

Department of Political and Social Sciences

Voting Smarter?

The Impact of Voting Advice Applications on Political Behavior

Kristjan Vassil

Thesis submitted for assessment with a view to obtaining the degree of Doctor of Political and Social Sciences of the European University Institute

Florence, December 2011

EUROPEAN UNIVERSITY INSTITUTE Department of Political and Social Sciences

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Abstract

Voting Advice Applications (VAAs) proliferate across Europe and beyond. By matching the political offer with voters' preferences, these internet applications assist voters in their decisions. However, despite the growing number of VAA users in several European polities, little is still known about the profile of a typical VAA user, let alone about the impact of VAA usage on individual level attitudes and behavior. Dominant research in this field offers contradictory evidence for it suffers from poor data quality, relies on descriptive analysis and fails to tap causality. To remedy these problems this thesis systematically investigates the patterns of VAA usage and its impact on voting preferences, vote choice and electoral turnout. In so doing I employ data from cross sectional election studies, panel surveys and a large N field experiment. First, I demonstrate that VAA usage is more frequent among the young, educated citizens from urban areas. However, additionally to these baseline properties, VAA users appear to be considerably more active in political life, they are interested in political issues and they are available to electoral competition. Second, using an experimental research design, I demonstrate that VAAs are more likely to affect the young and the less educated. Findings show that VAAs indeed influence users' political preferences, vote choice and motivate voters to participate in elections. More specifically, VAAs help young voters to distinguish between political parties and the less educated are likely to change their vote choice as compared to the previously intended one as a consequence of VAA usage. Taken together, the findings confirm theories of political socialization and the life cycle effects by which one's susceptibility to political information slows down with advancing age. However, the patterns of usage and impact appear to cancel each other out, in that those who most frequently use VAAs are least likely to be affected by their vote advice. Conversely, among those groups where the impact appears to be greatest, the likelihood of VAA usage is lowest. By implication, while the VAA effects can be found on an individual level, the mechanism by which the influence is exercised prevents large changes at the aggregate level. Therefore, much like the boat sailing against the tide covers little distance over ground, VAAs do influence individual level attitudes and behavior, but fail to bring about aggregate change.

Acknowledgements

It was my second time to Badia (the main building of the EUI campus), when I had met a big Bulgarian guy with a friend of mine. He had a car and he agreed to help us in getting some stuff from Ikea. We met up in the parking lot of Badia, but by the time we got there, he had managed to lock himself out of the car with the keys inside it. So we set out to break in to the car. After series of attempts the best way to get the job done seemed to be to bend the driver's door to the extent that we can reach the closing knob with a wire. Indeed, it worked fine and we got in. I can't remember exactly who did what, but because of the excessive bending the door looked eventually like a propeller of an aircraft. It was really bent! One could see it instantaneously and I suspected that it would not even keep the rain off the driver's seat. 'Sorry for that, Punky' I said feeling bad for the Bulgarian guy and his car. He didn't blink for a second and replied: 'Don't worry, its not my car, its your supervisor's!' I was supposed to meet my supervisor, Alexander Trechsel, the next week. Believe me, I was a little uneasy with meeting with him first. Probably because of this, I never mentioned this incident to him.

But it is not only the bent door of his Pandina (Italian diminutive of Fiat Panda) that I owe to my supervisor. In fact, it is the choice of this thesis topic and more - a yet another recommendation letter inquired consistently just an hour before the final deadline, a critical piece of advice tearing apart the core argument of a chapter, funds to fly me to an overseas conference, books, articles, contacts, datasets, you name it. The list of things that I owe him extends from Badia's terrace to Duomo. A big thank you for all of this!

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Chapter 1

Introduction

Voting advice applications (VAA) are internet-based tools or applications that allow voters to explore which parties or candidates stand close to their own political preferences. In a large number of European countries, including the Netherlands, Germany, Switzerland, Finland and Belgium the incorporation of VAAs into the electoral process is almost self-evident. Their availability is expected by voters and accepted by political elites. Yet, surprisingly little is known beyond the immediate success stories and anecdotal evidence about these internet applications, let alone their impact on the individuals who choose to interact with them.

This thesis seeks to show who are these people who use VAAs and how do they differ from the general electorate. It examines the patterns how people respond to such external vote advices and how it affects people's attitudes and subsequent voting behavior. More specifically, I demonstrate the effects of VAA usage on political preferences, vote choice and the propensity to turn out in elections.

1.1 What is a Voting Advice Application?

Voting advice applications are internet programs that allow their users to compare their political views with those of the parties. The nuclear component of every VAA that enables this comparison is a political issue statement or a question, e.g., "Social programs should be maintained even at the cost of higher taxes". Each user can express her agreement or disagreement with each particular statement. The number of issue statements used varies from one VAA to another, but it usually ranges between ten to thirty.¹ The resulting issue preferences of the user are then matched with the positions of the parties, which are extracted beforehand from party manifestos or other public documents. Finally, the program calculates the aggregate overlap between the user and all parties

¹In 2007, the Swiss Smarvote used 24 to 72 issue statements (depending on the interest of the user); in 2009 for the European Parliament elections the German Wahl-O-Mat used 29 and the EU Profiler 30 political statements; in 2010 the Austrian Wahlkabine proposed 26 questions for its users.

given all issue statements. This overlap is usually expressed in a form of a simple match list that shows in percentages to which extent user's preferences overlap with those of each party. The outcome is referred to as the voting advice.

Figure 1.1 displays an example of a vote advice that was used by the EU Profiler² - the largest VAA ever launched to cover European Parliament elections in 2009 across all European member states and beyond. Part A shows how parties and the user are situated on a two-dimensional political space; Part B provides a rank-ordering of the same parties based on the issue preferences.



Figure 1.1: The visualization of the vote advice

1.2 History and typology of VAAs

The first VAAs were developed in Finland in 1996 (Ruusuvirta, 2010) and in the Netherlands in 1998 (de Graaf, 2010). In both occasions the applications were developed to assist voters in the respective parliamentary elections. At the same time in the United States the Project Vote Smart launched its website.³ Although the evidence on the emergence of other VAAs remains sporadic or is not documented at all, it is likely that by the end of the 1990s a number of VAA initiatives spread across the western democracies providing the starting platform for the subsequent proliferation of these applications in the 2000s.

The early VAAs, however, did not appear out of the blue. They had existed long before their online versions. De Graaf (2010, p. 35) reports that the Dutch StemWijzer was first introduced already in 1989 in a form of a "small book with 60 statements and a diskette". This early paper based version was not targeted to the mass public, but rather for civic education purposes. Its aim was to demonstrate the "differences between

²www.euprofiler.eu

³Refer to: http://www.votesmart.org/about/history

parties, on the basis of the assumption that voters should know these differences and be able to compare them with their own viewpoint and political position" (*ibid.*). At around the same time, the Project Vote Smart was initiated in United States with a very similar social and political concern of providing voters with reliable and comprehensible information on candidates and elections.

By the early 2000s various European countries had started to use VAAs – Finland, the Netherlands, Switzerland, Germany and Belgium were the first movers in this regard. Voters quickly responded to such initiatives ensuring their success as standalone components of elections. For example, if the first StemWijzer in 1998 had about 6,500 users the version developed for the 2003 national elections issued 2.2 million voting advices (de Graaf, 2010, p.42). Soon, in several European countries more than ten per cent of the electorate was consulting with VAAs prior to elections and the numbers appear to be growing since. By now, almost all European countries have at least one VAA with a remarkable exception of Finland that had twenty different VAAs available during the 2007 parliamentary elections (Ruusuvirta, 2010, p. 49).

Given the rapid growth of VAAs, there is also great heterogeneity among the applications. Some aim for time-efficiency using only a few issue statements and presenting simple congruence lists by parties and issues. Others are more thorough and cover a wide range of salient issues across the entire political spectrum. Such VAAs require more time from their users. The way in which VAAs are constructed differs considerably, too. Simple VAAs rely on party manifestos only and take the political offer of the parties or candidates at face value. In similar fashion, a VAA may ask a party to selfposition itself along the selected issues without verifying whether this position actually reflects its stance. More complex solutions triangulate between what is known as an official party position (inferred through publicly available documents) and some sort of an objective evaluation of where the party actually stands. The latter is often acquired form public records reflecting past behavior of the party and it is employed in order to see through political rhetoric and circumvent the strategic self-positioning of the parties. The origin of VAAs varies greatly. Some of the early VAAs in the field were introduced by media companies in order to convey politically relevant information in a new and innovative fashion. Others emerged from scholarly interest or from the partnerships between the universities and the media. A particular breed of VAAs, although neither numerous nor popular, are those that have been introduced by parties themselves. Clearly, the latter type evokes questions on political neutrality and reliability which are considered as cornerstones for any VAA.

While recognizing differences between VAAs, one has to also bear mind remarkable similarities between them. This similarity is reflected in the nature of the vote advice and the logic by which it is provided. The vote advice from the VAA can be thought of as a form of political communication. Yet, these advices differ considerably from most of the messages that are received by citizens via electoral campaigning. First, unlike most of the political messages, VAA advices are normally not persuasive in nature (Stiff and Mongeau, 2003). Second, voters initiate the process of acquiring the vote advice out of their own self-interest. Thirdly, a vote advice offers an explicit issue based ranking of available options with an implication that this ranking is at least to some degree objectively constructed or tailored according to one's preferences. And finally, it provides an explicit quantification of how much a voter overlaps with each party. In other words, every VAA user can infer from the vote advice to which extent her political preferences are mirrored by the political offer.

Subsequently, depending on which type of VAA is selected for research it may have implications for the patterns of usage or levels of influence - the key outcomes of interest in this thesis. Although data availability determines the case selection to some degree, the VAAs that are used in this research adhere to transparency, objectivity and political neutrality.

1.3 Why does it matter?

Before the 2006 Parliamentary elections in the Netherlands three million unique visits were made to the Dutch voting advice application Kieskompas and about 1.7 million voting recommendations were provided (Kieskompas, 2007). A year before that in 2005, the voting advice application Wahl'O'Mat in Germany generated as many as five million voter profiles during the campaign leading to the federal elections (Marschall, 2011). Four years later in the next parliamentary election in 2009 the amount of Wahl'O'Mat users rose to a staggering 6.7 million (*ibid*). In Switzerland, between 2007 and 2008 in several elections and referendums, more than one million voting advices were provided by the voting advice application Smartvote (Smartvote, 2007). Before the 2009 European Parliament elections, EU Profiler was visited 2.5 million times providing some 900 000 vote advices. During the 2011 national elections in Estonia Valijakompass.ee issued around 110 000 voting advices in just six weeks before elections (Valijakompass, 2011).

In all of the examples above VAAs have succeeded to reach more than one tenth of eligible voters in each respective polity. This has not gone unnoticed. An immense success of VAAs in various European countries has evoked a scholarly interest in finding out what is the impact of VAAs on their users (Fivaz and Nadig, 2010; Hirzalla and Van Zoonen, 2008; Ladner et al., 2008, 2010; Ruusuvirta and Rosema, 2009; Kleinnijenhuis and van Hoof, 2008; Walgrave et al., 2008). After all, for behavioral social scientists VAAs serve as a prime example of an external stimulus that could potentially shift voters' interest from political rhetoric to issues. Whether voters are responsive to such stimulus and whether it implies any actual changes in subsequent voting behavior justifies the relevance of this research topic in its own right.

The second reason why this topic has gained relevance lies in the fact that there is virtually no control over how VAAs are constructed and how they operate. It should not be difficult to understand that if VAAs have any influence over individual's attitudes or behavior, then it bears an enormous range of normative implications with regard to democratic elections. In fact, Walgrave et al. (2008) demonstrate how the selection of issue statements into the VAA core functionality affects the advice given by the VAA. Kleinniejnhuis and van Hoof (2008) show how two VAAs in the Netherlands fail to meet basic intercoder agreement standards and how some of the Dutch parties are systematically neglected by the VAAs (Kleinnijenhuis and van Hoof, 2008, p. 6).

It has so happened that VAAs have emerged more often from either scholarly or non-partisan interest, thereby assuring at least from the outset that party positions are derived on equal and neutral grounds. Yet, there is no certainty that these applications will not be used for partisan purposes. In other words, VAAs can be effectively used in electioneering as campaign tools in providing anything but a non-biased vote advice to their users. In fact, Ramonaite (2010) provides evidence under which conditions Lithuanian parties can acquire such incentives.

Without going much further into the normative debate of about how VAAs ought to be constructed and held accountable, it should be reasonably well understood that if VAAs influence their users, then we better be well equipped to understand the likely consequences of VAA usage. In the following I explicate the specific outcomes of interest in which the VAAs effects are expected to occur.

1.4 Outcomes of interest

This thesis is about voting behavior and how individuals respond to the externally provided voting advice. In the first part of the thesis I explore the socio-demographic, attitudinal and behavioral profile of VAA users. The question here is to which extent do they differ from the general electorate and what explains the patterns leading to obtaining the vote advice? This 'sociology' of VAA users is then followed by the effects' study, i.e., the attention turns to what are the effects of the VAAs on the population of VAA users.

In particular, I will explain the effect of VAA usage on three areas. First, I investigate how VAA usage affects the political preferences of their users, i.e., do they affect they way in which people structure their preferences toward particular parties or candidates. While preferences reflect underlying political attitudes that can be translated in some instances to behavior, the second outcome of interest - the effect on vote choice - is clearly behavioral in nature. Here, the question is whether VAAs influence the way people vote. In other words, I investigate whether VAAs cause any actual changes in voting behavior. Finally, I address the question whether VAAs have the capacity to mobilize their users to participate in elections. Or conversely, do they perhaps discourage people from voting?

Why is it important to look at both, attitudinal (preferences) and behavioral (vote choice and turnout) measures? The reason why I take interest in these three outcomes lies in the way I conceptualize preferences *versus* choice. The preferences are individual's cognitive ability to rank alternatives based on the utility that they provide for each user. It is assumed that some preferences may share similar characteristics and therefore may have an equal rank. That is, two preferred alternatives that are measured may have an identical numerical value. That this is the case in the political realm is clearly shown by Van der Eijk and Oppenhuis (1991) and serves as a prime reason why van der Eijk and Niemöeller introduced the propensity to vote measures in the mid-1980s.

Although conceptually and empirically distinct from choice, preferences are assumed to feed into the mechanism that enables choice. The latter, is a process of judging the merits of multiple available options and choosing one for action. For example, a voter may prefer three parties, but can only choose one to vote for. To be sure, at every given time point there can be multiple preferences, but there can only be one choice.

I assume that the preferences of VAA users, more so than the vote choice, are more responsive to the external vote advice. This is basically the very reason why I take an interest in the preferences in the first place. In other words, I expect the change in the preference structure to be achieved more easily than change in the vote choice.

The second reason why I take a close interest in preferences is because studying them is feasible. Most notably, because literature on propensity to vote measures has offered a straightforward and a comprehensible way to conceptualize and operationalize preference as a distinct concept from choice (van der Eijk et al., 2006; van der Eijk and Oppenhuis, 1991). In short, it enables to measure individual's propensities to vote for each of the parties dismissing the particular context of a given election. PTV's as I will be referring to them throughout the thesis, have an important quality that meet exactly that logic.

Lastly, individual turnout is the most tangible behavioral measure that can be evoked as a function of VAA usage. But precisely for the fact that attitudes are more easily changed than behavior one also needs to compare the findings with the reference outcome that is hardest to achieve. The question here, is whether VAAs mobilize or, which is equally plausible, demobilize voters.

Mobilization patterns may occur for reasons that when people use VAAs they learn about their immediate political environment. It is probable that VAA users, once being exposed to the voting advice, discover that no party is sufficiently close to their preferences. What happens in the event when no party mirrors one's political positions and therefore the entire spectrum of issue space is limited to - in van der Eijk's words choosing the least of all evils (van der Eijk and Oppenhuis, 1991, p. 62)? If VAAs indeed demonstrate such a deficit, their users may become disenfranchised from politics and abstain from voting altogether. Conversely, it may happen that VAA users learn that their political preference is sufficiently, and at times even perfectly, mirrored by the political offer. It should be reasonable to expect that in such events VAA usage may effectively call for mobilization or demobilization.

1.5 Why voting advice applications?

There are two reasons for choosing VAAs for this study. First, when the internet became a mass phenomenon in the mid nineties the common expectation was that it will dramatically change the way in which ordinary politics is conducted. For example, internet voting, online deliberation platforms, electronic consultations, etc. were thought of as remedies to the declining patterns of political participation. However, by the time two decades passed and a vast number of online political applications were implemented, almost none of these expectations were fulfilled. Very quickly, scholarship turned from excessive optimism to excessive pessimism, claiming that the internet and its potential to bring about any change with regard to political standards has short lived these expectations.

By now, a more realist stance is taken toward ICTs and political life. In fact, it is a platitude to claim that internet applications matter with regard to political behavior. Yet, a careful look in the field of research dealing with political behavior through the lenses of ICTs all too often fails to tell us just how much and why it matters. I suspect this failure has its roots in the fact that dominant research fails to distinguish between two types of ICT-applications: tangible and intangible forms of technology. Tangible technologies are those that enable their user to perform tasks that they would not have been able to perform otherwise. An example of such a technology is internet voting, an application that allows you to vote from home or office, without actually going to the polling station. Clearly, one could also cast a postal vote or have the ballot booth delivered at home, but this has a great disadvantage in terms of convenience. Voting advice applications are also a form of tangible technologies, because given the time and attention required there are no alternatives to obtain a rational and policy based voting aid that ranks the alternatives according to the congruence between the voter and parties. Imagine the effort that a voter has to go through in the absence of the VAAs. Furthermore, there is hardly a way that can provide information about one's political position in the context of European Parliament elections, across 27 European Union member states, across 30 political issues and across some 270 parties other than a particular voting advice application. The latter example refers to the EU Profiler, the largest pan-European VAA ever launched. In a word, obtaining explicit information about one's political position would be almost impossible in the absence of VAAs.

Intangible forms of internet applications, by contrast, are those that facilitate the

performance of some of the functions that can be achieved by other means, too. For example, online deliberation is just a form of deliberation taken online. But as there is little incentives for citizens to deliberate off line, it is therefore difficult to imagine why would it be any different online. In other words, it merely substitutes an ordinary practice. Political blogs, e-consultations and other forms of soft applications also belong to the cluster that I characterize as intangible technologies.

The failure to group technologies according to their tangibility also facilitates meaningless conclusions that technology *matters*. The question has to be addressed at the level of careful precision. For example, does internet voting increase turnout? In choosing VAAs as a subject to study, the level of precision is exactly the same. I define them as tangible technologies that are directly linked to the very act of voting. I have deliberately excluded from this analysis less tangible technologies aiming to foster political participation - e.g., e-consultations, deliberation platforms, blogging, e-campaigning, social media, etc. I do not question their importance. Quite to the contrary, but in order to avoid ambiguity in my empirical analysis, I have restricted myself to one application that is well defined and that has a potential to affect the outcome of interest - attitudes and behavior and at the same time is intrinsically and closely linked to the very act of voting.

Secondly, I have chosen VAAs because they present a stimulus that is easily identifiable and can be precisely located in time and space. Therefore, it is a subject to unobserved heterogeneity to a far lesser extent, than many other stimuli that we are often used to. Media, parental socialization, role of education, etc. are some of such examples. VAAs by contrast, may influence individual attitudes and behavior mainly via the advice that they provide. It is easily measured, it can be located in time, a temporal sequence can be established with panel data, the range of heterogeneous effects is considerably narrower and it is remarkably easier to control them with statistical techniques. The vote advice can be defined in a very refined manner and its corresponding effects can be measured accordingly.

Finally, I have chosen to work with VAAs because the first data sources have become available just before and during writing this thesis. A number of cross sectional comparative studies, single country based election studies and panel data have been released within the last four years that contain relevant questions that allow shedding light on the effects of VAA usage. In the area of counterfactual analysis, however, almost no data are available. To remedy the latter, I have devised a field experiment that uses VAA usage as a treatment and investigates its causal effects on political behavior.

1.6 A note on the analytical approach

The analytical setup of this thesis starts with explaining who are the people that use VAAs in the first place. Surprising though it may seem, there are no empirical accounts available that have taken a comparative look into the sociology of VAA users. To remedy this problem, I employ data from the 2009 European Election Study and explain the patterns that lead to the VAA usage and compare the characteristics of the VAA users to the general electorate.

Next, I move beyond observational studies and employ panel data from Switzerland and an experimental study from Estonia in order to proceed with the causal analysis of the likely effects of VAA usage. Throughout these chapters, I am primarily concerned with the question of how people respond to a VAA advice with respect to their attitudes and behavior.

In sum, the analytical approach employed in this thesis departs from a conventional exploratory research in describing the population. However, as soon as the attention is given to assessing the impact of VAAs, the analysis will turn toward explanatory techniques lending themselves toward causal analysis. Throughout the thesis though, I will be concerned with the non-randomness of the VAA usage and use techniques that allow me to correct for self-selection biases that have been haunting VAA studies since they first emerged.

1.7 Plan of the thesis

This thesis has four substantial parts. The first part deals with setting up the research project. Chapter two posits research questions and offers an empirical puzzle that needs to be confronted an solved. It embeds the puzzle in the theoretical framework of voting behavior, and where appropriate, draws parallels with the literature on e-democracy. It further sets up the research design and offers a conceptualization of the core concepts. Finally, this chapter introduces the datasets that will be used in the subsequent empirical analysis.

The second part of the thesis uses a comparative study across 27 European Union member states and sets out to explain the patterns of VAA usage. It has been a unique timing and the opportunity for this study to be able to use a comparative dataset of 27 countries that contains a question on VAA usage - an extremely rare question in survey research, and indeed the only one at this level of comparative effort. After offering a descriptive analysis of VAA users across European countries, this chapter proceeds with multivariate analysis and theorizes the problem of sample selection bias with regard to the non-random event of VAA usage. It provides an analysis where the selection bias is isolated and discusses the likely mechanisms affecting such an outcome.

Part three of the thesis opens the box of causal analysis and employs panel data from Switzerland. It critically reviews previous empirical accounts of VAA research and explains why it provides contradictory evidence. The main argument is that dominant research suffers from poor data quality and self-selection biases. To remedy these problems panel data from Switzerland will be employed and I will demonstrate how using an appropriate econometric technique allows to correct for selection biases that are inherent to these data. In so doing I first replicate the results found by a number of studies relying on Swiss Smartvote data and confirm that the voting advice indeed has a sizable effect on individual level vote choice. These findings are then compared with the results where the potential selection mechanism is controlled for. Findings suggest that the naive estimator is likely to overreport the effect size, since it is driven by the subgroup of the entire universe of Smartvote users for whom the effect may be higher than on average. Indeed, the results from the multivariate analysis confirm that after controlling for the non-random event of individual participation in the panel survey, VAAs effect on vote choice diminishes considerably.

Further, this part of the thesis advances causal inferences by introducing a new randomized field experiment specifically designed to uncover causal effects of VAA usage. This field experiment was carried out in the real-world situation around the 2009 European Parliament elections in Estonia. In a nutshell, it was a panel study comprising a pre- and post-election survey between which the treatment was assigned to the randomly and evenly split half of the sample. The treatment was an invitation to use the EU Profiler - a pan-European VAA covering all European member states. By using an instrumental variable approach I demonstrate that the EU Profiler has conditional effects on all outcomes of interest mediated by a set of demographic and attitudinal properties of VAA users.

The final part of this thesis provides concluding remarks and an executive summary. It also reviews the puzzles outlined in the beginning of the thesis, answers the research questions and proposes a unified model of VAA usage and impact.

Part I

Setting up the Research

Chapter 2

Research Questions and Theory

In this part of the thesis I first explicate an empirical puzzle that introduces the three research questions guiding the entire research project. Second, I offer a broad theoretical framework in which the answers to the puzzle and the research questions are sought. Notice however, that specific theoretical models which guide the empirical analysis will be developed in the subsequent empirical chapters of the thesis.

2.1 The Puzzle

During the long decline of voter turnout in modern democracies (Franklin, 2004), the question of how to motivate citizens to participate in elections has remained on the agenda of politics and political science. When the internet became a mass phenomenon in the mid nineties, many theorists suggested that if democracy was in trouble, then perhaps the internet could be of help (Coleman, 1999; Street, 1997). One of the most tangible attempts to address this issue was the introduction of remote internet voting, i.e., the option to cast one's vote over the internet in otherwise traditional elections. However, the first internet voting experiences from Switzerland, the United Kingdom, the Netherlands and the United States did not boost electoral participation (Alvarez and Nagler, 2000; Norris, 2003; Staeuber and Gasser, 2009). Moreover, even the less tangible internet applications were only used by the limited number of tech-savvy enthusiasts, further skewing the unequal distribution of new technology usage across populations. Instead of mobilizing the disengaged, internet voting and related applications merely replicated the existing practices of political participation. Traditional patters of inequality in political engagement seemed to be reinforced, not transformed.

Subsequently the majority of scholars became less optimistic about the internet's ability to promote political participation in general and voter turnout in particular. Although the 2008 U.S. presidential primaries demonstrated major novelties in web campaigning, possibly contributing to differences in election outcomes, the effects of European e-democratic experiments have remained rather modest. Opposing the excessive cyber optimism from the mid-nineties, the contemporary literature admits that in theory the internet may lower the costs of electoral participation and thereby strengthen democratic practices and include the disengaged into civic life, but there seems to be little empirical support for these claims (Norris, 2001). Internet applications seem to only weakly impact on political participation and civic engagement.

Recently, however, as new data have become available, a number of scholars have raised some doubts about the internet's inability to exercise influence on political and electoral participation. The studies on internet voting and voting advice applications have shown small, but consistently positive effects on individual level turnout.

With regard to internet voting, results reported by Trechsel and Vassil (2010) and Vassil and Weber (2011) show that roughly one tenth of the internet voters in Estonian parliamentary elections in 2007 and 2009 would not have turned out without the possibility to vote online - a finding that seemed to be absent in the previous studies about internet voting.

Mobilization effects of about the same magnitude can be found in recent VAA studies, too. Boogers (2006) found that one tenth of the users of Stemwijzer (the Dutch VAA) reported an increased motivation to cast their vote after obtaining the advice from the VAA. Based on the data from the German federal elections in 2005 and 2009 almost eight percent of the Wahl-O-Mat users claimed to be more motivated to vote as compared to before consulting the VAA (Marschall, 2005, 2009). Kleinnijenhuis and van Hoof (2008) in their study of the usage of several Dutch VAAs observed that more people made a choice for a particular party after consulting the VAA, presumably leading to some mobilization effects. Similar effects are demonstrated by Ladner et al. (2008) and Ladner et al. (2010) in the case of the Swiss Smartvote usage.

Moreover, even a brief look at the aggregate usage numbers of European VAAs raises the question of whether voters are entirely immune to the technological influence in the electoral processes, as the literature suggests. The introductory chapter demonstrated how frequently VAAs are used by people in several European polities. These numbers are large in their own right, but they gain even more relevance if one relates them to the total electorate of each respective country. In the Netherlands during the national elections in 2006 14 percent of the total electorate obtained a political profile from the local VAA; the corresponding number for 2005 German federal election is eight percent and close to eleven percent in 2009. In Estonia, about ten per cent of the total electorate consulted the local Valijakompass.ee website.

This evidence - sporadic as it may be - points to existing (and possibly increasing) interest of individual voters toward voting technologies. An apparent question follows from here: Who are the users of these kind of technological applications? Are they tech-savvy optimists as the theory prescribes, or do we see indeed mobilization effects

among the less engaged citizens? Moreover, these applications seem to exercise an influence on individual voters that seem to contradict theoretical expectations: Does technology possess any transformative power with regard to attitudes, preferences or even behavior? More precisely, what is the impact of these technologies on individual turnout and vote choice?

Prior to proceeding with explicit research questions a few clarifications should be made. First, this thesis is a voters' study with the focus on voting advice applications. Examples on internet voting are only used to provide a discussion with the closely related technological application, but the core interest of this research does not lie with internet voting. Second, dissemination of political information in broader sense and the more intangible forms of online political participation (e.g., blogs, forums, electronic consultation and deliberation platforms, new media campaign tools) will be omitted from the scope of the theoretical framework and empirical analysis.

2.2 **Research questions**

The general goal of this thesis is to investigate whether VAAs exert an influence on individual level political behavior and if so, under which conditions the effect is likely to occur. Because few systematic inquiries have been made in order to detect the nature of the VAA users, I start the analysis by investigating the patterns that lead some individuals to use VAAs in the first place. Therefore, the first research question addresses the profile of the VAA users and reads as following.

Question 1: Who are the VAA users and how do they differ from the general electorate?

The goal of the second question is to demonstrate the effects of VAA usage on one's political attitudes and behavior. In particular, I will focus on three potential outcomes of interest: preferences, vote choice and turnout. Therefore, the second research question reads as following.

Question 2: What is the impact of VAA usage on (a) user's preferences, (b) vote choice, and (c) individual turnout?

The first research question expects VAA usage to be explained by a set of sociodemographic, attitudinal and behavioral characteristics of the users. Here, I provide both, a descriptive overview of the sociology of VAA users and an explanatory analysis of the VAA usage patterns. For the second research question an explanatory analysis will be carried out in order to explain the impact of VAA usage on individual turnout, voting preferences and eventual vote choice. The aim is to reveal what are the consequences of VAA usage with regard to the specific characteristics of political behavior. In the next section the general theoretical framework of this thesis will be introduced.

2.3 Theoretical framework

My theoretical framework will be presented in three distinct parts. The first part introduces the literature on digital democracy with an empirical focus on how technology matters with regard to political behavior and how its usage is explained by a set of individual level characteristics. I will summarize the literature explaining the patterns of technology usage and the expectations toward the influence of voting technologies on electoral participation. Parting from the theoretical viewpoint, this section will have a rather empirical focus based on previous studies. These studies provide a crucial point of reference, for constructing general expectations, and more specific hypotheses, with regard to VAA users.

In the second theoretical section the question about the expected impact of technology usage will be pursued. The point of departure here is the literature on e-democracy, but in the course of an argument increasing attention will be given to the voting behavior literature. This section also offers an empirical detour to introduce some new ideas about the use of technology and its expected impact on voting behavior.

The third part of this theory section is dedicated to the classical works in the voting behavior literature with an emphasis on preference formation and vote choice. It is important to note, however, that I will not provide a comprehensive literature review. The attention will be given only to the three mainstream approaches about models of voting behavior: sociological, social-psychological and economic (or rational choice) approach. The distinction between the approaches is an analytical one. One has to realize that in the empirical analysis, there is a considerable overlap between the approaches. For each tradition the basic features will be discussed, but these features are introduced with the clear intention to justify the hypotheses predicting the nature and the magnitude of the expected impact of the VAA usage. Note however, that theoretical models and hypotheses will be formulated separately in each respective empirical chapter.

Who are the users? Building on theoretical and empirical findings

Extensive international evidence suggests that citizens in contemporary western democracies are gradually becoming less involved in politics: that they are less interested in political issues, vote less often, show less party loyalty, possess lower levels of trust toward politicians and governmental institutions, and participate less in civil society than ever before (Huntington, 1996; Coleman, 1999; Pharr and Putnam, 2000; Putnam,

2001; Norris, 2003; Franklin, 2004; Mair, 2005). The tendency, labeled by a diverse set of scholars as the crisis of democratic engagement, seems to be apparent in almost every democracy in the western world.

The rapid development of the world wide web and its usage in the mid nineties led many theorists to suggest that democratic deficits may be mendable with the help of emerging ICTs. An internet-based technological modernization of governmental institutions and participatory practices was perceived as an opportunity to increase the quality of democracies. Proponents of digital democracy argued that such modernization boosts democratic and civic participation (Coleman, 1999; Fawkes and Gregory, 2001; McQuail, 2005; Street, 1997). After all, technology has played an important role in the past in shaping societal processes: Bicycles were instrumental in the political and social emancipation of women; photo and film technology induced a subtle form of apartheid; nuclear arms shaped international relations since the 1950s (Bijker, 2005). Yet, when technology was first adapted in the political arena in the form of experimental internet voting in Switzerland, the United Kingdom, the Netherlands and the United States the turnout levels hardly changed (Alvarez and Nagler, 2000; Norris, 2003; Staeuber and Gasser, 2009). Less tangible internet applications, e.g., e-consultations, deliberation and discussion platforms, political blogs, etc. became popular only among the limited number of technology enthusiasts who tended to be already politically active, thereby leaving the apathetics untouched. It seemed that high expectations toward the transformative power of the internet were short-lived.

The standard explanation of internet's inability to increase citizen participation in political life was offered by theories of digital divide in general and political divide in particular. It is argued, that online politics mirrors the patterns of inequality experienced in conventional politics and even increases the gap between the engaged and the disengaged (Alvarez and Nagler, 2000; van Dijk, 2000, 2005; Margolis and Resnick, 2000; Wilhelm, 2000; Putnam, 2001). Moreover, disparities in access to the internet, based on income and education are still widespread. Online politics therefore tends to empower the wealthy and well educated and to further marginalize the underprivileged (Mossberger et al., 2003). The prime beneficiaries of online politics are elites with the resources and motivation to take advantage of internet applications, whereas the costs remain too high for the less skilled citizens. It is argued that, the internet provides a new opportunity structures for the elite rather than mobilizing the disengaged periphery. In this sense, promoting politics on the internet means preaching to the faithful.

Far from mobilizing the general public, the Internet may thereby function to increase division between the actives and apathetics within societies./-/ But as the media of choice par excellence it is difficult to know how the Internet per se can ever reach the civically disengaged (Norris, 2001, p. 230).

Recently, however, scholars have raised some doubts about the internet's inability to reach the disengaged and bring them closer to politics. Based on studies of internet voting and Voting Advice Applications (VAA) small but consistent mobilization effects have been found. In particular, the results reported by Alvarez, Hall and Trechsel (Alvarez et al., 2009) show that roughly one tenth of the internet voters in Estonia would not have turned out without the possibility to vote online. In the realm of VAA usage, a mobilization effect of about the same magnitude was found by Boogers (2006) - one tenth of the users of Stemwijzer (the Dutch VAA) reported an increased motivation to cast their vote after obtaining the advice from the VAA. Kleinnijenhuis and van Hoof (2008) in their study of the usage of several Dutch VAAs observed that more people made a choice for a particular party after consulting with the VAA.

Political campaigning has been subject to substantial change simply because new communication technologies have opened new arenas in the way political campaigns are organized and carried out. The social-political networking site my.barackobama.com, an application created by the 25-year old Chris Hughes (a Facebook co-founder), allowed Obama supporters to create groups, plan events, raise funds, and connect with one another (McGirt, 2009). But beyond the fun-to-use tools often appealing to and advertised by the web-enthusiasts, the full employment of interactive technologies achieved a far more tangible effect than ever expected, possibly contributing to the eventual election outcomes.

By the time the campaign was over, volunteers had created more than 2 million profiles on the site, planned 200,000 offline events, formed 35,000 groups, posted 400,000 blogs, and raised USD 30 million on 70,000 personal fund-raising pages (McGirt, 2009).

This evidence points toward some mobilization effects caused by VAA-usage and internet voting. An apparent question follows from here: Who is being mobilized and for what reason?

One can argue, that if online politics has any effect on participation at all, it is likely to occur among the politically active citizens with particular attitudes and demographic characteristics. These characteristics, however, are of particular interest with regard to the current research. According to the main theoretical accounts on the digital divide the citizens to whom online politics is a meaningful channel to exercise their political and civic duties are young individuals with higher income, educational attainment, sense of political efficacy and positive attitudes toward politics in general (Norris, 2001; Mossberger et al., 2003), i.e., people with resources. Almost the same variables also predict political participation and thus, these people may indeed be more prone to make use of the new technology in political domain.

A number of studies have established that the usage of internet voting is indeed

skewed toward younger citizens (Alvarez and Nagler, 2000; Solop, 2002; Kersting and Baldersheim, 2004). Similarly, the emerging studies of VAAs tend to confirm the same pattern. After all, it is the young who are exposed to the new media to a far greater extent than the elderly, and it is reasonable to assume that internet applications are most conveniently accessible to those already familiar with new technologies. These preconditions, combined with the fact that turnout has been generally low among young citizens (Franklin, 2004; Wattenberg, 2008), raise expectations that precisely the young will be mostly affected by online political applications (Norris, 2003; Kersting and Baldersheim, 2004; Alvarez et al., 2009).

Considering voting behavior by age category, it becomes clear that above all younger people participated by voting over the Internet. /—/ Based on this finding, one can conclude that the introduction of voting by Internet seems to have a significant impact on the participation of younger voters in elections. The use of internet voting mobilizes the generally underrepresented young persons, while it is more seldom used by older voters (Trechsel et al., 2007, pp. 31-32).

It follows from theory then, that not only should the VAA usage be most frequent among the young and affluent citizens, but the same group of people should be subject to mobilization effects as a consequence of the VAA usage (or new media usage in more general terms). The effect is expected to occur due to their exposure to the new media and their general digital affinity. This mechanism implies that those using the online political application are also experiencing some sort of mobilization effects (i.e., impact). In sum, theory and previous empirical applications suggest equating usage with impact. The conclusion from this brief review of voting technologies literature is that technology only matters to the degree that it is available to its users.

The limited impact of technology

The previous section established what could be expected from technology usage and its capability to mobilize the citizens. According to the literature it is apparent that usage tends to be equated with experienced impact, with straightforward conclusions that the latter is a corresponding effect of the former. In the following I will present a line of argumentation with an intention to demonstrate that these assumptions are only partly correct. The conceptual and empirical model of the limited impact of technology was initially developed and presented by Vassil and Weber (2011) in studying the impact of internet voting in Estonia. The same model will be employed for the current research with the intention to validate its more universal character.

The main pitfall in understanding how technologies exercise an influence on its users lies in the insufficient distinction between usage and impact. Usage represents the mere practice of employment of a particular technology. Usage *per se*, however, does not imply any effects on individual's propensity to turn out, or follow the advice given by the VAA (or any other effect for that matter). It is only the misspecification of the theory that expects impact within the very practice of usage. The proposition that the young are more likely to engage in technology usage due to their digital affinity may well hold, but there are no compelling reasons for concomitant mobilization effects. It does not necessarily follow from the literature on usage that internet voting or VAA usage mobilizes particularly the young and affluent.

