**How do voters react when their party forms a coalition they dislike?**

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# Online Appendix

## 1. Our Research Design

Showing that one variable causes another using observational data is extremely difficult. The problem is that unobservable variables can confound the relationships that are found.

When panel data are available, there is a design that allows researchers to show a causal relationship even with non-experimental data: a differences-in-differences design (see Angrist and Pischke 2009, Chapter 5). This design focuses on changes between a measure of the dependent variable that takes place before and after some event. By focusing on changes, it controls for confounders that are stable over time. Even if a confounding variable is associated with both the independent variable and the dependent variable, that is not a problem because the value of the confounder is the same at the times of both the pre- and post-measures of the dependent variable. Taking differences thus controls for such a variable.

Another concern is that other events may occur between the pre- and post-measures. Differences-in-differences compares changes between groups (hence, differences-in-differences), which allows it to control for such over-time confounders. Usually it compares a group of individuals who are affected by an event to a group that is not affected by it, thus allowing researchers to estimate the effect of the event on the affected (note that our use of the word affected is analogous to the use of the word treated in the context of experiments). Other events are not a threat to showing causality, as long as they affect both groups equally.

Controlling for over-time confounders does rely on a major assumption, which is that the change between the pre- and post-measures of the dependent variable in the group that is unaffected by the event reflects the counterfactual change in the dependent variable among those who were affected by the event if they had not been affected by it. In other words, this design assumes that affected and unaffected individuals move in parallel over time in absence of the treatment (Angrist and Pischke 2009, 171). If that is the case, the deviation from the unaffected group's trend among affected individuals during the period of the event represents a causal effect of the event on the affected group.

It is impossible to test this for the period of treatment because we cannot observe affected respondents in the counterfactual state in which they are not affected by the event. However, we

can observe the evolution of each dependent variable during a longer period of time and observe whether they generally move in parallel in each group. If they do, we can be confident that the change in the unaffected group's values on the dependent variable reflects the change that would have occurred in the affected group if the event had not occurred.

Our analyses focus on the effect of seeing the party a citizen voted for participate in a disliked coalition, as well as on the effect of seeing the party one voted for participate in a coalition. We thus consider changes in two dependent variables: party ratings and coalition ratings. We hypothesize that seeing the party a citizen voted for participate in a coalition they dislike causes them to lower their rating of that party. We also hypothesize that seeing the party one voted for participate in a coalition leads voters to improve their evaluation of that coalition. (Note that our main analyses do not focus on the effect of seeing one's party form a disliked coalition on coalition preferences because negative preferences necessarily increase due to regression to the mean.)

Our analyses thus rely on two comparisons. First, in models of changes in party ratings, we compare respondents with various levels of dislike for the coalition that is formed among coalition party voters. We assess whether those who disliked the coalition more change their party ratings more in a negative direction than those who did not dislike the coalition as much. Thus, the assumption for party-ratings models is that, independently of coalition formation, ratings of each coalition party among its voters move in parallel among voters with different levels of dislike for the coalition.

In order to assess that assumption, the following graphs show ratings of coalition parties over time. To simplify, we compare respondents who voted for each coalition party who disliked (i.e. rated negatively) the coalition to those who did not dislike it (i.e. gave a zero or positive rating). To simplify the visual presentation of data, here we only include respondents who positively rated the party they voted for in the same wave as vote choice is measured (this is analogous to controlling for initial party ratings as in the regression models).

Figures A1 to A6 show party ratings over time. Note that, for the 2009 election year, we put ratings from that year in a separate facet from those in 2013 in order to make it easier to observe trends over time (there were no data points between 2009 and 2013). In all figures, we include 95% confidence bounds and vertical dashed lines at the time points we compare in our regression models (regression models compare waves with both coalition and party ratings questions). As we can see, trends over time are largely parallel. When they are not, deviations from parallel movement are not significant. Thus, we can confidently conclude that seeing the party they voted for participate in a coalition they dislike leads citizens to punish (weakly, as shown in the main text) that party by lowering their evaluation of it.

Note that graphs are much smoother and confidence bounds are narrower in 2013 and 2017 because more respondents participated in all waves of the survey in those years than in 2009.

Figure A1: Ratings of the CDU Over Time Among CDU/CSU Voters with Negative and Non-Negative Ratings of the CDU/CSU-FDP Coalition in 2009

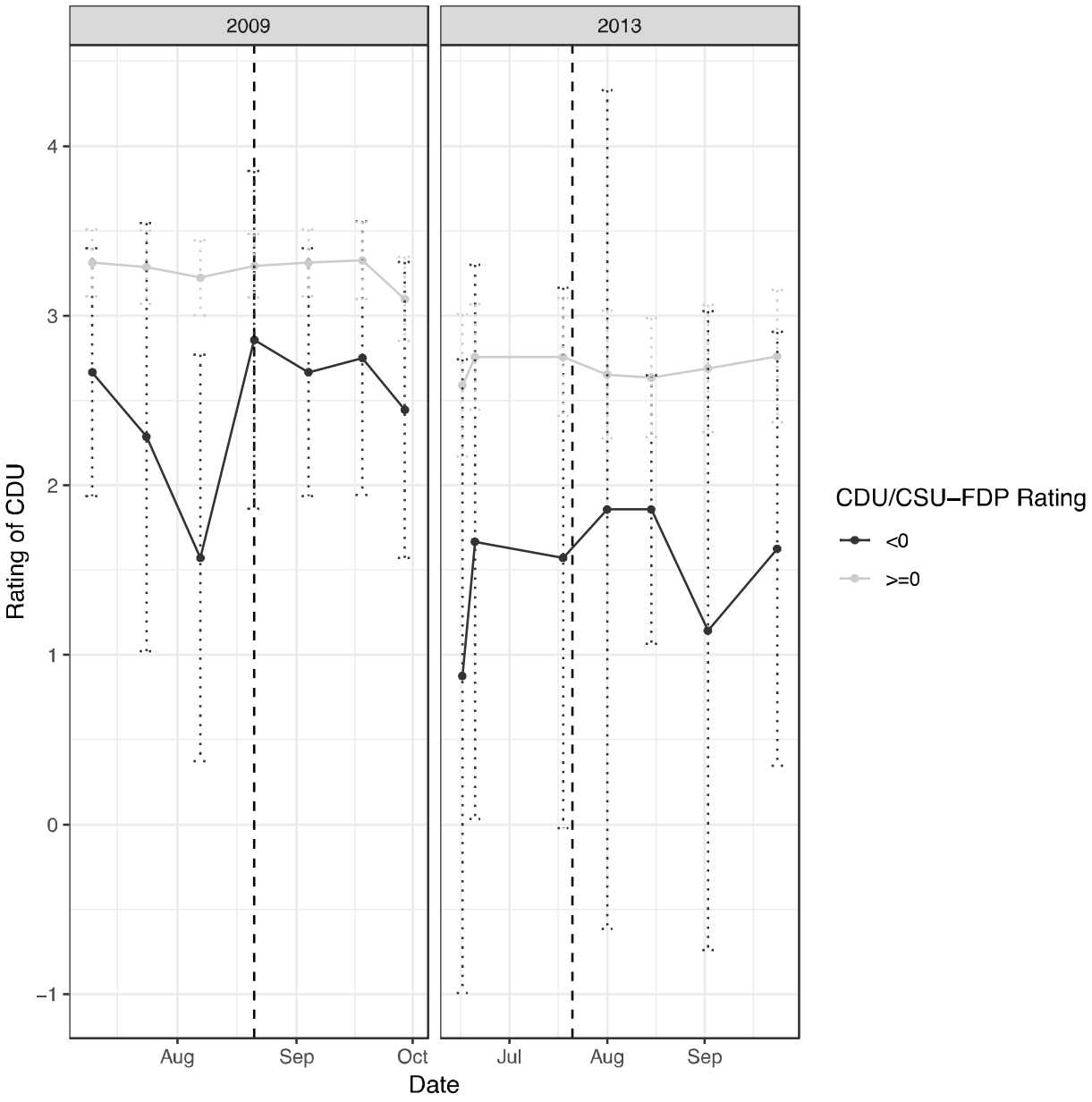


Figure A2: Ratings of the FDP Over Time Among FDP Voters with Negative and Non-Negative Ratings of the CDU/CSU-FDP Coalition in 2009

