# Strategic Voting in Canadian Elections

by

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## Abstract

This paper will examine the 2011 Canadian federal election and measure the extent of strategic voting that took place. I will be using the 2011 Canadian Election Survey data. I employ a random utility framework which I then estimate using an alternative specific multinomial probit model. I measure how demographic, issue based, and situational variables impact the probability of an individual voting strategically. This paper draws on the most up to date data and model(s). What I found is that the aggregate level of strategic voting is approximately 8 percent, which is in line with other empirical work on this subject.



**Special Thanks** To Lord Auld for his Stata wizardry.

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# 1. Introduction

Has there been strategic voting in Canadian federal elections? If so to what extent? These are the questions I will answer in the following paper. Voter turnout has often been considered a proxy for democratic strength within a country. However, historically in Canada voter turnout has been adequate at best. The most recent federal election saw the highest voter turnout since 1992, with approximately 69 percent of eligible voters turning up to vote. In the 2011 federal election the Conservatives won a majority with 166 seats and only 39.62 percent of the popular vote, whereas in 2015 the Liberals won a majority with 184 seats and only 39.47 percent of the popular vote (Elections Canada). Political parties have increasingly won seats with fewer and fewer votes. In a first past the post system each riding is won by having the highest number of votes, however a party can win an election without having the majority of votes. Individuals engage in strategic voting when they perceive their preferred candidate will lose their constituency. This is one concern with having a first past the post system, people are not casting votes for who they want to lead, but more so for who they don't want to lead. Low voter turnout combined with the increasing roll of strategic voting raises question about the proficiency of the current electoral system to fairly represent Canadian voters. There has been much talk of voting reform, changing the first past the post system could eliminated the roll of strategic voting, while possibly increasing voter turnout.

To start I will define strategic voting. In the context of an election, a vote is said to be cast strategically if a voter votes for someone other than their most preferred candidate in order to prevent their least preferred from winning. It is important to note that their preferred candidate would be in last place. Voting has received a lot of attention from the theory side, from Kenneth

Arrow (1950) where he first introduces the 'Independence of Irrelevant Alternatives' (IIA) assumption (which comes up later in my model), to Riker and Ordeshook (1968) where they present what they called "The Calculus of Voting". Which they followed up by extending their model to multi-party elections and identified the rational behavior defined as strategic. In comparison much of the empirical work has fallen short. It has generally been the case that estimates were created using aggregate election results, which as we know creates problems when trying to make inferences about individual level choices. Other models that are based off self-reported surveys fall victim to reporting errors, as people overstate casting their vote for the wining party. Alvarez and Nagler (2000) took a new approach to modeling strategic voting which they coined a direct measurement approach. By using a random utility framework they estimate a multinomial probit model while allowing for strategic considerations.

Multinomial probit models are commonly used to try and measure strategic voting in multiparty systems, both in the UK and Canada. However, no work has been done with Canadian data since the 1988 federal election (which was found to use a questionable methodology). I believe the extent of strategic voting has increased since that time due to the roll of both the internet and the increase in voter turnout of the younger population, who generally do not have as strong political partisanship. I wish to bring this discussion up to date with current data, which is my main motivation for writing this paper.

First I will present a model for sincere voting, than I will include measurements for strategic incentives as developed by Alvarez and Nagler (2000, 2006). I will be using Canadian Election Survey (CES) data and examining the 2011 federal election. Later I will present my results which are in line with the work done by Alvarez and Nagler (2000, 2006). Self-reported

levels of strategic voting for the most recent federal election were quite high, a google trends search will suggest that people were interested in this idea. Grassroots organizations like ThreeHundredEight.com and StategicVoting.ca were encouraging individuals to consider voting strategically, even highlighting ridings that were fertile grounds for it. People actively engaged in discussions regarding strategic voting. If I can indicate strategic voting in previous elections, one might postulate its existence in others. Possibly indicate the growing role of strategic voting in elections, and the questions that this raises. After I present my findings I will finish off with a brief insight into the implications of this phenomenon.

## 2. Data and Descriptive Statistics

The data I am using is from the Canadian Election Survey (CES) performed before and after the 2011 federal election. A rolling cross-sectional sample release was employed for the survey. 90 percent of the respondents who completed the pre-election survey also completed the post-election survey, with an overall 78 percent response rate. Calling for the post-election survey started the day after the election, this is useful to note as the further away from the election the higher probability of reporting errors. A modified form of random digit dialing was employed by the surveyors. Respondents were selected at random, however to be eligible the respondent had to be 18 years or older. Household and provincial weights were used to correct for unequal probabilities of selection. The overall number of respondents is listed in the table below under pre-cleaning, after I cleaned the data (dropped any observations with missing or incomplete data points) the overall distribution of respondents was fairly similar to the pre-cleaning, which I have labeled post-cleaning. This gave me 1497 individual observations.

| | Pre-cleaning | | Post-cleaning | |
|---|---|---|---|---|
| Party | Freq. | % | Freq. | % |
| Liberal | 540 | 18 | 324 | 22 |
| Conservatives | 1,089 | 36 | 637 | 43 |
| NDP | 826 | 27 | 536 | 35 |
| total | 3019 | 81 | 1497 | 100 |

