The Impact of Voting Advice Applications on Electoral Turnout: Evidence from Greece

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Abstract

A new aspect of electoral campaigns in Europe, and increasingly elsewhere as well, has been the proliferation of the online voter informaton tools, widely known in the political science community as Voting Advice Applications (VAAs). By accessing VAAs, users are provided with information about the degree of congruence between their policy preferences and those of different parties or candidates. Although the exact mechanisms have not been rigorously investigated, a series of studies across European countries, such as Finland, Germany, Italy, the Netherlands, and Switzerland have demonstrated a link between the use of VAAs and electoral turnout. The aim of this paper is to contribute to this growing literature by analyzing previously untapped data from Greece, extending the empirical literature to a country where VAA effects have not been investigated before. The analysis indicates that the effect of VAAs in Greece is marginal to non-existent while there seems to be no evidence of the hypothesized information mechanism which purportedly drives such effects. The paper concludes with suggestions that future studies of VAA effects on turnout can address in their design.

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1 Introduction

The declining electoral turnout rates across established democracies have generally been seen as a sign of citizen disengagement and apathy, that poses a danger to democratic legitimacy and representation (Lijphart 1997). Some of the proposed remedies focus on electoral engineering, such as increasing the proportionality of electoral systems, reducing voting complexity, or introducing compulsory voting, without necessarily addressing the underlying causes of the decline in turnout (Franklin 1999). Other approaches, especially in the US, focus on the impact of social norms through communication efforts such as "get-out-the-vote" strategies (Green & Gerber 2015).

The advent of the internet has brought with it additional strategies to address the declining turnout rates, focusing on reducing the costs usually associated with the act of voting. For instance, remote electronic voting addresses electoral costs (Germann & Serdült 2017), while the dissemination of political information online addresses the cost of gathering such information (Tolbert & McNeal 2003, Xenos & Moy 2007). Within the latter approach, a particular type of online tools known as "Voting Advice Applications" (VAAs) promise to address information asymmetries directly by allowing citizens to compare their preferences on a wide range of policy issues to those of political parties and candidates contesting elections.

VAAs were originally developed as civic education tools. Starting with *Stemwijzer* in the Netherlands in 1989, and continuing with other highly popular VAAs such as *Vaalikone* in Finland, *Wahl-O-Mat* in Germany, and *Smartvote* in Switzerland, public agencies have promoted VAAs with the intention of enhancing political knowledge. From the perspective of VAA designers, the presumption is that, by communicating information about the policy positions of parties and/or candidates and by showing how well these match users' preferences, VAAs can work as voter information tools helping citizens to make informed decisions when casting their vote. Although their efficacy in terms of boosting political participation is still a matter of debate, VAAs have become one of the top choices among young people when asked about different proposals for tackling low electoral participation (Cammaerts et al. 2016).

Nevertheless, and despite the widespread use of VAAs, we still have a rather limited understanding of their role in terms of citizens' voting behavior. While several studies have established the link between VAA usage and voter turnout, researchers have only just begun to acknowledge, let alone address, issues surrounding causal inference and measurement error which can compromise the quality of inferences. Moreover, research has not explored empirically the hypothesized mechanisms between VAA usage and turnout in

order to establish links between VAA design and the purported effects, which is necessary if we want to evaluate the efficacy of VAAs as civic education tools.

The paper begins by outlining the theory linking VAAs and electoral turnout in the context of the seminal contribution by Downs (1957), and summarizes the findings of the relevant empirical literature. The empirical part of this paper offers some evidence from Greece, paying particular attention to the context in which VAAs operate. The findings are critically discussed within the existing empirical literature, and the paper offers some concluding remarks on how researchers can design studies that adequately address and study the impact of VAAs on political participation, and evaluate the efficacy of VAAs as voter information tools.

2 Theory and literature review

According to Downs (1957), participation in democratic elections is dependent on cost/benefit calculations made by citizens. While cost refers to the time spent during the act of voting, depending on specific barriers set by electoral laws (such as the need to register), the benefit is primarily a function of how different from one another citizens deem the political parties to be. Furthermore, the effect of this benefit on participation is conditional on how pivotal the election is, which would imply that differences in platforms might be translated to changes in policy by the winning party (Downs 1957, 270–272). In order to be able to detect differences in policy among parties, citizens must collect and process information, which also comes at a cost. For most citizens, therefore, the costs outweight the benefits of voting, which makes the observed participation rates paradoxical. Nevertheless, provided that citizens value living in a democracy, they should recognize that the "cost of voting is lower than the cost of becoming informed" and that "the potential ill effects of not voting are worse than those of not becoming informed" (Downs 1957, 269) and therefore find it preferable to cast an uninformed vote than no vote at all.

