

Should We Include Error Margins in Public Opinion Polls?*

Evidence from a Survey Experiment

Werner Krause[†]

Christina Gahn[‡]

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Abstract

Public opinion polls have become vital and increasingly visible elements of representative democracies. Especially during election campaigns, opinion polls reflecting citizens' vote intentions attract substantial media attention. In this regard, previous research has frequently shown that polls can influence both citizens' vote intentions as well as political parties' campaign strategies. At the same time, opinion polls are fraught with great uncertainty. One way to reflect this uncertainty is to report error margins. This paper investigates how citizens change their vote intentions dependent on whether polling estimates are presented with or without error margins. Using a vignette experiment (N=3000), we examine this question based on a real-world example in which different election polls were shown to respondents ahead of the 2021 federal election in Germany. We manipulated the display of error margins, the framing of the polls and the closeness of the race. The results show that error margins indeed influence the propensity to vote for one of the two leading parties. Importantly, the effect is dependent on the framing of the polls that provides additional interpretative guidance to their readers. The findings of this study are important for two main reasons. First, they help to understand how error margins in media reports can help citizens make more informed (strategic) vote choices. They thus shed light on whether depicting opinion polls' uncertainty can affect key features of representative democracy, such as democratic accountability. Second, this paper's findings also contribute to the broader debate on the potential benefits of including methodological details for communicating scientific research results to the broader public.

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[†]University of Vienna, Department of Government, werner.krause@univie.ac.at

[‡]University of Vienna, Department of Government & Berlin Graduate School of Social Sciences (BGSS), christina.gahn@univie.ac.at

Introduction

Public opinion polls can be vital elements of democracy. Particularly during election campaigns, polls asking for citizens' vote intentions regularly attract high levels of attention. In more recent elections, media outlets have also started to host webpages dedicated to debating trends and shifts in anticipated election results or to provide aggregate measures of opinion polls.¹ While citizens are exposed to a growing number of polling estimates, a long-standing academic and public debate discusses the potential effects of public opinion polls on citizens' vote intentions. In fact, a substantial number of studies have demonstrated that polls can be crucial in influencing whether citizens decide to vote on election day and who they vote for. On the one hand, opinion polls might provide voters with high-quality information on the state of the voting preferences of their fellow citizens. This information might be used, for instance, by strategic voters to make better informed vote choices. Skeptics, on the other hand, have repeatedly underlined that pre-election polls can damage the democratic process as erroneous polling information might misguide citizens' perceptions of political parties' public support prior to election day (see, e.g., Bartels 1988; Mutz 1998). Especially apparent major polling failures have triggered substantial doubts regarding the credibility of opinion polls, such as after the 2016 and 2020 US presidential elections, or the 2016 Brexit referendum (see, e.g., Jennings and Wlezien 2018; Kenett, Pfeffermann, and Steinberg 2018).

Public opinion polls are inevitably surrounded by uncertainties due to multiple factors, such as sampling and weighting errors, selection effects as a consequence of different recruitment techniques (online vs. phone), or the simple fact that voters are not entirely certain who to vote for when asked for their vote intention. In addition, polling institutes themselves appear to engage in so-called herding behavior potentially resulting in further distortions in public discussions on likely election outcomes (Prosser and Mellon 2018). Hence, polls have always

¹See, e.g., <https://fivethirtyeight.com/>, <https://www.politico.eu>, <https://graphics.reuters.com/FRANCE-ELECTION/POLLS/zjvqkomzlvx/polls/>, <https://www.zeit.de/politik/deutschland/2021-08/sonntagsfrage-bundestagswahl-2021-bundeskanzler-koalition-umfragen>.

suffered from numerous methodological problems and probably will continue to do so. What drives public concerns, however, is the possibility that voters base their voting decisions on opinion polls without considering the uncertainty associated with the estimates.

As a remedy to these concerns, scholars and pundits have called for reporting error margins when publishing opinion polls (see, e.g., ESOMAR/WAPOR 2014; BBC 2019). Two main reasons speak in favor of this approach. First, error margins give a more accurate and complete picture of the voting intentions of the electorate. Second and more importantly, error margins are likely to affect citizens' perceptions of the polls and the core information they are showing. As a consequence, voters might be likely to respond differently to one and the same poll, dependent on whether error margins are shown or not.

In this article, we test this claim. More concretely, we ask whether and when error margins in public opinion polls alter citizens' vote intentions. We focus on election campaigns in which two major political parties compete to become the strongest force in the next legislature and argue that showing error margins in opinion polls underscores the openness of the electoral race. Based on theory on vote pivotality (Riker and Ordeshook 1968) and strategic voting (Cox 1997, 2018), we hypothesize that error margins prompt citizens to vote for one of the two largest political parties. We test these expectations using a large-scale representative survey experiment with more than 3,000 respondents that has been conducted in Germany a few weeks before the most recent general election in 2021. The empirical results of the study show that error margins indeed increase citizens' likelihood to cast their vote for one of the major parties. Furthermore, our results show that this effect is dependent on providing interpretative guidance of the polling results. Error margins only exert a significant influence on citizens' vote choices if polls are accompanied by a frame that underlines the openness of the electoral race. These results demonstrate that journalists and their interpretations play an important role in the impact of error margins on citizens' voting behavior and election outcomes.

To the best of our knowledge, this study is the first to develop a theoretical argument on the consequences of displaying error margins in opinion polls and to offer a strong causal test of the impact of error margins and their framing on individuals’ political behavior. The findings of this study are important for two main reasons. First, they illustrate that reporting error margins indeed has a substantial causal effect on citizens’ vote intentions. More specifically, our results indicate that citizens will make better informed vote choices once they are provided with clearly visualized error margins and an appropriate interpretation of the polls. Displaying error margins can thus have potentially positive effects on key features of representative democracy, such as democratic accountability. Second, our results also contribute to broader debates on the question of how scientific research results should be best communicated to the broader public (e.g., Podkul et al. 2020). While other studies have cast doubt on the effectiveness of showing confidence intervals to a non-scientific audience (see, e.g., Daoust and Bastien 2021), this study’s results illustrate that citizens are indeed able to correctly interpret and deal with the uncertainty that comes with public opinion surveys—as long as it is presented to them in an easily accessible way.

In what follows, we discuss previous work on the effects of close races on citizens’ voting behavior and theorize the role of error margins in this context. Next, we present the set-up of the survey experiment and discuss the empirical results. The final section summarizes the results and reflects on the general implications of making methodological details of scientific work available to the public.

State of the art: The effects of close races on citizens’ vote intentions

Whether accurate or not, public opinion polls can have a significant impact on citizens’ political opinions, turnout decisions, and vote intentions (see for a recent overview: Roy, Singh, and Fournier 2021). Particularly, strategic voting has been considered a conscious

way of poll-induced voting behavior, in which citizens weigh their own political preferences against expectations about likely election outcomes (see for a recent discussion: Gschwend and Meffert 2017). If tactically promising, these individuals will deviate from their most preferred voting option and support an alternative party. Here, polls are informative signals that individuals use to maximize the expected utilities of their vote. One crucial factor driving voters' strategic calculi is the closeness of an electoral race. Previous research has repeatedly found that the openness of an election campaign can significantly influence citizens' voting decisions. By and large, this effect comes in three variants.

First, work on the *calculus of voting* (Riker and Ordeshook 1968) has motivated researchers to inspect whether voters are more likely to turn out on election day if they perceive an electoral race to be highly contested. Based on the influential work of Downs (1957), individuals are assumed to be strictly rational actors who carefully weigh whether the benefits of voting outweigh the costs associated with going to the voting booth. In this line of reasoning, people may be more likely to vote if they perceive that their vote is pivotal, i.e., that their vote can influence the outcome of an election in substantial ways. Particularly studies conducted in plurality systems have supported the expectation that more conclusive information about the state of a race depresses turnout, whereas information underlining the openness of a race mobilizes voters to cast their vote. This connection has been repeatedly observed in observational (Cancela and Geys 2016; Westwood, Messing, and Lelkes 2020) and quasi-experimental studies (e.g., Sudman 1986; Morton et al. 2015). Similar results have been reported for electoral races in two-round election systems, where first-round results suggested an open race between the top two candidates in the second round (Fauvelle-Aymar and François 2006; Simonovits 2012; De Paola and Scoppa 2014). Lastly, field and survey experiments have found equal support for the causal effect of perceptions of electoral closeness

on turnout (Levine and Palfrey 2007; Duffy and Tavits 2008; Westwood, Messing, and Lelkes 2020).²

Based on the Duvergerian logic to avoid wasting a vote, close races provide a second strategic incentive to voters. In plurality electoral systems, the wasted-vote hypothesis assumes that voters are hesitant of voting for uncompetitive candidates or political parties that have little chances of winning a district. On this basis, supporters of these smaller parties are incentivized to vote for the most viable larger party. Following this argument, the incentive to vote strategically for one of the major parties increases the closer the race is. However, empirical support for this expectation remains mixed. On the one hand, Blais (2002) and Heath and Ziegfeld (2022) find limited evidence of strategic voting in Canada and India. Gschwend (2007), on the other hand, finds support for the wasted vote hypothesis in a study of split-ticket voting in the 1998 German general election. Kiss (2015) identifies a similar effect in the Hungarian two-round electoral system.

Third, considerations about future coalition governments can influence how citizens vote in proportional electoral systems. While the effect of close elections on strategic vote choices has long been studied primarily in plurality systems, more recent work points to similarly sizeable effects in proportional representation systems. For instance, Abramson et al. (2010) and Hobolt and Karp (2010) suggest that the number of strategically voting citizens is similar across proportional and plurality systems. By and large, coalition-oriented strategic voting assumes that citizens do not vote for their most preferred party with the goal of increasing the likelihood that certain government coalitions form after election (e.g. Cox 1997; Bargsted and Kedar 2009; Indridason 2011; Kedar 2012).

