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Spatial voting in non-partisan cities: A case study

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ABSTRACT

In spatial voting theory, voters choose the candidate whose policy preferences are most like their own. This requires that (a) voters and candidates *have* policy preferences that can be meaningfully summarized in terms of low-dimensional "ideal points" on a left-right scale; (b) voters are able to discern, either directly or through relevant cues, the ideal points of the candidates who are running for office; and (c) voters incorporate this information into the choices they make at the ballot box. Perhaps more than in any other elections, it is not clear that any of these requirements are met in non-partisan municipal elections: policy preferences may not be ideologically structured, information may be inadequate, and voters may choose candidates for reasons other than ideology. This makes non-partisan municipal elections an especially hard test for spatial voting theory. Using novel data from both municipal candidates and eligible voters in a major non-partisan municipal election in Canada, we show that municipal policy attitudes are ideologically structured and that these municipal policy ideal points are strongly related to mayoral and council vote choice. Thus, despite the institutional and informational obstacles, spatial voting can play an important role in non-partisan municipal elections.

1. Introduction

If someone were to ask a political scientist for an electoral context in which spatial voting is *most* likely to be present – that is, an election in which voters select the candidate who is closest to themselves on a left-right ideological scale (Downs 1957; Black 1958) – few would choose non-partisan municipal elections. In elections at other levels, political parties with well-established ideological reputations compete on ideologically charged issues like income taxes, climate policy, and immigration. In municipal elections, by contrast, many issues seem disconnected from ideological disagreement – speed limits, parking permits, park maintenance, and the many other important but quotidian matters of local community life. Candidates in many non-partisan municipal elections also tend to position themselves as independents: lone wolves with no pre-existing partisan or ideological "brand." Even in federal and state/provincial elections, some doubt that spatial voting accurately describes the choices that voters make at the polls, and many other theories for explaining vote choice, many of which are only partially compatible with spatial voting, have been proposed (Lazarsfeld et al., 1944; Campbell et al., 1960; Rabinowitz and Macdonald 1989, Clarke et al., 2004, among others). In municipal elections, we have all the more reason to doubt that spatial voting plays an important role in vote choice.

Non-partisan municipal elections, then, are an especially hard test for spatial voting theory. In these elections, it is not at all clear that any of the necessary ingredients for spatial voting even exist – policy preferences may not be ideologically structured, and voters may lack the information they need to make choices based on ideological proximity. Nor is it clear that they *would* make such choices even if the necessary ingredients were present.

Despite these substantial obstacles to spatial voting in non-partisan municipal elections, we argue that municipal policy attitudes *are* ideologically structured and that these attitudes are strongly related to mayoral and council voting decisions in at least one major case: the 2021 mayoral and council elections in the Canadian city of Calgary. Using data from council roll calls, candidate interviews, and candidate surveys, combined with a multi-wave representative survey of eligible voters, we estimate ideological positions for candidates and citizens on a shared left-right policy ideology scale. We then show that most municipal races in Calgary were characterized by meaningful ideological competition and that voters incorporated these ideological positions into the choices they made in both mayoral and council races. Finally,

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we show that voters who we would expect to be more likely to vote spatially – ideologues and partisans, high-knowledge and well-educated voters, and highly attentive voters – were indeed more likely to select the spatially proximate candidate.

Our analysis contributes to urban political science and to the wider literature on spatial voting. For urban political scientists, we provide a novel analysis of the ideological structure that underpins municipal policy preferences, strengthening the argument that ideological disagreement persists in municipal politics despite the distinctive policy focus and institutional structures of local governments. Our analysis also shows that information on the ideological position of municipal candidates is both available and valuable to voters in municipal elections. More generally, our findings suggest that spatial voting may be more pervasive than "democratic realists" (Achen and Bartels 2016) would argue, and may be present even in contexts where we might not expect to find it.

1.1. Spatial voting in non-partisan elections

At the heart of spatial voting theory, writes Stephen Jessee (2012: 33), is the argument that "voters base their choices on their ideological proximity to candidates." This argument not only requires that voters and candidates *have* ideologies – meaningful bundles of policy preferences that can be expressed as "ideal points" in a low-dimensional latent space[1] – but also that voters have sufficient information about candidates to be able to select the most ideologically proximate option. Spatial voting is thus an important foundation for what Achen and Bartels (2016) call "populist" theories of democracy: theories in which democracy might be said to function well because voters not only have meaningful policy preferences but also apply those preferences to the choices they make at the voting booth. If both ingredients are present, spatial voting is possible, but still not necessarily operative – voters could be aware of candidates' ideological positions but still choose candidates for other reasons, such as partisan identity, socio-demographic affinities, or incumbent status (Boudreau et al., 2019; Hajnal and Trounstine 2014).

For decades, each of these steps in the spatial voting argument – both the necessary ingredients and the presence of spatial voting itself – has been subjected to withering criticism. Many follow Converse (2006) and reject the very premise of spatial voting, arguing that most voters' policy preferences are not sufficiently constrained to be characterized as meaningful "ideal points" in the first place. This makes spatial voting unlikely among all but the most sophisticated voters (Kinder and Kalmoe 2017). This criticism is typically connected to strong arguments about the role of partisanship and other group identities in political behaviour, quite independent of the relatively unstructured assortment of policy preferences that an individual might hold (Achen and Bartels 2016; Mason 2018).

While these criticisms have prompted some spatial voting theorists to incorporate factors like partisanship and knowledge into their models of vote choice (Jessee, 2012), the underlying argument – that voters and candidates *have* ideal points and that these ideal points play a crucial role in vote choice – remains very much alive. Recent studies in the United States and elsewhere have suggested that ordinary citizens do in fact possess meaningful policy preferences that can be expressed as ideal points in a low-dimensional space (Caughey et al., 2019; Fowler et al., 2021; Lucas and Armstrong 2021). These ideal points are strongly related to citizens' vote choices and the candidates they prefer (Costa 2021, Fowler et al., 2021; Jessee, 2012). In short, citizens may not be quite as "blind" about the political world as the more trenchant criticisms of spatial voting have suggested (Achen and Bartels 2016; Fowler 2020).

1.2. Municipal spatial voting?

Despite the revival of spatial theories in recent years, there are good reasons to be especially skeptical about the possibility of spatial voting in non-partisan municipal elections. For one thing, many political scientists argue that municipal politics is rarely structured by standard patterns of ideological disagreement. Scholars have pointed to numerous mechanisms that may generate non-ideological elections and policy-making at the municipal level: intermunicipal competition and jurisdictional constraints may discipline municipalities to focus on non-ideological "developmental" issues (Peterson 1981); municipal elections may be more animated by a combination of valence issues (i.e. council's managerial competence) and hyper-local issues (Oliver 2012); and municipal policy issues may simply not lend themselves to a single left-right ideological structure because of the distinctive local interests, identities, and geographic preferences involved (Anzia 2021; Hajnal and Trounstine 2014). If municipal voters do not even *have* municipal "ideal points," then we can hardly expect ideological proximity to figure prominently in their vote choices.

