ABSTRACT

Title of dissertation: THE POLITICAL ECONOMY OF CAMPAIGN SPENDING AND CHECKS AND BALANCES

Ernest Seng Yoong Koh
Doctor of Philosophy, 2017

Dissertation directed by: Professor Ethan D. Kaplan
Department of Economics

This dissertation studies the role of money on election outcomes and the welfare impacts of the system of checks and balances in the context of United States.

The first two chapters investigate the impact of campaign spending by their purpose on candidate vote shares. In Chapter 1, I first document the spending composition of U.S. House of Representative candidates. I use transaction level data from 2004 to 2016 to develop 5 alternative spending measures that are distinct in their purpose. I find that incumbents allocate a large portion of their budget towards advertising spending and less on fundraising and indirect expenditures (such as transfers and donations) as the race becomes increasingly tight. Challengers are found to spend at least a quarter of their budget on political advertising and almost never engages in indirect spending. I also document spending patterns by geographical location and incumbent seniority.

In Chapter 2, I use data on spending measures developed in Chapter 1 to empirically estimate the effects of disaggregated spending on incumbent's vote share. I

find that the incumbent's vote share increases in the incumbent's share of fundraising, advertising, campaign events (such as rallies and canvassing efforts), and indirect spending. I also investigate the differential impact of each type of spending by electoral and candidate characteristics.

Chapter 3 studies the costs and benefits to voter expected welfare of having the system of Checks and Balances (CBs). I develop a theoretical framework where government officials differ in their ideologies and their policy preferences are not known to the voters. I found that only extreme voters will ever be hurt by CBs. This occurs whenever the preferred policy of the checker who holds veto rights, is closer to the status quo than to the ideal policy of the proposer, who holds bill proposal rights. I also found that an increase in uncertainty in the checker's political stand may exacerbate the detrimental effects of CBs. On the other hand, uncertainty on the proposer's preferences enhances the benefits of CBs by increasing policy stability.

THE POLITICAL ECONOMY OF CAMPAIGN SPENDING AND CHECKS AND BALANCES

by

Ernest Seng Yoong Koh

Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2017

Advisory Committee:
Professor Ethan D. Kaplan, Chair
Professor Allan Drazen
Professor Michael J. Hanmer
Professor Peter Murrell
Professor John J. Wallis

Dedication

To my parents and Rachel

Acknowledgments

First and foremost, my deepest gratitude goes to my advisor, Ethan Kaplan for his help and support. I am grateful for your patience and encouraging words at all stages of my graduate studies. I would also like to thank Allan Drazen for his valuable inputs in all aspects of my research. Your constructive criticisms and guidance forced me to think harder about my ideas, which benefited me tremendously. A further thank you to you both for generously taking time out of your packed schedule to organize the biweekly Political Economy research group, which was very helpful to me.

A special thank you goes out to John Wallis, who gave me critical feedback and suggestions in the later parts of my research which helped gave structure to this dissertation. I would also like to extend my appreciation to Peter Murrell for attending my brown bag presentation and for providing me with valuable comments on the first two chapters of my dissertation. I would like to thank Michael Hanmer for agreeing to serve on my dissertation committee.

Many thanks to John Shea, who is an exceptional director of graduate studies, and who gave me helpful career advise and for providing many research and teaching opportunities during my time here at the University of Maryland. I would also like to thank many departmental staffs, especially Vickie Fletcher, Terry Davis, and Mark Wilkerson who all did outstanding work in each of their respective roles, which allowed me to focus wholeheartedly on my research.

From the Masters in Applied Economics program, John Straub provided me with the rare opportunity to be the teaching assistant of the program, of which I truly appreciate. To Stephanie Bergwall, who often cheered me up during the day and who would always bring a smile with her to work, thank you for being a wonderful colleague and a friend.

I would also like to thank all seminar participants at the University of Maryland for helpful suggestions.

Finally, to all my peers, especially Jake Blackwood, Joonkyu Choi, Pavel Coronado, Prateik Dalmia, Sai Luo, Yongjoon Park, Svetlana Pivovarova, Cristian Sanchez and Emekcan Yucel, thank you all the engaging conversations and the good times together.

Contents

List of Tables

List of Figures

CHAPTER 1 A Documentary of Candidate Spending Composition in the U.S. House of Representative Elections

> "There are two things that are important in politics. The first is money and I can't remember what the second one is."
> — Mark Hanna, 1895

1.1 Introduction

One of the functions of elections is to serve as a formal platform for voters to select leaders who will shape the nation's institutions and policies. Since voter welfare depends on the identity of the elected politician, it is of utmost importance to understand the factors that influence an election outcome. One such aspect that has received wide attention over the past 50 years is campaign finance.[1] Billions of dollars have been poured into recent elections by candidates in hope of getting elected. If campaign money do indeed influence the public's voting decisions, then the impact of candidate spending in election becomes a question of great importance, and a thorough understanding of its implications can provide valuable insights that could assist in the design of campaign spending regulations.

Previous studies on campaign spending have so far been unsatisfactory in providing conclusive evidence on the role of candidates' expenditure on election outcomes, especially for incumbents. While many have found that spending by the closest challenger increases the challenger's own vote share (or similarly, decreases the vote share of the incumbent), there is little consensus on the effect of incumbent's spending on votes. A large portion of the literature has found small or even negative impact

[1] For a brief review of the campaign spending literature, see Stratmann (2005).

of incumbent's spending (e.g. Abramowitz (1991); Jacobson (1978); Levitt (1994)). There is also a host of articles that found positive and significant effect of incumbent's spending upon votes (e.g. Gerber (1998); Green and Krasno (1988); Erikson and Palfrey (2000)). These studies all seek to answer the same question, but differ in their empirical strategies used to estimate the causal effect.

A common feature of the papers mentioned above is the use of an aggregate measure of campaign spending (henceforth *total* spending). To the extent that different types of spending yields different amount of votes, focusing on total spending alone does not allow us to tease out the heterogeneous effects of spending on election outcomes by their purpose. Unfortunately, there are only a few studies that address this problem from a disaggregated perspective, mainly due to data constraints. To the best of my knowledge, only two papers do this. Ansolabehere and Gerber (1994) first identified the issue that total spending can contain components that are irrelevant to one's campaign. However, they only managed to collect detailed spending data from the 1990 U.S. House elections. Due to their small sample size, they lack the statistical power to estimate the spending effects by types. Moreover, they use only Ordinary Least Squares regressions and do not address endogeneity bias. Schuster (2015) uses the variation in advertising and campaign events spending (e.g. campaign rallies, speeches, get-out-the-vote efforts etc.) to identify the effect of spending on voter's self reported voting behavior, taken from the American National Election Studies (ANES) survey. He found a positive effect of spending on voter persuasion. However, there are concerns that shroud the use of survey data and the adopted empirical strategy, which are further discussed in Section 2.2.

To follow up on previous work done in this front, my research answers three important questions. First, how do candidates spend their money in election? Second, what are the components of spending that are crucial in influencing an election outcome? Third, how do these types of spending differentially impact a candidate's vote share by electoral and candidate characteristics? These questions are answered in the first two chapters of this dissertation. Chapter 1 addresses the first question by documenting spending patterns of the top two candidates in each congressional district in the U.S. House of Representatives elections. I also document compositional changes in spending along several dimensions, such as across congressional district, electoral closeness, and incumbent seniority defined as the number of years in office. Chapter 2 relates to the second and third questions by presenting empirical results and relating them back to the literature. Together, the first two chapters shed light on the differential impact of the types of spending that drives electoral outcomes.

In this chapter, I document the spending patterns of U.S. House candidates by using transaction level data from the Federal Election Commission (FEC). The detailed disbursement files are available from 2004 onward.[2] Each entry contains a short spending description and supposedly, with a category number ranging from 1 to 12 associated to it. Table 1.1 contains the full list of spending categories and their descriptions. However, approximately 60% of a total of 3 million transactions are missing a category number. I develop a text analysis algorithm to impute the missing categories for these entries. Details on the algorithm are laid out in Section 1.3.2. I then develop 4 alternative measures of campaign spending: 1) *Direct* spending – *total* spending excluding indirect expenditures such as contribution refunds, fund transfers, loan repayments and donations. 2) *No administrative* spending – which further eliminates administrative expenses, in fear that this category acts as a default placeholder for spending entries that are hard to classify, 3) *Communication* spending – which consists of advertising, campaign materials and campaign events spending (such as get-out-the-vote efforts), that are types of spending that involve direct voter contact, and finally, 4) *Advertising* spending. I also group the complementary components to *direct* spending and term it *indirect* spending. This consists

[2] At the time of writing, candidate spending data is only available up to the 2016 election.

of money that are not spent on a candidate's own campaign.

Using these measures of spending, I document the spending composition of candidates based on their incumbency status. In particular, I find that a House incumbent outspends a challenger 3:1 on average when spending is measured at the aggregate level, i.e. total spending. However, this ratio decreases to 2:1 as we focus on finer measures such as communication and advertising spending, which are arguably better representations of actual spending by candidates. Further, I find that a large portion of this discrepancy is due to high levels of indirect spending by incumbents, or money that is used for other purposes than the candidate's own campaign, such as fund transfers from one committee to another, contribution refunds, and donations.

I also investigate spending patterns of candidates by electoral and candidate characteristics. In particular, I examine candidate spending across congressional districts, electoral closeness, and incumbent seniority. First, I find that incumbent and challenger spending have a strong positive correlation. In districts where incumbent's spending is high, chances are that the challenger's spending is also high. This is true for all spending measures. However, the level of spending appears to be more homogeneous across districts within the same state when we focus on a finer spending measure, such as advertising spending. This is especially true for incumbents. I also find that several partisan states, such as California and Texas have many districts where spending levels are low for both incumbents and challengers. This suggests that incumbency advantage might be higher in these regions compared to other districts in the country. Candidates from the opposition party might also be discouraged from running against the incumbent since these states are well known to be established regions and powerhouses for their respective party. However, spending levels in these districts are higher in recent years (2012 to 2016) compared to the past decade (2004 to 2010) for both incumbents and challengers, which suggests a higher degree of political competitiveness in these areas.

Next, I look at how candidates' spending composition changes with electoral closeness, as proxied by ex-post incumbent vote share. I find that incumbents on average allocate a larger portion of their total budget on advertising expenditures, and less on fundraising and indirect spending as his vote share decreases (or similarly, the race gets closer). On the other hand, challengers highly prioritize advertising spending, which takes up at least 25% of their entire budget and almost never engage in indirect spending at all levels of closeness in a race.

Finally, I study the change in candidate spending by incumbent seniority. Seniority is defined in terms of the number of years the incumbent has held office. I find that a Freshman incumbent, or an incumbent who is up for reelection for the very first time, spends about 50% more in total spending, and twice the amount of advertising spending than a senior incumbent, or an incumbent who has held office for at least 3 terms. This makes sense as new incumbents have to convey information about their political stance to the voters whereas the constituents are more likely to be well informed on the competency and platforms of experienced incumbents. As a consequence, we also observe an average challenger spends significantly more when they face a young incumbent compared to when they are up against senior incumbents since they stand a much better chance in winning the election in the former scenario.

This chapter proceeds as follows. Section 1.2 discusses the components that are contained within total spending and motivates the need to focus on disaggregated measures of spending. Section 1.3 describes the data, sources, problems, as well as the text analysis algorithm used to impute missing spending category numbers. Section 1.4 presents summary statistics of House candidates' spending for years 2004 to 2016, and further breaks it down by electoral and candidate characteristics, starting with geographical regions, followed by electoral closeness, and finally incumbent seniority. Section 1.5 provides a brief summary of the results and Section 1.6 houses the Appendix which contains additional details on the algorithm.

1.2 What does Total Spending Capture?

Total spending is an aggregate measure of candidate expenditures reported by the Federal Election Commission. It is presented in the candidates' summary pages and is the measure that is most widely used in the literature. There are a total of 12 types of expenditures that make up the total spending numbers. These components are developed by FEC and are listed on their website as well as in the report filing instructions for candidate committees. The full list of categories and their detailed descriptions are presented in Table 1.1. The types of spending that make up total spending are vastly different in nature. On the one hand, we have money that is spent directly by the candidate such as administrative, traveling, fundraising, advertising spending etc. On the other hand we have money that are not spent directly on one's own campaign, such as fund transfers from one political committee to another (within and between candidates), contribution refunds, loan repayments, and donations. Some of these categories, especially in the latter group, are questionable as to whether they should be reflective of how much a candidate spends in an election.

Putting the issue of definition aside, a more fundamental concern regarding total spending is that it does not capture the essence of spending behavior. For example, Joseph Crowley and Michael Arcuri, are reported to have spent \$1.73 million and \$1.62 million in total spending in the 2008 House elections respectively. Both politicians are incumbents from the state of New York, where Mr Crowley was the representative of the 7th district while Mr Arcuri was the representative of the 24th district. Their spending amounts look quite similar at face value. However, this simple comparison completely hides the fact that there are large differences in the spending amounts of several categories. For starters, Mr Arcuri faced a much closer election than Mr Crowley, where the former obtained 52% while the latter obtained

84.7% of the total votes.[3] In terms of spending, Mr Arcuri spent a staggering $850,000 on political advertising while Mr Crowley spent only $60,000 in this category. For fundraising expenditures, Mr Arcuri spent about $180,000 while Mr Crowley spent an amount close to $450,000. For transfers and donations, these numbers are $30,000 and $510,000 respectively for Mr Arcuri and Mr Crowley. These are just several examples of the variation in spending composition between any two candidates that seemingly spend the same amount of money in terms of total expenditure. To the extent that the heterogeneity in spending composition generates different electoral outcomes, any study that examines the relationship between campaign spending and votes ought to incorporate these differences in their methodology.

1.3 Data and Methodology

1.3.1 Spending Data

Candidates running for office are required to establish a principal campaign committee, who will be responsible for reporting the candidate's spending to the Federal Election Commission (FEC). Both transaction level and aggregate level data are publicly available and can be downloaded from the FEC website.[4] As mentioned previously, the aggregated (total) spending figure is the historical measure of campaign spending. The disaggregated (transaction level) data breaks each candidate's total spending into one of the twelve spending categories listed in Table 1.1.

