

Explaining The Liberals' Loss of a Majority in 2019: A Modeling Study

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May 4, 2022

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1 Introduction

In 2015, Justin Trudeau brought the Liberal Party of Canada back to power after nine years of Conservative rule, winning a majority in the House of Commons. In 2019, after the reality test of governing for four years, the Liberals lost the popular vote to the Conservatives, though they won the most seats and held onto power in a minority government.¹ Which voters did Trudeau lose to his political competitors between 2015 and 2019? What made them change their mind? In this paper, I analyze these questions by leveraging the individual-level data in the Canadian Election Study survey, which contains information about voters' demographics, ideological views, evaluations of political figures, and vote choice in 2015 and in 2019.

To explain changes in parties' fortunes between elections, I fit a Multinomial Logistic model of individuals' vote choice for each of the elections, with controls such as demographics and ideological orientation which are present in survey data. I then test the difference in the coefficients on each characteristic between the two elections, in order to analyze whether certain factors shifted in their importance for predicting vote choice between elections, and thus to help explain the proximal causes of the election outcome. This approach is common in the literature on Canadian election dynamics, which I review.

Although my model simultaneously produces results concerning all parties, I only discuss the factors affecting the relative probability of voting Conservative rather than Liberal, since those are the two largest parties. My analysis generates three salient conclusions. First, I show that the importance of left-right ideology in determining vote choice significantly increased in the 2019 election relative to the 2015 election, controlling for demographic characteristics, as did being a man, being from a rural area, and being from Saskatchewan. Second, by relating voters' 2015 vote choice to their views as of 2019, I show that views about the performance of the Liberal government between 2015 and 2019 (for instance, opinions on the government's handling of a scandal that occurred in 2019) significantly determine vote choice in 2015. This suggests that opinions on topics that seem election-specific can in fact be significantly driven by voters' prior beliefs, even after controlling for ideology and other characteristics. In some cases, such as views of the handling of the 2019 scandal, the effect on 2019 vote choice does not even significantly exceed that on 2015 vote

1. See Appendix B for a table of changes in seats by party.

choice, thus indicating that the high-profile scandal had little independent effect on the Trudeau government’s loss of seats. Third, in a follow-up analysis, I relate voters’ views of national economic performance, which were found to significantly determine 2019 vote choice, to actual GDP growth in their particular province. I show that subjective views of the national economy as of 2019 were highly correlated with GDP growth between 2015 and 2019, and analyze this result in the context of the drop in oil prices that occurred around that period.

Separately, as a means of testing the robustness of my main analysis, I estimate a modified Multinomial Logistic model with individual time-invariant fixed effects, to account for potential unobserved heterogeneity. I show that the estimates of effect coefficients obtained from this modified model are not substantially different from those obtained from the main specification, which assumed that individuals’ vote choices in 2015 and 2019 were independent conditional on the specified characteristics.

2 Literature review

In this section, I survey the literature on the across-time determinants of vote choice in Canada, starting with methodology. There are two schools of thought on explaining vote choice in Canada: “Bloc-recursive” and “valence politics” models (Roy and McGrane 2015), which are essentially different choices of predictors in Multinomial Logistic models.

The so-called bloc-recursive approach organizes the analysis into several successive “blocs” of predictors, ordered by their presumed proximity to the vote. The first bloc consists of socio-demographic characteristics; the vote choice is first regressed on only that bloc, and those coefficients are reported. The second bloc may, for instance, consist of policy views; the vote choice is then regressed on the predictors in that second bloc, in addition to those of the first bloc, and the same would continue for the third and following blocs, which would include predictors from all the previous blocs. The reported coefficients for the second bloc will then only reflect the effect not explained by the first bloc, while the coefficients for the first bloc from this second regression will ordinarily not be reported (Gidengil et al. 2012, 9). The idea is to use assumptions about temporal causal structure, such as that race is fixed prior to the formation of any policy views, to ensure that more-proximate factors are only credited with the part of their effect that cannot be explained

by predictors in previous blocs. The blocs typically used are: socio-demographic characteristics, underlying values and beliefs (e.g., on gender roles, on racial minorities, on whether big business is generally good or bad, etc.), party identification, economic evaluations, issues opinions (e.g., on higher welfare spending or higher defence spending), and leader evaluations.

The valence model advocated by Harold Clarke and Allan Kornberg has a different emphasis. It uses only three variables: evaluations of party leaders, party identification, and a voter's assessment of which party is closest to them on their most important issue (e.g., the economy). The model essentially discards several elements in the bloc-recursive model, such as socio-demographics, non-election-specific values, economic perceptions, and opinions on key campaign issues. Clarke and Kornberg argue that their model is preferable because those other predictors don't add much explanatory power once their three preferred predictors have been used (in terms of in-sample classification accuracy). In contrast, proponents of the bloc-recursive approach criticize the valence-politics model for risking circularity, since it doesn't help explain why voters feel the way they do, and why some voters change their mind while others don't (Roy and McGrane 2015, 78–79). One paper replicates both models for provincial elections, and confirms that both types of models have similar explanatory power, though the bloc-recursive model better illustrates the nuances behind a vote choice (87–88).

The bloc-recursive approach in particular is often paired with a specific approach to comparing elections across time, which I now explain. Such analyses tend to either focus on a single election in comparison to the one that preceded it, seeking to explain what drove the election outcome, or focus on a single predictor across a long period of time and study whether the importance of its effect has changed or has been stable. In the first category, Fournier et al. (2013) seek to explain the rise of the New Democratic Party (NDP) in the 2011 general election, where the Party rose from third to second place for the first time in history, and relegated the Liberal Party to third place. They decompose the change in vote choice into: 1) changes in the distribution of the predictors, and 2) changes in the marginal effects of different predictors. To test the former, they calculate the significance of the difference in the means of the predictors; to test the latter, they pool data from both elections into one regression, and test the significance of an interaction term between each predictor and the election.

They end up finding, for instance, that a third of the NDP's gains in Quebec (where it rose

from 11% to 42%) was driven by changes in the importance of political attitudes (such as market interventionism) in determining support for that party (Fournier et al. 2013, 885), while another third was driven by changes in the importance of views on political issues (such as support for higher environment spending) (889).

Papers in the second category instead study the marginal effect of one particular predictor over long periods of time; they look not only at trends in the average effect, but also in heterogeneity in the effect. For example, in studying Quebec provincial elections, Daoust and Jabbour (2020) study some non-election-specific factors such as generations, sex, attitudes towards Quebec independence and party identification (where the two last factors have separately been shown to be the most stable non-demographic factors). These marginal effects are relatively stable between 2007 and 2018, but trend downward, suggesting increasing electoral volatility (importance of election-specific factors such as issues and leadership evaluation).

I now briefly discuss an existing analysis of the 2019 election. A valence-politics model by Clarke and Stewart (2020) is around 90 percent correct in classifying whether or not someone will vote for a given party, based only on party performance judgments, leader evaluations, party identification, and one additional term not appearing in previous valence-politics models, which is according priority to the environment over the economy. They find that views about Justin Trudeau were significantly worse than in 2015 and that this was an important driver of election results (242). They do not explicitly compare the weights of different predictors between the 2015 and 2019 elections; their focus is rather on performance in classification within 2019 election data (using private data from a polling firm, which is not the same as the dataset I am using but is likely similar in nature).

I could not find any more comprehensive model concerning either the 2015 or 2019 elections of the sort that were developed for the 2011 election.

3 Methodology

3.1 Data source and general approach

The dataset I will be using is the Canadian Election Study (Stephenson et al. 2020), which is a freely available recurring survey of Canadian electors that has run since 1965. It contains individual-

level data on demographics, vote choice, partisan affiliation, ideological views, and impressions of party leaders, among other things. It is not a panel: The respondents are not necessarily the same between years, but for each year, we have the individual observations and not only the column averages.

All the survey participants answered questions at some point before the election (i.e., during the campaign period), but only some answered additional questions after the election. When modeling vote choice in this paper, I exclusively use actual votes (reported post-election), not likely votes reported pre-election. Some questions were asked both both during the campaign period and after the election, for the same participants; in such cases, I always use the post-election answer in modeling vote choice. However, I do use the answers to some questions that were only asked during the campaign period as predictors of vote choice.

I model vote choice with a Multinomial Logistic distribution, the microfoundations of which are described in 3.2. This specification is the same as that used in most of the literature reviewed above. In order to ensure representativeness, I use the Post-Election Survey probability weights provided with the Canadian Election Study survey data. Not voting, refusing to answer which party one voted for, or voting for a candidate that is not from one of the six major federal parties are all marked as missing and not included in the model.

Note that I completely exclude Quebec voters in all of my regressions. In the literature I consulted, it was common to analyze Quebec and non-Quebec voters in separate models, since the electoral forces at play were considered to be different enough that this would be a more coherent approach; in this paper, I am simply choosing to focus on the non-Quebec case.² Voters from the territories (Nunavut, Northwest Territories and Yukon) are also excluded, since those territories are home to only a small number of voters. Another simplification worth noting is that I exclude people who voted for the People’s Party (1.6% of the popular vote in 2019) from the analysis, since the party existed in 2019 but not 2015.