Moreover, even if municipal policy attitudes *are* ideologically structured, the absence of political parties from many municipal elections may still make spatial voting unlikely. In partisan elections, political parties offer ideological "brands" to voters that simplify the decision task by allowing voters to rely, at least in part, on the ideological reputation that a party has built up over time. These cues are absent in non-partisan elections. This is especially true in Canada, where party affiliations for most municipal candidates are unknown to many voters, even if some candidates still choose to send partisan signals to voters in their advertising material or endorsements (Lucas and Michael McGregor, 2021; Lucas 2022; Stephenson et al., 2018). In short, spatial voting requires *information* about a candidate's position in ideological space, and in the absence of political parties, it is not clear that municipal voters have the information they need to vote spatially even if the municipal policy space *is* ideologically structured.

These considerations make non-partisan municipal elections an especially unlikely environment for spatial voting. Even in these elections, however, we have some reason to suspect that it may occur. In Canada, research on municipal voting behaviour has found that voters' ideological self-placements are strongly related to their mayoral vote choices (Lucas and Michael McGregor, 2021), and research on political representation in Canadian municipalities has found evidence of ideological congruence between constituents and their municipal representatives (Lucas and Armstrong 2021; Lucas 2022). In the United States, researchers have found similar evidence of ideological voting in municipal elections, even when party cues are absent or uninformative (Holman and Celeste Lay, 2021; Sances 2018). Most importantly, in the two studies that are closest to the analysis we undertake here – both of which focus on municipal voting in San Francisco – Boudreau et al. (2015, 2019) found strong evidence that municipal voters *do* prefer spatially proximate candidates. Thus, despite the apparent obstacles, spatial voting in non-partisan municipal elections does appear possible.

1.3. Theoretical expectations

In this paper, we offer a systematic test of spatial voting in a non-partisan election at both the mayoral and council levels, investigating if the ingredients for spatial voting are present both in terms of demand (ideologically structured attitudes on specific municipal policies among voters and candidates) and supply (ideological competition among candidates). If both ingredients are present, we can then go on to explore

[1] In other words, it requires that voters and candidates have "operative" or "policy" ideologies. However, it does *not* require that voters and candidates be ideologically "sophisticated" in the sense that they describe their policy preferences in explicitly ideological terms. See Jessee (2012) for further discussion of this point. For ideological sophistication, see Converse (2006) and Kinder and Kalmoe (2017); for a Canadian municipal application, see Matthews et al. (2021).

whether voters' spatial positions influence the choices they make at the municipal ballot box.

Given that we do find evidence for both the demand and supply conditions for spatial voting, we then explore individual-level characteristics that are associated with the likelihood of spatial voting among voters. Past research gives us some clear expectations for this final analysis related to voters' *political commitments,* their *knowledge and attention*, and their focus on *higher-profile candidates* in mayoral and council races.

First, we expect to find that voters who are strong *ideologues* or *partisans* will be more likely to vote spatially. While we believe, with Fowler et al. (2021), that ideological centrism is in fact a meaningful ideological position (cf. Kinder and Kalmoe 2017), we still expect those at the ideological extremes to care more passionately about their ideology than moderates, and to incorporate these ideological positions into their vote choices more consistently (as Fowler et al. found was the case among the American public). Relatedly, given past findings on municipal mayoral elections in Canada (Lucas and Santos, 2021; Stephenson et al., 2018), we expect committed partisans to seek out cues about candidates' party affiliations and ideological commitments more enthusiastically than non-partisans, and thus to be more likely to incorporate their ideological perspectives into their vote choices.

Second, we expect *knowledge* and *attention* to be related to spatial voting. Voting for a spatially proximate candidate does not require that a voter have detailed knowledge of the candidate's full suite of policy commitments – they may pick up ideological cues from high-salience issues or make assumptions about spatial proximity from the recommendations they receive from friends or family. Still, we would assume that voters with more knowledge of municipal politics, and who pay more attention to municipal elections, would be more likely than low-knowledge and low-attention voters to have the information they need to cast a spatially proximate vote. For similar reasons, we expect individuals with higher education levels – who tend to have more ideologically constrained policy preferences – to be more likely to vote spatially (Converse, 2006; Fowler et al., 2021; Jessee, 2012; Kinder and Kalmoe 2017).

Finally, we expect that voters who select an uncompetitive candidate in mayoral or council elections are less likely to be voting spatially than voters who choose one of the most competitive candidates in their local race. Non-partisan municipal elections in Canada have low barriers to entry and often feature large numbers of uncompetitive or "fringe" candidates. These candidates tend to receive support among small groups of voters because of specific local loyalties – ethnic affinities, highly localized issues, or even direct interpersonal connections based on shared residence in a neighbourhood, church membership, or workplace connections. If this is the case, we would expect voters who support a competitive municipal candidate to be more likely to be spatial voters than those who support an uncompetitive candidate.

1.4. Calgary's 2021 municipal election

As we will explain in more detail below, our analysis takes advantage of what is, to our knowledge, the most comprehensive data ever collected on the local policy preferences of municipal candidates and voters in a non-partisan election – specifically, the 2021 municipal election in Calgary, Alberta, Canada. Calgary is Canada's third-largest municipality and the seventh-largest non-partisan city in North America. Its elections are held every four years to elect a mayor (at-large) and a fourteen-member council (in single-member wards). Calgary's municipal elections resemble those in many other non-partisan cities in Canada and the United States, with high levels of incumbent success, low to moderate levels of turnout, and a focus on local rather than provincial or federal issues (Lucas, 2021; Lucas 2021).

For several reasons, Calgary's 2021 municipal election was especially congenial for a study of municipal spatial voting – the most obvious of which is the distinctive data we have available from this election, which we describe in more detail below. Aside from the novel data, the election featured a remarkably large number of open races, allowing us to study municipal vote choice in the absence of incumbency effects, which can be independent from ideological considerations if they are based on an incumbent's service work or personal vote (Lucas et al. 2022). The city's high-profile mayor, Naheed Nenshi, announced early in 2021 that he would not seek re-election, and a total of nine ward races (out of 14) were also without incumbent candidates. Three of the open ward races were caused by an incumbent councillor choosing to run for mayor, and the others reflected decisions by sitting councillors to step down after a long career, to run for office at another level of government, or simply to move on from municipal office for personal reasons. Because high levels of incumbent success in Canadian local elections can mean that high-quality candidates are discouraged from challenging incumbents, these open races offer a distinctive opportunity to explore the presence or absence of spatial voting in elections that feature a strong slate of candidates.

The 2021 municipal election was broadly typical of non-partisan contests in Calgary and other cities. In the mayoral race, the major candidates focused on policy issues such as police funding, local infrastructure, economic development, and downtown revitalization. Issues related to the pandemic such as municipal mask mandates and vaccines were also discussed. These issues were also salient in the ward races, alongside more local issues that included parking, speed limits and traffic safety, housing development and density, and parks and recreation infrastructure. In short, while every election has its own idiosyncrasies, Calgary's 2021 election was much like what we would expect to see in a non-partisan election in many cities in Canada or the United States.