Quite the contrary, the mobilization effects - if any - should be expected among those who normally are not engaged with political life, i.e., peripheral citizens in political sense. In particular, the greatest impact (on the propensity to turn out, or else) should appear among those who are unlikely to use internet applications in the first place. And conversely, the impact should be lowest among the typical internet users.

Why should one expect such a pattern? The following thought experiment is meant to illustrate the difference between the usage of internet voting and its impact. Imagine internet voter "A" who is computer-savvy, politically engaged, interested in political news, discusses politics with his friends and family, and usually participates in elections. In terms of technology he is an active user of the internet and related applications. However, technology is so deeply rooted in his everyday life that he pays minimum attention to it. Technology for him is a means rather than a goal.

Also imagine internet voter "B". He is much less computer literate, politically disengaged, rarely shows any interest in politics, and usually abstains in elections. In terms of technology he is no active internet user. Moreover, by default he rarely thinks of technology as an intrinsic part of his everyday life. However, when he happens to use it he finds technology somehow fascinating. For him, the usage of technology per se appears to be stimulating. For the same reason he finds the idea of casting his vote over the internet attractive, but he is attracted by the technology and not by the desire to vote.

By using internet voting or any other online political application, both ideal-type voters - "A" and "B" - may be positively affected in their propensity to turn out or experience any other post-usage effects. If voter "A" finds that internet voting works smoothly and is indeed a comfortable alternative to the polling booth, he may be even more likely to turn out in the future. In this respect internet voting indeed reduces electoral costs (Norris, 2003). The same could apply for VAA usage: If user "A" experiences a reduction of costs of political decision making his propensity to turnout may be positively affected by it. And if user "B"'s fascination with technology brings him in contact with politics in the first place, he may develop some political interest and turn out with a higher probability as well. This may be even more so for VAA usage than for internet voting. In any case, however, the effect is rather superficial for voter "A", whereas voter "B" may experience a more radical and potentially stronger impact. For voters of type
"B" the usage of technology is a major innovation, but for voters of type "A" it is a mere extension of a technology that they are long used to. The impact of usage then depends on the motivation an individual had to use the application. However, this link serves to differentiate impact from usage, not to equate the two.

In sum, the peripheral citizens (in political sense) of type "B" are unlikely to use VAAs, but they are strongly affected by it once they manage to clear the first hurdle. Conversely, voters of type "A" use technology more frequently, but the experienced impact on to follow the vote advice is limited. These expectations have been proven to be correct in the study of Estonian internet voters, where the mechanism was labeled as a bottleneck model of e-voting:

The mobilization effect of internet voting would be strongest among disengaged citizens, but not many of these citizens manage to use it in the first place. And usage of internet voting is most common among active citizens, but these citizens do not experience high impact. The interplay of these two effects constitutes the bottleneck mechanism of internet voting (Vassil and Weber, 2011, p. 4).

Provided that internet voting and VAAs, both closely related to the act of voting, share a number of commonalities, this pattern may be of a more general nature. That is, if electoral participation is constrained by certain demographic and attitudinal factors and the use of technology can overcome these barriers under some conditions, then these conditions may have a more universal character. This may, indeed, not be entirely improbable. Similar "bottleneck" effects have been described previously by Lazarsfeld, Gaudet and Berelson (1944) in the domain of political communication and its impact on individual preferences.

/—/ the people who did most of the reading and listening not only read and heard most of their own partisan propaganda but were also most resistant to conversion because of their strong predispositions. And the people who were most open to conversion - the ones the campaign managers most wanted to reach - read and listened least. Those inter-related facts represent the bottleneck of conversion (Lazarsfeld et al., 1944, p. 95).

At first sight, the reference to Lazarsfeld and his colleagues' findings is seemingly irrelevant, because it is about media consumption, campaign and conversion effects. However, thinking about VAAs as information sources, and not so much as a technology *per se*, there is a good reason to suspect that VAAs are not that different from many other information sources. The underlying mechanism for acceptance/resistance may follow a very similar logic. Technology here is a simple intermediary and its usage would perhaps filter out those users with established preferences, who are more open

to information but at the same time less prone to conversion. The non-users, however, may display the opposite characteristics.

Zaller (1992), by proposing his RAS-model points to the very similar mechanism with regard to change in attitudes. He argues, that attitude change is a two-step process involving, first, the reception of persuasive communication, and second, acceptance or non-acceptance of their contents (Zaller, 1992). The reception process depends on individual's awareness: the greater it is, the greater the likelihood that a person receives a message. The acceptance, however, depends on the very level of awareness: politically aware persons are better in resisting persuasive communication that is inconsistent with their prior preferences and values (Zaller, 1992). Being exposed to the message, then (or in our case to the technology) may not subsequently lead to the acceptance (or impact in the current case).

If this line of reasoning holds, then VAA usage and experienced impact should be addressed as two distinct phenomena, both conceptually and empirically. By making this distinction one arrives at the powerful tool to measure the two separately and test not only the bottleneck-hypotheses, but also more generally the mechanisms identified by Lazarsfeld, et al. (1944) and Zaller (1992). It is for these reasons that this thesis separately addressees the issues of VAA usage and impact.

The effect on vote choice

Until now, the theoretical and empirical expectations of the technology usage and its impact on turnout were demonstrated. It is apparent that investigating an impact of technology, the usage implies a more complex mechanism than proposed by the literature. This can be achieved by separating the usage and impact both conceptually and empirically. This approach would lend itself toward the analysis of actual conditions under which the impact is experienced. However, this is insufficient if one aims to understand the impact of VAA usage on electoral choices, i.e., what characteristics condition the impact of the VAA advice on individual voter's political choices. In the following section the attention will be given to the mainstream theoretical models explaining the preference formation and voter's choices. In particular, three strands of literature will be presented: the sociological, the social-psychological and the rational choice (or economic) approach.

Sociological approach

One of the first voting behavior studies relying on individual level data (based on the repeated interviews during the 1940 American presidential election) was guided by Paul Lazarsfeld from the Columbia University's Bureau of Applied Social Research. The intrinsic interest of the Columbia School was in campaign effects and how they potentially

change voting intentions. Focusing on sociological factors, largely due to the availability of census data demographics, they compared these with voting patterns (Dalton and Wattenberg, 1993).

The results, first published in The People's Choice (Lazarsfeld et al., 1944) pointed to the fact that differences in party choice between social groups result from politicized and institutionalized societal group conflicts, whereas the degree of identification with a particular social group reflect the intensity of the societal conflict and the influence of socializing agents and social control (Tillie, 1994). Moreover, the findings indicated that during the 1940 campaign there were relatively few voters who switched back and forth, leading the scholars to conclude that it is indeed the demographic patterns that keep the vote intentions relatively stable over time. However, to explain those few who switched between the parties Lazarsfeld et al. found strikingly that these people were not those they expected:

The people who were torn in both direction and who did not have enough interest in the election to cut through the conflicting pressures upon them and come to a deliberate and definite decision. /—/ In short, the party changers /—/ were, so to speak, available to the person who saw them last before Election Day. The notion that the people who switch parties during the campaign are mainly the reasoned, thoughtful, conscientious people who were convinced by the issues of the election is just plain wrong. Actually, they were mainly just the opposite (Lazarsfeld et al., 1944, p. 95).

In the subsequent study of the 1948 election Berelson, Lazarsfeld and McPhee (1954) laid out a comprehensive sociological model of the vote decision taking the study to a more formalized level. Rather than concentrating on the campaign itself it concentrated on preference formation - the social side of voting (Evans, 2004). The basic assumption was that social-structural characteristics (such as social and economic status, religion, education etc.) create common group interests that shape the party coalitions and define images of which party is the best representative of the needs of various groups in society (Tillie, 1994). The principal finding, and one that would guide the subsequent Michigan model, was that overall voting preference remained remarkably stable, and all the more so when social context was mutually reinforcing (Evans, 2004). To the all appearances, people belonging to the homogeneous social groups voted for similar political parties and do so consistently across time.

The social-structural tradition in European electoral research was followed by the seminal work of Lipset and Rokkan (Lipset and Rokkan, 1967) on party systems and voter alignments. In this macro-sociological approach authors looked at the nation-state building and democratization, which placed different social groups in opposition with each other, giving rise to the political competition relying on relevant social divisions.

Political elites, in their view, mobilize social groups based on their potency to support a respective group of elites. The common conclusion from the American and European experience was that voters prefer parties, which represent the specific class, religion (or other cleavage) they belong to and identify with.

Since the mid-1960's, however, the decline in traditional cleavage structures was noticed due to the socio-political change in Europe, based on a loosened economy in postwar period, service economy, increase in education and the emergence of a white-collar sector and declining religious affiliation (Thomassen, 2005). The rise of postmaterialist values (Inglehart, 1977, 1990) caused voters to become decreasingly aligned with traditional cleavage structures, and realign with new social divisions.

For this study, the sociological approach will serve as a principal guide in formalizing the baseline behavior of VAA usage. I assume that VAA usage (at baseline) is driven by a set of socio-demographic characteristics. However, an explicit empirical model and theoretical expectations will be provided in the subsequent empirical chapters.

Social-psychological approach

The weakness of the sociological approach in explaining electoral change, led investigators at the University of Michigan to focus more directly on the psychological process behind the calculus of individual voting behavior (Dalton and Wattenberg, 1993). The publication of 'The American Voter' in 1960 introduced an explicit model of social psychological voting (Campbell et al., 1960), with the clear focus on long-term psychological predispositions in guiding citizens' actions (Dalton and Wattenberg, 1993). The proposed concept was that of party identification which is a long-term stable psychological affinity for one of the two major parties (in an American context). Such an emotional or 'affective' attachment develops initially in the socialization process during childhood and adolescence, when individuals pick up the attitudes and values of their parents, family and peers. Children are taught from an early age to 'believe' in one of the parties and what it stands for.

The underlying model of voting behavior of the Michigan School described the voting process in terms of a funnel of causality (Campbell et al., 1960). At the wide mouth of the funnel are the socio-economic cleavages, which shape the long-term alliances between broad social groupings and political parties and determine individual party identification. At the narrower end of the funnel group loyalties become linked with more explicit political attitudes, which are of more short-term nature (Harrop and Miller, 1987). The concept of party identification in this model recognizes the importance of the short-term factors (attitudes toward policies, group benefits and candidates), but this does not mean that it dismisses the importance of a social group. On the contrary, party identification stems precisely from the attachment one feels toward a particular social group, but the eventual voting behavior is conditional on whether the party identification is congruent with the short-term factors.

The implications of party identification are of major importance for the current thesis. External stimuli (such as a VAA advice, for example) may interfere almost exclusively with short-term factors (such as attitudes toward issues) and they can have an effect on eventual vote choice if it is congruent with existing long-term factors (such as party identification). Therefore, voters with established party identification can be subject to possible changes in their behavior if the external stimulus does not conflict with existing political predispositions.

The economic approach of voting behavior

Finally, theories stemming from economic (or rational) approaches to voting behavior assume that voters act rationally in their political decisions, by evaluating the parties and candidates based on the utility they provide. According to Downs (1957):

This axiom implies that each citizen cast his vote for the party he believes will provide him with more benefits than any other. /—/ Given several mutually exclusive alternatives, a rational man always takes the one which yields him the highest utility, ceteris paribus, i.e., he acts to his own greatest benefit (Downs, 1957, p. 36).

The rationality in voting behavior implies the consideration of proposed policies, or issues, but since information about those issues is limited to the voters, the calculation of utility will be based on ideologies. Therefore, the voters compare each party's political offer with their own views on the basis of the ideological dimension. In particular, borrowing from Hotelling (1929) Downs introduced an ideologically meaningful space along which the political preferences can be ordered from left to right, both for the parties and the voters (Downs, 1957). Subsequently, each voter will prefer the party, which is perceived at smallest distance on the left-right dimension. This model assumes that voters evaluate each party based on this relative proximity. This implies, however, that voters can prefer more than one party (Tillie, 1994). Depending on the distances perceived, various magnitudes of party preference can be distinguished (*ibid*).

The Downsian approach, based on spatial proximity, was challenged by the directional model of issue voting (Rabinowitz and Macdonald, 1989). The latter also treats voters as rational decision makers. But instead of placing the parties and voters only on the left-right continuum, it introduced a center-point of the dimension. In the directional model voters do not have specific preferences for a particular policy, rather they favor one side or the other of an issue debate or they are neutral (Tillie, 1994). The vote choice is then determined by the party's position on the issue. If it falls on the same side with that of the voter, the issue will stimulate positive feelings toward the party (*ibid*). Numerous alternative models of issue voting will not be discussed any further. For the current research it suffices to make an analytical distinction between rational or issue voters and those with established party identification. Throughout the thesis both concepts will be used in theoretical models explaining the usage of VAAs and their impact.

The cost of information and VAAs as information shortcuts

An additional component of Downs' approach to economic theory of voting behavior involves the concept of information costs. In order to make political decisions citizens need to be informed about possible alternatives between which they can choose and the likely consequences that they have to face when choosing any given alternative. Downs (1957, pp. 207-259) provides and extensive framework to analyze the process of political decision making under the condition when perfect information is not available for voters. In such event, any voter is faced with several discrete steps that allow the provision of the background information necessary for making an informed decision. However, every step involves a cost.

According to Downs, information costs can be divided into those that can be transferred to other agents and those that cannot (*ibid*.). An example of a non-transferable cost is the very act of voting, which normally is conducted by the voter herself. In light of the VAA research, an example of a cost that cannot be delegated to others is that of evaluating policies. Only a voter herself can decide which policies to support or where to stand with respect to issue statements provided by the VAA. These costs should not be undermined. For example, assessing whether one wants to approve the building of a nuclear power plant in an immediate neighborhood might be an easy task and involve no more than a little common sense thinking. However, questions on social security or distribution of public funds may be extremely complex and require vast resources from VAA users. In such cases nontransferable costs may be considerable.

Another group of costs are those that can be delegated to others, i.e., transferable costs according to Downs (*ibid.*). Here, VAAs can dramatically improve the situation for the voter by considerably reducing such costs. In particular, Downs (1957, p. 210) distinguishes between procurement costs, analysis costs and evaluative costs. All of these can be transferred to others. Procurement contains actions related to gathering, selecting and transmitting information. In all of these instances a voter can transfer the costs to the VAA. After all, no VAA can operate without gathering relevant information on political issues, selecting the most salient ones for presentational purposes and transmit the quantified party positions through the web interface to its users. Analysis costs are covered by the back-office structures of VAAs. Usually, preparing a VAA involves a team of coders that go through large amounts of data and assign numeric values to each party position within the given issue that is identified beforehand. Such analysis,

is made in advance and the voter is not required to spend any more resources on it. By implication, VAAs reduce ambiguity that is associated with those political issues on which parties are for strategic purposes less motivated to express a clear stance. Finally, evaluative costs relate to activities where the voter is required to compare the party position with her own stance and decide what choice would yield the highest utility to her. Even here, voters can outsource these costs to the VAAs, because by offering a clear ranking of parties any VAA user simply needs to choose the closest one.

In such a framework VAAs function as informational shortcuts to voters who are less informed about politics and for whom the process of becoming informed is rather costly. Such group of voters is motivated to use VAAs simply because it allows them to gain information that would otherwise involve high costs. On the other hand, for voters with sufficient political information VAAs may function as additional channels for getting even more information. That is, for them VAAs are not as much as a shortcut, but as an additional data source. Subsequently, the expected marginal utility arising from the VAA usage should be much greater for the low-information group than for the highinformation group of voters. If so, introducing political awareness as a proxy to political knowledge, becomes indispensable in specifying the models explaining the impact of VAAs.

Before proceeding with empirical analysis, the next section provides a specification of concepts used in the general theoretical framework. The goal is to refine loosely formulated concepts and make them appropriate for the current research.

2.4 Conceptualization

Throughout the first sections of this chapter many concepts have been used rather loosely e.g., political participation, civic engagement, technology, voting preferences and vote choice, etc. As latent concepts their meaning is dependent on their definitions. The wide use of these concepts across countries and disciplines, if not clearly defined, may lead to a confusion of meaning, destruction of the sharpness of these concepts, and serious fallacies in further discussion. Sartori (1970) has argued that this confusion leads at the higher levels of analysis to macroscopic errors of interpretation, explanation and prediction, and at the lower levels, to a great deal of wasteful data misgathering. In order to avoid these pitfalls this thesis seeks to derive the major concepts from a variety of sources and make these concepts appropriate for further operationalization within the framework of how the concept is understood in the given discipline. Therefore, the concepts will be narrowed down to explicate those components, that can be operationalized.

In the following the definitions of political participation, electoral participation, voting preferences and vote choice, and electoral competition will be derived from the body of literature and made appropriate for the current research.

Political participation

Political participation is one of those concepts for which nearly everybody has a rough and general understanding (Arterton, 1987). We can look at another person's actions and agree as to whether or not those actions are "political" (*ibid*). This intuitive understanding of the concept captures its general essence, but in order to provide the operational components to the concept, a more specific definition is required.

In their seminal work Participation in America: Political Democracy and Social Equality, Verba and Nie (1972) define political participation in terms of individual activities that are more or less directly aimed at influencing the selection of governmental personnel and/or the actions they take, excluding passive or violent political activities, or those that gain unintended political outcome. Their definition aims to capture the sense of deliberate action intended to achieve a certain political outcome. It is a minimal definition, limited in many ways: their concern is with activities "within the system" - ways of influencing politics that are generally recognized as legal and legitimate. A broader definition is employed by Kaase and Marsh in their 1979 study referring to all voluntary activities by individual citizens intended to influence either directly or indirectly political choices at various levels of the political system (Kaase and Marsh, 1979). Their definition includes unconventional forms of participation. Moreover, it is their contention that a conceptualization of political participation must include protest and violence to present an adequate view of politics (Conge, 1988). Conge, by taking a critical look at definitions offered by Kaase and Marsh (1979), Nelson (1979), Booth and Seligson (1978) synthesizes his own definition. According to Conge, political participation is individual or collective action at the national or local level that supports or opposes state structures, authorities, and/or decisions regarding allocation of public goods (Conge, 1988). From his definition, Conge explicitly eliminates the notions of political attitudes, sentiments, awareness, and restricts "aggressive behaviour" to violent acts. Moreover, he binds political participation to governmental institutions only, excluding community behaviour from the definition (*ibid*). Brady (1999) summarizes previous definitions and extracts four basic elements common to most of the definitions: activities or actions, ordinary citizens, politics, and influence (Brady, 1999). According to Brady actions must have some political content before they can qualify as political participation. Furthermore, political participation involves a final element - an attempt to influence outcomes (Brady, 1999). This excludes actions such as getting information about politics by reading newspaper or watching a television program; being contacted by a person, party, or organization soliciting involvement in some political activity; and going to a governmental office to pick up a welfare check. These activities border on political activity, but, according to Brady, they are not in and of themselves attempts to influence politics.

It is apparent that some accounts use the narrow concept of political participation in order to frame the core essence of the subject under study (Verba and Nie, 1972); whereas the others tend to stretch the concept, grasping a variety of meanings (Kaase and Marsh, 1979). For example, further definitions of political participation include almost always a combination of the conventional and unconventional forms of political participation (Dalton et al., 2004; Stolle et al., 2005; Tilly, 2004; Tilly and Tarrow, 2007). Dalton et al. (2004) conclude that an exclusive focus on traditional forms of participation that target the political system per se entails the risk that innovations in the participation repertoire of citizens remain unnoticed; this in turn could lead to the false conclusion that political participation in general is in decline.

The above-mentioned definitions imply that the concept of political participation has to have a political outcome, and therefore the definition of the concept for the current research is the following: political participation is an individual-level action aimed to achieve a certain political influence or outcome. Actions that are not related at achieving a political influence or outcome (such as following the political news or talking to friends about politics) are excluded from the definition. The term political engagement will be used for these purposes.

Electoral participation

Electoral participation (or individual turnout), as a sub-division of political participation, refers to voting. They both refer to the same category of political activity and they both attempt to achieve a political outcome, however the distinction has to be made within the concept. This thesis seeks to explain the effects of the VAA-usage on electoral participation while controlling for several forms of political participation. Therefore, electoral participation has to be detached from political participation - otherwise either of the two cannot be operationalized properly.

Choice and preferences

Political scientists have made a clear conceptual distinction between voter's preferences and actual vote choice since Downs (1957) and Campbell et al. (1960). However, if looking at the empirical works on the voting behavior this distinction has gained little attention, in particular at the level of measurement and operationalization (van der Eijk et al., 2006; van der Eijk and Franklin, 2009).

Some scholars have increasingly insisted that voter's preferences and vote choice must be both conceptually and empirically detached, and they have proposed an empirical instrument to execute the analysis that accounts for preferences in particular (van der Brug et al., 2007; van der Eijk et al., 2006; van der Eijk and Franklin, 2009). The purpose of this section is not to explicate the method for measuring the preferences as distinct from party choice (which will be addressed in the subsequent parts of the thesis), but the conceptualization of preferences, vote choice and the corresponding terms.

Preferences are usually conceptualized as individual's cognitive ability to rank alternatives on the utility that they provide. Thus, preference is a mechanism enabling the choice. The choice on the other hand is a process of judging the merits of multiple options and selecting one of them for action. If measuring the impact on choice exclusively, the research only offers information about the first party that stands first in the voter's preference order. However, van der Eijk and Franklin (2009) have shown that changes in party choice are dependent on the existing structure of preferences, which cannot be deduced from the choices made.

Figure 2.1 is borrowed from van der Eijk and Franklin (2009) and it illustrates the imaginary situation where the changes in voting preferences may or may not lead to the actual changes in vote choice. In particular, for Voter 3 the preference change in t is sufficient to choose party B over party A, because she is closely tied to two of the parties at the same time.

	Preference	and vote ch	oice at t-1	Preferences and vote choice at t			
	Preference for A	Preference for B	Vote choice	Preference for A	Preference for B	Vote choice	
Voter 1	8	1	Α	6	1	A	
Voter 2	7	2	Α	5	2	А	
Voter 3	6	5	A	4	5	В	
Voter 4	3	6	В	1	6	В	
Voter 5	2	7	В	0	7	В	

Figure 2.1: Preferences and vote choice

Provided that the preference change for Voter 3 was a consequence of a slightly unexpected VAA advice (but still relatively close worth considering), the only satisfactory way to analyze the impact is through preferences and not exclusively through the vote choice. The latter would suffer from empirical imprecision leading to the conclusion that the impact of VAA (measured at *t*2) had consequences only for the Voter 3, whereas the structural changes in preferences for other voters will be ignored. By employing measures for preferences it will be possible to identify voters with similar preferences for two or more parties and measure critical change in preferences possibly leading to eventual changes in vote choice.

According to van der Eijk and Oppenhuis (1991) if a voter is confronted with several

choice options in a given election she may support one party or she may be inclined to give her support to several of them. In the former case there is no competition for her vote, since all the alternatives have been ruled out and she may well cast her vote for that single party. In the latter case, however, "if he keeps open various possibilities, the parties are competing for his vote" (ibid). There is a growing empirical support for the fact that voters tend to, indeed, be volatile in their choices, primarily due to the fact that they have not ruled out alternatives of multiple parties (Franklin et al., 1991; Tillie, 1994). The essence of electoral competition is then related to the degree voters are willing to consider more than just one single party as an acceptable choice option (van der Eijk and Oppenhuis, 1991).

The idea of electoral competition assumes that there exists a group of voters who are not tied down to only one single party by their group affiliation, ideology, socialization, tradition or whatever (van der Eijk and Oppenhuis, 1991) but that they exhibit multiple party preferences for several choice options (Tillie, 1994). This, however, does not imply that all voters are equally open to many parties. It may well be that many voters have narrowed down the choices to only one party. Nor does it mean that parties are in equal competition for votes. Some parties meet the preferences of some voters better than others and it is precisely the configuration of voters' preferences, which determines the eventual choice (van der Eijk and Oppenhuis, 1991). The idea to measure one's openness to electoral competition is not new. In a slightly different format it was also used by Mair (1987) and Bartolini and Mair (1992) and further elaborated by Bartolini (2002).

However, according to van der Eijk and Oppenhuis (1991) the concept of electoral competition is dispositional in its character, meaning that it cannot be directly observed. By looking exclusively at the vote choice we can observe only the outcome of the process, but not the competitive situation of elections. The only way, according to van der Eijk and Oppenhuis (*ibid*) to observe competition is through the likelihood that an individual voter could have chosen differently at the given election. This can be achieved by asking about her hesitations, or for her possible second choices.

The established survey instrument to measure these hesitations is to ask survey respondents about preferences and not party choice, by setting the respondent free from familiar restrictions that apply to the real act of voting (van der Eijk et al., 2006). Since the mid-1980s a 'propensity to vote' measure was introduced by van der Eijk and Niemoeller (1984), which has been implemented in numerous elections studies across Europe since. The question, in one of the variations, is formulated as follows:

Some people are quite certain that they will always vote for the same party. Others reconsider in each case to which party they will give their vote. I shall mention a number of parties. Would you indicate for each party how probable it is that you will ever vote for that party (van der Eijk et al., 2006, p. 432)?

In the survey, the respondent is provided with the list of parties in the respective polity with a scale ranging from 1 to 10 (or from 0 to 10, as proposed recently), where 1 means "Will certainly never vote for this party" and 10 means "Will certainly vote for this party at some time". The resulting scores constitute a propensity to vote measure, which indicates directly voters' preferences that may or may not determine the eventual vote choice.

Van der Eijk and Oppenhuis (1991) propose a categorization of these scores: high scores (8 through 10), medium scores (6 through 7) and low scores (1 through 5). These scores can be directly linked to the concept of electoral competition by distinguishing two major types of voters. First, voters beyond competition are these who are tied to one party (score 8 through 10) and for the other parities they indicate that it is unlikely that they will ever vote for them (scores 5 and lower). Second, voters who are subject to intense electoral competition, as they have awarded at least 2 (possibly even more) parties a high score. According to van der Eijk and Oppenhuis (1991) most voters who are subject to electoral competition have perceived either 2 or 3 parties as probable candidates for their vote. More parties in the given electoral system, however, does not magnify the choice problem for these voters. It only results in more parties being rejected as viable options, thus leaving the problem manageable. This group also constitutes the battleground for electoral competition. For the former group there is no competition, as for these voters there is one single party attractive enough to warrant their support van der Eijk and Oppenhuis (*ibid*). There are, however, two more groups that have been labeled as intermediate forms of electoral competition and voters for whom competition concerns which party is the least of all evils (van der Eijk and Oppenhuis, 1991).

The interplay between these voter groups has a consequence for the degree in which the particular electoral system is affected by short-term influences. An electorate beyond competition constitutes an anchoring point for the system, providing a shield for the system from whatever electoral results. The other group harbors the potential for aggregate change (*ibid*).

The implication of this conceptualization for the current research is that the overlap of voters' support for two (or more) parties constitutes an electoral potential. Provided that these voters are exposed to the advice given by the VAA, they might be particularly prone to be affected by the advice and therefore the advice in itself can contribute to the degree to which these electoral potentials are being realized. In all of the following empirical chapters measures of individual level availability for electoral competition will be used in the fashion proposed above.

2.5 A note on data sources and methods

This thesis relies on three data sources. Exploratory research will be carried out on the basis of European Election Study conducted after the 2009 European Parliament elections (EES 2009), where the question about the VAA usage was asked for the first time. An early release of these data are used in this research (a version issued by the PIREDEU on January 31, 2009). Using these data allows, for the first time, shedding light on the characteristics of the VAA users in a comparative perspective based on the representative samples of 27 European member states. Additionally to the EES 2009 data, the study employs also the data from the European Social Survey 2008 (wave 4). I will elaborate on the reasons of using these data in the respective chapters of the thesis.

The causal analysis on the impact of VAAs employs first the Swiss data stemming from the Smartvote project. The analysis of this section is based on the data gathered by the project IP16 "smart-voting" in the framework of NCCR "Challenges to Democracy in the 21st Century". The data were gathered by means of three online surveys before and after the 2007 national elections in Switzerland.

Second, in order to further our understanding on the causal effects of VAA usage on attitudes and behavior, the final empirical chapter introduces a field experiment that was carried out in the real-world situation around the 2009 European Parliament elections in Estonia. In a nutshell, it was a panel study comprising a pre- and post-election survey between which the treatment was assigned to the randomly and evenly split half of the sample. The treatment was an invitation to use the EU Profiler - a pan-European VAA covering all European Union member states.

Part II

Explaining the Usage

Chapter 3

Theory - The Sociology of VAA users

3.1 Introduction

Who are the people who choose to use voting advice applications? What is their sociological profile and how do they differ from the general electorate? In order to explain patterns that lead some people to use the VAAs one should realize that first and foremost VAA users are a subpopulation of internet users. That is, there are some baseline commonalities between the large pool of internet users and a small amount of VAA users. To be sure, internet users (as much as VAA users) can be expected to be younger, better educated with higher socio-economic status, etc. However, it is likely that on top of these commonalities some other properties are unique to the population of VAA users only and hardly reflect the characteristics of the general population of internet users. These expectations are theoretically embedded in the literature of digital divide in general and political divide in particular. The first branch of literature explains the distribution of ICT usage among the general population, while the literature on political divide examines why some people become involved in online politics and others not. These two intertwined streams of theories form a theoretical and a conceptual foundation for this chapter. After reviewing these theories I explicate a theoretical model of VAA usage and employ data from the 2009 European Election Study in order to test how well the theoretical model fits the observed patterns of VAA usage.

3.2 Theories of online political participation

According to the extensive literature on digital divide it is a well established fact that internet users have an above average socio-economic status, that they are younger and that they possess higher levels of educational attainment (Slevin, 2000, pp. 41-42, Norris, 2001, Katz and Rice, 2002, p. 41, Mossberger et al., 2003, p. 35, van Dijk, 2005, p. 130,). Since the early studies on the digital divide, scholars turned their attention to

a set of 'divides' on top of the simple 'access divide' that could potentially diversify the effect of digital divide on technology usage. Katz and Rice (2002) looked at the combination of access, skills and social interactions; Mossberger, Tolbert and Standsbury (2003) dismantled the concept of digital divide down to democratic divide and economic opportunities divide; Norris (2001) was primarily concerned with the democratic divide.

Yet, irrespective of which conceptualization of the 'divide' was used, most of the studies found that while the access divide is the most fundamental factor influencing internet usage, other types of divides (divide in skills, political involvement, economic opportunities, etc) replicate for the good part the access divide (Mossberger et al., 2003, p. 117). Therefore, it is widely accepted that at least the baseline model of internet usage is well explained by a set of socio-demographic characteristics only (Nie and Erbring, 2000, p. 7; Mossberger et al., 2003, p. 178; Hindman, 2007, p. 185). This set of baseline characteristics comprises most notably age, education and socio-economic status. As mentioned above, internet users are expected to be younger, more educated and with higher socio-economic status than those who do not use the internet.

The baseline model of internet usage is a first step toward theoretical expectations that explain the profile of the VAA users. Since internet usage is a precondition of VAA usage, one should expect both to share these baseline characteristics at the outset. More formally, this latent dimension of socio-demographical characteristics should affect both internet usage and VAA usage in a similar fashion, but vary in terms of its explanatory power. The latter should be expected because the VAA usage occurs much more rarely than internet usage.

Provided that the threshold between the internet users and the non-users is indeed set by a single underlying latent dimension, then in fact, VAA usage (as an event occurring among the population of internet users only) can be effectively explained as some form of deviation from that baseline model. Indeed, Van Dijk notices that VAA users simply exhibit higher levels of political activity and are thereby involved in politics in the first place (van Dijk, 2006, p. 107). Therefore, maintaining the baseline model of internet usage, but investigating the deviations from it, will shed light on the patterns by which some internet users become VAA users and others not.

Beyond the baseline model of VAA usage

It is widely accepted that those who become involved in online politics (e.g., VAA usage) are not substantially different from those who are also involved in political affairs offline (Mossberger et al., 2003, p. 176). For much the same reasons, participation in online politics is only mirroring conventional politics in the first place (Margolis and Resnick, 2000, p. 74). By implication, those involved in offline politics display higher political involvement just as those who participate in offline politics. If this holds, then VAA users should first and foremost deviate from the baseline model of internet usage with

regard to their higher political interest.

That those involved in online politics have higher levels of political interest and engage more in various political activities at the outset is empirically demonstrated by Boogers and Voerman (2002), Robinson, DiMaggio and Hargittai (2003) and Wilhelm (2003). It happens so because those already involved in politics are more likely to use new ICTs for political purposes than those who are less involved (van Dijk, 2006, p. 107).

Indeed, Bimber (2003, pp. 219-224) shows that internet usage makes almost no difference with respect to explaining conventional political behavior, thereby leaving little room for speculations that internet has changed levels of political engagement in any substantial way. He also shows that political interest ranks on top of the predictors of conventional political participation while controlling for internet usage (ibid).

Because participation in online politics mirrors the patterns by which individuals become involved in traditional politics I turn to classics of voting behavior. In predicting turnout, these studies use a very similar approach to the one that I propose in explaining VAA usage. For example, Lazarsfeld, et al. demonstrate that persons who were most likely to participate in elections, where men who lived in urban areas, had higher levels of education and shared a better socio-economic status than those who were likely to abstain from elections (Lazarsfeld et al., 1944, p. 45). However, this baseline model appeared to be disturbed as soon as political interest was introduced.

The difference in deliberate non-voting between people with more or less education can be completely accounted for by the notion of interest. Once the interest level is kept constant, education does not make any further difference. Deliberate non-voting increases greatly as interest decreases – but if a person is interested, he will vote irrespectively of his formal educational level. On the other hand, if he is not interested, he is not likely to vote in any case (Lazarsfeld et al., 1944, pp. 47-48).

Although applied in a rather different context, the way to theoretically explain VAA usage works in a similar fashion. Once we introduce political involvement into the baseline model of VAA usage, we should be able to identify VAA users much more accurately, while the initial explanatory characteristics (those from the baseline model) should contribute much less. To put it in more simple terms, when political activity is added to the model, the baseline differences between voters and non-voters should become trivial and the outcome should be explained mostly by their levels of political activity.

Imagine for the moment that VAA usage is solely a function of prior political engagement. If so, then would it be sufficient to explain the outcome of interest to the fullest extent? That this is not the case, is conveyed in Figure 3.1. It conceptually demonstrates how VAA users and voters cluster in four 'boxes' according to the two dimensions - internet usage and political activity. The axes simply denote whether one is involved in politics (1) or not (0) and whether one uses the internet (1) or not (0).



Figure 3.1: VAA users by internet usage and political activity

As one can see this model successfully identifies voters and VAA users, but as they both cluster in group B, it is not possible to distinguish what are the unique features of VAA users as compared to the general population of voters. Therefore, other characteristics ought to be sought after that allow this crucial distinction.¹

In the following, I extend the theoretical model with the help of literature on voting behavior. In particular, I turn to voter's availability to electoral competition and attention to political issues while considering which parties to vote for - the two characteristics that could potentially explain the unique features of VAA usage.

VAA users' availability to electoral competition

The conceptualizations of one's availability to electoral competition go back to the early studies of American voting behavior and is reflected by notions like changers (Lazarsfeld et al., 1944), floating voters (Berelson et al., 1954), switchers (Key et al., 1966) or in more subtle terms "differential susceptibility to partisan change" (Converse, 1966, p. 136). More recently, Mair (1987, pp. 85-86) classified Irish voters according to their orientation toward parties or candidates, subsequently leading some voters to be *in competition* and others *out of competition*. Bartolini extends this line of thinking into what he calls voter's availability to electoral competition (Bartolini, 2002). He argues that these available voters are "perfectly elastic consumers, who by definition, are available to change partisan preference should a better offer be made to him" (Bartolini, 2002, 93).

¹It is worth mentioning, that Figure 3.1 is an illustration of an average pattern of VAA usage that is expected to work beyond the socio-demographic model. Other scenarios are possible, too. For example, those in cluster D, i.e., politically disengaged internet users, may be interested in VAAs out of pure curiosity.

All in all, it is widely agreed that one's openness to electoral campaigns and party competition is usually captured by the dichotomy between voters who know certainly which party they are going to vote for and those who are ambivalent to a varying degree. Using the propensity to vote measures van der Eijk and Oppenhuis refer to this dichotomy of voter types as those being 'subject' and those being 'beyond' electoral competition (van der Eijk and Oppenhuis, 1991, pp. 61-62).

It follows, that voters in multiparty systems have varying degrees of propensities to support one or several parties. This implies that some voters are more certain about the political choices that are available for them, and some less. Concomitantly, voters who are open to electoral competition and consider more than just one party as a viable candidate for their vote choice may have higher motivations to use VAAs. It happens so, because these voters are inclined to learn about the alternatives that are at hand, whereas those who know certainly which party they are going to vote for have smaller incentives to consult with the VAAs. "The 'available voter' is not necessarily informed about issues or programmes, but is sensitive to them" (Bartolini, 2002, 93). He argues that sensitivity refers to susceptibility to changes in electoral preferences in response to *elements* that relate to public debate or personal experience (ibid). VAAs in this context are precisely the kinds of *elements* that can affect the behavior of those voters who are available to electoral competition and leave those beyond the competition unaffected.

Clearly, for the time being I assume rationality while introducing these conditions. In practice there is a myriad of reasons why one uses VAAs. Intelligent entertainment can motivate even those voters who clearly prefer and always vote for one single party. Similarly, the curiosity of whether the VAA mirrors one's preferences accurately can throw the rational choice reasoning overboard or bring those hardly interested in politics to use VAAs. However, as the data impose limits for testing more extensive models I will maintain the theoretical expectation that one's availability to electoral competition increases the chances of VAA usage.

VAA users as issue voters

Another feature that may be uniquely associated with VAA usage could be voter's above average attention to political issues and her level of political sophistication. Imagine a Downsian rational voter who, when given several mutually exclusive alternatives, always takes the one which yields him the highest utility (Downs, 1957, pp. 36-37). The ability acting to his own greatest benefit rests on the assumption that there is sufficient information about the alternatives on which this decision can be based upon. This information is related to political issues, party performance, one's own political preferences, etc.

