly reduces the log likelihood function and the probability of a second distinct party type is shown to be quite high. Moreover, when we compare the effects of the covariates on the hazards estimated using the nonparametric discrete time hazard models (with and without frailty) to those estimated using the earlier parametric and semi-parametric models of Table 2, we see that the ability to account for the turning points in the

²³ Here the Cox and discrete time hazard models have different parametric/nonparametric components. The Cox specification has its nonparametric component in the baseline hazard whereas the discrete hazard model uses a parametric representation for the baseline but allows heterogeneity to be modelled nonparametrically.

empirical hazard and the presence of two different party types allows a number of the individual covariate effects to stand out more strongly. In particular, the effect that higher average inflation rates, the growing diversity of religious denominations and the growth of government have on the higher risk of party exit now appear as being (weakly) significant in their effect on party lifespans. Once again, as in the earlier Cox case, the importance of public funding and earlier immigration flows in lowering the risk of exit is strongly indicated.

It is of interest to note that in relative terms, the Cox continuous semi-parametric model does a better job at capturing the shape of the empirical hazard but a less good job at indicating the presence of a response by the hazard to changes in the covariates than do the two versions of the nonparametric discrete time model. The continuous and discrete versions of the hazard model, however, complement each other in reinforcing the significance of public funding of established political parties and immigration rates while seemingly capturing other influences on party duration—inflation rate levels, urbanization, the number of incumbent competitors, the growth rate of government size and religious heterogeneity—that were only hinted at in the other forms.

5. Conclusion

In this paper we consider the significance of a number of individual hypotheses advanced to explain the lifespan of political parties in Canada in the context of testing Cox's (1997) more general theory designed to explain the entry of new political parties into the electoral process. We begin by using a Poisson count regression model to explain the number of political parties entering and exiting each election through the individual decision process governing the party's choice whether to enter and then whether to exit the electoral process. This is followed by an analysis of their combined effect on political party turnover or party churning. What is of interest here is not just whether the factors that can influence the probability of initial and/or ongoing electoral success and the expected benefits and costs of political participation affect the entry and exit decisions in an equally significant manner but whether the net effect of their interaction increases the rate of turnover of new parties as opposed to decreasing and so stabilizing the status quo. To the extent that political competition is enhanced by the turnover

of political parties, its determinants may be as significant as those determining the aggregate number of competitors.

When we examine the first two parts of the extensive margin—the entry and exit decisions—we find that while the two decisions are typically influenced by the same set of covariates in their expected manner, the separate effects often differ in sign and significance. For example, an increase in the number of incumbent competitors has only a weakly negative effect in discouraging new party entry but a significant positive effect on exit. Together they suggest a pattern consistent with convergence in the number of parties towards an implicit equilibrium size. In other instances, however, the effect has been offsetting. For example a period of minority government is characterized by insignificant increases in both entrants and exits but with a positive effect on churning that is highly significant. Here minority governments tend to produce a turnover of parties rather than increase or decrease their absolute number. Two of the more interesting findings consist of entry, exit and churning responses to the introduction of public funding and to new immigration flows. In terms of the former, the public funding of established political parties in Canada following 1974 appears not only to have reduced current party exits but to have disadvantaged potential entrants such that the combined effect has been to diminish the number of parties competing, reinforcing the dominance of the established parties. The latter result suggests that higher immigration flows have discouraged both new party entry and exit. This in turn suggests that the established political parties in Canada have successfully incorporated new voter heterogeneity within their established boundaries without having had that heterogeneity result in a proliferation of new parties.