I have also include some descriptive statistics for the demographic variables I have used in my model. A couple interesting points is that my sample is almost 50/50 male to female, and that 84 percent of the respondents are homeowners. The average income is quite high at almost $82000, however, the mean age is approximately 57 which would account for the high average income. The distribution of respondents from each province is close, within 1-5 percent of the reported distribution by Stats Canada.

| | mean | std.dev | min | max |
|---|---|---|---|---|
| Income | 81.79 | 64.3 | 0 | 900 |
| Age | 56.69 | 15.18 | 24 | 98 |
| Education | 7.14 | 2.08 | 2 | 11 |

| Union | | freq. | % |
|---|---|---|---|
| | yes | 349 | 23 |
| | no | 1148 | 77 |
| Homeowner | | | |
| | yes | 1249 | 84 |
| | no | 248 | 16 |
| Gender | | | |
| | male | 812 | 51 |
| | female | 781 | 49 |

| Province | freq. | % |
|---|---|---|
| Nfld | 51 | 3 |
| PEI | 64 | 4 |
| NS | 69 | 5 |
| NB | 47 | 3 |
| Quebec | 373 | 25 |
| Ontario | 468 | 31 |
| Manitoba | 80 | 5 |
| Sask | 87 | 6 |
| Alberta | 98 | 7 |
| BC | 160 | 11 |
| Total | 1,497 | 100 |

## 3. Empirical Strategy

The approach I will be taking is that used throughout the literature, namely by Alvarez and Nagler (2000, 2006). I will be modeling voter choice by implementing a random utility model while allowing for measurements of the strategic context. My model uses two types of independent variables, case specific which vary across individuals but not choice, and alternative specific which vary across both choice and individual. I will estimate my model using an alternative specific multinomial probit regression, this is used when you have a discrete dependent variable which has a finite number of values but no inherent order. The stochastic error terms are assumed to have a multivariate normal distribution with mean zero and variance covariance matrix $\Omega$. The individual selects the alternative whose utility is the highest. Since this form of probit model allows for a general covariance structure in the error terms, it does not impose the IIA property which is built into the logit models. The IIA assumption states, in the context of my model, that the preference ranking of the parties for an individual should not change by the introduction of another party. This is a fairly strong assumption which can be relaxed by using the multinomial probit model. The model is then estimated using a simulated maximum likelihood technique, as there is no closed form solution.

My dependent variable can take on one of three outcomes, Liberal, Conservative, or NDP. The individual chooses the outcome which gives them the highest systematic utility i.e. the highest probability. I will begin by estimating a model that does not include any strategic components and will call this the predicted sincere vote. The model will take on the form:

- $U_{ij} = \beta_0 + \beta_{1j}\text{income}_i + \beta_{2j}\text{union}_i + \beta_{3j}\text{age}_i + \beta_{4j}\text{gender}_i + \beta_{5j}\ \text{homeowner}_i + \beta_{6j}\text{educ}_i + \beta_{7j}\text{prov1}_i + \ldots + \beta_{15j}\text{prov9}_i + \delta_1\text{Education}_{ij} + \delta_2\text{Crime}_{ij} + e_{ij}$

Where the utility of the i'th individual voting for the j'th party depends on: income, union membership, age, gender, whether the individual is a homeowner or not, level of education, and the province in which they reside. These are my case specific variables, with union, gender, homeowner, and prov(s) being dummy variables. Education and Crime are my alternative specific variables. The purpose of Education and Crime are to try and capture the idea that issues matter when deciding how to vote. Theses variables are calculated by taking the absolute value of the difference between the mean placement of each party by respondents and their own self-reported placement on these issues. I then run this model and calculate the total amount of predicted votes for each given party. This uses the assumption that people vote for the party that gives them the highest utility.

Next I will add in variables to measure strategic incentives. Following Alvarez and Nagler (2000, 2006) I create two variables, one which measure the distance of your preferred party from first place, and the second measures the closeness of the race between the two reaming parties. It is useful to note that these are only relevant when the individual's first choice is in last place since this is when the opportunity to vote strategically arises. Otherwise these values will take on zero. Following is an example of a constituency where NDP is projected to be in last place, w1 and w2 are calculated as such:

- $W1_{iNDP} = \text{Max}(CON_i, LIB_i) - NDP_i$
- $W2_{iNDP} = 1 / |CON_i - LIB_i|$

I will use vote shares from the previous election as expected vote shares for the current election (i.e. vote shares from 2008 for expected voted shares in 2011). The reasoning behind this is, vote shares from previous election are both publically know prior to the election, and

have a high degree of correlation with previous elections. The goal of this is to reduce the chance of introducing endogeneity into the model, since using vote shares from the election in question will already have the strategic considerations accounted for. The second model with the strategic components added in, which I will call the predicted strategic vote, takes on the form:

- $U_{ij} = \beta_0 + \beta_{1j}\text{income}_i + \beta_{2j}\text{union}_i + \beta_{3j}\text{age}_i + \beta_{4j}\text{gender}_i + \beta_{5j}\,\text{homeowner}_i + \beta_{6j}\text{educ}_i + \beta_{7j}\text{prov1}_i + \ldots + \beta_{15j}\text{prov9}_i + \delta_1\text{Education}_{ij} + \delta_2\text{Crime}_{ij} + \delta_3 w1_{ij} + \delta_4 w2_{ij} + e_{ij}$

The expectation for $\delta_3$ is such, the further behind your first choice is (as w1 increases) the utility for voting for that party decreases, therefore the derivative of $U_{ij}$ with respect to $\delta_3$ will be negative. For $\delta_4$, as the race between the two leading parties gets closer (as w2 increases), the utility for voting for your first choice decrease, the derivate of $U_{ij}$ with respect to $\delta_4$ will also be negative. To clarify the second point, one might expect, if the leading party is projected to win by a significant amount this would increase an individual's probability of voting their sincere first choice, in other words to not vote strategically.

