Improving Issue Representation with Candidate-Level Voting Advice Applications

Online Appendix

Micha Germann Fernando Mendez Jonathan Wheatley

Constantinos Djouvas Roula Nezi Matthew Wall

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Contents

1 Issue Statements

Table A1: *MyVoteChoice* issue statements

#	Issue statement
1	There should be no private sector involvement in the NHS in Wales
2	The Welsh Government should scrap minimum unit price regulations for the sale of alcohol
3	Accident and emergency care should be centralised in larger hospitals even if some smaller hospitals lose these services
4	The restrictions on personal freedom imposed to combat COVID-19 were an over-reaction to the threat posed by the virus
5	The Welsh government should seek close alignment with the UK government in its response to COVID-19
6	Individuals who refuse the COVID-19 vaccine should be subject to restrictions on their movements
7	The Welsh government should use its power to set income tax rates at a different level from England during the next term of Parliament
8	The state should actively redistribute from the richest people to the poorest
9	Welsh businesses should have lower tax rates
10	It should be easier for trans people to have their gender identity legally recognised in Wales
11	Free school meals in Wales should be extended to all pupils whose families receive Universal Credit
12	Recreational use of cannabis by individuals should be decriminalised
13	Wales should become an independent country
14	Senedd Cymru (the Welsh Parliament) should be abolished
15	More powers should be devolved from the UK government to Senedd Cymru (the Welsh Parliament)
16	Brexit is good for Wales
17	Wales should develop alternatives to the comprehensive school model, such as academies, free schools, and grammar schools
18	Welsh residents should receive a subsidy to undertake their higher education in Wales
19	Moving away from exam-based assessment for primary and secondary students will lower the standard of education in Wales
20	The Welsh Government should bring back the Right to Buy for housing association tenants in Wales
21	Upper limits should be placed by the Welsh Government on rents charged by private landlords
22	Wales should continue to hold its rail operations in public ownership
23	Cardiff airport should be returned to commercial (private) ownership
24	Welsh transport strategy should prioritise public transport over private vehicles
25	The effects of human-made global warming have been exaggerated
26	The Welsh government should allow the extraction of gas and petroleum by hydraulic fracturing (fracking)
27	The Welsh government's promotion of the Welsh language has gone too far
28	Immigration undermines the cultural values of Wales

2 VAA Design incl. Screenshots

MyVoteChoice users were greeted with a welcome message (see Figure A1a). On this and all subsequent pages, users could access information on data protection, data privacy, and the creators of the tool. On the subsequent screen, users had to select their constituency. Next, users were asked to answer a few questions about themselves, such as their age or their sex (see Figure A1c), and then to answer the 28 policy statements (see Figure A1d). It was made clear that the policy statements will be used for the matching with political candidates and parties and that the more they answer, the more precise their result is going to be.

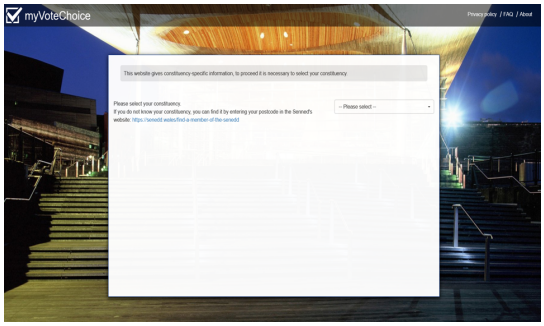
After the 28 policy statements, users could watch a short video explaining how to interpret and navigate the results (see Figure A1e). As part of this, users were informed that the first screen does not contain all results and that they should continue to see more results. The next screen featured the first set of VAA advice, which took the form of a bar chart. The type of advice users received at this stage – whether referring to constituency candidates or to parties – was randomized. The user in the example run was exposed to party-level advice (see Figure A1f). Note that the congruence scores were set to be approximately the same for all parties and candidates in the example run. As noted in the paper, the party-level advice showed party logos while the candidate-level advice showed candidate photos. Users could learn about the names of parties or candidates by hovering over the logos/photos with the mouse.

Note that not all candidates had photos. If we were not sent a photo by a candidate and could not find one independently, the candidate VAA page featured an avatar with a gray head and shoulders instead of a photo (see the two examples in Figure A1f). Since candidates who participated in the survey often sent us photos, photos were more likely to be available for participating candidates (91%) compared to non-participating candidates (54%). Overall, photos were available for 66% of candidates. Photos were most likely to be missing for candidates from small parties as well as independent candidates, for whom it often proved hard to find a photo if they did not send us one. In the paper, we study candidates from the four major parties, and we had photos available for most of them (90% across all 160 candidates; 98% among the 59 who participated in the candidate survey; and 85% among the 101 who did not). The availability of a photo may have contributed to users' candidate evaluations, but any such effect is accounted for by the candidate fixed effects.

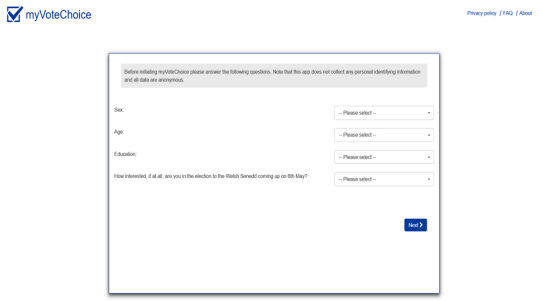
After exposure to the first set of VAA advice, users were asked about their candidate preferences (see Figure A1g). Finally, users could proceed to additional results. Additional results included, first, the respective bar chart users had not seen yet. In the present case, the user was first exposed to party-level advice, so they were directed to the candidate-level VAA advice (see Figure A1h). Furthermore, users could inspect a political map showing both their own and the different parties' or candidates' positions in a two-dimensional political space, the answers of candidates and parties to each policy statement, and short personal statements by the candidates (see Figure A1i – A1l).