While coalition-based strategic voting can take different forms, such as policy balancing or threshold-insurance voting (see, e.g., Indridason 2011; Gschwend and Meffert 2017), so-called “formateur optimization” or “strategic sequencing” (Cox 2018, 267–68) is most relevant

²At the same time, some studies report no effect of electoral closeness on citizens’ decisions to turn out to vote (e.g., Gerber et al. 2020).

for the effect of close races on citizens' vote choices. Most multi-party systems give the largest political party the opportunity to initiate and dominate the coalition forming process following an election (Ansolabehere et al. 2005). Hence, the party affiliation of the head of government is to a substantial extent a function of the party size in parliament (Martin and Stevenson 2001; Bäck and Dumont 2008). For supporters of smaller political parties, strengthening one of the leading political parties thus constitutes a useful strategy to secure the latter party's crucial role during coalition formation (Cox 1997). For instance, supporters of smaller radical left and eco-socialist parties might decide to vote for a major centre-left party to increase the probability that a left-wing coalition is formed after election. Again, this incentive should be stronger the closer the electoral race between the major parties is.

There is empirical evidence that voters do make considerations about the post-election bargaining power of political parties, and in particular about who will lead the government. For instance, Taagepera and Allik (2006) present a formal model showing that smaller political parties are destined to lose some of their inherent support to high-ranking parties due to strategic sequencing. Cox (2018) mentions three empirical studies focusing on the case of Israel (Felsenthal and Brichta 1985; Nixon et al. 1996; Nachmias and Sened 1999) in which strategic sequencing has been detected. Irwin and Van Holsteyn (2008) provide additional evidence of strategic sequencing from the Netherlands.

To sum up, extensive previous evidence indicates that close races fosters the electoral support for the major parties contesting an election. In these situations, citizens decide to (strategically) cast their vote because a) they perceive their vote to be pivotal, b) they aspire to avoid to waste their vote by voting for a smaller party, or c) they aim to strategically optimize post-electoral government formation. Despite these well-developed theoretical expectations, we have little knowledge whether and to what extent error margins in opinion polls affect citizens' strategic calculi. In the next section, we hypothesize that error margins strengthen voters' perceptions of the openness of an electoral race and, thus, increase their

likelihood to vote for one of the major parties. In addition, we expect that this effect is conditioned by two factors. First, the actual closeness of the electoral race will be important, i.e. the poll distance between the two leading parties. Second, public opinion polls are rarely presented in isolation but they are usually part (or the basis) of media articles interpreting and discussing the polls in question. We thus expect that the effect of error margins on citizens' vote intentions is particularly pronounced if the journalistic interpretation of the polls highlights the openness of an electoral race.

Error Margins in Public Opinion Polls

The number of polls that are reported to citizens is on an all-time high, especially immediately before election day. Although voters might ground their expectations about likely election results upon multiple factors (such as political parties' programmatic offerings, their performance in office, or candidate characteristics) opinion polls undoubtedly constitute an important—if not the “most important” (Irwin and Van Holsteyn 2008, 486)—source of information for the state of an election campaign. As a consequence, polls are widely discussed in media reports and perceived by many voters. For instance, 66% of the undecided voters in the 2002 Dutch election stated that they had read polls (very) often (Irwin and Van Holsteyn 2008). In the most recent 2019 Austrian national election, around 53% of all undecided voters indicated that they had read election polls in the week before the election (Aichholzer et al. 2020). In a German election survey, around 66% of all respondents indicated that they had seen public opinion polls prior to the 2021 general election (Debus et al. 2021).

However, sources of polling error are multifaceted. On the one hand, the response quality in surveys might be biased (e.g. due to late swingers, shy voters, differential don't knows, or turnout overreporting). On the other hand, decisions of polling institutes on how, when, and where to field the surveys can introduce additional biases resulting, for instance, from the sample sizes, the weighting approach, the mode of data collection, the wording and format

of survey questionnaires, or different ways to deal with geographic and other sub-group heterogeneity in survey responses (see for recent overviews: Jennings and Wlezien 2018; Kenett, Pfeffermann, and Steinberg 2018; Prosser and Mellon 2018). Hence, design choices can have a substantial influence on the accuracy and biases involved in public opinion polling.

With regard to the closeness of an electoral race, raw poll estimates thus risk overstating the gap in public support for the leading and the second-placed political party. To put it differently, opinion polls that do not report the corresponding error margins claim more precision than the survey results actually warrant. While not all kind of error can be calculated and, thus, communicated to polling consumers, the random sampling error can be easily included in opinion polls to display some of the insecurity that come with polling estimates. They thus give citizens an idea of how close we can reasonably expect a poll result to be to the true population value.

Although pundits in the field frequently demand that error margins should be transparently reported (see, e.g., ESOMAR/WAPOR 2014; BBC 2019), the media often fails to provide readers with this essential information (Welch 2002; Bhatti and Pedersen 2016; Beckers 2021). Brettschneider (2008) found that only 2% of the polling results reported in the German media between 1980 and 2002 included the corresponding error margins. Despite a substantial increase in the number of published polling estimates approximately 20 years later, Vögele and Bachl (2020) paint a similar picture concluding that error margins were reported in 4% of news reports covering opinion polls. In a Danish case study, Bhatti and Pedersen (2016) conclude that two-thirds of all poll-based comparisons are made using numbers that are not significantly different from each other. Beckers (2021) analyzed television news during the US 2020 presidential campaign. According to her analysis, 76% of the reported polling results of “in-house” polls included mentions of the corresponding error margins, while the share was

39% for “outside” polls. Still, error margins remained to be noted on the screens in small letters and in only 3% of the instances journalists explicitly referred to these margins.³

In the face of these discrepancies, how might displaying error margins affect citizens’ vote intentions? Or to put it differently, what are the electoral consequences if media reports fulfill the standards demanded by experts in the field? The preceding literature review motivates the general expectation that citizens are more likely to vote for one of the two major parties when they perceive the race to be tightly contested. In particular, vote pivotality, wasted-vote avoidance and strategic sequencing operate as the central mechanisms that explain the competitive advantage that larger political parties enjoy over smaller ones. Although we are agnostic about which mechanism is at play, we expect that error margins indicate that the anticipated winning margin of the leading party can be smaller than raw poll estimates would indicate. Hence, displaying error margins should have a substantial impact on citizens’ perceptions of the closeness of an electoral race. These perceptions should result in increased vote intentions for one of the major parties. We thus expect that error margins in public opinion polls —per se— increase citizens’ likelihood to vote for one of the leading political parties.

H1: Displaying error margins in opinion polls increases citizens’ vote intentions for one of the two leading political parties.

This effect should be particularly pronounced if the race is already highly contested. Assume that party A enjoys a 3-point lead over the second-placed party B in a poll with an error margin of 3 percentage points. In this situation, error margins will make voters aware that the electoral race is actually highly contested. In fact, the actual support of party A relative to the support of party B is between -3 and $+9$ points. Graphically, the two error bars

³Similar numbers were reported for Canada (Andersen 2000), Sweden (Oleskog Tryggvason and Strömbäck 2018), and Poland (Szwed 2011).

would overlap and voters would be able to see that their vote choice can have a significant impact on who will win the race.

In contrast, imagine a situation where party A enjoys a 8-point lead over party B. Showing error margins in this case should help voters realize that the race is not substantially contested and that strategic voting may not be worthwhile. Even in the most pessimistic scenario for party A, it will still gain 2 percentage points more than party B. As the error margins would not overlap, the voters should be able to recognize that the race is actually not close in this case. Hence, we expect that the effect of showing error margins is dependent on the closeness of the race. Formally, we hypothesize:

H2: Displaying error margins in opinion polls increases citizens' vote intentions for one of the two leading political parties in highly contested races.

Furthermore, opinion polls are seldom presented in isolation, but are usually part of larger media reports about the electoral campaign in question. While recent findings on the effect of news frames on citizens' political attitudes and behavior are mixed (see, e.g., Iyengar 2017; Amsalem and Zoizner 2022), several studies demonstrate that media framing and campaign priming can have substantial effects on citizens' turnout and vote decisions (e.g., Druckman 2004; Druckman and Parkin 2005; Schuck and de Vreese 2009; Coppock, Ekins, and Kirby 2018). In this context, previous work has long shown that poll results influence the nature of media reports about election campaigns, both in terms of salience and tonality with which candidates and parties are covered (Graber 1971; Patterson 2011). Much attention has also been paid to media's increased tendency to focus on even narrow margins in polls and to interpret them as definite win or lose margins (Larsen and Fazekas 2020). Such 'horserace' reporting becomes increasingly newsworthy the closer election days come (e.g., Aalberg, Strömbäck, and de Vreese 2012; Vögele and Bachl 2020). This kind of media coverage has been hypothesized and found to affect citizens' political attitudes and political knowledge (e.g., Valentino, Beckmann, and Buhr 2001; de Vreese 2004; Irwin and Van Holsteyn 2008).

