The Impact of Voting Advice Applications on Vote Choice

Ioannis Andreadis and Matthew Wall

In this chapter, we re-examine one of the best-investigated aspects of VAAs – their effects on the vote choices of users. We focus on whether VAA use is associated with an increased likelihood of vote switching using an integrated data set comprising nine national election studies that include items on VAA use. We explore the strengths and weaknesses of these data – noting that they are structured in a manner that makes it difficult to definitively distinguish causation from correlation, but that they do offer a high level of external validity – making it possible to make inferences about the impact of VAAs on electorates. We find that VAA use is associated with an increased likelihood to 'switch' between parties, controlling for an array of confounding factors. This finding is robust to several modelling strategies that were employed in order to account for epistemologically problematic data structures. We conclude with recommendations for future National Election Studies seeking to capture the effects of VAA use.

Introduction

Given their constantly increasing global reach and popularity (Rosema, this volume), it is important to know whether VAAs have an impact on users' vote choice. As Bartels (2006: 134) reminds us: 'the primary aim of participants in electoral campaigns is to produce politically significant changes in the attitudes and perceptions of perspective voters. The primary aim of scholarly observers of election campaigns is to measure and explain those politically significant changes'. While, as Grazia et al. (this volume) elaborate, several scholars have focused on turnout as a dependent variable, the question of whether VAA-use affects vote choice is also the subject of several research papers (Andreadis & Chadjipadelis 2011; Marschall & Schmidt 2010; Pianzola et al. 2012; Ruusuvirta, & Rosema, 2009; Walgrave et al. 2008; Wall et al., 2012).

This paper takes up the question of VAAs' effects on vote choice, but adopts a novel methodological approach – we seek to test for a VAA 'effect' across several political systems (Switzerland, Germany, the Netherlands and Finland) using data collected in national election studies. Because all of these studies include questions about respondents' use of VAAs, we combine these datasets and perform a pooled analysis of the link between VAA-use and voters' propensity to switch allegiance between parties. We outline our theoretical understanding of VAA effects on vote choice, elaborating a testable hypothesis. We then discuss the epistemological challenges of inferring 'effects' on the basis of survey data, before presenting our data, methods, and analysis. We conclude

with a discussion of best practice for future national election studies that seek to capture the effects of VAA use.

Why would we expect VAA use to influence vote choice?

In a context of growing voter-party dealignment in established democracies around the world (Dalton 2000), the importance attributed to political campaigns by both practitioners and academics has grown rapidly in recent years (Farrell and Schmidt-Beck, 2002), resulting in a scholarly focus on short-term determinants of voting behaviour, including *inter alia* party issue stances (Franklin et al., 1992; McAllister, 2007; Carmines and Stimson, 1980; Erikson and Tedin, 2007). We proceed from the presumption that issue-based voting represents a reasoned attempt by voters to use party policy positions to guide their electoral decision (Downs 1957). During campaigns, candidates and parties announce positions on issues in order to win votes, and voters choose the alternatives that best represent their interests on those issues. If we adopt this conceptualisation of political campaigns, VAAs represent a uniquely personalised and directed source of issue-based political *information* that voters can access during campaigns.

Walgrave et al. (2008) argue that the potential for VAAs to influence electoral behaviour lies in their informative effect. A major function of VAAs is to substantially reduce the cognitive cost needed for a voter to engage in informed issue voting. Wall et al. (2012) further argue that the 'recommendations' issued by VAAs have a powerful heuristic quality given that modern campaigns are often suffused with tracts of indigestible data coming from a baffling array of political and media actors. Thus, it is anticipated that VAA use may influence voter behaviour by making voters more likely to vote for the party that is recommended to them.

What are the observable implications of this theoretical approach? The most obvious hypothesis is that voters should be more likely to vote for party that was 'recommended' to them by the VAA. Indeed, Wall et al. (2012) find that this was the case for a group of Dutch VAA users. However, not all public opinion datasets that measure VAA use include a variable describing the specific recommendations received by users, and, even where they do, user's recall of their recommendation is not always reliable (Wall et al., 2012). A second, more analytically tractable implication of the argument can be stated in the following hypothesis:

H1: VAA users are more likely to switch parties (either between elections or during campaigns) than non-users.

The logic underlying this hypothesis is that, in cases where they are recommended a party that they had not previously voted for or considered as a potential vote choice, voters are more likely to give consideration to that party (Pianzola et al. 2012; Walgrave et al. 2008). It is this empirical contention that

we will explore. We begin this exploration with a discussion of the challenges involved in identifying VAA 'effects'.

The Epistemological and Methodological Challenges of Identifying VAA 'effects'

Differentiating causation from correlation is a challenge that unites social scientists across a wide array of specialisations – and one that has long been acknowledged as being of fundamental epistemological importance (see, for example: Wright 1921). This is particularly the case for advocates of a 'scientific' approach to the social sciences, with the foundational epistemological work on the topic holding that a definitional criterion of scientific social research is that 'the goal is inference' (King et al. 1994: 7). King et al. go on to elaborate that scientific inference can be either descriptive or causal, with the latter defined as 'learning about causal effects from the data observed' (p. 8).