Figure A1: Example Screenshots

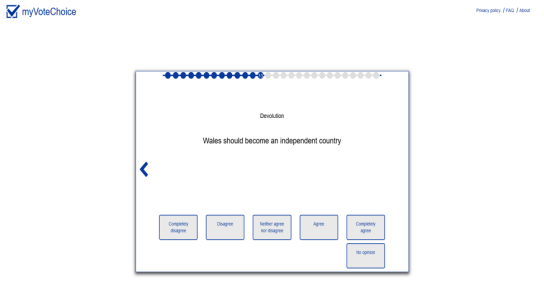
(a) Landing page



(b) Constituency selection



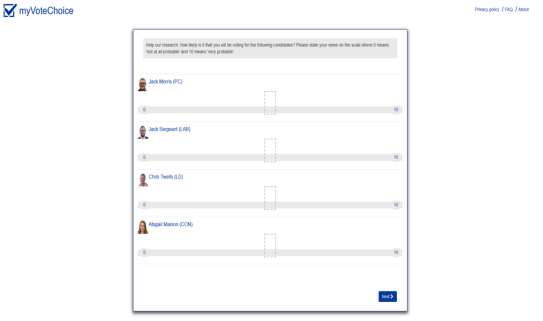
(c) General questions



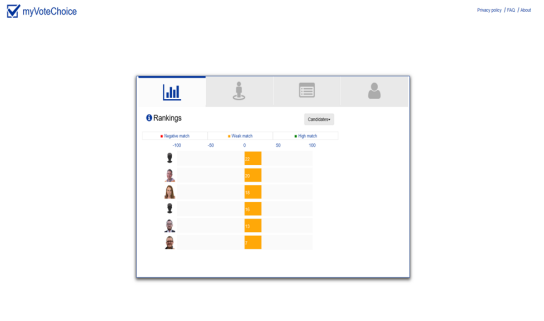
(d) Policy statement

(e) Explainer video

(f) VAA advice



(g) Candidate PTVs

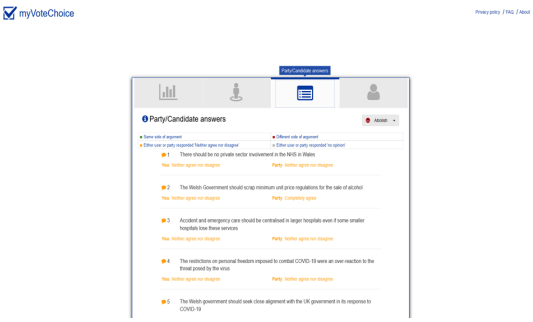


(h) Additional results: second bar chart

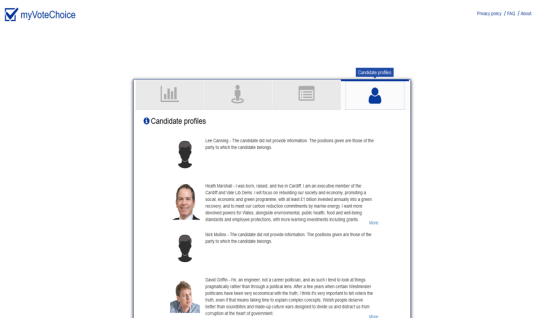
Figure A1: Example Screenshots (cont.)

(i) Additional results: candidate map

(j) Additional results: party map



(k) Additional results: policy statements



(l) Additional results: candidate statements

3 Data Cleaning

We exclude two types of user records from all our analyses. First, we drop all records that appear to be repeat attempts by the same individuals. To identify repeat attempts, a cookie was installed in the user's browser. Second, we drop all users who were not shown a voting recommendation. Users were only shown a voting recommendation if they provided valid answers to at least 13 of the 28 issue statements. Overall, the data cleaning leads us to remove 381 user records, or 3.6% of the observations exposed to one of our two experimental conditions. Table A2 provides further information.

Table A2: Data cleaning

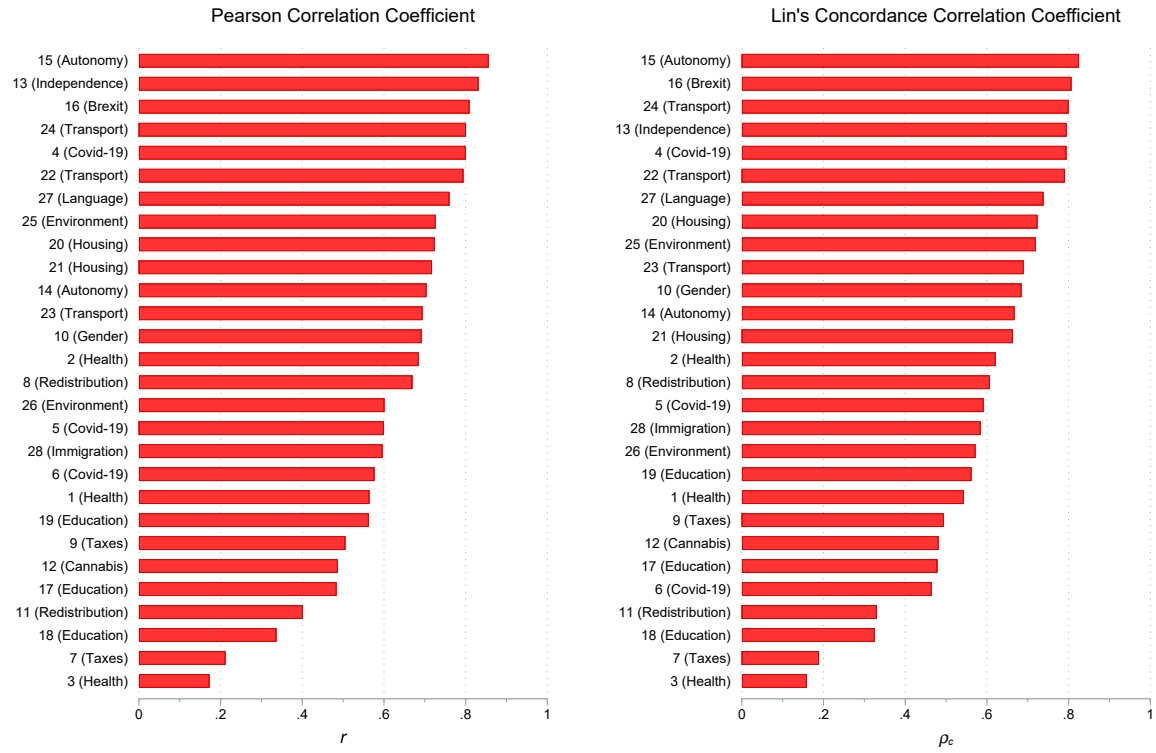
	User records	%
Total	10627	100
Repeated attempts	358	3.4
No voting recommendation	27	0.3
Total invalid	381	3.6
Total valid	10246	96.4