To the best of our knowledge, however, little attention had been paid to the question of how different interpretations of one and the same public opinion poll affect citizens’ attitudes and political behavior. One notable exception is the study by Dahlgaard et al. (2017), which finds poll-induced voting behavior to be particularly pronounced if respondents are provided with realistic newspaper articles giving guidance on the interpretation of the estimates. Further anecdotal evidence gives reason to assume that journalists’ interpretation of polling estimates can be crucial for citizens’ responses to polls. Prior to the Brexit referendum in June 2016 in the United Kingdom, several opinion polls were published that showed a narrow lead for the remain camp. This caused media reports to conclude that the majority of British voters will vote against Brexit. On the day of the referendum, the pollster YouGov released a press statement saying that “a Remain victory is the more likely outcome” based on a poll showing a 52-48 lead for the Remain camp.⁴ Such conclusions would not have been warranted if the error margins had been considered correctly.⁵

We assume that framing effects play an important role when it comes to effects of error margins on citizens’ vote intentions. Voters are not accustomed to interpreting polls including error margins. Evaluating these polling results becomes a cognitively demanding task and voters might be more confident in their judgment if media reports give additional guidance on how to read the polls. As a consequence, the effect of displaying error margins in opinion

⁴<https://yougov.co.uk/topics/politics/articles-reports/2016/06/23/yougov-day-poll>

⁵Several further examples illustrate how media reports have declared a clear winner of an election campaign based on larger winning margins. For instance, polling estimates in the run-up to the 2005 German federal election indicated a 7 to 11 point lead of the centre-right Christian Democratic Union (CDU) and its ally, the Christian Social Union (CSU), over the trailing Social Democratic Party (SPD). Based on these polling estimates, media reports declared the CDU/CSU coalition the likely winner of the upcoming election. In the end, the mainstream right camp won the election by a narrow margin of one percentage point. Had the media reports taken into account the corresponding error margins, a more cautious interpretation would have been appropriate. In the 2019 Australian election, polls consistently showed a 2-4 percentage point of the Labor Party over the second-placed Liberal/National coalition. In the actual election, however, the Liberal/National coalition won 51.5% percentage of the TPP vote, while Labor gained 48.4%. Although this result has been within the error margin of the pre-election polls, media outlets described the situation as a “spectacular failure of opinion polling” (<https://www.canberratimes.com.au/story/6131876/massive-polling-failure-experts/?cs=14231>).

polls is potentially dependent on being accompanied by an accurate interpretation. Hence, we expect hypothesis 1 to be conditioned by the framing of polls and their error margins.

H3: Displaying error margins in opinion polls increases citizens' vote intentions for one of the two leading political parties if a frame underlines the closeness of the race.

Putting both arguments together, the framing of error margins should matter much more if the electoral race is highly contested. Imagine again the poll about the leading party A and second-placed party B with a margin of error of 3 points. If party A is very likely to win, i.e. enjoys a 8-point lead over the second-placed party B, the margins of the two leading parties do not overlap. If a journalist or an opinion pollster correctly interprets the poll, voters are explicitly made aware of the fact that the race is not contested and should not be motivated to change their vote choice to one of the two leading parties. In contrast, imagine that the race is highly contested and the margins of the two major parties overlap. If this poll is correctly interpreted, voters will notice the openness of the race and will be more likely to vote for one of the two leading parties. Hence, the last hypothesis expects that error margins only matter when both conditioning factors are present simultaneously.

H4: Displaying error margins in opinion polls increases citizens' vote intentions for one of the two leading political parties if a frame underlines the closeness of the race in highly contested races.

Research Design, Data, and Operationalization

Experimental study design

To provide evidence for the effect of polls' error margins on citizens' vote intentions, we draw on a factorial survey experiment, which we carried out in Germany in July and August 2021

(CAWI).⁶ The survey was thus conducted a few weeks before the German federal election that took place on September 29 2021. The target sample size of our survey was approximately 3000 and respondents were sampled to be nationally representative on age, gender, education, and region.⁷ In addition, cross-quotas on gender and age were used.

An experimental set-up is the best way of testing the effect of error margins causally due to several reasons. First, error margins are seldom correctly visualized and reported in media reports, which hinders inspecting error margins' influence in real-world settings. Second, where error margins are implemented, there is considerable variation in their presentation. While they are sometimes shown graphically, they are most often only noted below the poll in question without further explication. Third, polls are usually accompanied by a journalistic interpretation that potentially conditions and mediates polls' effects on citizens' vote intentions. At the very least, these factors considerably complicate the causal identification of error margins' effects on voting behavior using a quasi-experiment or observational data. Employing a survey experiment, we are able to manipulate the display of error margins, the closeness of the electoral race, and the framing of the polling results independently from each other. This allows us to estimate the isolated and combined effects of these three dimensions on citizens' vote intentions.

The electoral context

Conducting the experiment in Germany in July and August 2021 is ideal to test the discussed hypotheses for two reasons.

First, our main aim is to inspect whether voters have a higher propensity to vote for one of the two leading political parties if exposed to error margins in opinion polls. At the time the survey experiment was fielded, the centre-left Green Party and the centre-right Christian Democratic Union/Christian Social Union (CDU/CSU) were the two main parties in the polls.

⁶A pre-test with 300 respondents was conducted in July 2021.

⁷Respondents were German citizens aged between 18 and 69 living in Germany.

While the incumbent CDU/CSU has been clearly ahead in the polls for most of the year 2020, the Greens became its most relevant challenger throughout 2021 (Faas and Klingelhöfer 2022). Since 2018, the party polled in front of the third-placed Social Democrats (SPD). After record showings in state elections in Rhineland-Palatinate and Baden-Württemberg in March 2021, the party even managed to poll first in many opinion polls later on. Overall, the polls since May showed great variation regarding which party had the most support among voters. For instance, a poll published by the public opinion polling institute *Forschungsgruppe Wahlen* on July 16 indicated a 10 point lead of the CDU/CSU. A poll published by the same institute one month earlier showed the Greens to be in front by one percentage point. As a consequence, respondents of the survey experiment could be plausibly exposed to different polls that either saw the CDU/CSU clearly ahead or suggested a close race between the Greens and the CDU/CSU. We see this as a major advantage with regard to the external efficacy of our study. Instead of using fictitious parties or polling results, we are able to test the proposed hypotheses in a real-world setting.

Second, we focus on strategic vote choices in favor of one of the two leading parties. Hence, we want to hold other incentives of strategic voting as constant as possible. At the time of the survey, no post-election government coalition has been officially favored by the competing parties. In fact, government constellations ranging from a centre-right coalition (CDU/CSU and FDP) to a “grand coalition” (CDU/CSU and Greens) to a leftist coalition (Greens, the SPD, and the Left) have been possible and publicly discussed by the leaders of all parties. The decision as to which coalition would be formed after the election thus depended to a large extent on which political party would win the largest seat share in parliament. As a consequence, incentives for policy balancing have been low. Furthermore, none of the smaller parties was expected to fall below the 5% electoral threshold. Citizens had thus little incentives to avoid a wasted vote or to engage in threshold insurance voting.

All in all, the campaign context in which the survey experiment was conducted should have motivated voters to focus on which political party would become the strongest in the election. The fact that German chancellors have always been nominated by the party that won the election underscores this incentive. Alternative forms of strategic voting should have played a small role in voters’ calculi.

Procedure

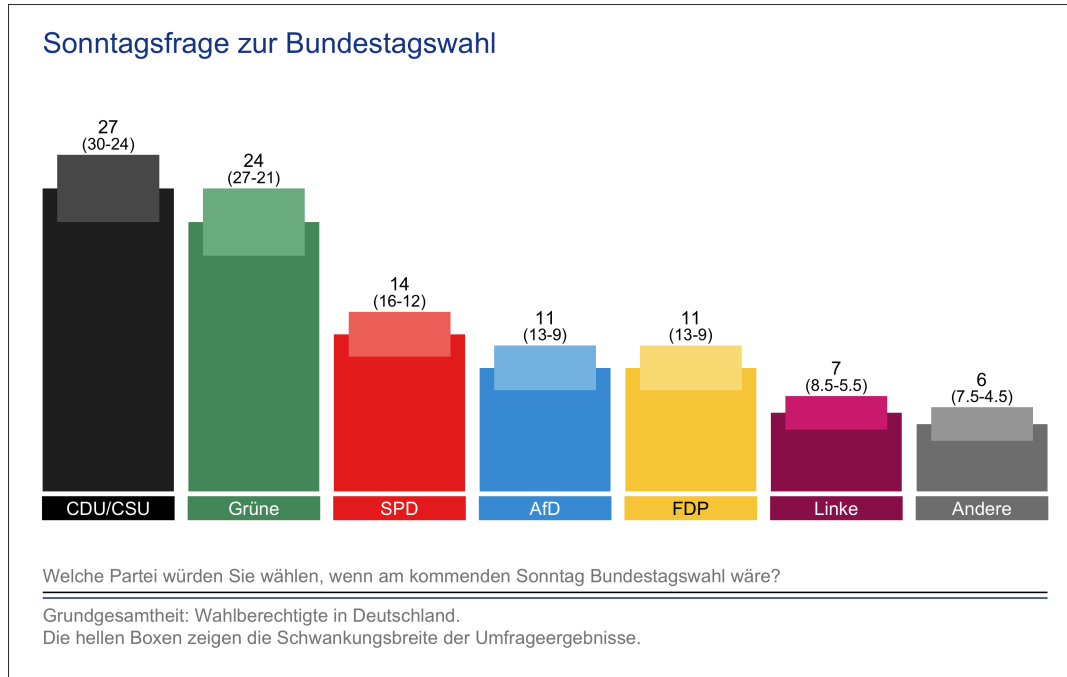
We use a 2 x 2 x 2 full factorial design with a total of eight experimental groups. Each of these groups was exposed to a vignette featuring a polling result that varied along three dimensions: the display of error margins, the gap between the polling estimates of the two major parties, and the framing of the poll.⁸ To maximise the external efficacy of the study, respondents were informed that the poll was conducted by a reputable German polling institute that would be published the next day.

Figure 1 shows one of the eight vignettes and Table 1 gives an overview of all manipulated treatment conditions.⁹ The vignette has three main parts: First, the graph shows the results of the opinion poll. The poll results indicate either a small (3 pp, close [+]) or large (8 pp, not close [−]) difference between the two leading parties, depending on the **race (R)** condition. Importantly, to avoid any further additional strategic voting incentives, the polling estimates of all other political parties are held constant. Second, depending on the **margins (M)** condition, error margins were shown [+] or not shown [−]. The margins were displayed graphically and mentioned in numbers above the bars. Third, there were two sentences below the poll. The first sentence of the statement varied depending on the **frame (F)** condition. A close-frame [+] states that “The Greens and the CDU/CSU are almost tied in the poll”, while the not-close frame [−] reads as “The CDU/CSU is clearly ahead in the poll”. In the

⁸Importantly, respondents were debriefed after the survey by stating that the polling data they saw was not real.

⁹Figure A1 and Figure A2 in the Appendix show all vignettes used in the experiment.