That voters can base their decisions beyond the conventional influences of voting behavior, like family, social class, candidate liking, etc. gave rise to the notion of issue voter. For such a voter questions of governmental policy are of paramount importance (Campbell et al., 1954, p. 112). "For him the party and candidate are but vehicles through which one policy or its alternate will be enacted. He will not "vote for the man" nor will he "vote for his party", except as the man or the party represents governmental policies which he himself wishes to see enacted or protected" (ibid). According to Dalton, "Many individuals base their decision on the issues and candidates of the campaign and the influences of friends, colleagues, and other political cue-givers, which produces an individualization of voting choice. /—/ Electoral research indicates that the decline in social group-based voting over time has been matched by an equivalent rise of issue voting (Dalton, 2000, p. 337)."

Applied empirical research has clearly demonstrated that issue voting indeed appears as a powerful predictor of voting behavior. Moreover, it has related issue voting models to the spatial proximity theory (Davis et al., 1970), directional theory of issue voting (Rabinowitz and Macdonald, 1989) and even attempted to merge different strands of issue voting into unified models (Merrill and Grofman, 1999).

At this stage, the idea is not to explicate each of these models in detail, rather the aim is to highlight that as long as issue voting is gaining relevance in contemporary voting behavior and as long as the traditional influences are eroding, then to all likelihood, VAAs are well embedded in the issue-centric understanding of voting behavior. As I briefly explained in the introductory chapter, VAAs provide voting advices on the basis of policy preferences. More specifically, the advice is calculated on the basis of issue congruence. The closer the party to one's preferences, the greater the overlap between the preferences and therefore the higher the chance that this party is being advised. In terms of classical voting behavior literature the advice is based on the Downsian concept of issue proximity (Downs, 1957). Voters who are interested in such type of voting advices should, at least to some degree, be interested in political issues. To put it differently, their vote choice is at least to some degree affected by political issues. Whether or not they remain typical issue voters is an empirical question, but from the outset they should be expected to lean toward issue voting. If so, then a typical VAA user should also deviate from the baseline characteristics of the internet user by the magnitude at which she considers political issues in her voting behavior.

In sum, if (1) internet voters and VAA users share some commonalities in their baseline behavior and attitudes and if (2) VAA usage can be explained as a deviation from this baseline on the basis of political interest, electoral openness and higher attention to political issues, we have all the necessary building blocks for a theoretical model that explains VAA usage. The following section explicates this model more formally and introduces corresponding hypotheses.

3.3 A theoretical model and hypotheses

A theoretical model of VAA usage expects VAA users to be a subsample of internet users. To be sure, the opposite is assumed to be impossible. Therefore, before specifying a theoretically justified relationships between the VAA usage and specific characteristics of individuals, one has to be explicit about the following axiom.

Axiom 1: VAA users are the subsample of internet users. If y_1^* is a latent variable denoting VAA usage and y_2^* is another latent variable denoting internet usage, then Axiom 1 states that $y_1^* = 1|y_2^* = 1$ and that $y_1^* \neq 1|y_2^* = 0$.

The main expectation of a theoretical model is that a single latent dimension, consisting of socio-demographic characteristics (such as age, education, socio-economic status, etc) explains internet usage. At the same time, large baseline commonalities between VAA users and internet users are assumed. Therefore the baseline hypothesis states the following relationship.

Hypothesis 1: VAA users are similar to internet users as long as the baseline socio-demographic characteristics are concerned, i.e., age, education, gender, social class and place of residence.

More specifically, if VAA users indeed share commonalities with internet users, then the baseline characteristics that explain internet usage also explain VAA usage. These baseline characteristics state that VAA users (just as internet users) are younger, they have higher educational attainment and socio-economic status, they are more often males and they come prominently from urban areas.

Next, additionally to the baseline characteristics that explain both, internet and VAA usage, the latter alone is expected to be driven by three characteristics: political activity, openness to electoral competition and attention to political issues. Higher political activity distinguishes VAA users from the population of internet users, but at the same time fails to identify VAA users as a distinct group from general population of voters (refer to Figure 3.1). Therefore, in order to uniquely identify VAA users I assume that VAA users have higher political involvement, but additionally to that, they are also more open to electoral competition and they are more attentive to political issues. The two following hypotheses tap these relationships.

Hypothesis 2: VAA users are distinguished from internet users by their higher levels of political activity.

Hypothesis 3: VAA users are uniquely identified by their openness to electoral competition and higher attention to political issues.

3.4 Data

In order to test my theoretical model and the proposed hypotheses, I employ data from the 2009 European Election Study (EES 2009).² This post-election study was conducted after the European Parliament elections in June 2009 across all twentyseven European Union member states.

EES 2009 is the only election study that has ever asked a question about the VAA usage on such a large scale. It allows shedding light on the characteristics of VAA users in a comparative perspective based on the representative samples of 27 European Union member states.

Additionally to the EES 2009 data, this part of the thesis also employs data from the European Social Survey 2008 (wave 4). These data are used in order to remedy some of the shortcomings of the EES 2009 data (refer to the section on Data limitations below).

VAA users in EES 2009 data

Before proceeding with the descriptive statistics, first consider the overall response rates that the question on the VAA usage in the EES 2009 survey received in the first place. The question reads as following.

There are websites offering advice on how to vote in the European Parliament elections on the basis of your ideas, values and policy preferences. In the weeks before the European Parliament elections, did you visit such a website? (Answer categories include "yes" and "no")

In total, 1872 respondents out of 27069 answered "yes" to this question. Figure 3.2 reports the distribution of the "yes" responses by countries.

²This analysis is based on the early release of the EES 2009 data issued on January 31, 2009.



Figure 3.2: The number of VAA users in EES 2009 data by countries

Figure 3.2 demonstrates that the EES 2009 sampled most of the VAA users from those countries that have the longest experience with VAAs. These countries include the Netherlands, Finland, Sweden and Belgium. Figure 3.2 also demonstrates that the overall number of respondents is sufficient in order to proceed with the analysis. This is not self-evident, because the number of VAA users in each respective country is highly dependent on whether that particular country had an experience with VAAs before the 2009 elections to begin with. In some countries, like for example the Netherlands or Germany, the history of having VAAs included into the electoral cycles reaches beyond one decade, whereas in other countries they may be absent or considerably less popular. In the latter case, ESS sample is not able to sample as many VAA users as in those countries where people are used to the VAAs.

That this is indeed the case for some countries is depicted by Figure 3.2. It shows great variation in terms of "yes" responses to this particular survey item. The unequal distribution of the responses makes some countries more suitable for individual country level analysis than others, potentially introducing unobserved heterogeneity at the country level. Important though it is, for the time being the analysis will proceed with the pooled EES 2009 data. In the subsequent chapters that deal with multivariate analysis, however, the data analysis will also account for the multilevel structure of the data.

Data limitations

It is important to notice that EES 2009 data do not contain information about whether the respondent is an internet user or not. In the following chapter (Chapter 4) I deliberately overlook this problem, and therefore also overlook Axiom 1 proposed earlier in this chapter. Therefore in the descriptive part of the analysis VAA users are compared to the entire electorate.

The situation will be changed in Chapter 5 where VAA usage will be explained by means of multivariate analysis. Here, I will introduce a technique to estimate the probability of internet usage for each observation in the sample. Moreover, by using Eurostat aggregate data on internet penetration across 27 European Union member states I bring the internet usage distribution in the sample in line to that of the population. This approximation technique allows me to remove those individuals from the analysis who are not internet users in the first place and therefore it also allows me to accommodate Axiom 1.

The next chapter examines the descriptive statistics of VAA usage by demographical, attitudinal and behavioral characteristics and relates the descriptive findings to the main hypotheses of VAA usage. The reason why I dedicate a little more attention than usual to the description of VAA users lies in the fact that the profile of VAA users is not well known due to the data availability up until now. After reporting and interpreting the bi-variate frequency distributions the subsequent chapters will proceed with testing the main theoretical model.

Chapter 4

Describing VAA usage

4.1 Introduction

This chapter provides a descriptive analysis of VAA users. First, I report to which extent VAA users differ from the general electorate with respect to their socio-demographic profile. This section corresponds to the first hypothesis and seeks to identify the baseline model of VAA usage. Subsequent sections extend beyond the socio-demographic characteristics and explore the attitudinal and behavioral profile of VAA users. Although the EES 2009 contains a number of variables that are of natural interest with respect to VAA usage, in all of the following sections I only consider those variables that are justified theoretically and that are incorporated into the theoretical model.

As noted in the last section of the previous chapter, the EES 2009 data are incomplete as they do not contain information on whether an individual is an internet user or not. In this chapter this problem is not addressed and I compare VAA users to all respondents in the data. In so doing one has to be aware that the descriptive analysis of this chapter offers a comparison of VAA users to the general electorate. In the next chapter, however, the problem of incomplete data will be addressed and then, inferences on VAA users are made so that the reference group includes the likely internet users only.

4.2 Findings

Table 4.1 provides descriptive statistics based on socio-demographic, attitudinal and behavioral variables. I report the frequency distributions of VAA users and non-users, mean differences between the two groups, and the statistical significance from the chi-square goodness of fit test. All variables are recoded to range from 0 to 1 and the reported mean is relative to the scale, not the absolute values of the initial variable (except of age, where the mean is interpretable in a meaningful manner). Additionally, for the continuous variables, the effect sizes are reported on the basis of the independent

t-test.¹ The size of the effect (r) can be interpreted in a similar fashion to the correlation coefficient where o means there is no relationship, and 1 means that there is a perfect relationship. However, r is not measured in a linear scale. In the following we consider effect sizes as proposed by Cohen (1969) suggesting what constitutes a large or a small effect: small effect accounts for 1% of the total variance; medium effect accounts for 9% of the variance, large effect accounts for 25% of the variance. In the next section, each group of variables will be discussed in detail.

** • 11		DIG	** • •		Q1 1/1
Variable name	Mean	Diff	Unit change	Effect size	Significance
Demographic variables					
Age	42.87	-7.96	1.00	0.42	*
Social class	0.46	0.10	0.20	0.33	*
Education	0.50	0.10	0.07	0.11	*
Urban residence*	0.73	0.57	1.00	-	*
Gender (male)*	0.54	0.11	1.00	-	*
Attitudinal variables					
Political sophistication	0.65	0.10	0.13	0.34	*
Openness to electoral competition					
Intense competition*	0.37	0.12	1.00	-	*
Beyond competition*	0.12	-0.06	1.00	-	*
Intermediate forms*	0.28	-0.08	1.00	-	*
Behavioral variables					
Political activity	0.49	0.18	0.09	0.63	*

Table 4.1: Descriptive statistics of the VAA users

Dummy variables are denoted with an asterisk (*). Column 3: Mean differences between the VAA users and non-users. Column 4: One unit change on a given scale (1 for dummies). Column 5: Effect size calculated from the independent t-test. Column 6: Statistical significance at 0.05 level.

4.3 Socio-demographic profile of the VAA users

For the socio-demographic baseline description of the VAA users, consider the variables presented in the first section of Table 4.1² Overall, some substantive differences between VAA users and non-users can be observed. In the following each variable will be discussed in a more in-depth fashion and, where appropriate, additional illustrative figures for bi-variate statistics will be presented.

Age

Age appears as one of the most important characteristics in distinguishing users from non-users. With a sizable effect and statistical significance (r=0.42, p<0.05) the mean age

¹The effect size is calculated by converting the t-value reported by the t-test into the r-value (effect size) as proposed by Rosenthal et al. (2000), for the detailed overview refer to Appendix A.4.

²Note that EES does not include a variable measuring the income of a respondent. Instead, the variable social class will be used as a proxy to income.

for the users is 42.87 years and on average it is 7.96 percentage points lower than for the non-users. The age differences between the two groups compared are graphically captured by the Figure 4.1³.



Figure 4.1: The age of VAA users

When age variable was subjected to the skewness/kurtosis test, it revealed that the sample of users had indeed a slight positive skew and this skew is statistically significant⁴.

Education

Education appears to be an important feature distinguishing users from non-users.⁵ In particular on a scale from 0 to 1, the mean educational attainment for users is 0.50 and for the non-users 0.40 (p<0.05, r=0.11). Although with a small effect size, the difference of 0.10 point reflects slightly more than one unit change on a 14-item scale, which means that on average, the users are one level higher with respect to their educational attainment as opposed to the non-users. Figure 4.2 achieves to represent these differences graphically.

³The box plot displays the median age (solid line in the middle of the two boxes), the 75% of the age distribution that falls between the upper and lower quartile (the boxes), and the 25% of the remaining variance (between the box and the lower and the upper "whisker"). Should there be any outliers, they are represented with dots outside the "whiskers".

⁴Skewness/Kurtosis test for normality.

⁵Education is measured on a 14-item scale standardized across 27 European Union member states using the following survey question: *What is the highest level of education you have completed in your education?*



Figure 4.2: Education by users and non-users

Social class

VAA users belong to higher social classes by almost half a point in a five-unit scale.⁶ The effect is sizable and statistically significant at 0.05 level (r=0.33). Figure 4.3 further reveals that the difference between the users and non-users occurs among those belonging to the working class. In particular, there are 12.6 percentage points less working class people among users than among non-users. Furthermore, among the users there are more respondents from the middle and upper middle class. The differences are 8.6 and 6.5 percentage points, respectively. The differences between users and non-users from lower middle class and upper class do not exceed 5-percentage point difference.

⁶The survey question measuring social class reads as following: *If you were asked to choose one of these five names for your social class, which would you say you belong to - the working class, the lower middle class, the middle class, the upper middle class or the upper class?*



Figure 4.3: Social class by users and non-users

Gender and Place of residence

When considering VAA usage by gender, it appears that males are only slightly overrepresented in the sample of users constituting 54.2% of the users (p<0.05). This finding should be treated as an indication that there is no particular gender bias among the VAA users, however this should be verified with the multivariate analysis in later stages.

The number of respondents from urban areas among the users is somewhat higher (73.1%, p<0.05) than among non-users, and therefore one could expect a small urban/rural cleavage with respect to VAA usage.

In sum, I find that VAA users are indeed younger, and a little better educated than those who do not use VAAs. They also come from slightly higher social classes and from urban areas. Therefore, with fair confidence one can conclude that as long as the baseline characteristics are concerned, VAA usage seems to indeed follow the theoretical expectations outlined in the previous chapter.

4.4 Attitudinal profile of the VAA users

Theory prescribed that VAA users can be expected to be open to electoral competition and they consider political issues as a basis for their vote choice more often that nonusers. With respect to electoral availability the measurement is simple, since the data contain propensity to vote measures. However, the measurement of issue voting appears to be more difficult as the data contain no information about one's attention to political issues. In the following I describe VAA users with respect to these two variables and provide a proxy measure for issue voting.

Propensity to vote

Following the literature on propensity to vote measures (PTV) (van der Eijk and Oppenhuis, 1991; van der Eijk et al., 2006; van der Brug et al., 2007; van der Eijk and Franklin, 2009) I use the operationlization of the PTV's as proposed by van der Eijk and Oppenhuis (1991). The distinction is made between those voters who possess multiple preferences for two or more parties and those who do not. This is achieved by recoding the respondents by how they awarded parties the propensity to vote scores. In particular, voters who award two or more parties a high PTV score (8-10) and any other parties medium or low PTV scores constitute a group of voters that are subject to electoral competition (van der Eijk and Oppenhuis 1991).

Those voters, who award only one party a high PTV score (8-10), none a medium score (5-7), and multiple parties a low PTV score are coded as those beyond electoral competition (ibid). Van der Eijk and Oppenhuis (1991) also distinguish between a number of intermediate forms of electoral competition, but as it is difficult to interpret these particular forms in light of the current research, I have collapsed them into one group.

Table 4.1 demonstrates that among VAA users the number of voters who are open to electoral competition is higher than among those who do not use VAAs (difference of 12 percentage points, p<0.05). Conversely the amount of those being beyond electoral competition is lower among VAA users as compared to non-users (difference of -6 percentage points, p<0.05). This evidence supports the theoretical expectations regarding the nature of VAA users. As far as the descriptive characteristics are concerned VAA users indeed seem to display greater availability toward electoral competition than those who do not use VAAs.

Furthermore, when looking at how electoral availability at the aggregate levels relates to the number of VAA users as sampled by the EES 2009 survey, an intriguing finding appears. Namely, the number of sampled VAA users seems to be higher in those countries where the electorate is more open to party competition. Conversely, the amount of sampled VAA users decreases with the growing number of those voters who are beyond electoral competition. Using the measure of van der Eijk and Oppenhuis (described above) I have grouped respondents in the ESS dataset into those who have multiple or single party preference. Then, I have calculated the percentage of both groups of the total respondents in each country (shown on a Y axis of the Figure 4.4). Finally, I fitted a linear trend line over the actual proportions. Figure 4.4 shows at the aggregate level how the proportion of those being beyond or those being subject to electoral competition varies across countries. It appears, that there are more VAA users in countries where the electorate is more open to party competition.



Figure 4.4: Voter types and VAA users in the EES 2009 sample

Political sophistication

The measurement of issue voting is not simple. Most notably, because the data do not contain survey questions on attitudes toward issue voting. Instead political sophistication index will be used as a proxy to issue voting. Following the theory, issue voters exhibit higher levels of political sophistication than voters who pay less attention to political issues (for more detailed theoretical explanation refer to Chapter 5 Section 5.1). The EES 2009 survey contains a battery of seven questions that reflect the degree to which a respondent is familiar with political life in her native country. I operationalize political sophistication as respondents' ability to provide correct answers to seven survey questions related to the political life. The answers are provided in a binary mode: either correct (coded as 1) or incorrect (coded as 0). On the basis of these answers an additive political sophistication index ranging from 0 (in case of all incorrect answers) to 7 (in case of all correct answers) captures one's political sophistication.⁷

The results in Table 4.1 and Figure 4.5 are immediately apparent. On average the levels of political sophistication are higher among VAA users by 0.1, which reflects almost one unit change on an eight-point scale. The effect is medium sized (r=0.34) and it is statistically significant (p<0.05). Figure 4.5 reveals the distribution of the sophistication index by users and non-users (absolute values of the scale), demonstrating that the users are more skewed toward the higher values of the scale, whereas the non-users are closer to the normal distribution. Provided that political sophistication indeed functions as a proxy to issue voting one can argue that VAA users are more attentive to political issues than non users.

⁷For the detailed operationalization refer to Chapter 5.



Figure 4.5: Political sophistication by users and non-users

4.5 Behavioral profile of the VAA users

Following the theoretical expectations the most crucial distinction between VAA users and non-users lies in the differences in political engagement. Theory suggests that VAA users ought to have higher political activity to begin with, before even considering becoming engaged in online politics.

Political activity

Political activity is the variable measuring a respondent's engagement in political activities on an 11-point additive scale (Appendix A.2). Findings show that VAA users appear to be considerably more active in the political sense than non-users, the difference in mean values is 0.18 which accounts for two unit-change on the scale. The effect is large (0.63) and statistically significant (p<0.05). Figure 4.6 illustrates the distribution of political activity between the users and non-users. In fact, political activity is a variable that has the largest effect size among all the variables described so far.



Figure 4.6: Political activity by users and non-users

4.6 Inferences from the descriptive statistics

Descriptive evidence of the VAA users point in the expected direction, in that the users tend to be slightly younger people with higher levels of educational attainment. They come from urban areas and belong to slightly higher social classes than non-users. With regard to gender, no marked differences were observed between the VAA users and non-users. In terms of attitudinal variables VAA users exhibit greater political sophistication and they are more open to electoral competition than those who do not use VAAs. As for the behavioral characteristics VAA users are politically more active than the non-users.

Descriptive findings are consistent with theoretical expectations. However, despite the fact that most of these effects are significant one must exercise caution in taking these findings at face value and drawing far-reaching conclusions. For example the effect sizes for most of the variables are at best medium-sized and the differences apart from a few exceptions not really extraordinary⁸.

It appears, though, that it is fair to expect that age, income levels (inferred through social class as a proxy), political activity, openness to electoral competition, and political sophistication will be good candidates in explaining VAA usage in the provided theoretical framework.

As mentioned above, the findings should be treated cautiously. Most notably, be-

⁸It must be noted, that the small effect sizes are, at least in part, an artifact of the the relatively few VAA users in the sample, which will also affect the predicted probabilities of VAA usage in the subsequent multivariate analysis. However, as this is an exploratory research, the aim is here to point to a probable mechanism that drives some citizens to the VAA usage and others not. Therefore, the small effects are not of particular concern to this study.

cause the descriptive analysis so far involves no controls of statistical relationships or whatsoever. Some relationships can therefore be potentially spurious, which can only be tested by means of multivariate analysis. The following chapter will address such a concern and test the validity of the theoretical model by estimating a number of multivariate models to predict the dependent variable of interest - the VAA usage.
Chapter 5

Explaining VAA usage

The preceding chapter provided a descriptive overview of the population of VAA users as compared to the general electorate. I found, just as the theory prescribes, that VAA users indeed tend to be younger, more educated, with higher socio-economic status and higher levels of political involvement. The population also appeared to be politically more sophisticated and they were more open toward electoral competition than the nonusers. However, taking descriptive findings at face value can be misleading in various ways, most notably, due to the lack of statistical controls.

In order to move beyond the descriptive statistics and explain the patterns that lead some individuals to use VAAs and some not, this chapter will test a theoretical model proposed in Chapter 3 by means of multivariate analysis. In the following, I first specify an empirical model on the basis of the theoretical one. Second, I provide an operationalization of relevant concepts that will be used as key independent variables in predicting VAA usage. And finally, I report the findings on the basis of the EES 2009 data.

Recall that the EES 2009 dataset is problematic in one respect. It offers no information on whether the respondent is an internet user or not. Therefore, by comparing VAA users to all others in the sample we also include those who do not use the internet and by definition are also not able to make use of VAAs. In the previous chapter I described VAA users by ignoring this problem and therefore that chapter compared the VAA users to the general electorate as such. In this chapter, however, I will deal with the problem of incomplete data and propose a strategy that removes those respondents from the sample who have a low probability of using the internet. Thereby, I correct the reference category of the outcome of interest. The operationalization and correction procedure of the dependent variable is discussed in detail in the following section.

5.1 The dependent variable: VAA usage

The main quantity of interest for this study is to explain the characteristics of respondents who have used voting advice applications prior to the European Parliament elections in June 2009. The dependent variable will be derived from the EES 2009 question Q22¹ about VAA usage and is coded 1 if the respondent used a VAA prior to the European Parliament elections (1,872 responses) and 0 otherwise (24,861 responses).

However, the operationalization of the dependent variable in this fashion bears a potential problem. Primarily, because the reference category (o) includes all those respondents who at the time of the European Parliament elections did not use VAAs, but also those, who in principle *could* not have used them, because these respondents had no access to the internet. If unresolved, this operationalization would violate the Axiom 1 in Chapter 3. Recall, that Axiom 1 insists specifying the VAA usage (y_2) conditional on one's probability of internet usage (y_1). More formally, internet usage is specified as following.

$$\left[\frac{Pr(y_2 = 1 \mid y_1 = 1)}{1 - Pr(y_2 = 1 \mid y_1 = 1)}\right]$$
(5.1)

Because y_1 remains unobserved in the EES 2009 data, the estimates will be inconsistent. For example, internet users are more likely to have a higher educational attainment than non-users. Intuitively, higher levels of education may also condition VAA usage. However, if the reference category of the dependent variable includes all others but the VAA users, the effect of education (or any other variable for that matter) is bound to be uncertain. Hypothetically, education can be expected to appear as a stronger predictor of internet usage and a weaker predictor of VAA usage. However, if the reference category includes all others than VAA users, the effect of education can be expected to appear as a stronger predictor of internet usage and a weaker predictor of VAA usage. However, if the reference category includes all others than VAA users, the effect of education would be impossible to assess.

The solution for this problem is not easily to be found. Namely, EES data contain no information about whether a respondent is an internet user or not. Neither it is possible to find a good proxy measure for this.

In order to overcome this deficiency and adjust the model with respect to the appropriate reference category I construct a continuous variable reflecting a similar latent socio-demographic dimension as conceptually described in Chapter 3. It indicates one's probability to use the internet. To estimate such a latent scale I employ data from the European Social Survey 2008 (ESS) that contains information about internet usage. In particular, I specify a model consisting of just three variables - age, income and educa-

¹There are websites offering advice on how to vote in the European Parliament elections on the basis of your ideas, values and policy preferences. In the weeks before the European Parliament elections, did you visit such a website? (Answer categories: Yes, No)

tion. These three variables form a parsimonious model that sufficiently explains internet usage.

Next, I assume that the same set of variables in the EES data should predict internet usage, too. This assumption allows me to subject age, income (through social class as a proxy) and education to the principal component factor analysis with the view of obtaining one factor designating the same latent scale of the probability of internet usage. On the basis of this scale, factor predictions are obtained for each observation in the data, which reflect individual propensities to use the internet. As a last step of the correction procedure, the low probability internet users will be omitted from the reference category.

The resulting variable is coded 1 if the probability of using the internet is above a certain threshold, and o otherwise. The threshold is identified by obtaining an aggregated average of internet users across 27 European Union member states and the same percentage is set as a threshold to distinguish between internet users and non-users.

Finally, this variable will be used to adjust the dependent variable with regard to the reference category. The new dependent variable is coded 1 in the case VAA usage and o in the case of non-usage, but only for those who were identified by the factor as potential internet users in the first place. Appendix A.1 provides a more thorough technical explanation of the procedure employed.

In order to simplify the notation conveyed in Axiom 1, in the subsequent parts of this thesis I simply refer to the VAA usage as a latent variable y_1^* and keep in mind that if $y_1^* = 0$ then it contains those who do not use VAAs (but who in principle could use them, i.e., non-internet users are omitted form the reference category).

Independent variables

For the socio-demographic variables I include age, gender, social class (five unit scale ranging from working class to upper class), place of residence (urban, rural) and educational attainment (fourteen unit scale reflecting the highest educational attainment of the respondent). These variables will be used in order to identify the baseline model of VAA usage.

Second, I use political activity which is a seven unit composite index of five survey questions measuring various political activities one can engage with before European Parliament elections (follow elections in the media, talk to friends and family about elections, attend a public meeting or visit a website concerned with elections).²

Third, one's availability to electoral competition is operationalized by following the suggestions of van der Eijk and Oppenhuis (1991). In so doing I use propensity to vote measures and distinguish between those voters who possess multiple preferences for

²For detailed survey questions that were used in constructing the political activity index refer to Appendix A.2.

two or more parties and those who do not. The third group, labelled as intermediate forms of electoral competition, serves as a base category. For the detailed operationalization of this variable refer to Section 4.4 in the previous chapter. All three groups are dichotomized into three dummy variables.

Finally, I use political sophistication as a proxy to issue voting. Namely, ESS 2009 data does not contain information about whether somebody is attentive to political issues or not. It does, however, contain a battery of seven questions that reflect the degree to which a respondent is familiar with political life in her respective country. Theory on voting behavior has demonstrated that issue voting involves conscious calculation of policy benefits for alternative electoral choices (Carmines and Stimson, 1980, p. 78). It presumes that issue voting is the final result of a sophisticated decision calculus; that it represents a reasoned and thoughtful attempt by voters to use policy preferences to guide their electoral decision (ibid). It is implied therefore, that issue voting requires high levels of political sophistication. Conversely, it is well understood that as citizens become more sophisticated and involved in the political process, issue preferences become increasingly important as an influence of voting choice (Dalton, 2006, p. 97).

Following these accounts, I operationalize political sophistication as a proxy for issue voting. In particular, I operationalize political sophistication as respondents' ability to provide correct answers to seven survey questions related to the political realm (Appendix A.2). The answers are provided in a binary mode: either correct (coded as 1) or incorrect (coded as 0). On the basis of these answers an additive political sophistication index was created ranging from 0 (in case of all incorrect answers) to 7 (in case of all correct answers), subsequently recoded to range from 0 to 1.

5.2 Empirical model

The first and foremost task of this chapter is to test the validity and the explanatory power of the proposed theoretical model. In order to do so, I specify an empirical model that fully rests on theoretical expectations and involves only those variables that are theoretically justified as valid predictors of VAA usage. An additive three step empirical model will be introduced in the following section.

Recall the first hypothesis. It states that VAA users are similar to the internet users as far as the baseline socio-demographic characteristics are involved. That is, following the theoretical expectations the same latent socio-demographic dimension that explains internet usage should also explain VAA usage.

EES 2009 data contains several socio-demographic variables that relate to these baseline expectations. In particular, I will use age, gender, social class, place of residence and educational attainment as components of the baseline model of VAA usage. In order to specify the first step of the additive model I let γ denote a vector consisting of these socio-demographic variables. I expect that the probability of VAA usage is to a certain degree explained by γ . More formally, I arrive at the baseline model of VAA usage as specified in the row H₁ in Table 5.1.

	Theoretical model / hypothesis	Empirical model
Ηı	VAA and internet usage is explained by the same set of socio-demographics	$y = \beta_0 + \beta_1 \gamma + \varepsilon$
H2	VAA users are politically more active than internet users	$y = \beta_0 + \beta_1 \gamma + \beta_2 X + \varepsilon$
H3	VAA users are open to electoral competition and they are attentive to political issues	$y = \beta_0 + \beta_1 \gamma + \beta_2 X + \beta_3 Z_1 + \beta_4 Z_2 + \varepsilon$

Next, hypothesis 2 posits that VAA users are distinguished from the general sample of internet users by their higher political activity. Let *X* denote this additive index of political activity. Row H2 in Table 5.1 extends the baseline model by one's political activity and following the theory, X is expected to be a large and significant predictor of VAA usage. Concomitantly, adding the vector X should considerably improve the explanatory power of the model.

As it was demonstrated in Chapter 3, political activity was not sufficient in distinguishing VAA users from those internet users who at the same turn out in elections. That is, H_2 effectively identifies voters who also use the internet, but fails to detect VAA users specifically. Therefore, hypothesis 3 proposed that given the baseline model and the generally higher level of one's political activity, the unique characteristics of VAA users relate to their openness to electoral competition and their higher attention to political issues. Row H₃ in Table 5.1 demonstrates the full empirical model of VAA usage by incorporating one's openness to electoral competition (Z_1) and political sophistication (Z_2)³ into the model.

Estimation issues

The dichotomous dependent variable of interest requires that the multivariate models are fitted by maximum likelihood. I prefer using normal probit model instead of a logit model because it allows comparing probit coefficients from the subsequent Heckman selection models. It must be noted though, that the logit model produced very similar results to those of the probit model (refer to Appendix A.3).

All continuous variables are coded following the intuitively meaningful direction so that the higher values of the variable reflect also meaningfully higher levels of the

³Political sophistication is used as a proxy to issue voting.

concept being measured. For example, the higher respondent's political sophistication or political activity, the higher the value of the corresponding variable.

The model will be estimated in a nested structure, in each step a new set of variables will be included while controlling for previously included ones. The nested structure of the models allows the evaluation of the model fit in each additive step and enables to demonstrate how each theoretical expectation performs while adding others. The model specification follows the logic of arriving at the most parsimonious model, i.e., using the minimal set of theoretically justified variables.

Quantities of interest

Interpretation of probit coefficients is a difficult task. Following the suggestions made by King et al. (2000) instead of reporting the coefficients and ancillary parameters, it would be ideal to extract and present quantities of direct substantive interest from standard statistical models. Therefore, instead of the probit coefficients or the first differences, I prefer reporting average marginal effects, which show the average of the variation induced in the probability of interest by a marginal change in an independent variable for each individual in the sample (Baum, 2006). According to Mood (2009), the appealing feature of average marginal effects is that they are affected by unobserved heterogeneity that is unrelated to the independent variables in the model, and thus they can be compared across models, groups, samples, years etc. Moreover, since all the variables in the model are recoded to range from 0 to 1 an average marginal change, which captures the effect of a one unit change of the independent variable on the dependent variable, is interpretable in a very similar way to the first differences.

Robustness of the findings: multilevel structure

An important concern regarding the robustness of the findings of the normal probit model relates to the fact that individual observations in the ESS data are assumed to be independent from one another. With clustered data where observations at lower levels (individuals) are nested in higher level clusters (countries) this assumption, however, is likely to be violated due to the dependence among observations within the same cluster (Rabe-Hesketh and Skrondal, 2008). For example, given the country-related specificities of the electoral behavior or the history of VAAs, individuals in one country might be more habituated to use VAAs than in others. This, in return may make some people in some countries to respond differently to the survey question measuring the dependent variable. Whether or not this actually happens is an empirical question, which is not fully accounted for by the normal probit model.

A way of controlling for multilevel effects in the data when still using conventional models is to include dummy variables to account for the second level unobserved heterogeneity and report standard errors adjusted for these second level clusters. Indeed, this is exactly what I have done in models 1 through 3 reported in Table 5.2. However, this model still forces all observations to have the same intercept, which given the discussion above, may not be adequate. In order to relax this assumption, I also estimated a multilevel model that allows for a country specific random intercept. Model 4 in Table 5.2 demonstrates that the results from the multilevel model are fairly similar (with somewhat larger standard errors) to the probit estimates. Because the differences between the two models are small in practical terms I use the results from the normal probit model as the basis for further discussion.

5.3 Findings

Table 5.2 shows the results from the probit model predicting the VAA usage and compares the results with the multilevel model using random intercepts.

We first notice that the estimates in Model 3 and Model 4 (that is, two fully specified models) remain consistent irrespective of the statistical technique used. Does it mean, that VAA usage is not affected by the unobserved heterogeneity at the country level? Actually, it is quite the contrary. The evidence of between-country variation is well captured by the statistically significant ρ which shows an interclass correlation. However, the variation is not overly large. The reason, why the normal probit model produces similar results to the multilevel model lies in the fact that including country level fixed effects (country dummies) does apparently a good job in arriving at unbiased estimates.

How does one substantially interpret the variation between countries in terms of VAA usage? One of the explanations could be linked to the degree to which citizens in each European polity are habituated to the use of VAAs. In the introductory chapter of this thesis I demonstrated that in some countries like the Netherlands, Germany, Belgium and Finland VAAs have been proliferating for longer than a decade. In other countries VAAs are a fairly new electoral phenomenon leaving citizens at large unaffected. Concomitantly, it may well be that in countries that have more experience with VAAs the pool of VAA users is much larger and therefore also much more heterogeneous. In such a case, the predictive power of the model should be weaker in those countries which subsequently leads to between-country variation. In order to verify whether this is indeed the case, I estimated 27 separate models for each of the European countries and plotted the pseudo $R^{2'}$ s of each model in Figure 5.1. Although not a perfect measure for goodness of the fit of the model, the pseudo R^{2} shows approximately how well each model fits in each of the 27 European member states.

A brief look at the figure shows that countries like Belgium, Finland, Germany and the Netherlands rank lowest in terms of the explanatory power of the model, which supports the hypothesis that in these countries the VAA population is more heteroge-

		Probit		MLM
	Model 1	Model 2	Model 3	Model 4
Male	1.60***	0.62*	0.46	0.42
	(0.33)	(0.25)	(0.24)	(0.27)
Age	-13.50***	-15.39***	-15.43***	-14.44^{***}
	(1.32)	(1.09)	(1.05)	(1.35)
Social class	3.52***	1.74^{*}	1.65*	1.68^{*}
	(0.75)	(0.72)	(0.67)	(0.80)
Urban	2.04***	1.62***	1.39**	1.29**
	(0.46)	(0.47)	(0.43)	(0.39)
Education	7.56***	4.54***	4.32***	4.05***
	(1.10)	(0.91)	(0.92)	(0.82)
Political activity		25.10***	24.40***	23.00***
		(1.38)	(1.40)	(1.97)
Open to electoral competition			1.02**	1.01**
			(0.36)	(0.33)
Beyond electoral competition			-0.31	-0.32
			(0.46)	(0.35)
Political sophistication			2.57***	2.49***
			(0.56)	(0.68)
Constant	-1.49^{***}	-2.28***	-2.41***	-2.49***
	(-1.49)	(0.08)	(0.09)	(0.11)
Observations	14180	13994	13724	13724
Pseudo R^2	0.10	0.20	0.20	
Correctly classified	29.58%	38.55%	39.56%	29.03%
Log likelihood	-3931.7	-3472.7	-3384.1	-3434.2
ρ				0.11^{***}
Wald test	211.40***	384.49***	457.06***	955.53***

Table 5.2: Explaining VAA usage (average marginal effects)

Average marginal effects. Robust standard errors clustered by country in parentheses for M1/M3. Model 1/Model3 normal probit models. Model 4 multilevel model. Country dummies in Models 1 through M3 not reported.

* p < 0.1, ** p < 0.05, *** p < 0.01

nous. Conversely, literature on VAA studies makes almost no references to countries on the left of the X-axis demonstrating that the identified model works better in countries where citizens are new to the VAAs (and therefore also more homogenous).

Another explanation could be related to the levels of internet penetration. One might expect that countries with low levels of internet usage are more homogenous with regard to VAA usage and therefore the model should show a better fit. In the case of Bulgaria this line of argumentation may well work. According to Eurostat (2009) about 30 per cent of Bulgarian households were connected to the internet making it the lowest internet penetration rates across Europe. Indeed, potential homogeneity in internet usage may be reflected in a high explanatory power of the VAA usage, too (Bulgaria ranks second in terms of the model fit in Figure 5.1). At the same time, however, in the case of Greece, a country with the 38 per cent internet penetration in 2009 (ibid) the model fit is extremely poor. Romania, with a similar internet penetration to Greece ranks in the middle in terms of the model fit. These inconsistencies point to the limited role of internet penetration in explaining the between-country variation in VAA usage. Moreover, in the course of the analysis I also estimated a model (results not reported) where internet penetration rates were used as a country level variable. Results showed that neither was internet penetration significant as a predictor of VAA usage nor did it contribute to the explanatory power of the model. Therefore, it is likely that the between-country variance is mainly driven by the tradition and experience with VAAs, rather than the general levels of internet penetration.



Figure 5.1: Explanatory power of the main model (Model 3)

As regards the general goodness of the fit of the model the fit appears to be fairly small in the case of the baseline model (Model 1), but substantially increases when political activity and VAA usage specific characteristics are added. Given the controversial nature of the pseudo R² I have also calculated the correctly predicted observations. At best, the full model correctly predicts as many as almost 40 per cent of the observations. By all standards, this tells us that the theoretical model explains a fair amount of the VAA usage.