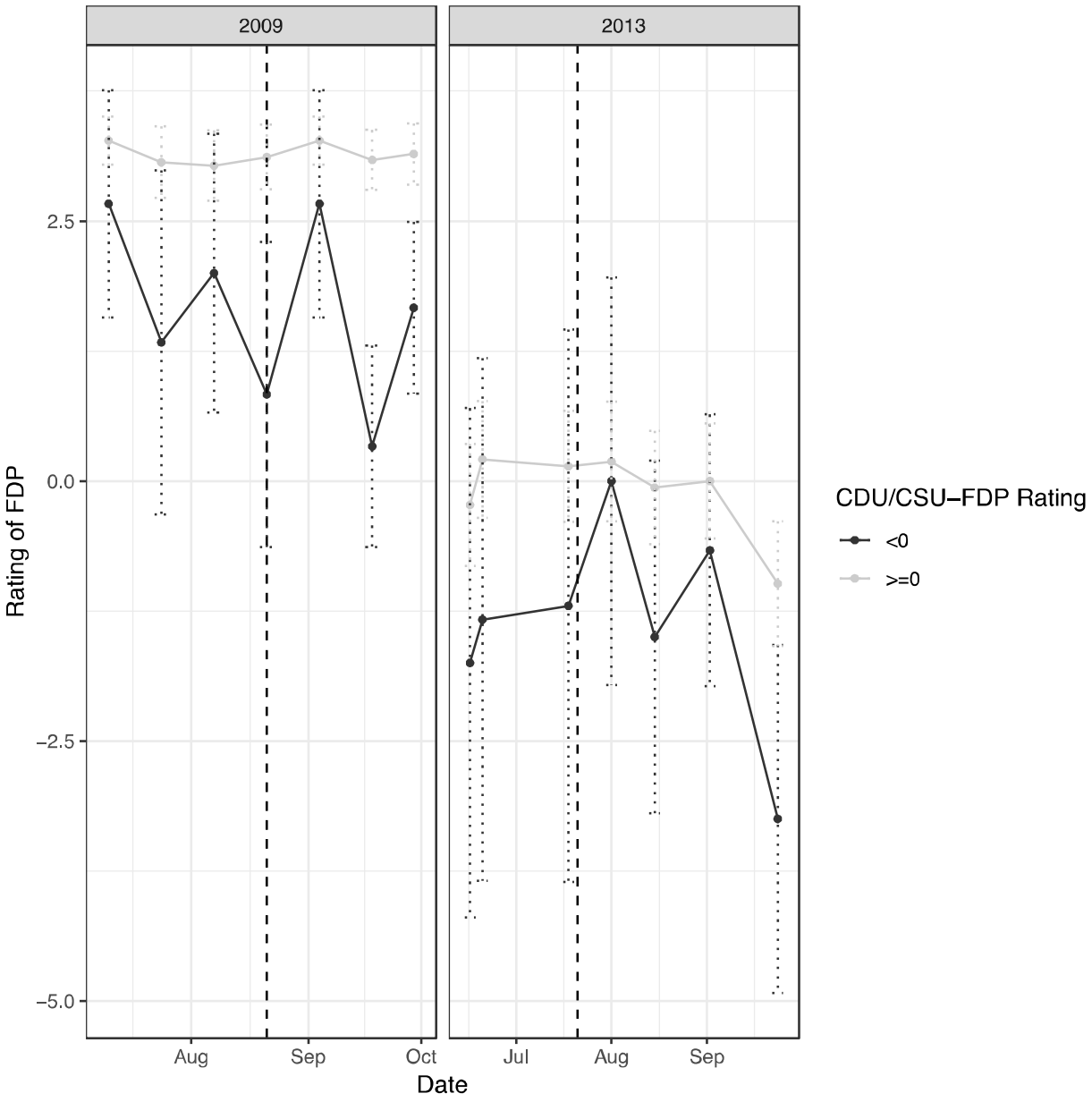


Figure A3: Ratings of the CDU Over Time Among CDU/CSU Voters with Negative and Non-Negative Ratings of the CDU/CSU-SPD Coalition in 2013

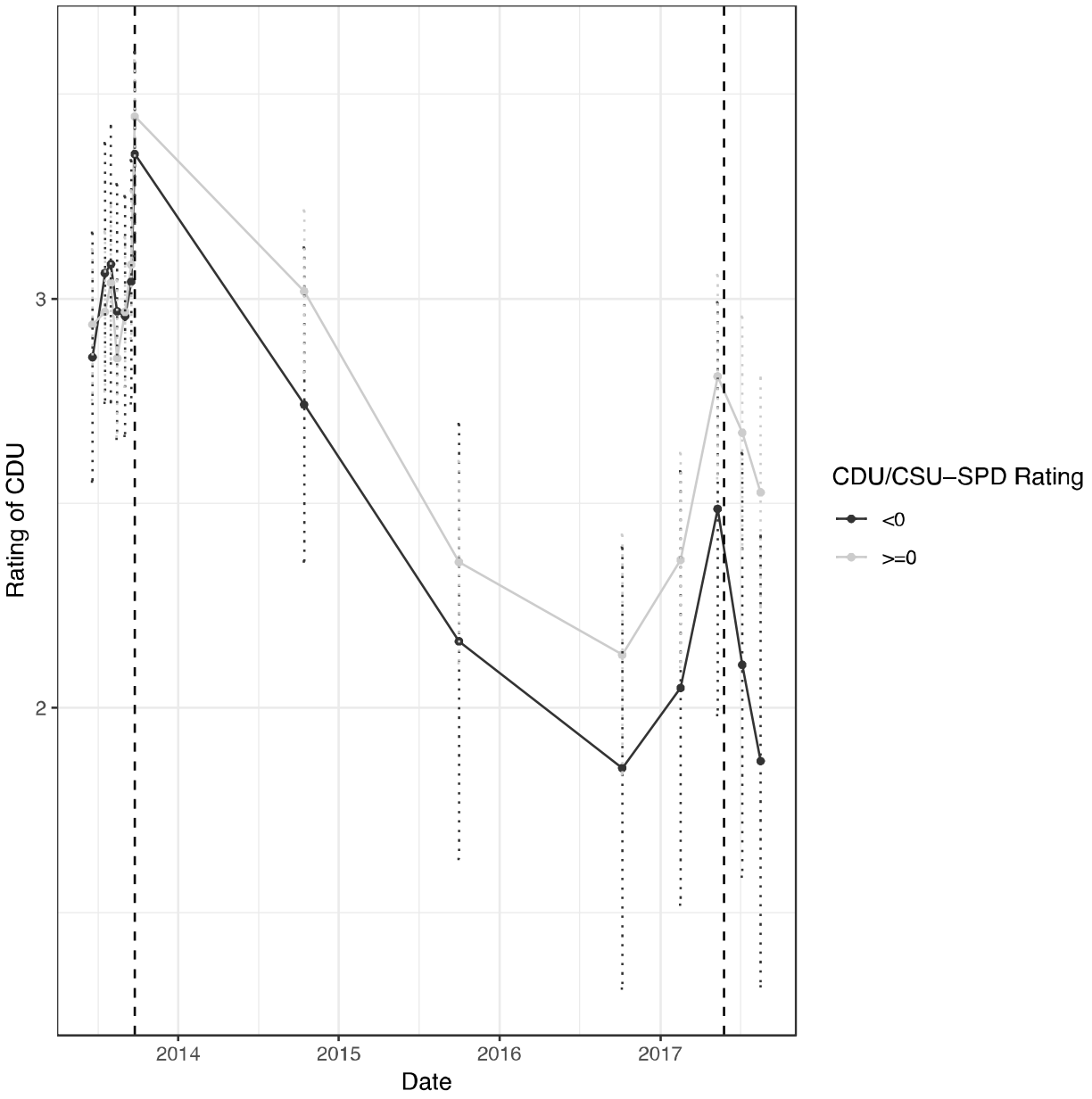


Figure A4: Ratings of the SPD Over Time Among SPD Voters with Negative and Non-Negative Ratings of the CDU/CSU-SPD Coalition in 2013

