

CS112 – Final Project

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Decision Memo

Date: April 25, 2019

To: Doug Collins, United States Representative, Georgia's 9th congressional district

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Subject: Would voting against party stance affect vote share in the next election?

Executive Summary

The representative is facing a key vote on whether to raise the debt ceiling again. His party has adopted a stance - to raise the debt ceiling - that is against the representative's personal view of what is best for the country. The representative would like to vote against his party stance in the national interest but does not want to lose the next election as a result. He has requested a prediction of the effect of him voting against the party stance on his vote share percentage in the next election.

Data from the 2011 Debt-ceiling raise vote was previously obtained and analyzed against results of the 2012 House election to determine any correlation between voting against raising the debt ceiling and electoral outcomes. A 2.4% positive causal effect of raising the debt ceiling on a candidate's share of the vote was found.

To explore the strength of this result, different statistical techniques were used to analyze the data - different matching techniques to observe the resilience of the effect, and a stronger causal effect emerged as a result. Next, a sensitivity analysis was performed to examine the possible effects of hidden bias, where unobserved differences between treatment and control units confound the treatment effect. It was found that there is a strong potential for hidden bias to the treatment effect. Lastly, a significant logical flaw in the characterization of the first outcome variable was discovered, and to account for it, the data was cleaned and matched. It was found that original finding that the first outcome provided evidence against a positive effect of voting now is incorrect, and instead there is a slight positive effect that both supports a positive effect of voting no and in is in line with the original findings with regards to Outcome 2.

Therefore, it is recommended that the representative votes based on his personal stance and not the party stance, as it is likely to not cost him but instead help him in the next election.

Background

The US federal currently runs at a persistent fiscal deficit - it spends more money on various programs such as the military, infrastructure, education, and healthcare compared to what it collects in taxes. However, it obtains money for spending by borrowing money from public markets. The debt ceiling refers to the maximum amount of money the government is allowed to borrow. Once the ceiling has been passed, the government goes into partial or complete shutdown. Congress meets to raise the debt ceiling whenever it is reached. At least 60% of congressional representatives need to agree in order to raise the debt ceiling. However, while acting as a short-term fix, raising the debt ceiling is seen as a short-term fix instead of closing the fiscal deficit by cutting spending or increasing taxes.

Representative Doug Collins' personal stance is against raising the debt ceiling. However, his political party, the Republican party, adopts the stance that the debt ceiling should be raised. Doug would like to vote out of line with his party. However, there are potential consequences when it comes to the next election. The party yields significant influence on its candidates' prospects when it comes to endorsements from groups and other candidates, as well as monetary sponsorship and support from various political action committees. Withdrawing any of these will lead to a loss in the share of votes. Doug currently has 79% of the total vote share and wants to understand the future electoral consequence of voting against his party stance in the upcoming debt ceiling raise vote. If it is predicted that he will lose more than 4% of the vote, he would not want to vote against the party stance.

Present data, method, and outcomes

Data

A study was conducted by Monogan, 2015 that explores how voting against raising the federal debt ceiling in 2011 affected 2012 US House Election outcomes in 2012. Both parties had instructed members to vote *for* the debt ceiling raise. There was 1 treatment variable, 2 outcome variables, and 4 control variables.

The treatment variable was whether the candidate had voted against raising the debt ceiling raise, with treated units voting *against* the debt ceiling raise and control units voting *for* the debt ceiling raise. The first outcome variable was whether members of Congress retained their seat in 2012. The second outcome variable was the member's share of the two-party vote in the election. The control variables were incumbent ideology, as measured by their DW-NOMINATE score for 2011 (Poole and Rosenthal 1997), district ideology, as measured by

President Obama's share of the two-party presidential vote in 2008 (Ansolabehere, Snyder, and Stewart 2001 ; Brady et al. 1996 ; Erikson and Wright 1980), incumbent's prior vote share from the 2010 election and campaign funding as recorded in their Federal Election Commission reports.