2. In preliminary regressions that I ran including an indicator for Quebec, the coefficient for this indicator was not significant under any of the specifications, for predicting the relative probability of voting for the Liberals versus for one of the other cross-national parties (Conservatives, NDP, Greens and People’s Party). However, because one party, the Bloc Québécois, only runs candidates in Quebec, not being in Quebec perfectly predicts not voting for the Bloc Québécois, which makes a Multinomial Logistic including a Quebec indicator misspecified, resulting in large coefficients on the Quebec indicator for the Bloc Québécois relative probability (around 20, corresponding to an e^{20} relative risk). Therefore, given that I am using a Multinomial Logistic, it seems more prudent not to include Quebec and non-Quebec voters in the same model, since neither including nor omitting a Quebec-specific effect would lead to satisfactory results.

Of primary interest is how different voter characteristics’ effect varied between the two elections in terms of determining vote choice: for instance, did gender have a significantly different effect in the Multinomial Logistic model in 2019 as opposed to 2015? I only use data from the 2019 Canadian Election Study, but I leverage the fact that participants answered who they voted for in both the 2015 election and 2019 elections. This can be thought of as a panel, even though we do not observe changes in the voter characteristics; those are only measured in 2019.

3.2 Cross-sectional model

I now formally describe the voter optimization problem underlying my analysis, which leads to the main regression setup for analyzing the changes between the 2015 and 2019 elections (the “cross-sectional model”, as distinct from the fixed-effects robustness test that I will describe later). For each individual $i \in \{1, \dots, N_i\}$, suppose that \mathbf{x}_i is an exogenous D -dimensional vector of voter characteristics: These could be age, identification with the Liberal Party, and preference for the environment over the economy, for instance.

There are K parties: $\{C_1, \dots, C_K\}$. Let $Y_{it} \in \{C_1, \dots, C_K\}$ be a random variable denoting the vote choice of the individual. Suppose that individual i has the following utility function for each party k and time t , and chooses the party that gives them the highest utility U_{itk} :

$$U_{itk} = \mathbf{x}_i^\top \boldsymbol{\beta}_{tk} + \epsilon_{itk}$$

where \mathbf{x}_i are the voter’s characteristics, and ϵ_{itk} is an observation-level error term such that ϵ_{itk} ’s are uncorrelated for different times t . Then, if we assume that ϵ_{itk} follows a standard Gumbel distribution, we have the result that the distribution of Y_{it} conditional on characteristics \mathbf{x}_i is Multinomial Logistic (StataCorp 2021, 323):

$$P(Y_{it} = C_k | \mathbf{x}_i) = \frac{\exp(\mathbf{x}_i^\top \boldsymbol{\beta}_{tk})}{\sum_{j=1}^K \exp(\mathbf{x}_i^\top \boldsymbol{\beta}_{tj})} \text{ for all } k.$$

We can abbreviate this as:

$$P(Y_{it} = C_k) \underset{\text{mLogistic}}{\sim} \mathbf{x}_i^\top \boldsymbol{\beta}_{tk}.$$

We will want to test hypotheses of the form: $\beta_{0kd^*} \neq \beta_{1kd^*}$, i.e., whether voter characteristic d^* (e.g., the d^* th element of the \mathbf{x}_i ’s) has a significantly different effect on the probability of voting for party k at time 0 as opposed to at time 1. Following the method commonly used in papers from

the literature review, we can test this by pooling the data from both years into a single regression as follows:

$$P(Y_l = C_k) \underset{\text{mLogistic}}{\sim} \sum_{d=1}^D \left(\beta_{0,1kd}(x_d) + \beta_{\Delta kd}(x_d I(T_l = 1)) \right)$$

where l ranges over the observations t, i from both years, T_l is the year corresponding to an observation, β_{tkd} 's are year-specific coefficients, and $I(\cdot)$ is an indicator function. Now, we can conduct a significance test on whether $\beta_{\Delta kd^*} \neq 0$ using our statistical package in order to see whether the effect of voter characteristic d^* on the probability of voting for party k differed between year 0 and year 1.

3.3 Choice of voter characteristics

3.3.1 Relationship to the literature

As for the choice of voter characteristics, taking inspiration from the bloc-recursive literature, I organize the individual-level voter characteristics into three categories (which that literature would call blocs): demographics, non-election-specific non-demographic factors, and election-specific factors.

I choose to follow the bloc-recursive literature rather than the valence-politics literature because the former's focus is mainly on description, which aligns with my goals for the paper, whereas the latter's focus is mostly on maximizing classification accuracy while minimizing the number of predictors. In particular, I present three models, each with one additional category of predictors, for the three categories mentioned above. I believe that the fact that the bloc-recursive literature presents information in this way is intuitive and insightful. Unlike in the bloc-recursive literature, though, I do not omit the coefficients on characteristics from a previous category in successive models since I think it is important which coefficients change.

As for the literature on valence-politics models, recall those models typically include party performance judgments, leader evaluations, and party identification as characteristics. While I include some judgments of government performance on economic issues as voter characteristics, I choose not to include more-global evaluations of party leaders, or party identification, because they seem too endogenous to be of interest for the sort of big-picture analysis that I seek to conduct.

3.3.2 Description of voter characteristics

The demographic factors are: gender; being under 35; being over 54; having at least one parent who was born outside Canada; having completed at least some university; being from a rural area;³ and being from a certain province.

The non-election-specific non-demographic factors that I include are an ideology score, and the level of agreement with the question “When there is a conflict between protecting the environment and creating jobs, jobs should come first.” The ideology score is a standardized variable representing left-right ideology (where more positive is more to the right), representing a latent variable fitted from a Bayesian model as to underlie the variety of different ideological views prompted by questions in the Canadian Election Study. This score was calculated for each voter by Lucas and Armstrong (2021) and was merged into the dataset. I additionally included the question about prioritizing jobs over the environment on its own, because of the emphasis on this factor in the valence-politics model of the 2019 election that was discussed in the literature review. The possible answers to that question were “Strongly disagree”, “Somewhat disagree”, “Neither agree nor disagree”, “Somewhat agree”, “Strongly agree” and “Don’t know/Prefer not to answer”. For this question and others with similar answer choices, I converted the answer choices to a scale between -1 and $+1$, with each choice spaced by 0.5 (so neutrality is 0 , and somewhat agreeing is $+0.5$), and coded not knowing or preferring not to answer as missing.

Those two factors are regarded as “non-election-specific” because, while not guaranteed to be stable over time, are not directly related to the present candidates, the current government’s performance, or events in the past year. This is clear when comparing them to the five election-specific voter characteristics (where square brackets represent one possible answer choice from a gradient):

1. “Over the past year, has your financial situation gotten [better]?”;
2. “Would you say that over the past twelve months, the state of the economy in Canada has gotten [much better]?”;
3. “Justin Trudeau kept the election promises he made in 2015. [Strongly agree]”;

3. I define this as living in a town of at most 50,000 people, which is not a suburb of a city of more than 50,000 people, since the four possible answers in the survey are a town of at most 10,000 people, a town of at most 50,000 people, a suburb of a city of at least 50,000 people, and a city of at least 50,000 people.

4. “Have the policies of the federal government made Canada’s economy... [Better]”;
5. “How would you rate how the government handled the SNC-Lavalin Affair? [Very well]”.

Election-specific voter characteristics 1 and 2 correspond to personal and national retrospective perceptions of the economy, which are considered to be an important dimension of vote choice in Gidengil et al. (2012). election-specific voter characteristics 3 and 4 were chosen since they directly reflect satisfaction with government performance. Finally, election-specific predictor 5 was chosen since the SNC-Lavalin scandal was a recurrent issue in the 2019 election campaign, and was the only major scandal about which a question was asked in this survey; Gidengil et al. (2012) had similarly demonstrated the importance of the Liberal sponsorship scandal in the 2006 and 2008 elections.

For context, the SNC-Lavalin affair was a controversy in which Justin Trudeau, or his close advisors suspected of acting on his behalf, was accused of having personally intervened to secure a non-prosecution agreement for SNC-Lavalin, a Montreal-based firm subject to criminal prosecution for bribes to foreign officials. The accusation was that he might have intervened to help the population of his own electoral district, and of his home province of Quebec.

3.4 Comparison of modeling approach with the existing literature

It may seem odd to include election-specific voter characteristics, such as an opinion about whether the Liberals broke their 2015 election promises between 2015 and 2019, in predicting 2015 vote choice, since those characteristics were fixed after the 2015 voting took place. In this way, my approach differs from those of the papers reviewed from the bloc-recursive literature, which used survey data from separate years, and thus separate voter characteristics for 2015 and 2019.

The results that would be obtained from each approach answer slightly different questions, and I believe that my approach has advantages. Suppose that voters determined whether the Liberals broke election promises objectively, but noisily. In that case, their opinion on the subject would be independent of any time-invariant voter characteristics, including unobserved heterogeneity not captured by my previously stated explicit model, and we would expect the effect of 2019 election-specific voter characteristics on 2015 voting to be zero. However, it seems perfectly plausible that voters’ 2019 assessments of things like election promises could be subjective and statistically

dependent on unobserved voter characteristics that influenced 2015 voter choice. Thus, it makes sense to incorporate the information into the regression to test whether this is the case, rather than assume it isn't.