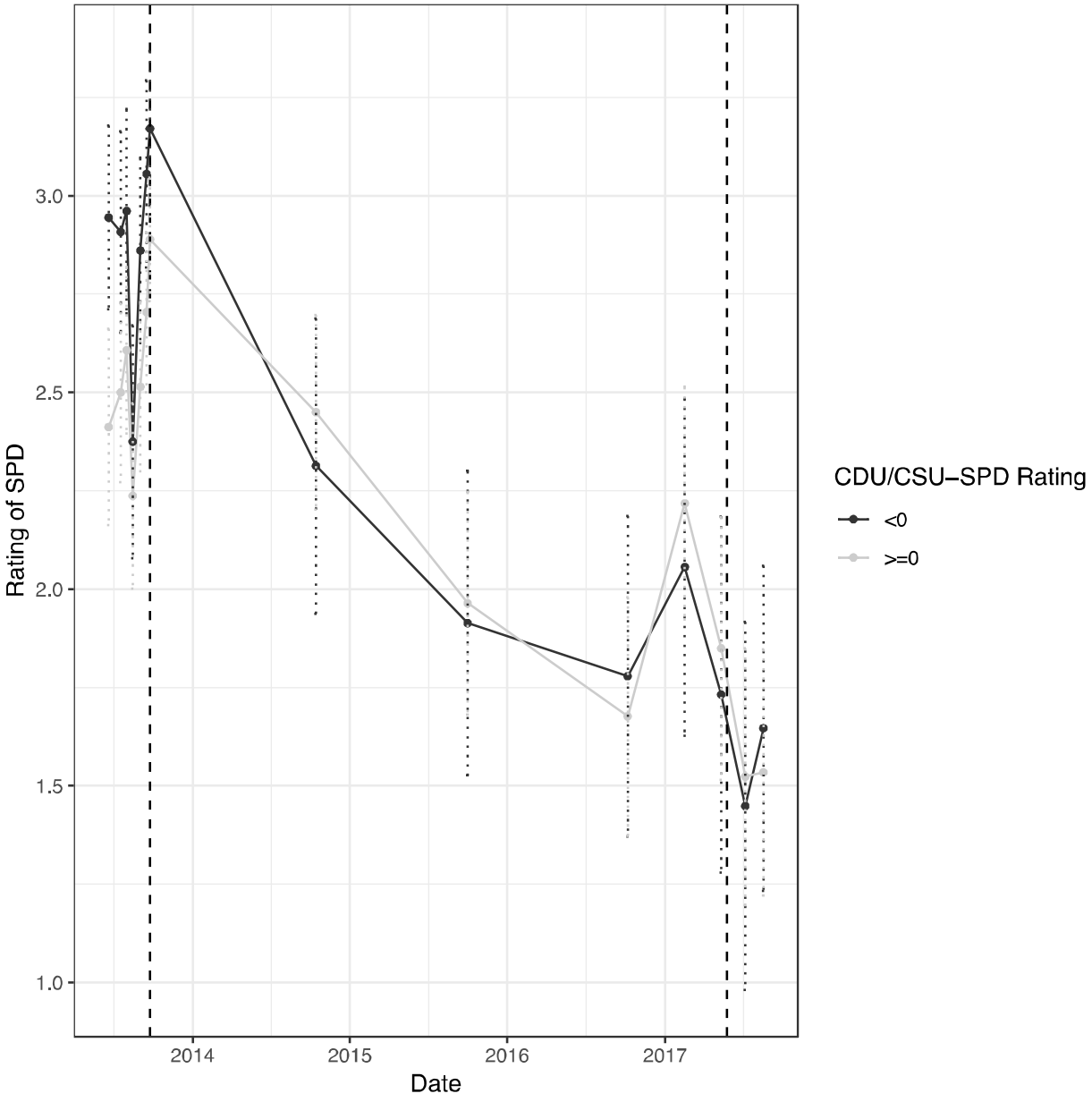


Figure A5: Ratings of the CDU Over Time Among CDU/CSU Voters with Negative and Non-Negative Ratings of the CDU/CSU-SPD Coalition in 2017

