Voting advice applications and party choice: evidence from *smartvote* users in Switzerland

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Abstract: Online voting advice applications (VAAs) have become popular across Europe with millions of voters using them during electoral campaigns. Despite their popularity, little is known about their impact on their users' electoral choices. Based on survey data from voters using the Swiss VAA *smartvote*, we present findings on the direct impact on the actual votes of VAA users and whether the voting recommendations led them to adapt their previous vote choices. Our findings suggest that there is a tendency toward swing voting among *smartvote* users, most prominently among younger voters. Moreover, we find that *smartvote* users who were very surprised by the outcome of their voting recommendations were also more inclined to change their party choices. Furthermore, we examine the directional change of the initial voting preferences of those voters who stated that the tool had influenced their voting decisions. Our findings are valid only for a self-selected sample of *smartvote* users; thus, we discuss necessary steps for improvement in future VAA research.

Keywords: e-democracy; VAAs; elections; electoral choice; smartvote; voting recommendation; decision-making; swing-voting.

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1 Introduction

Voting advice applications (VAAs) have become increasingly popular over the last several years. Today, they have established themselves as essential parts of most major electoral campaigns. During the 2007 electoral campaign in Switzerland, the VAA *smartvote* (http://www.smartvote.ch) was used by about 375,000 voters (Fivaz and Nadig, 2010; Ladner et al., 2010). In relation to the 2.4 million voters who participated in the election, this means that about 15% of voters used *smartvote* prior to their electoral decision-making.

Similar developments can be observed in a number of other countries. In Germany, for instance, the VAA *Wahl-O-Mat* (http://www.wahl-o-mat.de) delivered 6.2 million voting recommendations for the 2009 elections, which corresponds to about 12% of the electorate (Garzia, 2010). The Netherlands are probably the country where VAAs are most popular. In the weeks before the 2010 elections, the VAA *Stemwijzer* (http://www.stemwijzer.nl) delivered 4.2 million voting recommendations, while the VAA *Kieskompas* (http://www.kieskompas.nl) added another 1.5 million to the total of 5.7 million voting recommendations (Louwerse and Rosema, 2011). Thus, the number of voting recommendations issued in 2010 corresponds to more than 50% of Dutch voters.

With regard to this widespread popularity, it is not surprising that, in recent years, VAA-related research has drawn attention more and more to the question of whether VAAs affect the electoral decisions of their users. Several studies have conducted online surveys among VAA users and asked them directly whether the received voting recommendations had an impact on their party choices. In the Swiss case, about 70% of users stated that they were affected by the VAA *smartvote* in their vote choices (Ladner et al., 2010b). This is an unusually high figure and might be due to the complexity of the Swiss electoral system and the far-reaching possibilities involved in the voting process compared to other countries.

Therefore, the *smartvote* users were asked more precisely how the *smartvote* recommendations affected their voting decisions. Only 15% of those who were influenced stated that they had adopted the recommendations in their entirety and copied them onto the ballot papers. The other users adopted the recommendations only partially.

For instance, they listed candidates from different lists on their ballot papers (so-called "panaschieren" or split voting), or they listed candidates twice and thus gave them two votes (so-called "kumulieren" or cumulative voting) (Ladner et al., 2010).

Therefore, the Swiss results need to be interpreted against the background of the specific Swiss electoral system, and they cannot be directly compared with results from other countries. In other countries, VAA users were asked whether the use of VAAs had led to voting for a party other than the one originally intended. The resulting figures vary strongly depending on the country. In the Netherlands, between 10% (Kleinnijenhuis et al., 2008) and 15% of users (Aarts and van der Kolk, 2007) claimed to have adjusted their electoral decisions due to the recommendations received. For Germany, this figure is 6% (Marschall, 2005), and for Finland, it is as low as 3% (Mykkänen and Moring, 2006).

The VAA researchers themselves view these findings rather critically. Most of the cited studies are based on pre-electoral surveys. Correspondingly, what is captured are voting intentions and not real voting decisions. A Belgian study captured both voting intentions and voting decisions for the users of the VAA *Do De Stemtest*! by means of comparing data from pre- and post-electoral surveys. Among those users who said that the *Stemtest* had convinced them to vote for another party, only two-thirds effectively did so in the end. This study, thus, concludes that the evaluation of voting intentions is a very unreliable measure of the impact of VAAs. Post-electoral questioning leads to more reliable results (Walgrave et al., 2008). In addition, there is also the problem of an over-reporting effect – a problem inherent to all survey-based research.

Considering this critique on the direct measurement of a VAA's impact, we decided to try to measure the potential impact of VAAs by means of an indirect impact measurement. In this study, we will examine whether those users who stated that they were influenced by the voting recommendations have a higher probability of swing-voting in elections.

In the following section, we present a few theoretical insights into the question of why it can be expected that VAAs affect their users' electoral decision-making. The third section contains information about the datasetused, and the following sections present our empirical analyses. We conclude with a discussion and outlook for future VAA research.