Still, the major part of the variance remains unexplained. Two potential reasons may be accountable for this. First, it is likely that the explanatory power of the model is dependent on the small number of observed VAA users. Second, it may well be that VAA usage is driven by some unobserved individual level characteristics that are not fully accounted for by the current model. In either case, the current research will leave some doors open for further analysis, but even notwithstanding these considerations, it must be noted that the theoretically informed model that only incorporates nine individual level variables still manages to correctly predict about 40 per cent of the cases. Therefore, the explanatory power of the full model should be considered as satisfactory.

That the overall fit of the model is good is clearly conveyed in Figure 5.2 that displays a scatter plot of predicted probabilities of VAA usage as a dependent variable on the Y-axis and the actual VAA usage as sampled by the EES 2009 survey as an explanatory variable on the X-axis. Both variables are averaged by country clusters.



Figure 5.2: Model fit evaluation (EES 2009)

In the following section major findings of the multivariate analysis will be discussed in light of the theoretical model explicated in Chapter 3. I begin with the baseline model of VAA usage.

Baseline model of VAA usage

According to the theory younger and educated people with higher socio-economic status coming from urban areas are those who are likely to use internet. Hypothesis 1 posits that VAA users differ little from the general internet using population. Table 5.2 demonstrates that indeed all socio-demographic variables work in line with the theoretical expectations.

Age appears as the second most important predictor of VAA usage of all individual level explanatory variables. In particular, the findings suggest that all other things being equal, when moving the age variable from its minimum value (18) to its maximum value (99), an individual's propensity to use VAAs decreases by about 15.4%. Since age

is a continuous running variable a marginal effect of 15 per cent is not overly telling. Which age groups exactly are more likely to expose themselves to VAA usage? Figure 5.3 demonstrates that at least half of the effect originates from people between 18 and some 40 years of age. Because EES 2009 has little VAA users in the sample and the predicted probabilities are low due to the rare positive outcome, it is difficult to empirically determine at which threshold age would considerably increase the chances of VAA usage. Still, one can make an educated guess that VAAs do not appeal solely to the very young people (otherwise the probability curve would be much steeper) and therefore at least as regards age, it resembles the population of internet users.



Figure 5.3: Predicted probabilities of VAA usage by age

Education appears to be the second important socio-demographic variable in predicting VAA usage (and the third most important in overall terms). Indeed, when only looking at the baseline model (Model 1), the likelihood of VAA usage increases by seven and a half percentages when passing from 'no education' to 'higher education'. However, when moving beyond the baseline model, the effect of education diminishes slightly, suggesting that its effect is overtaken by other covariates - most likely by political activity. The effect of education is graphically depicted in Figure 5.4



Figure 5.4: Predicted probabilities of VAA usage by education

As regards social class, gender and place of residence, the effects remain very small and in the case of gender statistically insignificant. Yet, irrespective of their little explanatory power, the performance of these variables still works in the expected direction. VAA usage appears to be indeed the property of those with higher social class coming from urban areas. Gender, does not seem to make any difference with regard to VAA usage.

Comparing VAA usage and internet usage

The general theory of internet usage helps a great deal in explaining the baseline patterns of VAA usage. Yet, the explanatory power of the baseline model is clearly not sufficient, reaching a pseudo R^2 of a mere 0.1. This suggests that other characteristics that reach beyond the baseline model of internet usage have to be considered, too.

However, before expanding the model in order to verify the remaining two hypotheses, I make a brief detour. Namely, so far only the first half of hypothesis 1 was answered. The question still remains, whether the same set of variables indeed perform in similar fashion in predicting internet usage and VAA usage. As hypothesis 1 stated, I do expect that the baseline model of internet usage is not that different from VAA usage. This statement requires empirical validation.

In order to answer this question I employ data from European Social Survey and predict internet usage (coded 1 for internet users and 0 for non-users) from the same set of socio-demographic variables as was used for predicting the VAA usage from the EES 2009 data. The results are compared in Table 5.3.

	Model A (EES 2009)	Model B (ESS 2008)
	Dependent variable: VAA usage	Dependent variable: internet usage
Male	1.60***	1.97**
	(0.33)	(0.65)
Age	-13.50***	-81.64***
0	(1.32)	(1.39)
Social class/income	3.52*	2.67***
	(0.75)	(0.73)
Urban residence	2.04**	3.99***
	(0.46)	(0.74)
Education	7.56***	7.37***
	(1.10)	(0.22)
Constant	-1.49^{***}	-0.35***
	(.09)	(0.08)
Observations	14180	21380
Pseudo R ²	0.10	0.45
Log likelihood	-3931.7	-7749.7

Table 5.3:	Explaining	Internet usage	(average margina)	l effects)
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Average marginal effects. Robust standard errors clustered by country in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01

First, all variables indeed work in the same direction. The only substantial difference occurs for age, where its effect on internet usage is markedly larger than on VAA usage. Another difference between the two models relates to their explanatory power. For the model explaining VAA usage the pseudo R^2 is only 0.10, whereas for the model explaining internet usage it is as large as 0.45. The results clearly show that there are marked commonalities between VAA users and internet users and the large difference in age and the explanatory power of the models can be confidently attributed to the fact that only a few VAA users are observed in the EES 2009 data.

Having said that, empirical results appear to support the first hypothesis about shared commonalities between the population of VAA users and internet users. My next task is to verify whether political activity contributes to explaining the VAA usage.

Political activity

Model 2 in Table 5.2 demonstrates the effect of expanding the baseline model of VAA usage by one's activity in political life. The results show that if someone is engaged in all of the political activities as measured by the political activity index (see Appendix A.2), then her chances are 25.1 per cent greater of becoming a VAA users than for those who engage in no political activity at all. Political activity not only appears to be the most important predictor of VAA usage, but this variable alone contributes as much as all socio-demographic variables together. That is, the model's explanatory power increases

by about 10 per cent.

Figure 5.5 demonstrates the effect of political activity graphically. As it can be seen, VAA usage becomes markedly more probable for those respondents who have a political activity score well above the median.



Figure 5.5: Political activity

The substantial effect of political activity and its contribution to the variance explained confirms that the expectations of hypothesis 2 are valid. Indeed, VAA usage seems to be explained by the combination of the baseline characteristics of the internet users and one's engagement with political activities. However, as it was explained in the theoretical section, political activity falls short of in distinguishing VAA users from those voters who simply are also using internet. Therefore, the last hypothesis should be validated with regard to the political sophistication and one's openness to the electoral competition - the two characteristics that are more exclusively describing the population of VAA users.

Openness to competition and political sophistication

Model 3 in Table 5.2 presents the contribution of the following three variables. First, consider a pair of variables measuring one's openness to electoral competition. Just as hypothesis 3 posits, openness to electoral competition is positively associated with VAA usage and its opposite, i.e., being beyond electoral competition, is negatively associated with VAA usage. To put it more simply, those citizens who prefer multiple parties as a viable candidates for their vote choice have a higher probability of being VAA users than others. Conversely, those who prefer only one political party, are less likely to use VAAs.

Similarly, the effect of political sophistication supports hypothesis 3. I find that political sophistication has a moderate, but a positive impact on the probability of VAA usage.

Taken together, these three variables work in the hypothesized direction in explaining VAA usage. Yet, the effects are fairly small (albeit significant) and the explained variance only increases slightly as compared to Model 2. Does it mean that the hypothesis on VAA users as being more open to electoral competition and more attentive to political issues is rejected?

Quite the contrary. First, the variables still perform in the expected direction. Second, the effect size can be attributed to the rare positive outcome on the dependent variable. After all, I only observe 1,548 VAA users in my sample. The nature of the mechanism by which political sophistication operates is fairly subtle. Namely, it is a feature that distinguishes VAA users from the rest of the sample on top of a number of variables. The same goes for electoral availability. These differences, by implication cannot be too marked and therefore the effects intrinsically contain a fair amount of noise. And yet, the model still consistently picks up the effects and the variables perform in line with theoretical expectations. It is for this reason that I would maintain that the third hypothesis is validated by empirical findings.

5.4 Inferences from the multivariate statistics

Perhaps the most important finding of this chapter is that multivariate analysis validated all three hypotheses. It was possible to empirically demonstrate that theories of digital divide, online political participation and general voting behavior can be used in conjunction to explain a fairly new phenomenon - VAA usage.

First, I demonstrated that VAA users, just as internet users, are explained by a single socio-demographic latent dimension consisting of age, gender, place of residence, education and social class. Furthermore, just as the theory prescribes, this latent dimension universally explained both internet usage and VAA usage. This finding can be substantiated simply - why should VAA users be any different from the normal internet users when it comes to baseline socio-demographics? That they are different in some respect, is evident, but this difference is not accounted for by socio-demographic characteristics.

The second hypothesis introduced political activity into the equation explaining VAA usage. A component that would make some individuals more likely to use VAAs than others was related to one's interest and involvement in political life. In other words, if somebody is an active internet user and also takes an interest in and engages in politics, then she should also have a higher probability of becoming a VAA user. This theoretical expectation was indeed confirmed empirically, too. Moreover, the effect of political activity alone doubled the explanatory power of the baseline socio-demographic model.

CHAPTER 5. EXPLAINING VAA USAGE

Finally, and moving beyond existing theories of online political participation, the model was extended by two variables that were expected to uniquely identify VAA users. First, I argued that since VAAs operate uniquely on the basis of policies and political issues, the ones who choose to use VAAs have to be reasonably interested in those issues in the first place. I suggested that if this is the case, then VAA users should also exhibit higher levels of political sophistication. Indeed, the model convincingly demonstrated such an effect. Second, since VAAs provide a comparison of alternative choices available for the voter, then they should be more appealing to those types of voters who are to some degree uncertain or open about which party they are going to vote for. Electoral availability proved to be indeed a good predictor of VAA usage.

In sum, I find sufficient evidence that VAA usage is indeed conditional on higher involvement in politics and above higher political sophistication and openness to electoral competition. Is it sufficient to conclude the analysis of VAA usage at this stage and settle with results? Most probably no.

The main reason why the results til now are not still final are related to the Axiom 1 outlined in Chapter 3. Axiom 1 states that all VAA users are internet users to begin with. Despite the fact that the dependent variable of interest was corrected with respect to the reference category and despite the fact that the multivariate findings confirm most of the expectations, the analysis still suffers from an evident self selection bias.

For example, I have found that age is a predictor of VAA usage. This effect, might genuinely be attributed to the VAA users as compared to the reference category (which includes only internet users), but it should be reasonable enough to suspect that perhaps internet users are younger to begin with and therefore the model picks up age as a predictor of VAA usage, too. Therefore, the present results are not accurate with respect to such selection bias. Furthermore, the performance of each variable in the model may be questioned in this fashion - whether they are a property of internet users or VAA users. Results reported above do not account for such differences and thereby the point estimates upon which the current findings are based, may still be biased. At least, it remains an unresolved empirical question.

Therefore, in addition to the corrected dependent variable, one also needs to account for the sample selection bias as described by Heckman (1979). In the next chapter I describe the problem of selection bias in greater detail and estimate a final model that accounts for the self selection mechanism (internet usage) and the mechanism of substantial interest for this thesis (VAA usage). In so doing I will arrive at characteristics that uniquely identify VAA users as a distinct population from the general pool of internet users.

Chapter 6

VAA usage as a two-step process

Previous chapters of this thesis demonstrated that the measure of VAA usage, as taken directly from the EES 2009 dataset, entails a problem with the inability to measure internet usage. Previous chapter provided a solution to account for such a problem and reported the corresponding results.

Yet, correcting for the bias introduced by the reference category (internet usage) still leaves the bias in terms of self selection. The underlying problem of estimating VAA usage by means of normal probit model is that the VAA usage is restricted to those respondents who can use the internet. To put it differently, the decision to use VAAs and the ability to use internet, are not independent from each other, but VAA usage is conditional on the ability to use the internet. This is a potential restriction of the model. After controlling for regressors, those who use VAAs are not randomly selected from the entire population, therefore the point estimates from the normal probit model suffer from the selection bias even if the reference category is limited to internet users only.

In this chapter I address the potential pitfalls occurring from not accounting for the selection bias and estimate a model that predicts the dependent variable of interest while controlling for the selection mechanism. In doing so, I not only correct the point estimates, but will also gain analytical leverage by being able to attribute specific effects to either internet usage or VAA usage. To be sure, this analytical technique allows me to demonstrate properties that are unique to the VAA users. Therefore, correcting for selection bias is substantially relevant for investigating the mechanisms related to the VAA usage.

6.1 Empirical model and theoretical linkages

Based on the theory of online political participation (explicated in Chapter 3) VAA usage was conceptualized as a particular form of internet usage. The baseline model consisted only of a few socio-demographic properties and appeared as a powerful predictor of

both, VAA and internet usage. More specifically, VAA users were expected to display a similar profile to the normal internet users, but on top of these socio-demographic characteristics VAA users were expected to exhibit additional traits that are unique only to them. These unique characteristics were related to one's political activity, openness to electoral competition and higher attention to political issues.

Given that these expectations were confirmed empirically in the previous chapter, VAA usage should, in fact, be conceptualized as a two-step process. The first step of the process identifies one's likelihood of internet usage and the second step identifies VAA users as a distinct population within the general population of internet users.

More specifically, in step one, baseline socio-demographic characteristics determine whether somebody is likely to use the internet or not. If somebody is likely to be an internet user, then according to the theory she may also have higher educational attainment and she may well have greater knowledge about politics than those who do not use internet. These traits are evidently not caused by, but they tend to covary with internet usage. However, as the theory and the hypotheses in the previous chapters demonstrated, VAA users need to have very specific and therefore unique, characteristics that distinguish them from the population of internet users. This is conceptually quite different from mere internet usage and this is precisely what constitutes a second step of the selection model - traits that uniquely determine VAA usage. These traits were identified empirically in the previous chapter - openness to electoral competition and higher political sophistication. Yet, the question remains whether these unique traits are indeed solely those of VAA users (as the two-step process would prescribe), or is it just a concomitant effect of internet usage?

In order to empirically accommodate these theoretical considerations and determine the unique characteristics of VAA users, VAA usage should be understood as a nonrandom event conditioned by one's ability to use the internet. Internet usage as a selection rule and VAA usage as the main outcome of interest provide components for the Heckman selection model (Heckman, 1979). Following Cameron and Trivedi (2009, p. 542) I let y_2^* denote the outcome of interest - the VAA usage. This outcome is observed if $y_2^* > 0$. Next, consider a second latent variable, y_1^* , a selection rule, which determines whether an individual is an internet user or not. The outcome of substantial interest y_2^* is observed only if $y_1^* > 0$. The model, which is required to estimate the parameters of interest, comprises therefore a function of y_1^* , where

$$y_1 \begin{cases} 1 & if \quad y_1^* > 0 \\ 0 & if \quad y_1^* \le 0 \end{cases}$$
(6.1)

and the function of y_2^* , where

$$y_2 \begin{cases} y_2^* & if \quad y_1^* > 0 \\ - & if \quad y_1^* \le 0 \end{cases}$$
(6.2)

The outcome - VAA usage - is observed only when an individual is an internet user in the first place ($y_1^* > 0$). Therefore, instead of estimating VAA usage by means of normal probit model, the VAA usage can be estimated in line with theoretical expectations as a two stage process.

Model specification

First, since both, the selection equation and the outcome equation, have a binary dependent variable, a maximum likelihood model will be fitted using Heckman probit model instead of the normal linear model.

Second, a set of variables need to be specified that are used in the selection equation and omitted from the outcome equation. Due to the dichotomous nature of the outcome variable, it would not be possible to use the same set of regressors in both models, since the model identification cannot be based solely upon the nonlinearity in the functional form (Cameron and Trivedi, 2009, pp. 543-546). Therefore, the estimation requires an exclusion restriction. This is achieved by finding a variable that generates nontrivial variation in the selection variable but does not affect the outcome variable directly (in a very similar fashion to the logic of an instrumental variable). In particular, the selection equation needs to have an exogenous variable that is excluded from the outcome equation. That variable needs to have a substantial impact on the probability of internet usage while it leaves VAA usage unaffected.

I propose using a vector consisting of three variables - gender, place of residence and the standard of living - as an exclusion restriction¹. In oder to validate that the exclusion restriction indeed performs in a required fashion I regress VAA usage on standard of living and the internet usage on standard of living. For the latter, living standard alone achieved a Pseudo R^2 of 0.08, whereas for the former it was indistinguishable from 0. This confirms that the proposed vector indeed affects the selection, but leaves the outcome equation unaffected.

In terms of variables that are of substantial interest I include political activity, openness to electoral competition and political sophistication. All these variables are operationalized in the same fashion as in the previous chapter.

The two equations, simultaneously estimated, take the following form.

¹Recall that age, social class and education were used to create a latent dimension of internet usage and therefore cannot be used in Heckman's exclusion restriction.

$$ln\left(\frac{Pr(y_2=1)}{1-Pr(y_2=1)}\right) = \beta_0 + \beta_1 Z + \gamma + \varepsilon_{y_2}$$
(6.3)

and

$$ln\left(\frac{Pr(y_1=1 \mid y_2=1)}{1 - Pr(y_1=1 \mid y_2=1)}\right) = \beta_0 + \gamma + \varepsilon_{y_1}$$
(6.4)

where

$$corr\left(\varepsilon_{y_2},\varepsilon_{y_1}\right) = \rho \tag{6.5}$$

Equation 6.3 is a selection equation where the vector γ refers to independent variables included in the model and *Z* is an exclusion restriction (a vector of gender, place of residence and living standard). Equation 6.4 is an outcome equation where all components on the right handside are the same, but the the omitted exclusion restriction. It is assumed that correlated errors are jointly normally distributed and homoskedastic. If ρ - the correlation of the error terms - is different from o there is a selection bias and VAA usage should be indeed, theoretically and empirically handled as a two-step process.

6.2 Findings from the Heckman selection model

Before explaining the unique characteristics of VAA users, I propose a short detour. Namely, the Heckman model allows me to validate how serious the hypothesized problem of selection bias actually is. To put it more simply, it allows me to compare the results of a normal probit model that was presented in the previous chapter with the findings where the selection mechanism is controlled for. Table 6.1 offers such a comparison.

	Probit model (EES 2009)	Heckman selection model (EES 2009)
	Outcome: VAA usage	Outcome: VAA usage,
	Ũ	Selection: Internet usage
Political activity	24.40***	36.27***
	(1.40)	(4.09)
Subject to electoral competition	1.17**	3.98*
,	(0.41)	(1.64)
Beyond electoral competition	-0.37	-1.86
	(0.55)	(1.05)
Political sophistication	2.57***	3.61**
*	(0.56)	(1.19)
Constant	-2.41^{***}	-1.95^{***}
	(0.09)	(0.15)
Observations	13724	25654/9795
Pseudo R ²	0.20	
Correctly classified	39.56%	38.60%
Log likelihood	-3384.1	-19935.1
ρ		-0.40^{***}

Table 0.1. Theckinall Selection mode	Fable 6.1:	Heckman	selection	model
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Average marginal effects. Robust standard errors clustered by country in parentheses. Country dummies and Heckman's exclusion restriction not shown.

Heckman's exclusion restriction: living standard, male, urban residence.

* p < 0.1, ** p < 0.05, *** p < 0.01

The first and foremost important thing to notice is that ρ , which expresses the correlation of the error terms of the selection and outcome equation, is large and significant. As it was noted above, if ρ is any different from o, then selection bias occurs in the model and the estimation by means of normal probit model leads to biased estimates. In the current case $\rho = -0.40$ and it is statistically significant, which clearly indicates the presence of a selection problem. Substantially speaking, a large and significant ρ supports the thesis that VAA usage must be conceptualized and empirically addressed as a two-step process where internet usage appears as a conditional requirement for VAA usage.

That this selection mechanism introduces a bias of point estimates is clearly shown by the difference of marginal effects in Table 6.1. When looking at the variables of substantial interest, one can clearly see that the probit model suppressed the effects quite considerably and that correcting for the selection mechanism yielded much stronger effects. All of the effects gain in size, while those related to one's openness to electoral competition become considerably more sizable. In terms of explanatory power, the Heckman selection model does not perform any better than the normal probit model.

In sum, I find that the presence of a selection mechanism indeed has biased the estimates, and in fact the effects are considerably stronger.

Unique characteristics of the VAA users

Table 6.2 demonstrates the main findings of this chapter and reports a standalone Heckman model, where the selection equation is compared with the outcome equation. This comparison allows me to attribute each individual effect either to VAA usage or internet usage.

	Heckman selection model		
	Outcome equation:	Selection equation:	
	VAA usage	internet usage	
Political activity	1.87***	0.24^{*}	
	(0.13)	(0.10)	
Subject to electoral competition	0.19***	-0.02	
	(0.06)	(0.05)	
Beyond electoral competition	-0.11	-0.24^{*}	
	(0.58)	(0.05)	
Political sophistication	0.19***	0.50**	
	(0.07)	(0.08)	
Constant	-1.95***	-1.09**	
	(0.15)	(0.09)	
Observations	13724	25654/9795	
Correctly classified	38.6%		
Log likelihood	-19935.1		
ρ	-0.40^{***}		

Table 6.2: Standalone Heckman model

Probit coefficients. Robust standard errors clustered by country in parentheses. Heckman's exclusion restriction not shown.

Heckman's exclusion restriction: living standard, male, urban residence.

* p < 0.1, ** p < 0.05, *** p < 0.01

First, the strongest single predictor of VAA usage is political activity. This was already confirmed in the previous chapter. However, when controlling for the selection mechanism political activity stands out as the single most important predictor of VAA usage, and much less so as a predictor of internet usage. This finding is well embedded in theory. Internet users were assumed to have slightly higher political activity, simply because it is a concomitant effect of higher educational attainment and social class. Much more substantially though, political activity was expected to influence VAA usage. Indeed, findings from the Heckman model confirm such an expectation.

Second, consider the pair of variables measuring whether the respondent is subject to intense electoral competition or if she is beyond that. The comparison of the two equations reveals that those voters with multiple party preferences are more likely to use VAAs, while the opposite is true for those who are beyond electoral competition (although the latter effect should be treated with caution as it remains statistically insignificant). Both of them reflect the unique parameters of VAA users, which enables to draw a second, fairly well grounded conclusion - one hast to be indeed available for electoral competition at least to some extent, before becoming a VAA user.

Political sophistication appears to be a strong predictor of internet usage. However, its effect remains significant also in predicting VAA usage, which enables to conclude that VAA users tend to be indeed politically more sophisticated and by implication, are quite probably more interested in political issues.

In sum, I find that VAA users are uniquely explained by their higher political activity, openness to electoral competition and higher political sophistication.

6.3 Inferences from the Heckman selection model

There are a number of important aspects of VAA usage that can only be inferred from the Heckman model. First, it was possible to demonstrate that the theorized self selection mechanism affects VAA usage and that the findings from the normal probit model were quite biased. Correcting the point estimates with respect to self-selection bias allowed me to demonstrate that the normal probit model suppressed most of the effects and in fact VAA usage was more strongly associated with a proposed set of covariates. More specifically, political activity, political sophistication and openness to electoral competition were much strongly associated with ones likelihood of VAA usage when controlling for the selection bias.

Second, the Heckman selection model proved that VAA usage is indeed a two step process. In the first step a few socio-demographic variables determine whether somebody is likely to use the internet and by implication could potentially also use VAAs. This potential of VAA usage, however, is only realized if a person displays some unique characteristics on top of the baseline model. These characteristics were most notably higher political activity, openness to electoral competition and higher political sophistication. Indeed, all of the predictors that came out in the normal probit were, in fact, associated with VAA usage more strongly than with internet usage.

6.4 Discussion and concluding remarks

At the core of this chapter is the finding that VAA users are younger, more educated citizens with higher socio-economic status coming from urban areas. This sociological profile of VAA usage was theoretically embedded in the literature on the digital divide (Norris, 2001; Mossberger et al., 2003) and it was conceptualized as the baseline model of VAA usage. The baseline model of VAA usage states that just a few socio-demographic variables are sufficient to predict VAA usage. Moreover, the intrinsic nature of the

baseline model is that it is equally well suited for explaining the general patterns of internet usage.

The problem of the baseline model is that its explanatory power remains fairly low. This suggests that other characteristics are at play if one aims to explain VAA usage. According to the theory of online political participation (van Dijk, 2000; Margolis and Resnick, 2000), political activity was identified as a potential predictor of VAA usage. I theorized that one's likelihood of being engaged in VAA usage is dependent on her prior engagement in political affairs to begin with. Indeed, extending the model by political activity showed a substantial increase in explanatory power with political activity becoming a single most powerful predictor of VAA usage.

Finally, I turned to general theories of voting behavior in conjunction with the nature of voting advice applications. I argued that since VAAs operate on the basis of policy issues and issue proximity, then those who use VAAs should be interested in political issues. Otherwise, they might be less motivated to learn about where political parties stand in relation to their policy preferences. Equally, such people are likely to be aware of political issues, which implies that VAA users are intrinsically politically more so-phisticated than those who do not use VAAs. Indeed, political sophistication appeared to be positively associated with VAA usage.

The second unique characteristic of VAA users appeared to be their availability to electoral competition. Namely, following the literature on voters' availability to electoral competition (Mair, 1987; Bartolini, 2002) and propensity to vote measures (van der Eijk and Oppenhuis, 1991) I introduced another property that proved to be a consistent predictor of VAA usage. This property was one's ability to prefer multiple parties instead of being closely tied to only one party. Conceptualized as one's openness to electoral competition, this variable was positively associated with VAA usage. Most notably, because people who may be uncertain about electoral choices (Alvarez, 1998) or who are willing to consider various parties as candidates for their vote choice, have comparatively higher incentives to consult with VAAs than those who know certainly which party they are going to vote for. The pair of these variables (somebody being Open or closed to electoral competition) performed very consistently in predicting VAA usage.

In sum, I found empirical support for all three hypotheses (refer to Table 6.3). However, more important than the validation of each individual hypothesis, the analysis showed that the joint validation of all hypotheses suppors a theoretical model. This model posits that VAA usage is first and foremost predicted by the baseline model of internet usage (H1), and substantially complemented by a set of theoretically justified characteristics that are unique only to the population of those being engaged in (online) politics (H2) and those who are attentive to political issues (by the proxy of political sophistication) and open to electoral competition (H3).

	Hypothesis	Verified
H1	VAA and internet usage is explained by the same set of socio-demographics	Yes
H2	VAA users are politically more active than internet users	Yes
H3	VAA users are open to electoral competition and they are attentive to political issues	Yes

Table 6.3: Validation of hypotheses

General inferences on VAA usage

Two important aspects of the preceding analyses should be highlighted. First, it was possible to demonstrate the presence of the selection mechanism which constrains the probability of VAA usage only to those who are able to use internet in the first place. Although obvious from the outset, most of the studies dealing with VAA research (or internet-related behavior in general) fail to account for structural biases in their samples. It was therefore important to demonstrate empirically, that the effect of the selection mechanism was indeed found in the EES 2009 data and that it exercised a substantial influence on the findings.

Second, if the theoretical model was applied to estimate VAA usage, it became immediately apparent that its explanatory power greatly varies across European countries. The variance explained ranged from some 6 per cent to 35 per cent. This means that in some countries the theoretical model explained VAA usage much better than in other countries. Figure 5.1 ranked the countries according to the goodness of the fit of the model. Quite surprisingly, the model fit was very good for those countries which had very little experience with VAAs and conversely, the model fit was poorest in those countries which had the longest experience with VAAs. To put it simply - the higher the VAA exposure in a given polity, the poorer the explanatory power of the model. How could one substantially explain such a finding? Should the opposite not be expected?

In order to provide an answer to this puzzle, I turn to the theory of the *diffusion of innovations* (Rogers, 1995). According to Rogers, an innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption (Rogers, 1995, p. 10). The rate at which individuals adopt the new innovation, clusters users into five categories that differ from each other substantially (Rogers, 1995, pp. 261-266). He refers to these groups as innovators, early adopters, early majority, late majority and laggards (Rogers, 1995, p. 262).

Conceptualizing VAAs as a form of political innovation and given that VAAs are a fairly new political phenomenon in most of the European countries, it should be reasonably clear that the EES 2009 sampled mostly those VAA users that Rogers refers to as *innovators* or - at best - *early adopters*. These two groups are fairly homogenous,

because they are attentive to technological developments, they are more open to experimenting with various technological challenges and, above all, they must share some commonalities that distinguish them from *the late majority* or *the laggards*.

However, in a few European Union member states like the Netherlands, Germany, Belgium and Finland, VAAs have been available for more than a decade. Consequently, voters are more habituated to use VAAs and since VAA usage is more widespread in those polities, they also attract users from all typologies that Rogers refers to. In other words, in the Netherlands the population of VAA users consists of innovators, early adopters, early majority, late majority and laggards, whereas, say in Bulgaria, the VAA users are only innovators. Therefore, the pool of VAA users in those countries where VAAs are a new phenomenon is potentially more homogenous than in those where VAAs have proliferated for a longer time. Evidently, greater heterogeneity constrains the explanatory power of the model and conversely, greater homogeneity increases it.

This is an important finding, because what the proposed model appears to be explaining better is not a universal pattern on VAA usage, but the pattern that occurs among early adopters. Yet, that the model is valid also in 'old VAA countries' is reflected by the fact that the estimates perform in the same direction than in 'new countries'. The only difference lies in its reduced explanatory power, suggesting that in 'old countries' there are more variables at play that predict VAA usage on top of those that seem to be doing a sufficient job in 'new countries'.

What should be inferred from this evidence is that the baseline predictors of VAA usage (socio-demographics) gradually loose their explanatory power as the usage increases and the usage practice matures. However, some variables are so essentially tied to the very practice of VAA usage, that they manage to cross cut the maturation process and retain their predictive power over VAA usage. As mentioned above, these variables are most notably political activity, political sophistication and openness to electoral competition.

6.5 Summary

The primary goal of this part of the thesis was to answer the following research question: Who are the VAA users and how do they differ from the general population? In answering this question, the analysis relied primarily on the European Election Study of 2009.

Parting from the notion that knowledge about the VAA users is rather scarce due to the data availability so far a general theory of internet usage and online political participation was introduced. It suggested that if VAA users are a subsample of internet users, there should be some baseline similarities between the two populations. Indeed, thorough descriptive analyses revealed that VAA users, just as internet users, were slightly younger citizens from urban areas, with higher social class status, greater political sophistication and political activity.

The analysis then proceeded with multivariate analysis by first correcting the dependent variable of interest. In particular, the problem of the EES 2009 data was that it contained no information about individual access to the internet. As the population of interest cannot be randomly drawn from the entire population, the reference category of the dependent variable had to be corrected with regard to those respondents who can use internet in the first place. After correcting the dependent variable of interest, multivariate analysis confirmed that the profile of VAA users is almost indistinguishable from internet users when it comes to socio-demographic characteristics. However, with respect to attitudinal and behavioral variables, some marked differences occurred. In general, greater involvement in politics, higher political sophistication and openness to electoral competition, appeared to be facilitating factors of VAA usage.

Finally, the analysis further scrutinized the findings with respect to the potential self-selection bias. Namely, it was demonstrated that if not accounting for the selection mechanism - the fact that VAA users are not randomly drawn from the entire population, but are constrained to those respondents who are able to use the internet - the analysis would yield biased and inconsistent estimates. The model obtained on the basis of the Heckman two stage estimation process demonstrated that the results were indeed biased. Consequently, VAA usage was conceptualized as a two step process in which the baseline socio-demographic characteristics determine one's ability to use both, the internet and VAAs. However, on top of these baseline properties some other characteristics uniquely identify VAA users. These unique attributes were referred to as a second step of the process of becoming a VAA user. More precisely, it was possible to demonstrate that VAA users are politically more active and that they are informed about political issues by displaying higher levels of political sophistication. Finally, and perhaps most importantly, VAA users appear to be those voters who are open to electoral competition, i.e., they prefer multiple parties and consider various candidates for their final vote choice.

Part III

Explaining the Impact

Chapter 7

The Impact of the Swiss 'Smartvote' Application on Vote Choice

The previous part of the thesis demonstrated to which extent VAA users differ from the general electorate and explained the patterns that lead some individuals to interact with VAAs. In the following part the attention will be focused on the impact of VAA usage on electoral behavior. This part is divided into two chapters. The first chapter focuses on perhaps the most salient question in VAA related research - What is the impact of VAA usage on one's vote choice? More precisely, I will address the question of whether or not VAAs make people change their vote intention. Some individuals may follow the VAA advice whereas others will ignore it. At the same time, the propensity to change one's vote intention may depend on how surprising the vote advice appears to any given individual. These conditional effects under which somebody is likely to change her vote choice are of particular interest in the following chapter.

I employ panel data that was collected by the project 'Smartvote' - the largest Swiss voting advice application - during the 2007 national elections. With the help of this large N panel survey I first demonstrate that VAA users are indeed influenced by the nature of the vote advice obtained, i.e., the more surprising the vote advice is, the more likely somebody is to change her intended vote choice. However, using the same data I also demonstrate that VAA studies can be suspect to marked self-selection bias. In particular, respondents of the Swiss surveys non-randomly self-select themselves into the final samples whereas the mechanism by which they respond to the surveys remains unobserved. These data allow me to demonstrate a typical problem in VAA studies and employ an appropriate statistical technique to extract effects that are substantively reliable. In the following I briefly introduce the state of the Swiss data.

7.1 Empirical record on VAA studies

The immense popularity of VAAs in various European countries has evoked a scholarly interest in determining the impact of VAAs on their users. Three domains of individual level behavior stand out as those most often being influenced by VAAs - turnout, voting preferences and vote choice.

VAAs impact on individual level turnout is often translated into their capacity to mobilize new voters. According to the extensive literature on online political participation and digital divide, the basic premise on VAAs' mobilizing potential is based on the fact that since turnout is generally low among young cohorts, and since the same age groups are mostly exposed to new media (including VAAs), then it is precisely the young who might be drawn closer to politics (Norris, 2001). In this framework VAAs simply motivate young citizens to think about elections and concomitantly the same socio-demographic group of people may feel increasing motivations to cast their vote. In fact, Fivaz and Nadig (2010, p. 184) demonstrate that 'almost 40 percent of Smartvote users declared that the website had a decisive or at least slight influence on their decision to go to the polls'. Furthermore, just as the theory prescribes, they suspect that those being affected by the Smartvote application are precisely the young voters (Fivaz and Nadig, 2010, p. 185). This seems to be increasingly plausible considering that most of the VAAs are nowadays closely linked with social media and have built-in functionalities to share and discuss one's political profile with others. For the young and those enthusiastic about social media, the sheer opportunity to compare political profiles among friends and peers, could be greatly appreciated.

Another mechanism by which VAAs may motivate higher turnout at ballots is explicated by Kleinnijenhuis and van Hoof (2008). In their study of several Dutch VAAs they observe that more people who were initially undecided about which party to vote for, made a choice after consulting the VAA. They theorize that if the choice to vote at elections is preceded by one's understanding which party to vote for, then VAAs might well exercise an influence on mobilizing voters because they reduce the number of undecided voters (2008, p. 7). To put it more simply, if somebody who has a generally low propensity to turn out in ballots learns that one of the parties actually mirrors her preferences fairly accurately, then her willingness to vote might increase as compared to the similar person who realizes that no party comes close to her preferences.

Ruusuvirta and Rosema (2009) also refer to a third potential mechanism by which VAAs can motivate people to participate in elections. They hypothesize that by 'increasing the amount of easily available information vote selectors may reduce the costs of gathering information and thereby increase the likelihood of voting' (Ruusuvirta and Rosema, 2009, p. 6). As yet, this mechanism remains uncovered in the field of VAA research. However, drawning a parallel example with another technological innovation

in the realm of politics - remote internet voting - Norris (2003) demonstrates that 'while internet voting may decrease the participation costs (and thereby facilitate turnout), it would still fail to affect other important costs, such as the significant cognitive demands required to sort out the relevant information in deciding how to vote, nor would it influence electoral choices and electoral decisiveness' (Norris, 2003, p. 6). Surprisingly enough, VAAs fill in this gap that has been left open by Norris. In fact, VAAs in conjunction with remote internet voting may effectively mobilize new voters (Dinas et al., 2011).

That VAAs have indeed mobilized new voters is demonstrated by a number of early empirical accounts in VAA research. For example, Boogers (2006) found that one tenth of the users of Stemwijzer (the oldest Dutch VAA) reported an increased motivation to cast their vote after obtaining the advice from the VAA. About the same proportion of Wahl-O-Mat users - the most popular VAA in Germany - claimed that they felt more motivated to participate in elections after using Wahl-O-Mat. In particular, about 12 per cent of Wahl-O-Mat users claimed in 2004 (during the European Parliament elections) that they experienced increasing motivations to vote in elections (Marschall, 2004). The corresponding number in the subsequent national elections of 2005, was about 8 per cent (Marschall, 2005) and in the following European Parliament elections in 2009 about 11 per cent (Marschall and Schmidt, 2010). Moreover, that the impact of VAA usage on turnout is not solely a phenomenon of one country, is demonstrated by Kleinnijenhuis and van Hoof (2008) who show slightly more conservative, but still sizable effects of mobilization.

Effect on vote choice

Similarly to mobilization effects, scholars have found that VAAs also exercise a substantial influence on the actual vote choice of the users. On the basis of 2007 Swiss national elections Ladner et al. (2010) report that being affected by a Smartvote advice is positively associated with swing voting (i.e., voters who voted differently in the current elections from the preceding ones). On the basis of the Dutch 2006 national elections, Ruusuvirta & Rosema (2009) demonstrate that more than half of the undecided voters report a vote choice that is congruent with the vote advice. To be sure, undecided voters appear to be more susceptible for VAAs influence and follow the vote advice (*ibid*). De Rosa (2010), demonstrates the results of the online survey that was carried out among the sample of Italian *cabina-elettorale.it* users during the 2009 European Parliament elections. Apparently, as many as 46 per cent of the respondents claimed that the VAA did not affect their vote choice (Rosa de, 2010, p. 195), which still (even when considering the 'don't know's') leaves us with a substantial number of respondents who felt that the VAA did affect their voting decision. Similar findings can be found at Chappelet and Kilchenmann (2005); Hooghe and Teepe (2007); Hirzalla and Van Zoonen (2008); Laros

(2008); Walgrave et al. (2008); Fivaz and Nadig (2010); Ladner et al. (2010).