A separate way in which my model relates to the existing literature, and in fact mirrors it, is that in testing time-interaction effects in a pooled regression, I do not link the observations of 2015 vote choice with those of 2019 vote choice through anything like a voter fixed effect. In the approach used in the literature, this is not done because it is impossible: the survey data for each election year is collected from unrelated participants. In my approach, I do have information about how observations are related, but I do not use it in obtaining point estimates of the coefficients in my main model since I am interested in the entire population, whereas a fixed-effects model in this context must only focus on the minority of voters who did not vote for the same party in the 2015 and 2019 elections. However, I develop the fixed-effects approach as a robustness test, and describe it in the next subsection. In all cases, though, I do designate the vote choices at the two different times for each voter as belonging to the same Primary Sampling Unit (PSU) in Stata, so that the standard errors can be calculated appropriately.

3.5 Fixed-effects model

I also do a robustness test with respect to individual-level heterogeneity that is not observed through the voter characteristics in my models. Formally, in terms of the model expressed in 3.2, this would correspond to a violation of the assumption that ϵ_{itk} is independent across periods. The modified assumption involves the following specification for utility U_{itk} :

$$U_{itk} = \mathbf{x}_i^\top \boldsymbol{\beta}_{tk} + u_{ik} + \epsilon_{itk}$$

where u_{ik} is individual i 's unobserved preference for party k . There is a so-called conditional fixed-effects estimator which can be employed in this situation, and which is accessible through Stata's `xtmlogit` command. I use this as a robustness test and check whether it leads to importantly different estimates for the subpopulation of voters who voted for different parties in 2015 and 2019 (since these are the only voters whose preferences can be estimated through the fixed-effects method).

4 Results and discussion

4.1 Cross-sectional model

Models 1, 2 and 3 correspond to Multinomial Logistic regressions of vote choice on demographics, on demographics and non-election-specific non-demographic voter characteristics, and on all voter characteristics, respectively, in addition to interaction terms as explained in Section 3. Results for each model are presented in Columns 1, 2 and 3 of Table 1, respectively, with the Liberal Party arbitrarily fixed as the base outcome for the purpose of reporting Multinomial Logistic coefficients.⁴ Furthermore, since these are logistic coefficients, the interpretation is that, for instance, a coefficient of 0.2 on one predictor means that an increase of 1 in that predictor corresponds to an $e^{0.2}$ -greater relative probability of voting for the given party.

Model 1

Being a man, as well as being 35 and over, were the two characteristics which were predictive of voting Conservative in both 2015 and 2019, but did not have a significantly different effect across the two elections. Both are consistent with typical characterizations of conservative voters. However, being over 54 was not significant on its own nor in its interaction with time.

Being from a rural area, being from the Prairies, and not having a college education are all classic characteristics of right-wing voters, and are all significantly predictive of voting Conservative rather than Liberal. What is more, the effect of all three characteristics on the relative probability of voting Conservative became more pronounced in 2019.

Both mean and time-interaction effects of the indicators for each province were significant for a number of provinces. Since there are so many, I will restrict my analysis to those effects that are significant in Model 3, not Models 1 or 2.

Model 2

Both of the non-election-specific factors that are added in this model in comparison to the first one, ideology score and prioritization of jobs over the environment, have a highly significant effect in predicting Conservative voting. Of the two, only one has a significant interaction effect, and it is noteworthy: Ideology score appears to have played a significantly larger role in determining 2019

4. Note that “population size” is distinct from the number of observations because of the use of survey weights. Also, the actual population represented is half the size of the number given, since we have two observations (2015 and 2019) for each voter.

vote preferences in comparison to 2015.

Furthermore, once controlling for these two non-election-specific factors, several other effects change in significance: being over 54 becomes a significant predictor of voting Conservative; having a college education becomes insignificant (as does its interaction effect with time); and the time effect of being from a rural area becomes insignificant. Furthermore, the effect of being from a rural area on the relative probability of voting Conservative, controlling for other covariates, also shrinks significantly.

It is intuitive that demographic characteristics typically considered to be correlated with ideology would have their coefficients shrink once non-election-specific non-demographic factors are included in the model. What is far more surprising is that the effect of voting over 54 becomes significant only once those factors are controlled for, across both elections. More generally, it is interesting that being a woman and being under 35 are predictive of voting Liberal rather than Conservative even after accounting for ideology, across both elections.

Model 3

Model 3 adds controls for election-specific factors related to Liberal government performance. As discussed in Subsection 3.4, since these factors concern events that occurred between 2015 and 2019, a nonzero effect of the election-specific factors on both 2015 and 2019 voting would most naturally be interpreted as partially measuring an otherwise unobserved idiosyncratic preference for the Liberals or for the Conservatives. Of the five election-specific factors, we see that the three that explicitly involve the Liberals or Trudeau do have a significant effect common to both elections, but the two that relate to the general economic situation (whether for the nation or for oneself) do not, thus suggesting that projection of personal preferences (applying to both elections) onto election-specific factors (only pertaining to the 2019 election) is limited to plainly political questions. Notice also that the coefficient on ideology score changes dramatically from 1.00 to 0.51, with this difference being statistically significant (F -test $p = 0.0000$), indicating that it is statistically related to election-specific factors for the purposes of predicting vote choice.

Of the five election-specific factors, three turn out to not have a significant time-interaction effect. For one of them, which is opinions on whether one's personal economic situation improved, the finding merely indicates that the characteristic is not of much relevance to vote choice, since it also did not have a significant effect common to both elections.

However, it is much more noteworthy that opinions on whether Justin Trudeau handled the SNC-Lavalin scandal badly, as well as on whether the economy improved due to the Liberal government’s policies, do not have a significant time-interaction effect, even though they had highly significant effects common to both elections. On the other hand, opinions of whether the national economic situation improved are highly significant in determining vote choice in interaction with the present year. This suggests that questions about election-specific considerations with a less overtly political framing can be much more indicative of how voters will update their propensity to vote for a party based on its performance in government (net of their propensity to vote for it before it came to power).

Of the many province time-interaction effects that were noticed in Models 1 and 2, the only one that remains significant once all voter characteristics are included in Model 3 is the indicator for Saskatchewan’s time-interaction effect. A likely explanation is that this corresponds to a home-province effect: in 2019, unlike in 2015, the Conservative Party was led by Andrew Scheer, whose own district is in Saskatchewan.

Finally, I note that contrary to the emphasis in Clarke and Stewart (2020)’s valence-politics model, prioritization of jobs over the environment did not have a significantly greater effect in the 2019 election than in the 2015 election. My model, unlike theirs, does not include party identification as a predictor, so the findings are difficult to compare directly since they hold different things constant.

Table 1: Main models of 2015 and 2019 vote choice

	(1)	(2)	(3)
	Con	Con	Con
A woman	-0.39*** (0.080)	-0.15 (0.094)	-0.12 (0.11)
I(Under 35)=1	-0.30* (0.13)	-0.34* (0.15)	0.029 (0.20)
I(Over 54)=1	0.20* (0.086)	0.24* (0.098)	0.042 (0.12)
I(Parent born outside Canada)=1		0.12 (0.097)	0.25* (0.12)
I(College education or above)=1	-0.41*** (0.078)	0.10 (0.092)	0.038 (0.11)
I(Rural)=1	0.41*** (0.087)	0.25* (0.10)	0.33** (0.12)
Alberta	1.00***	0.28	-1.21***

	(0.13)	(0.15)	(0.22)
British Columbia	-0.19 (0.13)	-0.84*** (0.16)	-1.80*** (0.23)
Manitoba	-0.15 (0.18)	-0.80*** (0.21)	-1.65*** (0.27)
New Brunswick	-0.37 (0.25)	-0.90** (0.32)	-1.65*** (0.42)
Newfoundland and Labrador	-1.53*** (0.32)	-2.02*** (0.34)	-3.51*** (0.39)
Nova Scotia	-1.27*** (0.27)	-1.54*** (0.30)	-2.87*** (0.41)
Ontario	-0.35*** (0.10)	-0.98*** (0.13)	-1.81*** (0.18)
Prince Edward Island	-1.21 (0.69)	-1.80 (0.99)	-3.13** (1.04)
Saskatchewan	0.51* (0.20)	-0.22 (0.22)	-1.77*** (0.30)
Ideology score		1.03*** (0.056)	0.50*** (0.071)
Prioritize jobs over environment (-1 to +1)		0.56*** (0.079)	0.58*** (0.10)
Personal economic situation improved (-1 to +1)			-0.078 (0.092)
National economic situation improved (-1 to +1)			-0.073 (0.17)
Liberal gov. broke promises (-1 to +1)			1.24*** (0.12)
Trudeau handled SNC scandal badly (-1 to +1)			0.64*** (0.17)
Economy improved under Liberal gov. (-1 to +1)			-0.76*** (0.11)
A woman \times t=1	-0.045 (0.066)	-0.061 (0.083)	-0.30* (0.13)
I(Under 35)=1 \times t=1	0.25* (0.11)	0.27 (0.15)	0.33 (0.26)
I(Over 54)=1 \times t=1	-0.12 (0.069)	-0.088 (0.088)	-0.089 (0.14)
I(Parent born outside Canada)=1 \times t=1		-0.071 (0.084)	-0.13 (0.13)
I(College education or above)=1 \times t=1	-0.12 (0.064)	-0.023 (0.086)	-0.083 (0.14)
I(Rural)=1 \times t=1	0.25*** (0.073)	0.27** (0.093)	0.40** (0.15)
Alberta \times t=1	0.51*** (0.12)	0.53*** (0.15)	0.19 (0.28)

