# Meta-Analysis of the Effects of Voting Advice Applications

**Online Appendix**

## CONTENTS


**Appendices** 1

**Appendix A Overview of Collected Studies** 2

**Appendix B Supporting Tables and Figures** 6

**Appendix C Publication Bias Analysis** 13

**Appendix D Software Statement** 14

# APPENDIX A OVERVIEW OF COLLECTED STUDIES

**FIGURE A1:** Geographic distribution of VAAs. The purple filling indicates countries covered by studies that were included in the meta-analysis. *Source:* 2016 Global Census of the ECPR Research Network on Voting Advice Applications (http://vaa-research.net/?page_id=146).

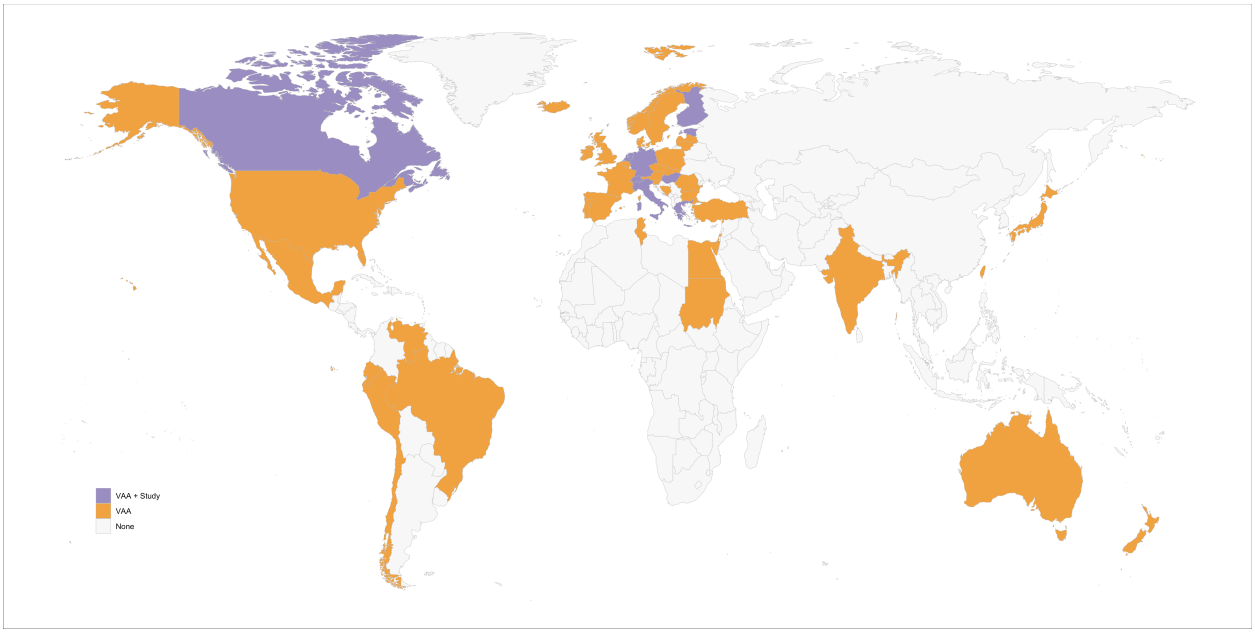



**FIGURE A2:** Publication timeline of 22 studies included in the meta-analysis, by study type.

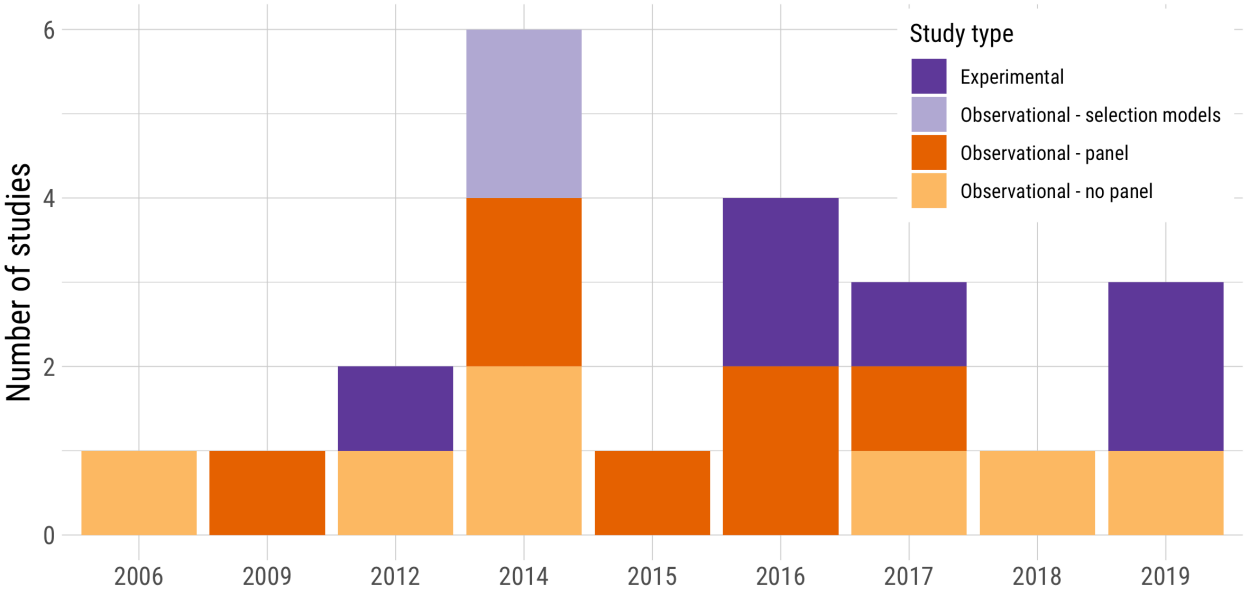


**TABLE A1:** Overview of selected within-study effects excluded from the meta-analysis.

| Study | Election | Outcome of interest | Exclusion reason |
|---|---|---|---|
| Alvarez, Levin, Trechsel and Vassil (2014) | EU 2009 | Perceived utility | IVAR; NOV |
| Alvarez, Levin, Mair and Trechsel (2014) | EU 2009 | Vote choice | IVAR |
| Boogers (2006) | Netherlands 2006 | Self-assessed impact on information seeking | IVAR; NOV |
| Boogers (2006) | Netherlands 2006 | Turnout | IVAR |
| Boogers (2006) | Netherlands 2006 | Vote choice | IVAR |
| De Rosa (2010) | Italy - EU 2009 | Motivation to seek information | IVAR; NOV |
| De Rosa (2010) | Italy - EU 2009 | Issue knowledge | IVAR |
| De Rosa (2010) | Italy - EU 2009 | Turnout | IVAR |
| Dinas et al. (2014) | EU 2009 | Turnout | IVAR |
| Enyedi (2016) | Hungary 2010 | Vote choice | IVAR |
| Fivaz and Nadig (2010) | Switzerland 2007 | Turnout | NMB; IMOV |
| Fivaz and Nadig (2010) | Switzerland 2007 | Vote choice | NMB; IMOV |
| Garry et al. (2018) | N. Ireland 2016 | Party support (propensity to vote for) | IMOV |
| Garzia et al. (2017) | Finland 2007 | Turnout | NISP - Duplicate of Garzia and Angelis (2014) |
| Garzia et al. (2017) | Finland 2011 | Turnout | NISP - Duplicate of Garzia and Angelis (2014) |
| Garzia et al. (2017) | Germany 2009 | Turnout | NISP - Duplicate of Garzia and Angelis (2014) |
| Garzia et al. (2017) | Netherlands 2003 | Turnout | NISP - Duplicate of Garzia and Angelis (2014) |
| Garzia et al. (2017) | Netherlands 2006 | Turnout | NISP - Duplicate of Garzia and Angelis (2014) |
| Garzia et al. (2017) | Netherlands 2010 | Turnout | NISP - Duplicate of Garzia and Angelis (2014) |
| Garzia et al. (2017) | Switzerland 2007 | Turnout | NISP - Duplicate of Garzia and Angelis (2014) |
| Garzia et al. (2017) | Switzerland 2011 | Turnout | NISP - Duplicate of Garzia and Angelis (2014) |
| Gemenis (2018) | Greece 2015 | Turnout | IVAR |
| Israel et al. (2016) | Germany - EU 2014 | Vote choice | IVAR |
| Israel et al. (2017) | Germany - EU 2014 | Vote choice | IVAR |
| Israel et al. (2017) | Germany - EU 2014 | Vote choice | IVAR |
| Kamoen et al. (2015) | Netherlands 2012 | Issue knowledge | IVAR |
| Kamoen et al. (2015) | Netherlands 2012 | Vote choice | IVAR |
| Ladner and Pianzola (2010) | Switzerland 2007 | Turnout | NMB |
| Ladner et al. (2012) | Switzerland 2007 | Vote choice | IVAR |
| Mahéo (2017) | Canada 2014 | Attention to campaign | NOV |
| Mahéo (2017) | Canada 2014 | Information seeking | NOV |
| Manavopoulos et al. (2018) | Germany 2017 | Information seeking | IVAR; NOV |
| Marschall and Schmidt (2008) | Germany 2005 | Information seeking | NOV |
| Marschall and Schmidt (2008) | Germany 2005 | Turnout | NMB |
| Marschall and Schmidt (2010) | Germany - EU 2009 | Turnout | NMB |
| Marschall and Schultze (2012*b*) | Germany 2009 | Turnout | NISP - Duplicate of Marschall and Schultze (2012*a*) |
| Nuytemans et al. (2010) | Belgium 2009 | Vote choice | NSI |
| Pianzola et al. (2019) | Switzerland 2011 | Propensity to vote for most preferred party | IMOV |
| Ramos et al. (2019) | EU 2014 | Turnout | NMB |
| Ruusuvirta and Rosema (2009) | Netherlands 2006 | Vote choice | NSI |
| Schultze (2013) | Germany 2009 | Issue knowledge | NISP - Duplicate of Schultze (2014) |
| Walgrave et al. (2008) | Belgium 2004 | Vote choice | NSI |
| Wall et al. (2014) | Netherlands 2010 | Vote choice | NMB; IMOV |
| Wang (2016) | Taiwan 2012 | Turnout | IVAR |
| Westle et al. (2015) | Germany 2013 | Issue knowledge | NSI |