2 Theoretical considerations

Since there is hardly any theoretical-oriented literature on VAAs to be found, we are bound to apply findings and debates from the general literature on electoral behaviour to gain some theoretical foundations concerning the question of the expected influence of VAAs on their users' electoral decision-making.

What determines the electoral choices of voters? State-of-the-art theories on electoral behaviour stress – besides other factors such as party attachment and affection for candidates– the crucial role of issue voting (Niemi and Weisberg, 2001, p.14). A large number of studies have shown the decisive importance of political parties' issue positions on a voter's electoral choices [e.g. Alvarez and Nagler, 2000; Powell, 2000; Kriesi and Sciarini, 2003 (for the case of Switzerland), and Schoen and Weiss, 2005].

Klein (2006, p.595) emphasises the importance of issue voting and describes, according to normative democratic theories, the ideal voter as follows: the ideal voter informs himself carefully about all the pressing political issues and the positions of political parties toward them. Then the voter compares the parties' positions with his own preferences and makes voting decisions based on this matching. Klein concludes that the services provided by VAAs come very close to this normative ideal for electoral decision-making.

All VAAs are based on the concept of issue voting or, to be more precise, on the well-known proximity model of Downs (1957). Downs' original model had a simple setting that was based on an election with only one issue dimension (usually the left-right dimension) and only two competing candidates. According to Downs, a voter will vote for the candidate that is closest to one's own position on the particular issue dimension. Downs' model fits quite well for elections within the electoral system in the USA. Over the following years, the model was adapted to more complex electoral systems such as those in European countries (e.g. constituencies with more than one seat, party systems with more than two parties, or electoral systems with open lists; see Cox,1997). The model was also extended in the direction of including multiple issue dimensions instead of only one.

By adapting the model to more complex electoral and party systems beyond that of the USA, the model itself increased in complexity. Today, the proximity-voting model is often criticised on the grounds that the average voter is not willing to or even capable of gathering and processing all the necessary information to perform the demanded comparison of policy positions. This might be feasible in the rather simplified original model, but clearly not in elections with multiple parties debating on a large number of political issues (Rabinowitz and MacDonald, 1989).

This critique concerning voters' limited information-collecting and information-processing capacities opens a link to VAAs because they seem to offer an interesting solution. VAAs reduce voters' information and transaction costs at large (Jeitziner, 2004). They provide easily accessible information on the policy positions of political parties and not only for one issue but for a large number of issues. Supported by a VAA, everyone should be capable of conducting his own personalised issue-matching with all the relevant political parties within a couple of minutes. Given the large number of voters using VAAs, they are obviously offering services that are needed and appreciated by voters.

This leads us to our assumption that VAAs have an impact on the electoral choices of the voters using them. This assumption is supported by an observation about voters' party attachment. Party attachment is seen within the social-psychological theory of voting as one of the main factors to explain voting decisions (e.g. Schoen and Weiss, 2005). Voters use a close party identification as a kind of a shortcut or cue that allows them to reduce both the complexity and the cost of making a voting decision. However, the last ten to 20 years have shown a constant decline in voters' party attachments in almost all advanced democracies. Voters' ties to parties are loosening (e.g. there has been a decline in party memberships or growth in distrust of parties). Furthermore, their electoral behaviour has become more volatile and led to an increase in swing-voting (Dalton and Wattenberg, 2000; Dalton, 2006). Because of this evident decline, the explanatory power of party attachment for electoral choice seems questionable, and it leads to the assumption that voters might be more open to seeking new cues with respect to their voting decisions.

Finally, research on the impact of electoral systems on electoral behaviour and electoral outcome offers some support for our assumption concerning the impact of VAAs. In his seminal work, Duverger (1959) stated that electoral systems based on proportional representation lead to party systems with more than two parties. More recent research supports this view and could further show that, with an increasing number of seats per electoral district, the number of parties and candidates is also increasing (Cox, 1997). In addition, the findings presented by Ezrow (2010) indicate that larger electoral districts also lead to more niche parties, which address issues that are more or less neglected by the traditional parties. To sum up, proportional representation combined with the increasing size of electoral districts leads to a large and growing offer of parties – from quantitative as well as thematic perspectives – on which voters can base their electoral decisions. These expanded offerings again make it more difficult and time-consuming for voters to find suitable parties or candidates to vote for (Sartori, 1968; Cox, 1997). Thus, it is reasonable to assume that, at least in large districts, VAAs could offer some assistance in this regard.

Even though there are – as we could show – several good reasons to assume that VAAs affect voters' electoral choices, the findings of the few existing empirical studies on this topic show contradictory results. Walgrave et al. (2008) analysed the Belgian VAA *Stemtest* ("Do the Vote Test") and its impact on voters during the 2004 election campaign in Belgium. They found evidence that the *Stemtest* affected Belgian voters in their electoral choices but only on a very modest level. These findings about the limited effect of VAAs are somewhat in contrast to those of other studies. Both Kleinnijenhuis et al. (2007) and Rusuuvirta and Rosema (2009) found evidence that, in elections in the Netherlands, VAAs played an important role and had a clear impact on the voting decisions of Dutch voters.