To help aid in understanding theses variables I have include a chart showing the first four individuals in my data set. Party 1 is Liberal, 2 Conservative, and 3 NDP. Gender, income, homeowner, and union do not vary across choices only individuals. Whereas Education, Crime, w1, and w2 vary across both choice and individual. In the next section I will go over the results from my estimations, and the approach I use will to measure strategic voting.

| | id | party | choice | gender | income | homeow~r | union | Educat~n | Crime | w1 | w2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 1 | 1 | 1 | F | 79 | Y | Y | .515519 | 1.515519 | 0 | 0 |
| 2. | 1 | 2 | 0 | F | 79 | Y | Y | 1.523431 | 1.523431 | 0 | 0 |
| 3. | 1 | 3 | 0 | F | 79 | Y | Y | .4932518 | 1.493252 | .5776 | 1.81686 |
| 4. | 2 | 1 | 0 | F | 90 | Y | Y | 1.515519 | 1.515519 | 0 | 0 |
| 5. | 2 | 2 | 1 | F | 90 | Y | Y | 1.523431 | 1.523431 | .4526 | 4.830918 |
| 6. | 2 | 3 | 0 | F | 90 | Y | Y | 1.493252 | 1.493252 | 0 | 0 |
| 7. | 5 | 1 | 0 | M | 90 | Y | Y | 1.515519 | .515519 | 0 | 0 |
| 8. | 5 | 2 | 1 | M | 90 | Y | Y | .5234309 | .5234309 | 0 | 0 |
| 9. | 5 | 3 | 0 | M | 90 | Y | Y | 1.493252 | .4932518 | .3803 | 2.997602 |
| 10. | 6 | 1 | 0 | F | 140 | Y | Y | 1.515519 | .515519 | 0 | 0 |
| 11. | 6 | 2 | 0 | F | 140 | Y | Y | .5234309 | .5234309 | 0 | 0 |
| 12. | 6 | 3 | 1 | F | 140 | Y | Y | 1.493252 | .4932518 | .1888 | 21.64503 |

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## 4. Results

The output from running the alternative specific multinomial probit model follows, key things to note: due to the non-linearity of this model one cannot directly interpret magnitude from the coefficient estimates, we need to inspect the marginal effects which are computed as the derivative of the simulated probability of an alternative with respect to an independent variable. I have include all the marginal effect outputs in the table section of this paper.

**Table 1 : 2011 Canadian Election Results**

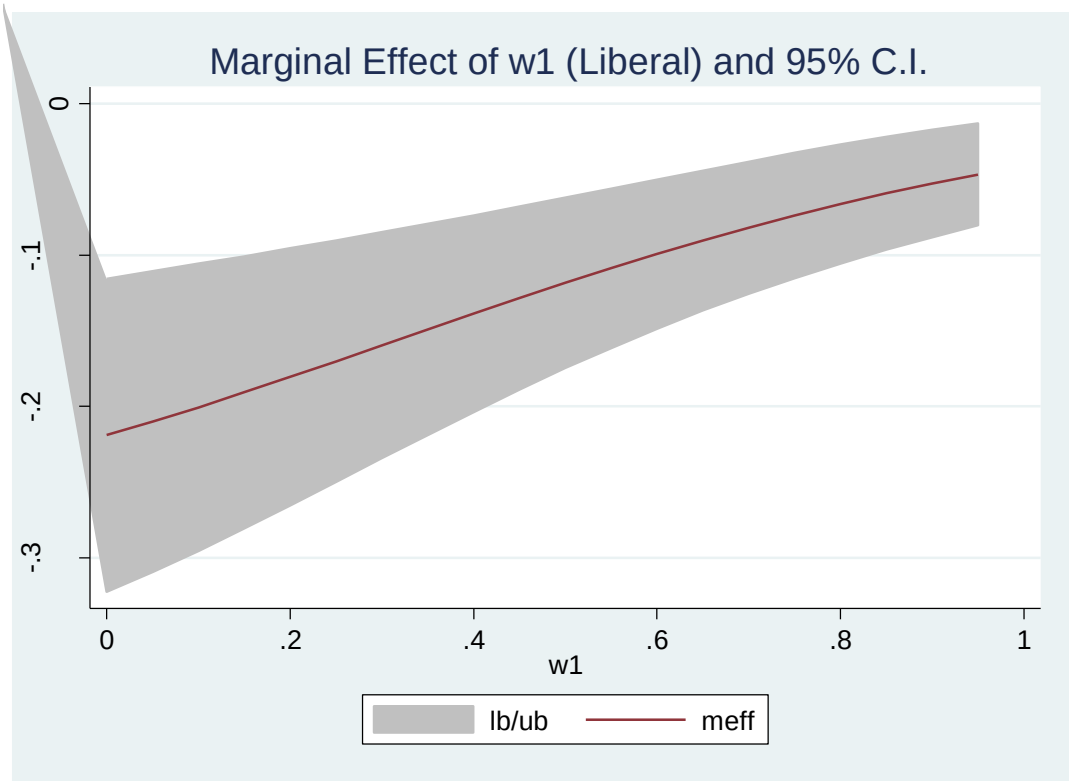
| | Liberal/NDP | | | | Conservative/NDP | |
|---|---|---|---|---|---|---|
| Education | | | -3.37 | (-7.23) | | |
| Crime | | | 9.84 | (-5.59) | | |
| w1 | | | -1.88** | (-0.34) | | |
| w2 | | | -0.002 | (-0.003) | | |
| Constant | -4.048** | (0.563) | | | 23.625 | (16.227) |
| Income | 0.006** | (0.001) | | | 0.045 | (0.032) |
| Union | 0.139** | (0.041) | | | 2.352 | (1.487) |
| Age | 0.022** | (0.005) | | | -0.186 | (0.625) |
| Gender | 0.016 | (0.034) | | | -0.407 | (0.136) |
| Homeowner | -0.030 | (0.046) | | | -2.51 | (1.631) |
| Educ | 0.047 | (0.035) | | | -3.21 | (1.962) |
| BC | 2.231** | (0.399) | | | -16.315 | (11.933) |
| Alberta | 1.024** | (0.389) | | | -4.844 | (6.929) |
| Saskatchewan | 0.768** | (0.371) | | | -3.113 | (6.509) |
| Manitoba | 0.755 | (0.424) | | | 4.488 | (7.772) |
| Ontario | -0.235 | (0.251) | | | -17.654 | (10.736) |
| Quebec | 0.753** | (0.249) | | | -0.985 | (5.973) |
| New Brunswick | 0.857 | (0.361) | | | 0.225 | (5.974) |
| Nova Scotia | -0.477 | (0.441) | | | 9.686 | (7.969) |
| PEI | 0.055 | (0.481) | | | 31.930 | (19.156) |