However, in seeking to arrive at causal inferences about the social/political world, we confront a fundamental problem: the impossibility of observing the counterfactual (Imai et al. 2011). Because human events cannot be replayed with a certain variable altered and everything else held constant, we can never be fully certain when we seek to infer causal relationships by observing data drawn from the social/political world.

Several studies investigating the effects of VAAs on their users' vote choices have employed post-election surveys of users (sometimes as part of larger surveys which also include non-users), where respondents provided their own subjective evaluations of whether their choice was influenced by their visit to a VAA site (Carlson and Strandburg 2005; Aarts and van der Kolk 2007; Ladner et al. 2010; Marschall and Schmidt 2010; Walgrave et al. 2008). These surveys have varied dramatically in their estimates of the importance attributed by users to VAA sites. Estimates of percentages of users who feel that their eventual decision was influenced by their visit to a VAA vary from a low of 6% (Marschall 2005) to a high of 67% (Lander et al. 2010). Unfortunately, a lack of standardisation in the field to date means that the specific questions used to elicit estimates of site influence vary across studies, which may help to explain some of the disparity of findings.

From an epistemological point of view, subjective evaluations of the extent to which an event or recommendation was influential after the fact, while informative, are regrettably not totally reliable sources of information as to the actual influence that the event may have exercised. The agenda-setting, priming and framing literatures in communication and media studies, for instance, have uncovered the existence of politically influential behaviours that rarely register in the consciousness of voters (Scheufele and Tweksbury, 2007). More generally, post-election surveys provide limited analytical leverage over the impact of any single campaign event on voting patterns, which is why dynamic designs, such as survey panels and rolling cross-sections (Bartels, 2006) have been employed by researchers interested in campaign effects. Finally, surveys of VAA users rely on

the co-operation of those users – and it is likely that those VAA users who respond to survey requests from VAA designers are more likely to have a positive perception of VAAs (Andreadis, 2013). We note here that Vassil (2011) presents a promising approach to dealing with this issue for user surveys - using a Heckman selection model in his re-analysis of Swiss *Smartvote* user survey data.

The ideal scenario from an epistemological and methodological standpoint is random assignment of a treatment (in this case, VAA use). Given random assignment, one can simply compare treatment and control groups. Indeed, this approach was adopted by Pianzola et al. (2012) – subjects were randomly assigned to treatment and control groups, where the treatment was an email invitation to use the *Smartvote* VAA. The resultant analysis indicates that, as our research hypothesis implies, those exposed to the treatment were more likely to consider multiple parties as viable vote choices.

However, experimental studies are of limited external validity when the experimental subjects are not randomly drawn from a representative sample of society. Furthermore, the attribution of VAA participation across a society by a research team is ethically questionable, given the purported role of VAAs as a source of politically useful information for voters (Marschall and Schmidt 2008). Finally, if access to a VAA is open to the public, we cannot be sure that the subjects selected for the control group have not followed the treatment (i.e., used the VAA), because even if they have not got an email invitation, they could learn about the VAA from their peers. This means that analysts must engage with observational survey data based on representative sampling if they wish to generate inferences about the effects of VAAs on electorates.

The difficulty that cross-sectional survey data poses relates to causal inference. VAA use is not randomly assigned to individuals (see Marschall, this volume), and VAA sites can attract high numbers of unaligned or wavering voters (Ladner et al., 2010). Analyses of whether users of VAA sites exhibit higher in-campaign or between-election volatility than non-users may therefore tell us more about the type of audiences that VAAs attract than about the effects that they may be said to exert. As such, a bi-variate analysis may report a VAA 'effect' that is little more than spurious correlation.

One strategy for addressing this difficulty involves using panellised survey data, where the same individuals are tracked at several time points, so that the causal effect of VAA exposure between these time points is identifiable (Ruusuvirta and Rosema 2009; Walgrave et al. 2008; Wall et al. 2012). Unfortunately, panellised data structures are the exception, rather than the rule, for national election studies, and we therefore cannot draw on such methods in our analysis. Even if we had panel data, we would not be absolutely sure that the users have switched their vote choice because of VAA use. It is possible that they switched their vote before visiting the VAA due to some other event. The only way to learn about vote intention before VAA use is to ask users on the VAA site immediately before presenting their 'recommendation' output (see: Andreadis, 2013; Wall et al. 2012).

Therefore, in this article we adopt the following analytical strategy when testing for the existence of VAA 'effects' using national election study data that captures responses at a single time point. We firstly control for possibly confounding variables – i.e., variables that are likely to affect both the probability of VAA use and vote switching. Secondly, we test the robustness of our analysis to multiple model specifications, including models that are specifically designed to account for endogenous causal relationships between independent and dependent variables. Finally, we analyse both pooled models capturing data from multiple studies and analyses that separate out the individual studies.