4 Comparing Candidate and Party Positions

This section investigates the level of agreement between constituency candidates and their parties on the 28 policy issues included in *MyVoteChoice*. This comparison is possible only for candidates who participated in our candidate survey (85 in total). Since no corresponding party-level data is available for independent candidates, we exclude the 6 independent candidates who completed the candidate surveys. For the same reason, we drop 5 candidates from two small parties that were not included in the party survey (Freedom Alliance and Propel). Overall, our sample for this analysis therefore contains 74 candidate-party combinations, including: 9 candidates from Labour, 6 candidates from the Conservatives, 21 from Plaid Cymru, 23 from the Liberal Democrats, 6 from the Green Party, and 9 from smaller parties (Abolish the Welsh Assembly, Gwlad, and Reform UK).

The left panel in Figure A2 shows Pearson's correlations between the positions of the 74 candidates and their parties for each of the 28 policy issues included in *MyVoteChoice* (see Table A1 for the exact wordings of the policy statements). We find very high correlations for several of the issues, such as Brexit, Welsh independence, and whether Wales should receive further autonomy. At the same time, though, we find significant disagreements between candidates and their parties on some other issues, such as the centralization of accident and emergency care in larger hospitals, subsidies for higher education, or whether Wales should exercise its power to set income tax rates. In numeric terms, correlations between the positions of candidates and their parties range from a minimum of 0.17 (centralization of accident and emergency care) to a maximum of 0.86 (Welsh autonomy). The average correlation between candidate and party positions is 0.62.

Figure A2: Level of agreement between candidates and their parties on 28 policy issues



A weakness of the Pearson correlation coefficient is that Pearson's r only considers the level of dispersion between two measures but not the level of accuracy. Therefore, we additionally measure candidate-party agreement using Lin's concordance correlation coefficient (Lin 1989). Lin's concordance correlation coefficient (ρ_c) departs from the observation that if two perfectly congruent measures are plotted in a square scatterplot, they fall on the 45 degrees line through the origin (i.e., the line of perfect concordance). ρ_c measures accuracy by evaluating the extent of deviation from the line of perfect concordance and combines this with a measure of dispersion (Pearson's r). Lin suggests that values of 0.90 or higher represent good concordance. As the right panel in Figure A2 shows, the level of concordance is often significantly below that. In most cases, the ρ_c and Pearson's r values are notably quite similar, suggesting that differences between candidates and their parties are often not systematic. In other words, candidates as a whole are about equally likely to deviate to the left or right on policy issues (or to the liberal or the conservative end of the political spectrum). Overall, concordance correlations range from a minimum of 0.16 (centralization of accident and emergency care) to a maximum of 0.83 (Welsh autonomy). The average concordance correlation between candidate and party positions is 0.60.

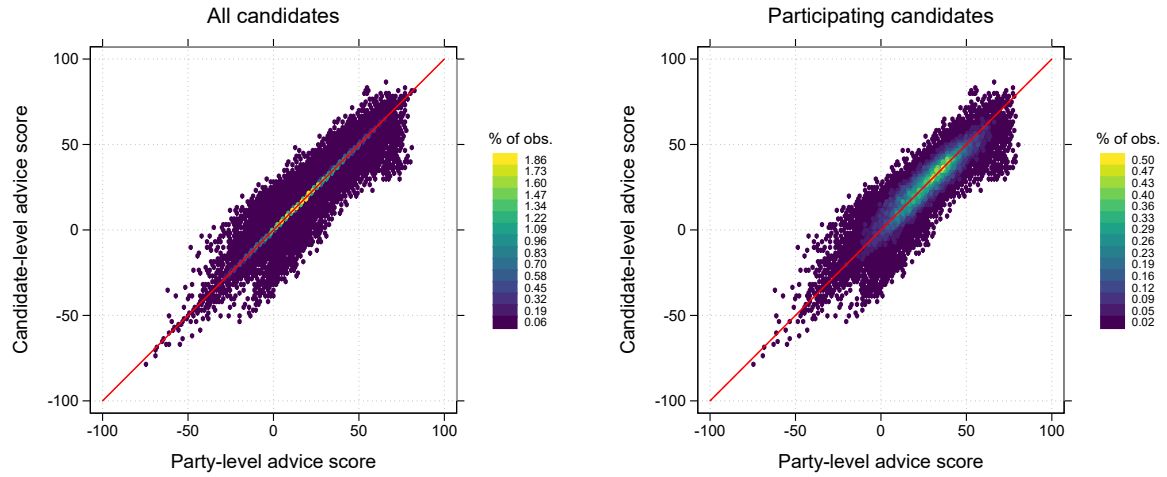
5 Comparing Candidate- and Party-level VAA Advice

Given the relatively high correlations between the policy positions of parties and candidates, the candidate- and party-level VAA advice are also significantly correlated. This becomes evident both when looking at the ranking of candidates or parties from best- to worst-matching in policy terms and the underlying continuous -100 to +100 advice scores. Still, we observe some meaningful differences.

Taking the continuous advice scores first, we find that the party and candidate advice scores are correlated at $r = 0.97$ when all candidates are considered, and at an only slightly lower $r = 0.91$ when focusing on candidates who participated in the candidate survey (and for whom the policy positions are therefore potentially different from those of their party's). Lin's concordance correlation coefficient suggests similar conclusions ($\rho_c = 0.97$; $\rho_c = 0.91$).

Despite these high correlations, we observe meaningful differences between the party- and candidate-level congruence scores for some of the users. For around 15% of all available user-candidate combinations, the congruence scores differ by 5 points or more; and for a little less than 10% of available combinations by 10 points or more. These figures increase when focusing on candidates who participated in the candidate survey, and for whom the advice scores were therefore by definition the same. Among participating candidates, we observe differences of 5 points or more in 50% of the cases, of 10 points or more in 20% of cases; and 20 points or more in around 5% of cases (always out of the -100 to +100 scale). The heat maps in Figure A3 provide a complete overview.