The basic mechanism by which VAAs can potentially affect vote choice is fairly straightforward. Assuming that any one VAA user intends to vote for only one party and that the VAA provides an advice that also identifies only one party being the closest, there are two potential outcomes. The VAA advice can either match one's prior vote intention or overlap with it very little. In the event of a matching advice users' prior predispositions are simply confirmed and it is likely that the user will vote according to these preexisting beliefs. In other words, the VAA advice will not change behavior in terms of party choice.

Things become more complicated, however, if the user gets an advice that does not match her prior preferences, i.e., instead of her preferred party one may receive a vote advice for another party. As a consequence, she can opt for two behavioral patterns. First, she can *ignore* the advice and remain with her old preference. Second, she may feel that the newly suggested party indeed reflects her political preferences more accurately and subsequently she may *change* her vote choice for this new party. Thus, depending on the nature of the advice given, there are three potential outcomes for any VAA user (refer to Table 7.1).

Scenario	User's preference	Advice given	Outcome
(1)	Party A	Party A	Confirmation
(2)	Party A	Party B	Ignore
(3)	Party A	Party B	Change

Table 7.1: Potential outcomes depending on the VAA advice

The first two scenarios imply no particular changes in one's voting behavior. However, the third presents a number of interesting puzzles. Previous research has shown that users indeed follow the VAA advice but this change is highly conditional on several factors. Ruusuvirta and Rosema (2009) and Kleinnijenhuis and van Hoof (2008) demonstrate that change occurs more often among undecided voters who are not entirely sure which party to vote for prior to elections. This is typically a situation in which most of the younger voters can be found, because they have not yet formed fixed political preferences and appear to be more susceptible for external influence. Ladner et al. (2008) show that people tend to follow the VAA advice only if the newly advised party is ideologically close to their prior predispositions. That is, if the voting advice falls into the other end of the ideological spectrum, then its effect is diminishing. Conversely, the closer the advice ideologically, but still not quite the same as the closest party, the higher the propensity to follow the advice.

Building on previous empirical accounts I focus on the question of whether VAA users change their vote choice as a consequence of VAA usage and if so, under which
conditions the change occurs. In the following I propose a simplified model of the effects of VAA usage on vote choice. Namely, I expect that one's propensity to change her vote intention depends on the nature of the vote advice that is provided by the VAA. More specifically, I expect people to change their vote choice if they receive a surprising vote advice. Conversely, the more expected the vote advice, the less likely somebody is to change her vote choice. Therefore, hypothesis 1 reads as following:

Hypothesis 1: The more surprising the vote advice, the higher one's probability to change her intended vote choice.

I intentionally keep the main hypothesis simple, dismissing several conditional effects that may interact with the nature of the VAA advice. For example, as the previous studies have shown, the effect of VAA advice may be conditional on its ideological proximity or one's decisiveness. I do so, because these conditional effects will be controlled for in the subsequent empirical analysis. But more importantly, alongside with substantial findings I will demonstrate how some technical problems, most notably sample selection bias, have plagued VAA research since the early empirical work. I will provide solutions how to account for them. The following explicates these problems in greater detail.

Inferential concerns

Recall some of the effects that were found by previous empirical accounts. Roughly ten per cent of VAA users (or even more) in several European countries claimed that VAA usage made them want to participate in elections (Marschall, 2004; Boogers, 2006; Marschall and Schmidt, 2010; Fivaz and Nadig, 2010). Moreover, marked proportions of users reported that the VAA advice had a substantial impact on their vote choice (Ladner et al., 2008; Ruusuvirta and Rosema, 2009; Rosa de, 2010). By all standards these are large effects that render caution in taking them at face value. In fact, most of the studies recognize that these problems are of great concern and that the results may occur due to either of the three reasons: sample selection bias, unobserved heterogeneity or misreporting. Yet, only few studies do anything about it: one study uses indirect measures of voting behavior (Ladner et al., 2010) to overcome the problem of misreporting; only one attempts to account for unobserved heterogeneity (Kleinnijenhuis and van Hoof, 2008); and no efforts have been made to address the problem of selection bias. Notwithstanding these considerations, all of the studies report sizable effects of VAA usage on individual level behavior as their best guess. Ignoring the poor quality of the data appears to be an 'industry standard' in VAA research.

The purpose of this chapter is to provide a solution to overcome the problems related to the potential sample selection bias. Here, the natural question of interest is whether the large effects reported thus far are indeed the effects of substantial interest or are they somehow confounded by the sample selection mechanism. The basic mechanism why sample selection bias is a concern for this research is due to the fact that all of the previous studies work with samples that are non-randomly drawn from the entire population of VAA users. That is, out of the entire pool of VAA users some people select themselves into responding to these surveys while others abstain from them. Subsequently, those who respond to the surveys may potentially differ considerably from the entire population by some observed or unobserved characteristics. Therefore, when reporting results that do not account for these baseline differences between the two samples there is no way to know, which proportion of the effect is related to the true effect and which proportion is related to these pre-existing baseline differences between the samples. Therefore, the non-random selection into the sample becomes one of the most central concerns of the VAA related research.

In order to empirically test such a concern I propose a second hypothesis that works in conjunction with the first one. The second hypothesis reads as following:

Hypothesis 2: The effect of the surprising vote advice on one's probability to change her intended vote choice is to a large extent driven by the non-random selection of the respondents into the sample under study.

Empirical model

In order to test the two proposed hypotheses I first formalize an empirical model that will be subsequently tested with Swiss Smartvote data. Empirical models are presented in Table 7.1. In the following analysis I will refer to the model H1 as the naive model, since it does not account for the potential selection bias. Model H2 will be referred to as the corrected model, because the point estimate of interest (β_1) is corrected with respect to sample bias.

Consequently, I test two hypotheses. First, my goal is to demonstrate that the surprising vote advice indeed has an effect on vote choice. In so doing, my aim to is to replicate some of the findings that have been demonstrated by previous studies, most notably those of Ladner et al. (2008). Secondly, I intend to demonstrate how one can account for the selection bias and arrive at more conservative estimation strategy.

	Hypothesis	Empirical model
Ηı	The more surprising the vote advice, the higher the chance of somebody changing her vote choice	$y_{naive} = \beta_0 + \beta_1 X + \varepsilon$
H2	The effect of surprising vote advice is driven by self-selection bias	$y_{selection} = \beta_0 + \beta_1 X + \varepsilon$
	Therefore, the effect in the naive model is larger than in the corrected model due to the pre-existing baseline differences between the two samples	$\beta_{1naive} > \beta_{1selection}$

Table 7.2: Empirical model

7.2 Data

The analysis is based on the data gathered by the project IP16 "smart-voting" in the framework of NCCR "Challenges to Democracy in the 21st Century".¹ The data were gathered by means of three online surveys before and after the 2007 national elections in Switzerland.

In the first wave, regular Smartvote users (about one million in 2007) were presented with an option to participate in the scientific survey. 13.361 users responded to this call and filled in the survey. At the end of the questionnaire they were presented with an additional invitation to participate in the second wave of the survey after the elections. Out of 9.930 who initially agreed to participate in the second wave 4.331 respondents actually did so. Eventually and in parallel to the second wave survey (i.e., after elections) a third survey gathered information from those Smartvote users who had registered with Smartvote, but did not participate in either of the two former surveys. Out of total number of 80.225 Smartvote users 13.959 chose to respond to this survey.

The data were integrated and released as one dataset containing respondents from all three surveys² For the present study, however, I do not use the responses from the third survey as they are not part of the panel and are of lesser use in estimating the effects of VAA usage. Instead, I will use data from the pre-election (N 13.361) and the post-election survey (N 4.331). Since the dependent variable is constructed as a function of difference between the two identical survey items measured both in the pre- and post-election survey, the resulting N for the present study is 4.331.

As it has undoubtedly become apparent the quality of these data impose several constraints with regard to selection biases that, if not appropriately accounted for, may influence the results of the subsequent analysis, let alone the general validity of the con-

¹www.nccr-democracy.uzh.ch

²Im particularly grateful to Gabi Felder, Jan Fivaz and prof. Andreas Ladner from the Swiss Politools and NCCR project for making these data available for my research.

clusions. On the other hand, these data represent well the data quality that is generally accessible for those interested in VAA research. What are the problematic features of these data?

Data limitations

There are two major concerns related to the Smartvote data that require careful attention - sample selection bias and the lack of repeatedly measured variables at both time points. With regard to the sample bias the survey design upon which the data were gathered introduced three selection rules that impose non-random selection of respondents into each subsequent survey. These selection rules are the following: (1) Becoming a VAA user out of the total population of Swiss citizens who have the right to vote;³ (2) Becoming a respondent to the first survey out of the population of Smartvote users; (3) Becoming a respondent to the second survey out of the population of those who responded to the first survey.

It is difficult to expect that these selection mechanisms will have no effect on the estimation results. The question is whether it is possible to model the effect of substantial interest while controlling for the selection mechanism. I will return to this point in greater detail after offering the operationalization of variables and the preliminary results where the potential sample selection bias is not accounted for. Subsequently, the solution for selection bias is offered and the naive estimates are compared with those where the selection bias is isolated.

Secondly, the Smartvote study uses a number of interesting and crucially important survey items for this study (e.g., party sympathy scores, propensity to vote measures, party identification). It is therefore one of the most suitable datasets to investigate the effects of VAA usage. However, a rather marked problem is related to the fact that almost none of the attitudinal variables - those that may be subject to change as a function of VAA usage - are recorded repeatedly at t - 1 and t. It is for this reason that, for example, one cannot assess the dynamics of party sympathy scores or partisanship conditional on the voting advice obtained - a hypothesis of great interest to any study dealing with the assessment of VAAs influence on voting behavior. However, there are a few variables that can be used to construct a dependent variable containing a time-variant component, e.g., vote intention at t - 1 and reported vote choice at t, and used for estimating the effects of VAA usage on vote choice. Operationalization of variables of such kind forms the basis of the subsequent analysis.

³Naturally, also those not eligible to vote can become VAA users, but for the matter of simplicity I restrict this rule only to the electorate.

Switzerland's electoral system

Prior to proceeding with the operationalization of variables, a few words must be said about the Swiss electoral system. The Swizerland is characterized by numerous overlapping social and cultural cleavages. The resulting party system is comparatively stable but highly fragmented (Kriesi and Trechsel, 2008, p. 84). Due to Switzerland's federal structure, a multitude of subnational (cantonal) party systems prevail (Ladner et al., 2008, p. 5). While federal elections take place on the national level, 'an important part of campaigning takes place on the cantonal level and takes into account the particular circumstances in the different cantons' (*ibid*).

For the federal parliamentary elections to the National Council (i.e., the lower house) voters elect 200 members for a four year term. The country has 26 multi- or single member constituencies corresponding to the 26 Swiss cantons. The number of seats per constituency varies according to the population in a given canton (European Elections Database, 2011). In practical terms it means that in the 2007 elections each voter in the largest canton of Zürich had 34 votes, whereas each voter from the six smallest cantons had only one vote (Ladner et al., 2008, p. 5).

Concerning the process of casting a ballot the Swiss system is particularly complex. Most notably, because a voter can vote for a party list as it stands or she can modify it by crossing out or repeating the names appearing on it; moreover, a voter can split her votes between different lists (referred to as "panachage") or select names from different lists in forming their own list on a blank ballot paper (European Elections Database, 2011). Consequently, according to Ladner et al. (2008), in 2007 national elections in the canton of Zürich a voter had to choose from 29 party lists and 804 candidates. Clearly, voting under such circumstances is far more complex than, say, in a system where only two parties propose candidates for the national assembly. Therefore it comes also of no surprise that the Smartvote VAA is highly appreciated among the Swiss.

Given the peculiarities of the Swiss electoral system a question about the impact of the VAA advice on vote choice requires further attention. How can one measure the change in vote intention and actual vote choice if citizens vote for a number of candidates or parties. Splitting the vote or "panachage" introduces further empirical complications because measuring change can be often very subtle.

The way the Smartvote study has addressed this issue is however, fairly simple. The respondent is asked which party is she going to vote for, or out of which party is she going to choose most of the candidates from. In so doing the survey still measures choice, but it does so by looking at the highest or most frequently chosen option. Therefore, measuring change becomes possible even notwithstanding the generally high complexities of the Swiss electoral system. The following section introduces the construction of the dependent and independent variables in greater details.

7.3 Dependent variable - impact on vote choice

The dependent variable is the difference in vote intention as measured before elections at t - 1 and the reported vote choice after elections at $t.^4$ The variable contains a time variant component and therefore it is considered as a more reliable measure of the potential VAA impact than any of the direct survey questions. The variable takes the value 1 for those respondents for whom the vote intention before elections was different from the reported vote choice after elections (922 respondents) and 0 otherwise (2823 respondents). Table 7.3 reports the frequency distribution of the dependent variable.

Table	7.3:	Impact	on	vote	choice
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Vote choice	Value	Ν	Percent
Vote intention = Vote choice	0	2.823	75.38
Vote intention \neq Vote choice	1	922	24.62

This operationalization is not unique in the field of VAA studies. (Ladner et al., 2010) have followed a similar path in principle but differ in specific aspects of the operationalization. Instead of recording the difference before and after the 2007 elections, they have used the difference between the vote choice at previous election in 2003 and the current election in 2007. I refrained from this operationalization, since taking the difference at closer time distances contains less unobserved heterogeneity affecting the difference and can be therefore linked with the effect of Smartvote usage more directly.

Independent variables

Following hypothesis 1, the main research variable is the degree to which the vote advice matched user's predispositions (hereinafter referred to as the 'match degree'). Derived from the following survey question '*Did the vote advice match your expectations*'⁵ this variable captures the degree to which the vote advice was surprising to the VAA user.⁶ The response categories include: (a) not surprising at all, (b) rather not surprising, (c) rather surprising, (d) very surprising. For being able to assess the effect of each response

⁴The dependent variable is constructed using two survey questions. The first asks the respondent before the elections about which party she is going to vote for (or out of which party will she choose most of the candidates from) in the coming 2007 elections ('Welche Partei werden Sie bei den Nationalratswahlen 2007 wählen bzw. von welcher Partei werden Sie am meisten Kandidierende wählen?'). The second question asks the respondent about which party she actually voted for, or out of which party she chose most of the candidates from ('Welche Partei werden Sie bei den Nationalratswahlen 2007 wählen bzw. von welcher Partei werden Sie am meisten Kandidierende wählen?').

 $^{^{5\}prime}$ Hat das Ergebnis bzw. parteipolitische Zusammensetzung der "smartvote"-Wahlempfehlung Ihren Erwartungen entsprochen?'

⁶Since the data contain no information about the actual vote advice given to the respondent, this variable will be used as as a self-reported proxy to the actual vote advice.

category, this variable will be dichotomized for the multivariate analysis (the reference category of each dummy contains all others, but the main outcome).

Next, I include two variables to control for individual's prior dispositions with regard to openness to electoral competition. These variables distinguish between those voters who possess multiple preferences for two or more parties and those who do not. Intermediate forms of electoral competition will be used as a reference category.⁷

Another attitudinal variable to be used in the analysis is respondent's self-positioning on the ideological left-right dimension. Arguably, since attitudes are more pronounced at either of the extremes of the ideological left-right scale, the effect of the surprising vote advice should be strongest in the middle. That is, spatial differences between the middle point and any random vote advice are likely to be smaller than between extreme points. The survey question that measures ideological left-right spectrum⁸ runs from o to 10, where 5 stands as a middle point. Respondents' positions are recoded as dummies. The value 1 for the left position is coded when the original variable runs from o through 3 (otherwise o); the value 1 for the center position is coded when the original variable runs from 4 through 6 (otherwise o); and the value 1 for the right position is coded when the original variable runs from 7 through 10 (otherwise o). I prefer using dummies for each category instead of a continuous left-right measure because I am interested in qualitative differences between ideological positions and the probability of VAA usage. Therefore, I include dummies for left and center position whereas the right position serves as a reference category.

Finally I control for the following demographic variables: age (running from 18 to 87), education (a continuos variable running from no education to university degree), gender (coded 1 for male and 0 for female) and income (categories from no income to high income).

All continuous variables are coded following the intuitively meaningful direction so that the higher values of the variable reflect also meaningfully higher levels of the concept being measured. In order to achieve a better comparison of the coefficients all variables are standardized to run from 0 to 1.

7.4 Explaining the impact on vote choice

In the following section I will explain the impact of Smartvote on vote choice in two stages. First, I estimate a normal probit model that takes the sample composition at face value and ignores the potential sample selection bias. In so doing, my goal is to replicate to some extent the state of art in VAA research and demonstrate the plain

⁷For the detailed operationalization of this variable refer to the Section 4.4

⁸The question reads: How would you position yourself on a left-right scale? ('Wie würden Sie sich selbst auf einer Links-rechts-Skala positionieren?')

effect of Smartvote on vote choice. In the second step, I propose a different estimation strategy designed for samples that are known not to be randomly selected from the entire population. Here, the goal is to verify whether controlling for the sample bias would yield more conservative effects.

Model specification

The binary response variable y requires fitting the multivariate model by means of maximum likelihood. A probit model will be used for achieving better comparison with models estimated in the subsequent sections of the paper.⁹ In the following three models will be estimated in a nested structure. In each step a new set of predictor variables will be added while controlling for the previously included ones. The estimated model takes the following form.

$$ln\left(\frac{Pr(y=1)}{1-Pr(y=1)}\right) = \beta_0 + \gamma_1 + \gamma_2 + \gamma_3 + \varepsilon_y \tag{7.1}$$

, where vector γ_1 is the main research variable dichotomized into four dummies (perfect match being a reference category), γ_2 is vector of covariates measuring individual's political predispositions and political attitudes (openness to electoral competition and position on the left-right political space), γ_3 is a vector of demographic variables and ε_y is a random error term.

Estimating the models in a nested structure is generally a means to observe explanatory power of each set of variables that is being added. In this event, however, the aim is not fitting a model in order to explain as much of variance as possible. Rather, the goal is to demonstrate a parsimonious model with a focus on the key explanatory variable - the 'surprisingness' of the vote advice. Therefore, the main interest is related to the performance of the main research variable while adding controls.

I report average marginal effects (in percentages) with corresponding standard errors instead of probit coefficients. Interpretation of marginal effects is straightforward. For example, an average marginal effect of 0.16 means that when moving that particular independent variable from its minimum to maximum value, it brings about a 16 per cent increase in the probability of the dependent variable.

Findings

Table 7.4 demonstrates the findings. First consider the explanatory power of the model. Although not an ideal measure for the goodness of fit of the model the pseudo R-

⁹In order to compare the predictions from probit model with those of the logit model, I graphically compared the predicted probabilities of those two models in a scatterplot. No meaningful differences between the two models were found.

	Model 1	Model 2	Model 3
Very surprising	19.45***	14.45***	16.91***
(base: not surprising at all)	(1.52)	(1.32)	(1.42)
Rather surprising	17.00^{***} (0.77)	$12.31^{***} \\ (0.66)$	$\begin{array}{c} 14.45^{***} \\ (0.72) \end{array}$
Rather not surprising	8.15^{***} (0.59)	6.06^{***} (0.47)	$7.14^{***} \\ (0.53)$
Subject to intense competition (base: other forms of competition)		3.52^{***} (0.41)	3.36*** (0.46)
Beyond electoral competition		-9.72^{***} (0.16)	-12.44^{***} (0.23)
Left		3.44^{***} (0.44)	2.82^{***} (0.48)
Center		$10.13^{***} \\ (0.60)$	$11.13^{***} \\ (0.65)$
Age			-6.93^{***} (1.04)
Education			-4.03^{**} (1.25)
Male			-2.57^{***} (0.23)
Constant	-0.95^{***} (0.05)	-1.27^{***} (0.09)	-0.94^{***} (0.16)
Observations	3620	3597	3567
Nagelkerke's pseudo R ²	0.02	0.05	0.06
Log likelihood	-1986.9	-1934.3	-1910.5
Wald test	59.04***	110.80***	123.03***

Table 7.4: The effect of Smartvote on vote choice

Average marginal effects; Standard errors in parentheses * p < 0.1, ** p < 0.05, *** p < 0.01

squared indicates that the model fit is rather poor. It increases from 2 percent in a model with the main research variable to 6 percent in a model where attitudinal and demographic variables are added. The low explanatory power of the model indicates that the effect is most probably driven by unobserved heterogeneity that the model fails to account for. Yet, as explained earlier, the current aim is not to specify a model which would increase the explanatory power of the model, but rather observe the proposed mechanism in which the match degree is hypothesized to have a substantial impact on the vote choice.

Results from Model 3 show that if a Smartvote user was confronted with a very surprising vote advice, her probability to vote differently on election day than she intended to initially is about 16.9 per cent higher as compared to those who received an expected vote advice. By all standards, this is a large effect. A comparable effect size occurs for those who received a rather surprising vote advice, i.e., the corresponding effect size is about 14.5 per cent. The smallest effect is that of the rather unsurprising vote advice an increase in probability of 7.1 per cent. Effects remain by and large the same across all three models, which provides evidence that the effect of the match degree remains prominent even when controlling for relevant and observed covariates. Following the intuitive expectations, the effect decreases as the surprise factor decreases. In order to get a better grip on the effect of the surprising vote advice, I also estimated a model where the match degree was used as an ordinal variable with 4 categories (from not surprising at all to very surprising) and plotted the corresponding predicted probabilities. Figure 7.1 achieves to represent this effect graphically.



Figure 7.1: Effect of the surprising vote advice on vote choice

As regards the attitudinal variables a voter's availability to electoral competition does not seem to influence the change in vote choice, while the opposite is certainly true for those who consider only one party as a viable choice for their vote. Empirically speaking, if a Smartvote user is tied to only one particular party her probability to change the vote choice decreases about 12.4 as compared to intermediate forms of electoral competition.

Self positioning on the left-right political spectrum appears to be an important predictor of the outcome variable, too. Theoretically, the effect of the surprising vote advice ought to be weaker for those at either extremes on the left-right scale, and stronger for those clustered at the middle. This should be the case because on average, the spatial differences in the middle are more likely to be smaller than those at either extremes. Indeed, the model confirms that the probability of changing the vote choice is about 11.1 per cent higher for those standing in the center as compared to those at the right. Conversely, the corresponding effect for those in the left is very small - just 2.8 per cent.

Finally, consider the group of demographic variables. Both age and education have a negative effect on the probability of changing the vote choice. More specifically, the probability of changing the vote choice is about 6.9 per cent less probable for 87 year old than for the 18 year old. Similarly, the same probability is 4 per cent smaller for those with a university degree than for those without education.

In sum, I find that the nature of the vote advice has a substantial impact on one's probability to change her vote choice. 17 per cent change in average marginal effect is by all standards a very large effect. Therefore, I conclude that if taking the sample at face value and not accounting for potential self selection biases, hypothesis 1 appears to be confirmed. Previous research using the same Swiss data and a similar statistical approach, has arrived at largely the same conclusion (Ladner et al., 2008, pp. 19-22). Yet, I remain critical about both, because according to the theorized problem of sample bias it is difficult to know how large is the proportion of the marginal effect (e.g., 17 per cent) that contains the true effect of the surprising vote advice (one that would be found on a random sample) and how large is the proportion that is carried over because of the sample bias. The following section demonstrates the foundation of the sample selection bias by introducing conditional effects of Smartvote's impact on vote choice.

7.5 Conditional effects of Smartvote usage

The previous section demonstrated that the role of demographic variables, in particular age and education, is small in practical terms. However, there is a good reason to suspect that the outcome of interest is conditional precisely on these demographic variables. If this is true, then the effect of both, age and education can be small in terms of average marginal effects, but it is small only because the effects are heterogeneous across the population. In particular, I expect younger users to have a greater probability to be affected by the surprising vote advice than their older counterparts. Similarly, less educated users are expected to be more responsive to the surprising vote advice that those with higher levels of educational attainment.

Why should this be the case? Imagine citizens in their formative years who are probably more open to various political messages (including the external vote advice) than their older counterparts. The latter group most probably has already formed their political preferences. Young also have lower levels of educational attainment, simply because they are still in education and have not yet had the ability to reach higher levels. Elderly voters, in return may have acquired higher levels of education, but also due to their established preferences and political attitudes they are much more resistant to the same kind of political messages. For a more elaborate theoretical discussion on political socialization and life cycle effects refer to Chapter 8.

It follows, that Smartvote's vote advice is likely to have a lower impact on the elderly than the young. Similarly, the effect may well be stronger for the less educated. All things considered, it is an empirical question, which cannot be answered with the previous model, because it fails to tap such conditional effects. Yet, their presence even in the previous (naive) model can be demonstrated graphically. Figure 7.2 shows predicted probabilities of changing the vote choice by the categories of age and education.¹⁰



Figure 7.2: Effect of the vote advice by age categories

Indeed, the impact of the vote advice is weaker for every higher age group or educational attainment. I recognize that probability curves on Figure 7.2 are lined up

¹⁰Probabilities are obtained on the basis of the previous model (Table 7.4), where the previously dichotomized research variable is operationalized as a continuous variable.

with close proximity to each other and would largely overlap when confidence intervals were included. However, the aim is not to draw inferences on this basis, but to use this evidence as an indication that Smartvote's effect is a conditional one. Therefore, given the structural consistency of the probabilities in Figure 7.2 the next step of the analysis should reveal whether the effect of vote advice is indeed conditional on these socio-demographics. A straightforward way to check it, is to extend the model with the help of interaction terms.

Interaction effects

If age and education appear as modifying variables for assessing the impact of voting advice on vote choice, then the previous model needs to be extended to include corresponding multiplicative interaction terms (additionally, I include an interaction with gender to control for potential gender effects). It would reveal to which extent the conditional hypothesis stated above is true.

In order to achieve this I append the model specified in equation 7.1 with the following interaction terms: (age * match degree), (education * match degree) and (gender * match degree). As both, age and education, are continuous variables, gender being a dummy, and the match degree is dichotomized into four dummies (one is omitted from the model as a base category) the subsequent model has nine more variables than the previous model.¹¹ The results appear in Table 7.5.

It is immediately apparent that the main effect of a surprising vote advice gains in effect size when controlling for potential modifying effects of age, education and gender. The effect of age interacted with 'match degree', however, is negative, large and significant. It shows, that the probability of changing the vote choice is considerably less likely for the older voters than the young. Therefore, the relationship between Smartvote's vote advice and its effect is indeed conditional on respondents' age. The younger the voter, the larger the effect and conversely, the older the voter the smaller the effect. When interacting education with the 'match degree' the effect is only sizable for those to whom the effect of the vote advice was rather not surprising. An interaction term of gender and 'match degree' yields no significant effects. ¹²

It follows, that the large and significant effect of Smartvote's vote advice in the naive model is to a great extent driven by the young Smartvote users. It may well be that this effect comprises also some other unobserved variables. If this holds, then the apparent

¹¹Interaction terms: age * very surprising; age * rather surprising; age * rather not surprising; education * very surprising; education * rather surprising; education * rather not surprising; male * very surprising; male * rather not surprising;

¹²The findings of interaction effects are difficult to interpret as product of a regression analysis. I have remained deliberately vague in my interpretation (i.e., with regard to the precise size of the interaction effects) and refrained from following Brambor et al. (2006) because here the analysis of interaction effects is not a goal in its own right, but rather serves as a means to introduce a problem why the effect seems to be not the same for everyone in the sample.

	Model 3	Model 4
Very surprising	16.91***	22.86*
	(1.42)	(9.55)
Rather surprising	14.45***	25.07***
	(0.72)	(4.57)
Rather not surprising	7.14***	1.67
	(0.53)	(2.39)
Subject to intense competition	3.36***	3.53***
, 1	(0.46)	(0.48)
Bevond electoral competition	-12.44^{***}	-13.90***
5 1	(0.23)	(0.28)
Left	2.83***	3.06***
	(0.48)	(0.51)
Center	11.13***	11.65***
Conter	(0.65)	(0.67)
Age	-6.93***	6.22*
1.80	(1.04)	(2.42)
Education	-4 03**	-9 67***
Buddion	(1.25)	(2.71)
Male	-2 57***	-3.01***
where	(0.23)	(0.51)
Age * Very surprising		-33 24***
Age * very surprising		(6.26)
Age * Rather surprising		-18 61***
Age * Rather surprising		(3.35)
Age * Rather not surprising		_1/ 36***
Age * Ramer not surprising		(2.75)
Education * Vory surprising		3.25
Education * very surprising		(8.28)
Education * Rather surprising		_3 72
Education * Ratici surprising		(3.88)
Education * Rather not surprising		10 71***
Education * Ratier not surprising		(3.18)
Malo * Vory surprising		2.68
wate * very surprising		(2.08)
Mala & Pathon summising		0.00
Male * Ratier Surprising		$(1\ 10)$
Male + Pathor not surprising		0.15
wate * Rather not surprising		(0.15)
Observations	3567	3567
Nagelkerke's pseudo <i>R</i> ²	0.06	0.06
Log likelihood	-1910.5	-1907.5
Wald test	123.03***	128.90***

Table 7.5: The conditional effect of Smartvote on vote choice

Marginal effects; Standard errors in parentheses * p < 0.1, ** p < 0.05, *** p < 0.01

question is why this happens, and how to extract a more conservative effect, that would represent the VAA users' population on the whole?

7.6 Sample selection bias - explicating the mechanism

Recall the problem of the sample selection bias described in Section 7.2. A bias in estimation results of Table 7.4 occurs because of three non-random events that are lined in a sequence and act as conditions or filters that one has to pass in order to become a part of the final sample upon which the model is constructed. These three non-random events are the following: (1) becoming a Smartvote user out of the total sample of those who potentially can use Smartvote; (2) responding to the first Smartvote survey out of the entire universe of Smartvote users and; (3) responding to the second Smartvote survey. In each step a selection rule narrows the possibilities that everyone in the preceding sample can enter into the succeeding one, thereby imposing a non-random selection into the final sample. The very mechanism by which this self-selection operates yields a bias in the estimation results if the model fails to account for such a mechanism.

When looking at the sample distribution in Appendix B.1 it is clear that the sample of those Smartvote users who responded to the survey over-represents the young, educated and males. This is the group of people exposed to the internet and new-media applications to a greater extent than their elderly and less educated counterparts. This is partly the reason why they use Smartvote in the first place.

However, being young is not not the only reason why people use Smartvote. They also need other qualities distinct from the random population - e.g., certain level of interest toward politics, openness to multiple political choices, uncertainty with regard to who to vote for, etc. In other words, a number of unobserved variables may determine whether one becomes a Smartvote user or not. And more importantly, whether one chooses to respond to the two consecutive surveys after using Smartvote.

It is therefore important to model the change the vote choice while accounting for the selection bias. In order to do so, one assumption is required: Given the effect of observed demographic variables (Table 7.5) it is assumed that the same variables predict participation in the Smartvote surveys. More directly, I expect the young and educated, who are 'usual' Smartvote users, be the same who select themselves into the Smartvote surveys.

It should not be difficult to explain that young citizens who are politically engaged and keen in using new technologies are also those who are more likely to participate in various surveys. If this assumption holds we have all the necessary building blocks for running a model where the selection bias is accounted for.¹³

¹³At this stage it is irrelevant to empirically validate the posited assumption because its validity will be

Specifying the sample selection model

To empirically apply the selection model discussed above, I utilize a two-step Heckman selection procedure (Heckman, 1979) to estimate the participation in the Smartvote survey in the first stage, and then correct for the non-random event in the second stage (change in vote choice). Prior to estimating the model a few considerations should be addressed.

First, since both, the selection equation and the outcome equation, have a binary dependent variable, a maximum likelihood model will be fitted using a Heckman probit model instead of the normal linear model. Second, a set of variables need to be specified that are used in the selection equation and the outcome equation. Due to the dichotomous nature of the outcome variable, it would not be possible to use the same set of regressors in both models, since the model identification cannot be based solely upon the nonlinearity in the functional form (Cameron and Trivedi, 2009, pp. 543-546). Therefore, the estimation requires an exclusion restriction. This is achieved by finding a variable that generates nontrivial variation in the selection variable but does not affect the outcome variable directly - in a very similar fashion to the logic of the instrumental variable approach (*ibid*). In particular, the selection equation needs to have an exogenous variable that is excluded from the outcome equation. That variable needs to have a substantial impact on the probability of selection.

The discussion in the previous section already shed some light on a potential exclusion restriction. It was assumed that the non-random self-selection into the surveys is driven (among other unobserved variables) by observed demographics: age, education and gender. Using these variables as an exclusion restriction I expect them to exercise an influence on the probability of selection, but not the outcome. For example, age *per se* should have little impact on the probability of changing the vote choice, whereas it should influence the likelihood of participation in the surveys. Indeed, when regressing all three variables (age, education, gender) on participation in the surveys and the difference in vote choice (both are dummies), the Pseudo R-squared for the former reaches 1% and for the latter is indistinguishable from o. Evidently, these are extremely low numbers for a variance explained, but they demonstrate a joint effect of the 'exclusion restriction' on the two outcomes.

The model specification incorporates Equations (7.2) and (7.3) that are simultaneously estimated. Note that y_2 refers to the participation in the Smartvote survey and y_1 refers to the main outcome of interest - the change in vote choice before and after elections.

revealed in the subsequent model where the hypothetical selection bias is isolated.

$$ln\left(\frac{Pr(y_2=1)}{1-Pr(y_2=1)}\right) = \beta_0 + \beta_1 Z + \gamma + \varepsilon_{y_2}$$
(7.2)

and

$$ln\left(\frac{Pr(y_1=1 \mid y_2=1)}{1 - Pr(y_1=1 \mid y_2=1)}\right) = \beta_0 + \gamma + \varepsilon_{y_1}$$
(7.3)

where

$$corr\left(\varepsilon_{y_2},\varepsilon_{y_1}\right) = \rho \tag{7.4}$$

Equation 7.2 is a selection equation where the vector γ refers to all independent variables included in the model and the vector *Z* is an exclusion restriction comprising three variables - age, education, gender. Equation 7.3 is an outcome equation where all components on the right hand-side are the same, but the the omitted exclusion restriction.

It is assumed that correlated errors are jointly normally distributed and homoskedastic. If ρ - the correlation of the error terms - is different from 0 there is a selection bias and the estimation of the plain outcome equation by means of standard probit model will lead to biased point estimates and inconsistent findings.

Findings from the Heckman model

Table 7.6 presents the findings from the two-step Heckman selection model and compares the results with the previously estimated naive model.

	Naive model		Selection model	
	Model 1	Model 2	Model 3	Heckman
Very surprising	19.45*** (1.52)	14.45*** (1.32)	16.91*** (1.42)	3.973^{***} (0.45)
Rather surprising	17.00^{***} (0.77)	12.31*** (0.66)	$\begin{array}{c} 14.45^{***} \\ (0.72) \end{array}$	3.657*** (0.33)
Rather not surprising	8.15*** (0.59)	6.06^{***} (0.47)	$7.14^{***} \\ (0.53)$	$1.92^{***} \\ (0.20)$
Subject to intense competition		3.52*** (0.41)	3.36*** (0.46)	1.07^{***} (0.17)
Beyond electoral competition		-9.72^{***} (0.16)	-12.44^{***} (0.23)	-3.02*** (0.21)
Left		3.44^{***} (0.44)	2.83^{***} (0.48)	2.51^{***} (0.23)
Center		10.13^{***} (0.60)	$11.13^{***} \\ (0.65)$	4.56^{***} (0.41)
Age			-6.93^{***} (1.04)	_
Education			-4.03^{**} (1.25)	_
Male			-2.58^{***} (0.23)	_
Constant	-1.58^{***} (0.09)	-2.12^{***} (0.16)	-1.55^{***} (0.23)	-1.86^{***} (0.11)
Observations	3620	3597	3567	12134
Nagelkerke's Pseudo R ² Log likelihood Wald test	0.02 –1986.9 59.04***	$0.05 \\ -1934.6 \\ 110.80^{***}$	0.06 -1910.2 123.03***	-9134.8
μ				0.05

Table 7.6: The effect of Smartvote on vote choice - Heckman model added

Average marginal effects; Standard errors in parentheses

* p < 0.1, ** p < 0.05, *** p < 0.01

The effect of controlling for the potential selection bias is staggering: the marginal effect of the surprising advice on vote choice decreases from the 16.9 to 3.9, which means that those being exposed to the surprising vote choice are instead of 16.9 a mere 3.9 per cent more likely to change their vote choice than those receiving an expected vote advice. An effect of similar size is found to be true for those who receive a rather surprising vote advice. All in all, with regard to the three dummies reflecting the main independent variable, the effect diminishes considerably when controlling for the sample selection bias.

The effect of electoral openness toward political parties changes for those who are beyond electoral competition. More specifically, the average marginal effect for those beyond electoral competition decreased from -12.4 to -3 per cent when using the correction procedures for selection bias. The effect of those who are subject to intense electoral competition, however, decreased only by a 2.4 percent indicating the effect of these variables was sufficiently robust in both models.

Finally, with regard to the left-right autopositioning, the effect remains almost the same for those standing on the left, but weakens considerably for those in the center. In relative terms, however, the effect of 'center' is still about twice the size of the 'left' which means that people in the center of the political spectrum are those who are about 4.6 per cent more likely to change their vote choice than those on the right.

All things considered, the Heckman model appears to confirm the second hypothesis. It proposed that the effect of surprising vote advice on one's probability to change her intended vote choice is to a large extent driven by the non-random selection of the respondents into the sample under study. Indeed, the main effect appears to diminish about four times. The likely reasons and consequences of such a process are discussed in the next section.

7.7 Discussion and concluding remarks

The growing body of research has demonstrated that the ICT usage in politics is skewed toward the young and affluent citizens (van Dijk, 2000; Norris, 2001; Mossberger et al., 2003). There are no profound reasons to expect why VAA users should be any different, other than with regard to their higher political interest. In fact, previous research in the field of VAAs and the first part of this thesis demonstrated that VAA users are indeed younger citizens with high levels of ICT usage and above average levels of political interest (Walgrave et al., 2008; Marschall, 2009; Fivaz and Nadig, 2010).