Standard errors in parenthesis. *Significant at 5% level, **Significant at 1% level.
Number of observations 1497. Log likelihood, -1388.36.

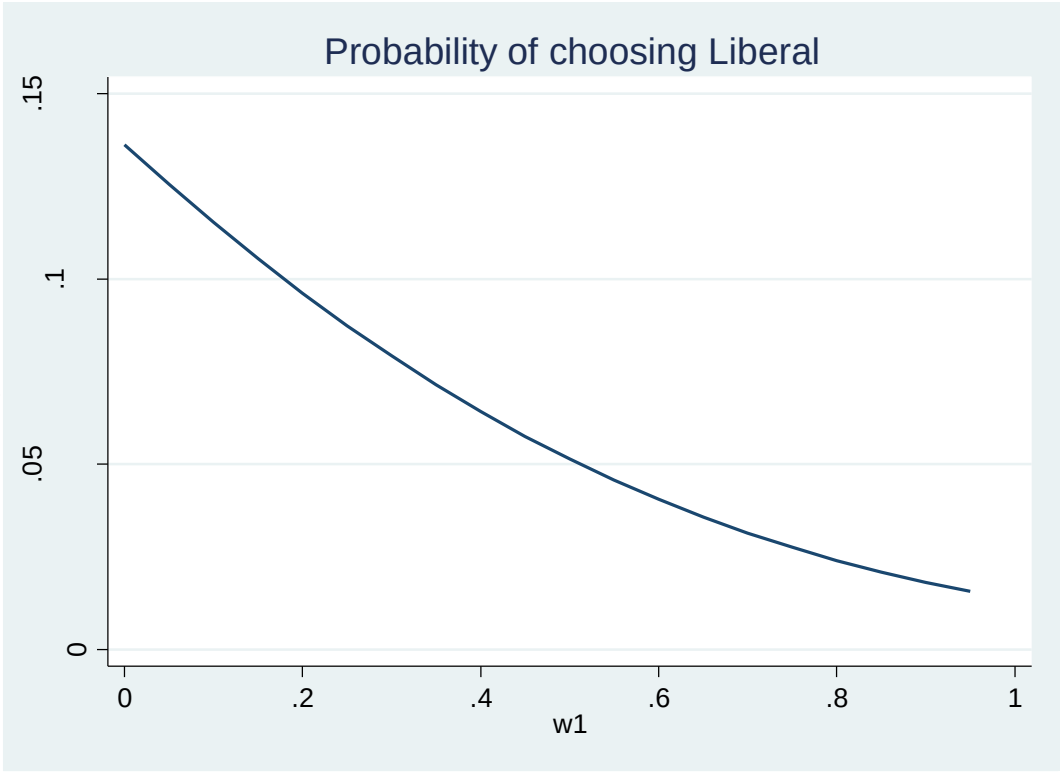
I would like to bring to attend the marginal effects of w1, for all three outcomes they are negative as hypothesized, with coefficients on Liberal and NDP being significant that 1 percent level, and the coefficient on Conservative being significant at the 10 percent level.