Figure A3: Heat maps comparing party- and candidate-level VAA advice scores



Note: The red line represents the line of perfect concordance.

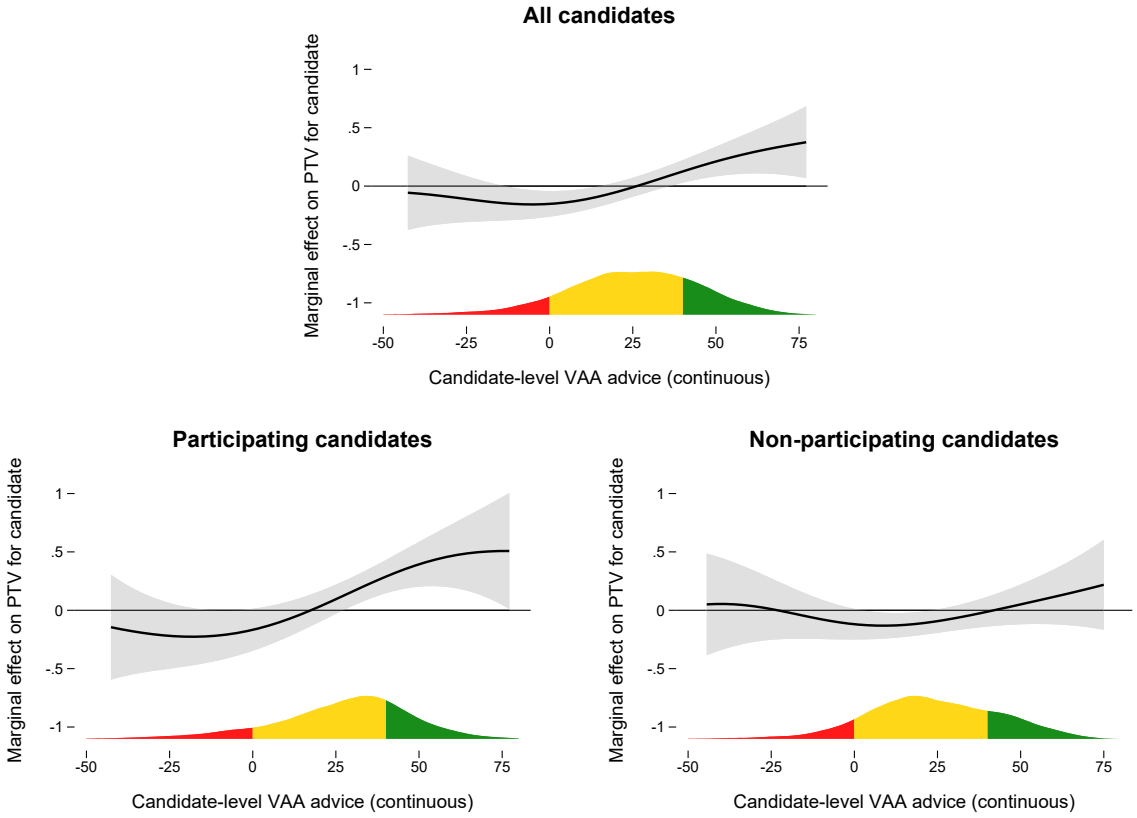
Turning to the ranking of candidates or parties from best- to worst-matching, we find similar results. To render the party and candidate rankings more directly comparable, we drop parties from districts where they did not run a candidate. We find that the candidate and party rankings are highly correlated ($r = 0.90$; $\rho_c = 0.89$). The correlations are a bit lower, but remain high, for candidates who did participate in the candidate survey, and for whom the policy positions were therefore potentially different ($r = 0.73$; $\rho_c = 0.72$).

Still, these differences are sufficient to translate into substantially different voting recommendations for some of the users. Arguably the most eye-catching element of a VAA is which candidate or party is suggested as the best policy match. We find that for 30% of users, the party and candidate VAA suggested a different closest policy match, i.e., 30% of users would have seen a candidate from a different party ranked first in the candidate-level VAA compared to the more traditional party-level VAA. This share increases to 32% of users in districts where at least one candidate participated in the candidate survey, to 37% in districts where two or more candidates participated, and to 43% in districts where three or more candidates participated.

6 Robustness Checks

6.1 Continuous Issue Congruence

Figure A4: Non-linear interactions



Note: This figure shows the results when we interact our treatment indicator with the continuous -100 to +100 issue congruence score for individual candidates instead of the candidate ranking. The dependent variable in all models is the propensity to vote for a candidate. All models are estimated using local linear regression (Hainmueller, Mummolo, and Xu 2019) and include the same covariates as in the paper. The gray area shows 95% confidence intervals while the density plot shows the number of observations. The VAA featured a traffic light system to signal the degree of congruence, with scores below 0 shown in red, scores between 0 and 40 in amber, and scores above 40 in green.