To find the best way of representing duration on the intensive margin, we modelled the electoral lifespan of a political party in a variety of different ways. The models used embodied different assumptions about how duration should be measured (in continuous versus discrete time), different modeling specifications (parametric versus semi-parametric) and different treatments of heterogeneity (parametric - gamma and nonparametric - discrete finite mixtures). Our findings suggest that political party lifespans is best modelled semi-parametrically, in either continuous or discrete time, and should allow for nonparametric

heterogeneity to distinguish among potentially different types of parties. We find that there are indeed two types of parties behind the explanation of length of stay, one small group that is always present and the major group that has a variable length of stay and whose duration experience drives the overall risk of exit. A look at the factors that most strongly impact the length of stay once again finds that the public funding of political parties following 1974 and the average immigration rate have had the strongest impact with both having a positive impact on the length of stay (decreasing the hazard of exit). As such the duration findings reinforce the findings made with respect to the extensive margin. Other factors such as the number of competitors, economic conditions, growth in government size and the religion index play a less obvious role with different hazard specifications better capturing the roles played by these measures.

DATA APPENDIX

AGRIC = percentage of the labour force in agriculture 1870-1925 M.C. Urquhart (1993) Gross National Product, Derivation of Estimates, p.24; 1926-1975 Cansim D31251/D31252; 1975-2011 Cansim II v2710106/v2710104; LNAGRIC = Log(AGRIC); AVERAGE_AGRICULTURE = average size over the previous governing period.

GNP = gross national product in current dollars. 1870-1926: Urquhart (1993: 24-25) (in millions); 1927-1938: Leacy et al. (1983: 130); 1939-1960 Canadian Economic Observer (Table 1.4), CANSIM D11073 = GNP at market prices. 1961-2011 CANSIM I D16466 = CANSIM II V499724 (aggregated from quarterly data).

GOV = total federal government expenditure net of interest payments. 1870-1989: Gillespie (1991: 284-286); 1990-1996: Public Accounts of Canada 1996-97; 1997-2000: Federal Government Public Accounts, Table 3 Budgetary Revenues Department of Finance web site, September 2001. To this we add the return on government investment (ROI) originally subtracted by Gillespie for his own purposes.

Expenditure is net of interest paid to the private sector. Data on ROI: 1870 to 1915: Public Accounts (1917: 64); 1915-1967: Dominion Government Revenue and Expenditure: Details of Adjustments 1915-1967 Table W-1; 1916-17 to 1966-67: Securing Economic Renewal - The Fiscal Plan, Feb 10, 1988, Table XI; 1987-88 to 1996-97: Public Accounts 1996, Table 2.2. Interest on the Debt (ID) was subtracted out (with adjustment for interest paid to the Bank of Canada (BCI) ultimately returned to the government). Data on ID: 1870-1926: Leacy et al. (1983: Series H19-34): Federal Government budgetary expenditures, classified by function, 1867-1975; 1926-1995: Cansim D11166. 1996-2000: Cansim D18445. Finally, data for BCI: copied by hand from the Annual Reports of The Bank of Canada, Statement of Income and Expense, Annually, 1935-2000. Net Income paid to the Receiver General (for the Consolidated Revenue Acct). Note: all government data are converted from fiscal to calendar years, and allows for a change in the definition of the fiscal year in 1906/07, as described in Gillespie (1991: Appendix C).

GSIZE = non-interest federal government, direct public expenditure, calculated as: GOV/GNP;

LnGSize = Log(GSIZE);

AVEGROWTH_GOV = average of LNGSIZE – LNGSIZE(-1) over the previous governing interval.

POP = the population size of Canada, 1870 – 1926: M.C. Urquhart (1993), Gross National Product of Canada 1870-1926, The Derivation of Estimates p. 24-25 (in thousands); 1927 – 1955: CANSIM data label D31248; 1996-2011 CANSIM Table 051-0005: Estimates of population, Canada, provinces and territories; Canada D1 Average of quarters.

IMMIGRATION: 1870 1953 O.J. Firestone Canada's Economic Development 1867-1953 Table 83, Population, Families, Births, Deaths (in thousands); 1954-1995; Cansim D27; 1996-2011 Cansim II v16.

IMRATIO = Immigration/POP where POP = Canadian population size. AVE_IMMIGRATION_RATE = average value of Imratio over the previous governing interval.

$RGNPPC = (GNP)/(P*POP)$; $LNGNPPC = \text{Log}(RGNPPC)$; $PCGrowth = LNRGNPPC - LNRGNPPC(-1)$.