| Marginal Effects of w1 | | | |
|---|---|---|---|
| | | s.e. | p-value |
| Liberal | -0.269 | (0.053) | 0.00 |
| Conservative | -0.022 | (0.001) | 0.07 |
| NDP | -0.302 | (0.053) | 0.00 |

NDP has the largest negative coefficient on w1, which tells us in fixed and repeated samples, on average as w1 increase the probability of voting for NDP decrease. Whereas Conservatives have the smallest average effect of w1, which is in line with my a priori expectation that Conservatives have the strongest political partisanship, hence they do not chose to vote strategically as often. The marginal effects of income, union, age, and education are all statistically significant at the usual 1-10 percent range. For example the coefficient on income for the outcome Liberal is 0.000743 which translates to, as income raises by $10000 the predicted probability of voting Liberal increase by 7.43 percent. Again see tables section for complete list of computed marginal effects for each individual outcome.




This is a graphical representation of the marginal effects of w1 for Liberal. The variable w1 is bounded between 0 and 1, we can see that the marginal effects are both negative and significant. The line is the marginal effect whereas the grey area is a 95% confidence interval. Both Conservative and NDP have similar results.




This graph show support for the hypothesis that, as w1 increases i.e. your first choice falls further behind, that the probability (utility) for voting Liberal decreases. The graphs for both Conservative and NDP are similar all showing a decrease in utility as w1 increases.

This gives evidence for the operationalization of strategic voting, now I want to know: what is the probability of an individual voting strategically? In order to do this I will conduct a counterfactual simulation. To start I estimate the sincere model with strategic components (w1 and w2) set to zero, which I call the predicted sincere vote. Then I re-estimate the model with the strategic components included, which I will call the predicted strategic vote. Therefore any difference between the predicted sincere vote and predicted strategic vote is due to the roll of strategic incentives.

To present this I cross tabulate the results from estimating an individual's predicted sincere vote against their predicted strategic vote. The sincere vote is listed in the columns, and the strategic vote is listed in the rows. Again using the assumption that an individual chooses the outcome that yields them the highest utility, and that the only difference between the sincere model and the strategic model are the two strategic components w1 and w2.

**Table 2 : Strategic Voting, 2011**

| Strategic | Sincere Voting | | | Total |
|---|---|---|---|---|
| | Liberal | Conservative | NDP | |
| Liberal | 136 | 28 | 33 | 197 |
| Conservative | 7 | 724 | 21 | 752 |
| NDP | 14 | 23 | 511 | 548 |
| Total percentage voting strategically | 9% | 6.60% | 9.60% | 8.40% |
| Column total | 157 | 775 | 565 | 1497 |

Each cell represents the estimated number of voters who's sincere first choice was the column party who would cast a strategic vote for the row party.

Along the main diagonal are the individuals' whose sincere vote is the same as their strategic. The columns and rows totals both sum to 1497 which is the number of unique observations in my data set. A couple things to note, 23 individuals with a predicted sincere vote of conservative have a predicted strategic vote for NDP, this is not in line with my prior

expectations, however when we look at the total amount of strategic voting per category we see Liberals at 9 percent, Conservatives at 6.6 percent and NDP at 9.6 percent, this is more in line with my prior expectations that:

1) Conservatives overall have the lowest percent of strategic voters.
2) NDP have the highest percentage of strategic voters.

This is what I would expect when modeling strategic voting. NDP as a party are the biggest 'losers' when it comes to strategic voting and conservatives have the strongest political partisanship. The aggregate level of strategic voting is 8.4 percent which is in line with previous work done by Alvarez and Nagler (2000, 2006). They found aggregate levels of strategic voting of 8.4 percent and 14 percent in two different elections they studied. One extension they included, in order to account for uncertainty, was perform the calculations by repeated draws from the estimated distribution of their model parameters (standard normal), and reported their average results.

## 5. Conclusion

I've defined the phenomenon of strategic voting as casting a vote for a candidate other than your most preferred candidate in an attempt to prevent your least preferred candidate from winning. I follow that up with a brief discussion of the study of strategic voting, explain the data and model, and then present my findings. Strategic voting in multiparty elections arises from having a first past the post voting system. If Canada had a different voting system, like ranked ballots for example, the roll of strategic voting would surely decline. However, is strategic voting a cause for concern? That question in amongst itself can be as difficult to answer as trying to model human behavior. In undergraduate economics we are taught that people are rational, utility maximizing, selfish beings. Whether people vote rationally or not is a point of contention. It seems that the prevalence of strategic voting is increasing in tandem with parties winning majority governments with fewer and fewer seats. Is a majority government being formed with less than 40% of the popular vote truly democratic? I'll leave that to you to decide.