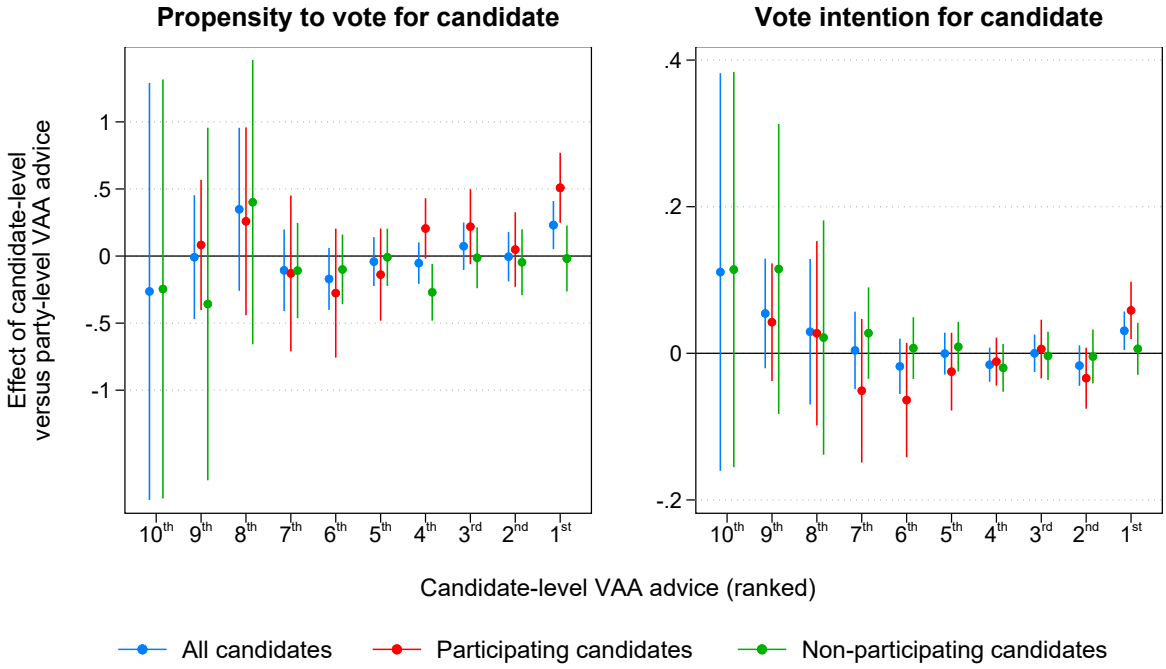
6.2 No Rank Cap

Table A3: No rank cap

	(1) PTV	(2) PTV	(3) PTV	(4) Vote intention	(5) Vote intention	(6) Vote intention
Treated	-0.264	0.082	-0.245	0.111	0.042	0.114
	(0.793)	(0.248)	(0.797)	(0.138)	(0.041)	(0.138)
Candidate rank = 1	4.030***	4.283***	4.124***	0.370***	0.446***	0.385***
	(0.657)	(0.362)	(0.663)	(0.097)	(0.051)	(0.096)
Candidate rank = 2	2.991***	3.211***	3.078***	0.239*	0.326***	0.240*
	(0.659)	(0.361)	(0.665)	(0.097)	(0.051)	(0.096)
Candidate rank = 3	2.290***	2.450***	2.384***	0.155	0.228***	0.163+
	(0.658)	(0.361)	(0.663)	(0.097)	(0.050)	(0.096)
Candidate rank = 4	1.545*	1.818***	1.600*	0.091	0.182***	0.091
	(0.659)	(0.357)	(0.665)	(0.097)	(0.051)	(0.096)
Candidate rank = 5	0.741	1.441***	0.543	0.017	0.167**	-0.016
	(0.660)	(0.367)	(0.668)	(0.097)	(0.053)	(0.096)
Candidate rank = 6	0.421	1.141**	0.204	0.011	0.191***	-0.039
	(0.662)	(0.390)	(0.668)	(0.097)	(0.055)	(0.097)
Candidate rank = 7	-0.066	0.317	-0.108	-0.010	0.120*	-0.034
	(0.663)	(0.393)	(0.673)	(0.098)	(0.060)	(0.097)
Candidate rank = 8	-0.111	0.050	0.101	-0.002	0.050	0.044
	(0.677)	(0.336)	(0.722)	(0.101)	(0.059)	(0.106)
Candidate rank = 9	-0.245		-0.140	-0.083		-0.128
	(0.687)		(0.809)	(0.102)		(0.116)
Treated * candidate rank = 1	0.495	0.426	0.227	-0.080	0.016	-0.108
	(0.798)	(0.284)	(0.806)	(0.139)	(0.045)	(0.139)
Treated * candidate rank = 2	0.259	-0.034	0.199	-0.128	-0.076+	-0.119
	(0.798)	(0.284)	(0.806)	(0.139)	(0.046)	(0.139)
Treated * candidate rank = 3	0.337	0.137	0.233	-0.111	-0.037	-0.118
	(0.798)	(0.283)	(0.804)	(0.139)	(0.045)	(0.139)
Treated * candidate rank = 4	0.211	0.123	-0.025	-0.126	-0.054	-0.134
	(0.797)	(0.270)	(0.804)	(0.139)	(0.043)	(0.138)
Treated * candidate rank = 5	0.223	-0.221	0.236	-0.111	-0.067	-0.105
	(0.799)	(0.295)	(0.806)	(0.139)	(0.048)	(0.139)
Treated * candidate rank = 6	0.093	-0.359	0.146	-0.129	-0.106+	-0.107
	(0.801)	(0.351)	(0.808)	(0.140)	(0.057)	(0.140)
Treated * candidate rank = 7	0.158	-0.212	0.137	-0.107	-0.093	-0.087
	(0.804)	(0.389)	(0.817)	(0.140)	(0.065)	(0.140)
Treated * candidate rank = 8	0.612	0.177	0.647	-0.081	-0.015	-0.093
	(0.833)	(0.435)	(0.924)	(0.144)	(0.077)	(0.153)
Treated * candidate rank = 9	0.255		-0.112	-0.057		0.001
	(0.807)		(0.952)	(0.140)		(0.158)
Constant	1.778*	2.131***	1.649*	0.463***	0.442***	0.453***
	(0.743)	(0.466)	(0.750)	(0.109)	(0.071)	(0.108)
Participating candidates	Yes	Yes	No	Yes	Yes	No
Non-participating candidates	Yes	No	Yes	Yes	No	Yes
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Candidate fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Candidates	160	59	101	160	59	101
VAA users	6564	5487	5867	6564	5487	5867
Observations	23279	9459	13820	23279	9459	13820

Note: In the paper, we show the combined effects for candidates ranked fifth or below in the candidate VAA. This table shows the results when the effects for all low-ranked candidates are separately estimated. All models are estimated with linear regression. Standard errors clustered by VAA user are in parentheses. PTV = propensity to vote for a candidate; Vote intention = intention to vote for a candidate. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure A5: Marginal effects (no rank cap)



Note: The figure shows the implied marginal effects of exposure to candidate-level versus party-level VAA advice in models 1 to 3 in Table A3 (left panel) and models 4 to 6 in Table A3 (right panel). The spikes represent 95% confidence intervals.