Data, Variables and Methods

Data – National Election Studies with VAA-use questions

In order to test our research hypothesis, at a minimum we need a variable that describes vote switching and a variable that describes VAA use. All national election studies include questions regarding vote choice both for the current and the previous election, and several include an item about in-campaign switching.

On the other hand, items regarding VAA use have appeared in a very limited number of national election studies questionnaires. We were able to find such items in studies from Finland, Germany, Switzerland, and the Netherlands. In our pooled dataset there are three election studies from Finland (2003, 2007 and 2011), one from Germany (2009), three from the Netherlands (2003, 2006 and 2010) and two from Switzerland (2007 and 2011). None of these datasets includes a variable for in-campaign vote switching, but all of them include variables regarding vote choice in the current and in the previous election. In order to analyse vote switching, we therefore consider only those respondents who named the political party they have voted in both elections. For these respondents we calculate a new variable that describes vote switching coded with the value of 1 when the two vote choices are different and 0 when the two vote choices are the same.

For VAA use, the situation is more complicated. For instance, in Finland information on VAA use was extracted by a question asking Finnish voters whether they followed the election campaign via online candidate selectors. The German study includes a direct question on VAA use, but this question is asked only to a subset of survey participants, because another question (about frequency of Internet use) is used as a filter. The Dutch study includes a direct question on VAA use but it is asked only to respondents who have indicated that they know one or more VAAs. A detailed description of the preparation of the datasets can be found at Andreadis et al. (2013). Table 11.1 shows the rates of VAA use and Vote Switching per study.

<<< Table 11.1 near here >>>

Variables to be controlled for

VAA use is only one of a number of factors that could have an impact on vote switching. Based on the established literature on vote choice and on the constraints imposed by the availability of the suitable variables in all datasets we have in our hands, we can construct a regression model to estimate the impact of VAA use on vote switching while controlling for other factors that can affect vote switching. Thus, in addition to VAA use, we have included the following control variables: age of respondent; strength of party identification; evaluation of the economy; left/right self-placement; and level of satisfaction with the way that democracy works in the country. In the pooled analysis, we also include country/year dummies for each election study.

Age is a particularly important control in an analysis of vote switching because it has been argued that as people get older, they accumulate political experience and become more confident about their party identification and less likely to change it. In addition, older people are more likely to forgive mistakes made by their parties. As Franklin and Jackson (1983: 960) put it: 'an older Republican in 1964 or an older Democrat in 1972 may easily discount the platforms of their party in those elections as not being truly representative of the party. On the other hand, younger voters with less experience and fewer observations may not be so sure of future party positions'. As a result, younger voters are expected to switch their votes more often.[1] Similarly, Carrubba and Timpone (2005) find that older people are less probable to defect from governing coalition parties.

Strong party identification is the best-known factor that makes voters remain loyal to their party (Campbell et al. 1960; Herrnson, and Curry, 2011; Evans and Chzhen, 2013), thus we expect to find party identification to have negative relationship with vote switching.

With regard to Left/Right self placement, right wing voters (being conservatives) are less probable than left wing voters to change their votes. Marsh (2009) using data on the elections for the European Parliament finds that left wing voters are more likely to switch. Similarly, on the other side of the Atlantic, Herrnson, and Curry (2011: 296) find that 'Republicans on the liberal end of the spectrum (roughly 2% of all identifiers), were about 37 percentage points more likely to cross party lines than the most conservative Republicans'.

As far as the evaluation of the economy is concerned, a negative evaluation would make voters of the government party(ies) more likely to switch their votes (see Erikson,1989; Evans and Chzhen, 2013). Furthermore, Carrubba and Timpone (2005) show that unemployment and low GDP have negative impact on voting for governing coalition parties.

Finally, with regard to satisfaction with democracy, we expect unsatisfied voters to be more probable to switch their vote. According to Zelle, political dissatisfaction is a potential predictor of volatility: ‘floating voters on average

[1] In fact, Franklin and Jackson (1983: 965) conclude that the effect of past identification on current identifications increases by 0.13 for each ten years of age.

are somewhat less satisfied with the political system, less trusting in parties, and less happy about their favoured party' (2005: 340).

With regard to the profile of VAA users, analyses that focus on user demographics have consistently shown that VAA-users are more younger, more affluent, and more educated than national populations as a whole (Çarkoğlu et al. 2012; Hooghe and Teepe 2007; Marschall, this volume; Ruusuvirta and Rosema 2009; Wall et al. 2009). However, there are indications that the gap between VAA users and the rest of the population is narrowing over time (Fivaz and Nadig 2010). We thus use these socio-demographic variables as predictors of VAA use. We also control for political interest, because it is expected to have a positive relationship with VAA use (Marschall, this volume). Finally, we have included the strength of party identification as independent variable in order to test if it has a positive or negative impact on VAA use.