Notwithstanding the literature that proposes increasing voter turnout through electoral engineering (Franklin 1999, Lijphart 1997), or through "get-out-the-vote" communication strategies (Green & Gerber 2015), there is a considerable strand in the literature which has investigated the relationship between political information and turnout (Degan 2006, Larcinese 2009, Lassen 2005). Within this context, the advent of the internet has offered technological solutions that directly address the information cost of voting. Early studies have hypothesized and demonstrated that internet

usage increases political knowledge and turnout (Hirzalla, Van Zoonen & de Ridder 2010, Tolbert & McNeal 2003, Xenos & Moy 2007), although such effect might have been compounded by selection bias as internet usage correlates with political interest (Bimber 2001).

While the internet simply allows citizens, especially those who traditionally have fewer resources at their disposal, to access political information at a low cost, VAAs go further and address information gaps and asymmetries directly. They do this by offering personalized information, precisely where citizens are expected to benefit from voting on how the policy positions of different parties relate to one another and to the preferences of the citizens themselves. VAAs therefore address what Downs (1957, 210) identified as "transferable costs" that can be delegated to experts, leaving citizens to bear only the cost of assimilating the information and making decisions on whether to vote or not, in addition to the (rather minimal) costs associated with the actual act of the voting. Moreover, the information provided by VAAs is not only tailored to each citizen and free of charge, it is also relatively unbiased. While Downs (1957, 213–214) anticipated that information flows from traditional media will be tainted by partisan bias potentially leading to "echo chambers", whatever flaws present in the information provided by VAAs are associated with limitations in their design rather than with partisan considerations (see Gemenis 2013, Germann, Mendez, Wheatley & Serdült 2014, Mendez 2012, Rosema & Louwerse 2016, Walgrave, Nuytemans & Pepermans 2009).

Considering that VAAs address the core of the calculus of voting in a hitherto unparalleled way, one would naturally expect that VAA usage could increase turnout. Consequently, we have observed the publication of a wealth of studies on the subject, considering the degree of specialization in this nascent field of enquiry. Fortunately, investigation of the link between VAA usage and turnout has avoided sterile discussions over aggregate data and addressed the link directly at the level of individual citizens. The question of whether usage of VAAs makes citizens more likely to vote has thus been examined across several countries, using different data sources and research designs.

In one of the earliest studies on VAA usage and its effects Marschall & Schmidt (2008) analyzed 13,557 online respondents who were recruited after completing the 2005 German federal election *Wahl-O-Mat*, a highly popular VAA in Germany that is designed by the German Federal Agency for Civic Education (BPB). Respondents were asked to assess whether using the *Wahl-O-Mat* motivated them to vote; Marschall & Schmidt (2008, 270) found that 7.8% of these users declared that they were motivated by the VAA to vote. Given that self-assessments of VAA effects among VAA users are wildly inac-

curate (see Walgrave, van Aelst & Nuytemans 2008), in a subsequent study Marschall & Schultze (2012) used data from the 2009 German Longitudinal Election Study (GLES), an online panel survey where respondents were recruited using quotas for gender, education, and age. The pre-election wave of GLES included 1,153 completed questionnaires and questions on whether respondents used *Wahl-O-Mat*. After controlling for several demographic variables in logistic regression, Marschall & Schultze (2012) found that *Wahl-O-Mat* users were 1.8 times more likely to report that they would vote in the 2009 federal election compared to non-users.

A similar study was conducted in the Netherlands in the context of the 2010 parliamentary election. Although Kruikemeier, van Noort, Vliegenthart & de Vreese (2014) addressed the issue of political uses of the internet more generally, their data included a question on whether respondents had used *StemWijzer*, a highly popular VAA in the Netherlands designed by ProDemos, a civic education agency that is partly subsidized by the government. Kruikemeier et al. (2014) analyzed 985 respondents drawn from both waves of a nationally representative pre-election online panel and, after controlling for several demographic variables in logistic regression, concluded that the use of *StemWijzer* led to a statistically significant increase in the willingness to vote if an election would be held that day. While it is difficult to gauge impact estimates from the regression models reported in Kruikemeier et al. (2014) due to the inclusion of interaction effects, Gemenis & Rosema (2014) attempted to do so by using the post-election survey of the 2006 Dutch Parliamentary Election Study (DPES), which included questions on VAA usage. Using data from the 2,806 respondents of the face-to-face survey, Gemenis & Rosema (2014) used entropy balancing to match VAA users to non-users on age, gender, education, political interest, knowledge, and party identification and estimated that the odds of voting among VAA users were 4.2 times higher than those among individuals who did not use a VAA. Moreover, by simulating the absence of VAA in their model, they concluded that VAAs contributed about 4.3% in the aggregate turnout (Gemenis & Rosema 2014, 286).