$AVEGROWTH_PC = \text{average of } PCGROWTH \text{ over the previous governing interval.}$

P = GDP deflator: 1929-1995 (1986=100), Cansim data label D14476; 1996-2011, Cansim D140668. All indexes converted to 1986 = 100 basis.

$INFLATION = LNP - LNP(-1)$; $AVEINFLATION = \text{average of } INFLATION \text{ over the previous governing interval.}$

REGISTERED = fraction of the population registered to vote. Source: Elections Canada web site, [www.elections.ca/past_elections/A History of the Vote in Canada: Appendix](http://www.elections.ca/past_elections/A_History_of_the_Vote_in_Canada:_Appendix)

TURNOUT = fraction of registered voters who voted. Source: Elections Canada web site, [www.elections.ca/past_elections/A History of the Vote in Canada: Appendix](http://www.elections.ca/past_elections/A_History_of_the_Vote_in_Canada:_Appendix)

$EFFECTIVE_PART(icipation) = REGISTERED*TURNOUT.$

MINORITY = 1 when election resulted in a minority government.

PUBLIC FUNDING 1974 = 0 from 1870 – 1993; 1 from 1974 onward.

WORLD WAR ELECTIONS = 1 for election numbers 1917, 1940, 1945 otherwise 0.

Number of political parties collected by election from Elections Canada to determine time of entry, exit and duration. Available online at