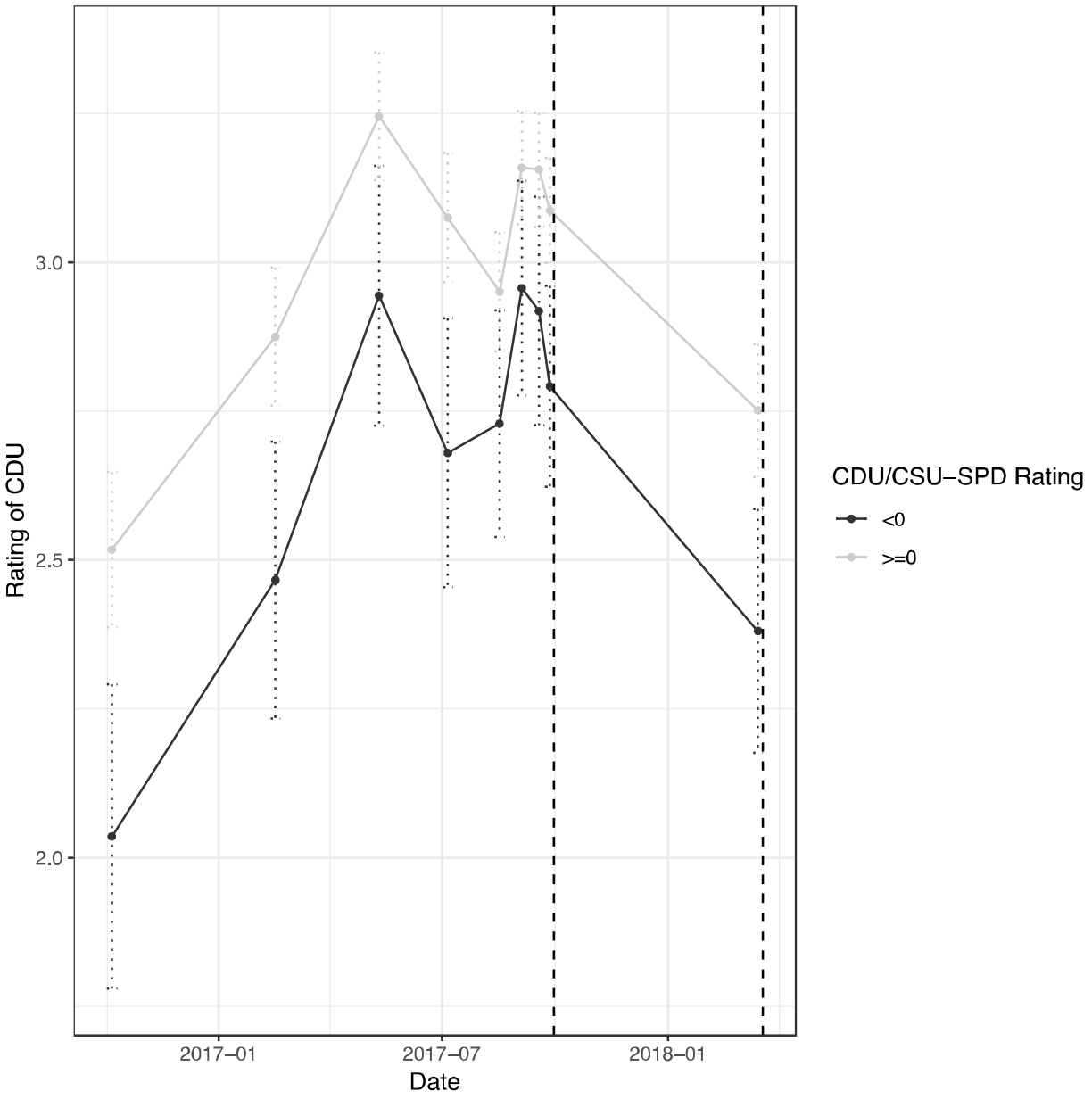
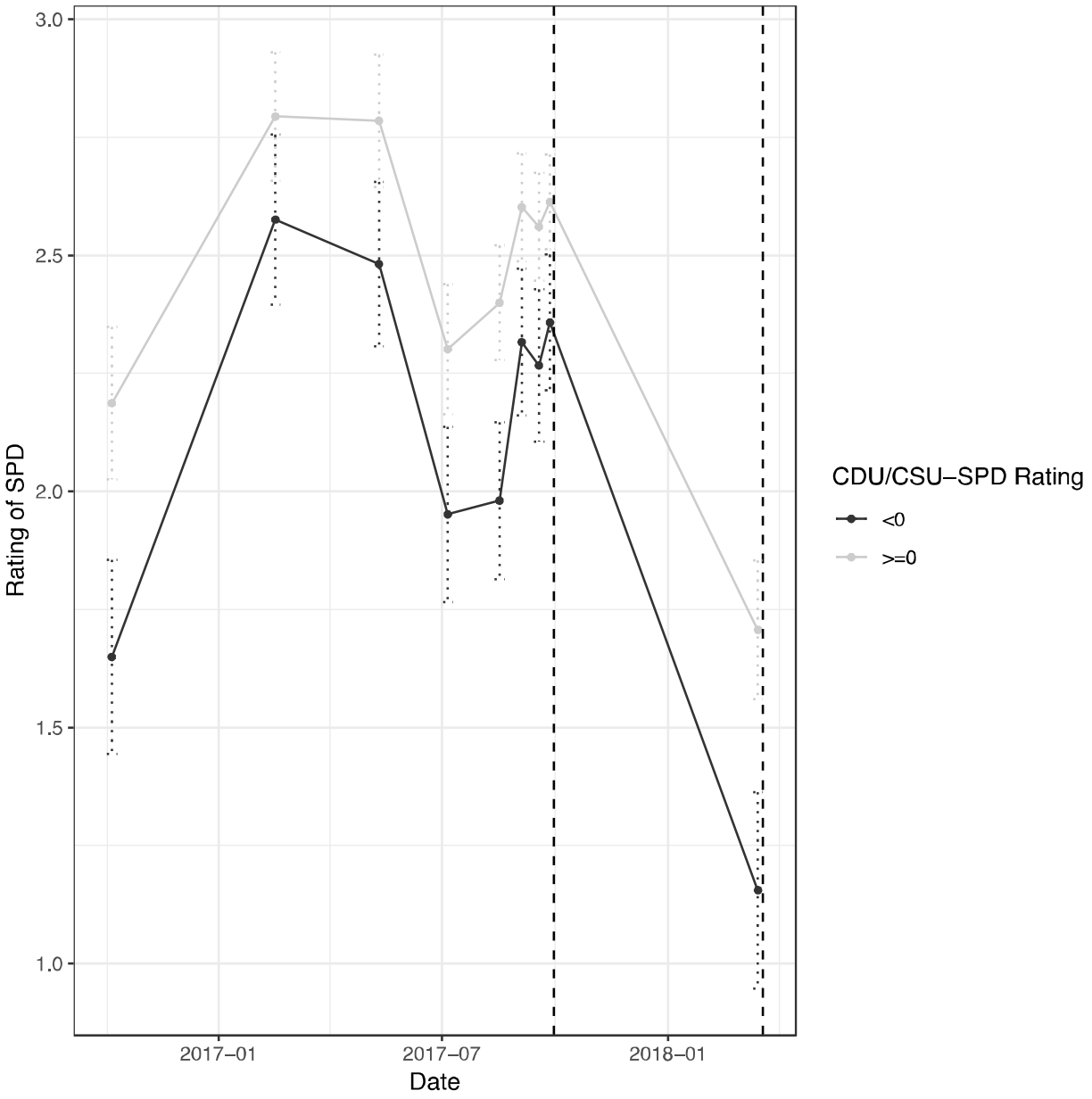


Figure A6: Ratings of the SPD Over Time Among SPD Voters with Negative and Non-Negative Ratings of the CDU/CSU-SPD Coalition in 2017



Our second comparison is in models of coalition ratings where we compare respondents who voted for a coalition party to respondents who voted for a non-coalition party with similar coalition ratings. Given our focus on respondents who dislike coalitions before they are formed, here we focus on assessing parallel movements among voters who gave the coalition formed a negative rating. Figures A7 to A12 show ratings of coalitions over time, comparing voters of each coalition party to those who voted for non-coalition parties among respondents who initially gave the coalition formed a negative rating. The key assumption in these analyses is that respondents who voted for a coalition party move in parallel with respondents who voted for a non-coalition party with similar coalition ratings.

Evidence that is supportive of the parallel trends assumption is that those who voted for each coalition party moved in parallel with those who voted for a non-coalition party, except during the period following coalition formation when they diverge (because of the reaction by coalition-party voters to the coalition).

We have added vertical dashed lines at the dates of the surveys used in our analyses. Note that it is harder to assess the assumption in 2009 because coalition ratings questions were asked less frequently. However, overall, coalition ratings move in parallel. Most importantly, when they do not, deviations from parallel trends are clearly not significant. The only major exception is FDP voters in 2009, who as we explain in the paper, are the exception to our general findings.

Because we have found evidence that party and coalition ratings move in parallel between the groups, our analyses compare. We can be confident that the effects we find are causal.

Our main analyses use regression models as suggested by Angrist and Pischke (2009, 174). We do so because it is important to control for regression to the mean by including initial coalition and party ratings. We want to ensure that our results are not simply due to the fact that, while many voters may not like the coalition formed by their party, they like that party. Controlling for prior ratings controls for that possibility.

We also compare averages by initial vote choice and coalition ratings in section 2 of this appendix. We focus on the regression results because they provide a simpler overall test of our hypotheses.

We must clarify though that our analyses assess the effect of seeing a disliked coalition (or of seeing a coalition formed by the party one voted for) be formed and govern during the period between the survey waves we consider. We, therefore, do not claim that we only consider how voters respond to the signing of a coalition agreement between the parties. We do come much closer to isolating reactions to initial coalition formation in 2017 though, when the survey waves are much closer in time.

Nevertheless, our results are about reactions to seeing the party one voted for participate in a coalition. While other factors like good or bad coalition performance likely influence both party and coalition ratings, they only influence our results to the extent that reactions to these factors differ between the groups we compare (coalition-party voters with varying levels of dislike of the coalition and coalition-party vs other party voters). If reactions (e.g. government performance

assessments) do differ between these groups, they should be seen as resulting for prior coalition dislike or vote choice and thus are appropriately considered part of citizens' reaction to a disliked coalition or to one formed by the party they voted for.

Figure A7: Rating of the CDU/CSU-FDP Coalition Over Time in 2009 Among CDU/CSU Voters and Among Non-Coalition-Party Voters Who Disliked the Coalition Before It Was Formed