In Switzerland, Fivaz & Nadig (2010) examined 27,320 respondents of a three-wave online survey who were recruited after completing the *Smartvote* VAA for the 2007 parliamentary elections in Switzerland. Respondents in this survey were asked to assess whether using *Smartvote* motivated them to vote. Based on these self-assessments, Fivaz & Nadig (2010, 184) found that almost 40% of the respondents declared at least some influence, and concluded that if they projected from this sample to the population of roughly 375,000 *Smartvote* users, roughly "6 percent of Swiss voters were positively influenced in their decision to cast their vote in the 2007 elections." Using the

same data, Ladner & Pianzola (2010) perfomed a similar analysis and concluded that *Smartvote* was responsible for 0.6–1.1% of turnout in the 2007 election. Germann & Gemenis (2018) attempted to approximate the true effect of *Smartvote* on turnout in the 2007 election using the 4,392 respondents of the Swiss election study (Selects), a nationally representative (with oversampling among smaller cantons) telephone survey. The Selects survey included a question on whether the respondent had used *Smartvote*. To account for self-selection in terms of VAA usage, Germann & Gemenis (2018) used entropy balancing to match users to non-users on a wide range of demographic variables as well as past turnout, and found that using *Smartvote* increased citizens' probability of voting by between 3 and 11.8%, with the effect being stronger among younger users. The effect translated to about 0.2–2% in the aggregate turnout, at a very competitive cost of about 8.8 CHF per mobilized citizen, which made *Smartvote* a particularly cost-effective way to mobilize voters compared to traditional get-out-the-vote methods. In addition, Germann & Gemenis (2018) performed a series of robustness checks and replicated these effects using the 2011 and 2015 Selects studies.

In a comparative study involving election study data from Finland (2007, 2011), Germany (2009), the Netherlands (2003, 2006, 2010), and Switzerland (2007, 2011), Garzia, de Angelis & Pianzola (2014) conducted logistic regression analyses controlling for a wide range of demographic and attitudinal variables and found statistically significant effects of VAA usage on turnout, with increases in individual probabilities to vote ranging from a little more than 1.5% (Netherlands 2003) to over 10% (Switzerland 2007), while aggregate effects ranged from about 0.25% (Germany 2009), to almost 2.5% (Finland 2007). However, when the same data were analyzed using selection models instrumenting for gender and ideology (Garzia, de Angelis & Pianzola 2014, 110–112), in half of the studies the effects were conspicuously absent. Moreover, a re-analysis of the same data with a few additional surveys (Finland 2003, Germany 2013, the Netherlands 2012, and the European Election Study 2009) by Garzia, Trechsel & De Angelis (2017), using coarsened exact matching to account for self-selection, found yet more differences in terms of the magnitude of effects. In addition, considering that the individual and aggregate effects found by Garzia, de Angelis & Pianzola (2014) were often different than those found by other studies using the same data, we understand that most of the estimated effects rest heavily on the assumptions made by the different statistical methods that were used. Furthermore, in a study analyzing a sample of 647 respondents drawn from over the 40,000 users of 2012 *iVote* VAA in Taiwan, Wang (2016) found no effect on the change in the intention to vote between the pre and post-election surveys.

In addition to the analysis of observational data, the fact that some countries have relatively low rates of VAA usage has allowed researchers to conduct experiments where randomization of respondents to treatment and control conditions increases our confidence in the reported estimates in terms of internal validity. Vassil (2011) conducted a survey experiment in Estonia using respondents recruited through university online mailing lists. Respondents were randomly assigned either using the Estonian version of the *EU Profiler* VAA or to a control group, and 394 respondents completed both waves of the online survey. Using the difference in the intention to participate in the 2009 election to the European Parliament between the two waves of the survey as the dependent variable, and accounting for divergence from the experimental assignment using an instrumental variable approach, Vassil (2011, 145–146) found very modest effects of VAA usage. Using a similar design, Enyedi (2016) analyzed 2,502 respondents of a two-wave online panel before and after the 2010 parliamentary election in Hungary. Respondents were assigned using either of two VAAs (*Választási Iránytű* and *Szavazatszonda*), both of the VAAs, or to a control group, and the dependent variable was operationalized as the difference between the pre-election intentions and the post-election self-reported turnout. Enyedi (2016) looked not only at VAA usage but also at whether the results obtained by the VAAs confirmed or disconfirmed their voting intentions, and whether the two VAAs provided converging or diverging results according to respondents' recollections. He concluded that after controlling for pre-electoral intentions to vote, none of the turnout-related tests was statistically significant (Enyedi 2016, 1011), although the results were not actually presented in the paper, which would have allowed us to gauge the size of the estimated effects.