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# TABLES/GRAPHS

Pr(choice = Liberal) = .21318411

| variable | dp/dx | Std. Err. | z | P>\|z\| | [ 95% C.I. ] | | X |
|---|---|---|---|---|---|---|---|
| w1 | | | | | | | |
| Liberal | -.296077 | .052821 | -5.61 | 0.000 | -.399605 | -.192549 | .028747 |
| PC | .008102 | .004609 | 1.76 | 0.079 | -.000931 | .017135 | .10469 |
| NDP | .287975 | .052364 | 5.50 | 0.000 | .185342 | .390607 | .19267 |
| w2 | | | | | | | |
| Liberal | -.000029 | .000044 | -0.66 | 0.510 | -.000116 | .000058 | 13.033 |
| PC | 8.0e-07 | 1.3e-06 | 0.61 | 0.539 | -1.7e-06 | 3.3e-06 | 11.967 |
| NDP | .000028 | .000043 | 0.66 | 0.510 | -.000056 | .000113 | 23.466 |
| Crime | | | | | | | |
| Liberal | -.529107 | 1.13176 | -0.47 | 0.640 | -2.74731 | 1.6891 | 1.0496 |
| PC | .014479 | .03011 | 0.48 | 0.631 | -.044535 | .073493 | 1.057 |
| NDP | .514628 | 1.10277 | 0.47 | 0.641 | -1.64676 | 2.67602 | 1.0288 |
| Education | | | | | | | |
| Liberal | 1.5437 | .866459 | 1.78 | 0.075 | -.154527 | 3.24193 | 1.1875 |
| PC | -.042243 | .008478 | -4.98 | 0.000 | -.05886 | -.025625 | 1.057 |
| NDP | -1.50146 | .865415 | -1.73 | 0.083 | -3.19764 | .194723 | 1.1667 |
| casevars | | | | | | | |
| income | .000743 | .000245 | 3.03 | 0.002 | .000263 | .001223 | 82.439 |
| union | .011721 | .007022 | 1.67 | 0.095 | -.002041 | .025484 | 4.0675 |
| age | .004249 | .000842 | 5.05 | 0.000 | .002598 | .005899 | 59.561 |
| gender | .004301 | .005857 | 0.73 | 0.463 | -.007179 | .015781 | 2.9506 |
| homeowner | .006064 | .00802 | 0.76 | 0.450 | -.009654 | .021782 | 1.6627 |
| educ | .021143 | .005875 | 3.60 | 0.000 | .009628 | .032658 | 7.1349 |
| prov1* | .472957 | .117934 | 4.01 | 0.000 | .24181 | .704103 | .034068 |
| prov2* | .202865 | .082916 | 2.45 | 0.014 | .040352 | .365378 | .042752 |
| prov3* | .146662 | .078054 | 1.88 | 0.060 | -.006322 | .299646 | .046092 |
| prov4* | .094655 | .082253 | 1.15 | 0.250 | -.066558 | .255868 | .031396 |
| prov5* | .068199 | .057182 | 1.19 | 0.233 | -.043876 | .180273 | .24916 |
| prov6* | .125721 | .045696 | 2.75 | 0.006 | .036158 | .215284 | .31263 |
| prov7* | .139611 | .070087 | 1.99 | 0.046 | .002243 | .276979 | .05344 |
| prov8* | -.099937 | .057155 | -1.75 | 0.080 | -.211959 | .012084 | .058116 |
| prov9* | -.127561 | .080484 | -1.58 | 0.113 | -.285306 | .030184 | .065464 |