Figure 1: Example Vignette (1: M[+], R[+], F[+])



“The Greens and the CDU/CSU are almost tied in the poll. The error margins (in parentheses) show that both the CDU/CSU and the Greens can still win the election.”

second sentence of the statement, the poll is further interpreted depending on the frame and margins condition. If the margins are shown, the margins are also mentioned in the text.

Before being exposed to the treatment, respondents were asked on sociodemographic and political characteristics, such as their citizenship, age, gender, place of residence, education, and their vote choice in the last German general election in 2017. After that, one of the eight experimental conditions was shown to the respondents. Respondents were advised to take a close look at the poll and were allowed to continue with the survey after at least 30 seconds. In the following, we asked the respondents to indicate their propensity to vote (PTV) for each of the six German political parties that were likely to enter the national parliament in the upcoming election. More concretely, we asked for respondent’s propensity to vote in the proportional component of the German electoral system. The response scales ranged from 0 (very unlikely) to 10 (very likely). As our main interest lies in citizens’ vote intentions for

Table 1: Overview of Experimental Groups

Vignette	Margins (M)	Race (R)	Frame (F)
1	[+]	[+]	[+]
2	[-]	[+]	[+]
3	[+]	[+]	[-]
4	[-]	[+]	[-]
5	[+]	[-]	[+]
6	[-]	[-]	[+]
7	[+]	[-]	[-]
8	[-]	[-]	[-]
Levels	shown [+] or not shown [-]	close [+] or not close [-]	close [+] or not close [-]

the two strongest parties, the following analyses focus on respondents' PTV scores for the Greens and the CDU/CSU.

Our main aim lies in estimating the effect of showing error margins. Hence, we aim to compare conditions *1 vs 2*: $R[+]$, $F[+]$, *3 vs 4*: $R[+]$, $F[-]$, *5 vs 6*: $R[-]$, $F[+]$, and *7 vs 8*: $R[-]$, $F[-]$. We employ OLS regression using the following formula:

$$\begin{aligned}
Y_i = & \beta_0 \\
& + \beta_1 M_i + \beta_2 R_i + \beta_3 F_i \\
& + \beta_4 M_i x R_i + \beta_5 M_i x F_i + \beta_6 R_i x F_i \\
& + \beta_7 M_i x R_i x F_i + \epsilon_i,
\end{aligned} \tag{1}$$

where i denotes the respondents and Y our two outcome variables, the PTV scores for the CDU/CSU and the Greens. M , R , and F are binary variables describing the three treatment dimensions. To investigate the impact of showing error margins, we introduce a three-way interaction between these three variables and focus on the marginal effect of showing error

margins conditional on the race and the frame condition. To confirm hypothesis 1, the results should indicate a positive marginal effect for all four effects in which we compare showing error margins to omitting them (*1 vs 2: $R[+]$, $F[+]$* , *3 vs 4: $R[+]$, $F[-]$* , *5 vs 6: $R[-]$, $F[+]$* , and *7 vs 8: $R[-]$, $F[-]$*). If however, the effect of error margins is dependent on how contested the electoral race is (hypothesis 2), the effect groups *1 vs 2: $R[+]$, $F[+]$* and *3 vs 4: $R[+]$, $F[-]$* should show a positive effect. Conversely, positive effects for the effect groups *1 vs 2: $R[+]$, $F[+]$* and *5 vs 6: $R[-]$, $F[+]$* would indicate support for hypothesis 3 as the effect of error margins would be conditional on a corresponding frame. Finally, we would find support for hypothesis 4 if only vignette 1 would show a positive effect on respondents' PTV scores (*1 vs 2: $R[+]$, $F[+]$*).

Empirical Results

Turning to the results, we theorized several possible effects of including error margins in opinion polls on vote intentions for one of the two major parties. In our experimental framework, the two leading parties are the CDU/CSU and the Greens. The results for our core models can be seen in Table 2.

Models 1 and 3 give results where we regress the PTV scores on the three experimental characteristics without using any interaction terms. This is a first simplistic test of hypothesis 1 in which we expected that error margins per se increase the vote intentions for one of the two leading parties. As one can see, the coefficient of the error margins condition is close to zero and not statistically significant in both models. Holding all other factors constant, we thus find no evidence in support for hypothesis 1. Contrary to our expectations, model 1 shows a negative and statistically significant effect for the race condition.¹⁰ This indicates that respondents' intentions to vote for the CDU/CSU have decreased if the polls indicated

¹⁰We also conducted t-tests for all three treatments and both dependent variables. Similar like the multivariate model, there is only one significant difference: the mean of PTV for CDU/CSU is higher in case of a not close race than in a close race ($p = 0.04$).

a contested race. However, this effect might be subject to the influence of the two other treatment conditions.

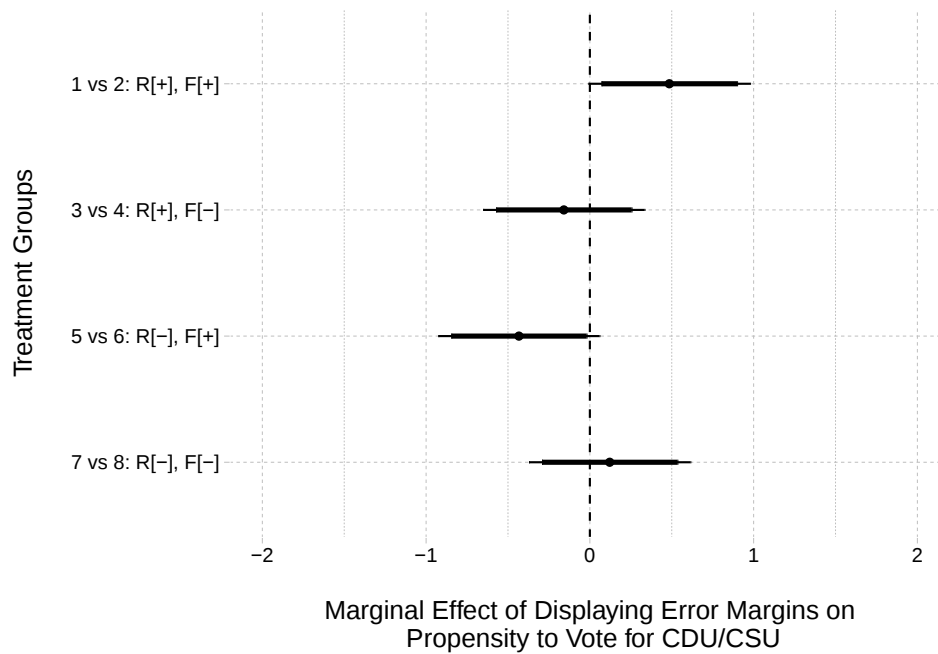
Table 2: Estimating the PTV for CDU/CSU and Greens

	DV: PTV CDU/CSU		DV: PTV Greens	
	(1)	(2)	(3)	(4)
Margins	0.003 (0.126)	0.121 (0.251)	0.108 (0.131)	-0.042 (0.262)
Close Race	-0.256** (0.126)	0.073 (0.252)	0.015 (0.131)	0.251 (0.262)
Close Frame	0.162 (0.126)	0.629** (0.252)	-0.043 (0.131)	-0.379 (0.262)
Margins*Race		-0.280 (0.355)		-0.430 (0.370)
Margins*Frame		-0.554 (0.355)		0.715* (0.370)
Race*Frame		-0.978*** (0.356)		-0.057 (0.371)
Margins*Race*Frame		1.198** (0.503)		0.028 (0.524)
Constant	3.619*** (0.126)	3.465*** (0.178)	3.253*** (0.131)	3.318*** (0.186)
Observations	3,224	3,224	3,224	3,224
Adjusted R ²	0.001	0.003	-0.001	0.001
<i>Note:</i>		*p<0.1; **p<0.05; ***p<0.01		

Models 1 and 3 serve only as an initial benchmark. To test the full set of hypotheses, models 2 and 4 present regression results where we introduce interaction effects between all three treatment conditions. Recall that our main interest relates to whether one and the same opinion poll changes citizens' vote intentions depending on whether error margins are shown or not. To ease interpretation of the interaction terms, Figure 2 and Figure 3 show the corresponding effects of the margins-condition moderated by the two other treatment conditions, i.e., whether the race is highly contested and whether a frame underlines the openness of the race.

Figure 2 suggests that hypotheses 1 to 3 cannot be confirmed in the case of the CDU/CSU. Only the first treatment group (*1 vs 2: R[+], F[+]*) shows a statistically significant and

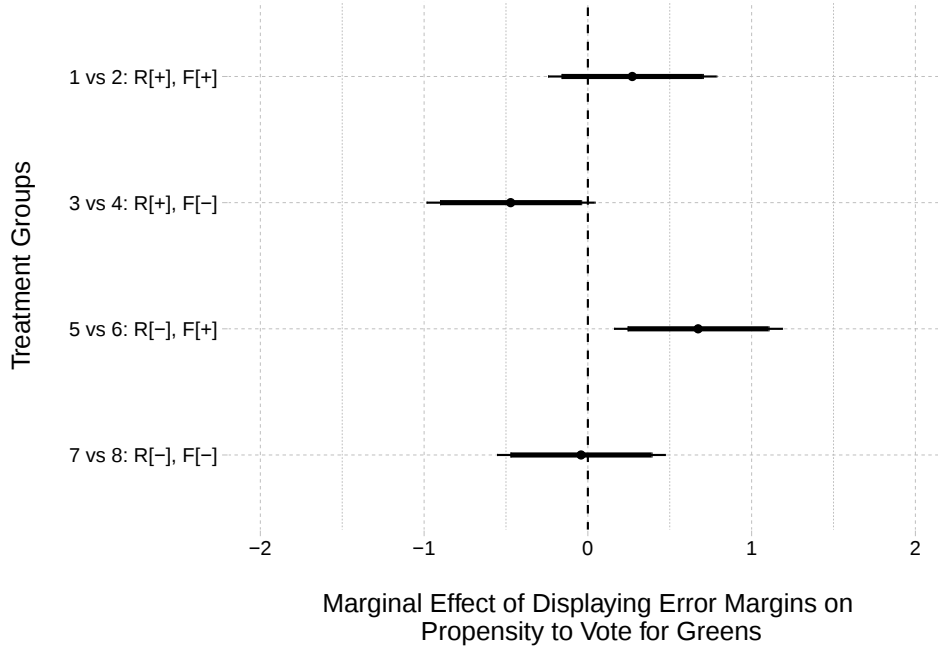
Figure 2: Marginal Effects of Displaying Error Margins on Vote Intentions for the CDU/CSU



Notes: Marginal effects based on three-way interactions shown in model 2 in Table 2. Error bars show 90% (thick lines) and 95% (thin lines) confidence intervals.

positive effect lending support for hypothesis 4. Hence, if the race is highly contested and the frame acknowledges the closeness between the two strongest parties, showing error margins in the polls increases respondents' PTV scores for the CDU/CSU by roughly .5 points on an 11-point scale. In addition, Figure 2 shows a borderline significant, negative treatment effect for comparing treatment condition 5 and 6. Here, the respondents were provided with polling results that showed the leading CDU/CSU clearly ahead, while the corresponding frame indicated that the race was still contested. To interpret this result, remember that our dependent variable are propensity to vote scores for the respective parties across all voters. Hence, it might be possible that this treatment condition has motivated some voters in favor of the Greens while simultaneously demotivating these voters to cast their vote for the leading CDU/CSU.