In our study, we trace the possibility of whether the information about parties and candidates provided by *smartvote* influences people in their voting decisions and whether this influence might eventually lead voters to rethink their initial party preferences. Although we cannot make any causal claims regarding the relationship between the VAA voting recommendations and the final vote choices of voters, we can nevertheless examine whether we find higher occurrences of swing-voting among those *smartvote* users who report that they were, in fact, receptive toward the voting advice given to them by *smartvote*.

3 Data

Against the background of the 2007 Swiss parliamentary elections, the NCCR Democracy research project conducted two surveys among the users of *smartvote*.[1] The first survey started before the election. After receiving their voting recommendations, users were asked to participate in the additional NCCR survey by clicking on a link that led them to a special website where they could fill out the pre-election survey, which included questions about socio-demographic characteristics, voting behaviour in previous elections, and voting intentions with regard to the upcoming election. Some days after the election, the respondents received an e-mail and were asked to fill out the post-election survey, which focused on actual voting behaviour in the 2007 elections. In total, 4331 users completed this survey.

In addition, a second post-election survey was conducted. This second survey comprised both parts of the first survey and was conducted after the election. *Smartvote* offers its users the opportunity to create their own user accounts on the website to save

their answers and results and to receive additional services. In 2007, a total of 80,225 users owned such accounts. A few days after the elections, all *smartvote* users with a user account received an e-mail and were asked to support the NCCR research project and to participate in this second survey, and 13,959 of them did so.

Data from both surveys could be merged into one combined dataset comprising 18,290 respondents in total. Although the data contains a large number of respondents, we cannot claim that it is representative with regard to the entire population of *smartvote* users. That the data stems from a self-selected group of *smartvote* users has to be kept in mind with regard to the empirical analysis.

To determine the validity of our data, we cross-checked the socio-demographic profile of *smartvote* users with the findings of several previous studies. First, we checked our socio-demographic profile of *smartvote* users with the profile of a previous study conducted by Fivaz and Nadig (2010). Instead of the NCCR survey data, they used data from the Swiss electoral study (Selects), a representative telephone-based survey. We found a very similar pattern in both profiles of *smartvote* users. Furthermore, we also compared our profile with those of VAA users in other countries (Marchall, 2005; Marschall and Schmidt, 2010; Wall et al., 2009) and again found similar patterns. In our own data as well as in all available studies, the typical VAA user is male, young, and well-educated. He also has a high interest in politics and exhibits above-average political activity.

Therefore, we can assume that this dataset is of sufficient quality for the results to be comparable to those of VAA research from other countries. Our aim is not to draw any general conclusions with regard to the overall impact of *smartvote* on the elections but, rather, to remain in the realm of how the tool affected those who actually used it and answered our surveys.

4 First analyses: direct impact measurement

The post-electoral surveys conducted among *smartvote* users contained a number of questions aimed directly at measuring the potential impact of *smartvote*. Survey participants were asked whether the use of *smartvote* had a direct influence on their voting decisions or not and, if so, how exactly *smartvote* affected their decisions.

Asked directly, 67% of the respondents stated that *smartvote* had affected their voting decisions. These findings differ to a large extent from results of similar studies for Germany, the Netherlands, and Belgium. According to Marschall (2005), in Germany, only 6% of voters using a VAA were directly affected in their electoral decision, and in Belgium, VAAs had an impact only on a small percentage of their users (Walgrave et al., 2008). Research results for the Netherlands show higher values (Aarts and van der Kolk, 2007), but at 15%, there is still a significant difference from the 67% we found for Switzerland. We will return to this aspect later.

In the following tables, we present descriptive statistics about the influence of *smartvote* on different user groups. Table 1 shows the share of influenced users with regard to age, gender, and educational level.

Table 1 shows that there are only minor differences between voters with regard to educational level or gender. The largest differences by far can be found between the several age groups. The influence of *smartvote* on voting decisions is strongest among young voters.

Table 1 Influence of *smartvote* on voting decisions – Part 1

Share of smartvote users (voters) influenced in their voting decisions			
	Yes (%)	*No (%)*	*N (=100%)*
Age groups			
18–24	71	29	3346
25–34	73	27	4759
35–44	68	32	3461
45–54	59	41	2400
55–64	54	46	1637
65+	48	52	711
Gender			
Male	65	35	11,382
Female	70	30	4968
Educational Level			
Low	69	31	490
Middle	66	34	5850
High	67	33	9774

Source: NCCR "Democracy", IP16 "smart-voting 2.0" (http://www.nccr-democracy.uzh.ch/research/module5/smart-voting/smart-voting)

One distinct aspect of the Swiss electoral system is the large variance between the electoral districts (cantons) with regard to their size. The number of seats (M) per constituency differs between one and 34. Subsequently, the number of candidates (C) running for a seat also differs to a large degree. In Table 2, we compare the ratio between C and M – in other words, the number of candidates per seat – with the impact of *smartvote* on its users. The more candidates are running for a seat, the more information has to be gathered and processed by voters. Thus, the aforementioned information problem of voters is most pressing in those constituencies with the highest C/M ratio. Due to this factor, we assume that the influence of VAAs is stronger in constituencies with more candidates running for a seat.