**Notes:** IVAR: VAA usage not independent variable; NOV: No measure of turnout, vote choice, issue knowledge as outcome; NMB: No meaningful baselines; NSI: Insufficient information about modeling; IMOV: Incompatible measurement of outcome variable; NISP: Not independent separate publication

**TABLE A2:** Overview of VAA turnout effects studies used.

| Study | Election | Sample size | VAA users | Model | Effect (orig) | SE (orig) | Effect (conv) | SE (conv) | Study Design Type |
|---|---|---|---|---|---|---|---|---|---|
| Enyedi (2016) | Hungary 2010 | 1727 | 1164 | mean differences | 3.10 | | 0.29 | 0.16 | Experimental |
| Garzia and Angelis (2014) | Finland 2007 | 1062 | 313 | logit | 0.53 | 0.15 | 0.53 | 0.15 | Obs — no panel |
| Garzia and Angelis (2014) | Finland 2011 | 1030 | 443 | logit | 0.24 | 0.15 | 0.24 | 0.15 | Obs — no panel |
| Garzia and Angelis (2014) | Germany 2009 | 1187 | 116 | logit | 0.15 | 0.17 | 0.15 | 0.17 | Obs — no panel |
| Garzia and Angelis (2014) | Netherlands 2003 | 1016 | 325 | logit | 0.65 | 0.27 | 0.65 | 0.27 | Obs — no panel |
| Garzia and Angelis (2014) | Netherlands 2006 | 1793 | 687 | logit | 0.46 | 0.15 | 0.46 | 0.15 | Obs — no panel |
| Garzia and Angelis (2014) | Netherlands 2010 | 1693 | 706 | logit | 0.59 | 0.14 | 0.59 | 0.14 | Obs — no panel |
| Garzia and Angelis (2014) | Switzerland 2007 | 3127 | 256 | logit | 0.26 | 0.07 | 0.26 | 0.07 | Obs — no panel |
| Garzia and Angelis (2014) | Switzerland 2011 | 3254 | 368 | logit | 0.32 | 0.07 | 0.32 | 0.07 | Obs — no panel |
| Garzia et al. (2017) | Italy 2013 | 888 | 454 | mean differences | 10.70 | | 0.54 | 0.15 | Experimental |
| Garzia et al. (2017) | EU 2009 | 19592 | 921 | logit | 1.11 | 0.11 | 1.11 | 0.11 | Obs — no panel |
| Garzia et al. (2017) | Finland 2003 | 1152 | 255 | logit | 1.17 | 0.31 | 1.17 | 0.31 | Obs — no panel |
| Garzia et al. (2017) | Germany 2013 | 1820 | 260 | logit | 1.08 | 0.33 | 1.08 | 0.33 | Obs — no panel |
| Garzia et al. (2017) | Netherlands 2012 | 1574 | 631 | logit | 1.84 | 0.27 | 1.84 | 0.27 | Obs — no panel |
| Gemenis and Rosema (2014) | Netherlands 2006 | 2356 | 903 | logit | 1.44 | 0.25 | 1.44 | 0.25 | Obs — panel |
| Gemenis (2018) | Greece 5/2012 | 890 | NA | entropy bal + LR | 1.01 | 0.59 | 1.01 | 0.59 | Obs — selection/matching |
| Gemenis (2018) | Greece 6/2012 | 896 | NA | entropy bal + LR | 0.97 | 0.64 | 0.97 | 0.64 | Obs — selection/matching |
| Gemenis (2018) | Greece 1/2015 | 1013 | NA | entropy bal + LR | 0.09 | 0.50 | 0.09 | 0.50 | Obs — selection/matching |
| Gemenis (2018) | Greece 9/2015 | 806 | NA | entropy bal + LR | 0.03 | 0.43 | 0.03 | 0.43 | Obs — selection/matching |
| Germann and Gemenis (2019) | Switzerland 2007 | 3578 | 322 | entropy bal + LR | 0.60 | 0.19 | 0.60 | 0.19 | Obs — selection/matching |
| Germann and Gemenis (2019) | Switzerland 2011 | 3657 | 366 | entropy bal + LR | 0.67 | 0.18 | 0.67 | 0.18 | Obs — selection/matching |
| Germann and Gemenis (2019) | Switzerland 2015 | 2931 | 410 | entropy bal + LR | 0.64 | 0.17 | 0.64 | 0.17 | Obs — selection/matching |
| Heinsohn et al. (2016) | EU - Germany - EU 2014 | 449 | 127 | log panel reg with FEs | 0.35 | 0.09 | 0.35 | 0.09 | Obs — panel |
| Mahéo (2017) | Canada 2014 | 277 | 138 | logit | 0.40 | 0.40 | 0.40 | 0.40 | Experimental |
| Marschall and Schultze (2012*c*) | Germany 2009 | 1153 | 421 | logit | 0.60 | 0.25 | 0.60 | 0.25 | Obs — no panel |
| Munzert et al. (Forthcoming) | Germany 2017 | 979 | 499 | IV model | -0.01 | 0.05 | -0.04 | 0.20 | Experimental |
| Mykkänen and Moring (2006) | EU - Finland - EU 2004 | 1362 | NA | logit | 0.63 | 0.23 | 0.63 | 0.23 | Obs — no panel |
| Mykkänen and Moring (2006) | Finland 2003 | 1511 | NA | logit | 1.01 | 0.23 | 1.01 | 0.23 | Obs — no panel |
| Ruusuvirta and Rosema (2009) | Netherlands 2006 | 2356 | 892 | frequency tables | 6.00 | | 1.21 | 0.22 | Obs — panel |
| Vassil (2011) | EU - Estonia - EU 2009 | 279 | 97 | IV model | 0.13 | 0.06 | 0.52 | 0.24 | Experimental |