Methods: Modelling VAA effects

Since our dependent variable (vote switching) is a binary variable, we can assume that the observed outcomes (0, 1) are determined by a latent regression on a continuous variable and that the errors are distributed according to the Normal distribution $N(0,1)$, i.e., we have a probit model. If all the aforementioned independent variables were exogenous, we could use a simple probit model for vote switching.

But, as we discussed above, VAA use is not randomly attributed across the population, so we also need to employ a model where VAA use is not considered to be exogenously determined. Following the approach of Greene (2002 p.715-718) and Greene and Hensher (2010 p. 90-93), we can model VAA effects on vote choice as a *recursive simultaneous-equations model* and, to be more specific, as a recursive bivariate probit model. A recursive bivariate model is a more complex specification than a probit, which accounts for unobserved heterogeneity that affects both independent and dependent variables. This is similar to "Model 6" analysed by Maddala (1983 p.122-123)[2]. Bivariate probit is the extension of the probit model to allow more than one equation, with correlated disturbances, as in a seemingly unrelated regressions model. We also note that this modelling strategy is advocated by Pianzola and Ladner (2011) in order to analyse the effects of VAAs on the vote switching propensities of users employing data that includes both treated and non-treated respondents (i.e., a mix of those who have and have not used VAAs).

In applying a bivariate probit model on a dataset there are two issues that require special attention: i) testing the goodness of fit of the model to the dataset and ii) testing if the correlation coefficient ρ equals zero. If the goodness of fit

[2] Following Maddala, we should clarify that our model is not a sequential model. Our model would be sequential if the occurrence of VAA use was a precondition for vote switching (i.e., if we could not measure the vote switching - or if it was always 0 when VAA use was 0). If the model was sequential, the proper estimation procedure would be to estimate the first model (VAA use) using the entire set of data, and estimate the second model (vote switching), but using the subset of observations for which VAA use =1.

fails then the model does not perform well in describing the data we have in our hands. For our model, which is based on maximum likelihood estimation, it is necessary to test for the goodness of fit because maximizing the joint density of the observed dependent variables does not guarantee a good fit (Greene 2002, p. 686). The goodness of fit is tested using Murhy's score test of normality in bivariate probit models (see Murphy, 2007; Chiburis et al. 2012). The correlation coefficient ρ measures the correlation between the disturbances in the equations According to Greene: *'ρ measures (roughly) the correlation between the outcomes after the influence of the included factors is accounted for'* (2002, p. 717). If ρ equals zero the model consists of independent probit equations, which can be estimated separately (p.712). The hypothesis the ρ=0 is tested by the likelihood ratio chi-square test (comparing the likelihood of the full bivariate model with the sum of the log likelihoods for the univariate probit models).

In the analysis below, we employ recursive bivariate probit models for cases where ρ is statistically significant, indicating that the exogeneity assumption cannot be met. This is the case for our pooled analysis of all datasets. However, apart from the 2011 Swiss election study, ρ is not statistically significant in any of the models for individual election studies, so in these cases, we employ probit models.

Analysis

Table 11.2 reports the results of an analysis of a pooled dataset comprising our 9 national election studies. The results reported in bold in the first column indicate that VAA use has a positive and significant effect on users' likelihood to engage in vote switching, with 99% confidence. This finding provides support for the relationship between VAA use and vote switching that we elaborated in Hypothesis 1.

<<< Table 11.2 near here >>>

In order to estimate the average treatment effect of VAA use on vote choice we have calculated the average value of the differences of the conditional probabilities P(vote switching = 1 | VAA use = 1) – P(vote switching = 1 | VAA use = 1) to get $ATE_{biprobit}$=0.209. This means that on average the probability to switch vote after using a VAA is 0.21 higher from the probability to switch vote without using a VAA. If we have used the univariate probit the estimated average treatment effect would be ATE_{probit} =0.073. i.e. it would be considerably smaller (though still positive and statistically significant).

The correlation coefficient of the bivariate probit model (reported in the third column of table 11.2) is significant and negative (ρ= -0.247**), indicating that this modelling approach is necessary for these data. We note that Pianzola and Ladner (2011: 12) inform us that 'A negative rho indicates that the treatment effect is underestimated by an ordinary probit model where the selection bias is not considered', and indeed the coefficient for 'VAA-use' is considerably smaller for the probit specification which is consistent with the corresponding findings on the average treatment effects.

Age has a negative effect both on VAA use and on vote switching. The bivariate probit model provides a better understanding of the impact of age on vote switching: age affects vote switching both directly and indirectly (through VAA use).