<http://www.parl.gc.ca/About/Parliament/FederalRidingsHistory/HFER.aspx>

Figure 1

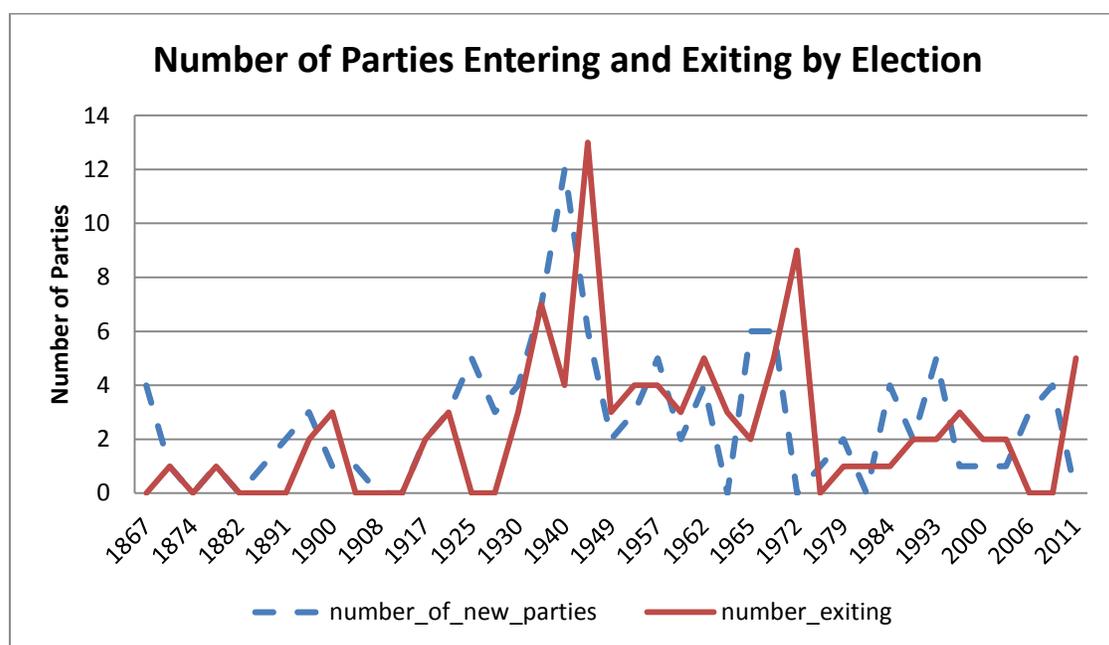


Figure 2a

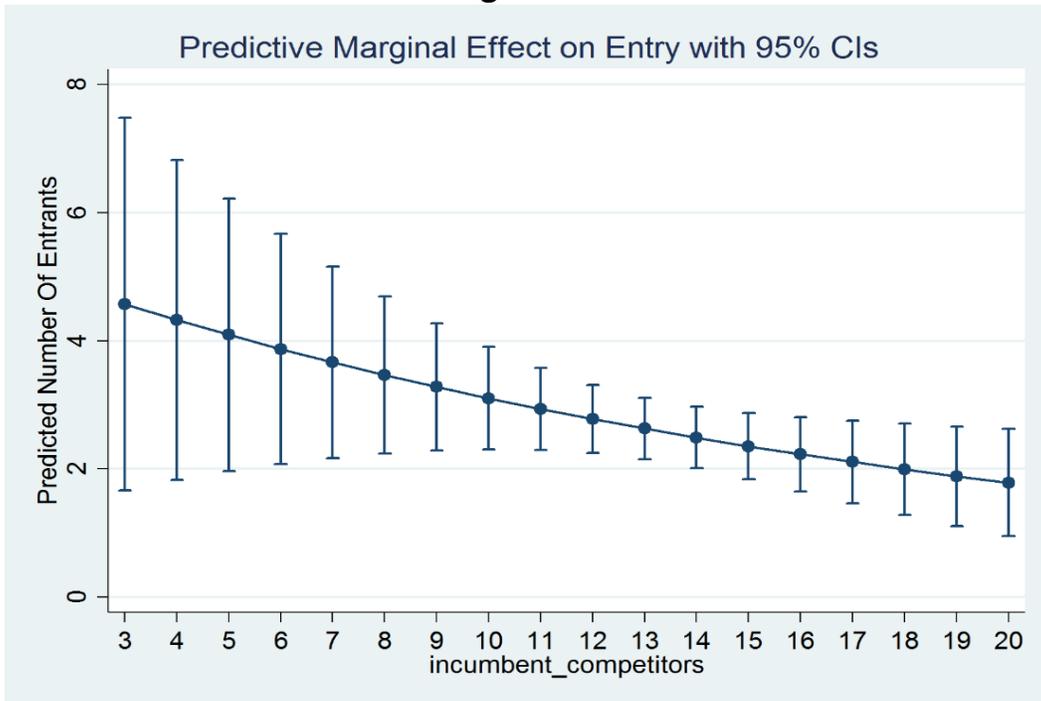
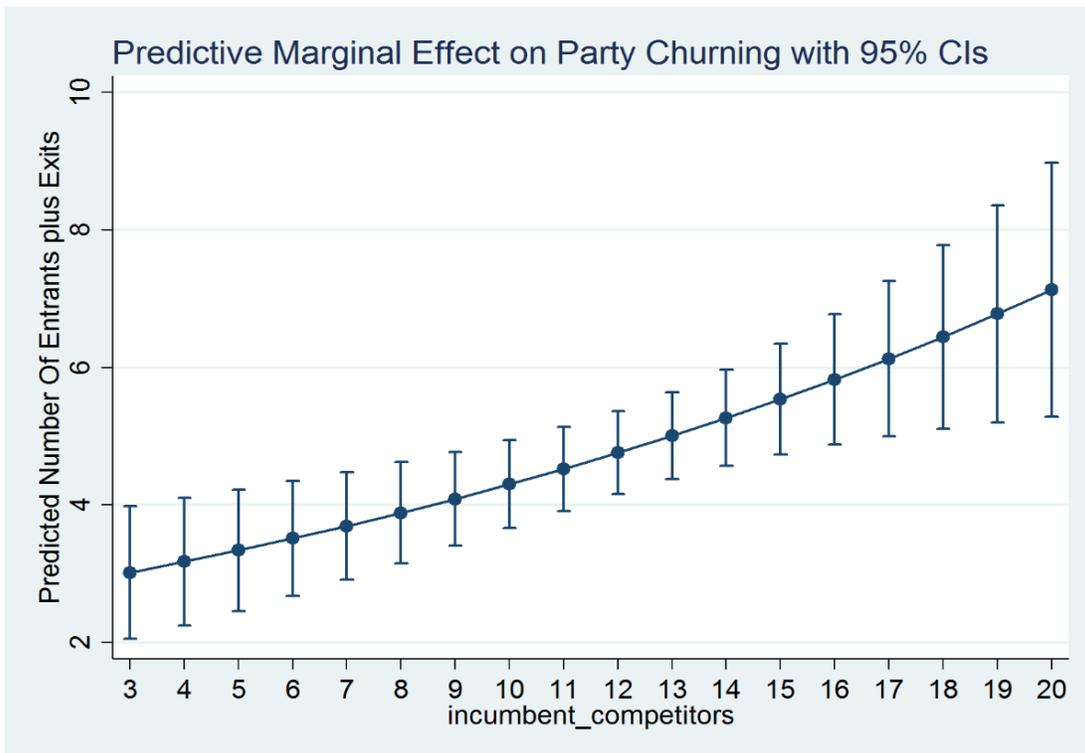