British Columbia \times t=1	0.39*** (0.11)	0.34* (0.14)	0.23 (0.27)
Manitoba \times t=1	0.76*** (0.16)	0.81*** (0.20)	0.37 (0.32)
New Brunswick \times t=1	0.48* (0.22)	0.36 (0.28)	-0.038 (0.43)
Newfoundland and Labrador \times t=1	0.95*** (0.26)	0.91** (0.31)	0.47 (0.45)
Nova Scotia \times t=1	0.46* (0.20)	0.47 (0.24)	0.33 (0.44)
Ontario \times t=1	0.33*** (0.085)	0.24* (0.12)	0.096 (0.25)
Prince Edward Island \times t=1	0.52 (0.39)	0.32 (0.42)	0.31 (0.62)
Saskatchewan \times t=1	1.16*** (0.23)	1.24*** (0.26)	1.49*** (0.42)
t=1 \times Ideology score		0.34*** (0.054)	0.33*** (0.079)
t=1 \times Prioritize jobs over environment (-1 to +1)		-0.11 (0.077)	-0.11 (0.13)
t=1 \times Personal economic situation improved (-1 to +1)			-0.13 (0.11)
t=1 \times National economic situation improved (-1 to +1)			-0.48* (0.20)
t=1 \times Liberal gov. broke promises (-1 to +1)			0.48*** (0.14)
t=1 \times Trudeau handled SNC scandal badly (-1 to +1)			0.30 (0.18)
t=1 \times Economy improved under Liberal gov. (-1 to +1)			-0.30* (0.15)
Observations	11538	11396	9506
Population size	9650.5	9514.8	7580.9

se in parentheses

Reported numbers are coefficients in a Multinomial Logistic regression on vote choice. Coefficients for all other parties were estimated simultaneously, and are reported in full in Table A1.

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

4.2 Robustness test: Fixed-effects model

I now present the results of the model with fixed effects (labeled as Model 5) in Table 2. Since the subpopulation considered in the fixed-effects model is only that for which the vote choice changes between the 2015 and 2019 elections (the “switchers”), I also present the results for Model 4, which

has the same specification as Model 3 but is applied to the same subpopulation as Model 5. In the fixed-effects model, the effect of voter characteristics common to both periods is absorbed into the fixed-effect term, so only the time-interaction effects can be estimated. I first compare Model 3 with Model 4, then Model 4 with Model 5.

Comparison of Model 3 and Model 4

A first important observation is that the time-invariant effect of the ideology score on the relative probability of voting Conservative rather than Liberal, which was significant in Model 3 with a value of 0.50, is insignificant with an estimate of 0.048 when we consider only the subpopulation of switchers. Meanwhile, the time-interaction effect of the ideology score, which was significant in Model 3 with an estimate of 0.33, becomes much larger at 0.91 among the subpopulation of switchers.

Some effects, such as the time-interaction effect of the indicator for being in Ontario, newly become significant. However, this is not necessarily insightful, given that the overall change in relative probability of voting Conservative between 2015 and 2019 is necessarily higher among switchers than among the general population, given that we know that the Conservatives gained in vote share. Since this model includes a full set of province indicators and omits a constant, we expect the effect of all the province indicators to be higher among the subpopulation of switchers.

Comparison of Model 4 and Model 5

Overall, the addition of fixed effects in moving from Model 4 to Model 5 does not change the coefficient estimates much. While the `svy: xtlogit` Stata command does not seem to allow for a quantitative comparison with the model without fixed effects (with something like a likelihood-ratio test or adjusted Wald test), we can see by inspection that the coefficient estimates for Models 4 and 5 are very similar for the most part. The only coefficient for which the difference between two models may be statistically significant is the time-interaction effect of thinking the Liberal government broke their promises, which is estimated to be 1.21 ± 0.39 in Model 4 and 0.68 ± 0.27 in Model 5. For some other coefficients, such as the time-interaction effect of thinking the national economic situation improved, the estimates are similar between the two models, but the coefficient is significant in Model 5 but not Model 4 because it is estimated with a lower standard error in Model 5.

Implications for overall analysis

The analysis we have performed does not say anything about the impact of unobserved heterogeneity among the subpopulation of non-switchers, which the fixed-effects model cannot be used to study. However, I have at least shown that for the full set of voter characteristics (that is, those included in Model 3, not just those in Model 1 or Model 2), adding fixed effects to account for unobserved heterogeneity does not seem to significantly change the estimates that are obtained for the subpopulation of switchers, thus demonstrating the robustness of the specification.

Table 2: Models of 2015 and 2019 vote choice (robustness test with fixed effects)

	(3)	(4)	(5)
	Con	Con	Con
A woman	-0.12 (0.11)	0.41 (0.22)	
I(Under 35)=1	0.029 (0.20)	-0.54 (0.35)	
I(Over 54)=1	0.042 (0.12)	-0.16 (0.24)	
I(Parent born outside Canada)=1	0.25* (0.12)	0.52* (0.22)	
I(College education or above)=1	0.038 (0.11)	-0.071 (0.23)	
I(Rural)=1	0.33** (0.12)	-0.0071 (0.25)	
Alberta	-1.21*** (0.22)	-1.18** (0.40)	
British Columbia	-1.80*** (0.23)	-1.56*** (0.39)	
Manitoba	-1.65*** (0.27)	-1.55*** (0.45)	
New Brunswick	-1.65*** (0.42)	-0.92 (0.60)	
Newfoundland and Labrador	-3.51*** (0.39)	-1.99** (0.64)	
Nova Scotia	-2.87*** (0.41)	-2.07*** (0.62)	
Ontario	-1.81*** (0.18)	-1.23*** (0.30)	
Prince Edward Island	-3.13** (1.04)	-1.78 (0.95)	
Saskatchewan	-1.77*** (0.30)	-2.60*** (0.58)	
Ideology score	0.50*** (0.071)	0.048 (0.14)	
Prioritize jobs over environment (-1 to +1)	0.58***	0.15	

	(0.10)	(0.19)	
Personal economic situation improved (-1 to +1)	-0.078 (0.092)	0.23 (0.18)	
National economic situation improved (-1 to +1)	-0.073 (0.17)	0.48 (0.33)	
Liberal gov. broke promises (-1 to +1)	1.24*** (0.12)	-0.13 (0.19)	
Trudeau handled SNC scandal badly (-1 to +1)	0.64*** (0.17)	-0.15 (0.25)	
Economy improved under Liberal gov. (-1 to +1)	-0.76*** (0.11)	0.0084 (0.20)	
A woman \times t=1	-0.30* (0.13)	-1.02* (0.40)	-1.29*** (0.30)
I(Under 35)=1 \times t=1	0.33 (0.26)	0.97 (0.66)	1.01* (0.46)
I(Over 54)=1 \times t=1	-0.089 (0.14)	0.068 (0.45)	-0.038 (0.33)
I(Parent born outside Canada)=1 \times t=1	-0.13 (0.13)	-0.69 (0.42)	-0.79* (0.32)
I(College education or above)=1 \times t=1	-0.083 (0.14)	-0.12 (0.44)	-0.37 (0.31)
I(Rural)=1 \times t=1	0.40** (0.15)	0.63 (0.47)	0.51 (0.33)
Alberta \times t=1	0.19 (0.28)	1.01 (0.79)	1.14* (0.54)
British Columbia \times t=1	0.23 (0.27)	1.20 (0.78)	1.31* (0.59)
Manitoba \times t=1	0.37 (0.32)	1.84* (0.91)	1.45* (0.62)
New Brunswick \times t=1	-0.038 (0.43)	0.30 (1.07)	0.64 (0.61)
Newfoundland and Labrador \times t=1	0.47 (0.45)	2.19 (1.40)	2.00 (1.07)
Nova Scotia \times t=1	0.33 (0.44)	1.10 (1.15)	-0.17 (0.82)
Ontario \times t=1	0.096 (0.25)	1.28* (0.63)	1.23** (0.42)
Prince Edward Island \times t=1	0.31 (0.62)	0.69 (1.84)	0.96 (1.43)
Saskatchewan \times t=1	1.49*** (0.42)	3.52*** (0.98)	2.27** (0.84)
t=1 \times Ideology score	0.33*** (0.079)	0.91*** (0.24)	0.99*** (0.21)
t=1 \times Prioritize jobs over environment (-1 to +1)	-0.11 (0.13)	-0.11 (0.37)	0.080 (0.28)

t=1 × Personal economic situation improved (-1 to +1)	-0.13 (0.11)	-0.52 (0.37)	-0.29 (0.28)
t=1 × National economic situation improved (-1 to +1)	-0.48* (0.20)	-1.12 (0.64)	-1.02* (0.46)
t=1 × Liberal gov. broke promises (-1 to +1)	0.48*** (0.14)	1.21** (0.39)	0.68* (0.27)
t=1 × Trudeau handled SNC scandal badly (-1 to +1)	0.30 (0.18)	0.77 (0.47)	0.37 (0.31)
t=1 × Economy improved under Liberal gov. (-1 to +1)	-0.30* (0.15)	-0.70 (0.42)	-0.80** (0.30)
Observations	9506	2350	2350