Garzia, Trechsel & De Angelis (2017) also reported results from a similar experiment in Italy, among 908 respondents of the online panel of the Italian election study (ITANES). Respondents were randomly assigned to a "mock VAA" that was created for the puproses of the experiment and to a control group, and the dependent variable was operationalized as the difference between the pre-election intentions and the post-election self-reported turnout. Garzia, Trechsel & De Angelis (2017, 438) concluded that the proportion of mobilized citizens among those who used the VAA was 10.7 percentage points higher than in the control group. Diverging from aforementioned experimental design, Mahéo (2017) conducted a field experiment of VAA effects in Quebec by recruiting 389 participants in various public locations. Participants were offered $15 and were randomly assigned to using a VAA or taking a movies quiz, with the dependent variables being the intention to vote in the 2014 election measured right after the intervention, the reported turnout measured through a follow-up telephone survey one week after the

election, and the validated turnout provided by the Quebec electoral body. Mahéo (2017, 522) found statistically significant effects among participants with lower levels of education when voting intentions were examined, but not for validated turnout. Even in this case, however, the effect size was consistent with other studies, although the study was probably underpowered (277 respondents in the model for validated turnout after listwise deletion) to detect statistically significant effects of that size.

3 Data and method

VAAs first became available in Greece with the local version of the 2009 *EU Profiler*. Even though this VAA attracted a very modest number of users, within less than 18 months a team of researchers from Aristotle University in Thessaloniki and the University of Zurich created the first Greek VAA, *HelpMeVote*, which was made available for the 2010 regional elections. By the May 2012 parliamentary election, the two institutions had established two different VAAs that have been running in parallel since then: *HelpMeVote* and *Choose4Greece* respectively (Gemenis, Konstantinidis & Triga 2015). Usage of these VAAs remains moderate compared to other countries (Marschall 2014), with roughly 480,000 (May 2012) to 570,000 (January 2015) users for *HelpMeVote*, and 58,000 (January 2015) to 98,000 (September 2015) users for *Choose4Greece*.

In many respects, the emergence of VAAs in Greece has followed a more general trend of proliferation and professionalization of VAAs elsewhere in Europe (Garzia & Marschall 2014) and in other countries (Liao, Chen, Jensen & Pritchard 2016). There are, however, particular aspects in the Greek political context that make the study of VAA effects in Greece quite different compared to other countries. For one thing, voting in Greece is characterized by compulsory (if unenforced) voting, and relatively high (but continuously declining) turnout rates.[1] Moreover, elections since 2012 have been characterized by record high levels of electoral volatility and a doubling in the effective number of parties with re-alignment of voters into a changing party system (Gemenis & Nezi 2015, Tsatsanis 2019).

This study uses three different data sources to investigate the possi-

[1] Readers might argue that turnout rates in Greece do not appear particularly high. Official turnout rates, however, are underestimated due to failures in the updating the electoral registers (Gemenis 2008, 97–98). Actual turnout figures in Greece are higher as much as 10 percentage points, compared to official figures, and researchers often adjust the turnout rates for Greece in order to account for this discrepancy (e.g. Franklin, van der Eijk & Oppenhuis 1996, 320).

ble VAA effects on turnout: two general surveys using representative samples of the voting population (Andreadis, Chadjipadelis & Teperoglou 2016, Marantzidis et al. 2017) which are used to estimate the effect at the individual level, and data from the January 2015 *Choose4Greece* VAA (Konstantinidis et al. 2018) which are used to assess the purprorted information mechanism as outlined in the previous section.

Although Greece does not have an institutional structure to conduct election studies, there are two surveys that have included items related to VAAs. The 2012 post-election Voter Survey (Andreadis, Chadjipadelis & Teperoglou 2016), a mixed-mode survey (online and face-to-face) which is part of Module 4 of the Comparative Study of Electoral Systems (CSES), included several items about *HelpMeVote* usage, while the two-wave telephone panel survey conducted for the "Collective Action of Indignant Citizens in Greece" (CAICG) project (Marantzidis et al. 2017) included a few items about VAA usage more generally. While the sampling of respondents and wording of items in these studies differs considerably, a consistent data analysis should produce estimates that are roughly comparable to each other and to similar studies in other countries.