2. Data and methods

To explore spatial voting in a non-partisan municipal election, we need data with two specific features. First, we would like to have data that allows us to estimate ideal points based on specifically *municipal* policy issues; while it is interesting from the perspective of political nationalization to know if provincial and federal partisanship and policy positions are connected to municipal vote choice, the strongest test of municipal spatial voting requires that voters' choices are related to their ideal points on *municipal* policy debates (Anzia 2021). Second, we need to be able to estimate these ideal points not only for voters, but also for candidates. In other words, we would like to be able to estimate voter and candidate ideal points on the same latent scale, and we want this latent scale to capture *municipal* policy attitudes, rather than more general values or wider policy preferences. We know that voters often draw links between local candidates and political parties from other orders of government (Lucas and Smith, 2019; McGregor et al., 2016), but a proper assessment of local spatial voting should be independent of this cross-level contamination. That is, assessments should be based on local considerations.

One way political scientists have generated this sort of data outside the municipal setting is to estimate candidate and voter ideal points based on policy debates that actually took place in a legislature. For example, Stephen Jessee studied spatial voting by comparing candidates' roll call votes or public statements on policy issues to citizens' support or opposition to those same policies drawn from public opinion surveys (Jessee, 2012). Similarly, Bafumi and Herron (2010) estimate shared ideal points from public opinion surveys and legislator roll calls to argue that American legislators tend to be more ideologically extreme than the citizens they represent. This approach not only allows researchers to estimate candidate and voter ideal points on a shared scale, but it also ensures that the policy issues included in the scale are meaningful and relevant to the specific legislature and election under consideration.

Inspired by this past work, we built a measure of policy ideology in Calgary using actual policy debates that took place in city council's most

recent term. We began by reviewing news coverage of the entire 2017–2021 council term, noting any city council votes that attracted especially high levels of public participation, news coverage, or debate. We then used three criteria to select our final list of eight policy items. First, the council vote had to be a straightforward matter of support or opposition. Any close observer of city council votes (or any legislature, for that matter) will be familiar with votes that seem to be a simple "yes or no" vote but, on closer inspection, turn out to be votes to delay the proposal, refer it to a committee, amend a subsection, engage the public, undertake outside consultation, and so on. If our goal is to compare voters and candidates, it would not be appropriate to compare voters' responses to the question, "do you support community water fluoridation in Calgary?" to council votes if council had actually voted on the question, "should the City of Calgary commit funds to study the possible benefits of community water fluoridation?" We needed to select issues that allowed us to ask voters how they might have voted on an issue and then compare their responses to those of their councillors or other municipal candidates.

Our second criterion was diversity: we wanted a list of issues that was diverse enough to capture the wide range of policy domains for which Calgary's municipal government is responsible, from policing to public health to public transit. Asking too many questions about a single policy area would have generated an attractively precise measure of voters' positions in one policy domain (Ansolabehere et al., 2008), but would not have captured more general municipal policy ideologies.

Finally, we selected issues that were sufficiently high-profile that they would be likely to have engaged the attention of at least a substantial fraction of ordinary Calgarians. Even in highly partisan and ideological legislatures, not all individual votes are ideologically structured (Lee, 2009), and many municipal council votes are unanimous or near-unanimous decisions on minor issues, procedural matters, or technical decisions. Little would be gained by including issues in our measure about which even the most informed members of the public would be expected to know nothing. We emphasize, however, that we did not select issues that were especially likely to be "ideological" in character – for instance, we did not focus on "redistributive" rather than "developmental" issues – and we selected a number of issues, such as land-use planning, LRT construction, and residential speed limits, whose relationship to standard left-right disagreement is far from obvious (Anzia 2021; Bucchianeri et al., 2019; Cann 2018). While the issues we selected were at least somewhat contentious, municipal issues can provoke disagreement for reasons unrelated to ideology – such as geography (e.g. suburbs and inner city) or identity (Doering et al., 2021; Hajnal and Trounstine 2014). Thus, while we did not select issues that were obviously ideological, we did focus on issues that a substantial number of Calgarians would have been likely to have heard about, even if they did not follow municipal politics closely.

These three criteria led us to select the issues listed in the first eight rows of Table 1 (under "Council votes" to include in our surveys of candidates and eligible voters. Having selected these issues, we then reviewed council minutes, watched video recordings of council meetings, and discussed the votes with a city hall reporter for a major local newspaper to be sure that the wording of our survey items accurately captured what was at stake in each council vote. When necessary, we added clarity by specifying the content of the vote (e.g., the Green Line LRT decisions) or the date that the vote occurred (e.g., the COVID-19 mask mandate decision), so that survey respondents who *did* follow municipal council closely would not be confused about the specific vote to which we were referring. The eight "council vote" items listed in Table 1 represent the heart of our measure of municipal policy ideology. Like council votes, citizens made a choice between "oppose" (0) and "support" (1) for each question; mean values for each question therefore represent the proportion of Calgarians who support each proposal.

However, it can be advantageous to add more items to a latent measurement model to add nuance and precision to the ideal points, provided that those items reflect individuals' positions on the same latent construct of interest. For instance, if two individuals are identical to one another on the eight "council vote" questions, additional survey items can help to further distinguish their ideal points (Boudreau et al., 2015). For this reason, we include nine additional items in our measure of policy ideal points, all of which are adapted from research on municipal policy preferences in the United States (Einstein and Glick 2018; Bucchianeri et al., 2019) and have been used in several studies of municipal policy ideology in Canada (Lucas and Armstrong 2021; Lucas 2021). These items are measured on a four-point scale from "strongly disagree" to "strongly agree." They add valuable information to our measure – in particular, they help further distinguish among

Table 1
Questions used to calculate policy ideology scores (municipal ideal points).

Question	Mean	SD	Min.	Max.
Council Votes				
Re-introduce fluoride into the water supply	0.68	0.47	0	1
Approve construction of the Green Line from 16th Ave N to Shepard	0.75	0.44	0	1
Endorse the "Guide for Local Area Planning" (previously called Guidebook for Great Communities)	0.59	0.49	0	1
Repeal the City of Calgary's mandatory mask bylaw on July 5, 2021	0.49	0.50	0	1
Devote 275 million in municipal funds to a new NHL arena and event centre in Calgary	0.41	0.49	0	1
Reallocate 20 million in police funding to mental health and addictions programs	0.64	0.48	0	1
Reduce residential speed limits to 40 km/h	0.55	0.50	0	1
On September 22, Calgary City Council passed a bylaw requiring Calgary restaurants, bars, movie theatres, and many other businesses to ask patrons for proof of COVID vaccination or a recent negative test. Do you support or oppose this bylaw?	0.81	0.39	0	1
Municipal Policy				
The city of Calgary should provide subsidized programs to low-income residents, even if doing so comes at the expense of businesses and/or wealthy residents	2.28	1.01	1	4
It is good for a neighbourhood when it experiences rising property values, even if it means some current residents might have to move out	2.84	0.85	1	4
The city of Calgary should play a strong role in reducing the effects of climate change, even if it means sacrificing revenues and/or expending financial resources	2.47	1.10	1	4
The city of Calgary should make its roads accessible to active transportation (walking, cycling) even if it means sacrificing driving lanes and/or parking	2.64	1.08	1	4
The city of Calgary should encourage increased housing density in established neighbourhoods, even if some local residents object	2.60	1.05	1	4
The city of Calgary should require that all municipal contractors pay their employees a living wage, even if it means increased costs for the municipality	2.14	1.00	1	4
The city of Calgary should allow residents to make their own decisions about mask-wearing and other COVID-19 safety measures, even if it means some residents may expose themselves and others to risk	3.27	1.08	1	4
The city of Calgary should prioritize keeping taxes low, even if it means low-income residents have access to fewer social services	2.61	1.02	1	4
The city of Calgary should keep historic street names, statues, and other heritage landmarks, even if some of the historical individuals being commemorated were prejudiced or racist	2.27	1.13	1	4
Self-Placement				
In politics people sometimes talk of left and right. Where would you place yourself on a scale from 0 to 10, where 0 means left and 10 means right?	5.27	2.38	0	10