There are two main sources on the FEC website from which I draw my spending data from. The first source is a candidate summary webpage that reports, on a less granular level, the in-flow and out-flow of cash. This is where I obtain candidate spending data on transfers, loan repayments, contribution refunds, political

[3] Vote percentages obtained from https://www.elections.ny.gov/NYSBOE/elections/2008/General/USCongress08.pdf

[4] The data sets are updated daily by FEC. Hence, spending files downloaded in the future might not be identical to the data set used in this study. The discrepancies might stem from report amendments, late filing, and manual corrections.

contributions and donations (categories 8 through 12). The second data source is the operating expenditure database which houses transactions for categories 1 through 7, i.e. administrative through campaign events expenditures. There are a total of about 3 million transactions made by the top two candidates in each House election from 2004 to 2016.[5][6]

A major drawback to the data is that approximately 1.8 million entries (about 60% of all transactions) are not assigned a category number. Since my goal is to compute the amount of spending in each category for each candidate, removing these many entries will undoubtedly raise concerns of systematic sample selection bias. To get a better understanding on how this can become a problem, Figure 1.1 shows the distribution of the percentage of spending entries that have missing category numbers by candidates. The shape of the histogram indicates that this issue is candidate specific, as most of the candidates either fully characterize their transactions or they do not. Among the pool of candidates who did not classify more than 90% of their entries, they are more likely to be incumbents (67%), Democrats (57%), and winners (72%). They are also higher spenders on average (at $1.3 million in total spending) compared to candidates who did not classify less than 10% of their entries (at $0.9 million in total spending). Since this omission in category assignments is by no means random, the sample will be heavily tilted towards challengers, Republicans, losers, and lower spenders if we simply remove the transactions with missing category numbers from the sample.

Fortunately, a short spending description is available for each transaction. Hence, I develop a text analysis algorithm which is similar in spirit to Gentzkow and Shapiro (2010) to impute the missing category numbers using the reported description. The

[5] The number of transactions are tallied after I eliminate "memo" entries which appears twice in the data set. For example, a payment of a credit card payment is counted as a "memo" entry and the individual transactions in the statement will also appear as a non-"memo" entry. Thus to prevent double-counting, the "memo" entries are thrown out from the data set.

[6] The exact number of transactions could possibly differ over time due to daily updates to the spending data, as mentioned previously.

algorithm is described in the next section.

1.3.2 Algorithm for Imputing Missing Categories

The goal of this algorithm is to search for and identify words that are highly predictive of a spending category. For example, an entry with "TV Advertising" as its description should clearly be predicted as advertising expenditure. "Staff Salary" should be predicted to belong to the "Administrative/Salary/Overhead" category and so on.

Since the methodology that I use in this paper is most similar to Gentzkow and Shapiro (2010), a brief background on their work is warranted. In a broad sense, Gentzkow and Shapiro (2010) is concerned about measuring political slant of U.S. newspapers. To do this, they used text from the 2005 Congressional Records to identify phrases that are used most frequently by a Democratic or a Republican legislator. Examples of words or phrases used mostly by Democrats include "tax breaks", "trade deficit", "minimum wage", and "workers right". On the other hand, Republicans mainly use phrases such as "tax relief", "war on terror", "illegal aliens", and "death tax". Next, they used the list of partisan words to map phrases into ideology, and finally to predict the language slant in newspapers. My algorithm employs a similar idea in that it attempts to identify keywords that are predictive of a spending category. The algorithm differs from theirs in that I am imputing continuous weights for each category, instead of binary weights. Using a cross validation test, I am able to provide a relative ranking of the performance of my algorithm to other variants of it through the means of minimizing the mean squared error. The explanation of this test is provided in Appendix Section 1.6.1.

Next, I introduce the algorithm used to impute the missing category values. Let Ω be the set of all spending entries and let Ω_C be the partition of Ω that contains all transactions with an assigned category number. Further, let Ω_N be the subset of Ω that contains only spending entries without a preassigned category or an assigned category number that is not 1-12.[7]

The algorithm proceeds as follows:

Step 1: Porter stem and removal of connector words

I reduce each word in the spending description to its linguistic root so that similar words such as advertising, advertise, advertised, etc. are treated as the same word.[8] This reduces both the number of unique words in Ω and also increases the precision of the algorithm.

I also remove all stop words or connector words such as "and", "the", "it" etc. that conveys no actual meaning and are only used as conjunctions. The list of stop words is taken from http://www.lextek.com/manuals/onix/stopwords1.html.

Step 2: Learning phase on Ω_C

A word-category pair wc in Ω_C is defined as a word w that is contained within the spending description of a transaction which is associated to a specific spending category. For example, an entry with spending description "TV advertising" that is classified as category 4 has two unique wc pairs–"TV-4" and "advertising-4". Note that a word need not necessarily be assigned to only one category. In fact, we have an abundance of words that get assigned to multiple categories, such as "food" which is commonly associated with traveling, fundraising, and campaign event expenditures. Let Λ denote the set of all wc pairs in Ω_C.

For each wc pair in Λ, define f_{wc} to be the number of times word w gets assigned to category c in all spending entries of Ω_C, i.e. the frequency that wc appears in Ω_C. Similarly, let $f_{wc'}$ be the frequency that word w gets assigned to categories other than

[7] Occasionally, I observe several invalid category numbers (not within the range of 1 to 12). I treat these entries as having a missing category number and impute the weights using the text analysis algorithm.

[8] The Porter Stemming algorithm that I use is the porter2 function contained in the stemming 1.0.1 Python package. This differs from the original stemming algorithm written by Martin Porter (1980) in that it is more accurate by reducing a larger amount of similar words to the common base word. The tradeoff for this efficiency is code time.

c in Ω_C. $f_{w'c}$ and $f_{w'c'}$ are defined analogously. I perform a number of filtering steps before arriving at the final list of words that are predictive of a category. First, I throw out any wc pair that appears less than 100 times in Ω_C to eliminate spelling or assignment errors. Second, following Gentzkow and Shapiro (2010), I compute the χ^2 statistic for each of the remaining wc pairs which measures the strength of the relationship between the word w and category c. The statistic is given as follows:

$$\chi^2_{wc} = \frac{(f_{wc}f_{w'c'} - f_{w'c}f_{wc'})^2(f_{wc} + f_{wc'} + f_{w'c} + f_{w'c'})}{(f_{wc} + f_{wc'})(f_{wc} + f_{w'c})(f_{w'c} + f_{w'c'})(f_{wc'} + f_{w'c'})} \tag{1}$$

I then gather all wc pairs if their χ^2 value is above 3.841, which corresponds to a 95% confidence level with 1 degree of freedom.[9] This restriction is put in place such that I retain only words that have high predictive power of a category. Third, I eliminate a wc pair if the inner expression of the quadratic term in the numerator $f_{wc}f_{w'c'} - f_{w'c}f_{wc'}$ is negative. This ensures that the final list contains only words that *positively* predicts a category. The details of this filtering step is described in Appendix Section 1.6.2.

This final list, denoted as Λ_F, contains 808 unique wc pairs. Note that a word might still be predictive of more than one category after surviving the filtering criteria. For example, "website" is used in administrative spending since it involves building and maintenance of the official candidate website. It is also used as advertising spending to mean online or internet advertising. In these cases, the weights are split by their relative frequencies in each of these categories.

Table 1.2 presents the top 5 words for each category sorted in descending order by the their predictive power based on the χ^2 statistic. Words such as "salary", "payroll", "phone", "office" and "tax" are all unambiguously indicative of the transaction being spent on the administrative side of the campaign. "Advertise", "radio", "media", "TV"

[9] There are only 2 categories for each wc pair– the category of interest c, and the complement of the category c'. This implies a degree of freedom of 1.

and "buy" are also highly connected to the activity of political advertising.

Step 3: Imputing missing categories in Ω_N

I compute the spending weights of each category for each transaction in Ω_N using the elements in Λ_F. For each transaction in Ω_N, the weight assigned to category $c \in \{1, 2, ..., 12\}$ is computed as follows:

$$\delta_c = \frac{\sum_{i=1}^{n} f_{w_i c}}{\sum_{i=1}^{n} \sum_{\hat{c}=1}^{12} f_{w_i \hat{c}}} \tag{2}$$

where n denotes the number of words in the spending description. In other words, the weighting scheme given by Equation (2) is determined by how frequent the words in the spending description gets assigned to category c in Λ_F compared to how frequent the same words *appear* in Λ_F. In the case where $f_{w,c}$ is 0 for all w and c, the entry is eliminated from the sample. This could occur if each word in the description does not have the statistical power to predict a category (hence, not in Λ_F), or that all words are foreign to the learning set Ω_C (new vocabulary or spelling errors). There are approximately 15,000 such observations, which accounts for only less than 1% of the total number of observations in the sample and less than 0.6% of the total spending amount within all entries that have missing category numbers. Finally, the imputed spending amount for category c is given by $\$X * \delta_C$, where X is the amount of spending for that transaction.

Appendix 1.6.3 contains a simple example that illustrates how the algorithm is carried out in practice.

Discussion: To get a better understanding of the credibility of the algorithm, I present several examples of the actual output (category weights) produced by the algorithm. These examples are given in Table 1.3. Bear in mind that these examples are by no means an exhaustive representation of the full sample. They are only used to gain a sense on how well the algorithm performs.

The examples in Table 1.3 are split into 3 panels. Panel A provides 5 examples of spending entries where the algorithm assigns full weight or close to full weight (above 90%) to a single category. These are examples where there should be no ambiguity in the type of spending. For example, “Airline Ticket” is associated to travel spending, while “Office Alarm Service”, “Payroll Taxes and Withholdings”, and “Web/Internet Services” are all part of a campaign’s overhead expenses. Panel B shows examples for which the algorithm assigns a more evenly distributed weights to several categories. These items can be thought of entries that are ambiguous in their purpose and the inference of the correct spending category from the description alone can be difficult. For example, “Food for Volunteers” does not explicitly mention the exact purpose for the volunteers. They could be volunteers for fundraising events, campaign rallies, or canvassing activities. Similarly, “Meeting Expense” is also ambiguous on the context of the meeting. The final panel, Panel C contains examples where the algorithm fails to predict any weights. These are entries that contain spelling errors in the description or they can be transactions that are highly specific and do not occur frequently. For example, “Adverisements” is a misspelled word of “Advertisements” and it is simply not possible for an algorithm to correct all typographical errors. It is also unsurprising that the algorithm does not pick up phrases that contain a person’s name (e.g. “Zhang, Xing”) or specific descriptions (e.g. “Barbershop Chorus”, “Hot Dog Buns”).

While there is certainly a point of content as to whether the imputed category weights are unbiased, the algorithm developed in this section is very similar to some of the most influential work done in the literature (e.g. Gentzkow and Shapiro (2010)). In that sense, we can take comfort in that there is sufficient credibility in our methodologies.

1.4 Spending Measures and Descriptive Statistics

Using the imputed spending data, I develop 5 alternative measures of candidate spending. The contents of each measure are listed in Table 1.4.[10] The first measure, "Total" spending, is the traditional measure used in most studies in the literature on campaign finance (Jacobson (1978); Levitt (1994); Green and Krasno (1988), etc.). The second measure, "Direct" spending, eliminates all transactions that are not directly spent on a candidate's own campaign, such as loan repayments, fund transfers between candidate committees, contribution refunds and donations. "No Administrative" spending further excludes administrative expenditure, as we worry that administrative spending (category 1) could be used as a default placeholder for entries that do not fall neatly in a single category. For example, "house christmas ornaments", "thank you gifts", "political strategist expenses" etc. are being labeled as administrative expenditures but they might not reflect the candidate's overhead spending. The reader should bear in mind that this does not imply that administrative spending is unimportant for an election, but rather, "No Admin" spending serves as a benchmark to compare and contrast the role of administrative spending in the context of election outcome when we turn our attention to empirical estimates in Chapter 2. Next, I group spending items that involve direct voter contact and those that have been the focus of recent research on political strategy, such as campaign advertising (Spenkuch and Toniatti (2016)), campaign events (e.g. personal canvassing, campaign rallies etc.), and campaign materials (e.g. fliers, handouts, etc.) (Gerber and Green (2000)). The aggregated spending on these 3 items is termed "Communication" expenditures. "Advertising" expenditure is self-explanatory, and finally, "Indirect" expenditures are

[10] FEC also provides a reported alternative for the "total" and "direct" spending measures. The "direct" spending measure corresponds to "Operating Expenditures" reported by FEC. The correlation coefficient between the total spending variable computed via the algorithm listed in Section 3 and the total spending variable reported by FEC is 0.981. The correlation coefficient between the "direct" spending variable computed via the algorithm listed in Section 3 and the "operating expenditure" variable reported by FEC is 0.976. All regression results are robust to using either measure.

spending components that are complementary to "Direct" spending.

The summary statistics for each spending measure is given in Table 1.5. Using the aggregate (total) measure on spending, an incumbent spends approximately \$1.5 million in an election on average, which is about 3 times as much as an average challenger who only spends \$0.5 million. More surprisingly, more than 82% of the total spending by the top two candidates in the race is attributed by the incumbent alone on average. Notice that this number is above 75%, which is the ratio of mean incumbent spending to the sum of the means of incumbent and challenger spending, indicating that there is a significant number of races where almost all of the spending is done by the incumbent. However, much of this is due to incumbent's indirect spending. In row 6 of Table 1.5, we see a large gap between indirect spending by an incumbent and a challenger. In particular, an incumbent engages in about \$240,000 of spending that is not directly related to his campaign compared to only \$30,000 by a challenger. This is all not too surprising as incumbents are long known to have an advantage in fundraising, which often times lead to contribution amounts far exceeding what is required to win an election. Hence, it could be in their best interest to transfer the excess money to another party member who needs it more than he does. The spending gap between an average incumbent and challenger decreases by about \$200,000 after the elimination of indirect spending (difference in rows 1 and 2 of column 8). More importantly, the average ratio between an incumbent's and challenger's spending amount decreases as we go down the rows of Table 1.6, implying that spending amounts between the two candidates are more equal as we focus on types of spending that are important to a candidate. Moreover, only 71% of the total advertising expenditures in a race are attributed to an incumbent, which is more than a 10 percentage point difference from total spending share. Since challengers are more likely to face liquidity constraints, they should be more selective in the usage of each dollar and this pattern suggests that they highly prioritize advertising spending as a means of pulling votes. Hence, the main insight that Table 1.5 provides is that although incumbents do stand an advantage over challengers in terms of total spending, this inequality might be exaggerated from the inclusion of the types of spending that might matter little in an election.

Table 1.6 further breaks down the aggregate spending into individual spending categories. Incumbents on average outspent challengers in all categories except for loan repayment. This is not surprising as challengers tend to borrow more than an incumbent due to the fact that they are typically less established and have less funds. This could also explain the fact that challengers barely transfer any of their campaign money to other committees or candidates. Comparatively, incumbents contribute about \$116 thousand to other candidates whereas challengers transfer about \$3 thousand on average. The pattern is also consistent with many other components of indirect spending, which includes transfers to other committees of the same candidate (row 8) and political donations (row 12). An average incumbent's campaign size, as proxied by administrative spending, is about 3 times as large as an average challenger's campaign size. Most of the challenger's money is spent on advertising – about \$230 thousand, which encompasses about 44% of their total spending. This shows that challengers do prioritize spending their money on tv, social media, online, and any other form of campaign advertisements since they tend to be less well known to the public than an incumbent is.

Next, I document candidates' spending pattern by geographical, electoral, and candidate characteristics. First, I compare candidates' spending by congressional district. Then, I look at spending compositions by electoral closeness and finally, by the incumbent's seniority as measured by the number of years in office.