Figure 3: Marginal Effects of Displaying Error Margins on Vote Intentions for the Greens



Notes: Marginal effects based on three-way interactions shown in model 4 in Table 2. Error bars show 90% (thick lines) and 95% (thin lines) confidence intervals.

Regarding the Greens, the marginal effects plot (Figure 3) paint a different picture. We do not observe statistically significant effects that would support either of the hypotheses. In fact, the results show a positive treatment effect only when the race was not contested but framed in a close way (5 vs 6: $R[-]$, $F[+]$). In this situation, respondents seemed convinced that the Greens could still catch up, as the shown error margins indicated that the actual lead of the CDU/CSU could only be two percentage points. This effect is substantial in size indicating that respondents' PTV scores increased by .67 points on an 11-point scale.

All in all, we find support for the idea that error margins can affect citizens' vote intentions. Consistent with the expectation that voters are particularly attentive to which political party can become the strongest force in parliament, our results suggest that error margins mobilize voters in favor of one of the leading parties. However, the framing of the polling results turns out to be decisive in this regard. Only if respondents are provided with additional interpretative guidance underlining the openness of an electoral race, they are willing to

change their vote intention. At the same time, the presented findings leave some questions open. On the one hand, we find a borderline significant and negative effect in the case of CDU/CSU for the treatment condition 5 *vs* 6: $R[-]$, $F[+]$, which requires further explanation. On the other hand, none of the proposed hypotheses was clearly confirmed in the case of the Green party. Instead, we find a positive and significant effect for situations in which error margins are shown together with polls suggesting that an electoral race is seemingly decided. To further explore the plausibility of these results, we continue in the next section with analyzing heterogeneous treatment effects across different ideological subgroups.

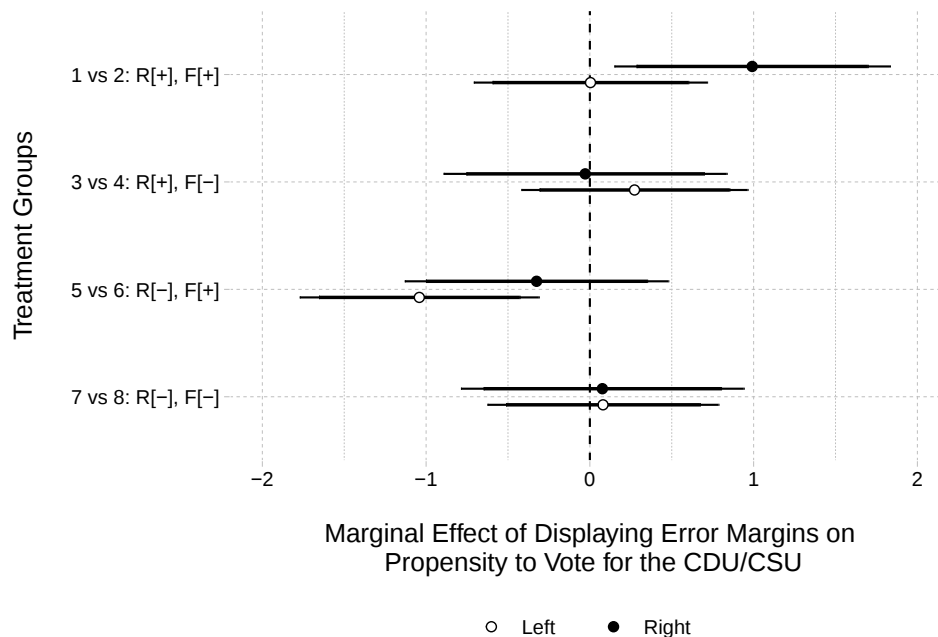
Heterogenous Treatment Effects Across Ideological Sub-Groups

In this section, we shed more detailed light on the heterogeneity of the treatment effects across different voter groups. As explicated above, the closeness of an electoral race should increase voters' inclination to vote for one of the two leading political parties. However, we should not expect this effect to be constant across all voter groups. Instead, voters of different ideological camps should be either incentivized to vote for the center-right CDU/CSU or the center-left Greens once they perceive the electoral race to be close.

To inspect the conditioning role of citizens' ideological orientations, we rely on respondents' reported vote choice in the last German general election that took place in 2017 and split the survey sample in two groups. The "centre-right" voters are those respondents who voted for the CDU/CSU or FDP in the last general election ($n=993$). We expect that group to move toward the leading party CDU/CSU if the race is perceived to be close. The "centre-left" voters are those respondents who voted for the SPD, the Greens, or the Left in the last election ($n=1201$).¹¹ This group should show a higher inclination to vote for the Greens if the race is perceived as close. Based on this distinction, we re-calculate Models 2 and 4 from

¹¹The question was asked pre-treatment. We exclude former AfD voters as this voter group has been frequently found to be "beyond competition". Hence, AfD voters are disproportionately less likely to vote for a party other than the AfD (Wagner 2017). For that reason, we do not expect these voters to be responsive to election polls.

Figure 4: Marginal Effects of Displaying Error Margins on Vote Intentions for the CDU/CSU Conditional on Past Vote Choice



Notes: Marginal effects based on three-way interactions shown in Models 1 and 2 in Table A1 in the Appendix. Error bars show 90% (thick lines) and 95% (thin lines) confidence intervals.

Table 2 separately for both groups. The full regression results are shown in Table A1 in the Appendix.

Figure 4 gives the resulting marginal effects on the vote propensities for the CDU/CSU. As expected, our main finding from Figure 2 is confirmed only for right-leaning voters. Showing error margins has a positive effect on these respondents' propensities to vote for the CDU/CSU if the race is highly contested and the frame underlines the closeness of the race (1 vs 2: R[+], F[+]). This finding speaks in favor of the idea that the race is perceived as uncertain in this case, which motivates right-leaning respondents to make sure that their preferred formateur will be able to lead the post-electoral coalition talks. Furthermore, we see that the negative treatment effect of the condition 5 vs 6: R[-], F[+] is restricted to left-leaning voters, which indicates that these voters are less likely to for the CDU/CSU.

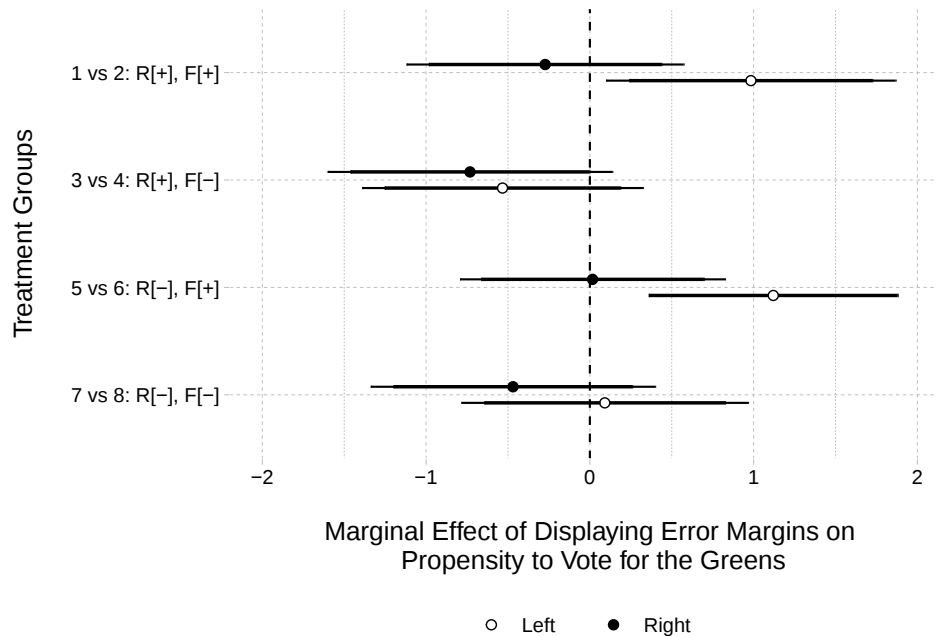
Figure 5 shows the corresponding marginal effects on respondents' PTV scores for the Greens. We again replicate the effect from the main table: Centre-left voters have a higher propensity to vote for the Greens if margins are shown, the frame is close and the race is not contested (*5 vs 6: R[-], F[+]*). Importantly, the figure also shows a statistically significant positive effect for the vignette that shows a close poll together with a frame underlining the openness of the race (*1 vs 2: R[+], F[+]*). We thus find support for hypothesis 3 in this situation: showing error margins increases centre-left voters' PTV values for the Greens if the frame underlines the openness of the electoral outcome, independent from the race condition.