**TABLE A3:** Overview of VAA vote choice effects studies used.

| Study | Election | Sample size | VAA users | Model | Effect (orig) | SE (orig) | Effect (conv) | SE (conv) | Study Design Type |
|---|---|---|---|---|---|---|---|---|---|
| Andreadis and Wall (2014) | Finland 2003 | 578 | 153 | probit | 0.43 | 0.14 | 0.68 | 0.23 | Obs — panel |
| Andreadis and Wall (2014) | Finland 2007 | 617 | 188 | probit | 0.32 | 0.14 | 0.52 | 0.22 | Obs — panel |
| Andreadis and Wall (2014) | Finland 2011 | 526 | 237 | probit | 0.20 | 0.14 | 0.32 | 0.22 | Obs — panel |
| Andreadis and Wall (2014) | Germany 2009 | 1175 | 147 | probit | 0.25 | 0.12 | 0.40 | 0.20 | Obs — panel |
| Andreadis and Wall (2014) | Netherlands 2003 | 1170 | 387 | probit | 0.14 | 0.09 | 0.22 | 0.14 | Obs — panel |
| Andreadis and Wall (2014) | Netherlands 2006 | 1721 | 685 | probit | 0.26 | 0.07 | 0.42 | 0.12 | Obs — panel |
| Andreadis and Wall (2014) | Netherlands 2010 | 1537 | 661 | probit | 0.24 | 0.07 | 0.39 | 0.12 | Obs — panel |
| Andreadis and Wall (2014) | Switzerland 2007 | 1787 | 166 | probit | 0.10 | 0.12 | 0.16 | 0.19 | Obs — panel |
| Andreadis and Wall (2014) | Switzerland 2011 | 1645 | 206 | probit | 0.20 | 0.10 | 0.32 | 0.17 | Obs — panel |
| Enyedi (2016) | Hungary 2010 | 1727 | 1124 | mean differences | | | 0.05 | 0.12 | Experimental |
| Klein Kranenburg (2015) | Netherlands 2006 | 1628 | 624 | logit | 0.29 | 0.13 | 0.29 | 0.13 | Obs — panel |
| Klein Kranenburg (2015) | Netherlands 2010 | 1485 | 619 | logit | 0.41 | 0.16 | 0.41 | 0.16 | Obs — panel |
| Klein Kranenburg (2015) | Netherlands 2012 | 1026 | 411 | logit | 0.47 | 0.18 | 0.47 | 0.18 | Obs — panel |
| Klein Kranenburg (2015) | Netherlands 2015 | 5211 | 1516 | logit | 0.48 | 0.07 | 0.48 | 0.07 | Obs — panel |
| Kleinnijenhuis et al. (2019) | Netherlands 2010 | 1159 | 426 | logit with REs | 1.34 | 0.52 | 1.34 | 0.52 | Obs — panel |
| Mahéo (2016) | Canada 2014 | 211 | 211 | linear regression | -0.24 | 0.30 | -0.24 | 0.30 | Experimental |
| Munzert et al. (Forthcoming) | Germany 2017 | 923 | 483 | IV model | 0.05 | 0.07 | 0.20 | 0.28 | Experimental |
| Pianzola (2014*a*) | Switzerland 2007 | 4067 | NA | IV model | 0.18 | 0.04 | 0.72 | 0.16 | Obs — selection/matching |
| Pianzola (2014*b*) | Switzerland 2011 | 9163 | NA | Heckman + PS matching | 0.16 | 0.02 | 0.66 | 0.07 | Obs — selection/matching |
| Pianzola et al. (2019) | Switzerland 2011 | 1775 | 1349 | IV model | -0.07 | 0.08 | -0.28 | 0.32 | Experimental |
| Vassil (2011) | EU - Estonia - EU 2009 | 394 | 186 | IV model | 0.15 | 0.10 | 0.60 | 0.40 | Experimental |

**TABLE A4:** Overview of VAA issue knowledge effects studies used.

| Study | Election | Sample size | VAA users | Model | Effect (orig) | SE (orig) | Effect (conv) | SE (conv) | Study Design Type |
|---|---|---|---|---|---|---|---|---|---|
| Heinsohn et al. (2016) | EU - Germany - EU 2014 | 1569 | NA | panel regression with FEs | 0.23 | 0.07 | | | Obs — panel |
| Munzert et al. (Forthcoming) | Germany 2017 | 979 | 499 | IV model | 0.04 | 0.01 | 0.16 | 0.04 | Experimental |
| Schultze (2014) | Germany 2009 | 1145 | 440 | SEM probit | 0.34 | 0.05 | 0.55 | 0.08 | Obs — no panel |
| van de Pol (2016) | Netherlands 2014 | 5571 | 3522 | entropy bal + LR | -0.06 | 0.02 | -0.06 | 0.02 | Obs — selection/matching |

# APPENDIX B SUPPORTING TABLES AND FIGURES

**TABLE B1:** Turnout study design results of mixed effects moderator analysis

| | Estimate | k | Std. Error | Z. Value | Conf. Low | Conf. High | P. Value |
|---|---|---|---|---|---|---|---|
| Experimental | 0.21 | 5 | 0.17 | 1.29 | −0.11 | 0.54 | 0.2 |
| Observational - no panel | 0.8*** | 15 | 0.16 | 4.94 | 0.48 | 1.12 | < 0.001 |
| Observational - panel | 0.91*** | 3 | 0.23 | 3.93 | 0.46 | 1.36 | < 0.001 |
| Observational - selection/matching | 0.56* | 7 | 0.27 | 2.04 | 0.02 | 1.1 | 0.04 |

**Notes:** The estimates are presented in log-odds. The tests for residual heterogeneity and of moderators are significant at the 95%: QE(df = 26) = 133.0338, p-val < .0001, QM(df = 4) = 44.9021, p-val < .0001

**TABLE B2:** Vote choice study design results of mixed effects moderator analysis

| | Estimate | k | Std. Error | Z. Value | Conf. Low | Conf. High | P. Value |
|---|---|---|---|---|---|---|---|
| Experimental | 0.04 | 5 | 0.09 | 0.45 | −0.14 | 0.23 | 0.65 |
| Observational - panel | 0.4*** | 14 | 0.04 | 10.37 | 0.33 | 0.48 | < 0.001 |
| Observational - selection/matching | 0.67*** | 2 | 0.07 | 10.16 | 0.54 | 0.8 | < 0.001 |

**Notes:** The estimates are presented in log-odds. The test for residual heterogeneity is not significant at the 95%: QE(df = 18) = 15.0816, p-val = 0.6564. The test of moderators is significant: QM(df = 3) = 210.7735, p-val < .0001

**TABLE B3:** Turnout country results of mixed effects moderator analysis

| | Estimate | k | Std. Error | Z. Value | Conf. Low | Conf. High | P. Value |
|---|---|---|---|---|---|---|---|
| Finland | 0.81*** | 4 | 0.16 | 5.16 | 0.5 | 1.12 | < 0.001 |
| Germany | 0.48*** | 4 | 0.17 | 2.82 | 0.15 | 0.82 | < 0.001 |
| Netherlands | 1.07*** | 6 | 0.15 | 7.23 | 0.78 | 1.36 | < 0.001 |
| Other | 0.43*** | 11 | 0.12 | 3.49 | 0.19 | 0.67 | < 0.001 |
| Switzerland | 0.71*** | 5 | 0.15 | 4.79 | 0.42 | 1.01 | < 0.001 |

**Notes:** The estimates are presented in log-odds. The tests for residual heterogeneity and of moderators are significant at the 95%: QE(df = 25) = 102.3942, p-val < .0001, QM(df = 5) = 58.2662, p-val < .0001

**TABLE B4:** Vote choice country results of mixed effects moderator analysis

| | Estimate | k | Std. Error | Z. Value | Conf. Low | Conf. High | P. Value |
|---|---|---|---|---|---|---|---|
| Finland | 0.63*** | 3 | 0.18 | 3.57 | 0.29 | 0.98 | < 0.001 |
| Germany | 0.45* | 2 | 0.2 | 2.29 | 0.06 | 0.84 | 0.02 |
| Netherlands | 0.5*** | 8 | 0.13 | 3.83 | 0.24 | 0.75 | < 0.001 |
| Other | 0.07 | 3 | 0.19 | 0.37 | −0.31 | 0.45 | 0.71 |
| Switzerland | 0.43*** | 5 | 0.13 | 3.41 | 0.18 | 0.68 | < 0.001 |

**Notes:** The estimates are presented in log-odds. The tests for residual heterogeneity and of moderators are significant at the 95%: QE(df = 16) = 27.5137, p-val = 0.0361, QM(df = 5) = 19.6308, p-val = 0.0015