respondents who were identical on the eight council votes questions – but we emphasize that our findings do not depend on the "general policy" items in Table 1 nor on the ideological self-placement measure. Indeed, we show in the supplementary material (SM2) that our results are substantively identical when we restrict the measurement model to the eight Calgary "council vote" items and nothing more.

In summary, then, despite the added complexity of the latent policy ideology measure, we prefer it to a simpler measure – such as simply comparing ideological self-placement scores among voters and candidates – for two reasons. First, as Jessee (2012) has rightly noted, the standard zero-to-ten ideological self-placement scale is fundamentally *unidentified*, meaning that respondents may have different ideas of what constitutes a "two" or a "seven" on the scale. Building an ideological score out of agreement or disagreement with concrete policy issues helps to avoid this problem. Second, and even more importantly, we are interested in offering a robust test of the role of *municipal* spatial voting in our case city. Ideological self-placement scores (along with other possible scores, like partisanship) may be linked to voters' or candidates' ideological positions in municipal elections, but this must be demonstrated, rather than assumed (Anzia 2021). To do so requires that we begin with a measure that is focused on voters' and candidates' attitudes on specifically municipal policy issues.

2.1. Data sources for citizen and candidate ideal points

To build our estimates, we rely on data from four sources. The first is the Canadian Municipal Election Study's (CMES) three-wave survey of eligible voters in Calgary in 2021.[2] This project consisted of an initial survey in the summer of 2021 (N = 2334), a pre-election survey in the month before Calgary's October 18th election (N = 2159), and a post-election survey in the weeks that immediately followed the vote (N = 1400). Respondents were recruited by Forum Research using Random Digit Dialing (RDD) and then re-contacted to complete surveys in subsequent waves; to ensure a sufficient sample size throughout the study, Forum Research also recruited 1201 fresh "top up" responses via RDD for the second (pre-election) wave of the survey. We provide additional detail on survey field dates and full question wording for the survey items used in this study in the supplementary material (SM1).

Our second data source is a set of interviews that we conducted with mayor and council candidates in Calgary in the months before the municipal election. We invited every registered candidate in Calgary to participate in our interviews and sent multiple follow-up requests to candidates who did not respond to our first invitation. A total of 40 candidates agreed to participate in these 30-min semi-structured interviews. Near the end of each interview, we directed candidates to a short online survey, which included their ideological self-placement and, for non-incumbents, the "Calgary council votes" questions.

Of course, not all candidates were willing to participate in our research interviews. For candidates who did not participate, we sent an invitation in the closing weeks of the election to complete a 5-min online survey – the same survey that our interviewees completed at the end of the interview. These survey-only participants added another 30 candidates to our available data.

Finally, because our "Calgary council votes" questions were specifically related to council votes that had taken place in the most recent term, we were also able to include data for any incumbent councillors who did not participate in our interviews. We recorded these councillors' actual vote choices on the eight council votes in the survey. Moreover, the "general municipal policy" questions were included in a recurring survey of mayors and councillors in 2020 and 2021 (the Canadian Municipal Barometer), which meant that we were also able to incorporate responses on these questions into our analysis for any incumbent councillors who had completed the 2020 or 2021 Canadian Municipal Barometer surveys.

All told, we were able to gather data for 73 municipal candidates in Calgary, representing 57% of the total candidate pool. Importantly, we have data on the winners of each of the fifteen races and 76% of the top-three candidates in all races. Our candidate dataset enables us to estimate ideal points for candidates representing 91% of all votes cast in the mayoral election and 78% of votes cast in the council races. In other words, we can generate municipal policy ideology estimates not only for thousands of ordinary Calgarians, but also for nearly all of the competitive candidates in the municipal election.

2.2. Estimating municipal ideal points for electors and candidates

We use the following Bayesian factor analysis model to estimate voter and candidate ideal points:

$$y_{ik} = \beta_k \xi_i + \varepsilon_{ik}$$

Here, i refers to each individual's response on each of the k items listed in Table 1 and ξ is a latent measure of each individual's municipal policy ideology.[3] Estimating the ideal points in a Bayesian framework has two major advantages over a standard factor analysis. First, the Bayesian procedure permits missing data; this allows us to make maximum use of the information we have available for the model (such as incumbents' responses to the general policy questions) without requiring that all candidates or voters answer all questions. Second, the Bayesian factor analysis allows us to measure policy ideology with uncertainty, and to propagate this measurement uncertainty through subsequent analyses. We do so in the supplementary material (SM3) as a robustness test of our main results; we also provide additional information on the implementation and convergence of the Bayesian latent variable model (SM2).

2.3. Models and analysis

We use a variety of models in our results below; we therefore describe each model in more detail as we proceed through the analysis, with additional information and full tables in the appendices. Our variables are drawn from the surveys described above (with full question wording available in SM1), and all independent variables are rescaled to range between zero and one. Unless otherwise indicated, we use OLS models when our outcome variable is municipal policy ideology, logit models when the outcome variable is binary (e.g., vote for the winning candidate vs. another candidate), and multinomial logit models when the outcome variable is categorical (e.g., mayoral vote choice). All pooled models of council voting include ward fixed effects to isolate within-ward rather than across-ward variation.

3. Results

We begin with a brief demonstration that Calgarians' municipal policy attitudes are indeed ideological. Fig. 1 summarizes the evidence. In Panel A, at the top of the figure, we report "scree plots" for factor analyses using the council votes questions on their own (top left) and all of the questions in the policy ideology model (top right). These plots summarize the amount of variance explained by each dimension, or "factor", in the analysis. When assessing the underlying dimensionality of attitudes on a set of questions, analysts look for distinct "elbows" in the scree plot, which represent points at which explained variance levels off and further dimensions add much less explanatory value than the dimensions that occur before the elbow. Notice, in both panels, that the

[2] See Lucas and Michael McGregor, 2021 for more information about the Canadian Municipal Election Study.

[3] We rescale all variables in the model to have mean = 0 and sd = 1, eliminating the need for item-specific intercepts (or "difficulty parameters") in the latent model.