These results are in line with our theoretical expectations on voters' strategic vote choices in close races. Error margins matter for citizens' vote choices if election outcome is uncertain. In this situation, centre-right voters are more likely to vote for the CDU/CSU and centre-left voters are more inclined to vote for the Greens. This effect prevails in the case of the centre-left voters independent of the actual closeness of the race. Crucially, the interplay between the display of error margins and the framing of the polling results are decisive for this effect. Furthermore, note that the effect sizes are considerably higher in these sub-group analyses. Overall, error margins can change citizens' vote intentions by one unit on an 11-point scale in favor of one of the major parties.

Robustness Checks

In the previous analyses, we made use of respondents' propensity to vote scores for the CDU/CSU and the Greens as the dependent variables. While PTV scores allow to estimate individuals' overall inclination to vote for all relevant political parties, they come with the disadvantage that increases or decreases in respondents' PTV values for single political parties are not necessarily consequential for their voting behavior. The preceding analyses indicate that respondents' PTV scores can change by up to one unit on a scale of 0 to 10. Consider, for example, a voter whose PTV score for the CDU/CSU has increased by one unit from 6 to 7 as a consequence of the experimental treatments. If that voter also has a PTV score

Figure 5: Marginal Effects of Displaying Error Margins on Vote Intentions for the Greens Conditional on Past Vote Choice



Notes: Marginal effects based on three-way interactions shown in Models 3 and 4 in Table A1 in the Appendix. Error bars show 90% (thick lines) and 95% (thin lines) confidence intervals.

of 10 for the market-liberal Free Democratic Party (FDP), we have little reason to believe that the poll has changed that person's voting decision.¹² However, if the CDU/CSU has become the party with the highest PTV value for this person, we can reasonably conclude that the treatment is decisive for this person's voting decision. Furthermore, we also need to make sure that our results are not exclusively driven by non-voters. If only the PTV scores of respondents with a low probability of voting on election day anyway respond to the treatment, we should be hesitant to conclude that error margins matter for actual election outcomes. To address these concerns, we re-estimated the models underlying Figure 4 and Figure 5 in two ways.

First, we made use of a transformed version of the PTV scores. Following van der Eijk et al. (2006), we constructed two dichotomous variables indicating voter support for the

¹²Previous work on PTV scores has shown that they do relate to actual voting decisions. Hence, respondents usually give the highest PTV score to the party they actually vote for (van der Eijk et al. 2006; Wagner and Krause 2021).

CDU/CSU or the Greens following two criteria. The first criterion is that a respondent had a PTV score of 6 or higher for the CDU/CSU or the Greens. The second criterion is that the respondent actually gave his/her highest PTV score to one of the two parties. If we find effects similar to those presented in the main text with these alternative dependent variables, we take this as a sign that error margins are indeed influential for citizens' vote choices. Figure A3 and Figure A4 in the Appendix show the corresponding marginal effect plots. Overall, we find broad support for our main findings. The results indicate that right-wing respondents are more likely to vote for the CDU/CSU if the vignette shows a contested race that is accompanied by an interpretative frame underlining the openness of the race (*1 vs 2: R[+], F[+]*). In the case of the Greens, we find positive and statistically significant marginal effects for left-wing voters. More concretely, error margins influence vote choice positively if a vignette shows a interpretative frame highlighting that the Greens can still become the strongest force in the election (*1 vs 2: R[+], F[+]* and *5 vs 6: R[-], F[+]*). These results thus replicate the findings presented in the main text.

Second, we also directly test whether our results are driven by respondents who are unlikely to go to the voting booth on Election Day. Note that the model results presented in Figure 4 and Figure 5 already excluded all voters who did not cast a vote in the 2017 general election. In addition, we also asked in our survey how likely respondents thought it was that they would vote in the upcoming election and excluded all respondents who indicated that they were very likely or certain not to vote in the upcoming election. Table A3 as well as Figure A5 and Figure A6 in the Appendix show the corresponding results, which confirm the conclusions discussed earlier.

Conclusion

Despite the widely held belief that displaying error margins is important for communicating opinion poll results to the public, the consequences of such a decision remain largely under-

theorized and unexplored. Even more, skepticism remains whether voters can understand the concept of error margins and make sense out of this additional methodological information (Lordan 1993; Wichmann 2010; Bhatti and Pedersen 2016). This study is the first to provide evidence on whether and when error margins in opinion polls influence citizens' voting decisions.

We theorized that error margins can increase citizens' perceptions of the openness of an electoral race before election day. Based on theories on the calculus of voting (Riker and Ordeshook 1968) and strategic voting (Cox 1997, 2018), voters will have a higher likelihood to vote for one of the major parties when error margins are shown to them. The experimental results provide evidence that error margins indeed cause voters to vote for one of the parties that are leading in the polls. However, this effect depends on two conditions: the actual closeness between the major parties and the existence of an interpretative framework that emphasizes the openness of the race. In our study, error margins increased right-leaning citizens' inclination to vote for the main centre-right party if the race was highly contested and a frame highlighted the openness of the electoral race. The experiment also showed that independent from how close the race is, framing the poll as indecisive is enough that margins increase the propensity to vote for the second-placed party, the centre-left Greens. This effect is, again, conditioned by the ideological orientation of the respondents: particularly left-leaning voters increased their PTV for the Greens. Additional robustness checks indicate that displaying error margins in opinion polls can have a substantial impact on individuals' vote choices and subsequent election results.

This study does not come without limitations. We focus exclusively on the question of whether error margins affect vote decisions in favor of the major parties contesting an election. It remains to be studied to what extent the display of polls and their interpretation can also affect the electoral fortunes of smaller parties. For instance, voters could opt for or against political parties that are on the borderline of parliamentary representation. If error margins

would indicate that a small party is likely to fall below an electoral threshold, voters might realize how decisive a vote for this party can be (Fredén 2014; Cox 2018). Relatedly, much recent scholarship has demonstrated that voters engage with more complex vote choices beyond strategic sequencing, such as policy balancing (Kedar 2005; Gschwend and Meffert 2017). It remains to be further examined whether and how voters’ strategic calculi regarding post-electoral bargaining structures are affected when error margins are provided.

This study focuses on electoral competition in a single country employing a mixed electoral system. However, based on the literature on contested races (see e.g. Levine and Palfrey 2007; Duffy and Tavits 2008; Westwood, Messing, and Lelkes 2020), we cannot think of strong reasons to assume that our results could not be generalized to other countries employing purely proportional or majoritarian electoral rules. To the contrary, the long research tradition on close races in majoritarian electoral systems—such as the US, the UK, or Canada—suggests that voters should have even greater incentives to focus on which party will be the strongest in an upcoming election. Nevertheless, replications of our results in other countries are mandatory to allow robust conclusions about the effect of error margins in opinion polls beyond the case under study.

As there is no observational data available that would allow to test the causal effect of error margins on citizens’ vote choices, we developed an experiment with the goal of maximizing the external validity of the results. For that purpose, we have designed vignettes that appeared as realistic as possible in terms of layout and polling results. Furthermore, this is one of the first studies that also inspected the conditional role of interpretative frames surrounding opinion polls. Our results underline the importance that journalists can play in guiding voters’ interpretation of polling results. Nevertheless, our treatment is restricted to only two sentences and do not resemble real-world reports on election campaigns. Future research will thus focus more strongly on inspecting the influence of media frames of polling results and their impact on citizens’ vote decisions.

Beyond contributing to our understanding of how error margins affect citizens’ vote preferences, this study also adds to broader debates on the “power of polls” (Roy, Singh, and Fournier 2021) in nowadays democracies. Our findings illustrate that polls, whose number has increased substantially in recent years, can become decisive for election outcomes and that displaying them with greater accuracy can help voters making more informed vote choices. The results, thus, speak to the literature on contested races and the crucial role that polling results can play in guiding voter expectations (see e.g. Levine and Palfrey 2007; Duffy and Tavits 2008; Westwood, Messing, and Lelkes 2020). Furthermore, our findings speak against the idea that framing effects are negligible and at best have little implications for individuals’ political behavior (see for an overview: Amsalem and Zoizner 2022). To the contrary, we find that the work of journalists in guiding their audiences through a correct interpretation of poll results can be decisive. Hence, even simple mentions of the fact that projected winning margins of leading parties are within the margin of error can help voters in interpreting poll results more accurately. As a consequence, we believe that pollsters and public opinion experts should continue and intensify their efforts to communicate the methodological details of opinion polls as transparent as possible (Beckers 2021). Finally, our findings also speak to broader debates about how scientific research results are best communicated to the public (Podkul et al. 2020). For instance, Daoust and Bastien (2021) studied the impact of incorporating confidence intervals in predicted mortality rates in the context of the COVID-19 pandemic and found no effect on citizens’ policy preferences. Westwood, Messing, and Lelkes (2020) examined the effect of meta-analytic forecasts of opinion polls in the US. They found voters mostly confused and less likely to vote. Our study adds to this ongoing debate and indicates that error margins can indeed have a meaningful impact on citizens’ understandings of political phenomena. Hence, we find no indication that providing technical details about scientific research results does overwhelm or even confuse the public, especially when guiding them with an appropriate interpretation.

Overall, we expect that opinion polls' relevance for elections will increase in the future. As a result, debates on how to best communicate polling results will prevail. This study offered a first step toward a better understanding of how and when voters respond to a transparent display of the uncertainty surrounding polling estimates.