Table 2 Influence of *smartvote* on voting decisions – Part 2

Share of smartvote users (voters) influenced in their voting decisions			
	Yes (%)	*No (%)*	*N (=100%)*
C/M ratio*			
1	22	78	46
3	13	87	16
4	33	67	42
7	52	48	103
8	31	69	99
9	54	46	474
10	50	50	221

Table 2 Influence of *smartvote* on voting decisions – Part 2 (continued)

Share of smartvote users (voters) influenced in their voting decisions			
	Yes (%)	*No (%)*	*N (=100%)*
C/M ratio*			
11	59	41	1087
12	60	40	2514
13	72	28	1147
16	68	32	1448
18	62	38	407
19	66	34	1453
20	72	28	3376
24	72	28	3941
Total	*67*	*33*	*16,374*

Source: NCCR "Democracy", IP16 "smart-voting 2.0" (http://www.nccr-democracy.uzh.ch/research/module5/smart-voting/smart-voting)

Notes: *C/M-ratio: the numerical relation between the number of candidates (C) and the number of seats (M) in a particular constituency. The higher the C/M ratio is, the more candidates are competing against each other per seat.

Indeed, Table 2 supports our assumption. The higher the C/M ratio in a constituency is, the more *smartvote* users were affected in their voting decisions by the voting recommendations they received.

With regard to the Swiss electoral system, voters have multiple options at their disposal to express their political preferences on the ballots. Hence, voters using *smartvote* were also asked how, in particular, they were affected in their electoral choices (see Table 3).

Table 3 Influence of *smartvote* on voting decisions (in percentage)

	Yes (%)	*No (%)*	*N (=100%)*
Did you copy the *smartvote* recommendations without any changes onto your voting list?	15	85	10,650
Based on the *smartvote* recommendations, did you vote for candidates from different lists (vote-splitting)?	61	39	10,580
Based on the *smartvote* recommendations, did you vote for parties and candidates that you would otherwise not have voted for?	67	33	10,559
Based on the *smartvote* recommendations, did you abstain from voting for parties and candidates you would otherwise have voted for?	35	65	10,372

Source: NCCR "Democracy", IP16 "smart-voting 2.0" (http://www.nccr-democracy.uzh.ch/research/module5/smart-voting/smart-voting).

According to Table 3, only a small number of voters copied the voting recommendations without any changes onto their ballots. This indicates that VAAs do not produce a kind of an "instant voter" whose voting decisions are completely computer-generated without reflection on the results. In fact, the opposite seems to be the case. As we can see from

Table 3, most of the voters used the voting recommendations to refine their ballots. Due to *smartvote*, they split their votes more often and also voted more often for candidates that they otherwise would have overlooked. These findings are in line with evidence from another study, which could show that users do not trust *smartvote* blindly but that they use it as a starting point for gathering further information about the candidates ranking highest in their voting recommendations (Fivaz and Nadig, 2010). For our later analysis, it is particularly interesting to see that two-thirds of users indicated that they voted for parties or candidates that they otherwise would not have voted for. We will follow up on this tendency when we assess whether those who were influenced by the tool in their decisions actually changed their vote choices to another party – an impact that would have the strongest consequences for the elections in general.

So far, the survey answers of users show that some *smartvote* users had been strongly influenced by the tool in their voting decisions. Even though not all users are affected to the same degree, the impact on all groups of users is on, an average, several times higher than that observed in other countries. Whether this is due to country specifics of the election process, the tool, or simply an artefact of the self-selected sample cannot be determined at this point. The next section offers a more in-depth analysis of potential impacts of the tool on voters by focusing on actual changes in the voting behaviour of users.

5 In-depth analyses: swing voters among *smartvote* users

As presented in the previous section, a large majority of *smartvote* users in our sample stated that the tool affected their vote choices. However, we likewise mentioned that we do not know whether this influence was actually exercised at the polls. As Walgrave et al.'s (2008) study on the 2004 Belgian elections suggests, VAAs seem to affect people's vote intentions and, to a lesser degree, their actual vote choices. According to the authors, people tend to report that the voting recommendations affected their vote intention but do not exhibit this change of mind at the polls. Since the chance of over-reporting the effects of the tool is great, we will now use a different indicator to measure the potential influences of *smartvote* on people's voting behaviour. Instead of the direct question used in the preceding section, we will use swing-voting as an alternative, indirect impact measurement. As outlined earlier, a majority of users stated that they ended up voting for someone that they would not have considered before using the tool. Our question is, therefore, whether we can observe an effective vote change among those users who reported that the tool influenced their vote choices.

Swing voters are defined as voters who changed their party choices in 2007 compared to their party choices in the previous elections. Since the voting recommendations are based on extensive policy congruence, chances are that these services reveal a matching outcome that is different from what people might have expected. Furthermore, since they gain additional information, it is likely that this might alter the perception that people have of parties or candidates. If they then place enough trust in the tool and are convinced by the outcome, they might be inclined to adapt their initial choices accordingly. At the same time, it is also likely that those who do not have clear-cut preferences with regard to their party choices or are uncertain about which party they

should vote for are more amenable toward the services provided by VAAs. The following table presents the bivariate association between those voters who reported that the tool had influenced their vote choices and swing-voting.