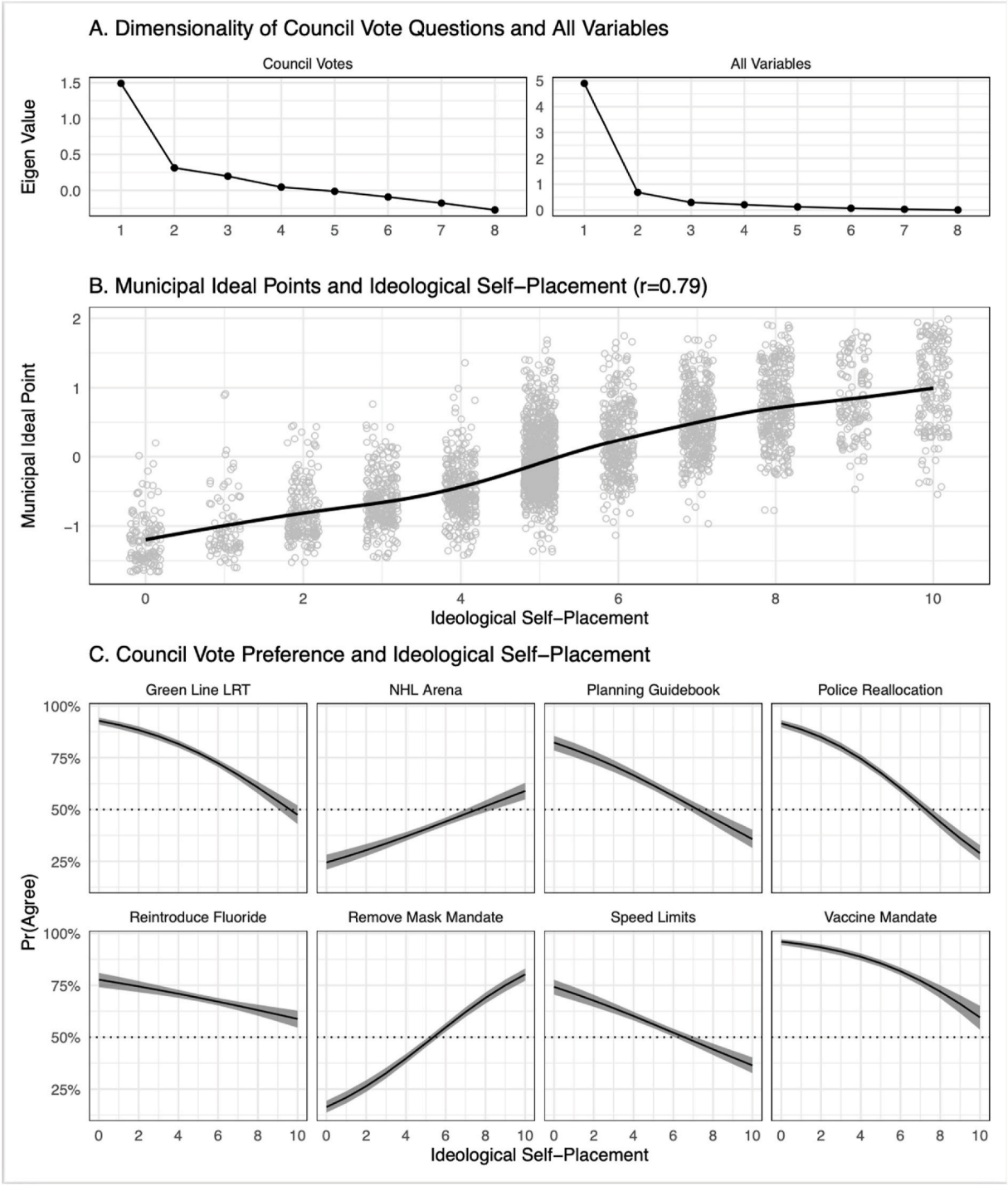

Fig. 1. Evidence for ideological interpretation of municipal policy ideal points.

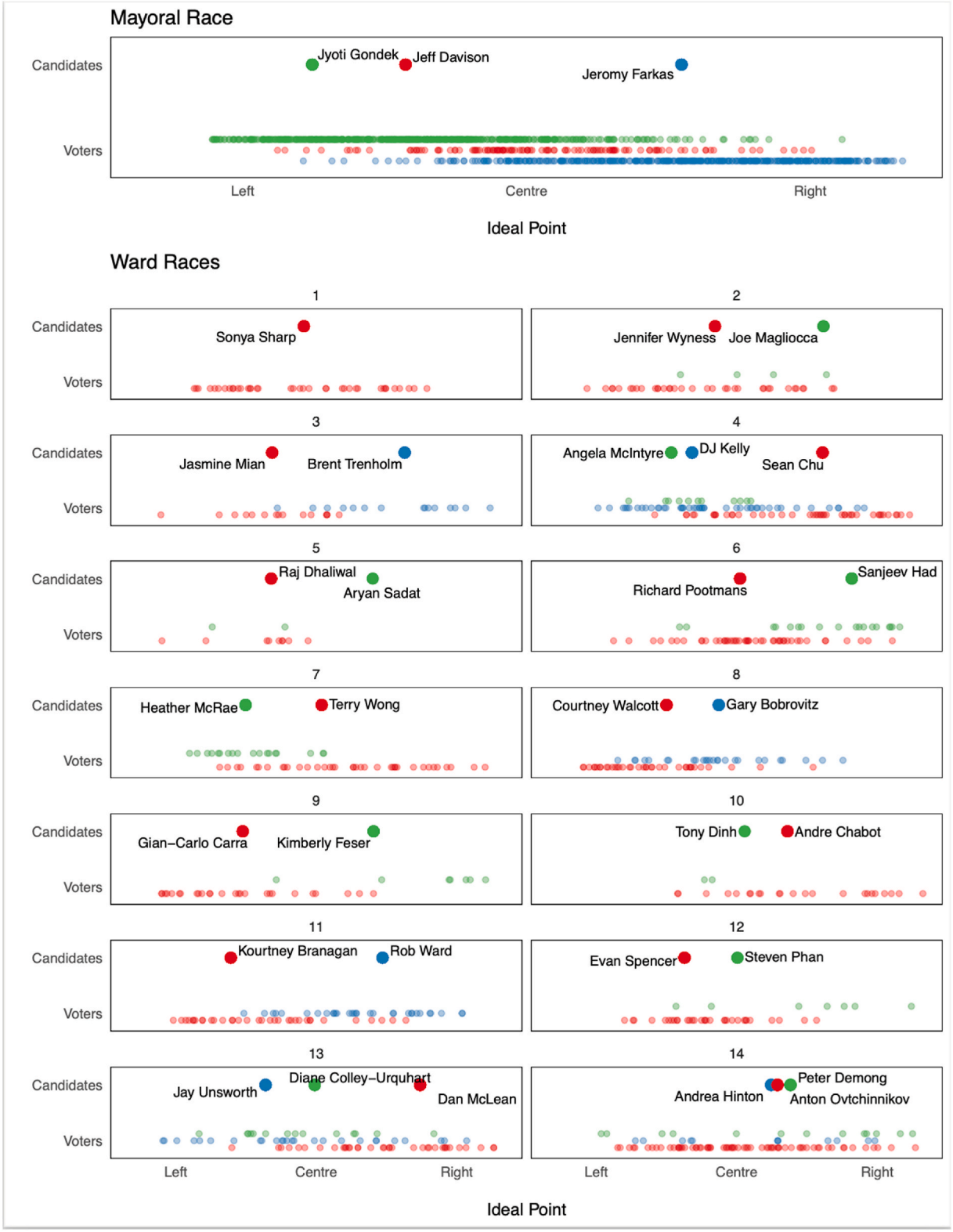

Fig. 2. Ideal points of candidates and voters, by race.