However, in post-estimation analysis we noted that this biprobit model gives a Murphy's score test result of $X^2_{(9)} = 43.27$ and $sig<0.001$, indicating that the model fit is not good for these data. Specifically, this result indicates that the assumption of bivariate normal distribution of the error terms, which underlies the bivariate probit model, does not hold. Using biprobit models in each individual study we found that the Murphy's score indicates that the bivariate probit model does not fit well to the data of the Dutch 2010 and 2006 and the Swiss 2007 studies. Thus, as a robustness check we exclude these three studies from the pooled analysis reported in Table 11.3. We note that the substantive findings discussed above (i.e. the coefficient of VAA use and the correlation coefficient ρ) do not change for this restricted sample, and Murphy's score test for biprobit indicates a much improved fit: $X^2_{(9)} = 15.94$, and $sig= 0.0682$.

<<< Table 11.3 near here >>>

Finally, we present study-by-study analyses in table 11.4, controlling for the same independent variables as was the case in the pooled analysis. As discussed above, for out of the 9 studies, ρ was not statistically significant, hence we report the results of probit models in table 11.4. We note here that, for the case of the 2011 Swiss election study, where ρ was significant, the substantive results presented here are robust to a bivariate probit specification.

<<< Table 11.4 near here >>>

We can see that, of the 9 election studies analysed, all report a positive coefficient for the 'VAA_use' variable. For 7 of the 9 studies, this coefficient is statistically significant with at least 90% confidence. As with our pooled analysis, these findings lend support to the relationship between VAA use and vote switching that we outlined in Hypothesis 1.

Conclusion

This chapter has examined whether VAA 'effects' on users' vote choices are discernible in a pooled dataset comprising representative samples from 9 national-level elections. While, as we acknowledge, the structure of the data militates against being certain of cause-effect relationships, we nonetheless argue that our findings indicate that VAAs do influence the vote choices of a significant portion of those who use them. This finding chimes with several published papers and work in progress on the effects of VAA-use on vote choice. The finding also serves to re-enforce a theme that is common in discussions

among VAA practitioners – the importance of values of impartiality, transparency and academic rigour in VAA implementation.

An important problem with the analysis the previous section is that with the variable 'VAA use', we cannot discriminate VAA users who have been advised to vote for a different party than they previously voted for from those who have been advised to vote for the same party they had previously voted for. VAA effects on vote choice can run in both directions: enhancing voter loyalty or provoking voter defection. The direction of the effect is determined by the nature of the advice. In fact, if a VAA suggests more than one party there are more possibilities: i) the previously voted for party appears first in the list of VAA results (absolute matching), ii) the VAA shows that the voter is close to his/her pre-selected party, but there is another party that appears first in the list (partial matching) and iii) VAA advice differs significantly from the previous voting behaviour (significant deviation). In the first case, the potential impact of using a VAA is to enhance the user's intention to vote for the pre-selected party. In the third case, the possible effect of VAA will be in the opposite direction, i.e., the VAA recommendation would undermine user's initial selection, and if the influence is strong enough, it can lead to a change of voter's position. In the second case, the possible impact could be towards both directions because it depends on how the voter interprets the output (see Andreadis, Pianzola and Garzia, 2013). Thus, the leverage that we can get over VAA effects is limited by both substantial variation in question wording across studies and the absence, in most cases, of a question asking voters to recall the party that was recommended to them.

This is a very significant factor that changes the role VAA use has for vote switching. In order to better measure the impact of VAAs on vote choice, we would recommend that future studies should consider the following options:

i) Follow the paradigm of Dutch Parliamentary Election Studies of 2006 and 2010, which ask respondents to indicate the parties that VAA(s) recommended to them.

ii) (For those analysts who are also VAA practitioners) ask VAA users to indicate their vote intention before the presentation of the advice and either follow up with an exit survey and collect vote intention or collect email address and follow up with a post election web survey.

Finally, the dataset that we analyse in this chapter will be published on the website for this book. We would urge fellow scholars to further investigate the effects that we have observed in this chapter – there are particularly rich pickings to be found in investigating the national and individual level variables that condition VAA effects, and these data are well-disposed to uncovering such conditioning variables. While the field to date appears to have established that VAA use does affect vote choice, the next step is understanding the factors that exacerbate or minimize these effects, and feeding such findings back into the design and implementation of VAA websites.

Bibliography

Aarts, K. and van der Kolk, H. (2007). The parliamentary election in the Netherlands, 22 November 2006, Electoral Studies, Vol. 26, pp.797 - 837.

Anderson, Christopher J. (1995) Blaming the Government: Citizens and the Economy in Five European Democracies. Armonk, NY: ME Sharpe.