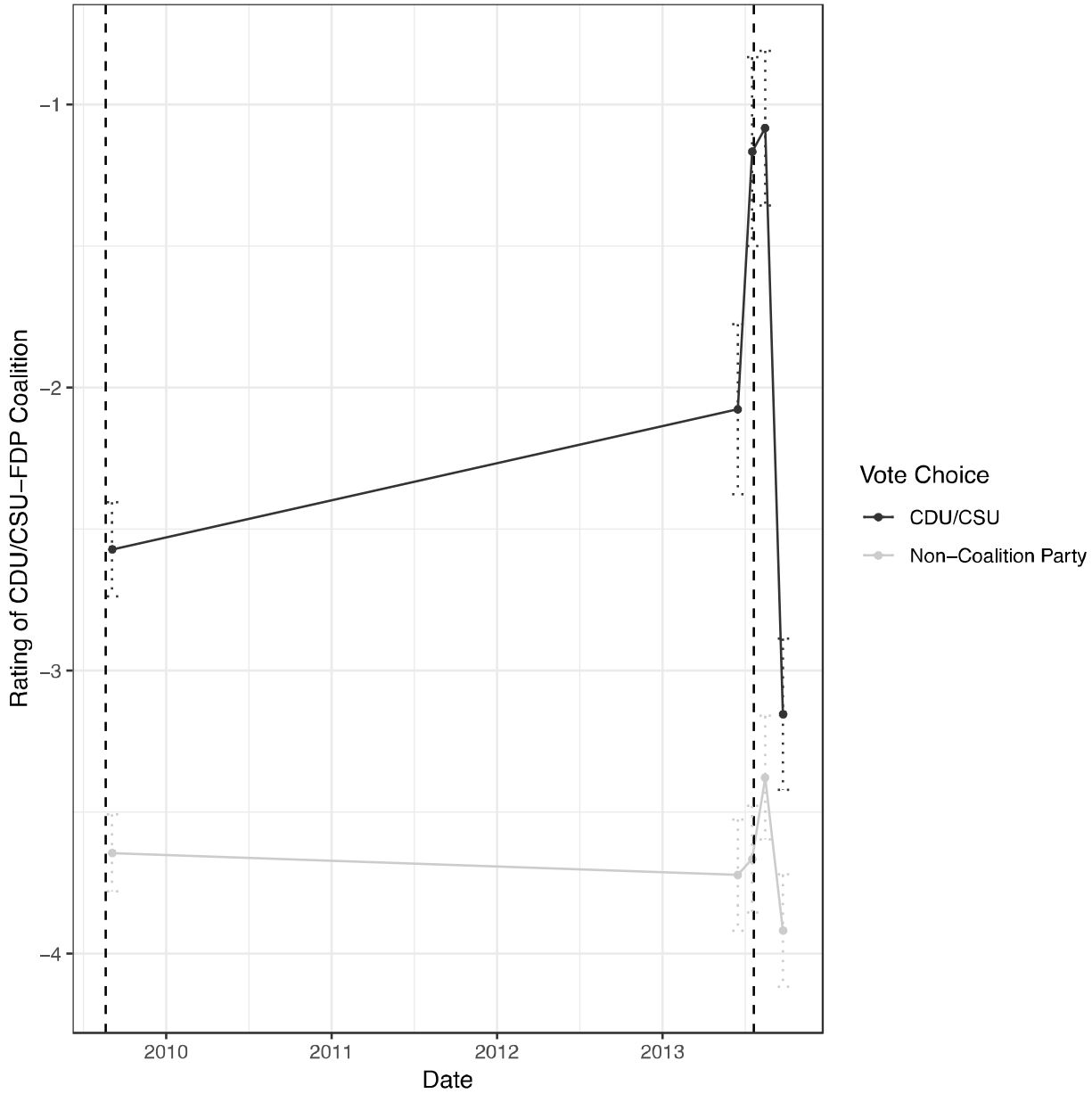


Figure A8: Rating of the CDU/CSU-FDP Coalition Over Time in 2009 Among FDP Voters and Among Non-Coalition-Party Voters Who Disliked the Coalition Before It Was Formed

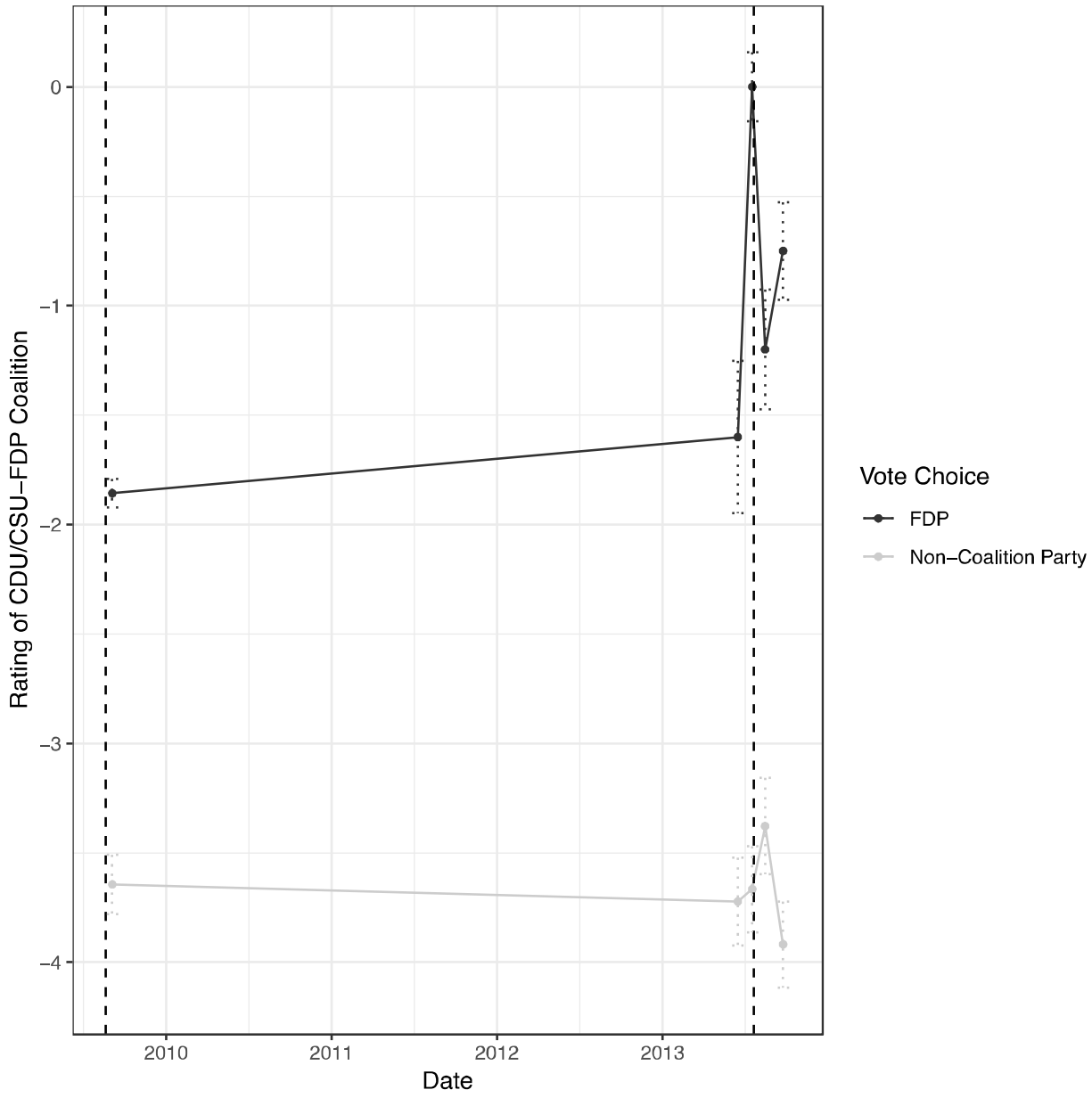


Figure A9: Rating of the CDU/CSU-SPD Coalition Over Time in 2013 Among CDU/CSU Voters and Among Non-Coalition-Party Voters Who Disliked the Coalition Before It Was Formed