(*) dp/dx is for discrete change of indicator variable from 0 to 1

Pr(choice = PC) = .42148414

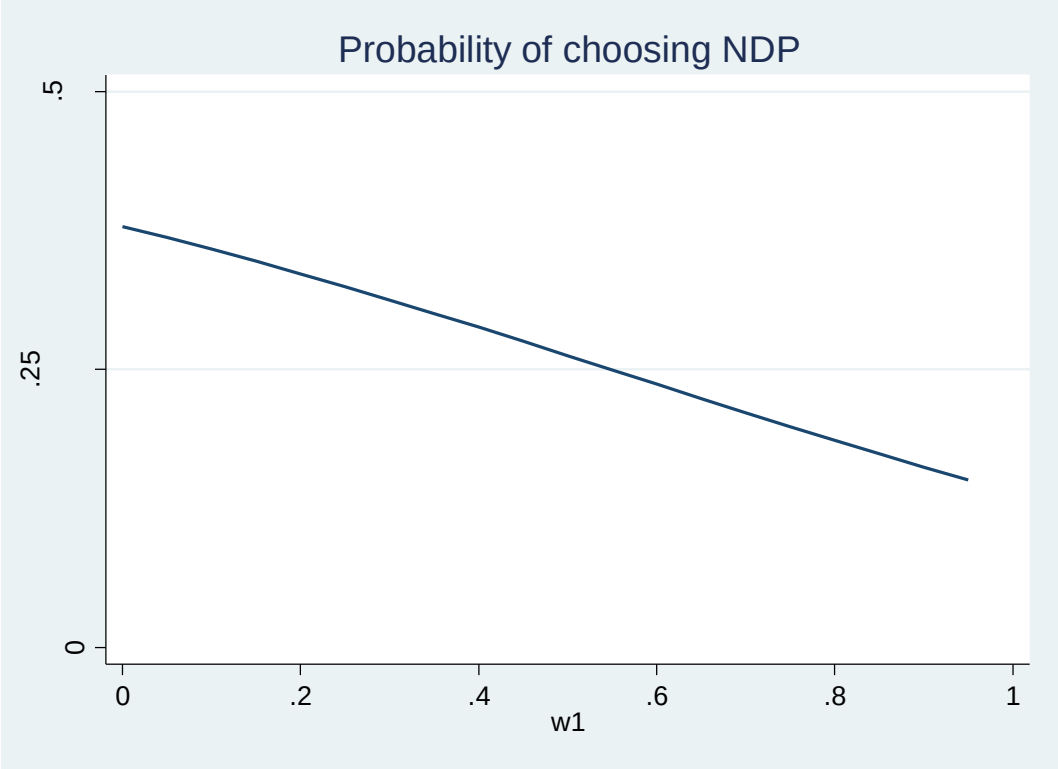
| variable | dp/dx | Std. Err. | z | P>\|z\| | [ 95% C.I. ] | | X |
|---|---|---|---|---|---|---|---|
| w1 | | | | | | | |
| Liberal | .008099 | .004611 | 1.76 | 0.079 | -.000938 | .017135 | .028747 |
| PC | -.021925 | .012354 | -1.77 | 0.076 | -.046138 | .002288 | .10469 |
| NDP | .013826 | .007773 | 1.78 | 0.075 | -.001409 | .029061 | .19267 |
| w2 | | | | | | | |
| Liberal | 8.0e-07 | 1.3e-06 | 0.61 | 0.539 | -1.7e-06 | 3.3e-06 | 13.033 |
| PC | -2.2e-06 | 3.5e-06 | -0.61 | 0.540 | -9.0e-06 | 4.7e-06 | 11.967 |
| NDP | 1.4e-06 | 2.2e-06 | 0.61 | 0.540 | -3.0e-06 | 5.7e-06 | 23.466 |
| Crime | | | | | | | |
| Liberal | .014473 | .030098 | 0.48 | 0.631 | -.044518 | .073464 | 1.0496 |
| PC | -.039181 | .081578 | -0.48 | 0.631 | -.199072 | .120709 | 1.057 |
| NDP | .024708 | .051495 | 0.48 | 0.631 | -.07622 | .125637 | 1.0288 |
| Education | | | | | | | |
| Liberal | -.042226 | .00848 | -4.98 | 0.000 | -.058847 | -.025605 | 1.1875 |
| PC | .114314 | .022056 | 5.18 | 0.000 | .071084 | .157544 | 1.057 |
| NDP | -.072088 | .014028 | -5.14 | 0.000 | -.099583 | -.044594 | 1.1667 |
| casevars | | | | | | | |
| income | .000492 | .000233 | 2.11 | 0.035 | .000035 | .000949 | 82.439 |
| union | .026721 | .008301 | 3.22 | 0.001 | .010452 | .04299 | 4.0675 |
| age | -.002263 | .000954 | -2.37 | 0.018 | -.004132 | -.000393 | 59.561 |
| gender | -.004793 | .006823 | -0.70 | 0.482 | -.018166 | .008581 | 2.9506 |
| homeowner | -.029035 | .009443 | -3.07 | 0.002 | -.047542 | -.010527 | 1.6627 |
| educ | -.037425 | .007019 | -5.33 | 0.000 | -.051181 | -.023668 | 7.1349 |
| prov1* | -.188652 | .102109 | -1.85 | 0.065 | -.388781 | .011478 | .034068 |
| prov2* | -.061068 | .076166 | -0.80 | 0.423 | -.210351 | .088215 | .042752 |
| prov3* | -.039873 | .073446 | -0.54 | 0.587 | -.183825 | .104078 | .046092 |
| prov4* | .048457 | .091284 | 0.53 | 0.596 | -.130456 | .22737 | .031396 |
| prov5* | -.195921 | .102388 | -1.91 | 0.056 | -.396597 | .004755 | .24916 |
| prov6* | -.014986 | .04606 | -0.33 | 0.745 | -.105262 | .07529 | .31263 |
| prov7* | -.002114 | .069156 | -0.03 | 0.976 | -.137657 | .13343 | .05344 |
| prov8* | .115795 | .09208 | 1.26 | 0.209 | -.064679 | .296268 | .058116 |
| prov9* | .356611 | .184563 | 1.93 | 0.053 | -.005125 | .718348 | .065464 |