se in parentheses

Reported numbers are coefficients in a Multinomial Logistic regression

on vote choice. Coefficients for all other parties were estimated simul-

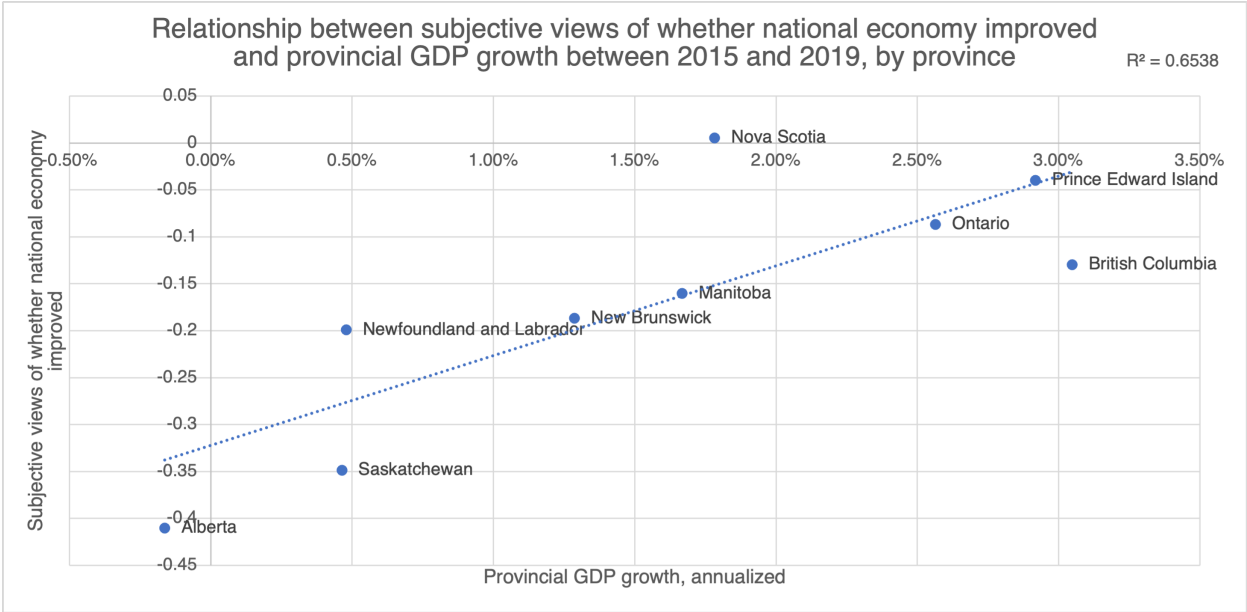
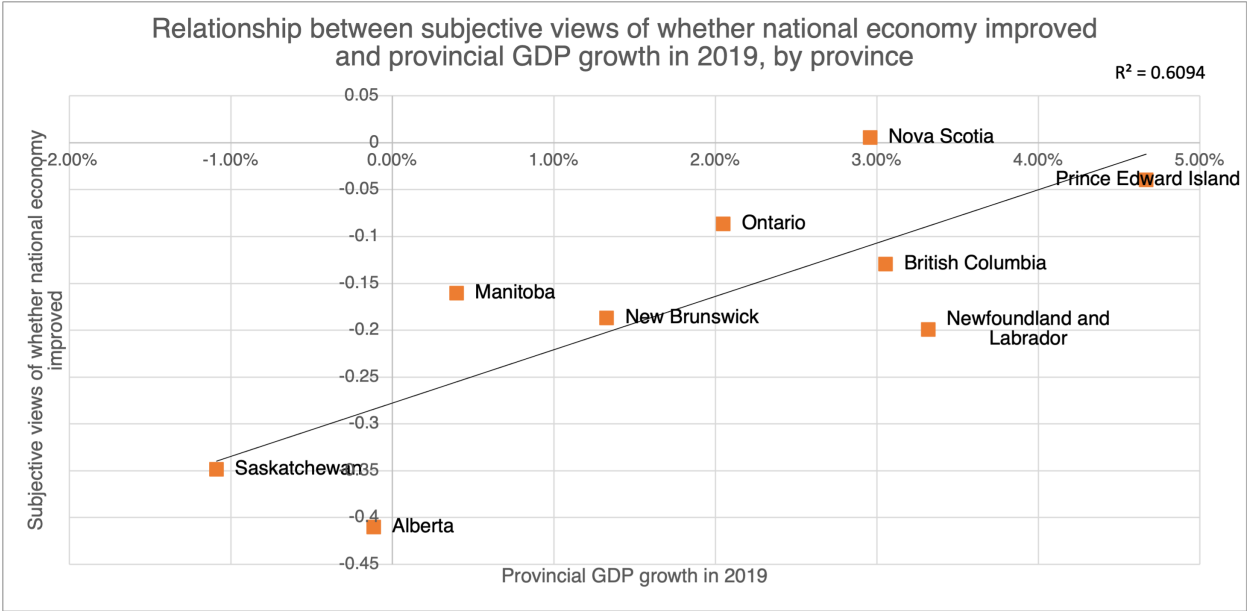
taneously, and are reported in full in Table A2.

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

4.3 Follow-up analysis: Relationship between views about the national economy and objective GDP growth in the voter’s province

As highlighted in Subsection 4.1, the one election-specific voter characteristic that had a significant effect specific to the 2019 election but did not have a significant effect common to both elections (and thus fit our intuitions about a truly election-specific factor) was voters’ views about whether the national economy had improved. Recall that the question was: “Would you say that over the past twelve months, the state of the economy in Canada has gotten much better, gotten slightly better, stayed about the same, gotten slightly worse, or gotten much worse?”, with the different possible answers converted to +1, +0.5, 0, -0.5 and -1, respectively.

To better understand this characteristic, I compute its mean for each province, and relate these different impressions about the state of the national economy to GDP growth in that province, which is an objective measure of the state of the *provincial* economy. I do this both for GDP growth in 2019 (since the election was in November, so most of the “past twelve months” were in 2019) and for average GDP growth between 2015 and 2019, which is the whole time the Trudeau government was in power prior to the 2019 election.



The GDP information was obtained from Statistics Canada (2021).

As we see, the subjective views of the voters of each province about the national economy and the objective state of the provincial economy throughout the entire government mandate are highly correlated ($R^2 = 0.6538$). Alberta and Saskatchewan, in particular, are heavily reliant on oil production, and thus had their economies particularly affected by a drop in oil prices over much of the period between 2015 and 2019.

Subjective views were also highly correlated with GDP growth in 2019 ($R^2 = 0.6094$), but slightly less so than with overall GDP growth between 2015 and 2019, even though the question

in the survey related to whether the national economy improved in the past year, not the past 4 years. It is reasonable to think that because the survey respondents knew they were answering questions relating to the federal election, they may have misread the question or not thought about it literally. Alternately, they might have intended to answer the question literally but not have had detailed enough knowledge to express an opinion on recent economic performance alone, or they might have been influenced by some psychological bias. In the rest of my discussion below, I focus on the second graph, relating subjective views about the national economy to GDP growth between 2015 and 2019, since it is the one that yielded the higher correlation.

Returning to the observation that provinces with the lowest average growth had suffered most from the drop in oil prices, it is worth noting that this drop in oil prices had already started occurring for almost a year prior to Trudeau's election in 2015. As such, it would not have been obvious *a priori* that this factor would have affected the 2019 election much more than the 2015 one. This is especially the case since the policies that voters in Alberta and Saskatchewan were described by the media as disliking as of the 2019 election (Austen 2019; Mazereeuw 2019), such as a carbon tax and low support to the oil industry more generally, are ones that Trudeau ran on in 2015 in a much publicized way.

I propose several possible explanations for those observations. First, voters in the oil-reliant provinces might not have expected in 2015 that the decline of their province's economy would last as long as it did. Second, the salience of the economic decline and of its importance likely increased with time, as voters noticed its effect on various aspects of their lives. Third, voters might have expected Trudeau to soften his 2015 stance on the energy industry as their provinces' economic downturn progressed, to a greater extent than he ended up doing, such that his consistency on key policies such as the carbon tax would have constituted a change relative to their expectations.

I also briefly note that Newfoundland and Labrador had essentially the same GDP growth as Saskatchewan, and yet voters in the former province had a much more favorable impression of the national economy than in those in the latter province. For context, though, Newfoundland and Labrador had GDP growth of -1.16% in 2014 (relative to 2013), whereas Saskatchewan had GDP growth of 2.02% over the same period. Therefore, though both provinces had similar economic performance between 2015 and 2019, voters' impression of improvement seems to relate to economic growth relative to a previous year, at least for this particular example. Thus, it is likely that we

would have obtained an even higher correlation had we compared GDP growth between 2015 and 2019 for each province to its historical average. I don't explore that possibility in this paper as this follow-up analysis is not intended to be extensive and because such a differencing with historical averages was not necessary to obtain what is already a strong prediction (that provincial GDP growth is predictive of views about the national economy), but it could be an avenue for further study.

5 Conclusion

In conclusion, my paper is the first to use a model rich in voter characteristics to study the outcome of the 2019 election, and how it differed from the 2015 election. My time-interaction regression approach produces a clear decomposition of voter characteristics' difference in importance between the 2015 and 2019 elections, both for election-specific and non-election-specific characteristics.