In addition to survey data, the analysis of VAA log files allows additional insights to be drawn, especially with respect to the hypothesized information mechanism. Luckily, and contrary to other countries, VAA user data in Greece from both *HelpMeVote* and *Choose4Greece* has been made available to researchers. In particular, *Choose4Greece* data have been used by numerous researchers in individual-level analyses (Germann & Mendez 2016, Katsanidou & Otjes 2016, Mendez 2017, Nezi & Katsanidou 2014). Like other VAAs designed by the PreferenceMatcher consortium,[2] the January 2015 *Choose4Greece* included three pages of supplementary questions that were presented to users in addition to the pages asking users to state their policy preferences and the pages asking users to place themselves and political parties on general ideological scales (Konstantinidis et al. 2018). In particular, one of the supplementary questions asked users to indicate the likelihood that they would turn out to vote. As this question was given in two pages in *Choose4Greece*, one prior to the VAA results and the other right after, the design of *Choose4Greece* allows for a quasi-experimental investigation of VAA effects.

With respect to research design an important question is whether the estimated effects are valid or whether they can be considered to be endogenous. Given that there are common determinants between VAA usage (Fivaz & Nadig 2010, Garzia, de Angelis & Pianzola 2014, Marschall

[2]See: http://www.preferencematcher.org

& Schultze 2012) and individual-level turnout (Smets & van Ham 2013), many studies on VAA effects, and more generally on turnout, have turned to survey (Enyedi 2016, Garzia, Trechsel & De Angelis 2017), field (Green & Gerber 2015, Mahéo 2017), and natural experiments (Lassen 2005) in order to gain leverage of internal validity. While well-designed randomized experiments are considered the gold standard in terms of internal validity, matching approaches have been proposed as second-best alternatives in estimating VAA effects (Garzia, Trechsel & De Angelis 2017, Gemenis & Rosema 2014, Germann & Gemenis 2018).

Matching has several advantages over regression adjustment in the analysis of observational data (Austin 2011, 417–418). Unlike regression, matching allows us to conceptualize VAA usage as a "treatment" which a group of citizens chooses to take (treatment group), while another group of citizens chooses not not (control group). Matching directly models self-selection into this treatment variable by attempting to make comparable the distributions of the confounding variables between the treatment and control groups. Moreover, matching allows researchers to use exact measures to assess the balance between treatment and control groups and to avoid the results becoming highly dependent on the estimated models. Nevertheless, matching is no panacea, as it relies on the assumption that all the variables that account for the selection into the treatment have been measured and included as covariates in the matching estimator. Matching therefore cannot account for any hidden (unmeasured) bias, so, in the case of positive results, additional tests are needed to instill confidence in the matching estimates (Sekhon 2009, 501–503).

In particular, we use entropy balancing (Hainmueller 2012), a "matching as preprocessing" method that works as a reweighting scheme by balancing treated (VAA users) and non-treated (non-users) units on a number of covariates on the basis of their moments (mean, standard deviation, etc). Entropy balancing has several advantages over other matching methods, as it does not discard any units from the analysis and is more flexible because weights can be used in a wide range of well-known models (e.g. logistic regression) that allow for the straightforward interpretation of the estimated effects. Moreover, the method has been shown to perform well in Monte Carlo simulations and to replicate the causal effects of experimental benchmarks (Hainmueller 2012).

4 Results

Table 1 presents estimates of the VAA mobilization effects for the four parliamentary elections conducted in Greece between 2012 and 2015. In every instance, the estimates are based on logistic regressions where the dependent variable is turnout in the previous parliamentary election and the independent variable is the self-reported usage of VAAs. The logistic regressions include inverse probability weights to match users to non-users on certain covariates based on entropy balancing (Hainmueller 2012). The covariates were chosen on the basis of being determinants of both VAA usage and turnout and include age, gender, education, political interest, and self-placement on the left-right scale.

As evident from both odd ratios and the simulated change in the individual probability of voting in the election (versus abstaining), the estimated effect is reduced with every subsequent election, becoming virtually indistinguishable from zero in 2015. Moreover, even in the case of the May 2012 election, the effect does not appear to be statistically significant. This is most likely because the 2012 Voter Survey appears to be underpowered to detect the magnitude of such an effect, since the analyses of the 2012 data include frequency weights in addition to the inverse probability weights in order to adjust the sample for the mixed mode design of the survey. In all instances, however, the analyses failed placebo tests (not shown here) when knowledge of VAAs was examined as an alternative "placebo" treatment (see Gemenis & Rosema 2014, 287). This implies that, even if the study would have had a larger sample size, the assumption that self-selection into the treatment can be controlled for on the basis of the covariates included in the analysis would not hold.

Table 1: VAA mobilization effects in Greece.