**TABLE B5:** Turnout election year results of mixed effects moderator analysis

| | Estimate | k | Std. Error | Z. Value | Conf. Low | Conf. High | P. Value |
|---|---|---|---|---|---|---|---|
| 2003-2005 | 0.86*** | 4 | 0.23 | 3.73 | 0.41 | 1.32 | < 0.001 |
| 2006-2008 | 0.75*** | 6 | 0.19 | 4.02 | 0.39 | 1.12 | < 0.001 |
| 2009-2011 | 0.63*** | 9 | 0.14 | 4.51 | 0.36 | 0.91 | < 0.001 |
| 2012-2014 | 0.68*** | 7 | 0.18 | 3.68 | 0.32 | 1.04 | < 0.001 |
| 2015-2017 | 0.27 | 4 | 0.22 | 1.23 | −0.16 | 0.7 | 0.22 |

**Notes:** The estimates are presented in log-odds. The tests for residual heterogeneity and of moderators are significant at the 95%: QE(df = 25) = 127.1568, p-val < .0001, QM(df = 5) = 41.8469, p-val < .0001

**TABLE B6:** Vote choice election year results of mixed effects moderator analysis

| | Estimate | k | Std. Error | Z. Value | Conf. Low | Conf. High | P. Value |
|---|---|---|---|---|---|---|---|
| 2003-2005 | 0.33 | 2 | 0.18 | 1.86 | −0.02 | 0.67 | 0.06 |
| 2006-2008 | 0.34** | 5 | 0.13 | 2.55 | 0.08 | 0.61 | 0.01 |
| 2009-2011 | 0.35*** | 10 | 0.12 | 2.88 | 0.11 | 0.59 | < 0.001 |
| 2012-2014 | 0.33 | 2 | 0.2 | 1.64 | −0.06 | 0.72 | 0.1 |
| 2015-2017 | 0.44*** | 2 | 0.15 | 2.98 | 0.15 | 0.73 | < 0.001 |

**Notes:** The estimates are presented in log-odds. The tests for residual heterogeneity is significant at the 95%: QE(df = 16) = 44.0260, p-val = 0.0002. The test of moderators is not significant: QM(df = 5) = 11.0442, p-val = 0.0505

**TABLE B7:** Turnout election type results of mixed effects moderator analysis

| | Estimate | k | Std. Error | Z. Value | Conf. Low | Conf. High | P. Value |
|---|---|---|---|---|---|---|---|
| First order | 0.65*** | 25 | 0.12 | 5.33 | 0.41 | 0.89 | < 0.001 |
| Second order | 0.57*** | 5 | 0.18 | 3.26 | 0.23 | 0.91 | < 0.001 |

**Notes:** The estimates are presented in log-odds. The tests for residual heterogeneity and of moderators are significant at the 95%: QE(df = 28) = 131.7178, p-val < .0001, QM(df = 2) = 32.4878, p-val < .0001

**TABLE B8:** Vote choice election type results of mixed effects moderator analysis

| | Estimate | k | Std. Error | Z. Value | Conf. Low | Conf. High | P. Value |
|---|---|---|---|---|---|---|---|
| First order | 0.35*** | 18 | 0.12 | 2.98 | 0.12 | 0.57 | < 0.001 |
| Second order | 0.43*** | 3 | 0.14 | 3 | 0.15 | 0.7 | < 0.001 |

**Notes:** The estimates are presented in log-odds. The tests for residual heterogeneity and of moderators are significant at the 95%: QE(df = 19) = 45.5668, p-val = 0.0006, QM(df = 2) = 10.7327, p-val = 0.0047

**TABLE B9:** Turnout sample size results of mixed effects moderator analysis

| | Estimate | k | Std. Error | Z. Value | Conf. Low | Conf. High | P. Value |
|---|---|---|---|---|---|---|---|
| Large (>3000) | 0.75*** | 8 | 0.12 | 6.09 | 0.51 | 0.99 | < 0.001 |
| Medium (2000-3000) | 0.84*** | 14 | 0.13 | 6.75 | 0.6 | 1.09 | < 0.001 |
| Small (<1000) | 0.27 | 8 | 0.14 | 1.91 | −0.01 | 0.55 | 0.06 |

**Notes:** The estimates are presented in log-odds. The tests for residual heterogeneity and of moderators are significant at the 95%: QE(df = 27) = 133.6281, p-val < .0001, QM(df = 3) = 48.1064, p-val < .0001

**TABLE B10:** Vote choice sample size results of mixed effects moderator analysis

| | Estimate | k | Std. Error | Z. Value | Conf. Low | Conf. High | P. Value |
|---|---|---|---|---|---|---|---|
| Large (>3000) | 0.52*** | 3 | 0.09 | 5.87 | 0.35 | 0.7 | < 0.001 |
| Medium (2000-3000) | 0.28*** | 12 | 0.08 | 3.4 | 0.12 | 0.44 | < 0.001 |
| Small (<1000) | 0.35** | 6 | 0.12 | 2.79 | 0.1 | 0.59 | 0.01 |

**Notes:** The estimates are presented in log-odds. The test for residual heterogeneity is not significant at the 95%: QE(df = 18) = 26.6059, p-val = 0.0867. The test of moderators is significant: QM(df = 3) = 38.3041, p-val < .0001

**TABLE B11:** Turnout sampling type results of mixed effects moderator analysis

| | Estimate | k | Std. Error | Z. Value | Conf. Low | Conf. High | P. Value |
|---|---|---|---|---|---|---|---|
| Non-probability | 0.56*** | 11 | 0.14 | 4.08 | 0.29 | 0.83 | < 0.001 |
| Probability | 0.73*** | 16 | 0.14 | 5.2 | 0.46 | 1.01 | < 0.001 |

**Notes:** The estimates are presented in log-odds. The tests for residual heterogeneity and of moderators are significant at the 95%: QE(df = 25) = 133.5, p-val < .0001, QM(df = 2) = 27.99, p-val < .0001

**TABLE B12:** Vote choice sample type results of mixed effects moderator analysis

| | Estimate | k | Std. Error | Z. Value | Conf. Low | Conf. High | P. Value |
|---|---|---|---|---|---|---|---|
| Convenience | −0.26 | 2 | 0.28 | −0.94 | −0.8 | 0.28 | 0.35 |
| Non-probability | 0.5*** | 9 | 0.11 | 4.45 | 0.28 | 0.72 | < 0.001 |
| Probability | 0.42*** | 10 | 0.11 | 3.77 | 0.2 | 0.64 | < 0.001 |

**Notes:** The estimates are presented in log-odds. The tests for residual heterogeneity and of moderators are significant at the 95%: QE(df = 18) = 34.62, p-val = 0.011, QM(df = 3) = 21.14, p-val < .0001

**TABLE B13:** Operationalization of vote choice results of mixed effects moderator analysis

| | Estimate | k | Std. Error | Z. Value | Conf. Low | Conf. High | P. Value |
|---|---|---|---|---|---|---|---|
| Between elections | 0.46*** | 16 | 0.11 | 4.24 | 0.25 | 0.67 | < 0.001 |
| In-campaign | 0.19 | 5 | 0.16 | 1.23 | −0.11 | 0.5 | 0.22 |

**Notes:** The estimates are presented in log-odds. The tests for residual heterogeneity and of moderators are significant at the 95%: QE(df = 19) = 34.43, p-val = 0.016, QM(df = 3) = 19.45, p-val < .0001