explained variance clearly levels off after the first dimension, with a distinctive "elbow" at the second factor. This indicates that the latent structure in the data can be usefully summarized by a unidimensional measure.[4]

Is this single unidimensional score related to left-right ideology? Panel B assesses this question by plotting voters' and candidates' municipal policy ideal points against their ideological self-placement scores. The relationship is strong and positive (the linear correlation is $r = 0.79$), suggesting that respondents' municipal ideal points are strongly connected to the divide that we ordinarily call "left" versus "right." Furthermore, in Panel C, we report the relationship between ideological self-placement and each of the council vote questions; each panel reports the predicted probability that a respondent will support the policy at each point along the left-right self-placement spectrum (with probabilities drawn from bivariate logit models of ideological self-placement and policy attitudes). All eight issues are strongly and significantly related to ideological self-placement.[5] Taken together, these results suggest that we can safely summarize citizens' issue responses using a unidimensional latent measure, and we can interpret this measure as capturing voters' and candidates' left-right municipal policy ideologies.

3.1. Spatial voting in Calgary

To what extent do these municipal ideal points inform Calgarians' actual vote choices? Fig. 2 provides a first answer to this question, summarizing estimated ideal points for voters and all available top-three candidates in Calgary's mayoral and council races. At the top of each panel, we plot each candidate's ideal point, with first-place candidates in red, second-place candidates in blue, and third-place candidates in green. Below the candidates, we plot survey respondents' ideal points, coloured by the candidate they supported.

Several interesting patterns are visible in Fig. 2. First, our ideal point estimates for mayor and council candidates have good face validity. In the mayoral race, for instance, Jyoti Gondek was regularly described as the "progressive" candidate, Davison as a centrist, and Jeromy Farkas as strongly conservative.[6] The candidates' relative positions in the figure reflect these expectations. Much the same is true of the council candidates. Candidates who we would expect to be on the right, based on personal conversations with local participants, research interviews with candidates, and close observation of the election, are indeed on the right: Brent Trenholm in ward three, Sean Chu in ward four, and Dan McLean in ward thirteen are good examples. The same is true of candidates who we know to be on the left, such as Courtney Walcott in ward eight, Gian-Carlo Carra in ward nine, and Kourtney Branagan in ward eleven.

The noticeable distance between major candidates in many of the races also suggests that voters had genuine opportunities for spatial voting in their mayoral and council races. Voters appear to have responded to this opportunity. Notice, for example, that Gondek's supporters cluster beneath her ideal point on the left-hand side of the top panel in the figure, while Farkas's supporters are equally well clustered beneath his ideal point. The same is true in many of the ward races: in ward three, for instance, voters on the left tended to prefer Jasmine Mian, who was also on the centre-left, while voters on the right preferred the more conservative Brent Trenholm. Similar patterns are clearly visible in many of the other ward races as well.

To understand the importance of this spatial alignment for Calgarians' vote choices, Fig. 3 adds two additional pieces of information. In the top panel, we summarize the probability that a voter will support the winning mayoral (top left) or council (top right) candidate as a function of the distance between their own municipal ideal point and that of the winning candidate.[7] In both panels, the probability of supporting the winning candidate declines dramatically as voters' ideal points move away from the winning candidate.

The bottom half of Fig. 3 (panel B) adds additional nuance to this analysis. To construct the results, we fit two multinomial logit models of vote choice for each race; to make the races as comparable as possible, we focus on the top three candidates in these models. In the first model, we predicted respondents' mayoral and council choices using only their gender, age, and education.[8] In the second model, we added respondents' ideal points to the model. We then compared how well each model predicted respondents' actual mayor and council vote choices, noting the improvement in predictive accuracy provided by adding the ideal points to the model. In the figure, we summarize the expected proportional reduction in error (ePRE) that is gained by adding ideal points to the basic gender + age + education model (Andersen and Armstrong 2021). These results suggest that spatial voting was at least somewhat important in every election, but that its importance varied substantially across wards. In the mayoral race, respondents' ideal points produce a remarkable 33% reduction in predictive error. The percentages are also high in wards with clear ideological divides among the major candidates. In wards where ideological disagreement played a less important role – such as ward one, a blowout victory for the centrist Sonya Sharp, or ward two, which focused primarily on the incumbent's behaviour in office – voters' ideal points are less valuable for predicting their vote choices. At the low end of the scale is ward 14, a decisive victory for Peter Demong, a conservative-minded councillor who is widely admired across the political spectrum – a useful validity test for the analysis, given the strongly non-ideological flavour of that particular election.[9]

We draw two main conclusions from our results thus far. First, we have found that Calgarians' policy preferences on high-profile municipal policy issues can be meaningfully summarized on a unidimensional left-right scale, and that their positions on this scale are strongly related to the choices they make in municipal elections. In short, spatial voting is an important component of both mayor and council elections in Calgary. We also found, however, that the role of spatial voting varied across races, figured most prominently in the mayoral election, and in some races was almost entirely absent.

3.2. Who votes spatially?

As we explained above, we expect some local voters to be more likely than others to vote spatially. Fig. 4 summarizes our models of the correlates of spatial voting for all races (left panel), the mayoral race (centre

[4] Some also suggest that factors with Eigenvalues above one (1) should be treated as "real", and those below one can safely be ignored (e.g. Stimson 2004). While there is some dispute about this heuristic, we note that in both scree plots, only the first dimension is above one.

[5] $p < 0.01$ for all eight issues.

[6] See e.g. Potkins 2021.

[7] These figures are drawn from bivariate logistic regression models, with support for the winning candidate as the DV and absolute distance as the IV. Full tables are available in the supplementary material (SM4). We focus on winning candidate support in this analysis, but extend the analysis to more candidates in the next section.

[8] This is not meant to be a fully specified model of voting, but rather a "baseline" model to which to compare the model containing ideal points. This baseline model is preferable to a null model, in which the expected vote in each ward would simply be the winner of the ward. The goal of this analysis is to compare the *relative* importance of ideal points for voting across wards, rather than to provide a fully specified vote choice model.

[9] For instance, Demong was endorsed by his former colleague Brian Pincott, a well-known left-leaning representative.