Figure 2b



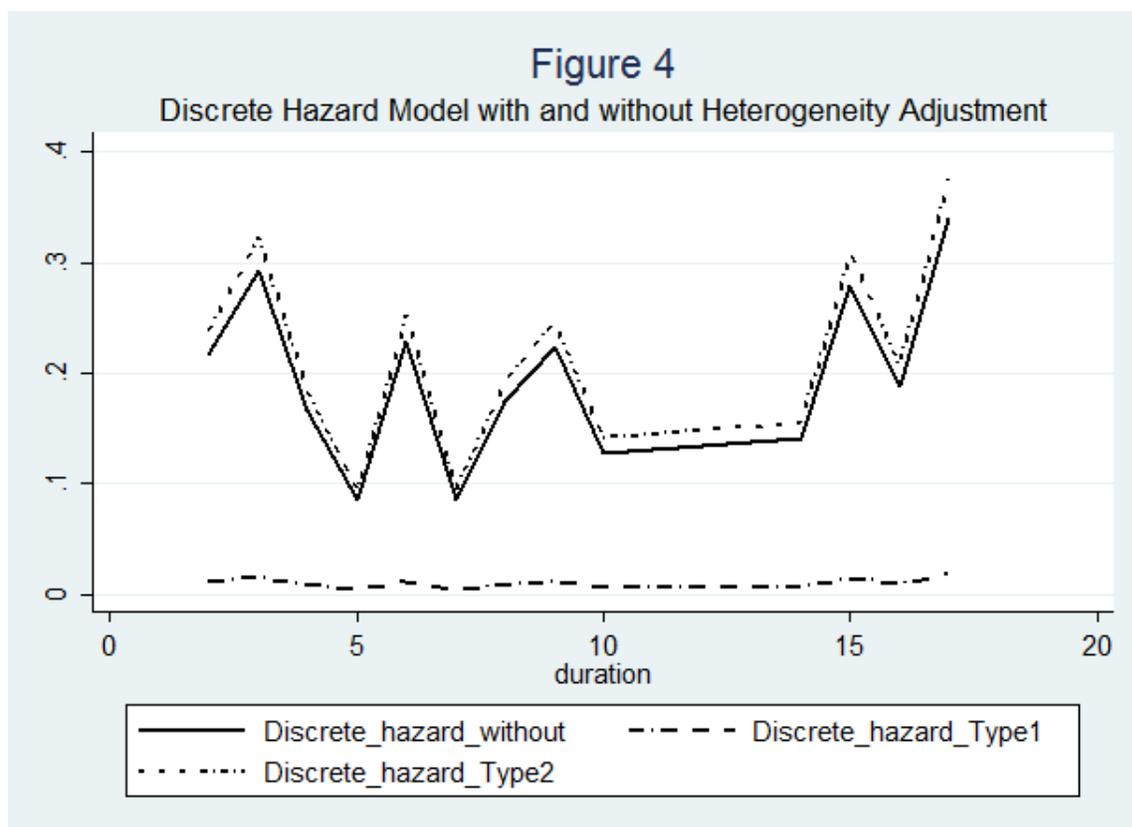
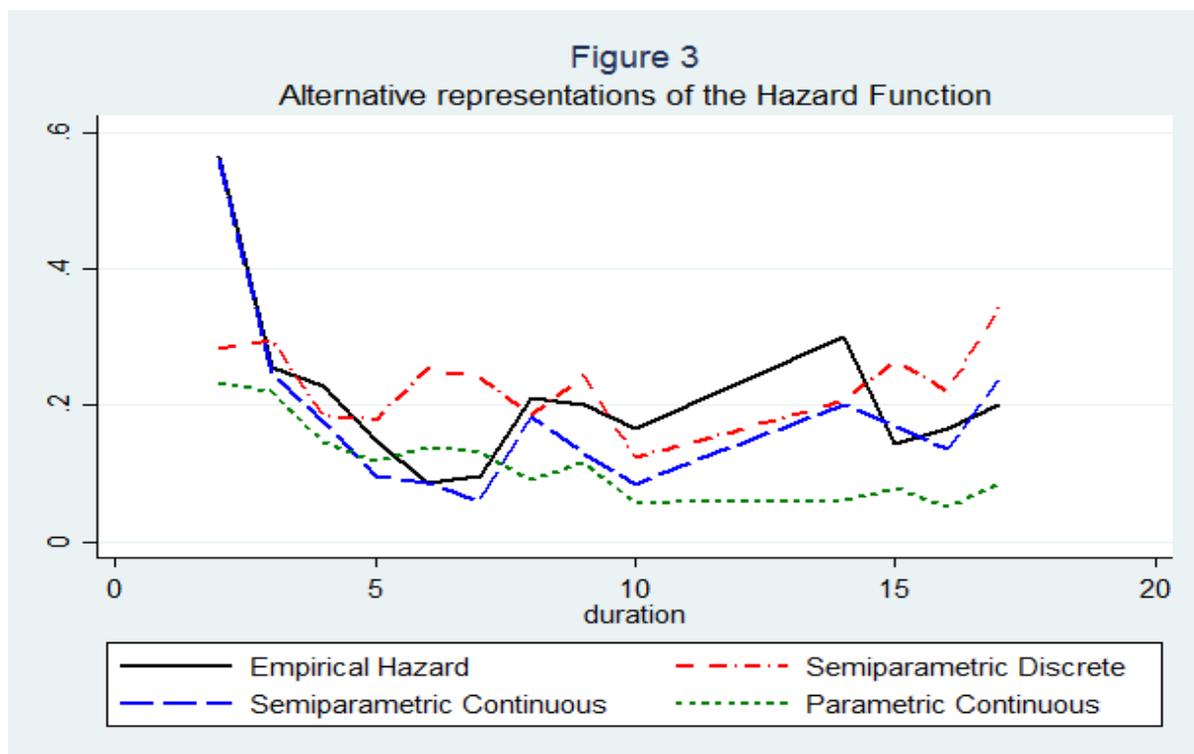