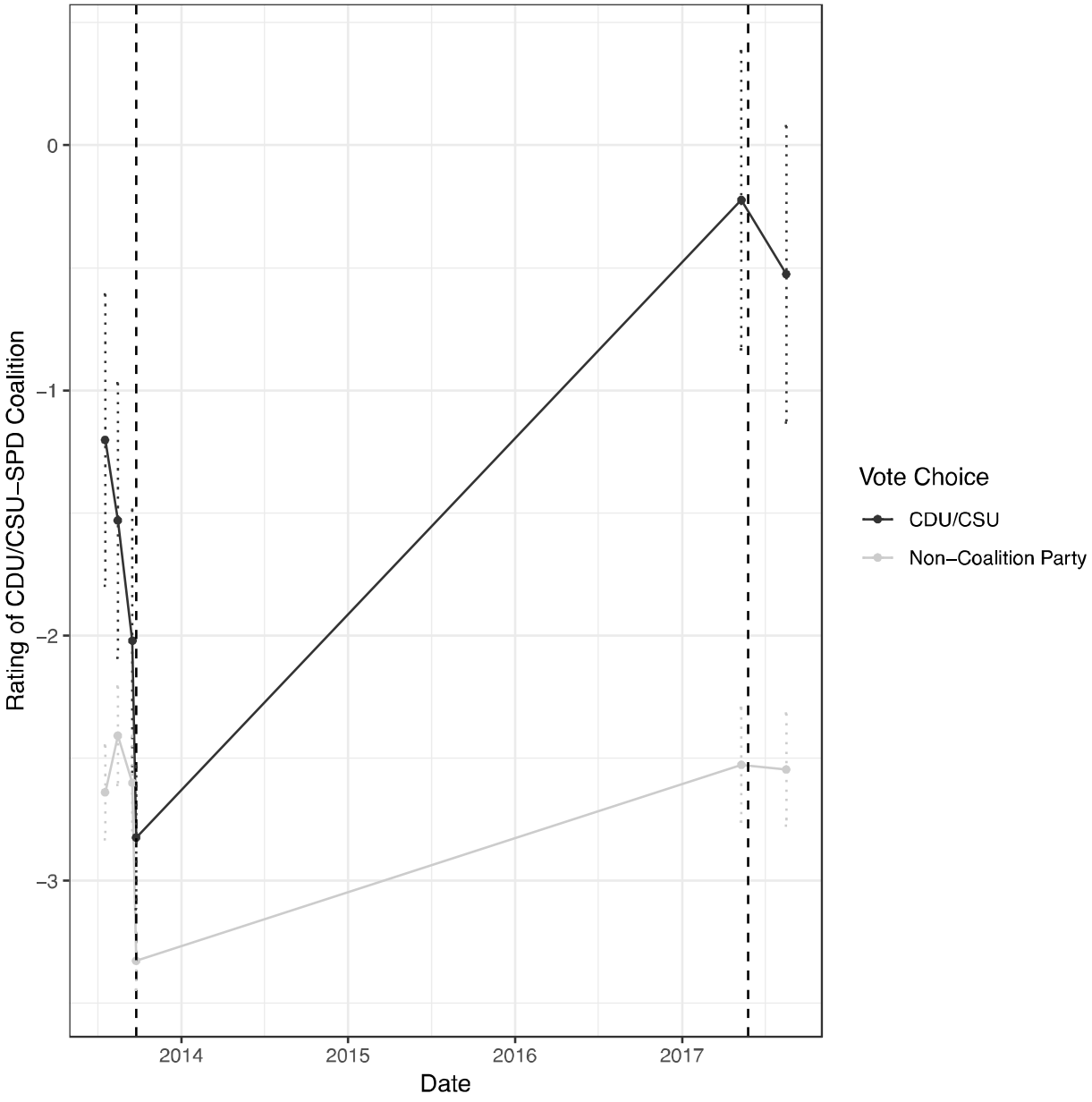


Figure A10: Rating of the CDU/CSU-SPD Coalition Over Time in 2013 Among SPD Voters and Among Non-Coalition-Party Voters Who Disliked the Coalition Before It Was Formed

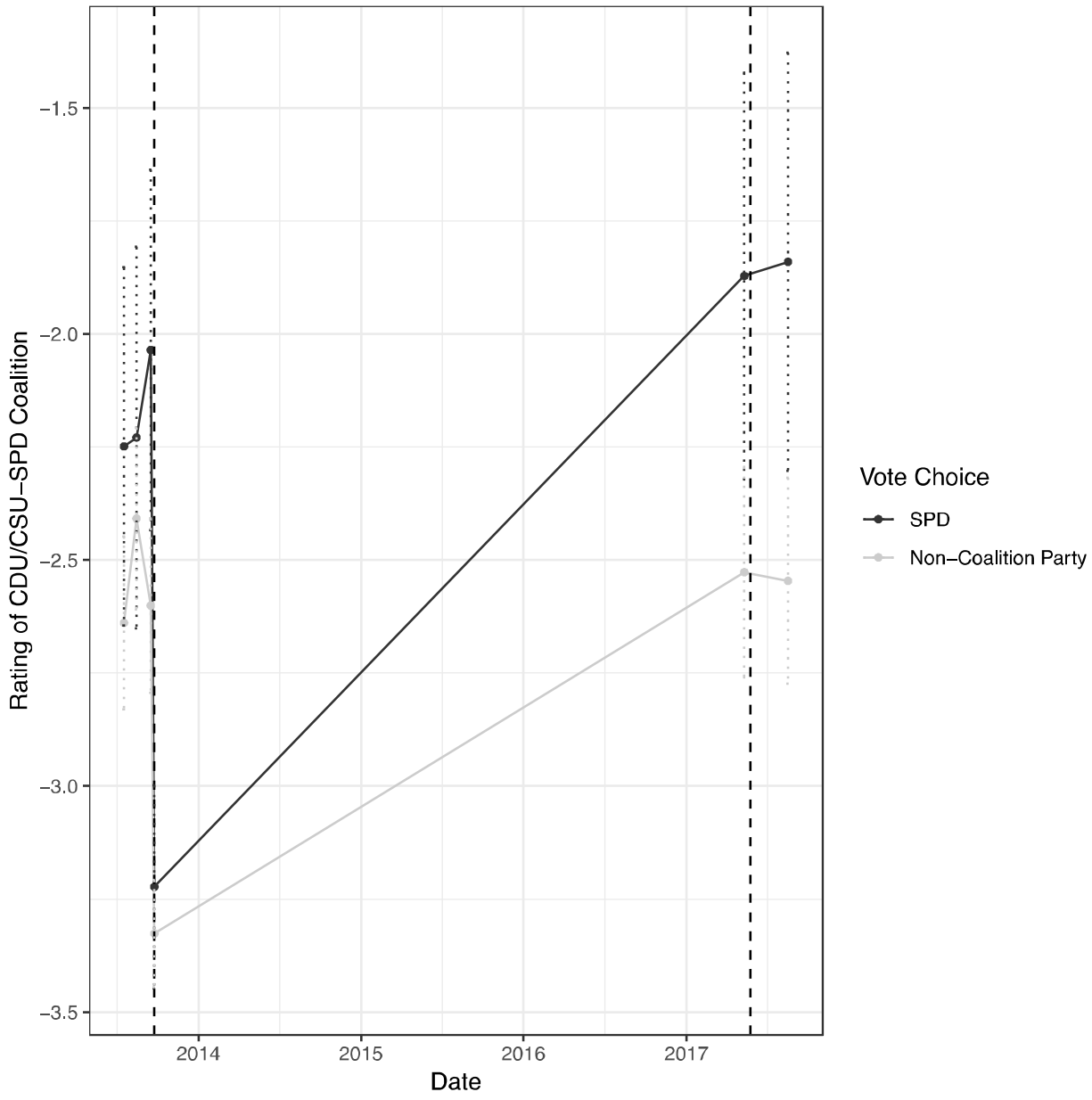


Figure A11: Rating of the CDU/CSU-SPD Coalition Over Time in 2017 Among CDU/CSU Voters and Among Non-Coalition-Party Voters Who Disliked the Coalition Before It Was Formed