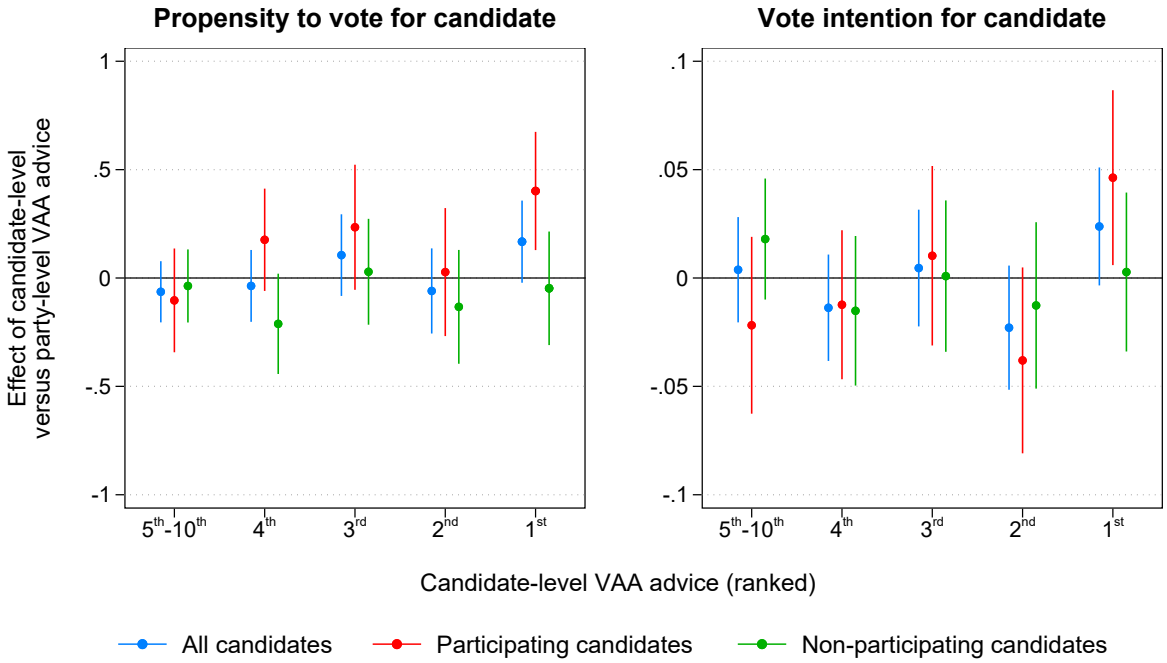
6.3 No Covariates

Table A4: Models without covariates

	(1) PTV	(2) PTV	(3) PTV	(4) Vote intention	(5) Vote intention	(6) Vote intention
Treated	-0.064	-0.103	-0.037	0.004	-0.022	0.018
	(0.072)	(0.122)	(0.086)	(0.012)	(0.021)	(0.014)
Candidate rank = 1	4.427***	3.849***	4.821***	0.457***	0.357***	0.524***
	(0.097)	(0.146)	(0.126)	(0.014)	(0.022)	(0.018)
Candidate rank = 2	3.263***	2.589***	3.698***	0.311***	0.218***	0.367***
	(0.098)	(0.151)	(0.126)	(0.015)	(0.023)	(0.019)
Candidate rank = 3	2.388***	1.621***	2.838***	0.206***	0.092***	0.273***
	(0.096)	(0.148)	(0.123)	(0.014)	(0.022)	(0.018)
Candidate rank = 4	1.379***	0.920***	1.647***	0.113***	0.035^{+}	0.158***
	(0.091)	(0.136)	(0.123)	(0.013)	(0.021)	(0.018)
Treated * candidate rank = 1	0.231^{+}	0.505**	-0.011	0.020	0.068*	-0.015
	(0.124)	(0.187)	(0.163)	(0.019)	(0.029)	(0.024)
Treated * candidate rank = 2	0.004	0.131	-0.096	-0.027	-0.016	-0.031
	(0.125)	(0.195)	(0.162)	(0.019)	(0.030)	(0.024)
Treated * candidate rank = 3	0.169	0.337^{+}	0.066	0.001	0.032	-0.017
	(0.120)	(0.189)	(0.153)	(0.018)	(0.028)	(0.022)
Treated * candidate rank = 4	0.027	0.280^{+}	-0.175	-0.018	0.009	-0.033
	(0.108)	(0.168)	(0.147)	(0.016)	(0.026)	(0.022)
Constant	2.804***	2.824***	2.551***	0.320***	0.340***	0.277***
	(0.363)	(0.307)	(0.365)	(0.047)	(0.049)	(0.047)
Participating candidates	Yes	Yes	No	Yes	Yes	No
Non-participating candidates	Yes	No	Yes	Yes	No	Yes
Covariates	No	No	No	No	No	No
Candidate fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Candidates	160	59	101	160	59	101
VAA users	6564	5487	5867	6564	5487	5867
Observations	23279	9459	13820	23279	9459	13820

Note: The table shows the results when all models reported in the paper are re-estimated without any covariates. All models are estimated with linear regression. Standard errors clustered by VAA user are in parentheses. PTV = propensity to vote for a candidate; Vote intention = intention to vote for a candidate. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure A6: Marginal effects (no covariates)



Note: The figure shows the implied marginal effects of exposure to candidate-level versus party-level VAA advice in models 1 to 3 in Table A4 (left panel) and models 4 to 6 in Table A4 (right panel). The spikes represent 95% confidence intervals.