**Figure B1:** Mixed effects moderator analysis on country of election

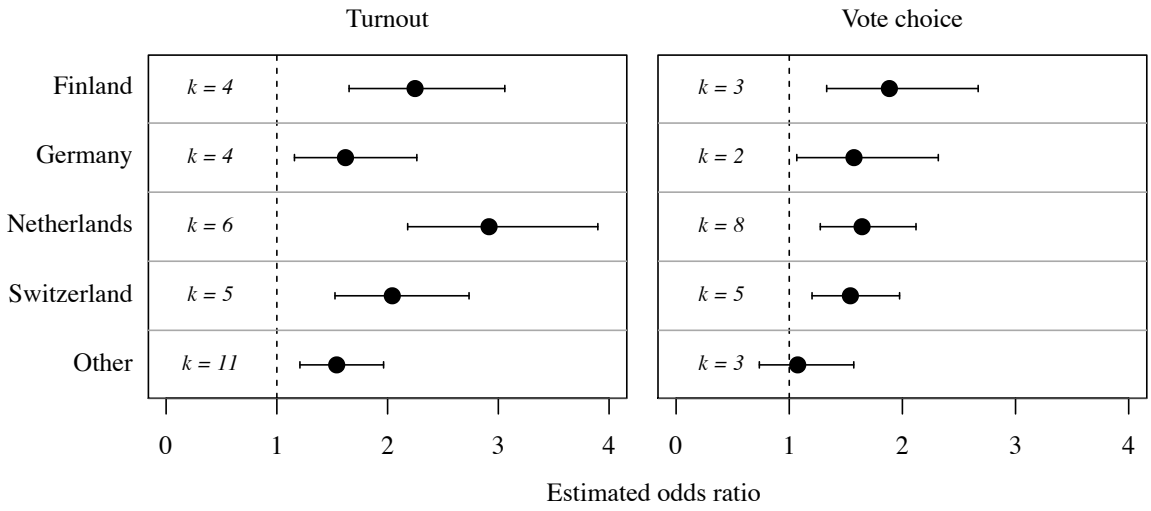



**Figure B2:** Mixed effects moderator analysis on election year

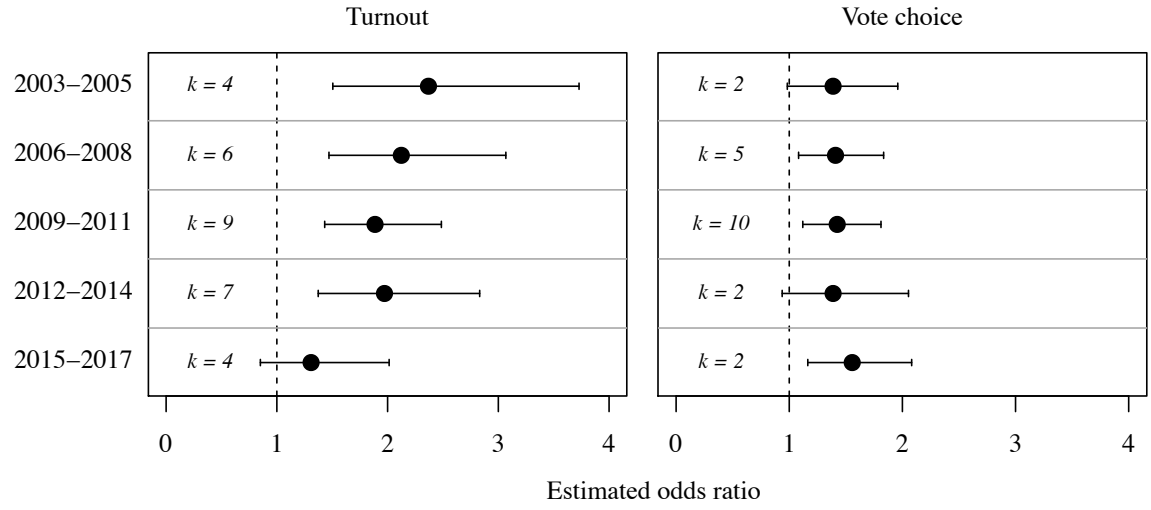



**Figure B3:** Mixed effects moderator analysis on election type

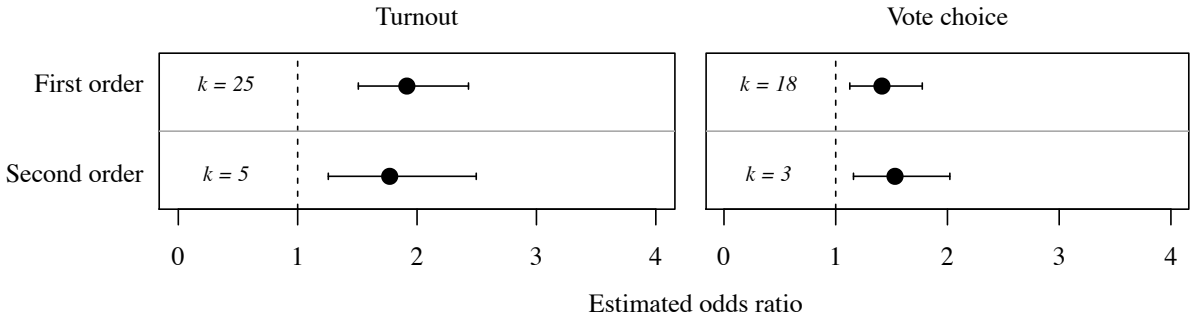


**Figure B4:** Mixed effects moderator analysis on sample size

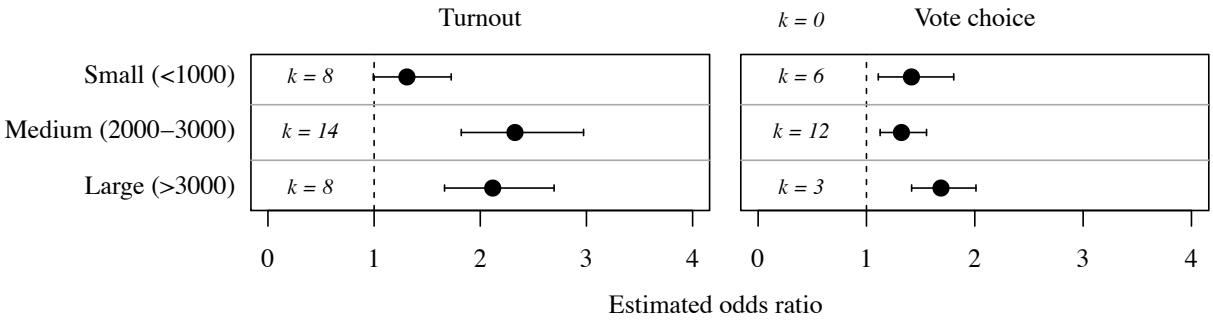



**Figure B5:** Mixed effects moderator analysis on sample type

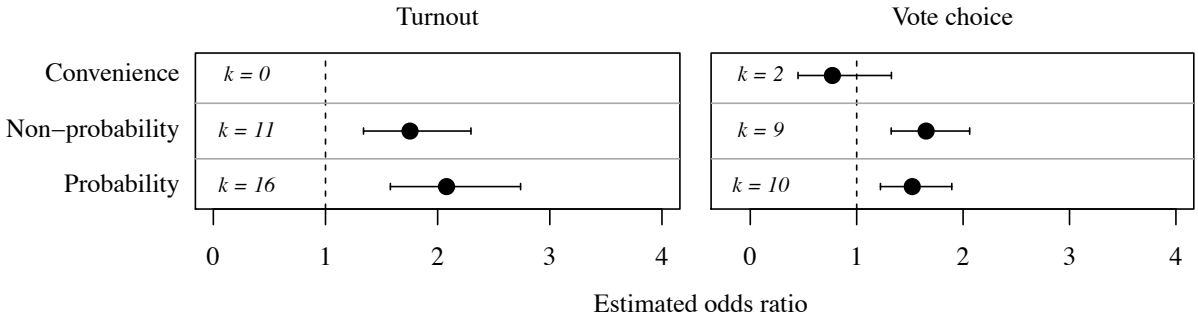



**Figure B6:** Mixed effects moderator analysis on operationalization of vote choice

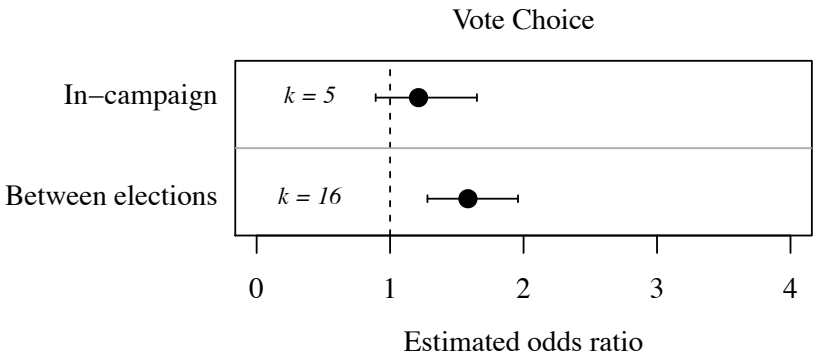


**Figure B7:** Mixed effects moderator analysis, multiple moderators

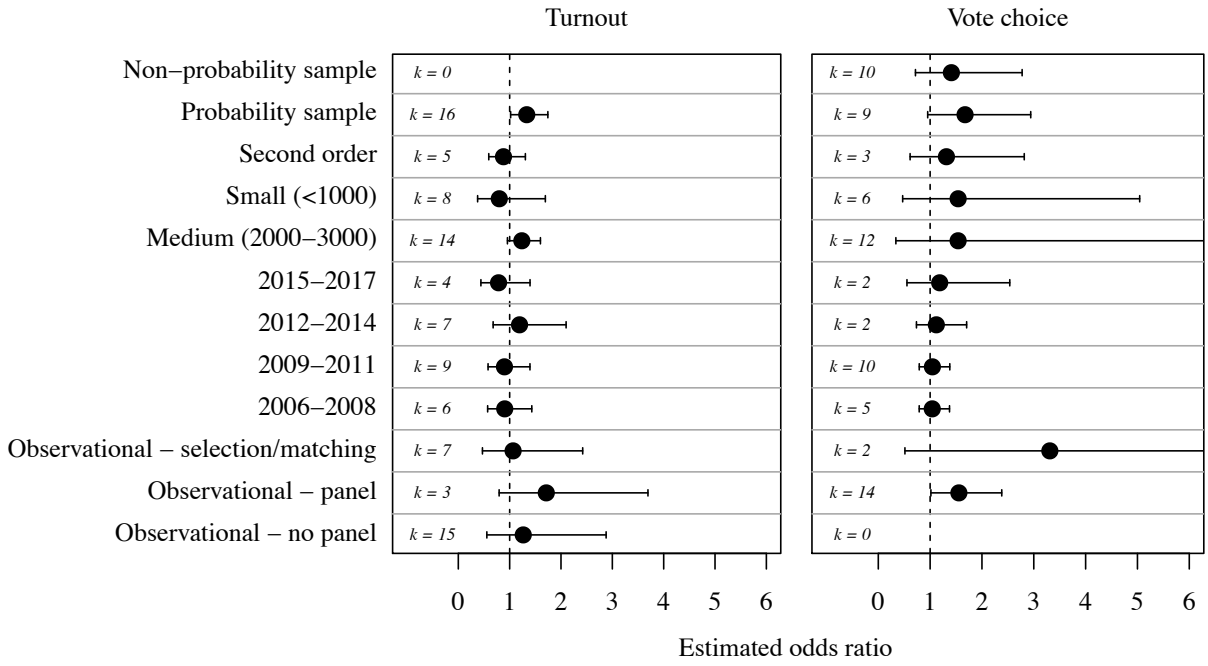