Andreadis, I. (2013) Who responds to website visitor satisfaction surveys? General Online Research Conference GOR 13 March 04-06, 2013, DHBW Mannheim, Germany. http://www.polres.gr/en/sites/default/files/GOR13.pdf

Andreadis, I. Chadjipadelis, Th. (2011) Voting Advice Applications and their impact on elections, at the 61st Political Studies Association Annual Conference (London, UK, 19 - 21 April 2011), Retrieved July 5, 2013, from: http://www.polres.gr/en/sites/default/files/VAAs-Impact-on-Elections.pdf

Andreadis, Ioannis, Joëlle Pianzola, and Diego Garzia (2013). Measuring the impact of Voting Advice Applications on Vote Choice, in 2nd European Conference on Comparative Electoral Research "The Context of Electoral Behaviour" 11-14 April 2013, Rhodes, Greece, available online at: http://true-european-voter.eu/sites/default/files/Measuring-the-impact-of-VAAs_0.pdf

Bartels, Larry. 2006. Three Virtues of Panel Data for the Analysis of Campaign Effects. In Capturing Campaign Effects, ed. Henry E. Brady and Richard Johnston. Ann Arbor: University of Michigan Press, 78-112.

Campbell, Angus, Phillip E. Converse,Warren E. Miller, and Donald E. Stokes. (1960) The American Voter. Chicago: University of Chicago Press.

Carlson, T., Strandberg, K. (2005) The 2004 European parliament election on the web: Finnish actor strategies and voter responses, Information Polity, Vol. 10 No. 3, pp.189 - 204.

Carmines, E., & Stimson, J. (1980). The two faces of issue voting. American Political Science Review, 74, 78–91

Carkoglu, A. Vitiello, T. and Moral, M. (2012) Voting Advice Applications in Practice: Answers to some Key Questions from Turkey, International Journal of Electronic Governance, 5 (3/4): 298-317.

Carrubba, Cliff and Timpone, Richard J. (2005) Explaining Vote Switching Across First- and Second-Order Elections: Evidence From Europe, Comparative Political Studies 38: 260

Chiburis, R. C. Das, J. and Lokshin, M. (2012) A practical comparison of the bivariate probit and linear IV estimators, Economics Letters, Volume 117, Issue 3, December, Pages 762-766.

Dalton RJ (2000) The decline of party identifications. In: Dalton RJ and Wattenberg MP (eds) Parties Without Partisans: Political Change in Advanced Industrial Democracies. Oxford: Oxford University Press, pp. 19–37.

Downs, Anthony. 1957. An Economic Theory of Democracy. New York: Harper and Brothers.

Dutch Parliamentary Election Study 2006 Statistics Netherlands. Kees Aarts, Henk van der Kolk, Martin Rosema and Martha Brinkman on behalf of the

Foundation for Electoral Research in the Netherlands (Stichting Kiezersonderzoek Nederland, SKON).
Evans G. and Chzhen, K. (2013) Explaining Voters' Defection from Labour over the 2005–10 Electoral Cycle: Leadership, Economics and the Rising Importance of Immigration POLITICAL STUDIES: 2013 VOL 61(S1), 138–157
Erikson, Robert S. (1989). Economic Conditions and the Presidential Vote. American Political Science Review 83: 567–73.
Erikson, Robert S. and Kent L. Tedin (American Public Opinion: Its Origins, Content, and Impact, 7th Edition, Pearson
Farrell, David and Rüdiger Schmitt-Beck (eds.). (2002). *Do Political Campaigns Matter? Campaign Effects in Elections and Referendums*. London/New York: Routledge.
Finnish National Election Study 2003 [codebook]. Tampere : Finnish Social Science Data Archive [producer and distributor], 2012.
Finnish National Election Study 2007 [codebook]. Tampere : Finnish Social Science Data Archive [producer and distributor], 2012.
Franklin, Charles H., and John E. Jackson. (1983) The dynamics of party identification. The American Political Science Review 77 (4) (Dec.): 957-73.
Franklin, M., Mackie, T., & Valen, H. (1992). Electoral change: Responses to evolving social and attitudinal. structures in Western countries. Cambridge: CambridgeUniversity Press
Greene, W. (2002) Econometric Analysis (5th edition), Prentice Hall.
Greene, W.H. and Hensher, D.A. (2010) Modeling Ordered Choices: A Primer and Recent Developments, Cambridge University Press.
Herrnson, Paul S. and Curry, James M (2011). Issue Voting and Partisan Defections in Congressional Elections, Legislative Studies Quarterly, XXXVI, 2: 281-307.
Hooghe, M., Teepe, W. (2007) Party profiles on the web: an analysis of the logfiles of nonpartisan interactive political internet sites in the 2003 and 2004 election campaigns in Belgium. New Media & Society 9(6): 965-985.
Imai, Kosuke, Luke Keele, Dustin Tingley, and Teppei Yamamoto. (2011). Unpacking the Black Box of Causality: Learning about Causal Mechanisms from Experimental and Observational Studies. American Political Science Review, Vol. 105, No. 4 (November), pp. 765-789.
Karvonen, Lauri & Paloheimo, Heikki: Finnish National Election Study 2003 [computer file]. FSD1260, version 1.1 (2012-01-05). Espoo: TNS Gallup Finland [data collection], 2003. Elections and Representative Democracy in Finland research group [producer], 2003. Tampere: Finnish Social Science Data Archive [distributor], 2012.
Fivaz, J. and Nadig, G. (2010) Impact of Voting Advice Applications (VAAs) on Voter Turnout and Their Potential Use for Civic Education, Policy & Internet, Vol. 2 No.4, Article 7.
King, Gary, Keohane, Robert O and Verba, Sidney (1994). Designing Social Inquiry: Scientific Inference in Qualitative Research. Princeton: Princeton University Press.