VAA studies usually report results that are inferred on the grounds of non-representative samples, i.e., these surveys usually allow respondents to self-select themselves into the samples. If a sample, which baseline characteristics differ from the entire population is used in empirical analysis, it may happen that this very difference leads to two subsequent processes that are of critical inferential importance. First, VAA surveys are usually conducted among the population of users in the same environment where the interaction with the VAA occurs¹⁴. The processes by which people choose to respond to such online surveys is far from random. Unfortunately, little is known about the specific mechanism that makes people participate in online surveys. I assumed that this mechanism is essentially the same than the one making people use VAAs in the first place but differs in magnitude. That is, the same variables that predict VAA usage also predict participation in the surveys. If this assumption holds, then the subsample of VAA users is structurally different from those of the representative sample of VAA

¹⁴A usual practice is to link a survey from the VAA website after providing a vote advice.

users. Therefore, an empirically informed analysis should take this bias into account.

A second process that imposes constraints on this type of analysis is that nonrandomly selected VAA users may overreport the effect of the VAA advice on their behavior. The likely reasons for such a behavior may be related to the spontaneous sympathy for digital applications that are carried over into self-assessed reports about attitudes and behavior. Namely, on can assume that giving affirmative answers to effectrelated questions is a function of sympathetic support toward the application rather than a critical self-assessment of its effects. Given the general skewness of the sample toward the young this is not entirely improbable (refer to Appendix B.1). Moreover, recall the dependent variable of interest - a difference in vote choice between two measurements at different time points. This is a behavioral measure - a choice - which, if taken *prima facie*, implies that VAAs exercise behavioral changes on about one fifth of their users. That empirical findings in VAA research suffer from considerable over reporting is also illustrated by other accounts (Boogers, 2006; Marschall and Schmidt, 2010).

I remain critical in taking large behavioral effects at face value. Moreover, even if such effects are found, it should be reasonable to suspect that they can be really linked to a single external stimulus - such as the VAA advice. If so, would it not be suspicious to take a high VAA-usage effects on about one fifth of the sample at face value? Would it not be reasonable to suspect that it is a function of over reporting and self selection as described above? And finally, would it not be more intuitively sound to find less sizable effects?

Prior research has addressed such problems, too (Fivaz and Nadig, 2010; Ladner et al., 2008). Yet, even these serious concerns have not triggered a more scrutinized approach toward solving for these issues.

In order to further our understanding of VAA effects on vote choice I proposed two hypotheses. The first one expected the surprising vote advice to be positively associated with one's probability to change her vote choice. Indeed, the findings confirmed such a relationship. Next, I proposed that this relationship is highly conditional on the sample selection bias and would diminish considerably if one estimates a model taking this bias into account. I then devised an appropriate estimation strategy using a Heckman selection model and theorized what the likely self-selection mechanism could look like. Due to the absence of control variables in the data that would allow to control for an elaborate sample bias, one assumption was required. As explicated above, I assumed that three demographic variables (age, education and gender) predict participation in the surveys but not the outcome of interest *per se*. Their connection with unobserved variables determining participation in the surveys is assumed to be correlated with observed ones. Therefore the understanding of how the Heckman model controls for sample bias is limited to these observed variables. This assumption is the cornerstone of the analysis. Clearly, one would prefer having a whole range of covariates that allow controlling for the self-selection mechanism. However, as these variables are absent an assumption suffices to propose a strategy that is likely to tap a theorized selection mechanism. In fact, when looking at the subsequent findings they meet the required criteria: sample selection bias is reflected by a significant and large positive ρ and the effects retain their direction but loose magnitude. Theoretically, this is exactly what one would expect from the findings when the sample bias is removed.

As for the substantial results, the findings from the Heckman model demonstrated that the main effect of the surprising vote advice decreased about four times, confirming the second hypothesis. Still, the effects are far from negligible. For those who received a very surprising or rather surprising vote advice the likelihood to change the vote choice is about four per cent higher than for those who obtained an expected advice. Provided that VAAs are part of an extremely heterogeneous environment that alters voters' preferences and influences choices (e.g., media, personal communication, online activities, etc), a four per cent effect is still a sizable component in the environment.

Given the limitations of data upon which the analysis rest, further data collection endeavors in the field of VAA studies must dedicate a much closer attention to which variables are collected. Moreover, more attitudinal and behavior variables need to be collected at various time points simultaneously for enabling researchers to construct variables containing time-variant components. Accounting for a selection mechanism ought to become a prerequisite of this type of analysis if the selection into the surveys is not random. This analysis was intended to shed light on these issues and explicate a possible research strategy for such an analysis.

7.8 Summary

The core interest of this chapter was to investigate the effect of Smartvote - a Swiss voting advice application - on its users' vote choice. This is not the first attempt to address such a research question on the basis of these data. Most notably, Ladner, et al. (2008) and Fivaz and Nadig (2010) have analyzed the impact of Smartvote on vote choice, turnout and civic education.

The goal of this chapter, however, was to further our understanding of the likely selfselection mechanisms that affect the estimation results when relying only on a naive model (in the statistical sense). In order to achieve this I first replicated as closely as possible the results found by previous studies and found, that indeed, the naive model by and large provides similar effects (in terms of their direction and size) to previous studies (Boogers, 2006; Ladner et al., 2008; Ruusuvirta and Rosema, 2009).

I further explicated that the likely reasons for why these effects are observed are due to the over reporting and the bias in the sample. I then proposed a mechanism by which the self-selection into the sample works and proposed a model that is likely to account for such a bias. A Heckman model provided a far more conservative estimation results by which the effect decreased from some staggering 16 per cent to only about four per cent.

I conclude that as long as VAA studies continue using observational data and a nonrandom survey design, further research needs to explore the problems of self selection biases and take them into account in empirical analysis. The consequences of neglecting the problem may yield a considerable bias in the naive models. Another way how to address this problematic aspect of survey research is to move beyond observational studies and use an experimental research design. In fact, studying the impact of VAA usage on one's attitudes and behavior appears to be particularly suitable for experiments. The next chapter introduces a field experiment in order to study the causal impact of VAAs on voters' political preferences, vote choice and turnout.

Chapter 8

The Causal Impact of VAAs - A Field Experiment

8.1 Introduction

Previous chapters of this thesis have demonstrated that what we can say about the patterns of VAA usage and its effects is highly conditional on the research design that we use. Despite growing scholarly interest, most studies are observational in form and therefore fail to account for two important problems: first, whether or not somebody becomes a VAA user is a highly non-random event, most likely driven by a set of demographic and attitudinal traits. The same traits, in turn, also generate a potentially large set of unobservable confounders that may account for the observed differences in various outcomes of interest, e.g., change in political preferences or vote choice. That this selection bias can be substantially misleading is empirically demonstrated in the previous chapter. Second, and mostly for the same reasons, observational studies fail to establish causality between the VAA usage and attitudinal or behavioral effects because the counterfactual scenarios are not controlled for.

Furthermore, systematic causal analysis of VAA effects is justifiable for several reasons. First, usage statistics of large VAAs in the Netherlands, Germany, Switzerland, and elsewhere show that in the national elections they assist more than one tenth of eligible voters. The large number of VAA users implies that if VAA experience influences the individual decision making process, their overall impact on electoral outcomes might (unless these effects are cancelled out) be decisive. But even if these individual-specific effects are counterbalanced at the aggregate level due to the emanation of political stimuli that go into opposite directions, the importance of these devices at the individual level might still be considerable. Given that VAAs are typically launched during the campaign period, they constitute a relatively new but potentially crucial campaign element that election studies need to take into consideration when trying to explain actual vote choice. Second, this new technology is based on the normative assumption that people's political preferences should be treated as a function of parties' stances in various issue dimensions. Finding that this is actually the case for at least a subgroup of voters would enrich our insight about the attitudinal profile of issue voters and, since the final advice is based on the proximity criteria, about the extent to which people adhere to the Downsian 'smallest distance' principle. Third, from the perspective of the political learning literature, evidence for attitudinal change as a result of VAA usage would enhance our understanding about how people change their attitudes in light of political information that is tailored for their needs. Are all age groups equally prone to update their opinions about the parties or is this tendency more evident among the group that has been suggested to be more responsive to new information, namely younger people still in their impressionable years?

The purpose of this chapter is to examine the effect of VAA usage on voter's preferences, vote choice and turnout. More precisely, I examine whether the effects of VAA usage are conditional on respondents' prior political experience. As indicated above, the obstacle in the attempt to address these questions is that people select themselves into the treatment condition, i.e., any comparison between users and non-users might well conceal imbalances in terms of political interest, IT literacy (which in turn may influence the sources and content of political information), age, gender and various other characteristics. To address this problem, a randomized field experiment was carried out under real-world conditions. An actual VAA that has been used throughout Europe shortly before the 2009 elections for the European parliament, namely the EU-Profiler - the largest pan-European VAA - has served as the treatment condition. The experiment was conducted in Estonia and it comprises a panel study consisting of a pre- and a post-election survey. Typically to the field experiments, these data suffer from non-compliance with the treatment. In order to provide consistent results I employ the potential outcomes framework suggested by Rubin (1974).

The results provide considerable support for the role of VAAs as devices that help people crystallize their preferences with regard to political parties. As one would expect according the 'formative years' hypothesis, this effect is only observed among the group of the electorate that is more likely to be still in the process of attitude formation, namely young adults. Furthermore, I find that the VAA's influence on real vote choice is considerably smaller and only occurs among the subgroup of those with lower levels of education. Finally, I find only small effects with regard to VAAs ability to mobilize new voters.

8.2 Theoretical expectations

VAAs may function as important funnels of political information because of two reasons. First, they pertain to objectivity and reason in voting behavior by analyzing voters preferences and issue based overlaps with political parties. Second, they use highly advanced visualization tools that help voters clearly and simply distinguish between parties that are close to them and those that are further away. For example, one of the leading VAAs during the 2009 European Parliament elections - the EU Profiler made considerable efforts to provide interactive visual aids to make the vote advice more attractive to voters than simple match lists. Namely, it used smart spiders and two dimensional layouts of the political landscape to make users understand in which areas they overlap with parties and what is their position in the political landscape.

That VAAs have an impact on attitudes and behavior is demonstrated in the previous chapter. Yet, the question of what is the causal mechanism of this influence remains largely unknown. In order to investigate the causal impact of VAA usage, the following section outlines the two prominent theoretical accounts that could shed light on the potential mechanisms of VAA influence.

John Zaller's RAS model

An average user spent about 12.6 minutes on the website of the EU Profiler. In Estonia, EU Profiler provided 1,627 profiles with an average session duration of 15 minutes. Similarly, an Estonian VAA, Valijakompass, that was used during the 2011 national elections reported that an average user took slightly over 11 minutes to complete the session (Valijakompass, 2011). The average time taken to go through the entire process of an online voting advice application indicates that those who use VAAs are typically interested in politics. By the same token, they may already hold well informed opinions about the political parties in their national contexts. Because typical VAA users are well informed about politics, they may also be less susceptible to political cues about parties' stances. The latter happens because although they are exposed to higher levels of political information, they, at the same time, tend to be more critical about the incoming information flows and refuse the persuasive character of the received messages. This process is known as the Zaller's 'Receive-Accept-Sample' model (Zaller, 1992), in which individuals who are likely to receive messages are at the same time the least likely to accept them. Conversely, those who are least likely to receive political information are those who are more susceptible to accept them and take them into further consideration.

In light of explaining the effects of VAA usage Zaller's model can be interpreted as following: users with lower levels of political awareness may not pay much attention to VAAs on average. Those, who come across VAAs, however, may only spend a few minutes on the webpage, give near-random responses to the policy statements and perhaps make little sense of the final results. Yet, because the final advice is given in a clear and highly comprehensible manner (using interactive visual aids), the effect of the advice may nevertheless be marked. That is, if citizens with low political awareness somehow manage to arrive at the vote advice, then its sheer attractiveness may exercise an influence on them.

On the contrary, VAA users who are very well informed about politics may give consistent and thoughtful answers to policy statements, they may observe carefully the resulting vote advice, check parties' positions, spend more time than average on the EU-Profiler, but they may still leave the page unaffected by the outcome simply because they have already well established views about the parties. For the latter group, the chances that an external vote advice will be even considered are rather low.

A VAA advice is similar to a political message that is persuasive in its character because it attempts to confirm or change the receiver's prior preferences. It can be therefore linked to Zaller's theory. However, when applying Zaller's model to VAA usage patterns, one has to bear in mind that in practical terms the effect is likely to occur for those users who belong to the intermediate types of VAA users (in terms of political awareness) and not to those at the extremes. That is, someone with moderate political awareness and vaguely established political preferences may still come across VAAs and provide reasonably thoughtful answers to the issue statements. After all, most VAAs try to appeal to the median voters so that the policy statements are formulated in an interesting and simple fashion (Walgrave et al., 2008). Subsequently, this type of a user may also respond to the vote advice by taking it into account when going to the polls. However, this person is neither a complete ignorant of politics, nor is she profoundly involved in it.

The relevance of Zaller's theory for VAA research cannot be underestimated, because it has been proven to be an important explanation of the impact on internet voting. Although different in nature, internet voting, just as VAAs, are directly linked with the very act of voting and involve a similar population of interest (Trechsel et al., 2010). In particular Vassil and Weber (2011) show how the usage of internet voting is inversely related to its mobilization effects. That is, political awareness is an important predictor of internet voting, but at the same time those who are likely to use internet voting are least likely to experience mobilization effects. On the other hand, those with low political awareness are very unlikely to use internet voting, but those who do, are mobilized to vote. This kind of a bottleneck model was broadly introduced in the overall theoretical section of this thesis, but now it can be tested empirically on the basis of VAA usage.

It is for these reasons that Zaller's model can easily be used for the analysis of VAA effects. Yet, it is difficult to apply it in the context of this particular experiment, because high political awareness is directly linked with the baseline characteristics of the sample used in this study. Namely, as it will become evident in the subsequent section, the

current sample varies very little in terms of political awareness and therefore Zaller's theory cannot be tested directly. However, while maintaining the basic premise of the RAS model, I propose an alternative theoretical approach to capture a fairly similar mechanism of the potential impact of the VAA usage.

Political learning and life cycle effects

According to Converse's learning resistance phenomenon one's openness to political learning and therefore likelihood of attitudinal change, declines with age in a non-linear fashion (Converse, 1969). This openness is expressed more commonly in the literature by its inverse of increasing attitudinal stability over the life span (Stoker and Jennings, 2008). In other words, people gradually develop their political orientations as they accumulate political experiences over their life cycle (Delli Carpini, 1989).

One's attitude about the effectiveness of elections for choosing political leaders, for example, is determined in part by the capacity of an individual to grasp the theory underlying the electoral process, in part by the gathering of specific information about the actual mechanics of the process, and in part by one's repeated experience with the process over time. All of these elements are related to the life cycle (Delli Carpini, 1989, p. 31).

Over time, political preferences and opinions (Converse, 1969; Carlsson and Karlsson, 1970; Abramson, 1992) as well as behavioral outcomes of interest (Plutzer, 2002; Franklin, 2004; Jennings et al., 2009) tend to crystallize and become more established in one's mind. A number of theoretical and empirical models suggest how and in which particular stages, life cycle affects learning and political socialization (Erickson, 1968; Piaget, 1968; Wolfinger and Rosenstone, 1980; Delli Carpini, 1989). However, there is an overall agreement that the rate of learning slows down with advancing age (Delli Carpini, 1989, p.31). As the ability to learn diminishes over time, so does the likelihood of attitudinal change. At the same time, young people in their impressionable years are more susceptible to external influences since they are still in the process of formulating their own political preferences (Dinas, 2010). Taken together, these accounts constitute the foundation how aging can be used as an approximation of Zaller's model.

In particular, literature on political learning shows that age, operationalized in different ways, can be a principle mediator in the probability that a given stimulus will cause change in people's prior attitudes (Achen, 1992; Glenn, 2005). Although the actual growth curve through which this pattern of partisan anchoring manifests itself is still largely unknown (Delli Carpini, 1989), existing evidence gives credence to either a monotonic (Plutzer, 2002) or a step-wise (Stoker and Jennings, 2008) function through which people 'get locked in their ways' (Franklin, 2004). The particular nature of this age curve is not even of great importance at the moment, rather if this argument holds in general, I expect VAAs to be more influential among young users. This expectation is based on the premise that the young are those among whom one should observe more individual-level fluctuation in opinions and preferences. These fluctuations can be translated into uncertainty in their partisan profiles (Alwin and Krosnick, 1991). Accordingly, if VAAs work as anticipated by those who design them, they should help reducing this uncertainty and help people to form partisan preferences. Subsequently, age can be used as an approximation of Zaller's indicator of political awareness. The lower the age the less informed an individual is about politics. However, age is not the only criterion suggested by this literature. Education, and in particular, college experience can be seen as a major influence on young adult's political views.

If a young adult is encountering political choices, she is subject to influences from her family, peers, school, etc. 'Thus, during early adulthood political opinions are formed, prior predispositions are challenged, and more generally the individual creates what constitutes her first encompassing scheme of political attitudes, which serves as a compass that helps her navigate in the political world' (Dinas, 2010, p. 13). Furthermore, apart from parental socialization, these preferences appear to be influenced predominantly by the liberal context of college experiences that can substantially affect one's initial political views in a more liberal direction (Dinas, 2010, p. 64). If so, then depending on one's level of education, individuals have varying susceptibility for accepting the external vote advice. Persons with low levels of education may consider VAA advice much more seriously than those in college or at even higher levels of educational attainment. Incorporating the effect of education into the current model operates as another proxy to political awareness in Zaller's model. Therefore, by parting from Zaller's RAS model I expect the effects of VAA usage to diminish with advancing age and education. In Zaller's words: 'the greater a person's level of awareness, the more likely she is to be able, under certain circumstances, to resist information that is inconsistent with her basic values of partisanship' (Zaller, 1992, p. 266). Subsequently, the first hypothesis to be tested in this chapter reads as follows.

Hypothesis 1: Young citizens and those with less education are more likely than the elderly and those with higher educational attainment to change their voting preferences and vote choice due to the EU Profiler vote advice.

Impact on issue voters

With age and education as mediating variables of the effect of EU Profiler usage, theories of political learning may considerably advance our understanding which subsets of the population are mostly influenced by the VAAs. However, this approach assumes that the impact is inversely related to one's political awareness. At the same time, VAA advice may also be considered seriously by those voters who score extremely high on the political awareness index.

These voters are typically known as issue voters. It is widely understood that this type of voter is rationally minded adhering to the Downsian 'closest distance principle'. Moreover, elections studies indicate that as many individuals consider political issues as the basis of their vote choice the aggregate numbers of issue voters have increased (Dalton, 2000, p. 337). However, acting to her own greatest benefit rests on the assumption that there is sufficient political information about the alternatives on which voting decisions can be based upon. Therefore, issue voting by definition implies higher political awareness. Typically, these voters tend to engage in political processes and display above average levels of political sophistication. Yet, the mechanism by which VAAs influence their decisions is quite different from the one explained until now.

The basic theoretical principle why issue voters are expected to use VAAs was explained in Chapter 3. Here, I adopt the same principle and propose an alternative mechanism through which VAAs can exercise their influence. Namely, since the first part of the thesis demonstrated that VAA usage is more frequent among those voters who consider political issues more often than other motivations to cast their vote, I expect VAAs to affect this type of voters more often than other types. Because VAAs intrinsically operate on the premise of the Downsian smallest distance principle, it would be reasonable to expect that VAAs are more influential among issue voters, too. Moreover, VAAs do not contain random issue statements, but usually reflect political stances that are salient in respective countries at respective time points (Walgrave et al., 2008). According to several definitions, issue voters are particularly sensitive to these sentiments (Aardal and van Vijnen, 2005). Therefore, the second hypothesis captures this alternative mechanism of VAAs influence.

Hypothesis 2: Issue voters are more sensitive than other types of voters to the advice of the EU Profiler and are more likely to follow it.

Testing these hypotheses jointly also sheds light on VAAs as informational shortcuts to voters with low levels of political information (H 1) as opposed to those who are politically more sophisticated (H 2). If confirmed, these two hypotheses together would point to the fact that VAAs can influence voters with varying degrees of political awareness by different causal mechanisms.

Before proceeding with the analysis, the next section describes the EU Profiler the largest pan-European VAA that will be used as a treatment condition in my field experiment.

8.3 EU Profiler

The EU Profiler was designed for the European Parliament elections that took place in June 2009. It covered all European Union member states (plus Switzerland, Croatia and Turkey) and included more than 270 political parties. The VAA offered voters to position themselves across 30 political issue statements for which the party positions were extracted by national 'coding' teams beforehand. The resulting vote advice was offered in three stages. The simple 'match list' demonstrated the rank ordering of parties on the basis of issue congruence with the voter. Second, the 'spider graph' showed the spatial overlap between the voter and each of the parties along seven political dimensions. Third, the 'compass' allowed voters to investigate their position (in relation to parties) in a two-dimensional political landscape where the X-axis represented the socioeconomic left and right and the Y-axis represented the pro and anti positions on EU integration. Figure 8.1 displays an example of the EU Profiler's vote advice where Figure A shows the image of parties and the voter projected on a two-dimensional political space; Figure B provides a match list of the same parties for a particular voter. Both are calculated on the basis of the overlap of political preferences between the parties and the user. More detailed information about the nature and the design of the EU Profiler can be obtained from Trechsel and Mair (2011).



Figure 8.1: The visualization of the vote advice

When investigating the impact of VAAs on users' attitudes and behavior one has to remember that essentially VAA usage is no different from any other interaction with a random web application. Users are expected to provide information about themselves (issue preferences) and in return they gain something (a voting advice). Yet, an interaction with the VAA differs in two important aspects. First, providing serious and a number of thoughtful answers to 30 policy statements requires a considerable amount of user's time before the vote advice can be obtained. An average time spent on the EU Profiler website was 12 minutes, which is a considerable effort given the generally uninteresting nature of politics for the common citizens. Therefore, one might expect that VAAs, at least for those taking it seriously, may be fairly influential in their subsequent behavior.

Second, all sorts of *vote advices* surround voters at all times. Conversations with friends or family, media texts, political commercials, etc - they all resemble vote advices and are to a varying degree persuasive in nature (Stiff and Mongeau, 2003). In other words, voters are continuously exposed to various sorts of 'advices'. A VAA advice, however, differs from all other persuasive messages in that it is a personally tailored mirror image of one's political preferences. Kleinnijenhuis and van Hoof compare the nature of the vote advice to the opinion of a psychoanalyst, 'who after serious of talks with a client, pretends to have based his or her advice on the client's true personality' (Kleinnijenhuis and van Hoof, 2008, p. 2). Provided that individuals indeed invest time to dig out their custom-made voting advice, the chances that it is actually taken into account should be greater than in many other forms of political communication.

8.4 Experimental setup

In order to investigate the causal relationship between VAA usage and potential attitudinal and behavioral effects a field experiment was specifically designed for the current analysis. The basic logic of the experiment consists of three sequential steps. First, the sample was constructed and the pre-treatment measurement was carried out. The second step introduced the treatment to the evenly and randomly split half of the sample – the treatment group. The treatment was an e-mail invitation to use the EU Profiler. Eventually post-treatment measurement was carried out. Figure 8.2 displays the temporal sequence of the experimental components.



Figure 8.2: Temporal sequence of the experiment

The experiment took place in the context of the European Parliament elections of June 7, 2009 in Estonia. The respondents were contacted and the treatment was assigned in the context of real world events. In the following I explicate the central components

of the experimental protocol: sampling, measurement of baseline characteristics of the sample, randomization, treatment assignment and the post-treatment measurement.

Sample

In order to construct a sample frame two Estonian universities were selected for which the information about their internal departmental mailing lists was available.¹ After acquiring the agreement from the respective departments to use their internal mailing lists, a general invitation to participate in the online survey was sent to eight departmental mailing lists two week before the Election Day. The invitation contained a brief explanation of the research project and asked respondents to follow the link to the online survey (the full text of the invitation letter is provided in Appendix C.3).

The invitation text contained explicit conditions that the respondents had to comply with in order to participate in the experiment. First, it was made clear that the survey had a follow-up wave after the elections which meant that each participant deciding to respond to the first wave of the study will subsequently be asked to participate in the second wave, too. Second, special attention was drawn to the fact that at the end of the first wave survey respondents will be asked for their personal e-mail address. It is important to highlight that respondents who eventually answered the surveys were naive about the goals of the experiment. The study was introduced as a panel study concerning European Parliament elections and voting behavior in general.

It must be noted that this sampling procedure implies that the final sample has no aspiration of being treated as globally random or representative, i.e., one cannot assess how these findings can be extrapolated to other populations of interest apart from university students, faculty and administrative staff.

Baseline characteristics

The goal of the pre-treatment survey was to measure the baseline behavior and the attitudes of the respondents. Additionally to the socio-demographics a number of questions about one's past political behavior, vote choice, party identification, left-right autopositioning, etc. were proposed. The aim was to gather information on the baseline characteristics that can be later compared with those measured after the treatment in both groups. A limited number of survey questions were used in order to ensure minimum panel attrition. Notice that all those control questions that could have been contaminated by the treatment condition (e.g., vote intention, left-right autopositioning, etc) were included into the pre-treatment wave of the study. In so doing the goal was to collect as much information about the respondents before exposing them to the treatment.

¹These universities include University of Tallinn and University of Tartu.

Randomization and the treatment assignment

After measuring the baseline characteristics, the sample was randomly split into two even groups differentiating between the control and the treatment conditions. The treatment was an e-mail, containing an invitation letter to use the EU Profiler before the European Parliament elections on June 7 2009 (for a full text of the invitation letter refer to Appendix C.4). The e-mail was sent to the previously split half of the sample (treatment group). The aim was to ensure that the treatment group is exposed to the entire EU Profiler workflow from the beginning to the end. This includes taking the time for answering the 30 issue statements provided by the EU Profiler and acquiring the visualized vote advice.

Additionally, respondents had to comply with one extra requirement. To be able to identify those who actually responded to the invitation and took the treatment, respondents were asked to register with the EU Profiler. In order to achieve this, an authorization was acquired from the EU Profiler steering committee in order to get access to the log files of the EU Profiler. Only because of this, it was possible to obtain information whether the respondent went through the whole EU Profiler work flow, simply because the e-mail was provided in the very end of the process within the extra questionnaire.²

Post-treatment measurement

After the election day, the second survey was introduced to both groups of participating people. As the aim was to compare the effect of EU Profiler usage on various measures between t - 1 and t, the key survey questions remained identical to those in the first wave. Table 8.1 demonstrates that the experiment reached 394 respondents who participated in both pre- and post-treatment surveys.³ Notice, that I cannot determine whether or not a respondent who was not invited to use EU Profiler actually did so. Therefore, the subsequent analysis may have some 'always takers' who are not actually accounted for. However, since the EU Profiler was not used too intensively in Estonia (only 1,627 vote advices were provided), it is likely that the number of 'always-takers' is not excessive. Moreover, even in the presence of these unintentionally treated respondents, the findings of the subsequent analysis would *under report* the substantial effects of interest and not *over report* them.

²It was made clear in the letter which assigned the treatment that the respondent needs to submit her e-mail in the extra questionnaire, but not necessarily respond to the questions in the extra survey.

³The actual number of respondents in the first wave of the survey was somewhat higher, but due to the panel attrition only 394 respondents remained as part of the eventual sample.

	Visited	Did not visit	Total
	EU Profiler	EU Profiler	
Invitation was sent	97	89	186
	52.2%	47.9%	100.0%
Invitation was not sent	0	208	208
	0%	100.0%	100.0%
Total	97	297	394
	24.7%	75.4%	100.0%

Table 8.1: Treatment and control group distribution

A note on alternative research strategies

Before proceeding with the operationalization of the dependent variables it is worth acknowledging that randomized field experiments are not the only possible research strategies available. Among some of the alternatives one might consider as well matching techniques or regression discontinuity designs, but the problem lies in the fact that the survey questions on VAA usages and related impact are rather scarce. Another matter is, for example in the case of propensity score matching that, it takes into account observable characteristics, but it is reasonable to expect that the VAA usage is determined also by unobservables.

Thus, the fundamental problem of unobserved heterogeneity cannot be fully addressed by other means. This is particularly problematic in this case because previous chapters of this thesis and the existing literature suggests that the use of VAAs and other internet tools depend highly on the level of political knowledge which means that matching is unlikely to perform well in isolating such differences. It can thus be these pre-treatment characteristics that again cause a spurious observational correlation between VAA usage and the propensity to change political preferences and attitudes more generally. Therefore, a proper causal estimation of the effect of such internet tools in actual preferences and behavior of those actually using them can be only satisfactorily captured through a field experiment of the type proposed here.

8.5 Dependent variables

This experiment was designed to investigate the impact of VAA usage on three outcomes of interest: voting preferences, vote choice and individual turnout. I start with voting preferences as the most subtle of these three outcomes.

Voting preferences

The most common way to capture empirically the process of attitudinal crystallization or change in those attitudes in two-party systems is to use a measure of party identification. Despite important criticism, the scale of partisanship - constructed on a series of survey questions that are used in the American National Election Studies (ANES) - has been shown to perform relatively well both in terms of face and construct validity and in terms of item reliability (Green et al., 2004). Yet, the European multi-party systems make it difficult to apply this concept in a European setting. Even in the US, with two parties running for government, the underlying uni-dimensionality assumption upon which the ANES question is based (the classical 'party identification' scale ranges from o (strong Democrat) to 6 (Strong Republican) with 3 denoting independence) has been challenged (Weisberg, 1980, 1983). In the Estonian party-system with relatively new party labels and more than five parties contesting in the elections, such an assumption would be undoubtedly problematic. Accordingly, one needs to seek a different measure.

The strategy adopted here (as well as throughout this thesis) is to combine information about people's party preferences and create an encompassing measure that could help distinguish individuals with regard to the extent of skewness in their partisan profiles. In a multi-party system, partisanship should manifest itself through a comparative advantage given to a single party by a focal individual. A measure that would adhere to this logic should provide information about people's preferences towards all parties that compete in the election. Importantly, this measure should at least try to evoke more encompassing and generic attitudes towards the parties than the actual vote choice. Party preference, therefore, has to go beyond contextual criteria related to a particular election. A measure that satisfies these conditions was proposed by van der Eijk and Niemoeller (1984) and further developed by (van der Eijk and Oppenhuis, 1991; van der Eijk et al., 2006; van der Brug et al., 2007; van der Eijk and Franklin, 2009). It is a series of survey questions asking people how likely it is that they will ever vote for Party X, where X includes all significant parties in a given electoral setting. The survey question, as formulated in the current experiment, reads as following:

Some people are quite certain that they will always vote for the same party. Others reconsider in each case to which party they will give their vote. I shall mention a number of parties. Would you indicate for each party how probable it is that you will ever vote for that party?

In the survey, the respondent is provided with the list of parties in the respective polity with a scale ranging from 0 to 10, where 0 means "Will certainly never vote for this party" and 10 means "Will certainly vote for this party at some time". The resulting scores constitute a 'propensity to vote' (PTV) measure, which is believed to perform well as a measure of voters' preferences in terms of face and construct validity as well as its added value by gaining further information about voters preferences as a distinct feature from their actual vote choice (Tillie, 1994; Pardos-Prado and Dinas, 2010). Therefore, this approach distinguishes between the vote choice and the preferences.

From these survey questions, a single summarizing indicator needs to be extracted that would allow individuals to differ with respect to the strength of preference for one party as compared to all other parties. One way to allow this gap to be manifested empirically is to compare people's first party preference with their second most preferred party. In particular, I measure the PTV's at t - 1 and t. At both time points the difference is calculated between the party that was awarded the highest PTV score and the party that was awarded the second highest PTV score. This gives me two differences measured at two time points.

$$Diff_t = PTV_{1st} - PTV_{2nd} \tag{8.1}$$

and

$$Diff_{t-1} = PTV_{1st} - PTV_{2nd} \tag{8.2}$$

Finally, the difference in differences is calculated by subtracting the difference at t from the difference at t - 1. Figure 8.4 achieves to represent graphically the measurement of PTVs and the calculation of differences between the first and second ranked party in an imaginary situation where three parties compete for voters preferences. Circles demonstrate respondent's answers to the PTV question described above. The difference between the two time points is that the second ranked party 'moved up' a step thereby decreasing the distance between the first and second preference by one point. The main quantity of interest is therefore, what is the effect of EU Profiler on these dynamics between the preferences.

$$t \begin{cases} Party A & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ Party B & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ Party C & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ Party C & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ \\ Party A & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ Party B & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ Party C & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ Party C & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\ \end{array}$$

Figure 8.3: Measuring preferences
This difference in differences approach yields a dependent variable operationalized as:

$$Y = Diff_t - Diff_{t-1} \tag{8.3}$$

From the theoretical point such an operationalization is interesting because it would reveal the extent to which VAAs advice either increases or decreases the distances between the the two highest ranked parties. In other words, it would be possible to judge whether the EU Profiler polarized voters' preferences and thereby reinforced their prior predispositions. On the other hand, it is possible to empirically measure whether the effect was equalizing making it more difficult for a user to distinguish between the parties.

Table 8.2 reports the distribution of this dependent variable. It shows the mean differences between the highest ranked and second ranked party at both time points when the measurement was taken for both, the treatment and the control group. It appears that the mean difference between the two measurements taken increases by 0.12 points with the treatment status. The differences are statistically not significant. Therefore, I conclude that only small but hardly significant effects can be found between the two groups compared on the basis of descriptive statistics.

Before electionsAfter electionsTreatment2.542.66(182)(177)Control2.652.69(204)(205)

Table 8.2: Dependent variable 1 - change in voting preferences

Mean differences between the 1st and 2nd ranked PTV

Vote choice

The operationalization of the vote choice is straightforward and it was already used in a similar way in the previous chapter. Namely, the change in vote choice measures the difference in vote intention before elections and the reported vote choice after elections. Both measurements rely on self-assessments. The variable takes a value 1 in the case the vote intention does not equal actual vote choice and 0 in the event when vote intention is equivalent to the reported vote choice. The aim is to explain those who switch their vote choice between the two measurements. Tabel 8.3 demonstrates the distribution of the second outcome of interest. The findings show, that the frequency of those switching their vote choice between two measurements is about 6.8 per cent higher in the treatment group than in the control group. As far as the descriptive statistics are concerned, being exposed to the EU Profiler seems to indeed affect an individual vote choice by a small

	Switch vote choice	Do not switch vote choice	Total
Treatment	60	126	186
	32.3%	67.7%	100.0%
Control	53	155	208
	25.5%	74.5%	100.0%

Table 8.3: Dependent variable 2 - change in vote choice

margin. However, the finding is not statistically significant.

Turnout

Similarly to vote choice, the operationalization of individual level turnout is simple. It is the difference in the intention to participate in the forthcoming European Parliament elections on June 7 as measured in the pre-treatment survey at t - 1 and the reported turnout as measured in the post-treatment survey at t. The variable measures the EU Profiler's capacity to mobilize those who intend to abstain from the elections but subsequently still vote. Therefore, it is coded 1 in the case when respondent aims to abstain from the elections at t - 1, but participates in elections at t. The variable is coded 0 for those to whom the intention to participate was equivalent to the reported behavior after elections (that is, planned to vote and voted, and correspondingly, did not plan to vote and did not vote). There were few participants who intended to vote, but subsequently did not. These 'demobilized' voters where coded as missing⁴.

Tabel 8.4 shows that the amount of mobilized voters, i.e., those who did not plan to participate in elections but actually did so is 3.5 per cent higher than in the control group. Again, the difference does not exceed the necessary threshold of statistical significance.

	Mobilized	Turned out	Total
	to vote	as planned	
Treatment	22	145	167
	13.2%	86.8%	100.0%
Control	18	168	186
	9.7%	90.3%	100.0%

Table 8.4: Voter's mobilization by treatment status

In sum, the distribution of the main outcomes of interest demonstrate small effects of treatment, but due to the wide confidence intervals it is impossible to know whether the treatment status indeed affected the outcome or did it appear due to the sheer randomness of the world. In fact, these effects may well be subject to heterogeneity that are not accounted for by descriptive statistics employed so far. Namely, theory

⁴When including the 'demobilized' to the reference group, the estimation results remained undistinguishable from those presented in this analysis.

suspects that the effect of VAAs should not be equal for the young and the old, more or less educated. Therefore, age, education and other characteristics might play a role in

8.6 Independent variables

tapping the effect of the EU Profiler usage.

The first and foremost important predictor of any of the three outcomes is clearly the treatment status of the respondents. I code the treatment status 1 for those respondents who were assigned to treatment (i.e., those who received an e-mail with an invitation letter to use the EU Profiler) and o for those who did not (i.e., control group). Here, I remain deliberately agnostic about whether the respondent actually took the treatment. Issues that arise from the non-random compliance with the treatment will be addressed in the subsequent sections of this chapter.

Next, in order to accommodate the first hypothesis I include a variable *Young* that is coded 1 for those between 18 and 30 years of age and 0 for those over 30 years of age. *Young x treatment* is an interaction term between the two. Education is a running variable with 8 categories from elementary to high school degree.

In order to test the second hypothesis I include *issue voter* that is constructed upon the following survey question: "People give different reasons for why they vote for one party rather than another? Which of the following best describes your reasons how to vote in 2009 European Parliamentary Elections?" The answer categories include "The party had the best policies", "The party had the best leader", "I really preferred another party but it stood no chance of winning the elections", "I always voted for that party". The variable is coded 1 if the respondent chose the first category (indicating that she votes for the party that has the best policies) and o otherwise.

Other controls

Beyond the main variables of interest I also control for partisanship by including a variable *partisan* coded 1 for respondents who feel very or fairly close to a particular party and o for those who consider themselves to be merely sympathizers.

Two variables capture one's openness to electoral competition as operationalized in the previous chapter. In particular, I code the variable *multiple preferences* taking a value 1 for respondents who award two or more parties a high PTV score (8 through 10) and any other parties medium or low PTV scores; and o otherwise. This is the group that is subject to electoral competition. Conversely, I code a variable *one preference* taking a value 1 for those respondents, who award only one party a high PTV score (8 through 10), none a medium score (5 through 7), and multiple parties a low PTV score; and o otherwise. They are referred to as those being *beyond electoral competition*. Intermediate forms of electoral competition serve as a reference category.