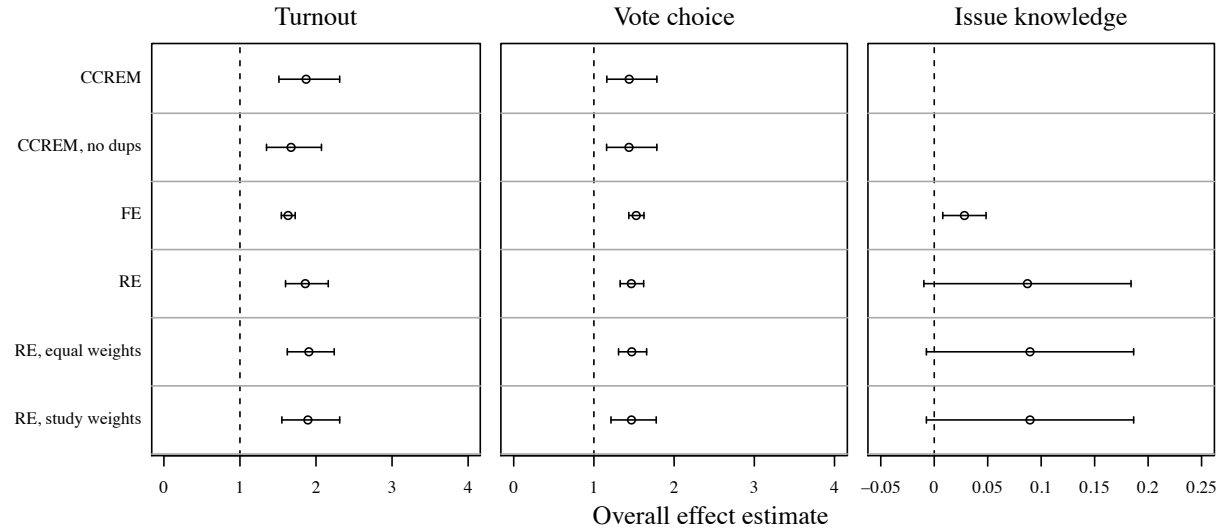
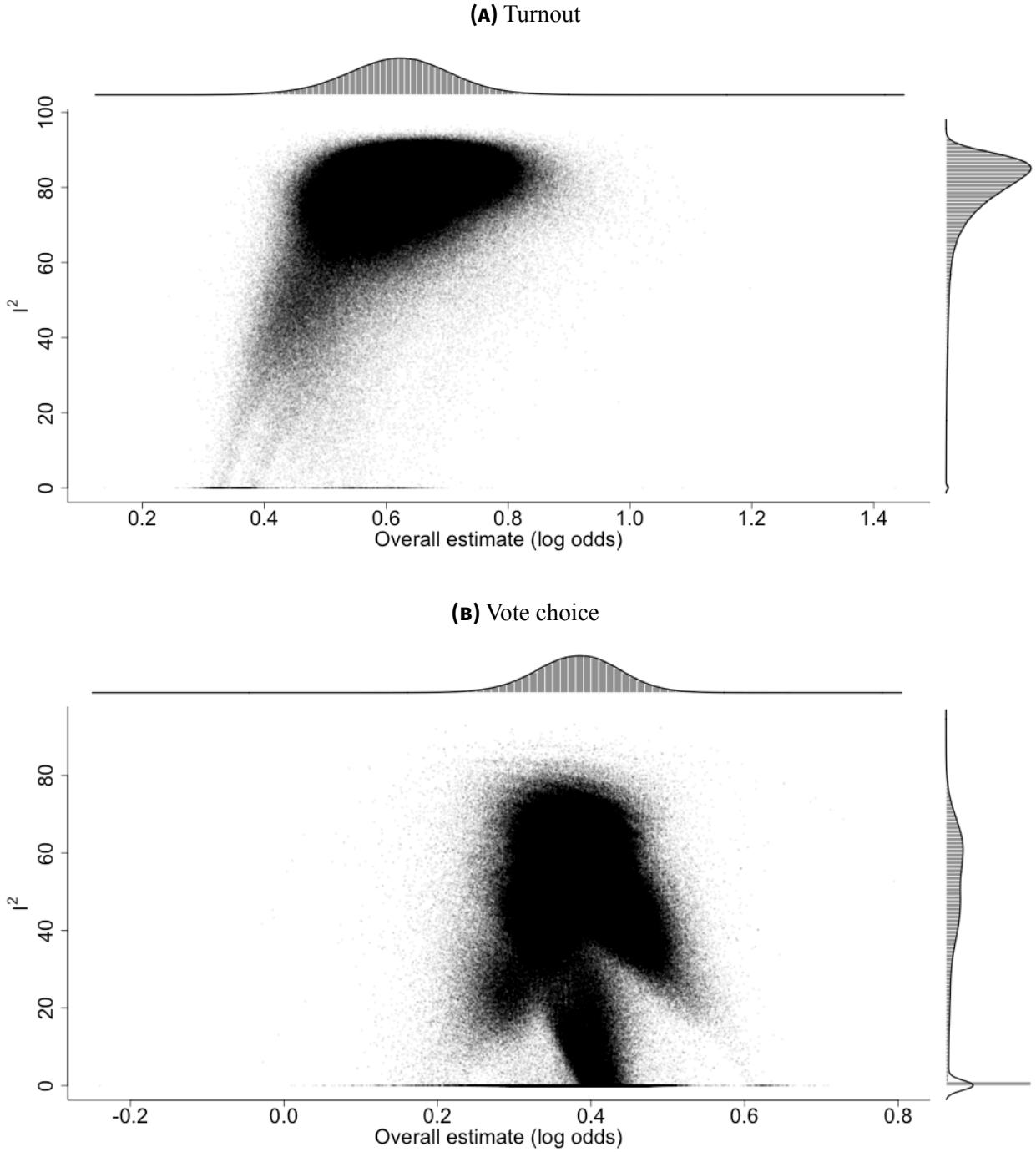



**Figure B8:** Sensitivity of overall effect estimates across several model specifications, by outcome




*Note:* The figure reports overall effect estimates together with 95% CIs across different model specifications by outcome type. The specifications used are (a) cross-classified random effects models (CCREM, as reported in the main text), (b) cross-classified random effects models excluding quasi duplicate studies that re-analyze study data which had been used in predecessor studies (CCREM, no dups), (c) fixed effects models (FE), standard random effects models (RE), random effects models assigning equal weights for effects (RE, equal weights), and random effects models assigning equal weights for studies (RE, study weights).