Table 4 Swing voters influenced by *smartvote* in their voting decisions

	Reported to be influenced by smartvote in their votes choices		
	Yes (%)	*No (%)*	*N(=100%)*
Swing voters			
Yes	73	27	4426
No	56	44	7082
Total	*63*	*37*	*11,508*

Source: NCCR "Democracy", IP16 "smart-voting 2.0" (http://www.nccr-democracy.uzh.ch/research/module5/smart-voting/smart-voting).

As expected, those who stated that they were influenced by the voting recommendations in their vote choices are also more likely to swing-vote (73% vs. 56%). In the next step, we will assess whether being influenced by the *smartvote* voting recommendations holds as a significant predictor for vote change if we control for relevant covariates. Through a logistic regression, we ascertain the probability of vote change based on the influence that *smartvote* had on users. The aim is to determine whether the previous illustrated differences can be maintained if we take other relevant factors into account. It has to be stressed beforehand that any findings hold only for the sample at hand.

The dependent variable in our logistic regression is vote change between elections. The dichotomised variable takes on the value of 1 if respondents changed their vote choices in comparison to the previous elections and 0 if they did not change their vote choices. The variable "influenced by voting recommendations" is also binary and indicates whether voters reported that *smartvote* affected their vote choices. We also assess how much the nature of the voting recommendations influences the probability of swing-voting. We asked participants whether the voting recommendations they received met their expectations or whether they were surprised by the results they got. The reception of the voting recommendations was measured on a 4-point scale; thus, three dummies and their respective reference categories are used as covariates in the model. We expect that, on average, the likelihood of swing-voting increases with the surprise of a voter about the voting recommendations. The reasoning behind this is as follows: if a voter is surprised by the voting recommendations, the recommended parties/candidates most likely differ from that of voters' initial party preferences (otherwise, she would not be surprised). If the voter is convinced by the voting recommendations, she might adapt her initial choices and vote in accordance with the voting recommendations (swing-voting if this occurs on the party level). At the same time, surprising voting recommendations might also cause the opposite reaction in that the voter dismisses it altogether. In any case, a voter who receives voting recommendations that meets her expectations is most likely simply strengthened in going along with her initial party choices (thus yielding no swing-voting). On average, therefore, we expect that surprising voting recommendations is more likely to trigger swing-voting than expected results in the voting recommendations.

A further important (continuous) covariate that we take into account is age. We show, based on direct measurement, that the impact of *smartvote* on voting decisions decreases with the increasing age of the voters (see Table 1). This finding is supported by a previous study, which also found evidence that younger voters were more likely to be influenced by the voting recommendations in their vote choices (Fivaz and Nadig, 2010, p.182). This could result from the fact that political preferences tend to become more consolidated with increasing age and are, thus, less amenable to newly encountered information. At the same time, younger users are more familiar with online-based communication and information and might, thus, be less sceptical with regard to its services. Whatever the case, similar mechanisms might be at play in terms of a higher tendency to adapt party preferences among younger voters. Hence, we not only expect that younger voters are more likely to adapt initial party preferences but we also expect age to condition the effect that the voting recommendations have on swing voting. In other words, the assumption is that the probability of swing-voting among those who were influenced by the voting recommendations compared to those who were not is higher among younger voters than among older voters. Therefore, we add an interaction term (age*influenced by voting recommendation) in our model to examine whether the influence of the voting recommendations on swing-voting is moderated by age.

Further covariates that could boost the probability of vote change are political ideology and multiple vote propensities. Voters in the middle of the political spectrum are expected to be more inclined to switch between available parties. Multiple vote propensities measure whether a voter has an inclination to vote for more than one party with a very high likelihood. The "vote propensity question" in election surveys asks voters to indicate the likelihood that they will ever vote for specific parties on an 11-point scale (Van der Eijk et al., 2006; Van der Eijk and Franklin, 2009). Those voters who indicate high likelihoods (vote propensities higher than 8) for one or more party besides their most preferred one are coded as voters with multiple vote propensities. This binary covariate is of utmost importance since it controls to some degree the fact that voters with several party preferences might be more inclined to swing-vote and more susceptible tothe services provided by VAAs. A binary measure for party attachment is included since we expect that strong party followers are less likely to adapt their vote intentions.

To control for contextual circumstances, we included variables that measure the degree of competition in the different constituencies in Switzerland. The ratio of competing candidates per available seat indicates the degree of variation for choices – the higher the competition is for the available seat, the bigger the choice set and the higher the probability are for deciding on a candidate from a different party. Thus, we controlled for the variation within cantons by including 14 dummies for the 15 different district magnitudes in our model. We also controlled for socio-demographic indicators such as gender, education, and income. Table 5 contains the corresponding results (the full model including all 14 dummies and 15 district seizes is attached in the Appendix A).