Table 1

**Marginal Effects on the Number of New Party Entrants and Exits
in Canadian Federal Elections: 1867 – 2011**

(absolute value of t-statistic in brackets using robust standard errors)

Predicted	Number of new parties		Number of parties exiting		Churn = Entrants + Exits Poisson Regression (3)
	Sign	Poisson Regression (1)	Sign	Poisson Regression (2)	
Incumbent Competitors	(-)	-0.097* (1.71)	(+)	0.268*** (5.50)	0.194*** (3.22)
Minority Government	(+)	0.881 (1.56)	(+)	0.415 (1.01)	1.572** (2.43)
World War Elections	(+)	4.83** (2.23)	(-)	-0.652*** (2.53)	2.08** (2.13)
Electoral Participation Rate	(+)	0.120*** (3.24)	(-)	-0.032 (1.22)	0.058 (1.20)
Average Immigration Ratio	(+)	-0.597 (1.19)	(-)	-0.875*** (3.35)	-1.94*** (2.90)
Public Funding (1974 onward)	(-)	-1.562*** (2.77)	(-)	-0.400 (1.09)	-2.19*** (4.37)
Average Inflation Rate	(-)	-0.178** (2.04)	(+)	0.095** (2.32)	0.006 (0.08)
Statistics					
1. Number of Obs.		41		41	41
2. Regression Pseudo R ²		0.242		0.419	0.386
3. Linktest (t value)		2.74***		4.17***	2.92***
_hat		-0.27		-0.52	-0.75
_hatsq					
4. Goodness-of-fit		43.25		29.43	33.56
Pearson		0.11		0.65	0.44
Prob > chi2 (33)					