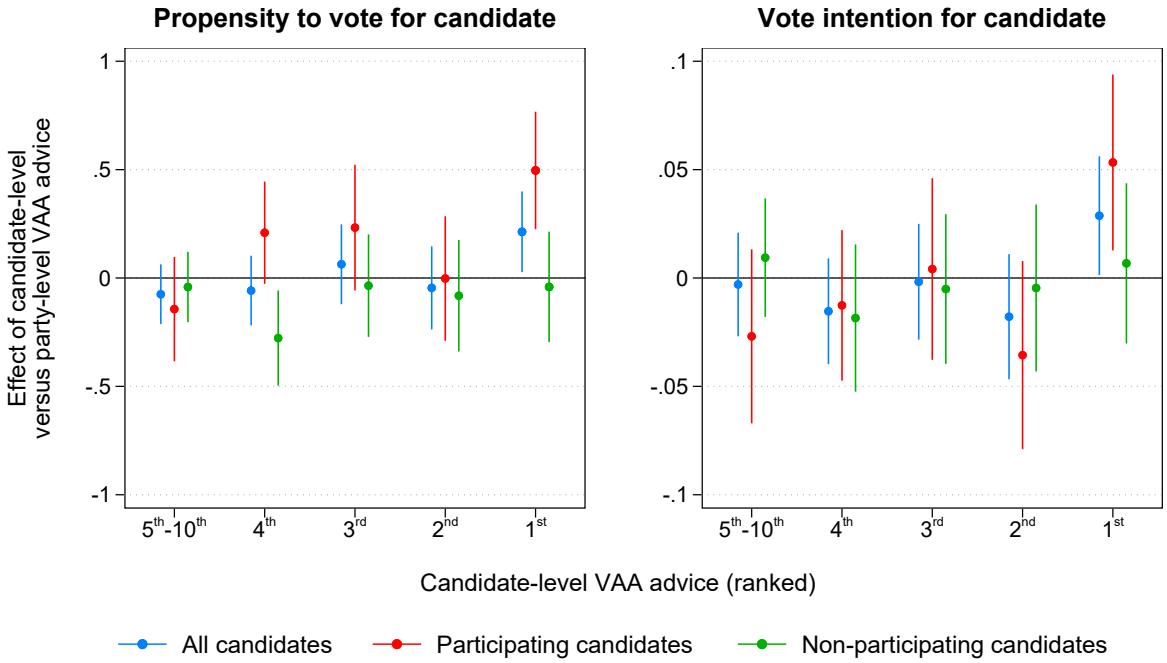
6.4 No Speeders

Table A5: Models without speeders

	(1) PTV	(2) PTV	(3) PTV	(4) Vote intention	(5) Vote intention	(6) Vote intention
Treated	-0.075	-0.143	-0.042	-0.003	-0.027	0.009
	(0.070)	(0.123)	(0.083)	(0.012)	(0.020)	(0.014)
Candidate rank = 1	3.545***	3.246***	3.753***	0.362***	0.305***	0.400***
	(0.097)	(0.149)	(0.125)	(0.014)	(0.022)	(0.019)
Candidate rank = 2	2.541***	2.197***	2.758***	0.233***	0.185***	0.260***
	(0.095)	(0.151)	(0.123)	(0.015)	(0.023)	(0.019)
Candidate rank = 3	1.820***	1.362***	2.077***	0.149***	0.084***	0.185***
	(0.093)	(0.149)	(0.118)	(0.014)	(0.022)	(0.018)
Candidate rank = 4	1.062***	0.721***	1.279***	0.083***	0.037^{+}	0.109***
	(0.087)	(0.137)	(0.116)	(0.013)	(0.021)	(0.018)
Treated * candidate rank = 1	0.288*	0.640***	0.001	0.032^{+}	0.080**	-0.003
	(0.121)	(0.186)	(0.157)	(0.018)	(0.029)	(0.023)
Treated * candidate rank = 2	0.029	0.141	-0.040	-0.015	-0.009	-0.014
	(0.120)	(0.191)	(0.157)	(0.019)	(0.029)	(0.024)
Treated * candidate rank = 3	0.138	0.376*	0.006	0.001	0.031	-0.014
	(0.116)	(0.189)	(0.146)	(0.017)	(0.028)	(0.022)
Treated * candidate rank = 4	0.017	0.352*	-0.235^{+}	-0.012	0.014	-0.028
	(0.104)	(0.168)	(0.138)	(0.016)	(0.026)	(0.021)
Constant	2.033***	2.938***	1.790***	0.463***	0.583***	0.430***
	(0.367)	(0.359)	(0.375)	(0.051)	(0.057)	(0.052)
Participating candidates	Yes	Yes	No	Yes	Yes	No
Non-participating candidates	Yes	No	Yes	Yes	No	Yes
Covariates	Yes	Yes	Yes	Yes	Yes	Yes
Candidate fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Candidates	160	59	101	160	59	101
VAA users	6069	5072	5436	6069	5072	5436
Observations	21516	8734	12782	21516	8734	12782

Note: This table shows the results when users who rushed through the VAA are excluded. Specifically, we exclude all users who completed the VAA in less than half of the average completion time (i.e., less than $458/2 = 229$ seconds). All models are estimated with linear regression. Standard errors clustered by VAA user are in parentheses. PTV = propensity to vote for a candidate; Vote intention = intention to vote for a candidate. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure A7: Marginal effects (no speeders)



Note: The figure shows the implied marginal effects of exposure to candidate-level versus party-level VAA advice in models 1 to 3 in Table A5 (left panel) and models 4 to 6 in Table A5 (right panel). The spikes represent 95% confidence intervals.