8.7 Conditional effects of EU Profiler usage

Before estimating the treatment effects of the EU Profiler usage one important problem needs to be fully acknowledged. Namely, it is difficult to imagine that the EU Profiler (or any other treatment for that matter) homogeneously affects the entire sample of interest. It may well be, that the treatment effects differ according to voters' socio-demographic and attitudinal characteristics. In fact, previous chapters have demonstrated that as long as the VAAs are concerned some groups of users are much likely to become VAA users than others. By the same token, the effect of the vote advice may also vary along the same lines of socio-demographics. Therefore, it is reasonable to expect that a set of conditions may have to be met before an online vote advice can exercise an influence on the outcome of interest. The conditional hypothesis, such as "an increase in X is associated with an increase in Y when condition Z is met, but not otherwise" (Brambor et al., 2006, pp. 64) seems to be particularly plausible in investigating the effects of the EU Profiler. Moreover, the nature of the proposed hypotheses explicitly demands the presence of such conditionality. For example, the first hypothesis states that young citizens are more likely than the elderly to change their voting preferences and vote choice due to the EU Profiler's vote advice. This conditional effect is empirically captured by interacting the *treatment* variable with the age variable. If this condition is satisfied, then the corresponding interaction term has to come out positive and statistically significant. Therefore, much rather than being interested in the average treatment effect, one should in fact be looking at the conditional effects of treatment.

Imai and Strauss (2010) argue that randomized experiments in the field of political science have excessively relied on reporting overall average treatment effects of each treatment rather than systemically study the variation in treatment effects across sub-populations. Yet, for the present analysis these subpopulations are of particular interest. According to the theory of socialization and political learning one should expect VAA usage to affect young and less educated at much greater rates than the elderly and more educated people. In a similar fashion, issue voters constitute only a subgroup of voters' population. Yet, precisely this group of voters is expected to be affected by the online vote advice. Therefore, in order to avoid these pitfalls, this section investigates associational parameters that identify the subpopulations for which the EU Profiler may potentially exercise heterogenous treatment effects.

In the following, two models will be estimated for each dependent variable operationalized in Section 8.5. The first model has only one predictor - the treatment status. The second model adds interaction terms (in order to identify a subpopulation of interest and to run an initial check that theoretical expectations work in an expected fashion) and a few controls (openness to electoral competition and partisanship). In so doing, two important aspects must be kept in mind.

First, I use interaction terms in order to investigate whether the hypothesized heterogeneity indeed affects the estimation results and whether the theoretical expectations are met. Therefore, the aim is to detect associational relationships between the treatment status and the response variable conditional on third variables (age, education, issue voting). If found, these conditional effects will be used in the subsequent analysis where the causal mechanism will be isolated. It is for this reason that I refrain from interpreting the findings from the following regression analysis and the included multiplicative interaction terms *per se*, but rather take an interest in their direction and relative size. I further take notice of these conditional settings and employ them in the succeeding causal analysis.

Secondly, as I regress treatment status on the three outcome variables I assume - for the time being - perfect compliance with the treatment. That is, I assume that all those who were assigned to the treatment actually responded to it, irrespectively of whether they actually did so. The models therefore reflect average treatment effects (ATE). In the subsequent sections of this chapter it will become apparent that ATE yields biased estimates with regard to the sample bias. This bias is an inherent component of field experiments, because the compliance is not perfect - this is also the case in the current study. However, for the purposes of demonstrating conditional effects on the outcome it suffices to stay with ATE for the moment.

Estimation issues

The first response variable - *voting preferences* is a continuous variable, the latter two *vote choice* and *turnout* are coded as binary outcomes. Therefore, the first model is estimated by means of ordinary least squares, whereas for the latter two I use a probit model. For the first model I report OLS coefficients, whereas for two latter probit models I report average marginal effects. They show the average of the variation induced in the probability of interest by a marginal change in an independent variable for each individual in the sample (Baum, 2006) and are interpreted in a similar way to first differences.

For each dependent variable I first regress only treatment status ATE (a binary variable indicating whether a respondent was assigned to the treatment group) on the outcome, and then include interaction terms and controls. In so doing, the aim is to demonstrate the sole effect of treatment and compare it to the model where interaction terms and covariates are included.

Findings

Table 8.5 displays the findings from the three models. The first thing to notice is that in all models at least one of the interaction terms included appears significant, whereas the treatment status alone yields significant effects only in the second model. Let us discuss the findings model by model.

	Prefe	Preferences ¹		Choice ²		obilization ³
	Limited	Full	Limited	Full	Limited	Full
ATE	0.07	-0.89	6.78	23.48*	0.18	5.87
	(0.23)	(0.68)	(4.81)	(11.61)	(0.18)	(8.29)
Young		-0.43		3.24		14.96
		(0.37)		(6.45)		(8.50)
Young x Treatment		1.12*		-10.03		-2.73**
		(0.55)		(6.57)		(0.88)
Education		-0.06		3.15*		1.55
		(0.10)		(1.33)		(1.04)
Education x treatme	nt	0.77		-15.88**	**	1.50
		(0.58)		(3.09)		(4.74)
Issue voter		0.16		-11.12**	**	-1.56
		(0.37)		(3.32)		(1.03)
Issue voter x treatme	ent	0.012		27.78**	k	8.31
		(0.55)		(8.48)		(8.02)
Observations	378	291	394	304	353	273
Pseudo R ²	0.01	0.06	0.01	0.08	0.01	0.14
Log likelihood	-843.3	-647.9	-235.0	-161.2	-124.2	-70.24

Table 8.5:	Conditional	effects	of	treatment
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¹ Linear regression model, OLS coefficients; standard errors in parentheses

^{2,3} Probit model, average marginal effects in percentages; standard errors in parentheses Controls not reported (openness to electoral competition and partisanship)

* p < 0.1, ** p < 0.05, *** p < 0.01

First, the full model predicting the change in preferences demonstrates that the effect of treatment is indeed conditional on respondent's age. Namely, I find that *young x treatment* has a positive and a sizable effect in explaining the change in vote preferences. More precisely, the interaction term shows that the advice of the EU Profiler for those under 30 years of age increases the gap between the first and second preferred party. This finding is consistent with theoretical expectations by which VAA advice should be more influential among the young who are in their impressionable years in the process of forming their voting preferences. Therefore, age clearly stands out as a modifying

variable in estimating the effects of EU Profiler usage.

The presence of heterogeneity appears in the second model, too. Here, the model explains the difference in vote choice - a second dependent variable as explicated in Section 8.5. Significant modifying variables include education and issue voting. The probability of changing the vote choice between the two measurements as a consequence of EU Profiler usage seems to be more likely for those who have lower educational attainment and those who base their vote choice on political issues rather than candidates or other motivations. According to theory two parallel mechanisms may be at play in explaining the effect of VAA usage on one's behavior. First account claims that those with fewer resources are affected mostly by the VAA advice. Indeed, lower educational attainment seems to condition higher impact of the EU Profiler vote advice. At the same time and probably by another mechanism, issue voters (as those being more resourceful) seem to be affected at higher rates, too. In sum, I gather that both education and issue voters condition the effect of the treatment on the outcome.

Also notice that for the second model the average treatment effect appears to be large and significant. I refrain from interpreting this effect at this point because, as noted previously, for the time being I assume perfect compliance with the treatment (that is, I assume that all of those who were assigned to the treatment condition also took it). That this is not the case is shown in Table 8.1. Therefore, simple ATE (average treatment effect) yields inconsistent estimates and taking it at face value can be substantially misleading. In the subsequent analysis final estimates will be presented that are cleared of the non-random response to the treatment invitation.

Finally, as regards mobilization, the single most important modifying variable appears to be age. In particular, the effect of treatment seems to be negatively associated with the propensity to vote among those under 30 years of age. This, somewhat counterintuitive, finding will be addressed in the subsequent analysis.

In sum, the analysis of potential heterogeneity influencing the effect of the EU Profiler presented some useful findings. In particular, it was possible to demonstrate how a set of demographic and vote-specific characteristics mediate the effect of the EU Profiler on each of the outcomes of interest. This implies that the following causal analysis should also investigate not only the average treatment effects, but focus on the potential effects across subpopulations. The identification of these subpopulations is based on the analysis presented above. In the next section, I turn to investigating the causal effects of VAA usage and estimate a model that provides consistent and unbiased estimates with regard to the non-perfect compliance with the treatment.

8.8 Causal inference

Before getting into the final analysis, an identification strategy employed in this analysis needs to be explicated. This is a typical experiment with one-sided non-compliance. Not all individuals who received the invitation actually visited the EU-Profiler. Table 8.1 shows the frequencies in EU-Profiler usage according to the treatment assignment condition. A question about whether the individual visited this VAA was included in the post-election wave of the survey. None of the respondents in the control group declared having used the VAA during the campaign. As a further check, none of the email addresses of the EU-Profiler users in Estonia match with any of the email addresses in the control group (this check was possible because the EU Profiler steering committee provided me with access to the Estonian log files). This makes it very likely that noncompliers consisted only of never-takers, i.e., these people who were prompted to visit the application but did not do so. Thus, to estimate the causal effect of EU-Profiler usage on the outcomes of interest, I use treatment assignment as an instrument of actual treatment status. Therefore, I compare the difference in the outcome of interest between those to whom an email was sent and those who did not receive any email to use the EU-Profiler. As intuition would also suggest, that one needs to adjust this outcome by accounting for the fact that not all members of the intention-to-treat group were actually treated. The following section serves to briefly formalize this intuition following the typical potential outcomes framework.

Causal model

Following the logic of Rubin's causal model (Rubin, 1974) and the literature on causal inference in statistical analysis (Rosenbaum, 1984; Holland, 1986; Angrist et al., 1996; Morgan and Winship, 2007; Angrist and Pischke, 2009)⁵ I code a binary variable D_i taking the value 1 for respondents who used the EU Profiler and o for those who did not use it. D_i is referred to as a *treatment indicator*. Two potential outcomes under control and treatment conditions are defined respectively as $Y_i(0)$ and $Y_i(1)$, that is, the difference in the propensity to vote measures between the two surveys (or differences in vote choice, or change in the motivation to participate in elections). For each individual the observed causal effect of the EU Profiler is defined as $Y_i = D_i Y_i(1) + (1 - D_i)Y_i(0)$ and the causal effect of of D_i on Y_i is the difference between these two potential outcomes ($Y_i(1) - Y_i(0)$). The identification and the measurement of this effect is logically not possible, because it is impossible to observe the value of $Y_i(1)$ and $Y_i(0)$ on the same unit and, therefore it is impossible to observe the outcome in the absence of the treat-

⁵In the following I closely follow the applied work by Kern and Hainmueller (2009), Dinas (2010) and the "The Problem of Causality" seminar notes held by prof. Andrea Ichino at the European University Institute in 2009.

ment (Holland, 1986, pp. 947). That is, for each individual in the current sample who is exposed to the EU Profiler one never gets to observe the difference in PTVs, vote choice or turnout that she would have had in the absence of EU Profiler usage (and vice versa). This is a fundamental problem of causal inference (Holland, 1986). Instead, we are forced to rely on comparisons between different individuals and estimate average treatment effects (Imbens and Angrist, 1994, pp. 467).

In order to obtain a valid estimator for the purposes of the current study a number of options are available. A common expectation is to investigate the effect of treatment by comparing respondents by treatment status, i.e., obtaining an Average Treatment Effect on the Treated (ATT)⁶. In such a case, the treated would be those who actually used the EU Profiler. However, this estimator is not desirable in light of the current experiment, because it would not account for an important obstacle caused by this experimental design, namely selection bias with respect to the treatment.

In particular, among the group that was assigned to the treatment some people actually took it and some did not. Table 8.1 showed that out of 186 respondents who were assigned to take the treatment 97 actually took it. In other words, compliance with the treatment was not perfect. There is every reason to believe that those who took the treatment (compliers) and those who did not (never-takers) are not homogenous at the baseline and differ both in observable and unobservable terms, i.e., the two groups differ in non-ignorable characteristics with respect to the outcome. This implies that focusing only on the compliers (those actually using the EU Profiler) yields bias in the final causal estimates due to unobserved heterogeneity, typically present in self-selection treatment designs⁷. Therefore, the results in the previous section not only captured the effect of the treatment but also the difference between the groups in the pre-treatment situation. This pre-existing difference at the baseline would make it difficult to isolate the causal effect of the EU Profiler. A common solution to this problem is to use an instrumental variable approach and estimate local average treatment effects.

Instrumental variable and LATE

To confront the problem of selection bias an Instrumental Variables (IV) approach will be used, typically employed in similar situations in GOTV and other field experiments, e.g., Green and Shachar (2000). The justification for using the IV is the presence of an endogenous explanatory variable *taking the treatment* (D_i). In order to obtain consistent estimates, an exogenous variable needs to be found that is uncorrelated with the error term and is correlated with the endogenous variable. Following Wooldridge (2009) consider a simple regression model $Y = \beta_0 + \beta_1 X + \varepsilon$, where X and ε are assumed

⁶Usually referred to as a *naive* estimator, i.e., comparison of outcome by treatment status.

⁷Note that this problem would be absent in the event of the perfect compliance, which clearly is not the case given the research design of the current study.

to be correlated: $Cov(X, \varepsilon) \neq 0$. In order to obtain consistent estimators of β_0 and β_1 when X and ε are correlated, an instrument Z is sought that is uncorrelated with ε , i.e., $Cov(Z, \varepsilon) = 0$ and Z is correlated with X, i.e., $Cov(Z, X) \neq 0$ (Wooldridge, 2009, pp. 463). Figure 8.4 illustrates the basic logic of the IV approach where the exogenous instrument Z only has an effect on the outcome Y through the instrumented treatment indicator *D*.



Figure 8.4: The basic logic of IV approach

A good candidate for Z in the current study is a variable indicating treatment assignment. In specifying a binary instrument I code a variable Z taking a value 1 if the respondent was assigned to receive the e-mail invitation to use the EU Profiler, i.e., the treatment (irrespective of whether she actually took it) and o if the respondent was not assigned to receive the treatment. This instrument is exogenous to the outcome and is correlated with the endogenous treatment indicator. More simply, receiving an e-mail causes by no means changes in political preferences other than through the actual use of EU Profiler.

In so doing randomization is achieved since the assignment to the treatment is unconfounded (with respect to both observable and non-observable characteristics) by design (refer to section 8.4 on experimental protocol). Given randomization, assignment to treatment is a valid instrument for the actual treatment. The presence of *never-takers*, i.e., people who will be assigned but will not actually do the VAA, only works against the posited hypothesis, thus making the identification of non-zero effects even more robust to pre-treatment characteristics.

Local Average Treatment Effect

In order to use 'treatment assigned' as an instrument the parameter of interest becomes what is known as a Local Average Treatment Effect (LATE). It differs from the ATE in that it applies to compliers only, hence the specification 'local', i.e., the people who change the treatment status because of a change of the instrument.

$$LATE_{Preferences} = \frac{P(Y=1|Z=1) - P(Y=1|Z=0)}{P(D=1|Z=1) - P(D=1|Z=0)}$$
(8.4)

Notice, that LATE identifies the effect for compliers and accounts for the sample selection bias. Thus, it yields a parameter that captures the effect of treatment without the differences in pre-treatment characteristics.

Normally, in the absence of covariates two-stage least squares estimator (2SLS) is used to identify LATE. Whereas there are no problems related to the first dependent variable (change in PTV differences) that is measured on a continuous basis, the other two (vote choice and mobilization) require further attention. Namely, 2SLS is not an ideal estimator for limited dependent variables, because it assumes a linear function on the outcome. In this particular case, the change in vote choice and mobilization are coded as binary variables, thereby decreasing the efficiency of the 2SLS estimator. Moreover, according to the literature, 2SLS becomes less efficient in identifying LATE unless treatment effects are constant across unit (Abadie, 2003; Kern and Hainmueller, 2009; Morgan and Winship, 2007). In order to overcome the implausible assumption that treatment has the same effect for individuals with the same covariate values (Kern and Hainmueller, 2009) an estimator called Local Average Response Function (LARF) is proposed by Abadie (2003). In a sense, LARF identifies LATE while controlling for covariates in the case of the binary outcome. However, since the 2SLS estimates without covariates successfully approximate both distributional effects and effects on means also for limited dependent variables (Angrist, 2001, pp. 13) 2SLS will be still used for the two dichotomized outcomes. Moreover, because obtaining LARF estimates is computationally demanding and in practical terms remained indistinguishable from 2SLS, I prefer reporting 2SLS estimands.

Identification assumptions

In order to validate the 'treatment assigned' as an instrument to identify LATE it needs to satisfy five assumptions discussed by Angrist and Imbens (1994), Angrist, Imbens and Rubin (1996) and Abadie (2003). These assumptions for the current research are summarized as following.

(1) Stable Unit Treatment Value Assumption (SUTVA)

SUTVA states that potential outcomes and treatments for each person *i* are unrelated to the potential assignments, treatment status and outcomes of other individuals (Angrist et al., 1996, pp. 446). In light of the current experiment: potential outcomes (i.e., changes in preferences, vote choice or turnout) and the chances of using the EU Profiler for each person in the sample are unrelated to the outcomes, chances of receiving the treatment letter and chances of using the EU Profiler.

This assumption could be violated if those who were assigned to receive the treatment 'advertise' EU Profiler by persuading others in the sample to use it, too. As a consequence other respondents in the sample are exposed to the treatment even though they are not assigned. Similarly, it may so happen that people who experience changes in the outcome may influence other respondents to either use the EU Profiler or also change their preferences, vote choice or motivation to participate in elections. It would, however, imply that respondents have a direct personal access to each other and that they are motivated to persuade other respondents.

Although this possibility cannot be refuted empirically, it is quite unlikely that any of these scenarios has actually taken place. It must also be noted that the popularity of EU Profiler in Estonia remained fairly low. The EU Profiler was only used 1,627 times during the period that it was available before European Parliament elections in 2009. Therefore, although disputable, it is highly unlikely that this assumption is violated to the degree that it would disable the identification of LATE.

(2) Random assignment (ignorability)

The assumption of random assignment posits that all units have the same probability of assignment to treatment. As it was explicated in the section of experimental design (refer to Section 8.4) randomization was achieved by means of drawing a random subsample of respondents from the total sample. The subsample constituted 50% of the total sample and was drawn using STATA's 'sample' procedure. This ensured that all individuals that entered the first wave survey had the same probability of receiving assignment to treatment. Therefore, random assignment is achieved by design.

(3) Non-zero average causal effects of Z on D

The probability of treatment must be different in the two assignment groups. It follows that the assignment to treatment must be correlated with the treatment indicator. In order to test for that, I ran the 'first stage' equation of the 2SLS procedure. Regressing 'treatment assignment' on 'treatment taken' yields a large and significant OLS coefficient of 0.5. The bivariate correlation between the two variables is 0.6. Therefore, I conclude that the instrument is correlated with the endogenous variable and thereby the non-zero effects of *Z* on *D* are validated.

(4) Exclusion restriction

The assignment affects the outcome only through the treatment. This assumption cannot be directly tested, because it relates to quantities that are never observed jointly. It is however not difficult to see, how this assumption is satisfied with ease. The treatment assignment in this study is an invitation letter that motivates respondents to use the EU Profiler. It is extremely unlikely that such a letter in its own right would affect respondents to change their voting preferences, vote choice or motivate them to go to polls other than through the use of EU Profiler.

(5) Monotonicity

No one does the opposite of her assignment, no matter what the assignment is. This assumption excludes the possibility of defiers and ensures that there is at least one complier. In the given experiment, this is achieved by design, because the instrument implies usage of the EU Profiler. The only type of 'defiers' are therefore 'never-takers' - these are the people who were assigned to the treatment, but actually failed to respond to it.

8.9 Findings

Given that all the quantities represented in Equation 8.4 are available one can estimate the effect of the EU Profiler on people's vote preferences, vote choice and turnout between the two waves for those who actually responded to the treatment. In other words, the following counterfactual question can be answered: how would the vote preference, vote choice or propensity to turn out for people who visited the EU-Profiler have changed, had they not come into the contact with the EU Profiler?

Causal effect on voting preferences

Table 8.6 displays the findings from three models explaining the causal effect of EU Profiler usage on political preferences. The first model is estimated for the entire sample - one model with LATE being the only predictor and the other model with LATE and the covariates (partisanship, open to electoral competition, beyond electoral competition). Model 2 reports the same model without covariates, but it is estimated only for the young (under 30) and the older users (over 30). Model 3 is the same as Model 2, but also controls for covariates. The purpose of this sequence of models is to show how treatment becomes sizable and significant for those under 30 years of age (irrespective of whether one controls for covariates or not).

Why is the model broken down by age? According to Section 8.7 age was a mediating variable of VAA's treatment effect. In other words, the previous conditional model suggested that if the LATE estimand on the overall sample will not produce marked effects, then age related heterogeneity might reveal effects in some of the age-specific subsamples. As there is no consensus in the literature at which age in the life-cycle the learning ability increases or decreases (Delli Carpini, 1989), the cut-off point at age 30 was determined empirically (by fitting the model on various age subsets of the sample).

	Model 1		Mod	el 2	Model 3	
	Full sample	Full sample	Under 30	Over 30	Under 30	Over 30
	Limited	Full	Limited	Limited	Full	Full
LATE	0.13	0.41	1.14^{*}	-0.95	1.52*	-0.73
	(0.44)	(0.55)	(0.58)	(0.70)	(0.77)	(0.87)
Constant	0.07	0.12	-0.16	0.32	-0.19	0.31
	(0.16)	(0.26)	(0.22)	(0.24)	(0.41)	(0.36)
Observations	378	297	176	200	132	163
Pseudo R^2	_	0.04	_	_	0.03	0.02

Table 8.6: Local average treatment effect on voting preferences

Dependent variable - change in voting preferences

Model 1 - without and with covariates, estimated for the entire sample

Model 2 - without covariates, estimated for those under and over 30

Model 3 - with covariates, estimated for those under and over 30

All models report 2SLS coefficients

* p < 0.1, ** p < 0.05, *** p < 0.01

Findings reveal the important conditional role of age on the direction and the magnitude of the EU-Profiler's vote advice on people's party preferences. The EU-Profiler seems to have exerted a clear reinforcing effect among the young and no effect among the old. Indeed, the results show that the LATE estimand that was small and insignificant for the entire population (Model 1) becomes sizable and gains significance at 0.1 level for the population aged under 30. More specifically, EU Profiler usage increases the differences between the highest and the second highest ranked party by 1.1 points on a 10 point scale (Model 2). Furthermore, when controlling for covariates the gap increases as far as to 1.5 points (Model 3). Conversely the effect for those above 30 years of age is negative, the magnitude is clearly smaller and the level of uncertainty associated with this estimate is much higher. The effect for them is therefore rather absent, however I would retain the possibility that it is an artifact of a small sample. Especially, because the coefficients are still sizable and the effect is consistent with theoretical expectations, i.e., the effect is opposite to the younger population. I also estimated a model with LARF estimates in order to relax the treatment homogeneity assumption (refer to Section 8.8). The effect remained markedly robust and in practical terms did not differ much from the results reported here.

Furthermore, in order to graphically illustrate the effect of age as a mediating variable I predicted probabilities (from the full model) of the dynamics between the 1st and the 2nd preferred party. Subsequently, I fitted a linear prediction line on the predicted values and plotted it over age. Figure 8.5 displays the results.



Figure 8.5: Effect on preferences conditional on age

In sum, I find that the VAA effects are consistent with the theory. When it comes to partisan preferences, the VAA advice is more influential among the young than the old. I turn to the substantive implications of this finding in the final discussion.

Causal effect on vote choice

The second outcome of interest is the effect of the EU Profiler on vote choice. First, recall the conditional effects of VAA usage on vote choice from Section 8.7. It revealed that education and issue voting were the two variables mediating the effect of the EU Profiler's advice. It seemed that the chances of switching the vote choice from the previously intended one was higher for those with lower education and for issue voters.

Table 8.7 reports the findings and first divides the sample by education. Again, as it was established with regard to political preferences, the local average effect of treatment for the entire sample is very small and statistically not significant (Model 1 in Table 8.7). However, when the model is broken down by the level of education, Models 2 and 3 show that LATE becomes sizable and significant for those for whom the secondary education is the highest level they have ever reached. In particular, it seems that respondents with lower levels of education are more influenced by the vote advice, whereas for those who have a higher educational attainment the effect is close to zero. The 2SLS linear approximation predicting the binary outcome shows that the EU Profiler usage for less educated compliers yields a 39 per cent higher probability of changing the vote choice between the two measurements than in the control group. Conversely, the effect is indistinguishable from o for those with higher educational attainment. Also note, that when adding covariates the effect rises as much as to 50 percent. By all standards, these are sizable effects that are far from negligible.

From this finding I gather that the effect of the EU Profiler on vote choice affects mostly those with lower levels of education and leaves those with higher levels of education untouched. This finding is perfectly consistent with the theoretical expectations and Converse's learning resistance phenomenon (Converse, 1969).

	Model 1		Model 2		Model 3	
	Full sample	Full sample	Higher	Secondary	Higher	Secondary
	Limited	Full	Limited	Limited	Full	Full
LATE	0.13	0.15	0.06	0.39*	0.05	0.50^{*}
	(0.09)	(0.10)	(0.10)	(0.19)	(0.11)	(0.25)
Constant	0.25***	0.25***	0.27***	0.22***	0.25***	0.22***
	(0.03)	(0.05)	(0.04)	(0.06)	(0.06)	(0.11)
Observations	394	310	287	101	226	80
Pseudo R^2	_	0.01	—	—	0.03	0.03

	able 8.	.7: Local	average	treatment	effect of	n vote	choice	(mediated b	v education)
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Dependent variable - change in vote choice

Model 1 - without and with covariates, estimated for the entire sample

Model 2 - without covariates, estimated for those with higher and lower level of education

Model 3 - with covariates, estimated for those with higher and lower level of education

All models report 2SLS coefficients

* p < 0.1, ** p < 0.05, *** p < 0.01

Note, however, that education was not the only mediating variable that conditioned the effect of the EU Profiler. Section 8.7 also showed that issue voters are more affected by the external vote advice than other types of voters. In the theory section of this chapter I proposed that the mechanism by which EU Profiler affects issue voters operates on different grounds than that by which it affects the young and the less educated. I theorized that the EU Profiler may appeal to the rationally minded and resourceful issue voters because the VAA is able to cut across political rhetoric and display a pragmatic issue based overview of the given political landscape and one's position in that landscape.

Table 8.8 first reports again the results of the baseline model of local average treatment effects (Model 1) and compares them with the two conditional models estimated for those respondents who consider political issues to be central in their motivations to which party to vote for as opposed to those who consider candidates or other features more important than political issues. Findings from Model 2 and Model 3 show that when receiving the treatment, the probability of changing the vote choice between the two measurements increases by 28 per cent for issue voters, and its is close to zero for other types of voters. When including the covariates, the 2SLS linear approximation yields a LATE estimand of 0.34, which translates into a 34 percent increase in probabilities when being an issue voter.

	Model 1		Model 2		Model 3	
	Full sample	Full sample	Issue voters	Other types	Issue voters	Other types
	Limited	Full	Limited	Limited	Full	Full
Late	0.13	0.15	0.28^{*}	-0.03	0.34^{*}	-0.11
	(0.09)	(0.10)	(0.12)	(0.13)	(0.13)	(0.16)
Constant	0.25***	0.25***	0.21***	0.30***	0.17*	0.35***
	(0.03)	(0.04)	(0.01)	(0.05)	(0.07)	(0.07)
Observations	394	310	198	195	167	143
Pseudo R ²	_	0.01	_	_	_	0.02

Table 8.8: Local average treatment effect on vote choice (mediated by issue voting)

Dependent variable - change in vote choice

Model 1 - without and with covariates, estimated for the entire sample

Model 2 - without covariates, estimated for issue voters and others

Model 3 - with covariates, estimated for issue voters and others

All models report 2SLS coefficients

* p < 0.1, ** p < 0.05, *** p < 0.01

In sum, my results clearly show that the EU Profiler has a substantial effect on users' vote choice, but the effect remains conditional on those who prefer issues in their political judgements rather than other motives. Therefore, similarly to the previous ones, the model demonstrates the heterogeneous nature of the EU Profiler vote advice impact across various types of voters. Taken together, education and issue voting form a basis of the two separate mechanisms by which the EU Profiler influences its users. These mechanisms will be discussed in detail in subsequent sections of this chapter.

Causal effect on mobilization

Finally, the question of whether the EU Profiler influences the most tangible feature of individual level political behavior - voting in elections - will be addressed. The question here, is whether using the EU Profiler made any difference with respect to those people who initially did not plan to vote, but eventually still voted.

First, Model 1 in Table 8.9 reports the baseline model with no conditional effects across subpopulations. It shows that the treatment has a small effect on the mobilization for the entire sample (significant at 0.1 level). In fact, this is the only effect that appears affecting the entire sample homogeneously (recall that neither of the previous outcomes of interest where affected on the level of the entire sample). However, Section 8.7 showed that as far as the EU Profiler's mobilizing capacity is concerned the effect is also conditional on respondents' age. Therefore, when further scrutinizing the model and estimating it for those under and over 30 years of age, it appears that those being affected by the treatment are those who are older than 30. In particular, the chances of voting if a person had not plans to participate in elections are about one fifth higher

among the treated.

The following section jointly discusses the findings and embeds them in a wider theoretical context.

	Model 1		Model 2		Model 3	
	Full sample	Full sample	Under 30	Over 30	Under 30	Over 30
	Limited	Full	Limited	Limited	Full	Full
Late	0.07	0.13*	0.06	0.08	0.04	0.20*
	(0.06)	(0.06)	(0.09)	(0.09)	(0.10)	(0.09)
Constant	0.10***	0.08*	0.11***	0.08***	0.10	0.06
	(0.02)	(0.03)	(0.04)	(0.03)	(0.06)	(0.04)
Observations	353	279	157	194	119	158
Pseudo R^2		0.01	—	_	0.06	_

Table 8.9: Local average treatment effects on mobilization

Dependent variable - mobilization

Model 1 - without and with covariates, estimated for the entire sample

Model 2 - without covariates, estimated for those under and over 30

Model 3 - with covariates, estimated for those under and over 30

All models report 2SLS coefficients

* p < 0.1, ** p < 0.05, *** p < 0.01

8.10 Discussion and concluding remarks

What are the main findings to take away from this chapter? Does the usage of the EU Profiler cause any changes in one's political attitudes and behavior? An if yes, under which conditions are these changes likely to occur?

Findings from this experimental study indicate that the EU Profiler indeed has a substantial impact on its users' voting preferences and vote choice and to some extent on mobilization. However, this effect is only observed among certain subgroups of respondents mostly characterized by younger and less educated citizens. It appears that different people have different susceptibility to change. Moreover, one can identify structural patterns by which various socio-demographic groups respond differently to the vote advice. In order to find a plausible theoretical mechanism explaining these observed patterns, let us first summarize the key findings. Table 8.10 shows the empirical findings by the three outcomes of interest - preferences, choice and turnout.

Impact on	Entire sample affected	Subsample affected
Party preferences	No	Under 30
Vote choice	No	Secondary education or less Issue voters
Mobilization	Yes	Over 30

Table 8.10: Summary of EU Profiler's effects on various outcomes

First, with regard to party preferences and vote choice no evidence was found that EU Profiler has an influence on the entire population of respondents. However, given that the general population of VAA users have higher political awareness (and perhaps those who select themselves into the experiment even more so), this null finding is consistent with the theoretical expectations. Recall, however, that the main point of interest was not to investigate the average effects of treatment but to detect subpopulations in which treatment effects could become more or less pronounced. In other words, there was little support to believe that the treatment affects everybody in the sample homogeneously.

That the effect of treatment is highly conditional on one's age and level of education, is clearly depicted in Table 8.10. In particular, the EU Profiler seemed to polarize young voters' preferences by shifting the two highest preferred parties apart from each other, possibly making it easier for young voters to differentiate between political alternatives. Therefore, it is likely that VAAs facilitate political learning and make it clearer for young voters where parties stand and how they differ from each other.

In terms of behavioral measures, further evidence showed that the EU Profiler also had a considerable impact upon the reported vote choice of the respondents. In particular, those with lower levels of education were affected by the EU Profiler's vote advice. More specifically, people who had acquired secondary education or less were more likely to change their initial vote choice as a consequence of EU Profiler usage than those who were in the control group.

When looking at preferences and vote choice together, the findings seem to confirm the first hypothesis. Indeed, it appears that the EU Profiler vote advice influences mostly a certain socio-demographic group of respondents - the young and the less educated. This finding is consistent with theoretical expectations by which people in their impressionable years are more likely to change their attitudes according to external information. Converse's resistance phenomenon (Converse, 1969) appears to be confirmed by the evidence of this experiment. Moreover, when investigating the effects of EU Profiler usage on vote choice, it was precisely educational attainment that was mediating its effect. The effect was particularly high for those with secondary education and less and almost absent for those with higher educational attainment. This finding feeds directly into the previous discussion which argues that higher age and education brings about immunity toward the VAA advice.

A second important finding is that VAAs impact appears to be mediated also by issue voting. It appears that the vote choice of those respondents who consider political issues rather than candidates or other aspects in their vote decision is more likely to be influenced by VAAs. However, the basic mechanism by which the treatment affects issue voters and those being younger and less educated hint at two different causal processes. The first one indicates that the effect is conditioned by political awareness and has to do something with political learning. I.e., the lower the political interest, the higher the impact. The other mechanism, by which issue voters are affected by the vote advice, demonstrates completely different, and perhaps an even orthogonal mechanism to the first one. Namely, the higher the political interest, the higher the impact. These empirical findings constitute a foundation of a broader causal mechanism that seems to be at play in VAA related impact patterns.

With respect to mobilization, I found a small effect of treatment on the entire population. More importantly, however, the conditional model revealed that this effect is almost entirely driven by those over 30 years of age. This finding is not entirely consistent with my theoretical expectations by which the EU Profiler should primarily have an impact among the young users in their formative years. It suggests that not all of the potential outcomes that can be affected by EU Profiler can be effectively explained within the theoretical framework employed here. It is for this reason, that the effect on mobilization will not be included to the subsequent elaboration of the causal mechanism.

A Causal Mechanism

VAA users, on average, possess higher political interest and awareness than the general electorate (refer to Chapter 3). By the same token, they also hold firm political preferences and are likely to ignore the vote advice provided by the EU Profiler. The mechanism by which VAAs should have little influence on their attitudes and behavior is essentially the same than that of the Zaller's RAS model (Zaller, 1992). Namely, users with high levels of political awareness are motivated to use VAAs, but at the same time they are resistant to its advice, because they already have acquired crystallized political preferences and they are certain about their future political behavior. In other words, the propensity of their attitudinal and behavioral change is very low. At the same time, voters who have low levels of political awareness take hardly any interest in VAAs, but if they do, they tend to be more influenced by the application. It may happen so mostly because the advice is presented in a simple and attractive way that drives politically unengaged citizens to think about politics. However, the mechanism by which low interest voters may change their attitudes lies in the fact that these attitudes are not crystallized to begin with. In other words, for the latter group the baseline susceptibility for attitudinal and behavioral change is much higher than among those with high political awareness. If so, then these baseline differences that determine the individual level propensity to accept incoming political messages becomes crucial in understanding what conditions people's responsiveness to the VAA advice. It seems that the first causal pattern by which VAAs influence their users manifests itself in the following mechanism.

Mechanism 1: The likelihood of attitudinal and behavioral change as a consequence of VAA usage is an inverse function of an increasing political interest and awareness (approximated by age and education).

Indeed, using age and education as proxies to Zaller's political awareness measure.⁸ this mechanism can be justified on theoretical grounds, too. For example, imagine a latent observed variable that captures one's political interest, political awareness, political sophistication, political engagement, civic skills, etc. That this latent dimension is explained (and by implication can be approximated) by age and education is showed by literature on political learning and life cycle effects. Furthermore, the same literature offers many accounts that allow linking age and education with both preferences formation and attitudinal crystallization. The basic expectation is that one's openness to political learning and thereby likelihood of attitudinal change is decreasing over the life cycle (Converse, 1969; Stoker and Jennings, 2008). That is, age appears as a principal mediator in the probability that a given stimulus (VAA advice, for example) will cause change to people's prior attitudes (Glenn, 2005; Achen, 1992). Moreover, Dinas (2010) has demonstrated that college experience can substantially affect one's initial political views. By implication, education operates in a similar fashion as age in mediating the effect of external influences to one's political attitudes and behavior.

This mechanism would also enable us to conceptualize VAAs as information shortcuts to those with low political information. That is, the main motivation for this group of people is to use VAAs in order to lower the costs associated with gathering, analyzing and evaluating information relevant for political decision making. Therefore, for them the expected utility arising from the VAA usage is also higher, which is inevitably reflected in higher probability of attitudinal and behavioral change.

However, findings of this experiment demonstrate that there are multiple causal process at play by which VAAs may influence their users. Issue voters, in particular, appeared to be changing their vote choice on the basis of the vote advice. Yet, issue voters have the same characteristics than typical VAA users in that they score high on political awareness and participation. If the first mechanism holds more universally (i.e., also for issue voters), then the impact on issue voters should be weaker by definition. I suspect that issue voters are affected by the EU Profiler because their baseline propensity to be influenced by whatever external influence is much higher than among other types

⁸Recall, that the sample of this study varied very little in terms of political interest and awareness.

of voters. That is, they display extremely high political interest and political awareness and that is precisely what makes them more likely to respond to the vote advice. It appears that the first mechanism is constrained by a certain threshold, which indicates the presence of a second causal mechanism of potential effects of VAA advice.

Mechanism 2: If political interest increases to the extent that a voter starts considering political issues in her voting behavior the likelihood of attitudinal and behavioral change as a consequence of VAA advice is likely to increase.

These two empirically found mechanisms are consistent with theoretical expectations and will be further elaborated in the concluding chapter of this thesis.