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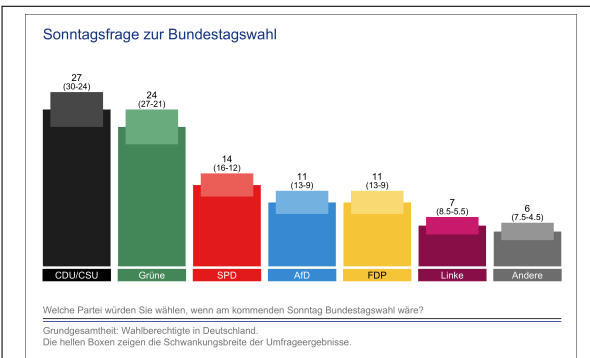
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Appendix

Vignettes

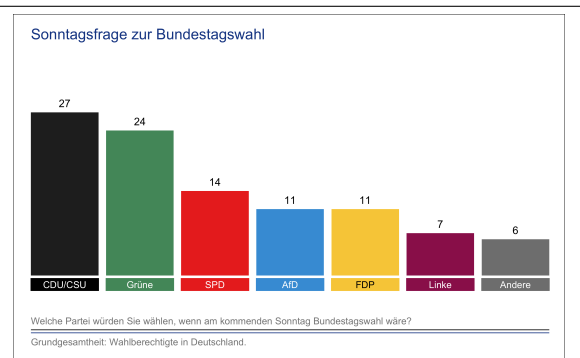
Figure A1: Conditions 1-4

Condition 1: M[+], R[+], F[+]



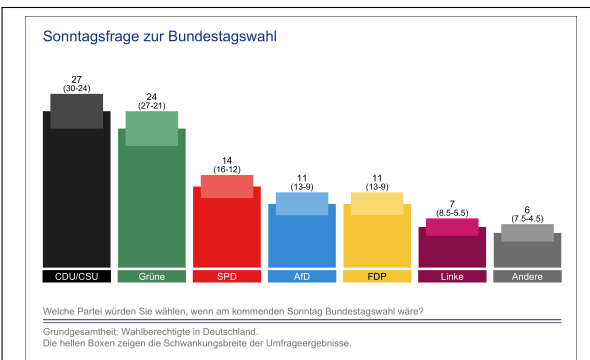
“The Greens and CDU/CSU are almost tied in the poll. The margins of error (in parentheses) show that both the CDU/CSU and the Greens can still win the election.”

Condition 2: M[-], R[+], F[+]



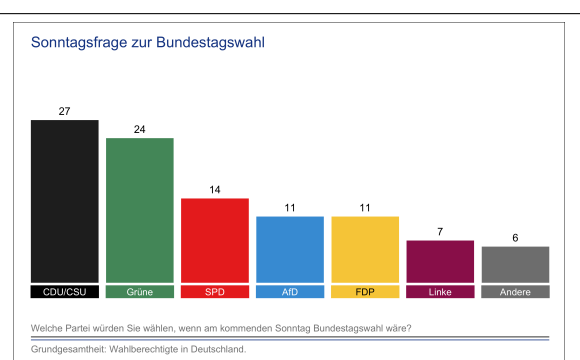
“The Greens and the CDU/CSU are almost tied in the poll. The poll shows that both the CDU/CSU and the Greens can still win the election.”

Condition 3: M[+], R[+], F[-]



“The CDU/CSU is clearly ahead in the poll. The margins of error (in parentheses) show that the lead of the CDU/CSU is as much as 9 p.p.”

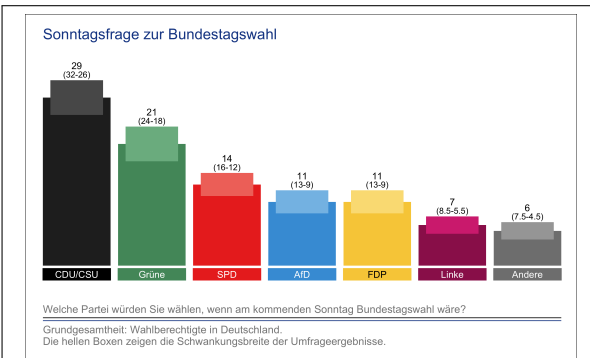
Condition 4: M[-], R[+], F[-]



“The CDU/CSU is clearly ahead in the poll. The poll shows that only the CDU/CSU can win the election.”

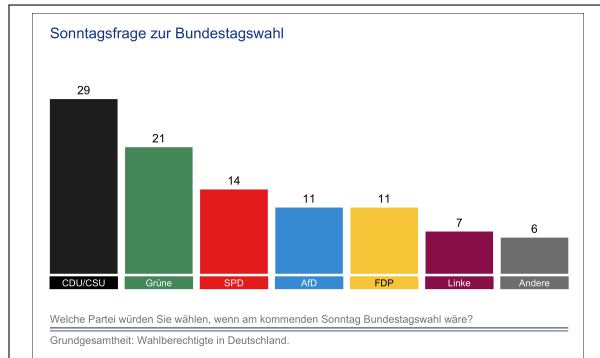
Figure A2: Conditions 5-8

Condition 5: M[+], R[-], F[+]



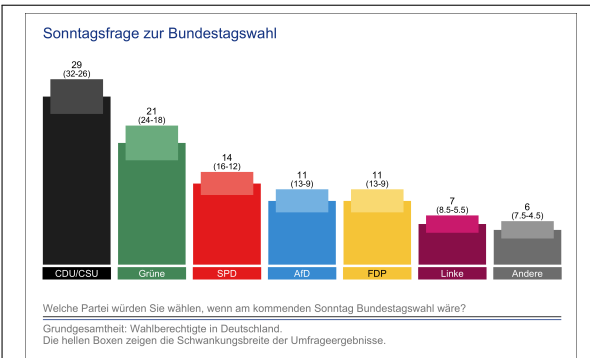
“The Greens and the CDU/CSU are almost tied in the poll. The margins of error (in parentheses) show that the difference between the both parties could be as small as 2 p.p.”

Condition 6: M[-], R[-], F[+]



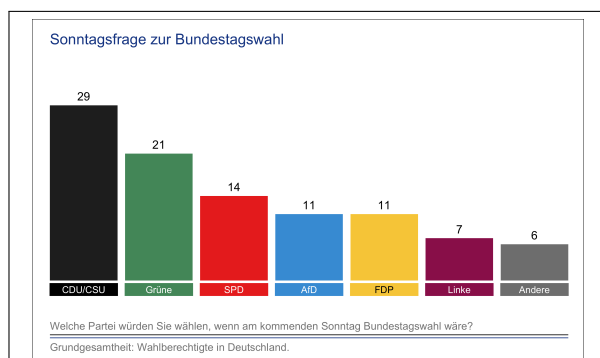
“The Greens and the CDU/CSU are almost tied in the poll. The poll shows that both parties can still win the election.”

Condition 7: M[+], R[-], F[-]



“The CDU/CSU is clearly ahead in the poll. The margins of error (in parentheses) show that the lead of the CDU/CSU is between 2 and 14 percentage points.”

Condition 8: M[-], R[-], F[-]



“The CDU/CSU is clearly ahead in the poll. The poll shows that only the CDU/CSU can win the election.”

Full Regression Tables

Table A1: The Effect on PTV for the CDU/CSU and the Greens Dependent on Past Vote Choice

	DV: PTV CDU/CSU		DV: PTV Greens	
	Past Left Vote	Past Right Vote	Past Left Vote	Past Right Vote
	(1)	(2)	(3)	(4)
Margins	0.080 (0.360)	0.076 (0.441)	0.091 (0.447)	-0.469 (0.443)
Close Race	0.822** (0.376)	0.419 (0.421)	-0.364 (0.466)	-0.553 (0.424)
Close Frame	-0.234 (0.365)	0.314 (0.447)	0.431 (0.453)	0.074 (0.449)
Margins*Race	-1.122** (0.518)	-0.402 (0.602)	1.029 (0.643)	0.486 (0.606)
Margins*Frame	0.192 (0.504)	-0.105 (0.623)	-0.624 (0.625)	-0.262 (0.627)
Race*Frame	-0.788 (0.520)	-1.233** (0.607)	-0.395 (0.645)	0.276 (0.610)
Margins*Race*Frame	0.853 (0.724)	1.421* (0.861)	0.488 (0.899)	-0.027 (0.866)
Constant	2.750*** (0.265)	6.045*** (0.319)	4.879*** (0.328)	3.268*** (0.321)
Observations	1,201	993	1,201	993
Adjusted R ²	0.004	0.001	0.005	-0.002

Note:

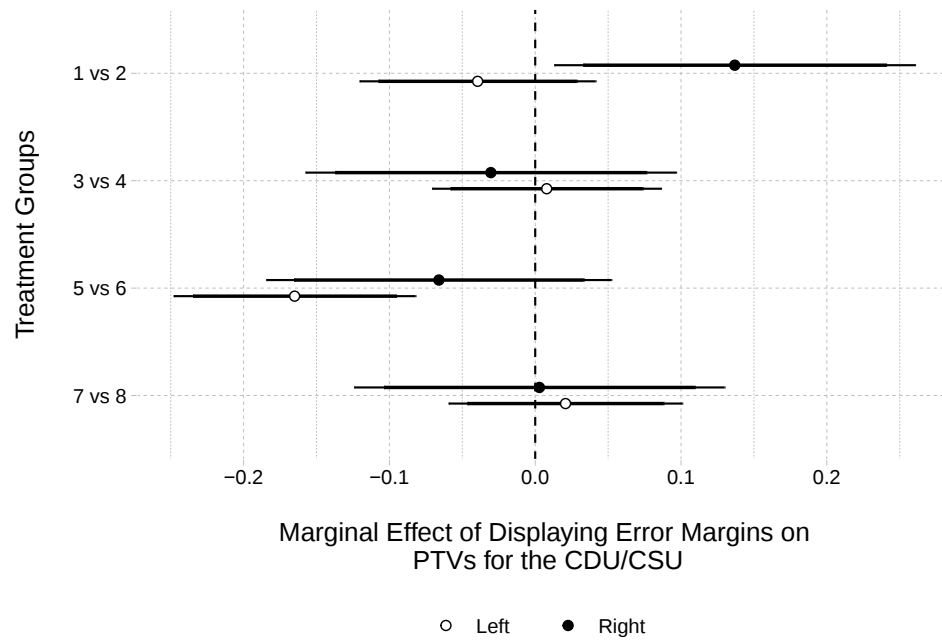
*p<0.1; **p<0.05; ***p<0.01

Alternative Operationalization of Dependent Variable

Table A2: The effect on CDU/CSU and Green Vote Choice

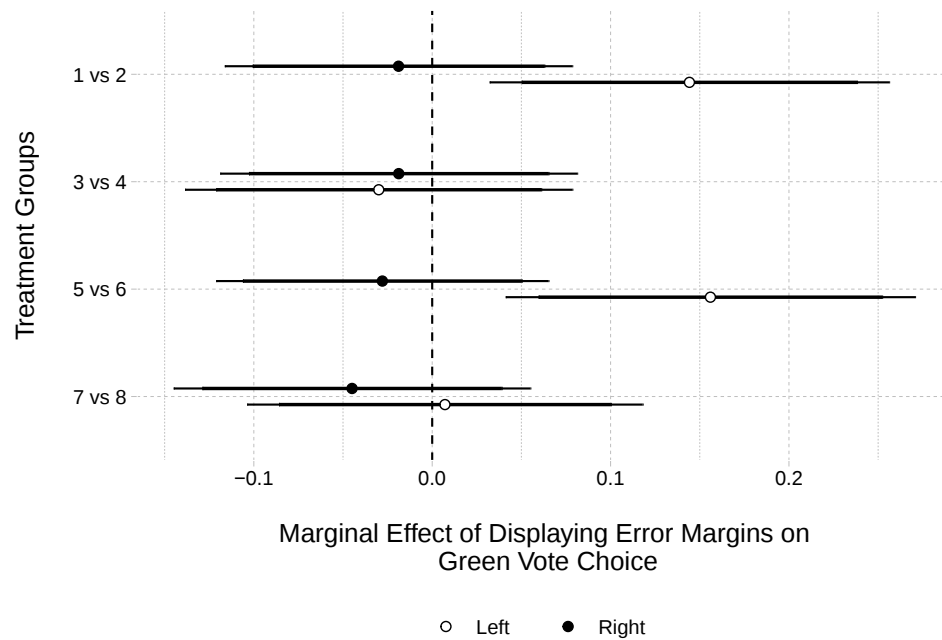
	DV: CDU/CSU Vote Choice		DV: Green Vote Choice	
	Past Left Vote	Past Right Vote	Past Left Vote	Past Right Vote
	(1)	(2)	(3)	(4)
Margins	0.021 (0.041)	0.003 (0.065)	0.007 (0.057)	-0.045 (0.051)
Close Race	0.133*** (0.043)	0.049 (0.062)	-0.052 (0.059)	-0.016 (0.049)
Close Frame	-0.020 (0.041)	0.036 (0.066)	0.078 (0.057)	-0.001 (0.052)
Margins*Race	-0.186*** (0.059)	-0.069 (0.089)	0.149* (0.081)	0.017 (0.070)
Margins*Frame	-0.013 (0.057)	-0.033 (0.092)	-0.037 (0.079)	0.026 (0.072)
Race*Frame	-0.101* (0.059)	-0.192** (0.089)	-0.076 (0.082)	-0.019 (0.070)
Margins*Race*Frame	0.138* (0.082)	0.236* (0.127)	0.025 (0.114)	-0.017 (0.100)
Constant	0.143*** (0.030)	0.554*** (0.047)	0.393*** (0.042)	0.214*** (0.037)
Observations	1,201	993	1,201	993
Adjusted R ²	0.012	0.001	0.008	-0.005
<i>Note:</i>			*p<0.1; **p<0.05; ***p<0.01	

Figure A3: Marginal Effects of Displaying Error Margins on Vote Choice for the CDU/CSU Conditional on Past Vote Choice



Notes: Marginal effects based on three-way interactions shown in models 1 and 2 in Table A2. Error bars show 90% (thick lines) and 95% (thin lines) confidence intervals.

Figure A4: Marginal Effects of Displaying Error Margins on Vote Choice for the Greens Conditional on Past Vote Choice



Notes: Marginal effects based on three-way interactions shown in models 3 and 4 in Table A2. Error bars show 90% (thick lines) and 95% (thin lines) confidence intervals.

Replication without unlikely voters

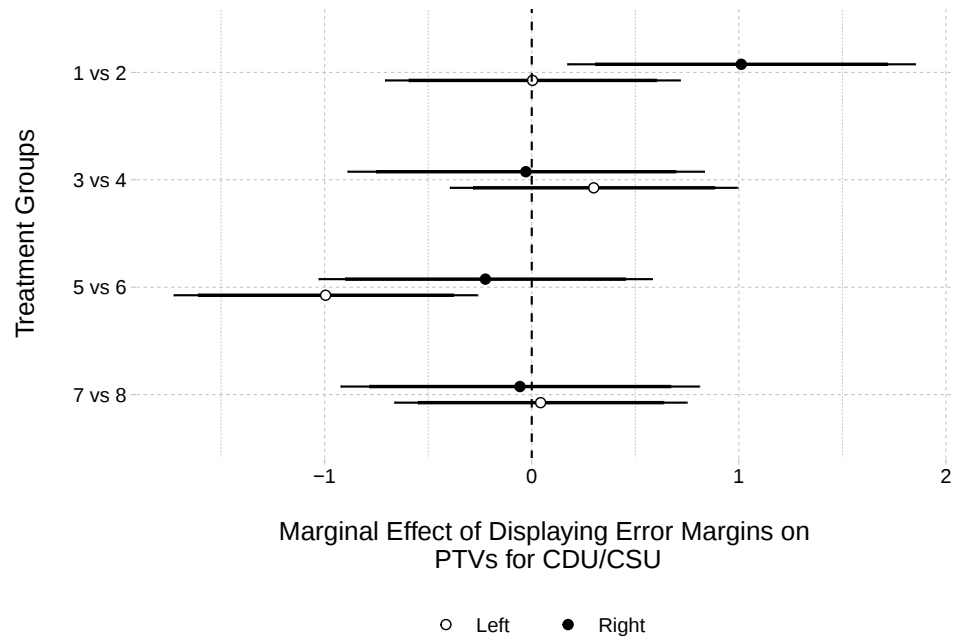
Table A3: The Effect on PTVs for CDU/CSU and Greens. Unlikely Voters Excluded

	DV: PTV CDU/CSU		DV: PTV Greens	
	Past Left Vote	Past Right Vote	Past Left Vote	Past Right Vote
	(1)	(2)	(3)	(4)
Margins	0.043 (0.360)	-0.057 (0.442)	0.079 (0.447)	-0.563 (0.446)
Close Race	0.812** (0.376)	0.309 (0.422)	-0.368 (0.467)	-0.612 (0.426)
Close Frame	-0.234 (0.365)	0.204 (0.447)	0.431 (0.453)	0.015 (0.451)
Margins*Race	-1.038** (0.519)	-0.167 (0.603)	1.054 (0.645)	0.625 (0.609)
Margins*Frame	0.256 (0.505)	0.029 (0.623)	-0.535 (0.627)	-0.169 (0.629)
Race*Frame	-0.778 (0.520)	-1.123* (0.606)	-0.392 (0.646)	0.335 (0.612)
Margins*Race*Frame	0.743 (0.726)	1.207 (0.860)	0.386 (0.901)	-0.143 (0.869)
Constant	2.750*** (0.264)	6.155*** (0.321)	4.879*** (0.328)	3.327*** (0.324)
Observations	1,193	987	1,193	987
Adjusted R ²	0.004	0.001	0.004	-0.001

Note:

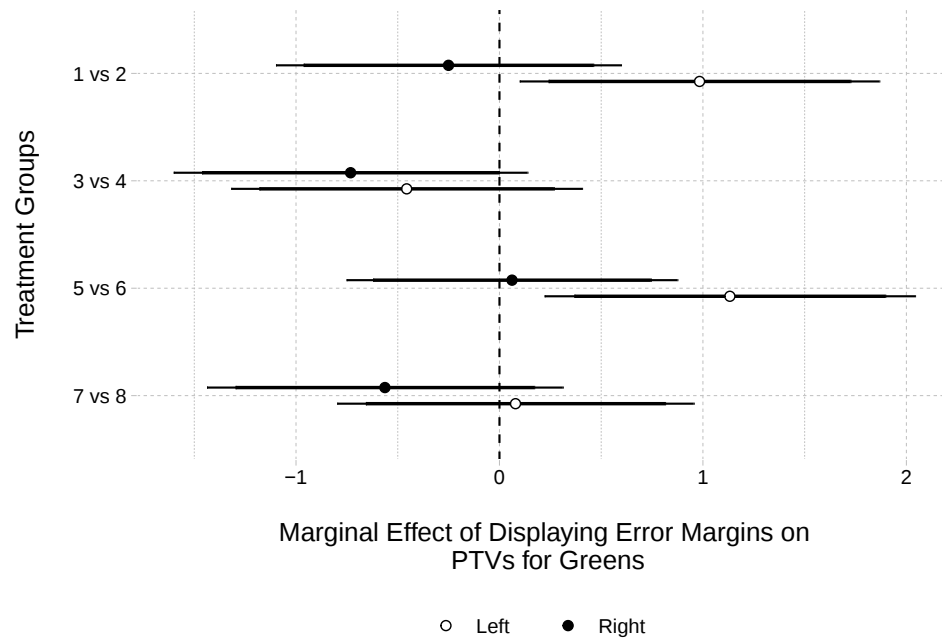
*p<0.1; **p<0.05; ***p<0.01

Figure A5: Marginal Effects of Displaying Error Margins on PTVs for the CDU/CSU Conditional on Past Vote Choice. Unlikely Voters Excluded



Notes: Marginal effects based on three-way interactions shown in models 1 and 2 in Table A3. Error bars show 90% (thick lines) and 95% (thin lines) confidence intervals.

Figure A6: Marginal Effects of Displaying Error Margins on PTVs for the Greens Conditional on Past Vote Choice. Unlikely Voters Excluded



Notes: Marginal effects based on three-way interactions shown in models 3 and 4 in Table A3. Error bars show 90% (thick lines) and 95% (thin lines) confidence intervals.