*, (**), [***] significantly different from zero at 10%, (5%), [1%]

Table 2
Hazard of Party Exit in Canadian Federal Elections: 1867 – 2011
 (absolute value of t-statistic in brackets using robust standard errors)

	Parametric (Gompertz) Continuous Table 2 (1)	Semi-parametric Discrete Hazard Parameter (2)	Semi-parametric (Cox) Continuous Hazard Ratio (3)
Incumbent Competitors	0.929 (0.070)	-0.138 (0.150)	0.861** (0.062)
Minority Government	0.795 (0.220)	-0.556 (0.443)	0.906 (0.264)
World war Elections	0.887 (0.393)	-0.853 (0.547)	1.189 (0.403)
Electoral Participation Rate	1.0003 (0.018)	0.039 (0.041)	1.013 (0.02)
Average Immigration Ratio	0.591* (0.160)	-0.705* (0.421)	0.610** (0.146)
Public Funding (1974 onward)	0.367*** (0.142)	-2.051** (0.859)	0.262*** (0.120)
Average Inflation Rate	1.037 (0.055)	0.138** (0.067)	1.009 (0.038)
Average Agriculture	0.974** (0.011)	-0.029 (0.025)	0.977* (0.119)
Religion Index	1.179 (0.445)	1.814 (1.160)	2.027 (1.274)
Average Growth Rate of Government	0.979 (0.009)	-0.024** (0.012)	0.991 (0.007)
Average Growth PC	1.043** (0.558)	0.0577 (0.058)	0.999 (0.046)
Gamma	-0.08*** (0.02)	0.526** (0.156)	

*, (**), [***] significantly different from zero (in column 2) or one (in columns 1 and 3) at 10%, (5%), [1%]

Table 3

Discrete Time Proportional Hazard Models with and without Frailty

Failed	Without Frailty		With Discrete Mixture	
	Coefficient Estimate	t	Coefficient Estimate	t
Incumbent Competitors	-0.1612	-1.13	-0.1800	-1.24
Ave growth per capita	0.0597	1.08	0.0496	0.87
Minority Government	-0.6562	-1.52	-0.5681	-1.32
World War Elections	-0.4100	-0.80	-0.8188	-1.58
Average Inflation rate	0.0762	1.24	0.1440	2.25
Average Growth of Government	-0.0228**	-1.96	-0.0208*	-1.74
Electoral Participation-Rate	0.0311	0.81	0.0429	1.09
Public Funding (1974 on)	-2.1210***	-2.66	-1.9746**	-2.33
Average Immigration Ratio	-0.6535	-1.66	-0.7162	-1.76
Proportion of labour force in Agriculture	-0.0297	-1.25	-0.0308	-1.27
Religion Index	1.8860*	1.77	1.8335	1.61
du1	-4.2816	-1.7	-6.8596**	-2.38
du2	-4.0752	-1.68	-6.9767***	-2.54
du3	-3.2632	-1.29	-6.0982**	-2.11
du4	-4.1128	-1.56	-7.1510**	-2.41
du5	-4.9737*	-1.78	-7.9899***	-2.56
Log Likelihood	-225.11		-206.37	
			m1_cons	≡ 0
			m2_cons	3.2249 3.54
			logitp2_cons	2.2275 4.49
			Prob(Type1)	0.097308 2.23**
			Prob(Type2)	0.902692 20.7***

du(i) indicates the timing of successive kinks in the empirical hazard of Figure 3.

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