In logistic regressions with interactions present, the interpretation of the results differs substantially from a regular regression. Without elaborating on the technicalities behind it (cf. Norton et al., 2004), the sign and the significance of the interaction coefficient and the corresponding single coefficients cannot be directly interpreted from the model. Thus, as recommended by Long and Freese (2006), we plot predicted probabilities based on the main variables of interest and their interaction (influenced by

the voting recommendations, age, and the respective interaction). Figure 1 illustrates the predicted probabilities for swing-voting for those who were influenced by the *smartvote* voting recommendations (black dots) versus those who were not influenced by it (blue dots) for different age levels. The vertical confidence intervals indicate the relative significance of the predicted point estimates.

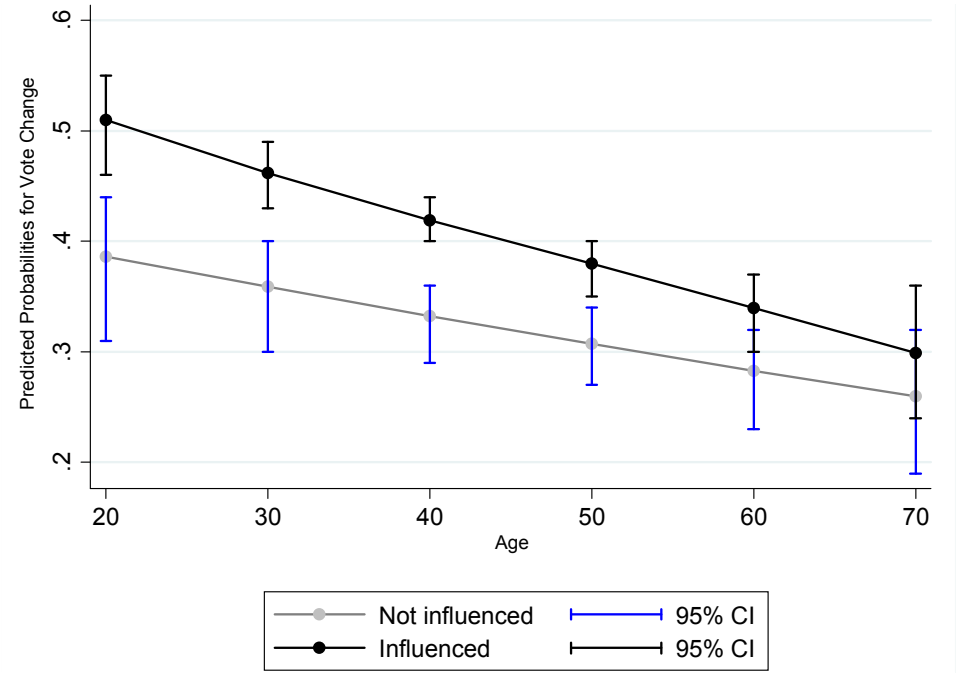
Table 5 Logit predictions for party change

Independent variables	*Vote change*
Influenced by voting recommendations	0.60* (0.31)
Age	–0.01*** (0.00)
Age*influenced by voting recommendations	–0.006 (0.007)
Rather unsurprised by voting recommendations	0.12 (0.11)
Rather surprised by voting recommendations	0.18 (0.14)
Very surprised by voting recommendations	0.69*** (0.28)
Multiple vote propensities	0.30*** (0.11)
Party attachment	–0.44*** (0.09)
Ideology (centre vs. left/right)	0.36*** (0.09)
Gender	–0.11 (0.10)
Educational level	0.00 (0.06)
Income level	–0.02 (0.03)
Constant	–0.39 (0.83)
Observations	2551
Log likelihood	–1620
Log likelihood 0	–1705
AIC	3295
Correctly predicted cases	64%

Source: NCCR "Democracy", IP16 "smart-voting 2.0" (http://www.nccr-democracy.uzh.ch/research/module5/smart-voting/smart-voting).

Notes: Standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$; Dependent variable is party change: binary coding, 0 = same party choice 2003 and 2007, 1= different party choice between 2003 and 2007. Nagelkerke *R* squared= .080, chi-square= 155.9 with p-2s=0.000. Dummies for district magnitude are not shown in the output.

Figure 1 Predicted probabilities for vote change for influenced vs. not-influenced *smartvote* users based on specific values for age (see online version for colours)



Source: NCCR "Democracy", IP16 "smart-voting 2.0" (http://www.nccr-democracy.uzh.ch/research/module5/smart-voting/smart-voting). Author's calculations.

Note: Predicted probabilities for vote change among those who were influenced and those who were not influenced at specific values for age, averaged over the remaining covariates.

Figure 1 illustrates that young voters who were influenced by the voting recommendations have a higher probability than older voters to change their vote choices. Moreover, the probability of swing-voting is higher among those who were influenced by the voting recommendations than among those who were not influenced in their vote choices. The confidence intervals around the point estimates indicate that the difference between the two groups is significant, with the exception of the age groups of 60 and 70. This is most likely due to the small sample size in these categories, which make a precise estimation more difficult (indicated by the larger confidence intervals). The exact values of the point estimates are not relevant in this context since they are dependent and vary according to the values set for the covariates. We are interested only in the differences and significance of the point estimates, which, in our case, remain stable even if we specify different values for the remaining covariates. In sum, the estimated model indicates that the probability for swing voting is higher among those *smartvote* users who indicated that they were influenced by the voting recommendations and more so for younger users than for older users.