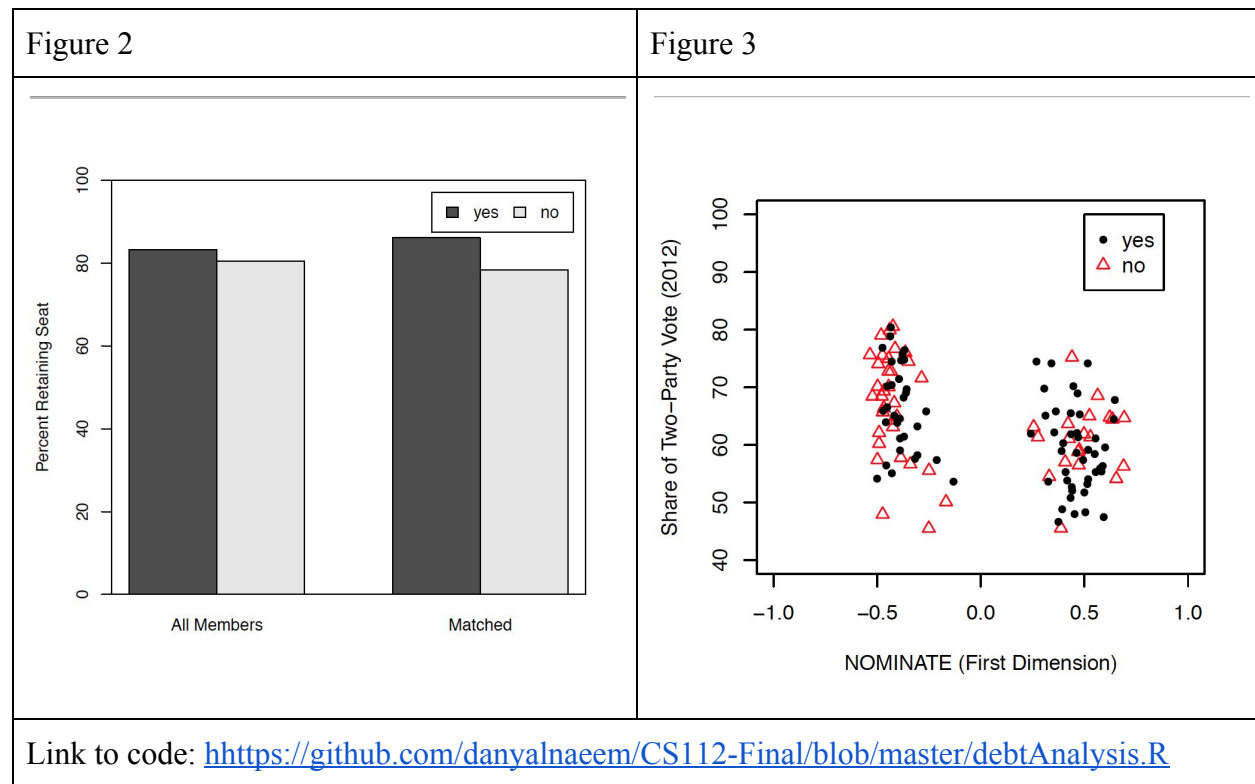
Method

Each unit (each candidate) was matched on the control variables indicated through Coarsened Exact Matching, and the causal effect was determined by evaluating the Local Sample Average Treatment Effect on the treated unit.

Results

On the first outcome variable, there was a negative effect of $\sim 7.7\%$ of voting against the debt ceiling raise on whether a member retained his/her seat. This was replicated by the authors of this paper, and the replication code and results are reproduced below.

On the second outcome variable, there was a positive effect of 2.4% of voting against the debt ceiling raise on the candidate's share of the 2 party vote. This was replicated by the authors of this paper, and the replication code and results are reproduced below.



Gaps

There are a few gaps with the current analysis. Each gap will be explored, followed by the action taken to address the gap and the result in terms of the treatment effect.

Gap # 1

Problem:

Coarsened exact matching (CEM) was selected as the matching method to match treatment and control unit, but there was no basis for this choice. CEM was attempted, it was determined there was a good balance between treatment and control units and therefore the authors proceeded with it.

However, there are several other methods of matching such as genetic matching and propensity score matching. These methods might lead to a better balance compared to CEM, and therefore would lead to a stronger conclusion of the effect of voting against the debt ceiling raise on re-election and vote shares.

Action:

All units were matched using 3 methods - CEM, genetic matching, and propensity score matching. The balance was calculated and recorded after each form of matching, and the effect size was also calculated and recorded for the most effective form of matching. Arguments to each form of matching were adjusted to ensure the matched sample size was not too small.

Result:

<u>Method</u>	<u>Balance p values</u>
CEM	0.23
Propensity score Matching	0.29
Genetic Matching	0.276

We find that propensity score matching provides the greatest balance. The authors had calculated the effect size with propensity score matching, and found the causal effect on share of the 2-party vote (Outcome 2) to be 3% instead of 2.4%.¹

Takeaway:

¹ #significance: used statistical tests to determine the significance of the results

The effect of a no vote on 2-party vote-share is larger than previously found when more statistically rigorous matching techniques were applied.

Gap # 2

Problem:

Although the 4 variables perceived to be the most significant in being confounders were isolated and controlled for, there are several variables that are not observed, such as age, gender, and race, that could be markedly different between control and treatment units. If they indeed are, we can no longer make a causal inference about the effects of voting against the debt ceiling raise, but can merely make a predictive inference that voting against the debt ceiling rate will predict a lower vote share or chance of retaining the seat.

Action:

Sensitivity analysis was performed to uncover the hidden bias present in the result. It determines the extent to which an unobserved covariate has a stronger relationship with both the treatment and outcome variables, as compared to an observed covariate.

Result:

It was found that when the Rosenbaum bounds sensitivity test was conducted for the treatment effect, a gamma value of **1.3** was obtained, above which the treatment effect is no longer statistically significant. This implies that the result obtained is sensitive to hidden bias - only a small bias is needed to refute the treatment effect observed by the study.

Takeaway:

The effect of voting against the debt ceiling raise on retaining the seat and on vote share percentages may possibly be attributed to unobserved covariates. Therefore, a stronger causal inference about the nature of this effect cannot be made - i.e. that voting against the debt ceiling rise may not lead to a reduction in vote share percentages.