1.4.1 Congressional Districts

Figure 1.2 plots the mean total spending for incumbents (Panel (a)) and challengers (Panel (b)) in each congressional district for the years of 2004 to 2010 by spending quartiles. Total spending in a district is averaged across 4 election cycles (2004 to 2010). White regions indicate low average total spending levels (either by incumbent or challenger status) while the dark blue regions represent districts with high averaged total spending levels. District shaded in black indicates regions where spending data is unavailable. This could occur whenever there is no candidate for a given incumbency status in all House elections from 2004 to 2010. In panel (b), this occurs whenever a district has no challenger for all 4 election cycles, in which case the incumbent ran unopposed in each year. The second reason where this could happen is whenever the candidates' do not file their spending reports to FEC. These districts are then dropped from the sample. The sample ends at 2010 since district borders are redrawn after the 2010 Census. As a result, the number of seats in a given state might also change. The total spending map for years 2012 to 2016 is given in Figure 1.4.

First of all, there seems to be a strong positive correlation between an incumbent's and a challenger's total spending. We see that many of the districts that fall within the top quartile of incumbent's total spending also fall within the top two quartiles of challenger's total spending. Second, there can be plenty of variation in spending across districts within the same state. For example, candidates in Texas do not appear to spend in cohesion with one another, even within the same state. There are cases of bordering districts where the incumbent's total spending lies within the bottom quartile of the distribution in one district while the other lies within the top quartile of the distribution. We also see high variations of spending in California and Florida. One explanation is that it is hard to coordinate spending in a large state with many congressional districts. However, this is not nation wide. We do see states like New York that has a total of 29 seats in the House having more homogeneous spending across its districts.

Spending is most heavily concentrated in several regions including North and South Dakota, the Mountain states, the upper east region surrounding the New York metropolitan area, and patches within the Southern Atlantic States especially Virginia, South Carolina, and Georgia. We also observe that partisan states such as California, and Texas do not attract challengers who spend a lot, which suggests that incumbency advantage is these states are higher than average.

Next, I look at the distribution of advertising spending to see if there are any significant changes to spending behaviors. Figure 1.3 depicts the distribution of advertising spending by quartiles for incumbents and challengers.[11] First, comparing panel (b)'s of Figure 1.2 and 1.3, we see that the spending patterns for challengers appear to be similar. This is consistent with our previous observation that advertising spending takes up a significant portion of the challenger's budget. On the other hand, we do see more distributional changes in incumbents' spending going from total to advertising expenditure. The distribution of spending appears to have shifted away from California and Texas towards larger districts, such as Montana and Wyoming which are each represented by a single at-large district. Districts in the Midwest states also appear to be on the upper end of distribution of incumbent's advertising spending. The most prominent change is around the New York-Pennsylvania area, where the districts are now shaded in dark blue, indicating that advertising spending in this area is a lot higher than average. However, this does not necessarily mean that these incumbents are engaging in higher levels of political advertising. It could very well be driven by the fact that the spot prices of TV advertising in the New York metropolitan area is one of the highest in the country Stratmann (2009).

Figures 1.4 and 1.5 are similar to Figures 1.2 and 1.3, but shows the spending distribution for years 2012 to 2016 instead. We do see a significant change in spending

[11] Spending distribution maps for other measures are available upon requests.

patterns across decades. In 2012 to 2016, incumbent's total spending appears to be more homogeneous across districts within the same state (e.g. see Illinois, Iowa, Texas and Washington) compared to the distribution of total spending in 2004 to 2010. Part of the reason could be that high spending incumbents get relocated to different districts where spending has been typically low.

1.4.2 Electoral Closeness

This section seeks to understand how the candidate's spending composition vary by electoral closeness as proxied by the ex-post two-party vote share. Table 1.7 shows the mean spending by vote share bins of 10 percentage points. First, observe that an average incumbent's spending amount is highest in the 40-50 percent vote share bin, where the incumbent barely lost the election. This is consistent with studies that found that incumbent's spending increases with expected closeness (Erikson and Palfrey (2000); Gerber (1998); Green and Krasno (1988)). Part of the reason is that incumbents react to how much their challenger is spending in a race (Jacobson (1978)). This is supported by the fact that challenger spending is significantly higher in this range compared to races where the challenger stands no chance of winning. On the contrary, we do not expect incumbents to spend large amounts of money in races that they are confident of winning.

Second, notice that the percentage of total spending due to advertising expenditure is decreasing in vote share. In particular, incumbents facing a close election (40-50 vote share category) allocate more than half of their budget on advertising, whereas incumbents in a lopsided election (90-100) allocate only about 10 percent of their total spending on advertising. Among the components that involve direct voter contact (communication spending), almost 80% are being spent on advertising alone for incumbents in close races. This is significantly higher than an average of about 30% for incumbents who won the election by a landslide . This implies that incumbents heavily prioritize advertising (Spenkuch and Toniatti (2016)) over other mobilization methods such as personal canvassing (Gerber and Green (2000)) when the election is tight and switch strategies to focus more on get-out-the-vote efforts over political advertising when the race is safe. Figure 1.6a shows exactly how total spending is being split up into finer categories for different levels of electoral closeness. We can clearly see that as the incumbent's vote share decreases, a larger percentage of the budget is allocated to advertising expenditure and the share of spending on fundraising and indirect expenditures decrease.

We observe a similar pattern for the challengers. One key difference is that indirect expenditures, or components to spending that are not related to one's own campaign, is small regardless of electoral closeness for challengers. If indirect spending is viewed as only a secondary mean to direct spending in increasing one's vote share, it makes more sense for challengers to allocate his spending on items that has a better chance of persuading a voter, such as political advertisements or canvassing activities. Figure 1.6b also shows that advertising expenditure takes up at least a quarter of the challenger's budget, even when they do not stand a chance of winning the election.

1.4.3 Incumbent Seniority

Political strategies develop with experience. Incumbents who have been in office for several years might change their spending strategies over time as they become well versed with the political landscape. To study the change in spending patterns, I split the sample along the dimension of incumbent seniority. In particular, I create 3 groups. The first consists of all races with Freshmen incumbents, i.e. incumbents who are up for reelection for the very first time or those who have been in office for at most 1 term.[12] The second group consists of all races with Sophomore incumbents,

[12]Some incumbents assume office in the middle of a term as a result of death or retirement by the former politician in office and are considered as Freshmen incumbents if they run in the next

i.e. incumbents who are seeking reelection for the second time. Finally, I group all races with incumbents who have been in office for at least 3 terms and they are known as "Senior" incumbents.

Table 1.8 presents the summary statistics of candidates' spending by incumbent seniority. It is obvious that among the 3 groups, Freshmen incumbents spend the most in elections on average in all measures except for indirect spending. Notice that the difference in direct spending between a Freshman and a Senior incumbent can be mostly attributed to political advertising, which explains about 70% of the gap in direct spending. The rest of the differences are mostly due to the change in administrative spending, or campaign size. In part, this could be due to the fact that junior incumbents are less well known to the public than senior incumbents. Hence, one of the best way to convey information to his constituents is through political advertising. As time goes by, the need to advertise is reduced as the incumbent should be relatively well know by then. Getting reelected many times will also boost the incumbent's confidence in a race, which could explain the increase in the level of transfers (indirect spending) despite the decrease in total spending levels with incumbent seniority.

The average total spending levels between a sophomore and a senior incumbent are very similar. However, this obscures the fact that sophomore incumbents engage in more advertising than senior incumbents. The mean difference in is about \$120,000. This gap is almost entirely offset by the higher levels of indirect spending by senior incumbents with a mean difference of about \$100,000. This observation further underscores the importance of breaking down aggregate spending to finer measures.

For challengers, we see that they spend the highest on average when facing an inexperienced incumbent. Once again, they do this primarily by expanding advertising expenditures. This makes sense as it is perhaps their best chance to take office

election.

whenever a freshman incumbent is on the ballot compared to facing a well established incumbent. The high reelection rates of House incumbents further deter them from launching any serious threats to a senior incumbent, which explains their reduced level of spending.

1.5 Summary

In this chapter, I document candidates' spending composition in the U.S. House of Representation election from 2004 to 2016. I first address the missing data problem by developing a text analysis algorithm that imputes spending weights for each of the 12 disbursement categories developed by the Federal Election Commission. Using the imputed data, I investigate how incumbents and challengers spend their money at a much finer level than previous studies have done by breaking down each candidate's aggregate spending into individual expenditure components. On average, an incumbent is quoted as spending \$1.5 million (in 2010 dollars), which is about 3 times larger than the total spending of an average challenger. I find that a great deal of this difference is due to indirect spending, which consists of fund transfers from one political committee to another, contribution refunds, and donations. The ratio between spending that involves direct voter contact, which consists of advertising, campaign materials (e.g. banners, fliers, etc.) and campaign events (e.g. rallies, speeches, canvassing efforts etc.) are much tighter at about 2, indicating that the spending advantage held by an incumbent might be traditionally overestimated.

I also study changes in patterns of candidate spending across several dimension of electoral and candidate characteristics. First, I document spending patterns by congressional districts and found that spending is more homogeneous across districts within the same states as we focus on spending items that have been traditionally believed to pull votes, such as political advertising. In some cases, partisan states such as California and Texas do not exhibit high levels of spending by both incumbents and challengers. This could suggest that incumbency advantage in these states are higher than in others. Next, I study candidates' spending composition by electoral closeness. This exercise reveals that incumbents increase their spending priority on political advertising while engaging less in fundraising and indirect expenditures as electoral closeness increases (or similarly, incumbent's vote share decreases). I also find that challengers allocate a significant percentage (of at least 25%) of their total spending regardless of electoral closeness and that they almost never engage in indirect spending. Finally, I also investigate spending behaviors of candidates by incumbent seniority. I find that Freshmen incumbents spends about 50% more in total spending and about twice as much in advertising spending compared to a senior incumbent. Challengers also take this opportunity by increasing their spending amounts whenever they face an inexperience incumbent as this is when their opposition is at his weakest state.

However, a simple summary statistic of the candidates' spending composition does not provide us with a good understanding of the effect of money on election outcomes. The next chapter addresses this concern by discussing the empirical approach used to estimate the effects of spending on vote shares.

1.6 Appendices

This appendix contains additional details on the algorithm used to impute missing spending categories.

1.6.1 Cross Validation

I compare the performance of my proposed algorithm in Section 1.3 to two alternatives, which uses χ^2 weights and binary weights as the metric to impute the weights for each spending category respectively. Specifically, my proposed algorithm (call it A1) assigns spending weights to each category according to word frequency weights, given by the formula $\delta_c^{A1} = \frac{\sum_{i=1}^{n} f_{w_i c}}{\sum_{i=1}^{n}\sum_{\hat{c}=1}^{12} f_{w_i \hat{c}}}$. The second algorithm (A2) assigns weights to each category according to the word χ^2 weights, given by the formula $\delta_c^{A2} = \frac{\sum_{i=1}^{n} \chi^2_{w_i c}}{\sum_{i=1}^{n}\sum_{\hat{c}=1}^{12} \chi^2_{w_i \hat{c}}}$. The third algorithm (A3) assigns binary weights to each category, where the value of 1 is given to the category c that has the highest weight in A1, i.e. $max_c \delta_c^{A1}$, and a weight of 0 to all other categories. In the event of a tie, the tie-breaking criteria is that we give full weight to the category that gets assigned the highest weight in A2. This is sufficient to break all ties in my sample.

I use a 10-fold cross validation approach to rank each algorithm by means of minimizing the mean squared error. Figure 1.7 illustrates the algorithm and the test proceeds as follows. The set Ω_C, which contains spending entries with preassigned category, is first randomly split and sorted into 10 different subsamples. In run $k = 1, ..., 10$, bin k is chosen as the validation set, denoted as Ω_V while the remaining 9 bins are designated as the training set, denoted as Ω_T. In Figure 1.7, Ω_V is shaded in gray while Ω_V is shaded in green. For each run, the learning phase of the algorithm is used on Ω_T and then category weights are imputed by the algorithm on the spending entries in Ω_V. Since Ω_V lies within Ω_C, I observe the true category of each entry in Ω_V. Thus allows me to compare the predicted to the true category value. This is repeated for a total of 10 runs, and for each of the algorithms A1, A2, and A3.

I use the mean-squared error (MSE) as the metric for performance comparison. The MSE is given by $MSE = \frac{1}{n_1}\sum_{i=1}^{n_1}\sum_{c=1}^{12}(w_{i,c} - \hat{w}_{i,c})^2$, where $w_{i,c}$ is the reported weight for entry i for category c in the validation set Ω_V (note that $w_{i,c}$ will equal 1 for exactly one category and 0 for others), $\hat{w}_{i,c}$ is the predicted weight depending on the algorithm used, and n_1 is the size of Ω_C. The MSE for A1 is 0.303, 0.425 for A2, and 0.433 for A3. In this sense, A1 comes out as the clear winner among these 3 algorithms.

1.6.2 χ^2 Statistics - Further Restriction

I impose a further restriction that the inner expression of the quadratic term in the numerator of equation (1) should be positive, i.e. $f_{wc}f_{w'c'} - f_{w'c}f_{wc'} > 0$. This is because the χ^2_{wc} metric has been typically used for the test of independence between two random variables, and is silent on whether one is positively or negatively correlated with the other. For our purpose, it is crucial to know the direction of correlation. The interpretation of the statistic differs depending on the sign of this term. If it is positive, then this implies that word w is highly predictive of category c. However, if the sign is negative, then this implies that word w is predictive that the spending entry should *not* belong to category c.

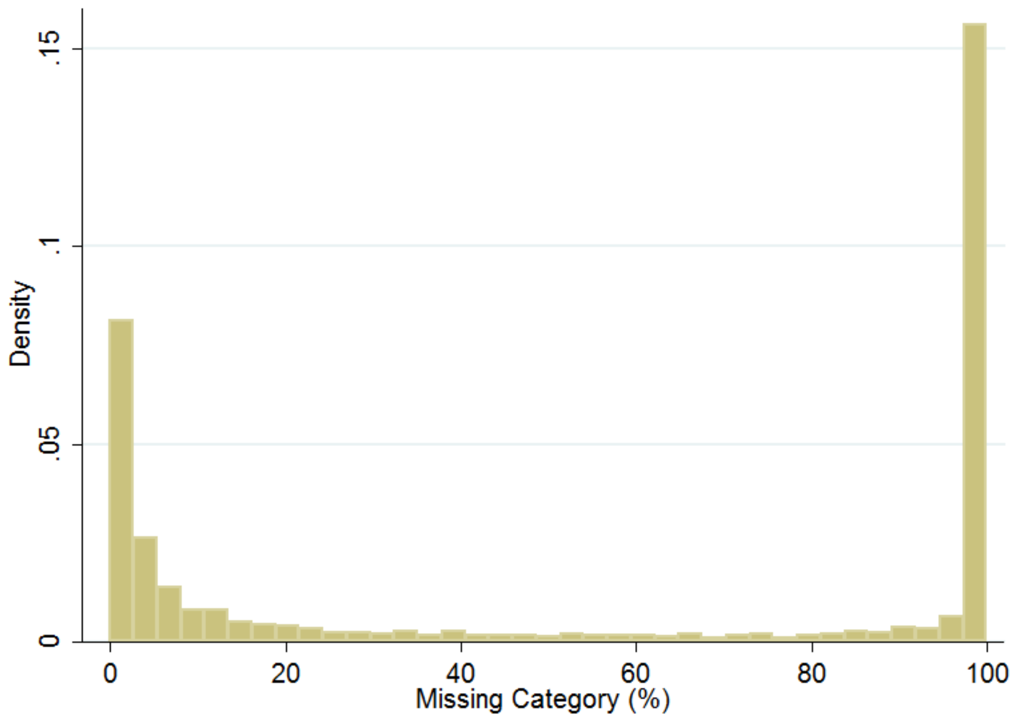
For illustration, consider the contingency matrices in Table 1.9. In both scenarios, χ^2_{wc} are identical. However, in scenario 1, it is apparent that if we encounter word w within a spending description, it *should* belong to category c. On the other hand, in scenario 2, it implies that the spending entry *should not* belong to category c if word w is part of its description.