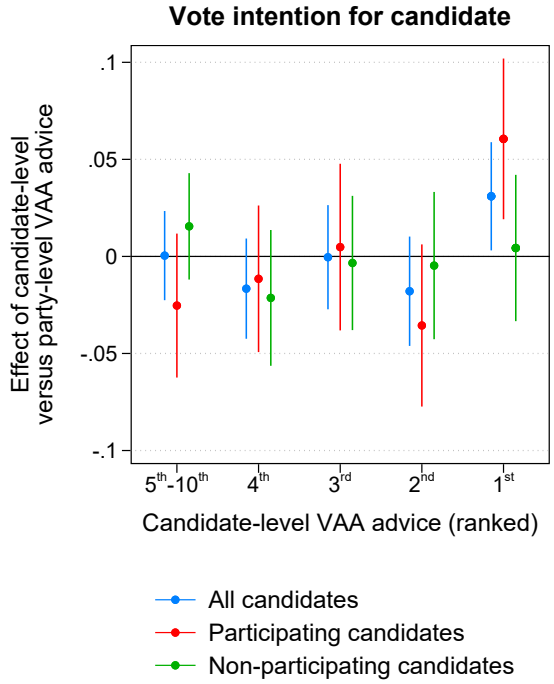
6.5 Logistic Regression

Table A6: Logistic regressions

	(1) Vote intention	(2) Vote intention	(3) Vote intention
Treated	0.003	-0.168	0.100
	(0.077)	(0.126)	(0.090)
Candidate rank = 1	1.856***	1.462***	2.130***
	(0.079)	(0.117)	(0.105)
Candidate rank = 2	1.204***	0.898***	1.379***
	(0.079)	(0.120)	(0.100)
Candidate rank = 3	0.769***	0.382**	0.983***
	(0.077)	(0.128)	(0.096)
Candidate rank = 4	0.433***	0.093	0.632***
	(0.078)	(0.126)	(0.101)
Treated * candidate rank = 1	0.152	0.456**	-0.077
	(0.104)	(0.160)	(0.134)
Treated * candidate rank = 2	-0.091	-0.011	-0.123
	(0.102)	(0.162)	(0.129)
Treated * candidate rank = 3	-0.005	0.195	-0.117
	(0.099)	(0.168)	(0.124)
Treated * candidate rank = 4	-0.099	0.096	-0.217^{+}
	(0.099)	(0.164)	(0.128)
Constant	0.024	0.651*	-0.192
	(0.272)	(0.285)	(0.282)
Participating candidates	Yes	Yes	No
Non-participating candidates	Yes	No	Yes
Covariates	Yes	Yes	Yes
Candidate fixed effects	Yes	Yes	Yes
Candidates	160	59	101
VAA users	6564	5487	5867
Observations	23279	9459	13820

Note: This table shows the results when the vote intention models reported in the paper are re-estimated using logistic regression. Standard errors clustered by VAA user are in parentheses. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure A8: Marginal effects (logistic regressions)



Note: The figure shows the implied marginal effects of exposure to candidate-level versus party-level VAA advice in models 1 to 3 in Table A6. The spikes represent 95% confidence intervals.

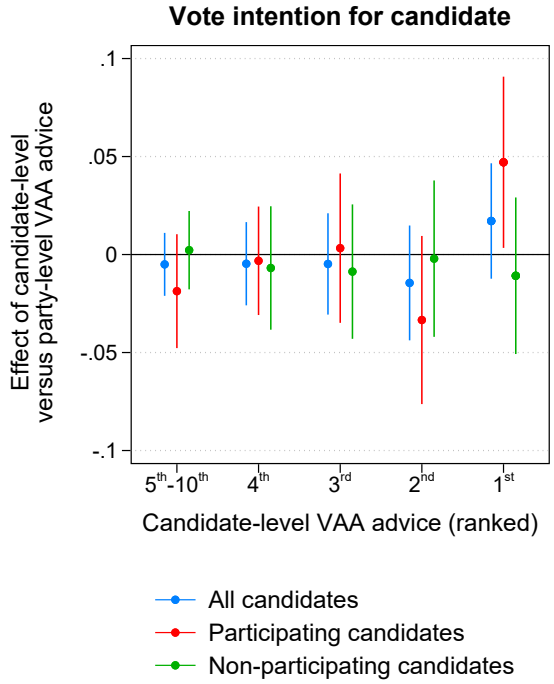
6.6 PTV Ties

Table A7: Removing tied vote intentions

	(1) Vote intention	(2) Vote intention	(3) Vote intention
Treated	-0.005	-0.019	0.002
	(0.008)	(0.015)	(0.010)
Candidate rank = 1	0.407***	0.337***	0.459***
	(0.015)	(0.021)	(0.020)
Candidate rank = 2	0.243***	0.194***	0.274***
	(0.015)	(0.021)	(0.019)
Candidate rank = 3	0.163***	0.109***	0.193***
	(0.014)	(0.020)	(0.018)
Candidate rank = 4	0.089***	0.066***	0.099***
	(0.013)	(0.018)	(0.017)
Treated * candidate rank = 1	0.022	0.066*	-0.013
	(0.018)	(0.027)	(0.023)
Treated * candidate rank = 2	-0.009	-0.015	-0.004
	(0.018)	(0.027)	(0.023)
Treated * candidate rank = 3	0.000	0.022	-0.011
	(0.016)	(0.025)	(0.021)
Treated * candidate rank = 4	0.000	0.015	-0.009
	(0.014)	(0.021)	(0.020)
Constant	0.160**	0.220***	0.141**
	(0.052)	(0.056)	(0.054)
Participating candidates	Yes	Yes	No
Non-participating candidates	Yes	No	Yes
Covariates	Yes	Yes	Yes
Candidate fixed effects	Yes	Yes	Yes
Candidates	160	59	101
VAA users	5033	4140	4438
Observations	17423	7093	10330

Note: This table shows the results when VAA users who are coded with multiple vote intentions are dropped. The vote intention results in the paper include a number of VAA users who are coded with an intention to vote for two or more candidates. This is because the vote intention variable is constructed based on the PTV variables and VAA users may assign the same PTV value to two or more candidates. The models reported in this table remove all such cases, retaining only users with an intention to vote for a single candidate. Standard errors clustered by VAA user are in parentheses. $^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure A9: Marginal effects (PTV ties removed)



Note: The figure shows the implied marginal effects of exposure to candidate-level versus party-level VAA advice in models 1 to 3 in Table A7. The spikes represent 95% confidence intervals.

7 Covariates

Gender
A binary variable that is coded 1 if a user indicated they are female, 0 otherwise.

Age
A set of binary variables which are coded with 1 (0 otherwise) if a user indicated that they are between 30 and 44 years; between 45 and 64 years; and 65 or older. Age below 30 serves as the reference category.

Education
A binary variable that is coded 1 if a user indicated that they hold a university degree, 0 otherwise.

Election interest
A four-point ordinal variable ranging from (1) no interest in the election at all, (2) not very interested, (3) fairly interested, to (4) very interested.

Past vote choice
A binary variable that is coded 1 if a user voted for a candidate's party in the 2019 UK general election, 0 otherwise.

Note: We impute missing data on all of our covariates using mean substitution. In mean imputation, missing covariate values are replaced with the mean of the observed values across both experimental groups. Mean substitution has been shown to be an unbiased and efficient method for handling missing covariate data in randomized controlled trials (Sullivan et al. 2018).

References

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Sullivan, Thomas R, Ian R White, Amy B Salter, Philip Ryan, and Katherine J Lee. 2018. Should Multiple Imputation be the Method of Choice for Handling Missing Data in Randomized Trials? *Statistical Methods in Medical Research* 27 (9): 2610–2626.