		ATT	
	N	Odds ratio	Δ probability of voting (%)
May 2012	890	2.745 [.866, 8.703]	9.5 [<0.01, 19.13]
June 2012	896	2.643 [.752, 9.283]	6.2 [<0.01, 12.67]
January 2015	1,013	1.098 [.414, 2.915]	-.09 [-3.94, 4.8]
September 2015	806	1.034 [.445, 2.401]	-.41 [-9.14, 9.9]

Note: Average treatment effects based on a logistic regression weighted by entropy balancing for age, gender, education, political interest and left-right self-placement. The 2012 estimates include additional post-stratification survey weights. 95% confidence intervals are given in square brackets.

So far, most of the studies on VAA effects on turnout that performed direct comparisons between VAA users and non-users, including the evidence presented here, did not account for the hypothesized mechanisms as set out in the theory. In other words, the comparisons did not take into account the information that the VAA communicated to the users. According to the theory postulated in this paper, however, VAAs are supposed to motivate citizens to participate in elections precisely on the basis of communicating information to them about party positions. We should therefore expect that the purported effect is conditional on the quality or usefulness of the provided information. The question then is how we can measure the quality or usefulness of VAA information. Some surveys include items that specifically ask respondents to recall which party they were matched to by the VAA, and this information can be used to compare the mobilization effect between those who received matches that either confirmed or disconfirmed their initial voting intention (see e.g. Enyedi 2016). Such measurements, however, are prone to recall error due to cognitive dissonance. Moreover, this distinction does not address the fact that many VAA users do not have preferences that they want to check up on but, instead, are genuinely puzzled about who to vote for and actively seek information (see Van de Pol, Holleman, Kamoen, Krouwel & De Vreese 2014). Alternatively, studies have measured the quality of VAAs in general by asking them whether they perceived VAAs as being biased in favor of certain parties (Enyedi 2016). However, it is questionable whether such measures can be used as proxies for the usefulness of the personalized information provided by VAAs.

Analyzing VAA log files (e.g. Alvarez et al. 2014, Dinas, Trechsel & Vassil 2014, Garry et al. 2018, Germann & Mendez 2016, Rosema & Louwerse 2016)

makes it possible to measure the information that was communicated to VAA users. However, shifting the analysis to VAA-generated data in our case implies dropping the control group of non-users. Nonetheless, this strategy can be instrumental in reflecting on the hypothesized mechanism after establishing the presence or absence of the purported effect using survey data. For instance, Dinas, Trechsel & Vassil (2014) examined about 8,000 respondents of the *EU Profiler* VAA across several EU member states who volunteered to participate in the opt-in questionnaire. They found a relationship between the self-assessed impact of the VAA on their vote and the "representational deficit", the degree to which the ideological profile of the respondent matches the configuration of party positions in their country.

The analysis of January 2015 *Choose4Greece* data (Konstantinidis et al. 2018) allows for an analogous, but different, investigation of the hypothesized information mechanism. As mentioned in the previous section, the design of the VAA website included a page with supplementary questions, including a question about the likelihood that the user would vote in the January 2015 parliamentary election (1="Very likely" to 4="Not at all likely"), before users could see the results. After users viewed the results indicating the degree of match with each of the parties contesting the election, the same question on the turnout likelihood was repeated later as a pop-up window inviting users to help the VAA designers with their research.[3] Combining the responses on the pages before and after the results, allows us to generate a variable measuring the mobilization (or demobilization) of users before/after viewing the VAA matching results.

Moreover, by combining user responses with the coded party positions used in *Choose4Greece* (Gemenis, Triga & Konstantinidis 2016), we can recreate the degree of match with each party that was communicated to each user.[4] Taking the standard deviation of matches across all parties in the VAA provides a good approximation of whether *Choose4Greece* users were confronted with informative results or not. A high standard deviation implies that the user was given a result that included both high and low (negative) matches with parties, in other words that there were considerable differences among

[3]Relying on the responses of those who answered the opt-in survey questions risks making the sample unrepresentative of VAA users at large. Despite this, there are several studies investigating VAA effects that rely exclusively on data from such opt-in surveys (e.g. Alvarez et al. 2014, Dinas, Trechsel & Vassil 2014, Garry et al. 2018).

[4]While *Choose4Greece* uses various methods to communicate information to users, the primary visualization (that also appears first) is a bar chart where parties are ordered by the degree of proximity to the user following an algorithm that is a mixture of the city-block distance and a scalar product following the directional theory of voting (see Mendez 2012).