This further restriction implies that that final subset of wc pairs contain only words that positively predicts a category.

1.6.3 Example

Here, I present an example to help illustrate the algorithm. Assume that all words satisfy the χ^2 filter listed in section 1.3.2. Further assume that there are only two spending categories, 1 and 2. Consider the example provided in Figure 1.8, where there are only 5 spending entries. The top 4 observations have preassigned categories, so they belong to Ω_C. On the other hand, the last entry has a missing category, so the algorithm will impute the spending weights for each category. The phrase "Printing and Food" will be collapsed down to "print food" after applying the porter-stemming algorithm on each word and eliminating connector words. Two-thirds of the weight will be assigned to category 1, since the words "print" and "food" are assigned to category 1 exactly once each in Ω_C, and "print" is further assigned to category 2 exactly once in Ω_C. The dollar amount for the last entry is split according to the imputed weights, so two thirds of \$30, or \$20 is assigned to category 1 while the remainder of \$10 is assigned to category 2.

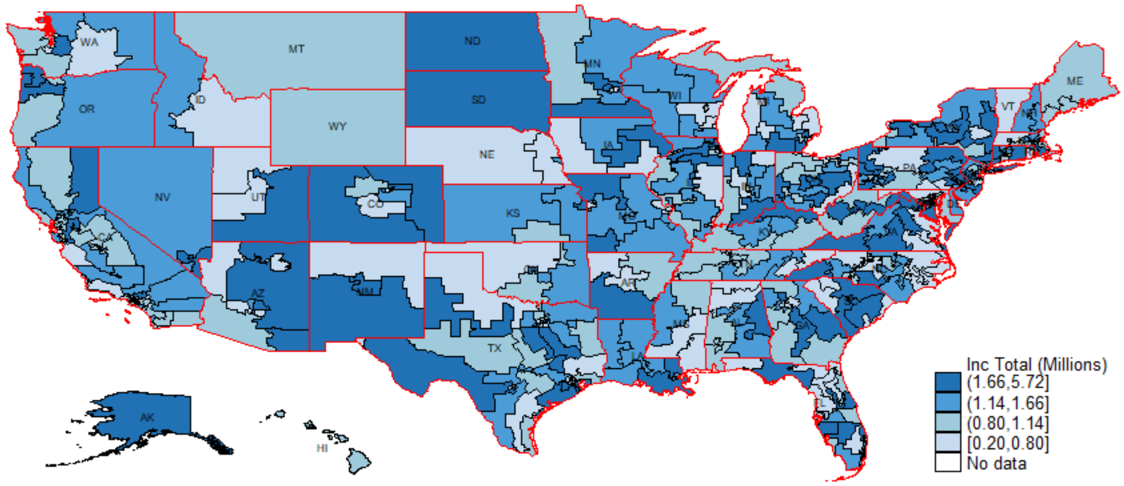
Figure 1.1: Percentage of Missing Categories by Candidates



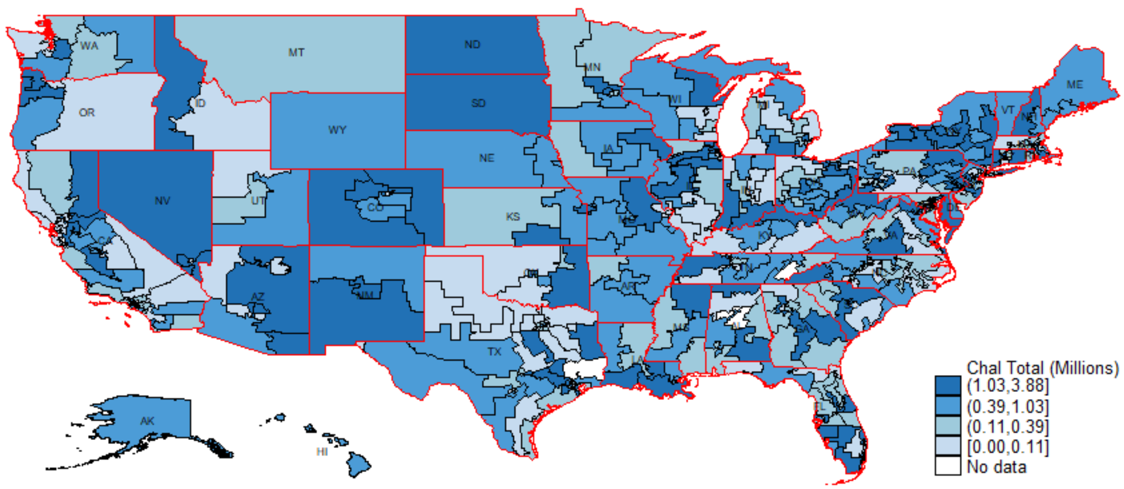
Notes: This figure shows the density histogram of the percentage of entries in the sample that are not assigned a category number for each candidate. The lower end (~0%) of the horizontal axis indicates that a candidate assigns a category number for almost all of his reported transactions. The upper end (~100%) of the horizontal axis indicates that a candidate does not assign a category number to almost all of his reported transactions.

Figure 1.2: Mean Total Spending by District: 2004-2010

(a) Incumbent



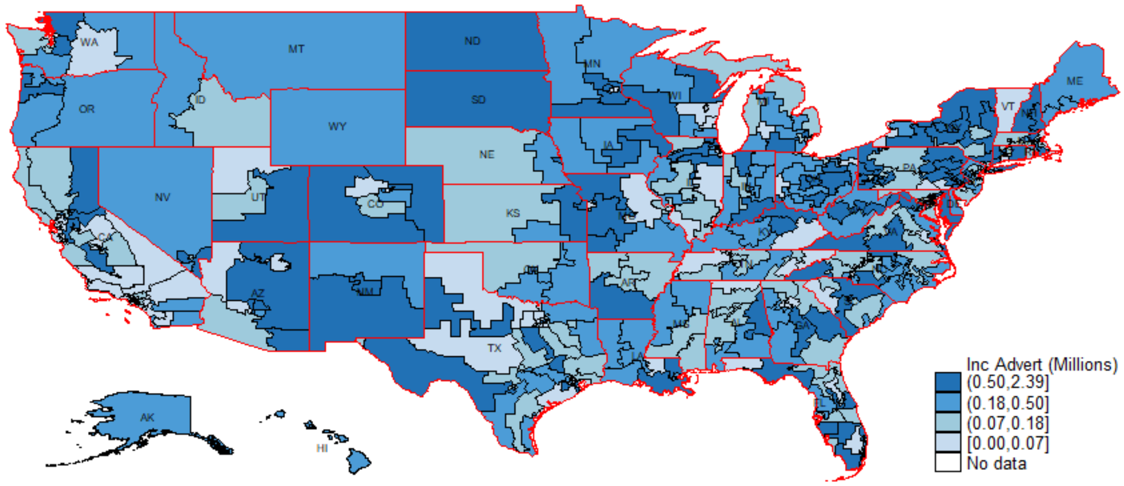
(b) Challenger



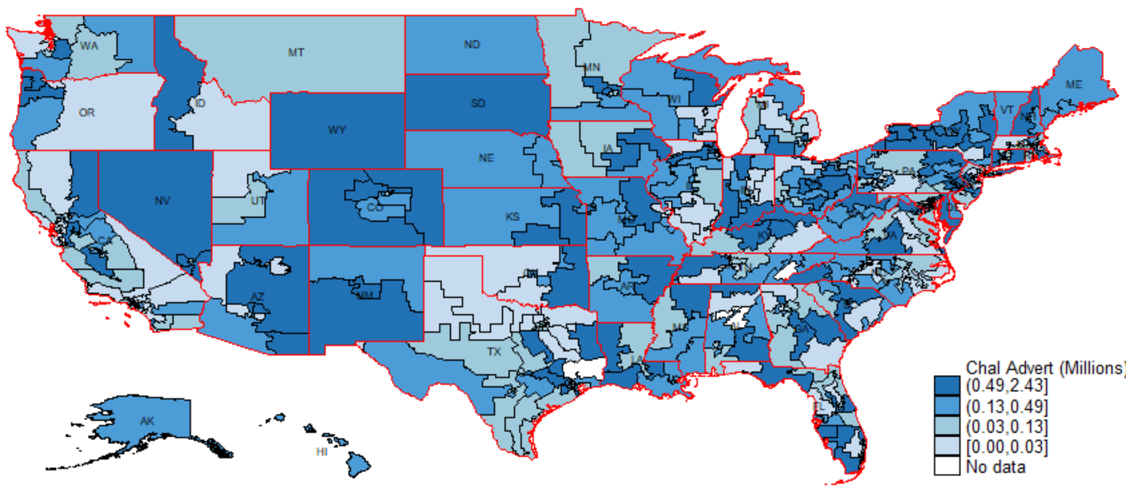
Notes: This figure shows the average total spending by congressional district for years 2004 to 2010 for incumbents and challengers. Alaska and Hawaii are rescaled and repositioned to the bottom left corner of each figure. State borders are highlighted in red. Districts are colored based on total spending quartiles. Regions where spending data is unavailable are shaded in black. There are two reasons that this could happen. One, there is simply no credible spending data. Second, there might be no incumbents (open seat races) or challengers (incumbents ran unopposed) in the sample period. Spending amounts are readjusted to 2010 dollars and units are in millions of dollar.

Figure 1.3: Mean Advertising Spending by District: 2004-2010

(a) Incumbent



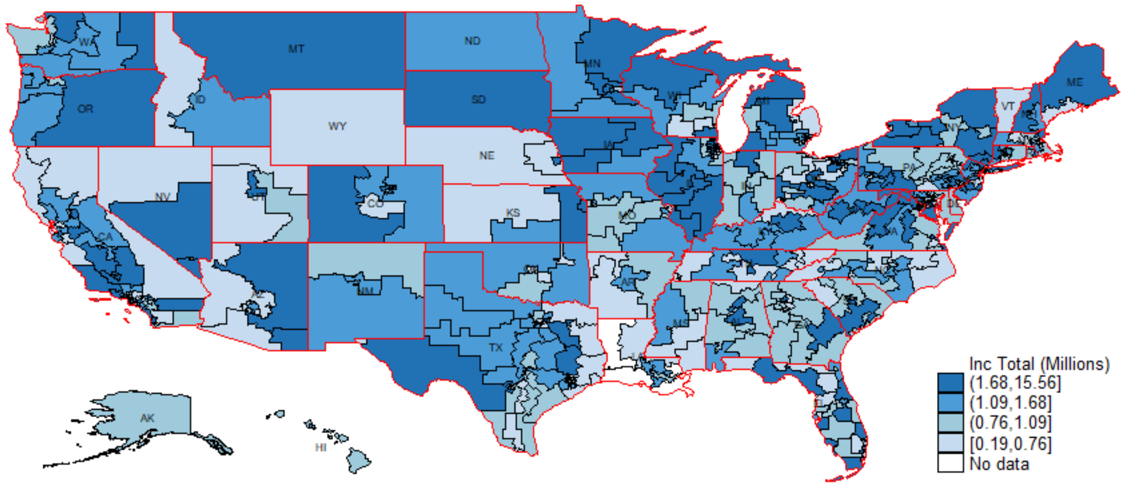
(b) Challenger



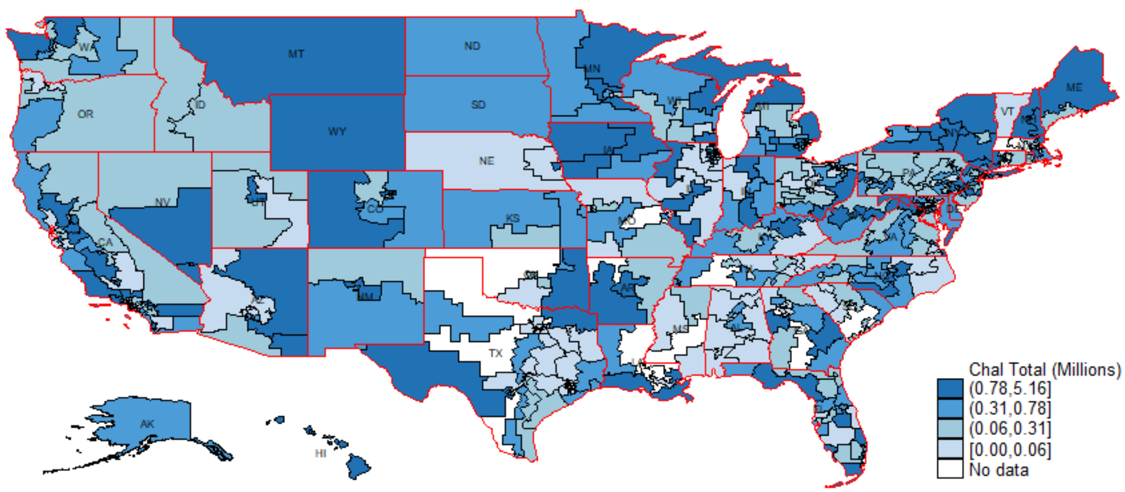
Notes: This figure shows the average advertising spending by congressional district for years 2004 to 2010 for incumbents and challengers. Alaska and Hawaii are rescaled and repositioned to the bottom left corner of each figure. State borders are highlighted in red. Districts are colored based on advertising spending quartiles. Regions where spending data is unavailable are shaded in black. There are two reasons that this could happen. One, there is simply no credible spending data. Second, there might be no incumbents (open seat races) or challengers (incumbents ran unopposed) in the sample period. Spending amounts are readjusted to 2010 dollars and units are in millions of dollar.