Furthermore, the model indicates that voters who were surprised by the voting recommendations they received were more likely to swing-vote compared to those who were not surprised by them. The probability of swing-voting, however, significantly increases only for those who were very surprised by the voting recommendations, but not so for those who were only somewhat surprised by it. Although still a far stretch, this result suggests that voters who were particularly surprised by the recommended parties and candidates they received might have been inclined to adapt their initial vote choices accordingly.

As expected, voters in the middle of the political spectrum and voters with multiple vote propensities are more likely to swing vote, while party attachment decreases the likelihood of swing-voting. The number of candidates running per seat also matters, with higher competition increasing the likelihood of swing-voting among voters in that constituency. The remaining socio-demographic variables are not significant predictors.

Although the explanatory power of the model is rather weak given the model fit measures, the number of correctly predicted cases based on the model is substantially higher compared to random chance (64% vs. 39%). In this paper, we are mainly interested in detecting theorised implications while being aware that there is still variance to be explained. In general, we do not make any claims about effects but remain in the realm of predictions. The data at hand stems from a non-random, self-selected sample of *smartvote* users, limiting any sort of interpretation to that specific sample. To improve the analysis, experimental data or measures to correct for self-selection need to be taken; only then can any general claims be made. For now, we acknowledge these shortcomings.

All things considered, the model supports our assumption that voters see *smartvote* as a serious and useful tool for their decision-making, one that can affect their actual vote. Thus, the findings in this section go along with those of the previous section. One argument that might strengthen our findings is that, due to the definition of swing-voting, we had to exclude those voters who were not eligible to vote in 2003 (the youngest users). Since it is this age cohort in particular that uses *smartvote* most frequently and is also most amenable to the tool, we can expect that an analysis that takes those voters into account as well finds even stronger support for an influence of the tool on decision-making. Another argument that might weaken our findings is that our specific sample might lead to such strong results. Chances are that convinced and highly enthusiastic *smartvote* users might have self-selected themselves into taking our survey; thus, we report a strong influence of the tool among a strongly influenced sample of *smartvote* users. For now, we can conclude only that some young *smartvote* users and those who were most surprised by the voting recommendations have a higher probability of changing their vote choices between elections.

6 Party change: winners and losers

Since our findings suggest that influenced *smartvote* users are prone to change their vote choices, our next and last step in this analysis is to take a look at the direction of their vote change. Table 6 shows the flow of votes between the elections of 2003 and 2007 for those voters who were influenced in their vote choices by *smartvote*.

Table 6 Party change between the 2003 and 2007 elections among those who were influenced in their vote decisions by *smartvote*

Party voted for in 2003		*Party voted for in 2007*						*Total*
		CVP	*FDP*	*SVP*	*SP*	*GPS*	*GLP*	
CVP	N		59	17	55	41	62	234
	%		25.2	7.3	23.5	17.5	26.5	100.0
FDP	N	152		99	46	45	135	477
	%	31.9		20.8	9.6	9.4	28.3	100.0
SVP	N	48	89		19	9	23	188
	%	25.5	47.3		10.1	4.8	12.2	100.0
SP	N	135	137	22		728	251	1273
	%	10.6	10.8	1.7		57.2	19.7	100.0
GPS	N	28	16	6	178		117	345
	%	8.1	4.6	1.7	51.6		33.9	100.0
Total	N	363	301	144	298	823	588	2517
	%	14.4	12.0	5.7	11.8	32.7	23.4	100.0

Source: NCCR "Democracy", IP16 "smart-voting 2.0" (http://www.nccr-democracy.uzh.ch/research/module5/smart-voting/smart-voting).

Notes: Only the major five parties in Switzerland plus the Green-liberals are included in this table. CVP = Christian-democrats; FDP = Liberal-democrats; SVP = National-conservatives; SP = Social Democrats; GPS = Greens; GLP = Green-liberals. The Green-liberals is a new party and did not run in the 2003 elections.

With regard to the five major parties in Switzerland, a remarkable number of *smartvote* users changed their vote to the Green-liberals, a newly founded party that ran for seats in a national election for the first time in 2007. In general, the percentage values indicate that the major flow of votes is restricted to parties with similar ideological positions. The largest movement of voters can be found between the Greens and the Social Democrats on the left side of the political spectrum and between the Liberals and the National-conservatives on the right side. The Christian-democrats, as the classic centre party, gains and loses voters to both sides. In contrast, the flows of voters between the parties on the poles are rather small.2

If we look at the votes received and lost by the different parties due to *smartvote* users, we find on the winning side the Green-liberals (plus 588 votes) followed by the Greens (plus 478 votes) and the Christian-democrats (plus 129 votes). Among the losing parties are, first, the Social Democrats (minus 975 votes), followed by the Liberal-democrats (minus 176 votes) and the National-conservatives (minus 44 votes). These findings should not be overrated due to the aforementioned problems of the data sample, but they indicate to some degree which party gained and which party lost votes through *smartvote*.