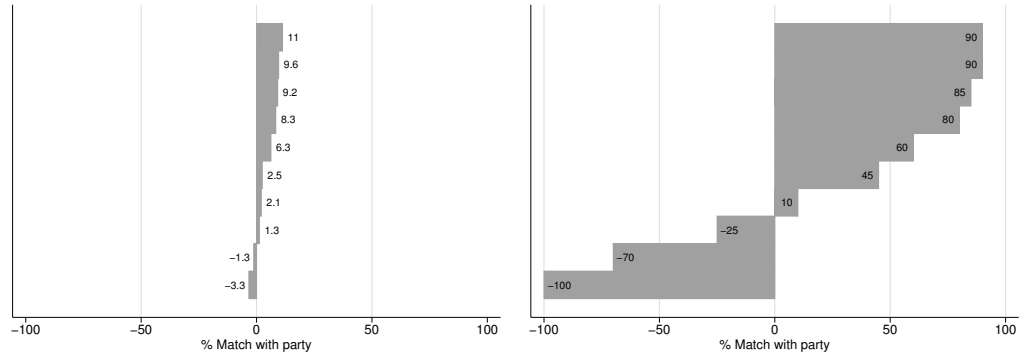

Figure 1: *Choose4Greece* voting advice results with low (left) and high (right) information value.

parties in terms of their policies. Conversely, a low standard deviation among the matches implies no differentiation among parties. An illustration of low and high standard deviation in the presented *Choose4Greece* matches is given in Figure 1.

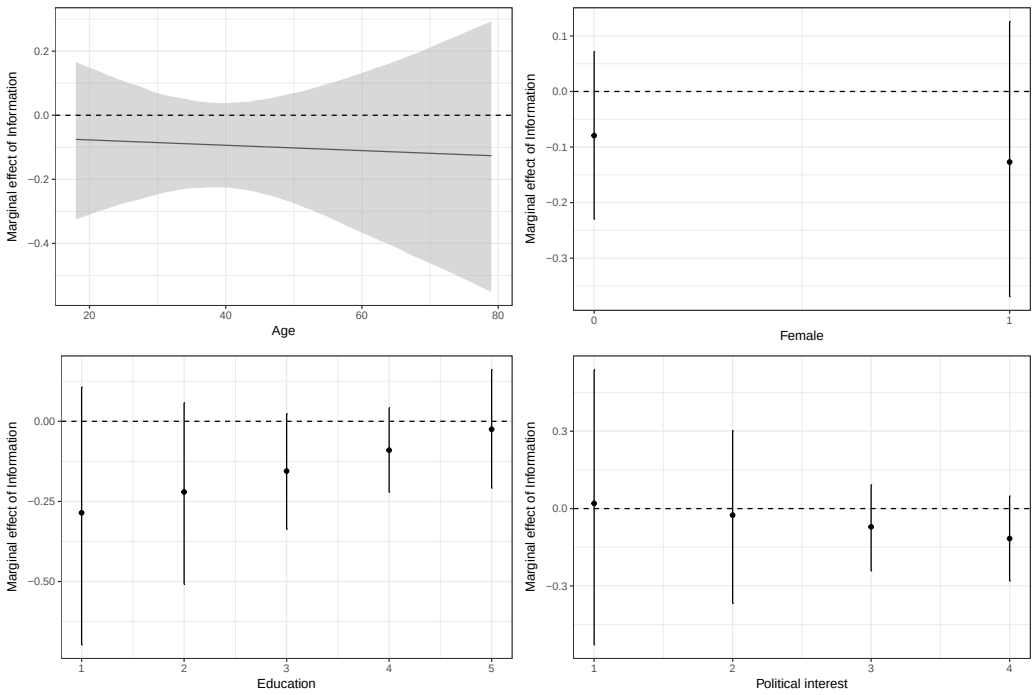

Figure 2: Estimating the conditional effect of the information provided by *Choose4Greece* on mobilization.

Figure 2 presents the conditional effect of this information measure to

the degree of mobilization, controlling for age, gender, education, political interest, and left-right self-placement, conditional on various demographic variables. As can be seen from the very large confidence intervals around the estimates, the effects are estimated with considerable uncertainty due to the small variability in the dependent variable: of the roughly 4,000 respondents who answered both pre and post-result questions, approximately 95% reported the same likelihood of voting before and after viewing the results.[5] More importantly, and irrespective of some minor differences across the values of the conditioning variables, the marginal effects of information on mobilization are negative, implying that more differentiation among parties leads to demobilization. While this generally goes against theoretical expectations about the relationship between ideological polarization and electoral turnout, the findings are consistent with prior empirical findings which showed that the demobilizing effects of policy divergence among political parties are higher for those with lower education attainment (Rogowski 2014).