Figure 1.4: Mean Total Spending by District: 2012-2016

(a) Incumbent



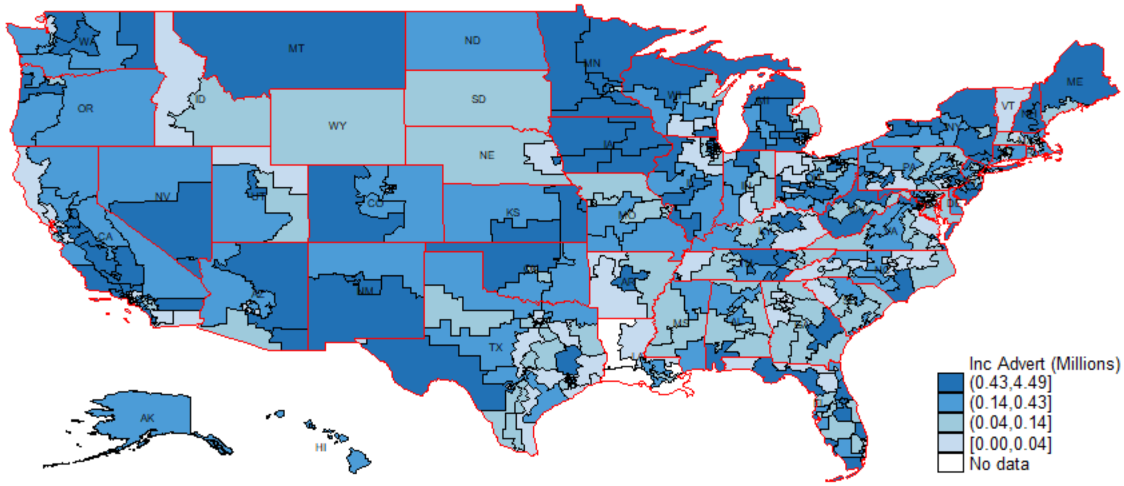
(b) Challenger



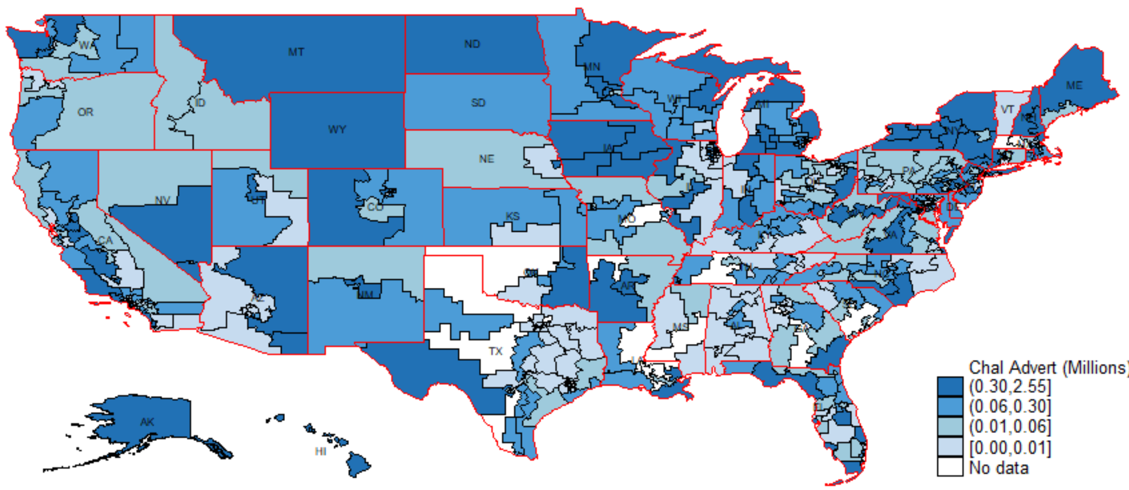
Notes: This figure shows the average total spending by congressional district for years 2012 to 2016 for incumbents and challengers. Alaska and Hawaii are rescaled and repositioned to the bottom left corner of each figure. State borders are highlighted in red. Districts are colored based on total spending quartiles. Regions where spending data is unavailable are shaded in black. There are two reasons that this could happen. One, there is simply no credible spending data. Second, there might be no incumbents (open seat races) or challengers (incumbents ran unopposed) in the sample period. Spending amounts are readjusted to 2010 dollars and units are in millions of dollar.

Figure 1.5: Mean Advertising Spending by District: 2012-2016

(a) Incumbent



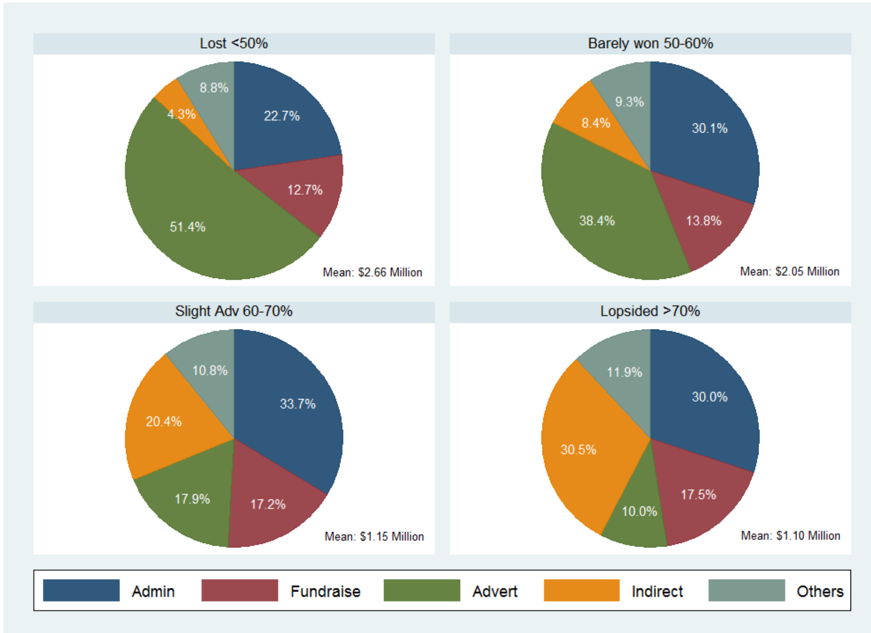
(b) Challenger



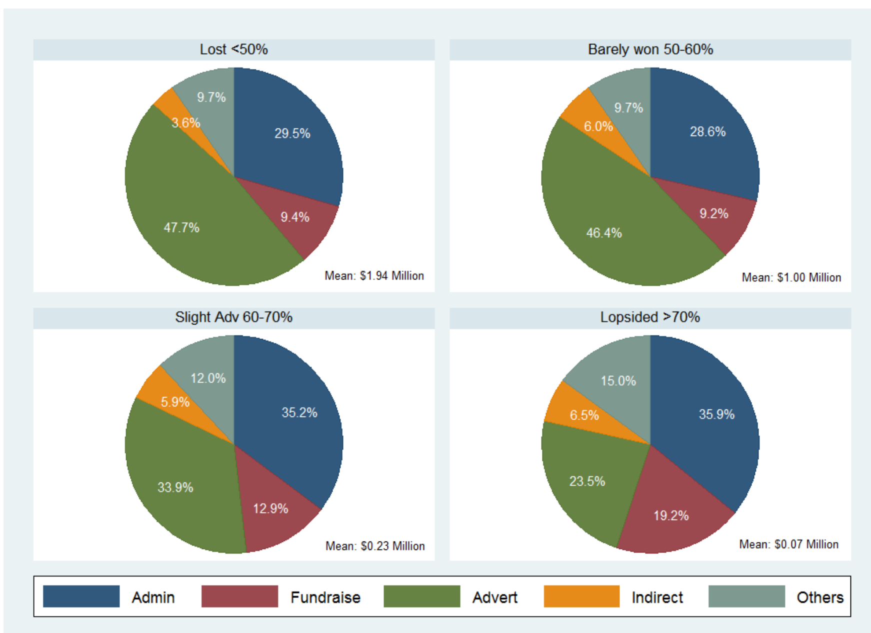
Notes: This figure shows the average advertising spending by congressional district for years 2012 to 2016 for incumbents and challengers. Alaska and Hawaii are rescaled and repositioned to the bottom left corner of each figure. State borders are highlighted in red. Districts are colored based on advertising spending quartiles. Regions where spending data is unavailable are shaded in black. There are two reasons that this could happen. One, there is simply no credible spending data. Second, there might be no incumbents (open seat races) or challengers (incumbents ran unopposed) in the sample period. Spending amounts are readjusted to 2010 dollars and units are in millions of dollar.

Figure 1.6: Candidate Spending Composition by Electoral Closeness

(a) Incumbent

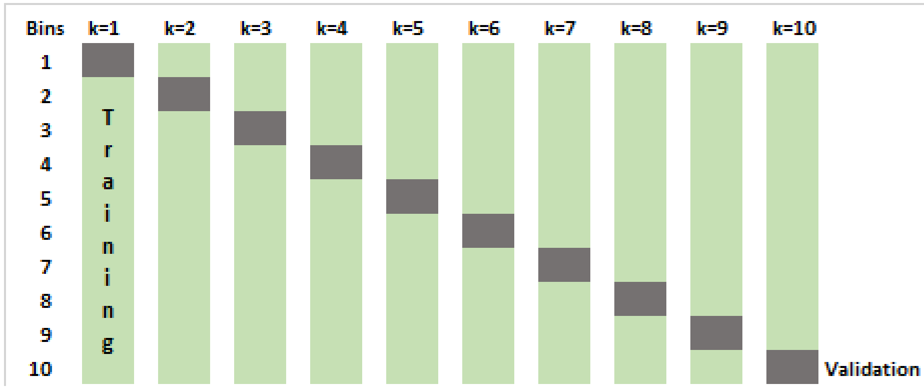


(b) Challenger



Notes: This figure shows the average spending composition of candidates for incumbents (Panel (a)), and challengers (Panel (b)) by ex-post incumbent vote share. There are a total of 1928 elections in the sample from 2004 to 2016. The sample is divided into 4 partitions, where the incumbent lost (<50% vote share), where he barely won (between 50-60% vote share), where he won by a comfortable margin (between 60-70% vote share), and where he won a lopsided race (>70% vote share). The mean level of spending for each subgroups are reported in the bottom right corner of each pie-chart. “Admin”, “Fundraise”, and “Advert” are all spending categories by themselves. “Indirect” is the sum of categories 8-12 of Table 1.4. “Others” is the sum of categories 2, 5, 6, and 7 of Table 1.4.

Figure 1.7: 10-Fold Cross Validation Algorithm



Note: This figure illustrates the 10-fold cross validation. Each row represents an equal-sized bin of the sample. Columns represent the ith number of runs, where $i = 1, ..., 10$. In each run, the 9 bins that are shaded in green represents the training set and the single bin shaded in dark gray represents the validation set.

Figure 1.8: Illustration of Algorithm

	Candidate	Amount	Description	Category	1	2
Ω_C	Trump	10	TV Advertising	2	10	
	Trump	20	Print and Mailing	1		20
	Clinton	15	Staff Salary and Food	1		15
	Clinton	20	Print and Advertising	2	20	
Ω_N →	Clinton	30	Printing and Food		$\frac{1+1}{(1+1)+1} * 30 = 20$	$\frac{1}{(1+1)+1} * 30 = 10$

Observed Data

Spending amount assigned to each Category

Note: This figure illustrates the text analysis algorithm presented in Section 1.3.2. Ω_C indicates the partition of the sample where spending entries have assigned category numbers. Ω_{NC} indicates the partition of the sample where spending entries have missing category numbers. This example assumes that the χ^2 statistic criteria is satisfied for each word-category pair. See Section 1.6.2 for more details.

Table 1.1: Spending Categories and Descriptions

	Category	Description
1.	Administrative/Salary/Overhead	Rent, staff salaries, postage, office supplies, equipment, furniture, ballot access fees, petition drives, party fees and legal and accounting expenses.
2.	Travel	Costs of commercial carrier tickets; reimbursements for use of private vehicles, advance payments for use of corporate aircraft; lodging and meal expenses incurred during travel.
3.	Solicitation and Fundraising	Costs for direct mail solicitations and fundraising events including printing, mailing lists, consultant fees, call lists, invitations, catering costs and room rental.
4.	Advertising	Purchases of radio/television broadcast/cable time, print advertisements and related production costs.
5.	Polling	-
6.	Campaign Materials	Buttons, bumper stickers, brochures, mass mailings, pens, posters and balloons.
7.	Campaign Event	Costs associated with candidate appearances, campaign rallies, town meetings, phone banks, including catering costs, door-to-door get-out-the-vote efforts and driving voters to the polls.
8.	Transfers	To other authorized committees of the same candidate.
9.	Loan Repayments	Repayments of loans made or guaranteed by the candidate or any other person.
10.	Refunds of Contributions	Contribution refunds to individuals/persons, political party committees or other political committees.
11.	Political Contributions	Contributions to other federal candidates and committees, donations to non-federal candidates and committees.
12.	Donations	Donations to charitable or civic organizations.

Source: Federal Election Commission Form 3 instructions.

Table 1.2: Top Words for Each Category by Predictive Power

Number	Category	Top Words
1.	Administrative/Salary/Overhead	Salary, Payroll, Phone, Office, Tax
2.	Travel	Travel, Airfare, Gas, Meal, Lodging
3.	Solicitation and Fundraising	Fundraise, Cater, Event, Direct, Consult
4.	Advertising	Advertise, Radio, Media, TV, Buy
5.	Polling	Poll, Survey, Petition, Carrier, Research
6.	Campaign Materials	Material, Sign, Paraphernalia, Print, Shirt
7.	Campaign Event	Event, Food, Campaign, Cater, Parade
8.	Transfers	Transfer, Fee, Wire, Fund
9.	Loan Repayments	Loan, Payment, Repay, Bank
10.	Refunds of Contributions	Refund, Contribution, Excess, Return
11.	Political Contributions	Contribution, Politic, Donate, Ticket
12.	Donations	Donate, Charity, Sponsorship, Contribution, Ticket

Notes: Words are sorted in descending order by their χ^2 statistic.

Table 1.3: Examples of Spending Weights Imputed by Algorithm

Description	Weights
Panel A: Single Category	
Airline Ticket	Travel (93%), Campaign Events (5%)
Office Alarm Service	Admin (100%)
Payroll Taxes & Withholdings	Admin (100%)
Refreshments for Fundraiser	Fundraise(99.45%), Campaign Events (0.55%)
Web/Internet Services	Admin (96%), Advertising (4%)
Panel B: Multiple Categories	
Campaign Consulting	Admin (55%), Fundraise (25%), Campaign Materials (7%), Campaign Events (12%)
Event Services	Admin (64%), Fundraise (17%), Campaign Events (18%)
Food for Volunteers	Admin (15%), Travel (23%), Fundraise (35%), Campaign Events (27%)
Meeting Expense	Admin (19%), Travel (36%), Fundraise (29%), Campaign Events (15%)
Strategic Consulting	Admin (69%), Fundraise (30%)
Panel C: Unassigned	
Adverisements	-
Barbershop Chorus	-
Hot Dog Buns	-
Rev Share Deduction	-
Zhang, Xing	-

Notes: This table shows the spending description and category weights imputed by the text analysis algorithm given in Section 1.3.2 for some examples of entries with missing categories. Spending weights are given in parentheses. Panel A shows 5 examples for which the algorithm assigns full weight or close to full weight (above 90%) to a single spending category. Panel B shows 5 examples for which weights are more evenly distributed across multiple categories as determined by the algorithm. Panel C shows 5 examples for which the algorithm fails to predict any category weights. Note that all examples are pulled randomly from the sample and are by no means an exhaustive list.