On external and internal validity of the experiment

Randomized experiments offer sufficient internal validity because the treatment is randomized and its effects, if appropriately accounted for, unconfounded. In this chapter a set of analytical techniques were employed in order to control for the biases in sampling procedures, as well as the conditional effects of the treatment. There is little doubt that this experiment meets the standards of internal validity.

However, external validity - the likelihood that the findings of this study can be confirmed by replication by another study or extrapolated to a representative sample require further attention. As it was mentioned, the sample recruitment strategy that was employed by this experiment yields a biased sample with regard to several observables (selection of universities, availability of mailing lists, self-selection of respondents to either of the surveys). Ideally, a random sampling strategy with traditional survey methods would have been used in order to avoid any biases based on self-selection. However, this is difficult to achieve by cost-efficient means that were available for this study. The alternative strategy was to recruit the sample of people from a universe of people who are homogenous to some extent, and easily accessible (i.e., university students through e-mails or mailing lists). For the reasons of feasibility, the latter option was chosen.

University students, by definition have a higher educational attainment, higher levels of political knowledge and activity than any random representative sample. Theory on public opinion and preference formation, for example (Zaller, 1992), posits that higher levels of education and political activity expose people more likely to various messages, but at the same time reduce the likelihood that these messages will be ever taken into account. If so, then university students should be more resistant to external influence (this effect should be even stronger among those selecting themselves to the survey) than any random population. Subsequently, the null hypotheses will expect no impact of the VAA usage. However, a rivaling explanation can be derived from the premise that age is a mediating variable distinguishing those with established political preferences and those in their formative years. Previous chapters found that younger voters are more available to electoral competition than their elderly counterparts. They are more likely to consider multiple parties as viable alternatives for whom to vote than the old. If so, university students are more likely to be influenced by an external vote advice.

Considering these two rivaling hypotheses that may hinder external validity of this experiment, I would still maintain that even if the findings cannot be generalized over a representative sample, they still serve as conservative estimates of what would have been found on a random representative sample.

All things considered, this experiment here offered an approach to use causal analysis in studying the effects of VAA usage - a technique that has not yet gained much attention in the field of VAA research. Whether or not these processes are at play in a larger representative sample remains a question to be answered in the future.

8.11 Summary

This chapter addressed the fundamental question of VAA research: what are the causal effects of VAA usage on political preferences, vote choice and individual level turnout? In so doing, the chapter introduced a field experiment that was specifically designed for the purposes of this research question. The experiment was carried out during the European Parliament elections in June 2009 in Estonia. By cost-efficient means, the experiment reached a a sample of around 400 respondents. An invitation letter to use the EU Profiler was sent to the randomly split half of the sample - the treatment group - between the two surveys that took place before and after the elections.

In estimating the results, this research relied on Rubin's causal model and employed the literature on causal inference and counterfactual analysis (Rubin, 1974; Holland, 1986; Rosenbaum, 1984; Angrist and Pischke, 2009; Angrist et al., 1996; Morgan and Winship, 2007). The results showed that the causal effects of EU Profiler usage were identifiable and that they were far from negligible. In all instances - preference, choice and turnout - effects were found. However, all effects appeared in a conditional setting mediated by other variables. Consistent with theoretical expectations, it was shown that age and education mediated the effect of the EU Profiler's vote advice. Similarly, the effects appears to be stronger on issue voters.

In sum, this chapter showed two parallel mechanisms by which VAAs can influence their users. First, according to the literature on political learning and life cycle effects, VAAs have a greater impact on the young and less educated. Second, VAAs appeal more to issue voters.

It is also important to notice that EU Profiler mobilized older voters to participate in elections. However, as this finding was not entirely consistent with the theoretical expectations of this chapter, the full account of the underlying causal mechanism has to be addressed in future research. Field experiments are a way forward in this respect, allowing researchers to move beyond observational studies and establish causal relationships between VAA usage and subsequent changes in behavior. Feasibility of such experiments served as one of the principal motivations for this chapter.

Part IV

Conclusion and Summary

Chapter 9

Conclusion

VAA research is a new field in academic scholarship. Although early VAAs emerged already in the nineties (Ruusuvirta and Rosema, 2009), the corresponding scholarly interest was considerably delayed. First descriptive studies on the VAA users and the usage effects appeared only in the middle of 2000s (Boogers, 2006; Marschall, 2005). The broader academic interest toward VAAs, however, has its roots in 2007 when the first conference of VAA research brought together scholars in Antwerp, Belgium.

The delayed scholarly interest toward VAAs may have happened because at the outset VAAs were considered as digital toys with no particular affinity of influencing voting behavior of their users (Ladner et al., 2008). However, as the first descriptive reports started to appear, evidence was found that VAAs also exercise an impact on individual level voting behavior. Scholars soon started to understand that due to the large user base in several European countries, VAAs can potentially affect aggregate election outcomes or at least substantially influence individual level voting behavior. From here, it was a matter of little time for the corresponding scholarly interest to emerge. And perhaps to some surprise, more sophisticated analyses than simple descriptions confirmed that these 'toys' indeed affect political behavior of their users.

In virtually all aspects of political behavior - voting preferences, vote choice, split ticket voting, civic education, electoral turnout, etc - VAAs seemed to exercise an influence on their users. The effects however, seemed to be highly dependent on the analytical method employed and varied considerably between countries. Soon however, scholars started to understand that the reliability of these reports may be questionable. Namely, most of the studies were not comparative in nature, they mostly relied on observational data, self-reported survey measures and rarely went beyond the descriptive statistics. Inferential limitations that were inherent to the type of data that VAA research worked with, were considerable.

The principal motivation for this thesis was twofold. First, the goal was to systematically investigate both, the patterns of VAA usage and the corresponding effects on

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attitudes and behavior. Secondly, however, the goal was to remedy inferential problems by using better data or employ better statistical techniques that help to correct for the shortcomings of the insufficient data quality. Clearly, the former was only possible, because sufficient number of good quality data sources were made available for the time of writing this thesis.

Accordingly, I first set out to describe the population of interest - the VAA users. By using a large N comparative survey of European Election Study my primary goal was to shed light on the patterns which make people more likely to use these internet applications and clarify the plausible mechanisms leading to usage. In so doing I refrained from the analysis of single countries (the Netherlands, Switzerland, Finland, Estonia, for example) for which the data were available, too. Rather, my goal was to explain the VAA usage patterns comparatively.

Having understood what makes people use VAAs, my second question was to address the effects of VAA usage. In so doing, I focused on a single country analysis. The decision to move away from a comparative perspective to a single country analysis was a pragmatic one. Only for this particular country - namely, Switzerland - panel data were available that enabled me to investigate the causes of Smartvote usage on vote choice. Here, I made a clear decision to avoid datasets that have used direct measures on voting behavior. Although interesting in its own right, the Swiss study contained too much uncertainty with regard to the causal mechanisms at play. The data simply did not allow to control for counterfactual scenarios. In order to achieve this I further set up a randomized field experiment in Estonia and proceeded with the causal analysis. The next section recaps the key findings of this study.

9.1 Key findings

Given the general setup of this study the findings may appear scattered across empirical chapters of this thesis. The first chapters address the patterns of usage, whereas the latter ones focus on impact. In the following, I first pool the key findings together and then propose a unified model of VAA usage and impact.

VAA usage as a two-step process

In exploring the patterns of VAA usage the analysis started by exploring the 2009 European Election Study. This large N comparative survey was the first in its kind to ask a question about VAA usage across 27 European member states. The analysis departed from a theoretical expectation that VAA usage is first and foremost explained by a single latent dimension consisting of a few socio-demographic characteristics, such as age, education and socio-economic status.

Simple descriptive statistics and the subsequent multivariate analysis indeed showed that VAA users tend to be slightly younger people with higher levels of education. They also come from urban areas and belong to a slightly higher social class than the nonusers. In other words, VAA usage appeared to be structurally explained by this baseline model, but at the same time the model failed to distinguish VAA users from the general population of internet users. In other words, the model was insufficiently specified with respect to the unique characteristics of VAA users. It is not difficult to explain why it happened. Literature on the digital divide has clearly demonstrated that notwithstanding the overall spread of the internet usage, marked differences remain between those who use the internet and those who do not (Mossberger et al., 2003). These differences are largely accounted for not by attitudinal or behavioral differences between users and non-users, but rather by socio-demographical characteristics (Norris, 2001; Mossberger et al., 2003). It appears to be a simple fact that internet users are distinguished from the rest by their lower age, higher education and higher socio-economic status (Katz and Rice, 2002).

Therefore, in order to uniquely identify VAA users, I turned to theories of online political participation. After all, VAA usage is first and foremost participating in politics online. Theories suggest that online political behavior is explained by political interest, activity and general political awareness (Robinson et al., 2003; Wilhelm, 2000; Bimber, 2003). Consequently, I introduced political activity, openness to electoral competition and higher attention to political issues - as qualities uniquely associated with VAA usage and less so with general internet usage. In so doing, I extended the baseline model of VAA usage by these characteristics and theorized that VAA usage, in fact, consists of two stages. In the first stage a few socio-demographic variables determine whether somebody is likely to use the internet and by implication could potentially also use VAAs. More specifically, the first stage of VAA usage is recapped by the following mechanism.

Step 1: VAA users are similar to internet users as long as the baseline sociodemographic characteristics are concerned, i.e., age, education, gender, social class and place of residence.

Notice that the first step only identifies the sample from which VAA users are likely to be drawn. However, the potential of VAA usage is only realized if a person also displays some unique characteristics on top of this baseline model - namely, political interest, openness to electoral competition and attention to political issues.

Step 2: All other things being equal at the baseline, VAA users are uniquely identified by their higher levels of political activity, openness to electoral competition and higher attention to political issues.

Indeed, further analysis showed that VAA users exhibit greater political interest and sophistication. With regard to their political preferences VAA users have multiple party preferences and they are certainly less tied to one particular party than non-users. As for the behavioral variables are concerned VAA users are politically much more active than the non-users and on average there are more voters among the VAA users than among non-users. Moreover, modeling the two step process of VAA usage with the help of the Heckman selection model I established that the theorized two step model is indeed strongly associated with internet usage, but the fine-grained differences between VAA users and internet users are based precisely on measures of political activity.

In order to extend the discussion with respect to the impact of VAA usage, I suggested to simplify the two step model of VAA usage even further. In particular, imagine that three unique characteristics of the VAA usage - political activity, openness to electoral competition and higher attention to political issues - form a single latent dimension that can be measured and operationalized in some uniform fashion (e.g., in the form of a single factor score predicting one's political activity/awareness). Each individual can be then positioned across this continuum. If so, then the higher values of this latent dimension should bring about higher probabilities of VAA usage (given that the baseline model of internet usage operates as a primary threshold and is held constant). Consequently, the probability of VAA usage occurs among those internet users who score high on this latent 'political activity' score.

The impact of VAA usage

In order to investigate the causal impact of VAA usage on voting preference, vote choice and turnout, I introduced a field experiment that was specifically designed for these purposes. The experiment was carried out during the European Parliament elections in June 2009 in Estonia. The general idea of the experiment was to introduce the EU Profiler as a treatment condition to an evenly and randomly split half of the sample and compare its attitudinal and behavioral dynamics with the control group. Because the compliance with the treatment was not perfect the study relied on Rubin's causal model and employed the literature on causal inference and counterfactual analysis in estimating the effects of treatment (Rubin, 1974; Holland, 1986; Rosenbaum, 1984; Angrist and Pischke, 2009; Angrist et al., 1996; Morgan and Winship, 2007). The results showed that the causal effects of EU Profiler usage were identifiable and that they were far from negligible. In all instances - preference, choice and turnout - effects were found.

However, no effect appeared to be significant on the average, i.e., on the entire sample of respondents. Quite to the contrary, whenever an effect was found, it appeared on a subsample of respondents. In particular, I found that those under the age of 30 and with less than high school education were mostly influenced by the EU Profiler's vote advice. Conversely, older citizens with higher levels of education experienced almost no impact

on their voting preferences or their vote choice.

In order to explain these findings theoretically, I turned to the literature on political learning and life cycle effects. According to these theories, one's openness to attitudinal change is decreasing with age (Converse, 1969; Delli Carpini, 1989; Stoker and Jennings, 2008). As political attitudes crystallize and become more established in one's mind over the life cycle, the chances that any external stimulus has an impact, is gradually decreasing. Not surprisingly, this is exactly what I find. Citizens below the age of 30 are more likely to be open to various political messages and respond to the VAA advice more strongly than those over 30. Similarly, and much for the same reasons, people with less education may not have established their political preferences as of yet and tend to be influenced by the EU Profiler, too.

Taken together, I find that the theories of political learning and life cycle effects strongly predict the impact of the EU Profiler. However, bear in mind that age and education were proposed as proxy measures of political awareness. Namely, I departed from Zaller's RAS model (Zaller, 1992) which uses political awareness as a key predictor of accepting (or actually dismissing) political information that is not congruent with ones prior political predispositions. Since the data at hand did not vary sufficiently in terms of political interest, I proposed using age and education as proxies of political awareness. I assumed that increasing age and education are associated with higher political awareness too. If this assumption holds, then the findings from the experiment suggest that the impact of VAA usage can be summarized by the following mechanism.

The likelihood of attitudinal and behavioral change as a consequence of VAA usage is an inverse function of an increasing political interest and awareness.

That is, if citizens with low levels of political awareness and political interest are exposed to the VAA advice, the chances that they change their attitudes and behavior in line to this advice are higher than for those who score high on the political awareness index. Now, recall the two step model VAA usage, which stated the opposite: the difference between the VAA users and non-users is characterized by the higher levels of political activity among the users. Following the logic of Zaller's RAS model and taking the empirical findings of this research together, one arrives at the building blocks of a unified model of VAA usage and impact.

9.2 A unified model of VAA usage and impact

Given the empirical findings of this study the usage and impact of VAAs are inversely related to each other. How does this mechanism work? Imagine a latent individual level trait that comprises one's political interest, affinity to read political news and being informed about political events, perhaps even participating in those events. If such a latent

dimension can be conceptualized, the findings of this study show that one's probability to use VAAs is positively associated with this latent 'political interest' dimension. In other words, the higher one's political awareness the higher the chances that this person becomes a VAA user (*ceteris paribus* with respect to the general probability of internet usage).

However, while higher political awareness *increases* the likelihood of VAA usage, at the same time it *decreases* the probability of experiencing an impact on voting preferences or vote choice. That is, the lower one's political awareness the higher the chances that she is going to be influenced by the VAAs vote advice. Figure 9.1 conceptually illustrates the basic logic of how the mechanism of VAA usage and impact works.



Figure 9.1: Conceptual model of VAA usage and impact

Essentially, this unified model is based on the basic premise of Zaller's RAS model (Zaller, 1992). It states that individuals who are most likely to be exposed to political messages are at the same time least likely to accept them. Applying Zaller's model in the realm of online political behavior is not new. Vassil and Weber (2011) have demonstrated that precisely the same mechanism is at play in explaining the usage and impact of internet voting. They introduce a concept of political 'peripheralness' and show how citizens who are involved in politics are likely to participate in internet voting, but the chances that they are drawn closer to politics remain low. Mostly because these citizens are already engaged in political life. Conversely, citizens at the political periphery hardly come across internet voting, but if they do, then for the sheer attractiveness of the ICT based voting solution, they feel motivated to participate in elections. The interplay between these two processes, both in internet voting and VAA usage, facilitates the use of new technologies and at the same time explains why new technologies have a moderate impact upon their users at large. However, because impact is still detected at

the individual level, it seems that new technologies have a potential to reach those who are traditionally not interested in politics. Whether simple technologies like VAAs can reach beyond individual level effects and bring about aggregate change at large, remains a question to be answered in the future.

9.3 Sample bias and implications for future research

Along the main findings of this thesis, my second goal was to deal with inferential problems that are inherent in the field of VAA studies. That VAA research suffers from poor data quality is a well known fact. Most of the studies rely on self-reported measures and work with samples that are non-randomly drawn from representative samples. In other words, considerable sample selection biases are present in the field of VAA research. Although the preferable way is to work with representative probability samples or even engage in large N experimental research set ups, it is not always feasible. For example, the Swiss Smartvote project has collected an interesting dataset opening various research avenues for scholars interested in VAA usage effects, but it still operates with the biased sample. The same goes for many other datasets, e.g., Wahl-O-Mat's data from Germany (Marschall, 2005) or the Netherlands (Boogers, 2006). Clearly, this comes of no surprise to anyone dealing with these data. Quite the contrary, many studies recognize that sampling procedures (among other things) impose many constraints toward the inferences made. Yet, no considerable efforts have been made to account for these known shortcomings even if the solution is fairly simple, straightforward and commonly used in political science. It is for these reasons that I have chosen to demonstrate how simple sample selection models can be used in this research and how these techniques considerably improve our analysis.

The basic premise of this approach is to recognize that if the pool of respondents is non-randomly drawn from a larger pool of people, then the mechanism by which people self-select themselves into the research sample may be endogenous with respect to the outcome of interest. For example, the Swiss Smartvote project has collected an impressive number of respondents in three consecutive stages. First, from the entire pool of the Swiss electorate some people became Smartvote users. Second, some of those who happened to use Smartvote responded to researchers' call and answered the first survey. Third, some of those who responded to the first survey also responded to the second one. In each step a selection rule narrows the possibilities that everyone in the preceding sample can enter into the succeeding one, thereby imposing non-random selection into the final sample. In the case of the Swiss Smartvote study, my interest was to investigate its impact on vote choice. However, people who choose to respond to all of these surveys may be structurally different from the probability sample. For example, they may be younger and therefore have more volatile political preferences and subsequently report higher impact of VAA usage. This is a typical situation of the endogeneity that may substantially affect final estimates.

As the analysis of Swiss Smartvote data showed, this was indeed the case. I demonstrated that consistently with prior empirical findings, most notably those of Ladner et al. (2008), the Swiss Smartvote VAA substantially affects individual level vote choice. It seemed that those who received a surprising vote advice were about 17 per cent more likely to switch their vote choice as compared to those who received a non-surprising vote advice. I then assumed that this effect is driven by the sample bias described above and devised a simple and a well-known estimation technique that will account for such a bias. Results showed, that the application of the sample selection model reduced the effects by about four times as compared to those found previously.

In sum, the findings of this study suggest that using two-stage selection models in an applied empirical research in the field of internet studies should be considered seriously. In virtually all studies that deal with some sort of internet applications with a non-random user base, the use of selection models should be a standard, rather than an exception. The only condition for doing so is the knowledge about the likely causes that make people self-select themselves into the samples. Once this is known (or assumed), then the final estimates can be effectively cleared of these biases. Failure to do so yields considerable problems in the naive models. The Swiss Smartvote study showed how these pitfalls can be avoided and how future research can be improved considerably with the help of appropriate techniques.

Appendices

Appendix A

A.1 Correcting the dependent variable

This Appendix provides an overview of the technique that was used to estimate a latent socio-demographic variable that would indicate the individual level probabilities of internet usage. Based on this procedure, the corrected dependent variable was constructed and used throughout the multivariate models of this chapter.

According to the European Social Survey (ESS, wave 4) 58.15% of the respondents use internet either at home or work¹. There is no profound reason to believe that the sample of respondents in European Election Study of 2009 (EES) differs on average from that of the ESS. Provided that this assumption holds, there are about 41.85% of the observations that should be omitted from the reference category of the dependent variable. Which particular observations to omit, remains a question.

In order to decide upon this, I assume that there is an underlying latent sociodemographic dimension that reflects one's probability to use Internet. Theoretically, the probability to use the internet should be higher for the young educated urban citizen than for the elderly less educated person living in the rural areas. If this is true, principal component factor analysis would reveal such a dimension in the data and one could identify the location of each individual along this latent dimension. In order to identify this latent dimension, good indication about the components of that dimension are required.

To achieve this, the internet usage will be predicted on the basis of the ESS 2008 (wave 4) dataset, which includes a variable about internet usage². The dependent variable will be coded 1 in the case of internet usage and o otherwise (the two first categories). Next, the same set of demographic variables will be used that are available in the EES data as independent variables predicting the VAA usage. These variables include age, income, and education. Note, however, that none of the particular variables are not of substantive

¹The amount of internet users in the ESS data comes close to the one reported by Eurostat – the EU 27 mean internet access by households in 2008 was 60 percent (Eurostat, 2009).

²Question A7. How often do you use the internet, the World Wide Web or e-mail - whether at home or at work - for your personal use? Answer categories: No access at home or work, Never use, Less than once a month, Once a month, Several times a month, Once a week, Several times a week, Every day.
interest *per se*, rather it is important to see their performance in explaining the outcome variable, and verify that, indeed, these are the variables that can be subjected to the factor analysis to identify the latent scale described above.

The results of the analysis are presented in Table A.1. The table reports first differences in probabilities multiplied by 100, which demonstrate (in percentages) the probabilities of the change in a dependent variable when moving a particular independent variable from its minimum value to its maximum value.

VARIABLE	Model
Age	-90.51***
0	(0.38)
Income	5.68***
	(0.02)
Education	13.98***
	(0.06)
Constant	-0.44
	(0.30)
Observations	23158
Pseudo R-squared	0.40
Correctly classified	81.92%

Table A.1: Explaining internet usage (first differences)

Robust standard errors clustered by country in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1

The overall goodness of fit of the model appears to be good. First, the pseudo R-squared is 0.40 and the number of correctly classified cases is sufficiently high (81.92%). Second, consider Figure A.1 to evaluate the coherence between the predicted probabilities of internet usage and actual internet usage (both averaged by country clusters). With a few outliers it can be assessed as a good model.



Figure A.1: Model fit evaluation (ESS 2008)

On the basis of this model, the components of the latent dimension reflecting one's probability to use internet can be inferred. In particular, all three variables included to the model had a considerable explanatory power and will be therefore used in factor analysis in order to identify the dimension determining one's probability to use internet.

Principal component factor analysis is a data reduction technique identifying components that are composites of the individual items. On the basis of the previous analysis three variables were used to predict internet usage (age, income, education). Equivalent variables are found in the EES 2009 dataset. Using the principal component factor analysis, on the basis of these three variables I estimate one single factor. The estimated factor has an eigenvalue of 1.42 and an explained variance of 0.47. All variables load highly on the factor: age (-0.48) social class as a proxy to income³ (0.74), education (0.81). The overall Kaiser-Meyer-Olkin measure of sampling adequacy is 0.53.

Based on the estimated factor a scale was constructed reflecting one's probability to use internet. Next, on the basis of that scale the only remaining task is to establish a cut-off point at which the low-probability internet users will be omitted from the subsequent analysis. Since the initial components of the scale were obtained from the ESS 2008 data and the same data demonstrate that 41.85% of the respondents did not use the internet, the same proportion will be assumed to be valid for the EES data.⁴ Therefore, the proportion of low-probability internet users will be cut at 41.85% level.

³Due to the absence of income variable in the EES 2009, social class will be used as a proxy.

⁴As a point of triangulation, notice that this proportion is approximately the same than the aggregate internet penetration reported by the Eurostat study (Eurostat, 2009).

Assessing the reference category

On the basis of the scaling diagnostics from the factor analysis reported above the overall reliability of the scale appears to be satisfactory in order to continue with the subsequent analysis. However, due to the unobserved heterogeneity, this scale is bound to be imperfect, containing some degree of uncertainty. This uncertainty is partly reflected by 324 respondents who actually did use VAAs in the EES sample, but were qualified as internet non-users by the factor analysis. These disqualified respondents exhibit a considerably different socio-demographic profile than that obtained on the basis of the ESS data. Their mean age, educational and social class level is markedly lower than that of those qualified as internet users.

In other words, these 324 respondents are presentable outliers that are neither explained by the model or captured by the factor analysis. How to handle these outliers requires a decision. One option is to force these 324 respondents to appear as 1 on the dependent variable, but in doing so the effect that these residuals alone will exercise on the slope will be remarkable. Therefore, one would need a proportional amount of randomly chosen respondents from the high-probability range of the internet score to balance the influence of these 324 outliers. This procedure will unnecessarily complicate the procedure and still yield uncertain estimates.

Alternatively, it is feasible to omit these 324 respondents and code them as noninternet users, because they were identified as such by the estimated latent scale, which reflects the average pattern. This would be particularly appealing because the primary goal of this research is to find regularities, rather than explain the outliers. In doing so the model will still contain some uncertainty, but the estimates will be consistent with the given assumptions. Therefore, in the subsequent analysis the latter alternative will be used.

The new dependent variable is coded 1 in the case of VAA usage (1 548 respondents) and 0 in the case of non-usage, but only for those who were identified by the factor as potential the internet users in the first place (15 087 respondents instead of 24 861). Those with low probability of internet usage are coded as missing (10 228).

A.2 Survey questions

Nr	Survey question	Coding
	Political sophistication	
	Now some questions about the European Union and (country). For these questions, I am going to read out some statements. For each one, could you please tell me whether you believe they are true or false? If you don't know, just say so and we will skip to the next one.	
Q92:	Switzerland is a member of the EU	1 true, o false
Q93:	The European Union has 25 member states	1 true, o false
Q94:	Every country in the EU elects the same number of representatives to the European Parliament.	1 true, o false
Q95:	Every six months, a different Member State becomes president of the Council of the European Union	1 true, o false
Q96:	The (country) Minister of Education {Appropriate national title will be provided} is {Name of Minister of Education – was provided}	1 true, o false
Q97:	Individuals must be 25 or older to stand as candidates in (country) general elections.	1 true, o false
Q98:	There are {actual number plus 50% - (country specific figures were provided)} members of (country) parliament.	1 true, o false
	Political activity	
	How often did you do any of the following during the three or four weeks before the European election? How often did you:	
Q16:	watch a program about the election on television?	3 often, 2 sometimes, 1 never
Q17:	read about the election in a newspaper? Often, sometimes, or never?	3 often, 2 sometimes, 1 never
Q18:	talk to friends or family about the election?	3 often, 2 sometimes, 1 never
Q19:	attend a public meeting or rally about the election?	3 often, 2 sometimes, 1 never
Q20:	look into a website concerned with the election?	3 often, 2 sometimes, 1 never



A.3 Comparing logit and probit models

Figure A.2: Comparing probit and logit predictions (corrected model)



Figure A.3: Comparing probit and logit predictions (naive model)

A.4 Calculating the effect size

The effect size is calculated by converting the t-value reported by the t-test into the r-value (effect size) using the equation (A.1) proposed by Rosenthal et al. (2000).

$$r = \sqrt{\frac{t^2}{t^2 + df}} \tag{A.1}$$

The size of the effect (r) can be interpreted in a similar fashion to the correlation coefficient where o means there is no effect, and 1 means that there is a perfect effect. However, r is not measured in a linear scale. In the following we consider effect sizes as proposed by Cohen (1969) suggesting what constitutes a large or a small effect: small effect accounts for 1% of the total variance; medium effect accounts for 9% of the variance, large effect accounts for 25% of the variance.

I prefer reporting the effect size over t-statistic due to the fact that even though the t-statistic can be statistically significant, the effect may still be small in practical terms, and therefore the t-statistic may be hard to interpret.

Appendix B

APPENDIX B.

B.1 Sample distribution

Variable name	Frequency	Per cent
Nature of the advice		
Not surprising	931.0	23.6
Rather not surprising	2,210.0	56.0
Rather surprising	697.0	17.7
Very surprising	108.0	2.7
Total	3,946.0	100.0
Electoral competition		
Subject to electoral competition	3,264.0	24.4
Beyond electoral competition	92.0	0.7
Intermediate forms	10,010.0	74.9
Total	13,366.0	100.0
Political left-right		
Left	6,394.0	48.7
Center	3,504.0	26.7
Right	3,227.0	24.6
Total	13,125.0	100.0
Age ¹		
18-30	4,747.0	36.8
31-45	4,440.0	34.4
46-60	2,694.0	20.9
61-87	1,013.0	7.9
Total	12,894.0	100.0
Education		
No education	11.0	0.1
Elementary	123.0	0.9
Secondary	539.0	4.1
Vocational	2,307.0	17.5
College	3,291.0	24.9
University	6,937.0	52.5
Total	13,208.0	100.0
Gender		
Female	4,501.0	33.8
Male	8,809.0	66.2
Total	13,310.0	100.0
Houshold's income in CHF (bruto)		
- 4,000	1,035.0	8.6
4,000-6,000	1,907.0	15.8
6,001-8,000	2,434.0	20.2
8,001-10,000	2,626.0	21.8
10,000 +	4,063.0	33.7
Total	12,065.0	100.0

Table B.1: Descriptive statistics

Appendix C

C.1 Field experiment survey items

Table C.1 provides an overview of the survey items that were used in the first wave of the field experiment. Items marked with an asterisk are those repeated in the second wave of the survey.

Table C.1: Field experiment survey items

Question	Answer categories
A lot of people abstain in elections, while others vote. In the forthcoming European Parliament elections in June 7, which party are you planning to vote for?	Party list provided
How certain are you about which party are you going to vote in European Parliament elections in June 7 2009?	Very certain, Rather certain, Rather uncertain, Not certain at all
Which party did you vote for at the Parliamentary Elections of 2007?	Party list provided
And if there was a general election tomorrow, which party/candidate would you vote for?	Party list provided
Do you think that your vote influences who is in power and how the country is governed?	Yes, Probably yes, Probably no, No, Don't care, Don't know
We have a number of parties in Estonia each of which would like to get your vote. How probable is it that you will ever vote for the following parties? Please specify your views on a scale where o means "not at all probable" and 10 means "very probable"	0 to 10 scale for each of the parties
People give different reasons for why they vote for one party rather than another? Which of the following best describes your reasons how to vote in 2009 European Parliamentary Elections?	The party had the best policies, The party had the best leader, I really preferred another party but it stood no chance of winning the elections, I always voted for that party, Other (open)
Do you consider yourself to be close to any particular party? If so, which party do you feel close to?	Party list provided
Do you feel yourself to be very close to this party, fairly close, or merely a sympathiser?	Very close, Fairly close, Merely a sympathiser
In political matters people talk of "the left" and "the right". What is your position? Please indicate your views using any number on a scale from o to 10, where o means "left" and 10 means "right". Which number best describes your position?	o to 10 scale
And about where would you place the following parties on this scale? Please indicate party position using any number on a scale from 0 to 10, where 0 means "left" and 10 means "right". Which number best describes party's position?	0 to 10 scale for each of the parties

Question	Answer categories
What is the highest level of education you have completed in your education?	Educational level appropriated for Estonian educational system
Gender	Male, female
What year were you born?	Year
What is your current marital status?	Single, living with partner, married, separated, widowed, divorced
What is your current work situation? Are you:	Self-employed, Employed, In school - still in education, Working in the household, Military service, Retired, Unemployed, Other
What is the level of gross monthly income of Your household per month? Add the net incomes of all Your family members and split with the number of Your family members.	Up to 1500 Estonian crowns, 1501-3000 Estonian crowns, 3001 – 5000 Estonian crowns, 5001 – 7000 Estonian crowns, 70001 – 10000 Estonian crowns, More than 10000 Estonian crowns, No answer
If you were asked to choose one of these five names for your social class, which would you say you belong to - the working class, the lower middle class, the middle class, the upper middle class or the upper class?	Working class, Lower middle class, Middle class, Upper middle class, Upper class
Would you say you live in a rural area or village, in a small or middle size town, or in a large town?	Rural area or village, Small or middle-sized town, Suburbs of large town or city, Large town or city
Apart from special occasions such as weddings and funerals, how often	Several times a week, Once a week,

Table C.1 continued

Please provide us with your valid e-mail address. We would like to assure you that this e-mail will be treated confidentially and exclusively within this study. It will not be exposed to any third parties.

do you attend religious services nowadays?

Several times a week, Once a week, At least once a month, A few times a year, Once a year or less, Never Open text field

C.2 Model specification

In order to specify the model estimating the effect of the treatment $D_i = 1$ on the dependent variable $Y_i(1)$ consider the conventional approach to the normal panel data. Essentially, the current experiment is no different from the panel study in which the variables for each individual *i* are collected at time *t* and time t - 1. The presence of the lagged dependent variable Y_{t-1} allows analyzing the changes of *Y* over time, and if this change is associated with treatment D_i , then this can be fairly confidently associated with the causal effect of interest.

In specifying the model I follow (Finkel, 1995) in demonstrating how the normal linear regression model can be transferred and used into the model accounting for changes over time in order to explain the causal link between the treatment and the outcome. As for the first step, consider the normal cross-sectional linear model specified as

$$Y_t = \beta_0 + \beta_1 X_t + \varepsilon_t \tag{C.1}$$

Where Y_t is the outcome of interest and it is predicted from an independent variable X_t , measured at the same point in time as Y_t .

Following (Finkel, 1995, p. 5), it is assumed that the independent variable changes to some extent in the interval between measurements, and that the same causal process between X and Y holds at time t - 1. If so, then subtracting from equation C.2 a similar equation using X, Y, and ϵ at time t - 1 yields the following (Finkel, 1995, p. 5):

$$Y_t - Y_{t-1} = (\beta_{0t} - \beta_{0t-1}) + \beta_1 (X_t - X_{t-1}) + (\epsilon_t - \epsilon_{t-1})$$
(C.2)

or

$$\triangle Y = \triangle \beta_0 + \beta_1 \triangle X + \triangle \epsilon$$

This specification represents the simple regression of the change in *Y* on the change in *X*, and is thus referred to as the unconditional change score approach to panel analysis (also known as the method of first differences). However, although the first difference model can be useful in estimating parameters in these types of misspecified models, it contains on highly restrictive assumption: that the lagged dependent variable Y_{t-1} does not have an influence on either Y_t or $\triangle Y$ (Finkel, 1995, p. 6). To put it differently, this model assumes no influence from the past value of the dependent variable on the present value. For example, it does not account for the possibility that individual preferences in the present can be derived from the earlier preferences in the past. It is needless to say that this assumption will be most certainly violated by in the current study.

In order to overcome this deficiency the lagged dependent variable has to be in-

cluded as one of the predictors of *Y*. This yields what is referred to as the static-score or conditional change panel model (Finkel, 1995, p. 6):

$$Y_t = \beta_0 + \beta_1 X + \beta_2 Y_{t-1} + \epsilon_t \tag{C.3}$$

In this model, Y_t is predicted from its earlier value $Y_t - 1$, from the treatment status X, and from the random error term. As the treatment status X is constant there is no further need to include the lagged values of X.

From this model the causal effect of X on Y can be interpreted as the effect of X on Y while controlling for the initial values of Y. For the current study this control is of utmost importance as the true effect of the treatment can only be detected while controlling for the initial values of Y.

This model specification - also known as conditional change model - accommodates the assumption that the present state of Y can be determined directly from the past state of Y_{t-1} . Therefore, inclusion of the lagged dependent variable to the model is a must to specify the model properly (Finkel, 1995, p. 7).

An overly long introduction serves the single purpose to demonstrate that algebraically it does not make sense to include Y_{t-1} to the right hand-side of the equation, because the lag ought to be restricted to have a coefficient of 1. Therefore, the lagged dependent variable Y_{t-1} cancel each other out. The final model is therefore no different from the simple regression equation:

$$Y_t = \beta_0 + \beta_1 X_t + \varepsilon_t \tag{C.4}$$

C.3 Invitation to participate in the survey

Dear respondent,

Please accept our gratitude for participating in this panel study about electoral behavior. Prior to proceeding with actual questions we would like to familiarize you with this study.

The study is designed by Kristjan Vassil and Elias Dinas, two PhD students in the department of social and political sciences at the European University Institute in Florence, Italy. It is a panel study consisting of two surveys – one before and the other after the elections. Please note, that for your convenience we have kept these surveys very short. Neither of the surveys extends 25 questions and we sincerely do not think that it will take more than 10 minutes to fill in each of them.

Most importantly, as the link of the second survey will be sent to you directly, we will ask your e-mail address in the end of the survey. This e-mail will be used only within this study to submit you the link of the second survey. Your e-mail, as well as your answers, will remain strictly confidential and they will not be used outside this study in any way. The results of this study will be published within the next 6 months and made available on the website of involved researchers for your download.

Your help and participation in these surveys serves a great purpose, without which the study won't be possible. We would like to thank you in advance for participating in these surveys.

In order to continue with the survey, please click the "next" button below.

In case of any questions before or after filling in the survey, please do not hesitate to contact us directly based on the contact information provided below.

Best regards,

Kristjan Vassil and Elias Dinas E-mail: kristjan.vassil@eui.eu Cell: +39 388 342 6442 Address: Via dei Roccettini 9 50014 San Domenico di Fiesole Florence, Italy

C.4 Treatment - An Invitation Letter

Hello,

thank you for responding to our previous survey and for trust leaving your personal e-mail address with us.

Before the second stage of our survey we would like to inform you about EU Profiler. It is an internet program that allows voters to position themselves in a political landscape. By answering to 30 political issue statements EU Profiler compares your preferences with those of the parties. Subsequently, the program calculates which party comes closest to your preferences and identifies your position on the political landscape. To put it simply, EU Profiler help voters to find a party that best matches his or her political preferences.

EU Profiler is an academic research project that involves all European Member states and political parties in those countries. As of now, more than 2 million people across European have visited the EU Profiler.

In the framework of our survey, we ask you to use the EU Profiler and position yourself on the current political landscape. We would like to emphasize that it is crucially important for our study that you actually do use the EU Profiler.

In order to participate in the process of the EU Profiler please go to the internet address www.euprofiler.eu and follow the instructions on the screen until you are presented with your personal vote advice. In order to make use of your responses, we ask you to further register with the EU Profiler and submit your e-mail where indicated. In order to do so please click on the button "Help our research" and provide us with the same e-mail address that you used before. It is not necessary to respond to all question that are displayed under "Help our research" section. According to our agreement with the academic council of EU Profiler your contact information will be treated confidentially and they are not going to be included into any other studies apart from this one.

We hope that despite of the long instruction you are still with us. In short, we hope you can complete the three following steps:

- go to the address www.euprofiler.eu

- answer to the 30 political issue statements and discover your political position

- click on "Help our research" and submit your e-mail address to the last open text field

We hope that you can find time to go through the process of EU Profiler. Should you have any further questions, please do not hesitate to contact us.

Best regards,

Kristjan Vassil and Elias Dinas E-mail: kristjan.vassil@eui.eu Cell: +39 388 342 6442 Address: Via dei Roccettini 9 50014 San Domenico di Fiesole Florence, Italy

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