**FIGURE B9:** Graphical display of heterogeneity (GOSH) plot based on fixed-effects models in all possible subsets of effects.



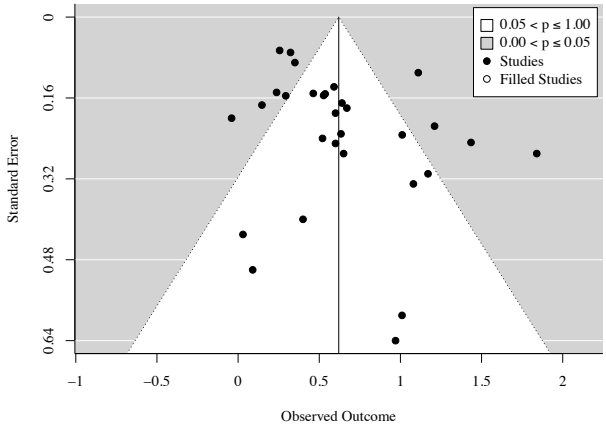

*Note:* The GOSH plot (Olkin et al., 2012) is based on fixed-effects models computed with all $2^{k-1}$ possible subsets of effects. The overall estimate is plotted against between-study heterogeneity $I^2$.

# APPENDIX C PUBLICATION BIAS ANALYSIS

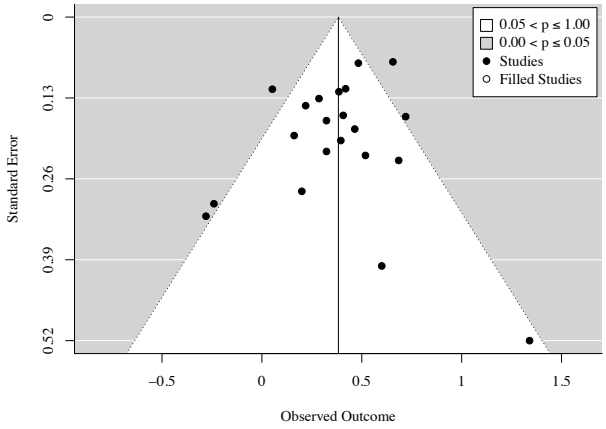
To assess publication bias, we have utilized a trim-and-fill method, which takes a two-step approach to identifying and adjusting for publication bias based on the funnel plot (see Duval and Tweedie, 2000). First, the model trims out small-$N$ studies to obtain a more symmetrical funnel plot and estimates a new summary effect based on the larger-$N$ studies. Second, the model restores the trimmed studies and adds the imputed "missing" counterparts of the effects around the new summary effect estimate. There are no "missing" studies imputed in either case (see Figure C1). The results do not suggest support for potential publication bias for the reported effects. Given that the funnel plot-derived trim-and-fill method assumes publication bias as the only reason for asymmetry, we note that there are various alternative explanations in this case for the observed asymmetry, such as methodological heterogeneity.

**FIGURE C1:** Trim-and-fill funnel plots, random-effects models

**(A)** Turnout




**(B)** Vote choice



# APPENDIX D SOFTWARE STATEMENT

The entire analysis was run under OS X 10.15.4 using R version 3.6.2 (R Core Team, 2019). In the empirical analysis, we made use of the following `R` software packages:

`dmetar` (Harrer et al., 2019),
`dplyr` (Wickham and Francois, 2015),
`ggplot2` (Wickham, 2016),
`haven` (Wickham and Miller, 2018),
`janitor` (Firke, 2018),
`magrittr` (Bache and Wickham, 2014),
`metafor` (Viechtbauer, 2010),
`readxl` (Wickham and Bryan, 2018),
`stringr` (Wickham, 2015),
`writexl` (Ooms, 2018), and
`xtable` (Dahl, 2016).

# REFERENCES


Alvarez, R Michael, Ines Levin, Alexander H Trechsel and Kristjan Vassil. 2014. "Voting advice applications: How useful and for whom?" *Journal of Information Technology & Politics* 11(1):82–101.

Alvarez, R Michael, Ines Levin, Peter Mair and Alexander Trechsel. 2014. "Party preferences in the digital age: The impact of voting advice applications." *Party Politics* 20(2):227–236.

Andreadis, Ioannis and Matthew Wall. 2014. "The impact of voting advice applications on vote choice." *Matching Voters with Parties and Candidates. Voting Advice Applications in Comparative Perspective* pp. 115–128.

Bache, Stefan Milton and Hadley Wickham. 2014. *magrittr: A Forward-Pipe Operator for R*. R package version 1.5.

Boogers, Marcel. 2006. "Enquête bezoekers Stemwijzer." *Universiteit van Tilburg* .

Dahl, David B. 2016. *xtable: Export Tables to LaTeX or HTML*. R package version 1.8-2.

De Rosa, Roberto. 2010. "cabina-elettorale. it (Provides advice to Italian voters since 2009)." *Voting Advice Applications in Europe: The State of the Art* pp. 247–257.

Dinas, Elias, Alexander H Trechsel and Kristjan Vassil. 2014. "A look into the mirror: Preferences, representation and electoral participation." *Electoral Studies* 36:290–297.

Duval, Sue and Richard Tweedie. 2000. "Trim and fill: a simple funnel-plot–based method of testing and adjusting for publication bias in meta-analysis." *Biometrics* 56(2):455–463.

Enyedi, Zsolt. 2016. "The Influence of Voting Advice Applications on Preferences, Loyalties and Turnout: An Experimental Study." *Political Studies* 64(4):1000–1015.

Firke, Sam. 2018. *janitor: Simple Tools for Examining and Cleaning Dirty Data*. R package version 1.0.0.

Fivaz, Jan and Giorgio Nadig. 2010. "Impact of voting advice applications (VAAs) on voter turnout and their potential use for civic education." *Policy & Internet* 2(4):167–200.

Garry, John, James Tilley, Neil Matthews, Fernando Mendez and Jonathan Wheatley. 2018. "Does receiving advice from Voter Advice Applications (VAAs) affect public opinion in deeply divided societies? Evidence from a field experiment in Northern Ireland." *Party Politics* 0(0):1–8.

Garzia, Diego, Alexander H Trechsel and Andrea De Angelis. 2017. "Voting advice applications and electoral participation: a multi-method study." *Political Communication* 34(3):424–443.

Garzia, Diego and Andrea De Angelis. 2014. The Impact of Voting Advice Applications on Electoral Participation. In *Matching Voters with Parties and Candidates. Voting Advice Applications in a Comparative Perspective*, ed. Diego Garzia and Stefan Marschall. ECPR Press chapter 8, pp. 105–114.

Gemenis, Kostas. 2018. "The Impact of Voting Advice Applications on Electoral Turnout: Evidence from Greece." *Statistics, Politics and Policy* 9(2):161–179.

Gemenis, Kostas and Martin Rosema. 2014. "Voting advice applications and electoral turnout." *Electoral studies* 36:281–289.

Germann, Micha and Kostas Gemenis. 2019. "Getting Out the Vote With Voting Advice Applications." *Political Communication* 36(1):149–170.

Harrer, Mathias, Pim Cuijpers, Toshi Furukawa and David Daniel Ebert. 2019. *dmetar: Companion R Package For The Guide 'Doing Meta-Analysis in R'*. R package version 0.0.9000.

Heinsohn, Till, Jonas Israel, Stefan Marschall and Martin Schultze. 2016. "Online-Wahlhilfen in Wahlkämpfen." *Zeitschrift für Politikwissenschaft* 26(3):253–277.