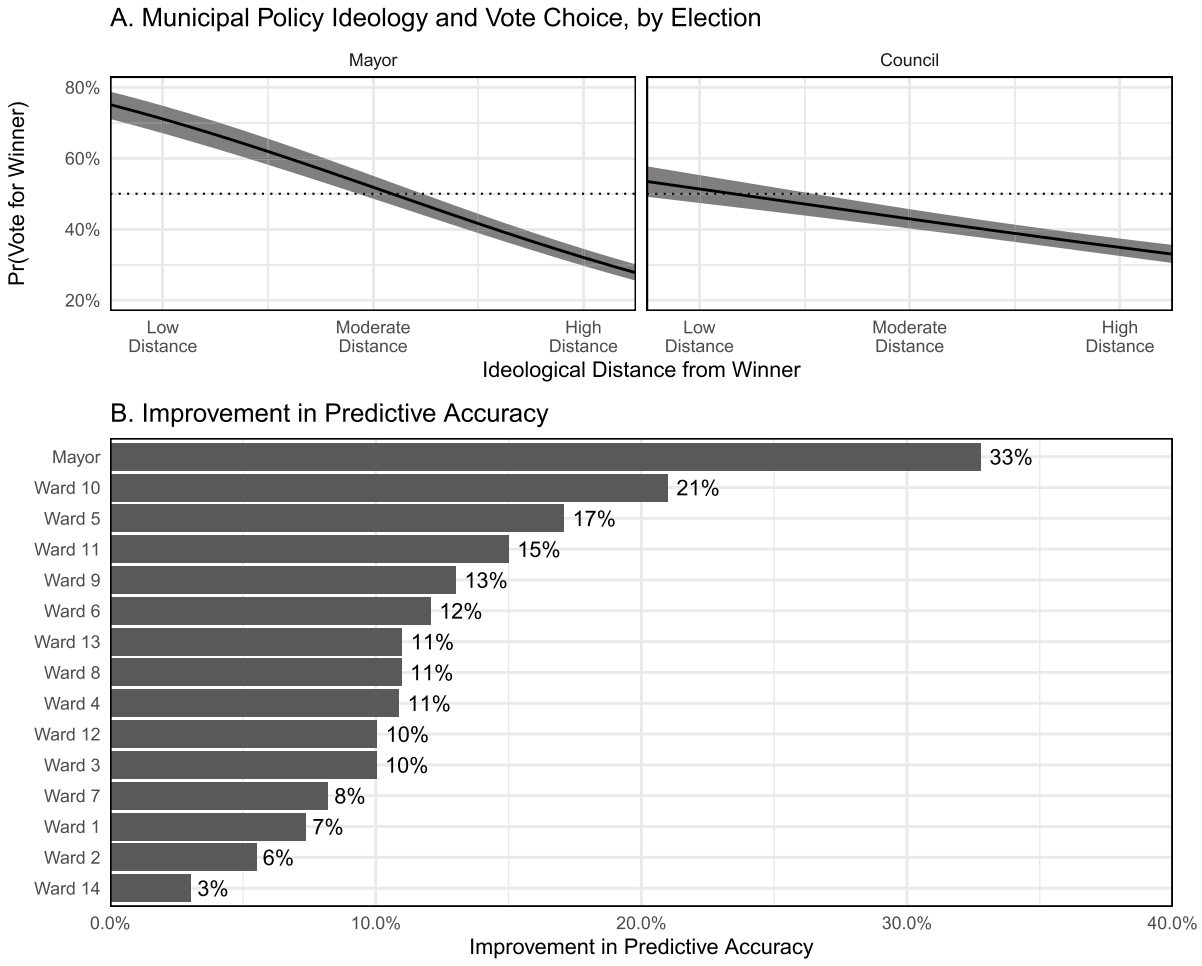

Fig. 3. Ideological proximity and vote choice.

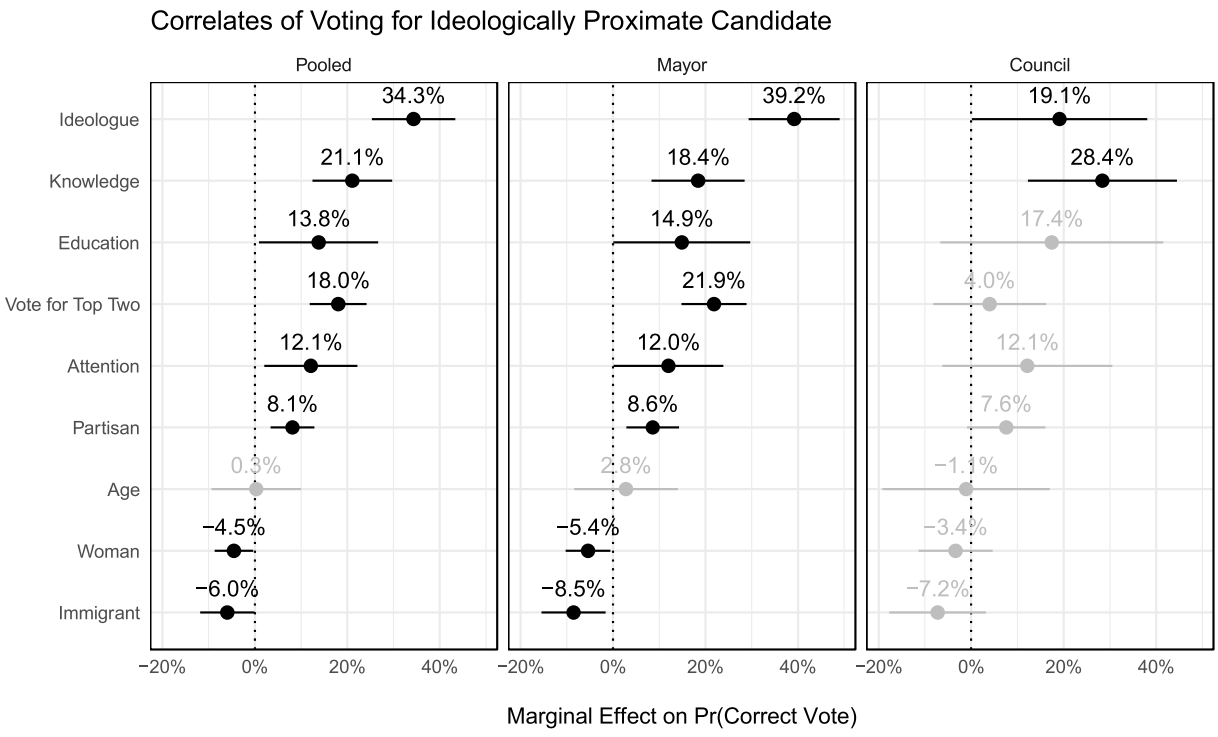

Fig. 4. Correlates of voting for the spatially proximate candidate.

panel), and the council races (right panel). In each case, the figure reports the expected marginal effect for each variable on the probability of voting for the candidate who is spatially closest to oneself.[10] Recall that "ideologue" is coded with high values if respondents choose more extreme positions at either end of the ideological spectrum, and lower values if they choose positions closer to the centre of the ideological spectrum. The "knowledge" variable is generated from a series of factual questions about municipal politics in Calgary, with higher values representing a larger number of correct responses. Readers should also recall that both the pooled model and the council model include ward fixed effects to isolate within-race variation in spatial voting.