Kosuke Imai, Luke Keele, Dustin Tingley and Teppei Yamamoto, 'Unpacking the Black Box of Causality: Learning about Causal Mechanisms from Experimental and Observational Studies', *American Political Science Review*, 105 (2011), 765-89.

Ladner, A., Fivaz, J., Joelle, P. (2010) Impact of Voting Advice Applications on Voters' Decision-Making, presented at: Internet, Politics, Policy 2010: An Impact Assessment, Oxford Internet Institute (OII), University of Oxford

McAllister, I. (2007) The personalization of politics. In: Dalton R and Klingemann H (eds) Oxford Handbook of Political Behavior. Oxford: Oxford University Press

Maddala, G. S. (1983) Limited-Dependent and Qualitative Variables in Economics, New York: Cambridge University Press.

Marsh, Michael (2009): Vote Switching in European Parliament Elections: Evidence from June 2004, Journal of European Integration, 31:5, 627-644.

Marschall, S. (2005) 'Idee und Wirkung des Wahl-O-Mat'. Aus Politik und Zeitgeschichte 51-52: 41-46.

Marschall, S. and Schmidt, C.K. (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, edited by Farrell, D. and R. Schmitt-Beck. Baden-Baden: Nomos. p. 259-278

Marschall, S. and Schmidt, C.K. (2010). The Impact of Voting Indicators: The Case of the German Wahl-O-Mat. In Voting Advice Applications in Europe. The State of the Art, eds. Lorella Cedroni & Diego Garzia, 65–104. Napoli: Scriptaweb.

Murphy, A., (2007). Score tests of normality in bivariate probit models. Economics Letters 95 (3), 374–379.

Paloheimo, Heikki: Finnish National Election Study 2007 [computer file]. FSD2269, version 1.1 (2012-01-05). Helsinki: Taloustutkimus [data collection], 2007. The Political Participation and Modes of Democracy: Finland in a Comparative Perspective research group [producer]. Tampere: Finnish Social Science Data Archive [distributor], 2012.

Pianzola, Joëlle, and Andreas Ladner, (2011) Tackling Self-Selection into Treatment and Self-Selection into the Sample Biases in VAA Research. Paper presented at the 6th ECPR General Conference, Reykjavik, August, 25-27.

Pianzola, Joëlle, Alexander H. Trechsel, Guido Schwerdt, Kristjan Vassil and Michael R. Alvarez, (2012) The Effect of Voting Advice Applications (VAAs) on Political Preferences. Evidence from a Randomized Field Experiment. Annual Meeting of the American Political Science Association, August 30-September 2, 2012.

Rattinger, Hans; Roßteutscher, Sigrid; Schmitt-Beck, Rüdiger; Weßels, Bernhard (2011): Post-election Cross-section (GLES 2009). GESIS Data Archive, Cologne. ZA5301 Data file Version 4.0.0, doi: 10.4232/1.10998.

Ruusuvirta, O., and M. Rosema. (2009) Do online vote selectors influence electoral participation and the direction of the vote? Paper presented at

European Consortium for Political Research General Conference, Potsdam, Germany.
Scheufele, D.A., Tewksbury, D. (2007) 'Framing, Agenda Setting, and Priming: The Evolution of Three Media Effects Models'. Journal of Communication 57(1): 9-20.
Vassil, Kristjan (2011) Role of Self Selection in Estimating the Effects of Voting Advice Applications. Empirical Evidence on the Basis of Swiss Smartvote Data. Paper presented at the 6th ECPR General Conference, Reykjavik, August, 25-27
Walgrave S, van Aelst P and Nuytemans M (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, Andre Krouwel, and Thomas Vitiello (2012) 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 doi: 10.1177/1354068811436054.
Wall, M., Sudulich, M.L., Costello, R. and Leon, E. (2009) Picking your party online – An investigation of Ireland's first online voting advice application, Information Polity, Vol. 14 No.3, pp.203 - 218.
Wright, S. (1921): Correlation and Causation, Journal of Agricultural Research, 20 (1921), 557-585.
Zelle, Carsten (1995) Social dealignment versus political frustration: Contrasting explanations of the floating vote in Germany. European Journal of Political Research 27: 319-345.