I find that several non-election-specific voter characteristics significantly changed in importance: being a man, being from a rural area, being from Saskatchewan, and having a right-wing ideology all made one likely to vote Conservative rather than Liberal to a greater extent in 2019 than in 2015, and were the only characteristics to do so. While the 2019-specific effect of being from Saskatchewan can be explained by the fact that the Conservative Party had a leader from Saskatchewan in 2019 but not 2015, the other findings warrant further qualitative analysis.

As for election-specific characteristics, by including opinions that seem to be specific to the 2019 election in the regression on vote choice in both 2015 and 2019, I found that several such characteristics do not only affect vote choice in the 2019 election, even after controlling for other factors. Surprisingly, views of Trudeau's handling of the SNC-Lavalin scandal do not affect vote choice significantly differently between the 2015 and 2019 elections. Thus, they seem to in fact mostly reflect pre-existing beliefs affecting vote choice in both elections, and not otherwise captured by other voter characteristics such as demographics or ideology. By contrast, I find that views on whether the national economic situation improved in the previous year significantly affect vote choice in 2019 but not in 2015. In follow-up analysis, I find that views on the national economic situation are well predicted by the objective state of economic growth in the voter's province, namely among Alberta and Saskatchewan voters whose economy was most affected by a drop in oil prices.

To sum up, my paper not only provides insight into the factors driving the Liberals' loss of a majority in 2019 relative to the 2015 election, but also finds that voters' views about recent events should not be always considered to be independent inputs into their utility function, even when factors such as demographics and ideology are accounted for.

A Full tables

Table A1: Main models of 2015 and 2019 vote choice

	(1)				(2)				(3)			
	Lib	Con	NDP	Green	Lib	Con	NDP	Green	Lib	Con	NDP	Green
A woman	0 (.)	-0.39*** (0.080)	0.14 (0.11)	0.24 (0.21)	0 (.)	-0.15 (0.094)	0.15 (0.11)	0.24 (0.21)	0 (.)	-0.12 (0.11)	0.070 (0.13)	-0.035 (0.28)
I(Under 35)=1	0 (.)	-0.30* (0.13)	-0.0031 (0.16)	0.12 (0.28)	0 (.)	-0.34* (0.15)	0.041 (0.16)	0.20 (0.30)	0 (.)	0.029 (0.20)	0.15 (0.21)	-0.14 (0.46)
I(Over 54)=1	0 (.)	0.20* (0.086)	-0.26* (0.11)	-0.32 (0.21)	0 (.)	0.24* (0.098)	-0.22 (0.11)	-0.21 (0.22)	0 (.)	0.042 (0.12)	-0.29* (0.13)	-0.27 (0.26)
I(Parent born outside Canada)=1					0 (.)	0.12 (0.097)	-0.0069 (0.11)	0.27 (0.20)	0 (.)	0.25* (0.12)	0.038 (0.13)	0.40 (0.24)
I(College education or above)=1	0 (.)	-0.41*** (0.078)	-0.45*** (0.10)	-0.48* (0.19)	0 (.)	0.10 (0.092)	-0.42*** (0.11)	-0.54** (0.20)	0 (.)	0.038 (0.11)	-0.31* (0.13)	-0.37 (0.25)
I(Rural)=1	0 (.)	0.41*** (0.087)	0.066 (0.12)	0.34 (0.21)	0 (.)	0.25* (0.10)	0.084 (0.12)	0.32 (0.21)	0 (.)	0.33** (0.12)	0.14 (0.14)	0.60* (0.24)
Alberta	0 (.)	1.00*** (0.13)	-0.97*** (0.20)	-3.09*** (0.42)	0 (.)	0.28 (0.15)	-1.01*** (0.20)	-3.22*** (0.43)	0 (.)	-1.21*** (0.22)	-1.47*** (0.27)	-3.55*** (0.48)
British Columbia	0 (.)	-0.19 (0.13)	-0.43** (0.16)	-1.74*** (0.28)	0 (.)	-0.84*** (0.16)	-0.48** (0.17)	-2.01*** (0.28)	0 (.)	-1.80*** (0.23)	-0.91*** (0.21)	-2.44*** (0.40)
Manitoba	0 (.)	-0.15 (0.18)	-1.61*** (0.25)	-2.53*** (0.50)	0 (.)	-0.80*** (0.21)	-1.80*** (0.26)	-2.72*** (0.51)	0 (.)	-1.65*** (0.27)	-2.09*** (0.31)	-3.12*** (0.57)
New Brunswick	0 (.)	-0.37 (0.25)	-1.58*** (0.38)	-1.93*** (0.45)	0 (.)	-0.90** (0.32)	-1.60*** (0.38)	-2.01*** (0.49)	0 (.)	-1.65*** (0.42)	-1.91*** (0.43)	-2.70*** (0.57)
Newfoundland and Labrador	0 (.)	-1.53*** (0.32)	-0.89** (0.32)	-16.4*** (0.25)	0 (.)	-2.02*** (0.34)	-0.93** (0.32)	-17.9*** (0.27)	0 (.)	-3.51*** (0.39)	-1.71*** (0.35)	-17.4*** (0.41)
Nova Scotia	0 (.)	-1.27*** (0.27)	-1.50*** (0.30)	-2.74*** (0.47)	0 (.)	-1.54*** (0.30)	-1.50*** (0.31)	-2.91*** (0.49)	0 (.)	-2.87*** (0.41)	-2.02*** (0.39)	-3.26*** (0.58)
Ontario	0 (.)	-0.35*** (0.10)	-1.12*** (0.13)	-2.55*** (0.27)	0 (.)	-0.98*** (0.13)	-1.16*** (0.15)	-2.81*** (0.30)	0 (.)	-1.81*** (0.18)	-1.54*** (0.19)	-3.34*** (0.39)
Prince Edward Island	0 (.)	-1.21 (0.69)	-1.76** (0.63)	-2.19** (0.70)	0 (.)	-1.80 (0.99)	-1.82** (0.64)	-2.36*** (0.70)	0 (.)	-3.13** (1.04)	-2.89*** (0.75)	-3.17** (0.97)
Saskatchewan	0	0.51* (0.25)	-0.30 (0.25)	-2.83*** (0.50)	0	-0.22 (0.21)	-0.32 (0.26)	-2.93*** (0.51)	0	-1.77*** (0.27)	-0.97** (0.31)	-3.64*** (0.57)

	(.)	(0.20)	(0.24)	(0.51)	(.)	(0.22)	(0.24)	(0.52)	(.)	(0.30)	(0.32)	(0.62)
Ideology score	0	1.03***	0.032	0.10	0	0.50***	-0.19*	-0.32*	(.)	(0.071)	(0.084)	(0.16)
	(.)	(0.056)	(0.063)	(0.12)	(.)	(0.071)	(0.084)	(0.16)				
Prioritize jobs over environment (-1 to +1)	0	0.56***	-0.0038	-0.65**	0	0.58***	-0.065	-0.85**	(.)	(0.10)	(0.12)	(0.26)
	(.)	(0.079)	(0.096)	(0.22)	(.)	(0.10)	(0.12)	(0.26)				
Personal economic situation improved (-1 to +1)	0	-0.078	-0.0077	0.37	0	-0.078	-0.0077	0.37	(.)	(0.092)	(0.10)	(0.21)
	(.)	(0.092)	(0.10)	(0.21)	(.)	(0.092)	(0.10)	(0.21)				
National economic situation improved (-1 to +1)	0	-0.073	-0.16	-0.27	0	-0.073	-0.16	-0.27	(.)	(0.17)	(0.20)	(0.41)
	(.)	(0.17)	(0.20)	(0.41)	(.)	(0.17)	(0.20)	(0.41)				
Liberal gov. broke promises (-1 to +1)	0	1.24***	0.78***	0.89**	0	1.24***	0.78***	0.89**	(.)	(0.12)	(0.12)	(0.29)
	(.)	(0.12)	(0.12)	(0.29)	(.)	(0.12)	(0.12)	(0.29)				
Trudeau handled SNC scandal badly (-1 to +1)	0	0.64***	0.28*	-0.21	0	0.64***	0.28*	-0.21	(.)	(0.17)	(0.14)	(0.28)
	(.)	(0.17)	(0.14)	(0.28)	(.)	(0.17)	(0.14)	(0.28)				
Economy improved under Liberal gov. (-1 to +1)	0	-0.76***	-0.22	-0.61*	0	-0.76***	-0.22	-0.61*	(.)	(0.11)	(0.13)	(0.25)
	(.)	(0.11)	(0.13)	(0.25)	(.)	(0.11)	(0.13)	(0.25)				
A woman × t=1	0	-0.045	0.087	-0.079	0	-0.061	0.060	-0.073	0	-0.30*	-0.027	-0.073
	(.)	(0.066)	(0.12)	(0.21)	(.)	(0.083)	(0.12)	(0.21)	(.)	(0.13)	(0.15)	(0.28)
I(Under 35)=1 × t=1	0	0.25*	0.47**	-0.026	0	0.27	0.48**	-0.14	0	0.33	0.11	0.17
	(.)	(0.11)	(0.18)	(0.31)	(.)	(0.15)	(0.18)	(0.33)	(.)	(0.26)	(0.27)	(0.48)
I(Over 54)=1 × t=1	0	-0.12	-0.15	0.11	0	-0.088	-0.15	0.047	0	-0.089	-0.17	0.070
	(.)	(0.069)	(0.11)	(0.19)	(.)	(0.088)	(0.11)	(0.20)	(.)	(0.14)	(0.15)	(0.25)
I(Parent born outside Canada)=1 × t=1	0	-0.071	-0.070	-0.27	0	-0.071	-0.070	-0.27	0	-0.13	-0.11	-0.41
	(.)	(0.084)	(0.11)	(0.20)	(.)	(0.084)	(0.11)	(0.20)	(.)	(0.13)	(0.14)	(0.24)
I(College education or above)=1 × t=1	0	-0.12	-0.020	0.22	0	-0.023	-0.071	0.26	0	-0.083	-0.076	0.15
	(.)	(0.064)	(0.12)	(0.19)	(.)	(0.086)	(0.12)	(0.20)	(.)	(0.14)	(0.15)	(0.23)
I(Rural)=1 × t=1	0	0.25***	0.17	0.19	0	0.27**	0.17	0.18	0	0.40**	0.26	0.078
	(.)	(0.073)	(0.13)	(0.21)	(.)	(0.093)	(0.13)	(0.22)	(.)	(0.15)	(0.17)	(0.25)
Alberta × t=1	0	0.51***	0.50*	1.23**	0	0.53***	0.59*	1.34***	0	0.19	0.49	0.76
	(.)	(0.12)	(0.23)	(0.41)	(.)	(0.15)	(0.24)	(0.41)	(.)	(0.28)	(0.31)	(0.44)
British Columbia × t=1	0	0.39***	0.14	0.48	0	0.34*	0.21	0.64*	0	0.23	0.25	0.50
	(.)	(0.11)	(0.17)	(0.29)	(.)	(0.14)	(0.18)	(0.30)	(.)	(0.27)	(0.25)	(0.44)
Manitoba × t=1	0	0.76***	1.22***	0.96	0	0.81***	1.40***	1.05	0	0.37	1.05**	0.73