There are several possible explanations for these results, and these explanations relate to how the usefulness of the VAA results was measured. First, larger standard deviations among the VAA matches imply more consistency in the user response to the VAA questions. As ideological consistency is often taken as a measure of political sophistication, and sophisticated users are also less likely to change their responses pre and post-survey, this particular operationalization of VAA information could be biasing the estimates of the VAA information effects downwards. Second, larger standard deviations among the matches imply an increased likelihood of observing a party with a high match, but such ideological congruence has been shown to have an impact only on proportional electoral systems (Lefkofridi, Giger & Gallego 2013). Third, while larger standard deviations among the matches imply greater polarization, it has been shown that the positive effect of polarization on turnout is conditional on actual polarization at the party system level rather than perceptions at the individual level (Moral 2017).

5 Conclusions

The available evidence from Greece generally indicates that the effect of VAAs on turnout is marginal to non-existent, while there seems to be no evidence for the hypothesized mechanism of the purported effect. While these results may be due to limitations associated with the available data and the measurement of key concepts, it is theoretically plausible that the informa-

[5] The original number of respondents was further reduced after dropping suspect entries (see Mendez, Gemenis & Djouvas 2014).

tion mechanism under which VAAs purportedly have an impact on electoral turnout could be conditional on party system characteristics such as proportionality and polarization. Moreover, just like in Estonia, Hungary, Quebec, and Taiwan, where researchers identified only small or insignificant effects (Enyedi 2016, Mahéo 2017, Vassil 2011, Wang 2016), Greece might well fit in this group of countries where VAAs are relatively new innovations in the election campaigns and do not have the reputation and institutional support that VAAs enjoy in countries such as Finland, Germany, the Netherlands, or Switzerland. Even small effects can go a long way, however, as Kleinnijenhuis, van de Pol, van Hoof & Krouwel (2017) argued in the case of municipal elections in the Netherlands, where aggregate data suggest that VAAs are partially succesful in dampening the negative effect of demographic and socioeconomic conditions on turnout.

Overall, the findings point to the need to place more emphasis on the contextual characteristics of the countries in which VAAs operate. Future research can investigate this hypothesis by including appropriately worded items relating to VAA knowledge and usage in large-scale surveys (e.g. European Election Study, European Social Survey, European Values Survey) which can establish a baseline comparison of aggregate effects across different contexts. In turn, this will allow researchers to explore the relationship between VAA effects and contextual factors such as the institutional context and popularity of VAAs, as well as electoral volatility, party system fragmentation, electoral system disproportionality, and so on.

Nevertheless, while cross-national surveys and national election studies remain the workhorse of electoral research, research on VAA effects can also be served by surveys and designs that better represent specific groups where VAAs have most policy relevance: among women, low-income citizens, newly enfranchized citizens, or groups that are considered apathetic but easily reachable by technologies online (such as young people). Such research might be best served by data that oversamples these groups. Data generated from VAAs, just as employed in this study, might be helpful in this regard, especially if the analysis is not reliant exclusively on the responses of users who self-select into the additional opt-in surveys (e.g. Dinas, Trechsel & Vassil 2014, Ladner & Pianzola 2010), who are known to be systematically different compared to regular VAA users. To counter this, VAAs can be optimized for research purposes by the strategic placement of supplementary questions to maximize response rate, and by introducing elements that allow for conducting randomized experiments (e.g. Garry et al. 2018).

Moreover, despite the artificiality of the setting, researchers interested in studying VAA effects on turnout should consider laboratory experiments as credible alternatives to field experiments. Laboratory experiments allow

greater control over the experimental conditions, ensuring the proper implementation of the treatment condition and, in addition, allow researchers to experiment with different methods and outputs in the way VAAs present information to users, thus drawing out important policy implications in terms of VAA design.

Finally, although this study did not reflect specifically on measurement issues facing studies of VAA effects, research on turnout more generally has illustrated how validated turnout measures are preferable over self-reported measures. While few countries offer the option of employing validated turnout data, future VAA studies should at least consider alternative wordings on measuring turnout that are known to be less affected by social desirability (Belli, Traugott, Young & McGonagle 1999). Similarly, VAA-generated data offer the advantage of online surveys with self-administration, which have been shown to be less susceptible to social desirability bias (Kreuter, Presser & Tourangeau 2008).

Considering the evidence from Greece and that of the previous studies, we can safely conclude that we have only scratched the surface and still have a limited understanding of the magnitude and mechanisms of the hypothesized effects of VAAs on voter turnout. Future studies could reflect on the available evidence as well as on the recommendations offered here and improve our understanding by examining the postulated mechanisms beyond simply comparing VAA users to non-users.

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