Table 1.4: Spending Measures and Their Contents

	Spending Measure	Contents
1	Total	Categories 1-12
2	Direct	Categories 1-7
3	No Admin	Categories 2-7
4	Communication	Categories 4, 6, and 7
5	Advertising	Category 4
6	Indirect	Categories 8-12

Notes: Category numbers corresponds to spending categories listed in Table 1.1.

Table 1.5: Summary Statistics for Spending Measures

	Incumbent			Challenger					
	(1) Mean	(2) Std Dev	(3) % of Total	(4) Mean	(5) Std Dev	(6) % of Total	(7) Inc Share ($\frac{I}{I+C}$%)	(8) Diff (I-C)	(9) Ratio (I/C)
Spending Measures ('000s)									
1. Total	1536.52	1381.91	-	534.78	912.44	-	82.63	1001.74	2.87
2. Direct	1299.34	1224.82	81.69	506.24	848.35	92.67	81.42	793.10	2.57
3. No Admin	831.89	918.38	50.03	343.77	640.15	59.49	79.73	488.12	2.42
4. Communication	713.20	831.82	41.73	311.25	597.70	51.10	78.88	401.95	2.29
5. Advertising	437.97	626.85	22.55	233.61	494.13	32.11	71.36	204.36	1.87
6. Indirect	237.18	384.91	18.31	28.53	181.51	7.33	87.50	208.65	8.31
Observations		1928			1928				

Notes: All amounts adjusted to 2010 dollars. "% of Total" indicates the mean of spending for each measure (other than total spending) as a percentage of the mean of total spending. "Inc Share" denotes the average percentage of spending by measure in each race that is due to the incumbent.

Table 1.6: Summary Statistics for Spending Categories

	Incumbent		Challenger				
	Mean	Std Dev	Mean	Std Dev	Inc Share ($\frac{I}{I+C}$%)	Diff (I-C)	Ratio (I/C)
Spending Categories ('000s)							
1. Administrative/Salary/Overhead	467.46	513.28	162.47	279.57	80.38	304.99	2.88
2. Travel	55.51	94.37	12.75	42.39	82.65	42.76	4.35
3. Solicitation and Fundraising	237.45	335.95	55.02	150.58	84.76	182.43	4.32
4. Advertising	437.97	626.85	233.61	494.13	71.36	205.36	1.87
5. Polling	26.12	35.01	11.34	273.23	71.25	14.78	2.30
6. Campaign Materials	37.78	56.36	22.62	78.72	64.60	15.16	1.67
7. Campaign Event	37.05	52.56	8.43	18.87	79.90	28.62	4.40
8. Transfers	24.63	148.19	1.26	15.06	80.99	23.37	19.55
9. Loan Repayments	13.80	57.60	16.66	170.75	29.99	-2.86	0.83
10. Refunds of Contributions	7.94	13.51	2.46	150.58	81.41	5.48	3.23
11. Political Contributions	116.23	222.36	3.39	18.70	91.92	112.84	34.29
12. Donations	61.70	118.05	1.96	10.81	87.09	50.89	31.48
Observations	1928		1928				

Note: All amounts adjusted to 2010 dollars. "Inc Share" denotes the average percentage of spending by measure in each race that is due to the incumbent.

Table 1.7: Mean Spending by Incumbent Vote Share

	Spending Measure (000's)									
	Incumbent					Challenger				
Incumbent Vote Share (%)	Total	Direct	No Admin	Comm	Advert	Total	Direct	No Admin	Comm	Advert
30-40	2292.77	2192.36	1358.80	1199.00	832.28	2571.36	2481.01	1686.72	1547.89	1284.93
40-50	2675.43	2560.92	1969.83	1781.58	1394.09	1905.58	1836.87	1277.01	1154.49	906.75
50-60	2052.60	1880.84	1263.12	1121.20	788.49	997.06	937.64	651.38	595.13	462.39
60-70	1235.44	983.57	567.59	467.64	220.85	231.70	218.00	136.34	120.78	78.65
70-80	1085.02	770.55	445.20	340.71	120.58	67.90	62.77	36.41	31.16	18.15
80-90	1169.97	733.02	374.35	275.51	53.35	114.11	110.48	79.60	74.25	15.36
90-100	1246.90	821.10	485.25	360.30	128.49	21.30	18.91	13.07	10.88	5.84
Total	1536.52	1299.34	831.89	713.20	437.97	534.78	506.24	343.77	311.25	233.61

Note: Spending amounts adjusted to 2010 dollars.

Table 1.8: Mean Spending by Incumbent Seniority

	Freshman (Term=1)		Sophomore (Term=2)		Senior (Term≥3)	
	Inc	Chal	Inc	Chal	Inc	Chal
Spending Measures (000's)						
Total	1868.47	905.95	1467.63	617.29	1462.82	417.72
Direct	1721.17	865.29	1294.65	568.33	1188.09	396.75
No Admin	1159.62	590.89	829.61	384.67	745.16	269.07
Comm	1034.67	536.23	723.41	350.90	625.48	242.74
Advert	725.70	414.67	472.93	268.27	353.97	177.99
Indirect	147.30	40.65	172.99	48.97	274.73	20.96
Observations	347	347	277	277	1304	1304

Note: Spending amounts adjusted to 2010 dollars. Sample is split based on incumbent seniority. "Freshman (Term=1)" represents races where the incumbent is seeking reelection for the very first time. "Sophomore (Term=2)" represents races where the incumbent is seeking reelection for the second time. "Senior (Term≥3)" represents races where the incumbent seeking reelection for at least the third time.

Table 1.9: Contingency Matrix for χ^2

(a) Scenario 1

		Category c	Category c'
Word	w	100	0
Word	w'	0	100

(b) Scenario 2

		Category c	Category c'
Word	w	0	100
Word	w'	100	0

Note: This figure presents 2 scenarios of word-category frequencies. The values in the tables indicate the frequencies. For example, the top left cell of the matrix in Scenario 1 with value 100 indicates that word w is associated with category c 100 times in the sample.

CHAPTER 2 Disaggregated Campaign Spending Effects – Evidence from the U.S. House of Representative Elections

2.1 Overview

This chapter continues the discussion on the role of money by presenting empirical evidence on the effect of campaign spending on election outcomes using the spending measures developed in Chapter 1. The goal of this chapter is to capture the differential impacts of campaign money based on their usage upon candidates' vote shares.

To do this, I estimate two empirical specifications. The dependent variable for both models is the incumbent's share of votes going to the top two candidates. The models differ in the functional form of the spending variables. The first specification assumes that spending is additive and separable in incumbency status and is used by most studies in the literature. This feature allows the effect of spending to vary for incumbents and challengers. In the second specification, candidates' spending is represented by a single independent variable, which is the incumbent's share of expenditure incurred by himself and his challenger. This model thus estimates the effect of *relative* spending between the incumbent and the challenger on vote shares. To identify the differential impact of spending by purpose, I separately estimate each specification for each measure developed in Chapter 1. In other words, I obtain 5 different estimates based on total, direct, no administrative, communication, and advertising spending for each specification. To identify the components to candidate spending that influence an election, I further breakdown *direct* spending into its 7 individual categories and estimate each specifications assuming that the components enter in an additive and separable manner.[13]

[13] The components of direct spending are: administrative/salary, travel, fundraising, advertising, polling, campaign materials, and campaign event expenditures.

There are obvious concerns of endogeneity bias with this approach. Previous studies have attempted to address 2 sources. The first is simultaneity bias, where money does not only affect the incumbent's vote share, but it is also affected by the expected closeness of a race. The second source of endogeneity stems from unobserved candidate characteristics. For example, high quality challengers who have the ability to raise more money will also be spending more on average. As a result, incumbents might also respond by increasing their spending. Both biases drive down the estimates of incumbent and challenger spending in the first specification. On the other hand, the effect of the bias in the second specification is ambiguous as it depends on the magnitude of candidates' responses to changes in unobservables. However, I show that the estimates in this model are not significantly affected by the bias due to unobserved challenger quality by using the repeated challenger strategy developed by Levitt (1994).

I show that the estimates for incumbent spending on his vote shares in the first specification are negative for all measures despite my best efforts to control for reverse causality through the use of covariates. Since previous studies have tried to estimate the same specification repeatedly, my findings reveal that past estimates might also be plagued by the same problem. Without a good identification strategy, it is difficult to uncover the causal effect of incumbent's and challenger's spending upon vote shares.

Using the second specification, I show that the incumbent's vote share increases in his share of spending on fundraising, advertising, campaign events (such as rallies, speeches, and canvassing activities) and indirect expenditures. I also found that an increase in the relative share of administrative expenditures towards the incumbent increases the incumbent's vote share by enhancing the effectiveness of money spent on labor-intensive activities, such as fundraising and campaign events, but has no effect on the effectiveness of advertising spending. I also investigate how the effectiveness of spending changes with electoral and candidate characteristics. I found that

Democratic incumbents appear to gain more from increasing their spending shares in fundraising and canvassing efforts compared to Republican incumbents, all else equal. I also found that there is no discernible difference in the marginal effect of advertising spending share on incumbent's vote share. This result can be explained through the role of administrative spending. I found that ratio of campaign sizes between an incumbent and the challenger, as proxied by administrative expenditure, is significantly larger for Democrats. If campaign sizes have a non-trivial effect only on labor-oriented activities, then this serves as an explanation as to why we see the difference in results between advertising and other types of spending. I also found that redistricting after the 2010 Census eliminates a large portion of the incumbent's spending advantage. Moreover, I can not reject the hypothesis that advertising spending has no impact on the incumbent's vote share at the 10% level. This implies that the redrawing of district borders have largely leveled the playing field between the incumbents and challengers, which encourages political competition.

The rest of the chapter is organized as follows. The next section contains a brief literature review. Section 2.3 discusses the empirical specifications in detail. Section 2.4 shows the main estimates. Section 2.5 shows results from restricting the sample to repeated challenger races to control for unobserved candidate characteristics. Section 2.6 discusses several robustness checks and finally, Section 2.7 concludes.

2.2 Literature Review

There is a host of articles on the impact of money in elections, and most studies have used total spending as their measure of candidate expenditures. The literature started with Jacobson (1978) who found that challenger's spending appears to have high effectiveness in increasing one's own vote share while incumbent's spending does not. In fact, Jacobson (1978) found that incumbent's vote share decreases in the incumbent's total spending in certain specifications. Subsequent articles have pointed out that Jacobson's estimates are plagued by endogeneity bias due to reverse causality and unobserved candidate characteristics. However, attempts to solve this problem have so far been unsatisfactory and results are highly dependent on the empirical technique.

On the one hand, there are papers that found an insignificant effect of incumbent's spending on vote share. Abramowitz (1991) builds on Jacobson (1978) by adding in more covariates such as race forecast published by Congressional Quarterly to control for race expectation. However, the effect of incumbent's spending on votes remains small and insignificant. Levitt (1994) controls for unobserved challenger quality through the means of candidate fixed effects on the sample of races where an incumbent faces a challenger repeatedly. Not only does he find that incumbent's spending is still small and insignificant, he also found that challenger's spending has virtually no impact on vote shares, with point estimates of an order of magnitude lower than previous studies. However, as I show in Section 2.5, the sample of repeated challengers has a peculiarity that eliminates the effectiveness of candidate spending even without appropriate controls for unobserved candidate quality.

On the other hand, there are also many papers that found a significant effect of incumbent spending. Erikson and Palfrey (2000) developed a theoretical model of candidate spending behavior to show that simultaneity bias is minimal when elections are close. Splitting the sample by vote shares, they found that incumbent and challenger spending are identical in strength and significant in influencing votes in races where the incumbent achieved less than 52% of the vote. Green and Krasno (1988) used lagged incumbent spending as an instrument for incumbent spending and controls for candidate quality through the use of a self developed measure. They conclude that incumbent spending is effective in pulling votes. However, lagged incumbent spending might be affected by both district and candidate characteristics in past elections which violates the exclusion restriction for a valid instrument. Gerber

(1998) studied candidate spending in Senate elections instead of House elections. He proposed 3 instruments for candidate spending, which consists of challenger wealth, state voting age population, and sum of lagged spending by Senate incumbents and challengers. He ran a two stage least squares estimation for each instrument to identify the effect of spending on outcomes. He found that both incumbent and challenger spending significantly increases each of their vote shares. However, as he pointed out that "Exactly how campaign spending leads to more votes is an ongoing research question", and that "Relatively little is known about how money is spent" opens up a window of opportunity for researchers to conduct a more thorough study on the use of campaign money. This chapter addresses those concerns.

Unfortunately, there has been minimal research done on the effect of campaign money by usage. Ansolabehere and Gerber (1994) uses a detailed expenditure data set on House candidates in 1990 to develop two alternative measures of expenditures. The first, which they term "general" campaign expenditures, contains only money directly spent on the candidate's own campaign, such as advertising, polling and overhead expenditures. The second, which they term "communications" expenditures relates to money used for direct voter contact. They found that total spending understates the effect of incumbent spending on vote shares, but the sign of their estimates are negative even after eliminating spending that are unrelated to one's own campaign. However, two shortcomings of their paper is the use of cross-sectional data, which does not sufficiently control for time varying district characteristics, and the use of simple OLS to identify the effects. My work extends the analysis to more recent campaign spending data (from 2004 to 2016) that has the advantage of a larger sample and the ability to control for unobserved electoral and candidate characteristics through the inclusion of district and election cycle fixed effects. My research is most closely related to Schuster (2015). We use a similar data set on candidate spending, but differ in data usage and empirical strategies. As mentioned in chapter 1, there is an apparent problem with missing spending categories. While Schuster (2015) does not go to great lengths to address this problem, I present a statistical based methodology which is similar in spirit to Gentzkow and Shapiro (2010) to impute missing spending categories in the data. On the front of empirical strategy, Schuster (2015) estimates the effect of campaign spending on individual's self reported vote using survey data from the American National Election Studies (ANES) conducted in 2012. He exploits the timing of spending to identify the causal effect of money through the variation of spending and the change in the voters' reports. There are potentially several drawbacks to this empirical strategy. First, the timing of spending might not be exact which introduces systematic measurement error that could bias the estimates. Second, the problem that shrouds most survey data is the reliability of self-reported answers. In particular, Abelson et al. (1992) stated that about 25% of the responses of turnout from the National Election Survey are inconsistent with the respondents' voting records. This percentage could very well have decreased over time with more innovative changes to the survey structure, but it would be difficult to conclusively claim that voter responses are completely free of such error.[14] My paper estimates the effects of spending on vote shares by using the variation in the incumbent's spending share across elections and election cycles, which immune to these errors. Moreover, I show the estimates on the incumbent's share of spending are not affected by unobserved candidate characteristics. I also uncover the types of spending that significantly affects an incumbent's vote share.