We find that several of our variables are strongly associated with spatial voting. Ideologues – those who place themselves near the end of the ideological spectrum, rather than the centre – are dramatically more likely to vote spatially than centrists; ideological extremists are some 35 percentage points more likely to vote for the most spatially proximate candidate than are otherwise similar ideological centrists. This is consistent with what we would expect; not only will those at the ideological extremes find it easier to identify the ideologically proximate candidate, recent research on the voting behaviour of ideological moderates has shown that their choices are more influenced by non-ideological factors (Fowler et al., 2021). We would expect much the same to be true of partisans, as compared with non-partisans. This is indeed what we find, for both variables, in Calgary.[11]

The predictive power of the next variable in the figure – knowledge of municipal politics – is equally unsurprising. Those with high knowledge of municipal politics, measured with a set of five factual questions specifically related to municipal government and politics in Calgary, are more than twenty percentage points more likely to vote for the spatially proximate candidate than those with low knowledge. Strictly speaking, spatial voting may not be impossible in the absence of specific knowledge of council candidates – for instance, one might learn which candidate to support from a more informed friend or family member – but it is hardly surprising that those who know more about municipal politics find it easier to identify more ideologically proximate candidates. Much the same is true of the fifth variable in the model – attention to municipal politics – which is also positively associated with spatially proximate voting.

Several other findings are also worth emphasizing in Fig. 4. Notice that voters who chose from among the top two mayoral candidates – Jyoti Gondek and Jeromy Farkas – were more likely to vote for the spatially proximate candidate than were those who voted for another candidate. This finding reflects the ideological polarization between Gondek and Farkas, and also suggests that those who selected a less competitive candidate probably did not do so for ideological reasons.

Finally, there are several interesting socio-demographic patterns in Fig. 4. More educated Calgarians were more likely to make a spatially proximate vote, perhaps reflecting more ideologically structured municipal policy attitudes among those with higher levels of education (see e.g., Converse, 2006; Fowler et al., 2021). In contrast, women were modestly less likely than men to vote for the spatially proximate candidate. This relationship is only statistically significant in the mayoral model, and appears to reflect the fact that Jeromy Farkas was not the most spatially proximate candidate for many women who supported Farkas; more general ideological and partisan identities may have been more salient than specific municipal policy commitments in shaping these women's voting choices.[12] Finally, we find that immigrants were slightly less likely to cast a spatially proximate vote. This may reflect informational challenges among those members of the

[10] Marginal effects are drawn from logit models, with full tables available in the supplementary material. Pooled and mayoral models include ward fixed effects. Larger standard errors in council-level models may reflect meaningful ward-level heterogeneity, but they also reflect the more mechanical effects of much smaller sample sizes (due to missing candidates in some races).

[11] In the case of partisanship, the magnitude of the relationship is smaller in the council-only model (it is significant at $p < 0.1$).

[12] Among men who voted for Farkas, 53% selected the most spatially proximate candidate, whereas the number is 31% among women who voted for Farkas. This 22% gender gap is substantially larger than the gap for Gondek (2%) or Davison (2%).

immigrant community for whom English is not a first language, as well as the presence of ethnic affinity voting – a factor that some candidates told us was an important ingredient for success in their races (see also Boudreau et al., 2019).

To summarize: as expected, some Calgarians were substantially more likely than others to cast a vote for the most proximate candidate on the municipal policy ideology spectrum. Voters who select the spatially closest candidate were especially common among those with strong ideological positions, those with high levels of knowledge of and attention paid to municipal politics, and, in the mayoral race, those who chose either Gondek or Farkas.

4. Discussion and conclusion

Studies of the presence or absence of spatial voting have been central to debates about the character and health of contemporary democracy (Achen and Bartels 2016; Jessee, 2012; Fowler et al., 2021). Using a case study of Calgary's mayoral and council elections in 2021, we have demonstrated not only that the ingredients for spatial voting can be present in non-partisan municipal contests in Canada – that is, both voters and candidates have ideologically structured preferences on municipal policy – but also that voters incorporate their spatial positions into the choices that they make for mayor and council. While spatial proximity is by no means the only consideration for municipal voters, it is an important element of their voting decisions, even in a non-partisan context.

This finding reinforces past research on ideological and spatial voting in municipal elections in Canada (Lucas and Michael McGregor, 2021; McGregor et al., 2016) and the United States (Boudreau et al., 2015, 2019; Holman and Celeste Lay, 2021; Sances 2018). Even so, we find the durability and persistence of ideological competition remarkable. Non-partisan municipal elections feature debates about distinctive policy issues, not all of which can be easily absorbed into standard left-right ideological positions (Anzia 2021), and the absence of political parties means that available information is relatively low even as the number of candidates who are competing for voters' attention is unusually high – especially in open, non-incumbent races. Despite these obstacles, many municipal voters can identify the candidates whose policy views resemble their own and to support those candidates with their vote.

These findings suggest many important questions for future research. Most obviously, we need to know much more about *how* spatial voting is possible in non-partisan municipal elections – that is, how voters acquire the information they need to make these choices. A number of possible mechanisms are worth investigating, including perceived mayoral alignment as a cue for council-level spatial voting[13] (that is, if voters know more about mayoral candidates' positions, and they also perceive alignments between mayoral candidates and council candidates, this may assist them in making their choices for councillor); ideological cues that voters receive from candidates and from the individuals and groups who endorse them; cues that voters receive from candidates' comments about partisan figures at other levels of government; and so on. Ward-level factors, such as information levels, incumbent vs. open races, and ward-level diversity, are also likely to be important factors in generating opportunities for spatial voting. Understanding these information sources will not only clarify the mechanisms of spatial voting when traditional cues like party labels are absent, but will also illuminate the types of information that are most effective for informing voters about candidates' positions.

[13] In our interviews, council candidates told us that voters often asked them which mayoral candidate they supported. This question, while annoying to some council candidates, was not entirely unfounded; we personally witnessed several instances of mayoral and council candidates sharing volunteers for literature drops and other campaign activities.

Perhaps most importantly, future research should also extend our analysis to other municipalities – especially smaller and medium-sized municipalities. Calgary is a big city, as are most of the other cities in which ideological voting has been closely investigated (Boudreau et al., 2015; Holman and Celeste Lay, 2021). Research from the Canadian Municipal Election Study suggests that ideological preferences play an important role in city elections across Canada, at least at the mayoral level (Lucas and Michael McGregor, 2021), but it is not yet clear if these relationships extend into smaller municipalities. Perhaps, given the more standard "bread and butter" local issues in which smaller municipalities are engaged, policy attitudes are less well-structured in smaller places (Lucas and Smith 2019). The underlying ideological diversity of the public may also shape the presence or absence of ideological competition. On the other hand, Michael Sances (2018) has found strong evidence of ideological voting in smaller municipalities in the United States, and recent research in Canada and the United States suggests that municipal ideological responsiveness does not appear to vary by population size (Lucas 2022; Lucas and Armstrong, 2021; Tausanovitch and Christopher, 2014). The generalizability of our findings to small and medium-size cities is therefore an important – and open – question for future research.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Replication files are available at https://doi.org/10.5683/SP3/ALSIBJ.

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Appendix A. Supplementary data

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