According to our data, there are substantially more left-wing voters among *smartvote* users than right-wing voters. Previous research also showed that the typical *smartvote* user differs noticeably from the typical voter: the *smartvote* user is younger, better educated, with a clearly above average political knowledge and interest, and is predominantly male (Fivaz and Nadig, 2010). Hence, to establish the real extent of the impact on the election, we would have to know more about the entire population of *smartvote* users.

7 Conclusions

VAAs have become increasingly popular and emerged as indispensable elements in electoral campaigns (Marschall and Schmidt, 2010). Until now, only a few studies have focused on the impact of VAAs on the actual voting decisions of their users. In this paper, we addressed the question of whether the *smartvote* voting recommendations influenced people's vote choices and whether it led them to vote for another party than they chose in previous elections.

We showed that a considerable portion of *smartvote* users were affected by the voting recommendations in their vote choices. The measured impact in our study is clearly stronger compared to findings for other countries (Marschall, 2005; Aarts and van der Kolk, 2007; Walgrave et al., 2008; Rusuuvirta and Rosema, 2009). In our analysis, we moved from direct survey questions about the impact of the voting recommendations to an indirect measure of vote change to assess the influence of *smartvote* on users. Our estimates show that voters who reported that they were influenced by the VAA had a significant higher probability of swing-voting, particularly the younger voters. Moreover, voters who were surprised by the voting recommendations they received also show a higher likelihood to change their initial voting preference.

Since our data stems from a self-selected, non-representative sample, we refrain from making any statements other than probability claims. Among those *smartvote* users who participated in our survey, clear patterns emerged with regard to who was most influenced by the tool and whose voting decisions were influenced by the voting recommendations. Whether these findings hold for the entire population of *smartvote* users and whether those voters would have adapted their vote choices even if they had not used the tool cannot be determined at this point. Hence, we conclude with a few suggestions for future VAA research.

First, it is necessary to improve the quality of the available data. Most studies use data from online surveys among VAA users. Thus, self-selection into the sample has the great potential to bias the results. A representative sample of VAA users would greatly improve the data quality and the subsequent findings; however, for causal claims, further steps are needed. The best way to approach the question of how VAAs might exert an impact on their users is to conduct an experiment. The ability to randomly assign study participants to both users and non-users enables researchers to arrive at causal claims – the most sought-after goal in science. Although it is theoretically the best way forward, in social science settings, the random experiment is often plagued by real-world obstacles such as non-compliance. A further approach would be to increasingly invest in

examining the self-selection process that causes voters to use VAAs and model the procedure accordingly (Heckman, 1978, 1979). Further investments can be made in the realm of comparative research, which would imply stronger international collaboration in VAA research. A first step could be to develop comparable questionnaires and data sets.

For the moment, we can see that some people are highly susceptible to the voting recommendations that they receive through *smartvote* and that those users tend to change their vote choices. If this influence of VAAs on individual electoral decisions can be confirmed in future studies, questions with regard to the quality of VAAs become increasingly relevant.

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Notes

1 For more details about the project, see http://www.nccr-democracy.uzh.ch.

2 The parties' positioning within the political space was carried out on the basis of the parties' answers to the VAAs questionnaire. The analysis used a two-dimensional political space with the left-right axis and a liberal-conservative axis (for details, see Ladner et al., 2008, pp.29–35).

Appendix A Full logit model for predictions for party change

Independent variables	*Vote change*
Influenced by voting recommendation	0.60* (0.31)
Age	–0.01*** (0.00)
Age*influenced by voting recommendation	–0.006 (0.007)
Rather not surprised by voting recommendation	0.12 (0.11)
Rather surprised by voting recommendation	0.18 (0.14)
Very surprised by voting recommendation	0.69*** (0.28)
Multiple vote propensities	0.30*** (0.11)
Party attachment	–0.44*** (0.09)
Ideology (centre vs. left/right)	0.36*** (0.09)
Gender	–0.11 (0.10)
Educational level	0.00 (0.06)
Income level	–0.02 (0.03)
District size 2	0.27 (0.86)
District size 3	–0.42 (0.83)
District size 4	–0.41 (0.86)
District size 5	–0.31 (0.76)
District size 6	–0.21 (0.80)
District size 7	–0.18 (0.75)

Appendix A Full logit model for predictions for party change (continued)

Independent variables	*Vote change*
District size 8	–0.17 (0.82)
District size 9	–0.25 (0.78)
District size 10	0.23 (0.78)
District size 11	0.32 (0.76)
District size 12	–0.07 (0.76)
District size 13	–0.07 (0.75)
District size 14	–0.09 (0.75)
District size 15	–0.37 (0.75)
Constant	–0.39 (0.83)
Observations	2551
Loglikelihood	–1620
Loglikelihood 0	–1705
AIC	3295
Correctly predicted cases	64%

Notes: Standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$