More recent articles have focused on targeted spending where they estimate the effect of a specific spending purpose, such as get-out-the-vote mobilization efforts (Gerber and Green (2000)), television advertising in the United States (Spenkuch and Toniatti (2016)) and radio advertising in Mexico (Larreguy et al. (2014)), on electoral outcomes such as voter turnout and candidate vote shares. My paper contributes

[14] See Bernstein et al. (2001) for a study on the reasons individual misreports their voting behavior and how it can affect empirical results.

towards this front of the literature by identifying the types of spending that are crucial in affecting an election outcome, and hence suggesting areas of future research

2.3 Empirical Strategies

I estimate two empirical models to identify the spending components that influence an election. The first specification, which is used in most works in the campaign spending literature, is given as follows:

$$IncVote_{d,t} = \beta_0 + \beta_1 IncSpend_{d,t} + \beta_2 ChalSpend_{d,t} + \Theta Z_{d,t} + \gamma_t + \delta_d + \epsilon_{d,t} \tag{3}$$

A unit of observation in equation (3) is an election at the district-year level. Congressional districts are denoted with a subscript d while election cycles (or years) are denoted with a subscript t. The dependent variable $IncVote$ denotes the incumbent's share of the vote going to him and his nearest challenger in the race. For that reason, my sample does not include open races. In this model, it is assumed that candidate spending enters the equation in an additive and separable manner. This allows the incumbent's vote share to depend differentially on the incumbent's and the challenger's spending. $IncSpend$ and $ChalSpend$ are generic spending variables that vary depending on the measure used. Specifically, I estimate equation (3) separately for each spending measure developed in Chapter 1 to study the differential impact spending types upon vote share. I also estimate equation (3) using the natural log of spending instead of linear spending to allow for diminishing marginal returns to expenditure. Whenever the spending amount is 0, I replace it with the lowest positive log amount for that spending category.[15] Z is a vector of district by year level control variables. It includes transfers made by party committees such as the Democratic National Committee and the Republican National Committee to the candidates, the

[15] My results are also robust to replacing the 0 expenditure values with \$200 or by shifting all spending amounts up by \$200.

lagged vote share of the presidential candidate from the incumbent's party at the congressional district level, and Cook Political race ratings. γ is the year fixed effect, which captures national shocks to election such as the systematic midterm punishment effect for the president's party (Alesina and Rosenthal (1989)). δ is the district fixed effect, which captures local level factors such as the constituents' preferences.

The second empirical specification that I estimate is

$$IncVote_{d,t} = \alpha_0 + \alpha_1 IncShare_{d,t} + \Theta Z_{d,t} + \gamma_t + \delta_d + \nu_{d,t} \tag{4}$$

where d and t once again represent district and year respectively and other variables are defined similarly as equation (3). $IncShare$ is the percentage of spending in the race that is due to the incumbent, i.e. $\frac{Inc\$}{Inc\$+Chal\$}\%$ where $Inc\$$ and $Chal\$$ denotes the spending amount by the incumbent and challenger respectively. As in previous cases, this variable is measure specific. This means that the percentage of spending is only computed for the spending measure in question. α_1 is interpreted as the marginal effect of increasing the percentage of incumbent spending in the race on incumbent's vote share. In other words, equation (4) captures the effect of incumbent spending *relative* to his challenger on vote shares.

2.3.1 Challenges to Identification

For the coefficient estimates to be interpreted as the causal effect of money on incumbent's vote share, the spending variables have to be exogenous to other unobserved factors that affect the incumbent's vote share, conditional on covariates. Formally, this implies that the condition $E(\epsilon|Z, \gamma, \delta, IncSpend, ChalSpend) = 0$ for equation (3) and $E(v|Z, \gamma, \delta, IncShare) = 0$ for equation (4) must be satisfied. However, there are two identified sources of endogeneity that might render these assumptions invalid. First, the causal mechanism can go in the opposite direction. Not only does spending influence the number of votes cast, the candidates' optimal spending strategy is also determined by race expectations. In particular, incumbents in races that are expected to be close may have to incur high amounts of spending in order to persuade and mobilize voters. Without appropriate controls for reverse causality, the regression estimates of β_1 and β_2 will be biased downwards. However, the sign of the bias on α_1 is ambiguous. It is likely that incumbents increase spending by more than their challengers in the event of an adverse shock to their election prospects since incumbents often face a much easier time raising funds. However, the direction of this bias on α_1 depends on the *proportion* of increase in spending relative to their initial amount of expenditure and not the level itself. Thus, even if an incumbent responds by spending more than the challenger, if the proportion of increase is similar for both candidates with respect to their initial spending levels, then $IncShare$ should not change.

Historical attempts to correct for simultaneity bias has been unsatisfactory. The most convincing strategy which employs the the use of instrumental variables, is by Gerber (1998). He uses 3 instruments–challenger wealth, state population, and sum of lagged spending by the incumbent and challenger. However, these instruments might not satisfy the exclusion restriction. For example, challengers are more likely to run when they are wealthy simply because they are also more influential and better known to the public, which directly affects their vote share. Also, highly populated areas have higher chances of producing more competent challengers. Finally, spending in the previous election can be influenced by many external factors that also decide an election outcome, such as the systematic midterm punishments suffered by incumbents from the president's party.

In the absence of good instrumental variables for spending, I attempt to minimize the bias by using 3 proxies of expected closeness as controls. The first is the lagged vote share of the presidential candidate at the district level. Expectations are driven by constituents' preferences. To the extent that voter composition remains fairly constant over time and voters are strongly attached to a political party, the vote share of the presidential candidate in the most recent presidential election serves as a decent proxy for voter composition. One caveat is that voters can engage in split-ticket voting (Campbell and Miller (1957); Chari et al. (1997)). If there is substantial variation in the population who votes for candidates of different parties for president and Congress, past presidential vote share is insufficient to control for expected closeness. I include a second control, which is the total amount of funds that party committees transfer to a candidate to mitigate this concern. Each party committee is subjected to a \$5,000 contribution limit per election to a candidate.[16] Figure 2.1 shows that party contributions are highly concentrated around the 50% incumbent vote share threshold, suggesting that contributions are made only when candidates are facing a tough election. Furthermore, an election is a collective game for political parties who seek to maximize their chances of gaining a majority share of seats at the national level. Hence, party committees will be expected to lend a hand to the incumbents in close races. Another reason for using party contributions is that it also indirectly incorporate private information within the party that are otherwise not known to the public. This could affect how much a candidate spends and in turn affect election outcomes. My third proxy for expected closeness of election is the race ratings published by the Cook Political Report. The report categorizes each congressional district as either a safe, lean, likely, or toss-up race associated to one party. I use monthly ratings from August to November of an election year and recode each race on a scale of 0 to 7, with 0 being safest race for the incumbent, i.e. if a Democratic incumbent is in a safe Democratic district or a Republican incumbent is in a safe Republican district, and 7 being the least safe district for the incumbent, i.e. a Democratic incumbent in a safe Republican district or a Republican incumbent

[16] Taken from http://www.fec.gov/pdf/partygui.pdf. Primary, runoff, and general elections are considered as separate elections.

in a safe Democratic district.[17] Since the exact methodology for classification is not released to the public, one should be skeptical about the credibility of these subjective ratings. In particular, the ratings might be colinear with the spending variables if they are based off of candidate spending. The regression estimates reported in Section 2.6.1 provide support to this claim.

The second identified source of endogeneity is unobserved challenger quality. High quality challengers are defined in Levitt (1994) as candidates who have high intrinsic vote-getting ability. These candidates are able to obtain campaign funds more easily than a typical challenger and also have high voter appeal. For example, in the 2016 election, Josh Gottheimer, a Democrat, challenged Republican incumbent Scott Garrett in New Jersey's 5th congressional district. Gottheimer was a former aide to ex-president Bill Clinton and had also worked with John Kerry in his 2004 presidential campaign. He raised \$4.8 million and spent almost the entire budget, significantly more than an average challenger, which helped him defeat Scott Garrett. Once again, inadequately controlling for unobserved candidate quality will biased both β_1 and β_2 downwards, while the sign of the bias on α_1 is ambiguous. Following Levitt (1994), I reestimate the effect of spending on vote shares by restricting the sample to only races where an incumbent faces a challenger more than once. Assuming that candidate quality is constant over time, taking a fixed effects transformation of equation (3) and (4) will eliminate the omitted variable bias due to unobserved challenger quality. I also show that the estimates of α_1 before and after controlling for candidate quality are not significantly different from each other at the 5% level for all measures, suggesting that the bias due to unobserved candidate characteristics is negligible for equation (4). If anything, α_1 in equation (4) is under-estimated since the point estimates of 4 out of the 5 measures have increased after appropriately controlling for candidate quality.

[17]The ratings are published at irregular periods, but at least once a month starting from August. I use the ratings published at the beginning of the month for each month.

2.3.2 Comparison of Models

There are several differences in the features of both models.

Firstly, implicit in equation (4) is the feature of diminishing marginal returns to spending. Since $IncShare$ normalizes incumbent spending by total expenditure in the race, the effectiveness of an additional dollar of spending for the incumbent relative to his challenger is higher when total expenditure in the race is low compared to when the total expenditure in the race is high. On the other hand, one has to explicitly specify a functional form such as the natural log for the spending variables in (3) to achieve this.

Secondly, the identification of β_1 and β_2 in (3) relies on the variation in the levels of incumbent and challenger spending while the identification of α_1 in (4) relies on the variation in the incumbent's spending *relative* to the challenger's spending. This fundamental difference might appear to be quite important if what really matters in a race is not how much a candidate spends, but rather how much they spend compared to one another. Figure 2.2 depicts the partial correlation plots between the candidates' total spending and the incumbent's vote share. The top 2 panels, (a) and (b), show the relationship between the incumbent's vote share and the natural log of total spending for incumbents and challengers, respectively. It can be seen that total spending varies negatively with incumbent's vote share. Panel (c) plots the difference in total spending between the incumbent and the challenger in each race on election outcomes. The correlation between the two variables are still negative, but with a flatter slope. Panel (d) plots the incumbent's vote share against the incumbent's spending share in a race and shows a strong positive correlation. Going from panel (c) to (d), notice that the correlation between vote share and spending turns from negative to positive. This is due to the fact that the spending amounts in panel (d) are normalized by the total expenditure in the race whereas spending in panels (a), (b), and (c) are not. Hence, this suggests the normalization of the spending variables could be crucial to our results.

2.4 Results

2.4.1 Incumbent and Challenger Spending

In this section, I present results from the estimation of equation (3), which is the specification where incumbent and challenger spending are assumed to enter the spending equation in an additive and separable manner.

Table 2.1 reports the estimates of the effect of total spending, the traditional measure used in the campaign spending literature, on incumbent's vote share. All spending variables are in units of $10,000. First, note that the estimates of incumbent spending are negative. Taking this observation at face value, it implies that the incumbents are lowering their chances of getting reelected by increasing their spending, which is puzzling. However, as mentioned previously, the estimates are likely to be plagued by simultaneity bias that drives the point estimates downwards. The fact that the sign of the estimates are reversed from our expectations indicate that this bias is severe. Nonetheless, going through the results might prove useful in understanding how the estimates depend on covariates and spending measures.

Columns 1 though 4 of Table 2.1 report the estimates on linear total spending, while columns 5 through 8 report estimates on the natural log of total spending. Column 1 reports the results from a regression without any controls and fixed effects and shows that an increase in 1 standard deviation of incumbent's total spending (an increase of about $1.38 million) decreases the incumbent vote share by 0.83 percentage points. On the other hand, an increase in challenger spending by 1 standard deviation (an increase of $0.91 million) decreases the incumbent vote share by 4.56 percentage points, which is a large effect. To allow for diminishing marginal returns to spending, column 5 takes a natural log transformation of total spending and shows that the estimated effects for both the incumbent and challenger are much closer to each other in their magnitudes. In particular, an increase in \$100,000 in total spending for incumbent decreases his vote share by 0.13 percentage points on average, while an increase in \$100,000 in total spending for challenger decreases the incumbent's vote share by 0.46 percentage points on average.

Comparing the estimates in columns 1 and 2 (and also 5 and 6), adding in election cycle and district fixed effects decreases the magnitude of the challenger total spending estimate by about 30% while leaving the incumbent spending estimate unchanged. If challengers choose to run in an election as a response to a negative shock to the incumbent's electoral chances, then the estimate of challenger spending in column 1 will be biased upwards (in a negative sense), which is what we observe. Columns 3 and 7 add in party committee contributions to candidates as a control for expected closeness of the election. As mentioned previously, party committees such as the DNC and the RNC contribute to a candidate when the election is tight. The magnitude of the spending estimates of incumbent and challenger are now smaller compared to columns 2 and 6. Columns 4 and 8 further include lagged vote share of the presidential candidate who is from the the same party as the incumbent. We see that the magnitudes of the spending estimates are further decreased. The points estimates in column 4 indicate that an increase in \$100,000 in incumbent spending decreases the incumbent's vote share by 0.05 percentage points on average, while the same increase in challenger spending decreases the incumbent's vote share by 0.27 percentage points. Using log total spending, the estimated effects report in column 8 indicates a decrease of 0.10 percentage points for incumbent spending and a decrease of 0.29 percentage points for challenger spending on average when expenditures go up by \$100,000. To summarize, even with our best efforts to control for reverse causality, the estimates of incumbent's total spending are all negative and significant at the 90% confidence level and beyond. Next, I investigate whether this bias is caused by the usage of the spending measure.

I reestimate equation (3) separately for each measure developed in section 1.4. Table 2.2 presents the results and shows that there is little evidence to support this claim. The estimated incumbent spending effects are once again negative regardless of the measure used, indicating that the bias is not specific to total spending. In fact, I suspect that the bias is increasing in the fineness of the spending measure, i.e. from total to advertising spending. In particular, the incumbent spending estimates increase in size going from column 1 to 5 and from column 6 to 10. This is not in line with the observation that incumbents view political advertising as being their primary means of increasing vote shares. On the other hand, the challenger spending estimates are fairly consistent across the linear spending panel. Comparing the point estimates of challenger spending between columns 1 and 5 (total spending at -0.027 and advertising spending at -0.023), political advertising alone can account for about 85% of the effectiveness of challenger's spending. This would probably explain why challengers highly prioritize advertising expenditures at all levels of race closeness.