Israel, Jonas, Stefan Marschall and Martin Schultze. 2016. "Kognitive Dissonanz und die Effekte von Voting Advice Applications–Ergebnisse eines Quasi-Experiments anlässlich des Einsatzes des Wahl-O-Mat zur Europawahl 2014 (Cognitive Dissonance and the Effects of Voting Advice Applications–Results from a Quasi-Experiment during Use of the Wahl-O-Mat before the 2014 European Elections)." *Politische Psychologie* (1):115–135.

Israel, Jonas, Stefan Marschall and Martin Schultze. 2017. "Cognitive dissonance and the effects of Voting Advice Applications on voting behaviour: evidence from the European Elections 2014." *Journal of Elections, Public Opinion and Parties* 27(1):56–74.

Kamoen, Naomi, Bregje Holleman, André Krouwel, Jasper Van de Pol and Claes De Vreese. 2015. "The effect of voting advice applications on political knowledge and vote choice." *Irish Political Studies* 30(4):595–618.

Klein Kranenburg, Laurens. 2015. The impact of voting advice applications on party choice in Dutch national and provincial elections. Master's thesis University of Twente.

Kleinnijenhuis, Jan, Jasper van de Pol, Anita MJ van Hoof and André PM Krouwel. 2019. "Genuine effects of vote advice applications on party choice: Filtering out factors that affect both the advice obtained and the vote." *Party Politics* 25(3):291–302.

Ladner, Andreas, Jan Fivaz and Joëlle Pianzola. 2012. "Voting advice applications and party choice: evidence from smartvote users in Switzerland." *International Journal of Electronic Governance* 5(3-4):367–387.

Ladner, Andreas and Joëlle Pianzola. 2010. Do voting advice applications have an effect on electoral participation and voter turnout? Evidence from the 2007 Swiss Federal Elections. In *International Conference on Electronic Participation*. Springer pp. 211–224.

Mahéo, Valérie-Anne. 2016. "The Impact of Voting Advice Applications on Electoral Preferences: A Field Experiment in the 2014 Quebec Election." *Policy & Internet* 8(4):391–411.

Mahéo, Valérie-Anne. 2017. "Information Campaigns and (Under) Privileged Citizens: An Experiment on the Differential Effects of a Voting Advice Application." *Political Communication* 34(4):511–529.

Manavopoulos, Vasilis, Vasiliki Triga, Stefan Marschall and Lucas Constantin Wurthmann. 2018. "The Impact of VAAs on (non-Voting) Aspects of Political Participation: Insights from Panel Data Collected During the 2017 German Federal Elections Campaign." *Statistics, Politics and Policy* 9(2):105–134.

Marschall, Stefan and Christian K Schmidt. 2008. Preaching to the converted or making a difference? Mobilizing effects of an internet application at the German general election 2005. In *Non-party actors in electoral politics*. Nomos Verlagsgesellschaft mbH & Co. KG pp. 259–278.

Marschall, Stefan and Christian K Schmidt. 2010. "The impact of voting indicators: the case of the German Wahl-O-Mat." *Voting advice applications in europe. The state of the art* pp. 61–86.

Marschall, Stefan and Martin Schultze. 2012*a*. "Normalisierung oder Mobilisierung?–Die Auswirkungen politischer Online-Kommunikation auf die Wahlbeteiligung am Beispiel einer Internet-Applikation zur Bundestagswahl 2009." *Politische Vierteljahresschrift* pp. 444–466.

Marschall, Stefan and Martin Schultze. 2012*b*. "Voting Advice Applications and their effect on voter turnout: the case of the German Wahl–O–Mat." *International Journal of Electronic Governance* 5(3-4):349–366.

Marschall, Stefan and Martin Schultze. 2012*c*. "Voting Advice Applications and their effect on voter turnout: the case of the German Wahl–O–Mat." *International Journal of Electronic Governance* 5(3-4):349–366.

Munzert, Simon, Pablo Barberá, Andrew M. Guess and JungHwan Yang. Forthcoming. "Do Online Voter Guides Empower Citizens? Evidence from a Field Experiment with Digital Trace Data." *Public Opinion Quarterly* .

Mykkänen, Juri and Tom Moring. 2006. "Dealigned Politics Comes of Age? The Effects of Online Candidate Selectors on Finnish Voters." Paper presented at the Conference of Politics on the Internet: New Forms of Media for Political Action, Tampere, 24-25 November, 2006.

Nuytemans, Michiel, Stefaan Walgrave and Kris Deschouwer. 2010. Do the vote test: the Belgian voting aid application. In *Voting advice applications in Europe, the state of the art/Cedroni, Lorella [edit.]; ea*. pp. 125–142.

Olkin, Ingram, Issa J Dahabreh and Thomas A Trikalinos. 2012. "GOSH–a graphical display of study heterogeneity." *Research synthesis methods* 3(3):214–223.

Ooms, Jeroen. 2018. *writexl: Export Data Frames to Excel 'xlsx' Format*. R package version 1.1.
**URL:** *https://CRAN.R-project.org/package=writexl*

Pianzola, Joëlle. 2014*a*. "Selection biases in voting advice application research." *Electoral Studies* 36:272–280.

Pianzola, Joëlle. 2014*b*. "Swing voting due to smartvote use? Evidence from the 2011 Swiss federal elections." *Swiss Political Science Review* 20(4):651–677.

Pianzola, Joëlle, Alexander H Trechsel, Kristjan Vassil, Guido Schwerdt and R Michael Alvarez. 2019. "The impact of personalized information on vote intention: Evidence from a randomized field experiment." *The Journal of Politics* 81(3):833–847.

R Core Team. 2019. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing.
**URL:** *https://www.R-project.org/*

Ramos, Javier, Javier Padilla and Enrique Chueca. 2019. "Abstentionism, Voting Advice Applications and Voting Activation." *Statistics, Politics and Policy* 10(1):55–85.

Ruusuvirta, Outi and Martin Rosema. 2009. Do online vote selectors influence electoral participation and the direction of the vote? In *ECPR General Conference 2009, Potsdam*. pp. 1–22.

Schultze, Martin. 2013. "Effekte des Wahl-O-Mat auf politisches Wissen über Parteipositionen." *ZPol Zeitschrift für Politikwissenschaft* 22(3):367–391.

Schultze, Martin. 2014. "Effects of voting advice applications (vaas) on political knowledge about party positions." *Policy & Internet* 6(1):46–68.

van de Pol, Jasper. 2016. *Voting wiser: The effect of Voting Advice Applications on political understanding*. University of Amsterdam: PhD Thesis.

Vassil, Kristjan. 2011. *Voting Smarter? The impact of voting advice applications on political behavior*. European University Institute: PhD Thesis.

Viechtbauer, Wolfgang. 2010. "Conducting meta-analysis in R with the metafor package." *Journal of Statistical Software* 36(3):1–48.

Walgrave, Stefaan, Peter Van Aelst and Michiel Nuytemans. 2008. "'Do the vote test': the electoral effects of a popular vote advice application at the 2004 Belgian elections." *Acta Politica* 43(1):50–70.

Wall, Matthew, André Krouwel and Thomas Vitiello. 2014. "Do voters follow the recommendations of voter advice application websites? A study of the effects of kieskompas. nl on its users' vote choices in the 2010 Dutch legislative elections." *Party Politics* 20(3):416–428.

Wang, Austin. 2016. The Connection and Effectiveness of iVoter in Taiwan's 2012 Legislative Election. In *Political Behavior and Technology*. Springer pp. 137–155.

Westle, Bettina, Christian Begemann and Astrid Rütter. 2015. "The "Wahl-O-Mat" in the course of the German Federal Election 2013–Effects of a German VAA on users' election-relevant political knowledge." *Zeitschrift für Politikwissenschaft* 24(4):389–426.

Wickham, Hadley. 2015. *stringr: Simple, Consistent Wrappers for Common String Operations*. R package version 1.0.0.

Wickham, Hadley. 2016. *ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York.

Wickham, Hadley and Evan Miller. 2018. *haven: Import and Export 'SPSS', 'Stata' and 'SAS' Files*. R package version 1.1.1.

Wickham, Hadley and Jennifer Bryan. 2018. *readxl: Read Excel Files*. R package version 1.1.0.
**URL:** *https://CRAN.R-project.org/package=readxl*

Wickham, Hadley and Romain Francois. 2015. *dplyr: A Grammar of Data Manipulation*. R package version 0.4.3.