	(.)	(0.16)	(0.29)	(0.55)	(.)	(0.20)	(0.30)	(0.56)	(.)	(0.32)	(0.35)	(0.68)
New Brunswick × t=1	0	0.48*	0.23	1.27**	0	0.36	0.28	1.30**	0	-0.038	-0.14	1.32*
	(.)	(0.22)	(0.54)	(0.48)	(.)	(0.28)	(0.55)	(0.49)	(.)	(0.43)	(0.59)	(0.57)
Newfoundland and Labrador × t=1	0	0.95***	0.79**	12.9***	0	0.91**	0.83**	14.4***	0	0.47	0.53	13.0***
	(.)	(0.26)	(0.27)	(0.66)	(.)	(0.31)	(0.28)	(0.66)	(.)	(0.45)	(0.36)	(0.72)
Nova Scotia × t=1	0	0.46*	0.64	0.84*	0	0.47	0.61	0.95*	0	0.33	0.53	0.77
	(.)	(0.20)	(0.34)	(0.40)	(.)	(0.24)	(0.35)	(0.41)	(.)	(0.44)	(0.50)	(0.51)
Ontario × t=1	0	0.33***	0.30*	0.80**	0	0.24*	0.34*	0.92**	0	0.096	0.20	0.85*
	(.)	(0.085)	(0.14)	(0.25)	(.)	(0.12)	(0.15)	(0.28)	(.)	(0.25)	(0.22)	(0.37)
Prince Edward Island × t=1	0	0.52	-1.37	1.55	0	0.32	-1.28	1.73	0	0.31	-0.56	1.86
	(.)	(0.39)	(1.02)	(0.94)	(.)	(0.42)	(1.03)	(0.97)	(.)	(0.62)	(0.89)	(1.15)
Saskatchewan × t=1	0	1.16***	0.77*	0.21	0	1.24***	0.78*	0.22	0	1.49***	1.16*	0.64
	(.)	(0.23)	(0.36)	(0.66)	(.)	(0.26)	(0.37)	(0.66)	(.)	(0.42)	(0.52)	(0.76)
t=1 × Ideology score					0	0.34***	0.049	0.19	0	0.33***	0.054	0.35*
					(.)	(0.054)	(0.069)	(0.11)	(.)	(0.079)	(0.093)	(0.14)
t=1 × Prioritize jobs over environment (-1 to +1)					0	-0.11	-0.26*	-0.46*	0	-0.11	-0.37**	-0.26
					(.)	(0.077)	(0.10)	(0.23)	(.)	(0.13)	(0.14)	(0.26)
t=1 × Personal economic situation improved (-1 to +1)									0	-0.13	0.030	-0.46*
									(.)	(0.11)	(0.12)	(0.21)
t=1 × National economic situation improved (-1 to +1)									0	-0.48*	-0.16	0.17
									(.)	(0.20)	(0.23)	(0.44)
t=1 × Liberal gov. broke promises (-1 to +1)									0	0.48***	0.33*	0.26
									(.)	(0.14)	(0.14)	(0.29)
t=1 × Trudeau handled SNC scandal badly (-1 to +1)									0	0.30	0.40*	1.12***
									(.)	(0.18)	(0.17)	(0.32)
t=1 × Economy improved under Liberal gov. (-1 to +1)									0	-0.30*	-0.24	0.19
									(.)	(0.15)	(0.16)	(0.24)
Observations	11538				11396				9506			
Population size	9650.5				9514.8				7580.9			

se in parentheses

Reported numbers are coefficients in a logistic regression on vote choice.

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

Table A2: Models of 2015 and 2019 vote choice (robustness test with fixed effects)

	(3)				(4)				(5)			
	Lib	Con	NDP	Green	Lib	Con	NDP	Green	Lib	Con	NDP	Green
A woman	0 (.)	-0.12 (0.11)	0.070 (0.13)	-0.035 (0.28)	0 (.)	0.41 (0.22)	0.15 (0.20)	-0.22 (0.34)				
I(Under 35)=1	0 (.)	0.029 (0.20)	0.15 (0.21)	-0.14 (0.46)	0 (.)	-0.54 (0.35)	0.17 (0.30)	-0.048 (0.52)				
I(Over 54)=1	0 (.)	0.042 (0.12)	-0.29* (0.13)	-0.27 (0.26)	0 (.)	-0.16 (0.24)	0.019 (0.22)	-0.28 (0.39)				
I(Parent born outside Canada)=1	0 (.)	0.25* (0.12)	0.038 (0.13)	0.40 (0.24)	0 (.)	0.52* (0.22)	0.0020 (0.21)	0.39 (0.33)				
I(College education or above)=1	0 (.)	0.038 (0.11)	-0.31* (0.13)	-0.37 (0.25)	0 (.)	-0.071 (0.23)	-0.14 (0.20)	0.12 (0.34)				
I(Rural)=1	0 (.)	0.33** (0.12)	0.14 (0.14)	0.60* (0.24)	0 (.)	-0.0071 (0.25)	0.12 (0.21)	0.72* (0.33)				
Alberta	0 (.)	-1.21*** (0.22)	-1.47*** (0.27)	-3.55*** (0.48)	0 (.)	-1.18** (0.40)	-0.91* (0.39)	-3.09*** (0.62)				
British Columbia	0 (.)	-1.80*** (0.23)	-0.91*** (0.21)	-2.44*** (0.40)	0 (.)	-1.56*** (0.39)	-0.56 (0.38)	-1.96*** (0.54)				
Manitoba	0 (.)	-1.65*** (0.27)	-2.09*** (0.31)	-3.12*** (0.57)	0 (.)	-1.55*** (0.45)	-1.84** (0.57)	-2.28** (0.82)				
New Brunswick	0 (.)	-1.65*** (0.42)	-1.91*** (0.43)	-2.70*** (0.57)	0 (.)	-0.92 (0.60)	-1.00 (0.59)	-2.79*** (0.67)				
Newfoundland and Labrador	0 (.)	-3.51*** (0.39)	-1.71*** (0.35)	-17.4*** (0.41)	0 (.)	-1.99** (0.64)	-1.57** (0.60)	-17.5*** (0.51)				
Nova Scotia	0 (.)	-2.87*** (0.41)	-2.02*** (0.39)	-3.26*** (0.58)	0 (.)	-2.07*** (0.62)	-1.05 (0.58)	-3.00*** (0.74)				
Ontario	0 (.)	-1.81*** (0.18)	-1.54*** (0.19)	-3.34*** (0.39)	0 (.)	-1.23*** (0.30)	-0.76* (0.32)	-2.85*** (0.52)				
Prince Edward Island	0 (.)	-3.13** (1.04)	-2.89*** (0.75)	-3.17** (0.97)	0 (.)	-1.78 (0.95)	-2.15* (0.96)	-1.76 (0.90)				
Saskatchewan	0	-1.77***	-0.97**	-3.64***	0	-2.60***	-0.78	-2.89***				