Table 11.1 VAA use and Vote Switching per study

Study	*N*	VAA use	Vote Switching
Switzerland 2011	1698	12.5%	22.9%
Switzerland 2007	1883	9.3%	19.8%
Netherlands 2010	1713	43.0%	44.0%
Netherlands 2006	1963	38.9%	37.6%
Netherlands 2003	2355	33.1%	28.2%
Germany 2009	1260	12.5%	24.0%
Finland 2011	845	45.0%	34.8%
Finland 2007	944	30.4%	22.8%
Finland 2003	603	26.5%	19.2%
Total	13264	27.4%	29.0%

Table 11. 2. Recursive Bivariate Probit Model of Vote Switching, Pooled Data.

Variables	Switching	VAA Use	ρ
vaa_use	**0.628*** **		
	(0.134)		
age	-0.004**	-0.031***	
	(0.001)	(0.001)	
partyid	-0.349***	-0.027*	
	(0.015)	(0.016)	
econ	-0.037*		
	(0.021)		
lr	-0.022***		
	(0.006)		
democ	-0.055***		
	(0.015)		
2.study	0.294***	0.183**	
	(0.088)	(0.085)	
3.study	0.381***	0.593***	
	(0.096)	(0.087)	
4.study	0.201**	-0.448***	
	(0.080)	(0.081)	
5.study	-0.013	-0.0938	
	(0.077)	(0.080)	
6.study	0.166**	0.146**	
	(0.076)	(0.074)	
7.study	0.265***	0.223***	
	(0.079)	(0.075)	
8.study	0.078	-0.893***	
	(0.074)	(0.079)	
9.study	0.332***	-0.690***	
	(0.075)	(0.078)	
educ		0.665***	
		(0.062)	
income		0.248***	
		(0.063)	
polint		0.153***	
		(0.016)	
Constant	-0.091	0.075	**-0.247*** **
	(0.130)	(0.094)	**(0.086)**
Observations	9,685	9,685	9,685

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11. 3. Recursive Bivariate Probit Model of Vote Switching, Pooled Data (Restricted Sample).

Variables	Switching	VAA use	ρ
vaa_use	**0.653*** **		
	(0.178)		
age	-0.005***	-0.028***	
	(0.002)	(0.001)	
partyid	-0.350***	0.068***	
	(0.0219)	(0.024)	
econ	-9.32e-05		
	(0.0294)		
lr	-0.0372***		
	(0.00895)		
democ	-0.0569***		
	(0.0209)		
2.study	0.293***	0.133	
	(0.0889)	(0.086)	
3.study	0.401***	0.533***	
	(0.102)	(0.088)	
4.study	0.231***	-0.460***	
	(0.0844)	(0.081)	
5.study	-0.0229	-0.035	
	(0.0788)	(0.086)	
9.study	0.365***	-0.782***	
	(0.0789)	(0.082)	
educ		0.748***	
		(0.082)	
income		0.421***	
		(0.096)	
polint		0.159***	
		(0.023)	
Constant	0.0633	-0.352***	**-0.260****
	(0.155)	(0.119)	**(0.113)**
Observations	5,163	5,163	5,163

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11.4. Univariate Probit Models of Vote Switching for each study

	Election Study								
Variables	FIN 03	FIN 07	FIN 11	GER 09	NET 03	NET 06	NET 10	SWI 07	SWI 11
vaa_use	**0.428*** **	**0.324** **	**0.202**	**0.247** **	**0.137**	**0.262*** **	**0.241*** **	**0.101**	**0.202***
	(0.144)	**(0.139)**	**(0.135)**	**(0.124)**	**(0.089)**	**(0.072)**	**(0.075)**	**(0.119)**	**(0.104)**
age	-0.004	-0.016***	-0.015***	-0.013***	-0.007**	-0.005**	-0.009***	-0.001	-0.005*
	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
partyid	-0.342***	-0.629***	-0.490***	-0.332***	-0.218***	-0.423***	-0.442***	-0.274***	-0.310***
	(0.069)	(0.074)	(0.072)	(0.046)	(0.041)	(0.037)	(0.039)	(0.031)	(0.040)
econ	0.099	0.001	-0.198**	-0.033	0.023	-0.177***	-0.091*	0.155***	0.067
	(0.073)	(0.093)	(0.077)	(0.080)	(0.061)	(0.046)	(0.047)	(0.058)	(0.058)
lr	-0.010	0.014	-0.079***	-0.088***	-0.018	0.015	-0.011	-0.020	-0.017
	(0.032)	(0.029)	(0.028)	(0.024)	(0.019)	(0.016)	(0.015)	(0.014)	(0.014)
democ	0.054	-0.151**	-0.098	-0.088*	-0.049	-0.115***	-0.072*	0.075*	0.018
	(0.068)	(0.069)	(0.062)	(0.046)	(0.043)	(0.035)	(0.037)	(0.039)	(0.038)
Constant	-0.450	1.427***	1.747***	0.980***	0.078	0.357**	0.711***	-0.685***	0.087
	(0.351)	(0.348)	(0.371)	(0.201)	(0.218)	(0.178)	(0.200)	(0.183)	(0.208)
Observations	578	617	526	1,175	1,170	1,721	1,537	1,787	1,645

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1