Gap # 3

Problem:

Figure 2 states that candidates who vote against the debt ceiling raise are less likely to get re-elected. However, individuals who retire are counted among those who are *not* re-elected.

The explanation given by the authors is as follows: “If a member’s vote deterred challengers (making reelection easier) or drew sufficient opposition to result in strategic retirement, this outcome captures the effect(of a no vote on election outcomes)”

However, this reasoning is flawed because it assumes the vote will cause individuals to retire in greater numbers or cause potential opponents to stay away - it assumes a *causal* effect.

However, in the absence of any actual or statistical counterfactual, this cannot be assumed. The causal relationship may well be in the opposite direction. Congress members who know they are going to face re-election do not depend on the party for any future connections or resources and are much more free to vote based on their personal stance instead of the party stance. Similarly, Congress members in safe districts also do not depend on their party to win and therefore are freer to oppose the party stance. Or, there may be a third variable that causes changes in both the independent and dependent variables.

Instead, the effect of voting yes on individuals not standing in elections is a *descriptive* inference. Without rigorous experimental or statistical methods, this relationship can merely be observed, not explained as done so in the original paper.

Because the paper diverts to this explanation and groups retirees into the negative outcome group, there is overrepresentation of treatment units in the negative outcome group. This means that the causal effect of voting against the debt ceiling raise on the probability of re-election may be underestimated. Indeed, the fact that a 2.4% increase in vote share was observed but a 9% decrease in the chance of reelection is an inconsistency that illustrates this possible mismatch of treatment and control units.^{2 3}

Action:

To control for the effects of congress members retiring on their votes, n top of the 4 existing control variables, units were matched on a fifth variable - whether or not they had competition for re-election. Both unopposed and retiring congress members would be assigned a 0 value for this variable.

Result:

It was found that when also matching for whether a candidate stood for re-election, the causal effect of voting against the debt ceiling raise on the probability of reelection increased, from -8% to 0.2%, as shown in Table 3 below. The result better corresponded with the result on the effect of voting against the debt ceiling increase on vote-share percentages⁴

² #cs112-decisioninference

³ #probability: used statistics to uncover the flaws in the probabilities given and gave more correct probabilities

⁴ #distributions: constructed probability distributions to see if the overlap is small enough to justify treatment effect

	Sample not matched for retirement	Sample matched for retirement
Difference in Outcomes : Treatment - Control, Unmatched sample	-2.8%	-7.7%
Difference in Outcomes : Treatment - Control, Matched sample	-0.4%	+0.2%

Table 3: The difference in outcomes for matched and unmatched samples for retired and non-retired.

Takeaway

Voting against the debt ceiling raise will increase - not decrease - chances of re-election.

Discussion

3 problems with the current analysis of the data were identified and addressed. As a result of modifications made in analysis methods, it was found that the treatment effect was stronger than expected, that it is not sensitive to hidden bias and that it holds true for both outcome variables - re-election as well as voter share percentages.

However, while extrapolating this data in the past to guide decisions made in the future, we assume that the causal effect of voting against the debt ceiling raise on electoral outcomes remains the same. This may be invalid if the party reacts differently, such as withdrawing support more easily for candidates that do not follow its stance. This assumption should be qualified before the recommendations of this paper are implemented.

Conclusion

The data from the 2011 Debt Ceiling vote and 2012 House elections strongly suggest a positive effect of voting against raising the debt ceiling on voter share percentages. Assuming the causal effect of voting no on electoral outcomes remains the same, the representative should vote based

on his personal stance instead of following party stance, and does not need to worry about losing the next election as a result.

References

Monogan, Jamie, 2012, "The 2011 Debt Ceiling Controversy and the 2012 U.S. House Elections", <https://doi.org/10.7910/DVN/41B5UL>, Harvard Dataverse, V4, UNF:5:dOKRnmVicC8Vh3uk21y10Q== [fileUNF]

Appendix

Link to code: <https://github.com/danyalnaeem/CS112-Final>

Input data:

<https://drive.google.com/drive/folders/1xcbZFAPr1LYLq8n3F50zRacYNvnAeDG8?usp=sharing>

Rosenbaum Sensitivity Test for Wilcoxon Signed Rank P-Value			
Unconfounded estimate 0			
Gamma	Lower bound	Upper bound	
1.00	0	0.0000	
1.05	0	0.0000	
1.10	0	0.0000	
1.15	0	0.0000	
1.20	0	0.0000	
1.25	0	0.0000	
1.30	0	0.0552	
1.35	0	0.7716	
1.40	0	0.9987	
1.45	0	1.0000	
1.50	0	1.0000	
1.55	0	1.0000	
1.60	0	1.0000	
1.65	0	1.0000	
1.70	0	1.0000	
1.75	0	1.0000	
1.80	0	1.0000	
1.85	0	1.0000	
1.90	0	1.0000	
1.95	0	1.0000	
2.00	0	1.0000	

Figure 1: Results for sensitivity test which highlights the gamma value = 1.30.