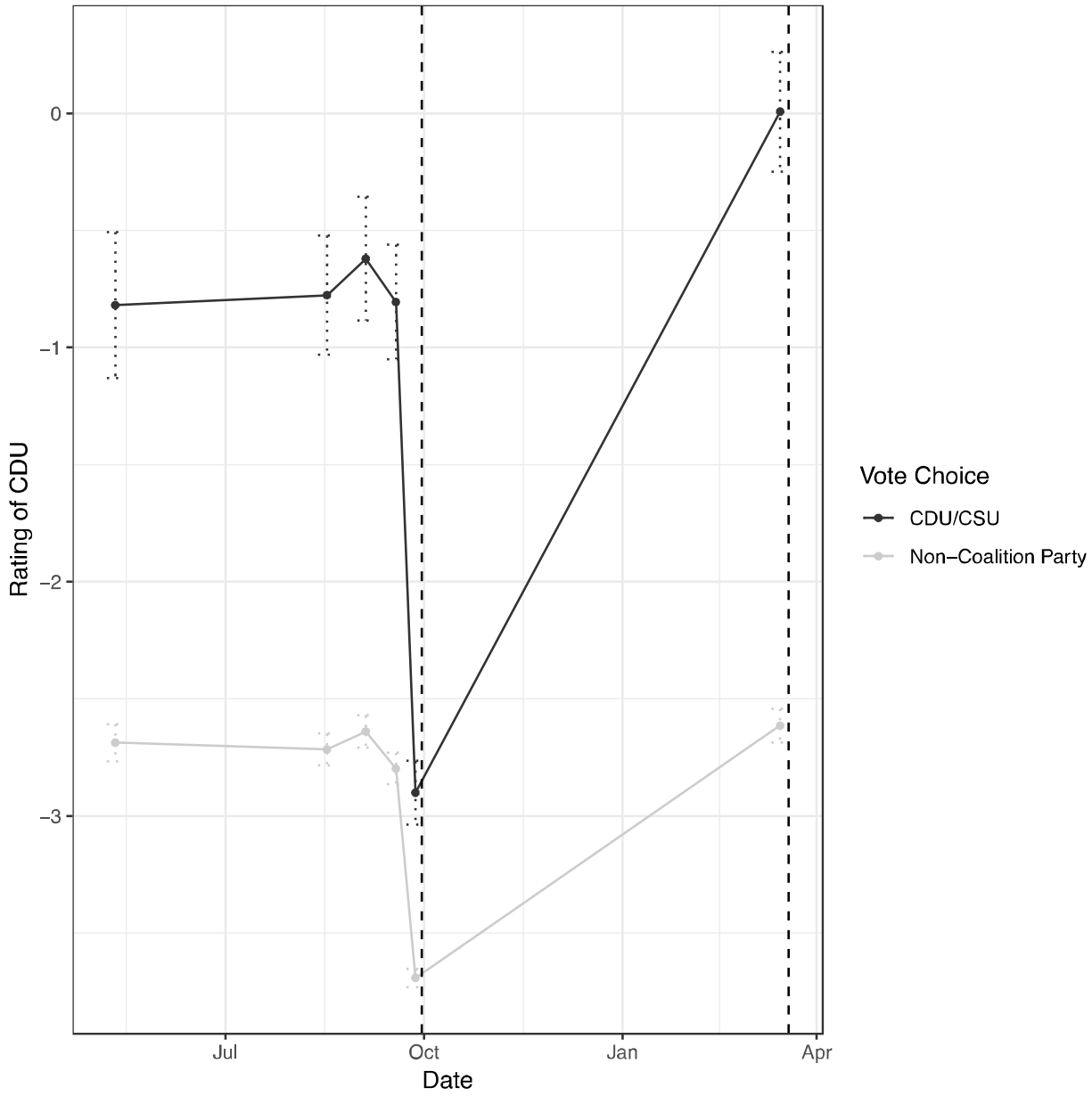
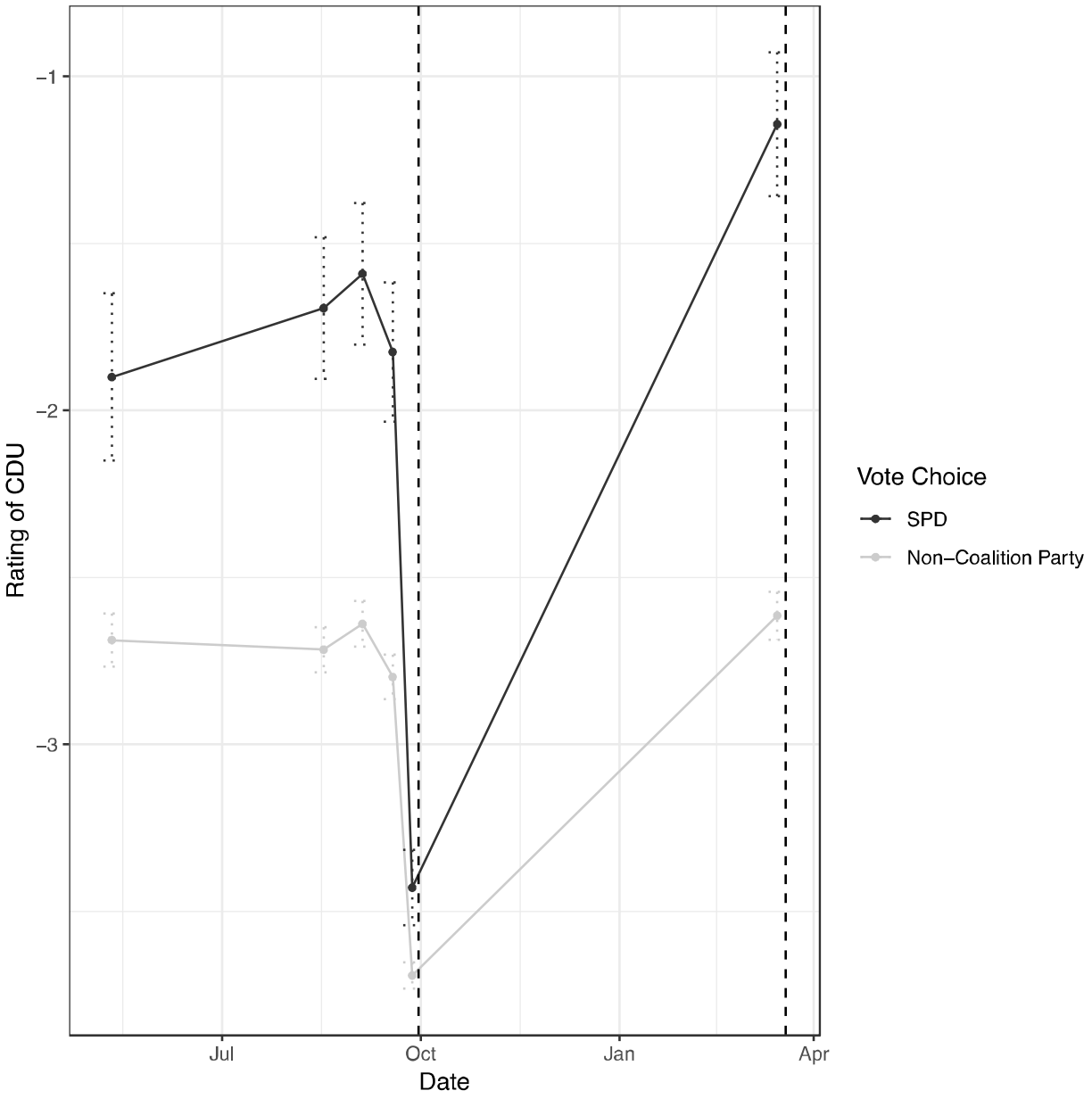


Figure A12: Rating of the CDU/CSU-SPD Coalition Over Time in 2017 Among SPD Voters and Among Non-Coalition-Party Voters Who Disliked the Coalition Before It Was Formed




## References

Angrist, Joshua D. Jörn-Steffen Pischke. 2009. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton: Princeton University Press.

## 2. Descriptive Tables

Table A1: Changes in Party Ratings Among Voters of Each Party by Coalition Rating

| | Δ Party Ratings | |
|---|---|---|
| | Disliked Coalition | Did not Dislike |
| **2009** | | |
| CDU | 0.25 | -0.42 |
| CSU | NA* | -0.95 |
| FDP | -3.00 | -3.01 |
| **2013** | | |
| CDU | -0.78 | -0.67 |
| CSU | 0.38 | 0.59 |
| SPD | -0.39 | 0.14 |
| **2017** | | |
| CDU | -0.23 | -0.32 |
| CSU | -0.10 | -0.03 |
| SPD | -0.99 | -0.75 |

Note: we consider voters disliked a coalition if they gave it a negative rating. We consider voters did not dislike a coalition if they gave it a positive or zero rating.