	(.)	(0.30)	(0.32)	(0.62)	(.)	(0.58)	(0.46)	(0.70)				
Ideology score	0	0.50***	-0.19*	-0.32*	0	0.048	0.0013	-0.33				
	(.)	(0.071)	(0.084)	(0.16)	(.)	(0.14)	(0.12)	(0.20)				
Prioritize jobs over environment (-1 to +1)	0	0.58***	-0.065	-0.85**	0	0.15	0.35*	-0.28				
	(.)	(0.10)	(0.12)	(0.26)	(.)	(0.19)	(0.17)	(0.32)				
Personal economic situation improved (-1 to +1)	0	-0.078	-0.0077	0.37	0	0.23	-0.19	0.82*				
	(.)	(0.092)	(0.10)	(0.21)	(.)	(0.18)	(0.16)	(0.36)				
National economic situation improved (-1 to +1)	0	-0.073	-0.16	-0.27	0	0.48	0.12	0.29				
	(.)	(0.17)	(0.20)	(0.41)	(.)	(0.33)	(0.27)	(0.49)				
Liberal gov. broke promises (-1 to +1)	0	1.24***	0.78***	0.89**	0	-0.13	-0.0023	0.35				
	(.)	(0.12)	(0.12)	(0.29)	(.)	(0.19)	(0.19)	(0.32)				
Trudeau handled SNC scandal badly (-1 to +1)	0	0.64***	0.28*	-0.21	0	-0.15	-0.23	-1.07**				
	(.)	(0.17)	(0.14)	(0.28)	(.)	(0.25)	(0.22)	(0.36)				
Economy improved under Liberal gov. (-1 to +1)	0	-0.76***	-0.22	-0.61*	0	0.0084	0.021	-0.71**				
	(.)	(0.11)	(0.13)	(0.25)	(.)	(0.20)	(0.19)	(0.27)				
A woman × t=1	0	-0.30*	-0.027	-0.073	0	-1.02*	-0.18	-0.25	0	-1.29***	0.088	-0.60
	(.)	(0.13)	(0.15)	(0.28)	(.)	(0.40)	(0.38)	(0.47)	(.)	(0.30)	(0.27)	(0.42)
I(Under 35)=1 × t=1	0	0.33	0.11	0.17	0	0.97	0.11	-0.052	0	1.01*	0.21	0.53
	(.)	(0.26)	(0.27)	(0.48)	(.)	(0.66)	(0.58)	(0.71)	(.)	(0.46)	(0.42)	(0.63)
I(Over 54)=1 × t=1	0	-0.089	-0.17	0.070	0	0.068	-0.28	0.35	0	-0.038	-0.22	0.67
	(.)	(0.14)	(0.15)	(0.25)	(.)	(0.45)	(0.42)	(0.53)	(.)	(0.33)	(0.31)	(0.43)
I(Parent born outside Canada)=1 × t=1	0	-0.13	-0.11	-0.41	0	-0.69	-0.29	-0.68	0	-0.79*	-0.058	-0.44
	(.)	(0.13)	(0.14)	(0.24)	(.)	(0.42)	(0.39)	(0.47)	(.)	(0.32)	(0.29)	(0.42)
I(College education or above)=1 × t=1	0	-0.083	-0.076	0.15	0	-0.12	-0.22	-0.17	0	-0.37	-0.35	-0.21
	(.)	(0.14)	(0.15)	(0.23)	(.)	(0.44)	(0.40)	(0.46)	(.)	(0.31)	(0.31)	(0.44)
I(Rural)=1 × t=1	0	0.40**	0.26	0.078	0	0.63	0.28	-0.16	0	0.51	0.45	0.026
	(.)	(0.15)	(0.17)	(0.25)	(.)	(0.47)	(0.41)	(0.48)	(.)	(0.33)	(0.30)	(0.47)
Alberta × t=1	0	0.19	0.49	0.76	0	1.01	1.22	1.78*	0	1.14*	0.65	2.15*
	(.)	(0.28)	(0.31)	(0.44)	(.)	(0.79)	(0.74)	(0.87)	(.)	(0.54)	(0.51)	(0.85)
British Columbia × t=1	0	0.23	0.25	0.50	0	1.20	0.66	1.32	0	1.31*	0.29	1.13
	(.)	(0.27)	(0.25)	(0.44)	(.)	(0.78)	(0.74)	(0.81)	(.)	(0.59)	(0.55)	(0.80)
Manitoba × t=1	0	0.37	1.05**	0.73	0	1.84*	2.55**	1.80	0	1.45*	1.22	0.72

	(.)	(0.32)	(0.35)	(0.68)	(.)	(0.91)	(0.90)	(1.19)	(.)	(0.62)	(0.71)	(0.85)
New Brunswick × t=1	0	-0.038	-0.14	1.32*	0	0.30	0.11	3.00**	0	0.64	0.50	2.13*
	(.)	(0.43)	(0.59)	(0.57)	(.)	(1.07)	(1.07)	(1.02)	(.)	(0.61)	(0.87)	(0.95)
Newfoundland and Labrador × t=1	0	0.47	0.53	13.0***	0	2.19	2.86**	16.3***	0	2.00	1.63*	21.1***
	(.)	(0.45)	(0.36)	(0.72)	(.)	(1.40)	(1.08)	(1.14)	(.)	(1.07)	(0.67)	(1.46)
Nova Scotia × t=1	0	0.33	0.53	0.77	0	1.10	1.06	1.99	0	-0.17	0.40	1.72
	(.)	(0.44)	(0.50)	(0.51)	(.)	(1.15)	(1.14)	(1.05)	(.)	(0.82)	(0.86)	(1.01)
Ontario × t=1	0	0.096	0.20	0.85*	0	1.28*	1.09	2.45***	0	1.23**	0.60	2.13***
	(.)	(0.25)	(0.22)	(0.37)	(.)	(0.63)	(0.58)	(0.72)	(.)	(0.42)	(0.43)	(0.57)
Prince Edward Island × t=1	0	0.31	-0.56	1.86	0	0.69	-13.0***	3.16	0	0.96	-19.8***	1.06
	(.)	(0.62)	(0.89)	(1.15)	(.)	(1.84)	(1.47)	(1.81)	(.)	(1.43)	(1.59)	(1.32)
Saskatchewan × t=1	0	1.49***	1.16*	0.64	0	3.52***	1.84	1.18	0	2.27**	1.27	1.58
	(.)	(0.42)	(0.52)	(0.76)	(.)	(0.98)	(1.08)	(1.11)	(.)	(0.84)	(0.79)	(1.21)
t=1 × Ideology score	0	0.33***	0.054	0.35*	0	0.91***	0.075	0.58*	0	0.99***	0.18	0.75**
	(.)	(0.079)	(0.093)	(0.14)	(.)	(0.24)	(0.24)	(0.28)	(.)	(0.21)	(0.18)	(0.27)
t=1 × Prioritize jobs over environment (-1 to +1)	0	-0.11	-0.37**	-0.26	0	-0.11	-0.97**	-0.93*	0	0.080	-0.75**	-0.56
	(.)	(0.13)	(0.14)	(0.26)	(.)	(0.37)	(0.33)	(0.44)	(.)	(0.28)	(0.27)	(0.42)
t=1 × Personal economic situation improved (-1 to +1)	0	-0.13	0.030	-0.46*	0	-0.52	-0.055	-1.15*	0	-0.29	0.064	-0.97*
	(.)	(0.11)	(0.12)	(0.21)	(.)	(0.37)	(0.34)	(0.46)	(.)	(0.28)	(0.25)	(0.38)
t=1 × National economic situation improved (-1 to +1)	0	-0.48*	-0.16	0.17	0	-1.12	-0.28	-0.0046	0	-1.02*	-0.39	-0.53
	(.)	(0.20)	(0.23)	(0.44)	(.)	(0.64)	(0.56)	(0.71)	(.)	(0.46)	(0.44)	(0.54)
t=1 × Liberal gov. broke promises (-1 to +1)	0	0.48***	0.33*	0.26	0	1.21**	0.67	0.46	0	0.68*	0.40	-0.070
	(.)	(0.14)	(0.14)	(0.29)	(.)	(0.39)	(0.35)	(0.44)	(.)	(0.27)	(0.25)	(0.45)
t=1 × Trudeau handled SNC scandal badly (-1 to +1)	0	0.30	0.40*	1.12***	0	0.77	0.92*	2.11***	0	0.37	0.84**	2.06***
	(.)	(0.18)	(0.17)	(0.32)	(.)	(0.47)	(0.40)	(0.51)	(.)	(0.31)	(0.26)	(0.45)
t=1 × Economy improved under Liberal gov. (-1 to +1)	0	-0.30*	-0.24	0.19	0	-0.70	-0.42	0.37	0	-0.80**	-0.28	0.39
	(.)	(0.15)	(0.16)	(0.24)	(.)	(0.42)	(0.39)	(0.39)	(.)	(0.30)	(0.29)	(0.41)
Observations		9506				2350				2350		

se in parentheses

Reported numbers are coefficients in a logistic regression on vote choice.

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

B Difference in seat counts between the 2015 and 2019 general elections

Table A3: Difference in seat counts between the 2015 and 2019 general elections, by party (sorted by absolute value of party total change)

Party	Liberal	Bloc Québécois	Conservative	New Democratic	Green	Others	People's Party
Province							
<i>Total</i>	-27	22	22	-20	2	1	0
AB	-4	0	4	0	0	0	0
BC	-6	0	7	-3	1	1	0
MB	-3	0	2	1	0	0	0
NB	-4	0	3	0	1	0	0
NF	-1	0	0	1	0	0	0
NS	-1	0	1	0	0	0	0
NT	0	0	0	0	0	0	0
NU	-1	0	0	1	0	0	0
ON	-1	0	3	-2	0	0	0
PE	0	0	0	0	0	0	0
QC	-5	22	-2	-15	0	0	0
SK	-1	0	4	-3	0	0	0
YT	0	0	0	0	0	0	0

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