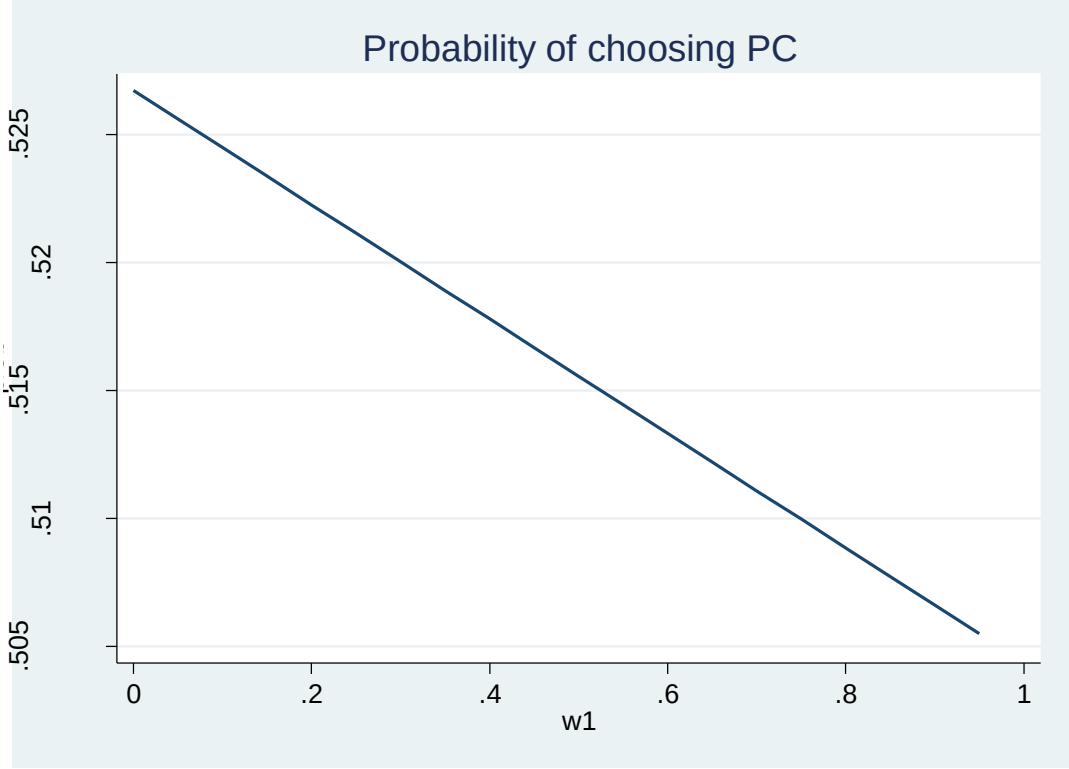
(*) dp/dx is for discrete change of indicator variable from 0 to 1

Pr(choice = NDP) = .36533365

| variable | dp/dx | Std. Err. | z | P>\|z\| | [ 95% C.I. ] | | X |
|---|---|---|---|---|---|---|---|
| w1 | | | | | | | |
| Liberal | .287977 | .052364 | 5.50 | 0.000 | .185345 | .39061 | .028747 |
| PC | .013822 | .007775 | 1.78 | 0.075 | -.001416 | .02906 | .10469 |
| NDP | -.301799 | .053345 | -5.66 | 0.000 | -.406354 | -.197245 | .19267 |
| w2 | | | | | | | |
| Liberal | .000028 | .000043 | 0.66 | 0.510 | -.000056 | .000113 | 13.033 |
| PC | 1.4e-06 | 2.2e-06 | 0.61 | 0.540 | -3.0e-06 | 5.7e-06 | 11.967 |
| NDP | -.00003 | .000045 | -0.66 | 0.510 | -.000118 | .000059 | 23.466 |
| Crime | | | | | | | |
| Liberal | .514632 | 1.10278 | 0.47 | 0.641 | -1.64678 | 2.67604 | 1.0496 |
| PC | .024701 | .051479 | 0.48 | 0.631 | -.076197 | .125599 | 1.057 |
| NDP | -.539333 | 1.15241 | -0.47 | 0.640 | -2.79802 | 1.71935 | 1.0288 |
| Education | | | | | | | |
| Liberal | -1.50147 | .865416 | -1.73 | 0.083 | -3.19766 | .194711 | 1.1875 |
| PC | -.072066 | .014027 | -5.14 | 0.000 | -.099559 | -.044573 | 1.057 |
| NDP | 1.57354 | .867497 | 1.81 | 0.070 | -.126723 | 3.2738 | 1.1667 |
| casevars | | | | | | | |
| income | -.001235 | .00027 | -4.58 | 0.000 | -.001763 | -.000706 | 82.439 |
| union | -.038441 | .008382 | -4.59 | 0.000 | -.054869 | -.022013 | 4.0675 |
| age | -.001986 | .000969 | -2.05 | 0.040 | -.003886 | -.000087 | 59.561 |
| gender | .000491 | .006821 | 0.07 | 0.943 | -.012877 | .01386 | 2.9506 |
| homeowner | .022969 | .00934 | 2.46 | 0.014 | .004662 | .041276 | 1.6627 |
| educ | .01628 | .006948 | 2.34 | 0.019 | .002662 | .029898 | 7.1349 |
| prov1* | -.28431 | .047072 | -6.04 | 0.000 | -.37657 | -.192049 | .034068 |
| prov2* | -.1418 | .070338 | -2.02 | 0.044 | -.279659 | -.00394 | .042752 |
| prov3* | -.10679 | .070381 | -1.52 | 0.129 | -.244735 | .031155 | .046092 |
| prov4* | -.143109 | .074553 | -1.92 | 0.055 | -.289231 | .003012 | .031396 |
| prov5* | .127715 | .080643 | 1.58 | 0.113 | -.030343 | .285773 | .24916 |
| prov6* | -.110735 | .047078 | -2.35 | 0.019 | -.203007 | -.018463 | .31263 |
| prov7* | -.137497 | .066461 | -2.07 | 0.039 | -.267759 | -.007236 | .05344 |
| prov8* | -.015853 | .078914 | -0.20 | 0.841 | -.170521 | .138815 | .058116 |
| prov9* | -.229023 | .116926 | -1.96 | 0.050 | -.458194 | .000149 | .065464 |

(*) dp/dx is for discrete change of indicator variable from 0 to 1


Probability of choosing NDP
.5
.25
0
0
.2
.4
.6
.8
1
w1


Probability of choosing PC
.525
.52
.515
.51
.505
0
.2
.4
.6
.8
1
w1