Table A2: Changes in Coalition Ratings Among Respondents Who Disliked the Coalition by Vote Choice

| | Δ Coalition Ratings |
|---|---|
| **2009** | |
| Voted for Coalition Member | 1.24 |
| Did not Vote for Coalition Member | 0 |
| **2013** | |
| Voted for Coalition Member | 1.82 |
| Did not Vote for Coalition Member | 0.80 |
| **2017** | |
| Voted for Coalition Member | 2.55 |
| Did not Vote for Coalition Member | 1.05 |

Table A3: Percentage of Voters Who Intend to Vote for the Same Party Following Coalition Formation by Coalition Attitude and Party

| | Negative Coalition Rating | Non-Negative Coalition Rating |
|---|---|---|
| **2009** | | |
| CDU/CSU | 70% | 70.7% |
| FDP | 0% | 29.1% |
| **2013** | | |
| CDU/CSU | 56.7% | 62.7% |
| SPD | 60.3% | 57.2% |

Note: a non-negative rating is positive or zero.

### 3. Models with Alternative Measures of Party Preferences

Table A4: Models Using District Vote

| | Δ Party Rating | Δ Coalition Rating |
|---|---|---|
| Intercept | -0.24 | -2.24* |
| | (0.17) | (0.11) |
| Coalition Dislike | -0.08* | |
| | (0.01) | |
| Party 1 Vote | | 1.25* |
| | | (0.06) |
| Party 2 Vote | | 0.62* |
| | | (0.05) |
| Lagged Party Rating | -0.33* | |
| | (0.01) | |
| Lagged Coalition Rating | | -0.46* |
| | | (0.01) |
| FDP | -2.75* | |
| | (0.27) | |
| SPD | -0.49* | |
| | (0.06) | |
| 2013 Election | 0.18 | 0.08 |
| | (0.16) | (0.10) |
| 2017 Election | -0.01 | 1.03* |
| | (0.15) | (0.09) |
| *N* | 4716 | 13708 |
| Adjusted $R^2$ | 0.13 | 0.27 |
| Standard errors in parentheses | | |
| * indicates significance at $p<0.05$ | | |

Note: the coefficient on coalition dislike is the difference in the change in party ratings as coalition dislike increases among coalition-party identifiers. The coefficients on Party 1 Vote and Party 2 Vote represent the difference in changes in coalition ratings between respondents who voted for each coalition party and non-coalition-party voters.

Table A5: Models Using Party Identification

| | Δ Party Rating | Δ Coalition Rating |
|---|---|---|
| Intercept | 0.09 | -2.24* |
| | (0.16) | (0.10) |
| Coalition Dislike | -0.07* | |
| | (0.01) | |
| Party 1 Identification | | 1.46* |
| | | (0.05) |
| Party 2 Identification | | 1.00* |
| | | (0.05) |
| Lagged Party Rating | -0.35* | |
| | (0.01) | |
| Lagged Coalition Rating | | -0.48* |
| | | (0.01) |
| FDP | -2.25* | |
| | (0.27) | |
| SPD | -0.47* | |
| | (0.05) | |
| 2013 Election | 0.20 | 0.03 |
| | (0.15) | (0.10) |
| 2017 Election | -0.01 | 0.93* |
| | (0.14) | (0.09) |
| *N* | 5789 | 13708 |
| adj. $R^2$ | 0.13 | 0.29 |
| Standard errors in parentheses | | |
| * indicates significance at $p<0.05$ | | |

Note: the coefficient on coalition dislike is the difference in the change in party ratings as coalition dislike increases among coalition-party identifiers. The coefficients on Party 1 Identification and Party 2 Identification represent the difference in changes in coalition ratings between respondents who identify with each coalition party and non-coalition-party identifiers.

## 4. Separate Models for each Election

Table A6: 2009 Models

| | Δ CDU Rating | Δ CSU Rating | Δ FDP Rating | Δ CDU-FDP Rating |
|---|---|---|---|---|
| Intercept | -0.25 | -0.92 | -1.70† | -1.22*** |
| | (0.66) | (2.67) | (0.93) | (0.30) |
| Coalition Dislike | 0.03 | 0.71 | -0.17 | |
| | (0.09) | (0.46) | (0.15) | |
| CDU/CSU Vote | | | | 1.20*** |
| | | | | (0.26) |
| FDP Vote | | | | 0.26 |
| | | | | (0.30) |
| Lagged CDU Rating | -0.34** | | | |
| | (0.12) | | | |
| Lagged CSU Rating | | 0.47 | | |
| | | (0.47) | | |
| Lagged FDP Rating | | | -0.47* | |
| | | | (0.19) | |
| Lagged Coalition Rating | | | | -0.44*** |
| | | | | (0.03) |
| *N* | 123 | 19 | 97 | 779 |
| adj. $R^2$ | 0.08 | 0.02 | 0.02 | 0.25 |
| Standard errors in parentheses | | | | |
| † indicates significance at $p<0.10$; * indicates significance at $p<0.05$; ** indicates significance at $p<0.01$; ** indicates significance at $p<0.001$ | | | | |

Note: the coefficient on coalition dislike is the difference in the change in party ratings as coalition dislike increases among coalition-party voters. The coefficients on CDU Vote and FDP Vote represent the difference in changes in coalition ratings between respondents who voted for each coalition party and non-coalition-party voters.

Table A7: 2013 Models

| | Δ CDU Rating | Δ CSU Rating | Δ SPD Rating | Δ CDU-SPD Rating |
|---|---|---|---|---|
| Intercept | -1.07* | 0.48 | -0.51 | -1.25*** |
| | (0.48) | (0.78) | (0.53) | (0.24) |
| Coalition Dislike | -0.07† | -0.08 | -0.07† | |
| | (0.04) | (0.09) | (0.04) | |
| CDU Vote | | | | 1.41*** |
| | | | | (0.16) |
| SPD Vote | | | | 0.45** |
| | | | | (0.15) |
| Lagged CDU Rating | -0.30*** | | | |
| | (0.07) | | | |
| Lagged CSU Rating | | -0.46** | | |
| | | (0.14) | | |
| Lagged SPD Rating | | | -0.46*** | |
| | | | (0.08) | |
| Lagged Coalition Ratings | | | | -0.68*** |
| | | | | (0.02) |
| *N* | 293 | 57 | 402 | 2027 |
| adj. R2 | 0.09 | 0.14 | 0.09 | 0.35 |
| Standard errors in parentheses | | | | |
| † indicates significance at $p<0.10$; * indicates significance at $p<0.05$; ** indicates significance at $p<0.01$; ** indicates significance at $p<0.001$ | | | | |

Note: the coefficient on coalition dislike is the difference in the change in party ratings as coalition dislike increases among coalition-party voters. The coefficients on CDU Vote and SPD Vote represent the difference in changes in coalition ratings between respondents who voted for each coalition party and non-coalition-party voters.

Table A8: 2017 Models

| | Δ CDU Rating | Δ CSU Rating | Δ SPD Rating | Δ CDU-SPD Rating |
|---|---|---|---|---|
| Intercept | -0.17 | -0.66* | -0.70** | -1.34*** |
| | (0.16) | (0.33) | (0.23) | (0.08) |
| Coalition Dislike | -0.01 | -0.10** | -0.09*** | |
| | (0.01) | (0.04) | (0.02) | |
| CDU Vote | | | | 1.32*** |
| | | | | (0.06) |
| SPD Vote | | | | 0.69*** |
| | | | | (0.06) |
| Lagged CDU Rating | -0.21*** | | | |
| | (0.02) | | | |
| Lagged CSU Rating | | -0.17*** | | |
| | | (0.05) | | |
| Lagged SPD Rating | | | -0.38*** | |
| | | | (0.03) | |
| Lagged Coalition Rating | | | | -0.42*** |
| | | | | (0.01) |
| *N* | 1270 | 238 | 1435 | 10902 |
| adj. R2 | 0.06 | 0.06 | 0.10 | 0.23 |
| Standard errors in parentheses | | | | |
| † indicates significance at $p<0.10$; * indicates significance at $p<0.05$; ** indicates significance at $p<0.01$; ** indicates significance at $p<0.001$ | | | | |

Note: the coefficient on coalition dislike is the difference in the change in party ratings as coalition dislike increases among coalition-party voters. The coefficients on CDU Vote and SPD Vote represent the difference in changes in coalition ratings between respondents who voted for each coalition party and non-coalition-party voters.