To further examine how different categories of spending differentially influence the election outcome, I break down *direct* spending into its individual components and assume that they are additive and separable. There are 7 components in total–administrative, travel, fundraising, advertising, polling, campaign materials and campaign events.[18] Table 2.3 reports the estimates from breaking up *direct* spending into these components, and further controlling for indirect expenditures. Findings appear to be consistent– that incumbent spending doesn't help the incumbent at all. Columns 2 and 3 controls for indirect expenditures and surprisingly, transfers made to external parties, such as party committees and other federal candidates, help the incumbent. These could be true as there might be positive spillover effects from spending in neighboring districts or if that the transferred funds are being used

[18] The reader can refer to Table 1.1 in Chapter 1 for the detailed description of each category.

for coordinated party expenditures within the district, such as distribution of fliers and door-to-door canvassing activities by party volunteers on behalf of the candidates. More strikingly, taking the estimates of column 3 at face values, spending components that matter in election (advertising, polling, campaign material and administrative spending) seems to have a negative impact on incumbent's vote share, which is again not in line with conventional wisdom that direct voter contact strategies increases one's votes. However, these results should be treated with skepticism since evidently, simultaneity bias is not completely eliminated even after controlling for electoral expectation by including more covariates.

2.4.2 Incumbent's Spending Share in Race

Rather than being conclusive, the estimates in the previous section should be viewed as the baseline results for comparison to estimates obtained from estimating a different empirical model. In this section, I present estimates from the second specification, which is given by equation (4). Instead of assuming that incumbent and challenger spending are linearly separable, the spending variable takes the form of $\frac{\$Inc}{\$Inc+\$Chal}\%$, where $\$Inc$ and $\$Chal$ denote the incumbent and challenger spending respectively, which in turn depends on the spending measure in question. The coefficient of the spending term then captures the effect of incumbent's spending *relative* to the challenger's spending on incumbent's vote share.

Table 2.4 shows the results from the estimation of equation (4). In particular, incumbent's vote share is regressed on incumbent's spending share with district and year fixed effects, lagged presidential vote share and party committee contributions as controls. Standard errors are clustered at the state level since districts within the same state might be affected by state-level policies. Odd numbered columns report the linear estimates of incumbent's spending share while the even numbered columns report the estimates of a quadratic specification. Column 1 indicates that as the incumbent's spending share rises by 1 percentage point, his vote share is expected to increase by 0.19 percentage points. Although the estimates are not easily interpreted in terms of spending levels, putting it in perspective of the average total spending level can give us a better understanding on the size of this effect. Recall from table 1.5 that the mean share total spending due to the incumbent is about 82.63% and the average sum of both candidates' total spending is approximately \$2.07 million. Hence, for an incumbent who faces this scenario, a 1% increase in his share of spending corresponds to approximately an increase of \$130,000 in total spending, holding the challenger's spending amount fixed.[19] Thus, this equates to an increase of about 8% from his total spending amount (of an implied \$1.71 million in total spending), which is expected to drive his vote share up by 0.19 percentage points–a moderately sized effect. As we focus on more refined measures, the magnitude of the estimates go down. In particular, looking at advertising spending (column 9) and taking the point estimates at face value, a 1 percentage point increase in incumbent's share of advertising spending in the race is expected to only bring in an additional 0.029 percentage points in vote share. Going through the same exercise as before, this corresponds to an increase of roughly \$24,000 in advertising expenditure. To obtain a 1 percentage point gain in vote share, the incumbent has to spend an additional of over \$1 million in advertising expenditures, which is a very large amount.[20] However, this finding is consistent with many studies that found a minimal impact of TV

[19]The exact calculation is done as follows. The implied incumbent's spending level (denoted by $IncSpend^*$) at the mean of incumbent's total spending share in percentage (denoted by $\overline{IncShare}$) and the mean of total expenditure in a race (denoted by $\overline{Total}$) is computed from:

$$IncSpend^* = \overline{IncShare} \times \overline{Total}$$

Let ϵ be the increase in incumbent's spending that is required to increase the incumbent's spending share by 1 percentage point from the mean level. The closed form solution to ϵ is then given by:

$$\epsilon = \frac{(\overline{IncShare} + 0.01)\overline{Total} - IncSpend^*}{0.99 - \overline{IncShare}}$$

[20]Recall that there is diminishing marginal returns to spending. So the actual required amount depends on the relative spending amounts between the incumbent and the challenger.

advertising on turnout (e.g. Ashworth et al. (2007); Krasno and Green (2008)), that it persuades rather than mobilizes the electorate (Spenkuch and Toniatti (2016); Larreguy et al. (2014)) but has very short-lived effects on voters (Gerber et al. (2011)). There is also an increase in the intensity of negative campaigning in the form of attack advertisements over the years (Fowler and Ridout (2012)) that also contributes to the fall in vote turnout (Ansolabehere et al. (1994)). Taking these effects together, it seems as if advertising spending, while having a positive impact on vote shares, has an extremely small effect.

The even numbered columns in Table 2.4 reports the estimates from a quadratic specification, where the squared term $IncShare^2_{d,t}$ is included in the spending equation. This allows us to test if there is a differential effect of incumbent's spending share upon vote share at different levels of the incumbent's share of spending. The estimated coefficients for the quadratic spending share term are positive and significant for all spending measures, indicating that the benefits of expanding the incumbent's share of spending is higher when he is already doing most of the spending in a race compared to when his spending share is low. Note that this does not imply that there is increasing marginal returns in incumbent's spending *levels*. Quite the contrary, marginal returns to spending could still very well be diminishing as the amount of spending required to expand the incumbent's expenditure share by 1 percentage point is increasing at an exponential rate, whereas the benefit of this expansion is only increasing at a linear rate. Figure 2.3 shows the predicted vote shares as a function of incumbent's spending share in the race for all spending measures. First, notice that the standard errors of the prediction is large for low values of incumbent's spending share. This is due to sparse observations in this range. From Table 1.5, we can see that the average incumbent's spending share is within the range of 70-85 percent for all measures. Hence, the sample is heavily dense in the upper end of the distribution. As a result, the standard errors of the predictions are much tighter for higher levels than lower levels of the incumbent's spending share. Second, notice that the predicted vote share for advertising expenditure has the least curvature among all spending measures. This is consistent with my previous argument that there are minimal effects of advertising spending. There is also a huge difference in the predicted values going from direct to no administrative spending, indicating that the share of administrative expenditures do contribute significantly to an incumbent's vote share. One explanation could be that the effectiveness of each dollar that is being spent is dependent upon the size of the campaign. Activities like fundraisers, rallies, and canvassing can be carried out more efficiently when there are significantly more campaign staffs and volunteers. I test this hypothesis by including interaction terms of the spending share variables and the incumbent's share of administrative spending. The results are reported in Table 2.5. The estimated coefficients of the interaction term $IncShare^2 * AdminShare$ are positive and significant for 2 out of the 3 spending measures–no administrative and communication spending but not for advertising spending. The results indicate that the relative size of the campaign between an incumbent and challenger does matter for the effectiveness of money used in labor-intensive activities, such as fundraising and canvassing efforts, but not for spending that can be carried out independently of the campaign size, such as TV and radio advertising.

The remainder of this section analyzes the differential impact of spending by electoral and candidate characteristics from the perspective of the second specification – using the incumbent's spending share.

2.4.3 Breaking Down the Effects by Spending Components

To better understand the types of spending that drive the effects in the previous section, Table 2.6 reports spending estimates broken down to the category level. Column 1 is identical to column 2 of Table 2.4 and is included as reference. Column 2 additionally controls for incumbent's share of indirect expenditures, which includes fund transfers to other political committees, loan repayments and contribution refunds. The estimated effect on indirect spending is positive and significant, implying that external spending does indeed contribute to an incumbent's chances of getting reelected.[21] Column 3 breaks down the direct spending share into its components. I find that the incumbent's vote share is increasing in administrative and advertising spending shares, which is consistent with previous results. Additionally, I also find that the effect of increasing the incumbent's fundraising and campaign events expenditures relative to his challenger is statistically significant at the 95% confidence level and beyond. Fundraising might be positively correlated with incumbency advantage and political experience (Krebs (2001)). Hence, it may be the case that an increase in fundraising efforts relative to his challenger does not directly increase the incumbent's vote share, but the act of raising more funds may signal his popularity in the electorate, which in turn increases his vote share. Campaign events consist of speeches, rallies, and get-out-the-vote activities which have direct vote contact. This positive finding is in line with previous studies on voter engagement efforts, such as personal canvassing (Gerber and Green (2000)) and candidate personal appearances (Shaw (1999)).

On the other hand, I found no significant effects of traveling, polling, and campaign materials spending on vote shares. If anything, increasing the incumbent's share of traveling expenditure decreases his vote share, but the effect is not significant at the 10% level. Excessive traveling by candidates can be viewed negatively by the voters, especially if it is unnecessary. An increase in polling expenditures by the incumbent relative to his challenger seems to have a positive but small and insignificant effect, suggesting that polling is less useful in affecting a candidate's vote share. Moreover, if

[21] As a robustness check, I exclude loan repayments and contribution refunds from indirect expenditures since one can argue that the nature of these 2 spending categories differ from other components such as transfers and donations. The estimates of the coefficient on this new indirect spending variable remain positive and significant.

conducted carelessly, the candidate's campaign strategy might be led astray. Finally, the effect of campaign materials spending also have a positive but insignificant effect. Campaign materials consist of banners, lawn signs, and pamphlets distributed to voters. However, there is little evidence that voters pay much attention to these.

2.4.4 Party Effects

Now, I examine how the effectiveness of each spending measure differ by electoral and candidate characteristics. I start with looking at the differential impacts of the incumbent's spending share by the incumbent's party identity. Formally, I estimate the following empirical model:

$$IncVote_{d,t} = \alpha_0 + \alpha_1 IncShare_{d,t} + \alpha_2 Rep_{d,t} + \alpha_3 IncShare_{d,t} * Rep_{d,t} + \Theta Z_{d,t} + \gamma_t + \delta_d + \nu_{d,t} \tag{5}$$

where $Rep_{d,t}$ is an indicator variable that equals to 1 if the incumbent in district d and year t is a Republican. It equals to 0 if he is a Democrat. α_2 thus captures the advantage of simply being a Republican over a Democrat (or the disadvantage if α_2 is negative) and α_3 captures the difference in spending effectiveness between a Republican and a Democratic incumbent.

Table 2.7 shows the estimated coefficients. In columns 1 and 2, we do not see a discernible advantage in terms of party identification (Rep) and spending effectiveness ($Rep * IncShare$) when we focus on total and direct spending. However, in column 3, a Republican incumbent has a 4.25 percentage points base advantage in vote share over a Democratic incumbent. Despite this advantage, I found that Democrats are more effective in their spending when campaign money is measured in terms of no administrative or communication spending. On the contrary, I do not find any significant differences in the effectiveness of advertising spending between incumbents from opposing parties. Going from columns 2 to 3, notice that the positive and significant effect in column 3 is driven entirely from eliminating the incumbent's administrative spending share from the measure. This is indeed consistent with our previous findings that higher administrative spending shares enhances the effectiveness of labor-intensive spending. Taking a look at the data, Democratic incumbents on average spend a larger portion of administrative expenditures in a race (at about 81.5%) compared to a Republican incumbent (at about 79.5%) and this difference is significant at the 95% confidence level. Thus, removing administrative spending from our measure creates a gap in the effects that should favor the Democrats. This is indeed the case–that we found that Republicans are on average less effective in their spending when focusing on no administrative and communication spending shares. In column 5, the fact that the spending estimates revert back to being insignificant for advertising spending can be tied back to my previous finding that administrative spending have no impact upon the effectiveness of political advertisements.

2.4.5 Candidate Expenditure Levels

Next, I investigate whether the spending effects vary with the level of expenditure in the race. In particular, one might wonder if it is the case that an increase in incumbent's share of spending would net a lower percentage of votes in high spending races due to diminishing marginal returns to spending. I test this hypothesis by estimating the spending model that allows the effect of incumbent's spending share to differ by total expenditure in a race. Formally, I estimate:

$$IncVote_{d,t} = \alpha_0 + \alpha_1 IncShare_{d,t} + \alpha_2 \$Sum_{d,t} + \alpha_3 IncShare_{d,t} * \$Sum_{d,t} + \Theta Z_{d,t} + \gamma_t + \delta_d + \nu_{d,t} \tag{6}$$

where $\$Sum_{d,t}$ denotes the sum of the incumbent's and challenger's expenditure in district d and year t, depending on the measure used. α_3 would then capture the differential impact of incumbent's spending share by spending levels.

The estimates are shown in Table 2.8. I find that effectiveness of incumbent's percentage of the spending do not vary by spending levels for all measures except for advertising spending. The estimates of the coefficients for the interaction term $IncShare * \$Sum$ are small and very tightly estimated for the first four spending measures. Moreover, they can not be significantly differentiated from 0 at the 10% level. On the other hand, it appears that the effect of increasing the incumbent's advertising expenditure relative to his challenger diminishes in the amount of advertising spending done in the race. The incumbent's political strategy might backfire if he engages in excessive political advertising. This is especially true if the number of attack advertisements increases with the spending level, which could potentially discourage voter turnout (Ansolabehere et al. (1994)).

2.4.6 Closeness of Election

In this section, I analyze how the incumbent's vote share changes in his spending share by electoral closeness. To do this, I partition my sample into 3 groups based on ex-post vote shares. The first sample contains races where the incumbent obtained less than 60% of the two-party vote share. This sample can be viewed as closed elections. There are 671 elections that fall within this category. The second sample are races where the incumbent's vote share falls between 60 and 70 percent. They can be thought of as races where the incumbents are favored to win, but not by an overwhelming margin. There are 857 elections that belong to this category. Finally, the third sample are races where the incumbents won by a landslide, i.e. received more than 70 percent of the votes going to the top two candidates. There are 398 races in this group. I separately estimate equation (4) for each of the subsamples to examine the differences in the effectiveness of spending by electoral closeness. The results presented below are robust up to a 3 percentage point difference in the vote share boundaries.[22]

Table 2.9 reports the spending share estimates for each subsample and for each measure. Panel A reports the effect of spending shares in close elections. The estimates for total and direct spending are both significant and positive, and are not significantly different from each other. The effects become insignificant after throwing out administrative spending, implying that the positive effects of incumbent spending are driven entirely by administrative spending in close elections. Also, communication and advertising spending shares do not have a significant impact on incumbent's vote share in close elections. The standard errors are larger here than for previous estimates due to the reduction in sample size. Taking the magnitudes of the point estimates at face value, it seems that the incumbent's vote share increases in the percentage of mobilization spending (communication), but decreases in advertising spending. Although I can not reject the hypothesis of a null impact, a negative advertising effect can sound puzzling at first. Given that the election is close, incumbents and challengers are already spending a lot of money on political advertising (see Table 1.5). In the previous section, we see that the effectiveness of incumbent's advertising spending relative to his challenger decreases in the level of total advertising expenditure in the race. Therefore, we see that the marginal returns to advertising spending have reached the point where an expansion in political advertising by either candidate will hurt him instead.

The sample in Panel B looks at races where the incumbent achieved a comfortable winning margin over the challenger. The spending share effects for incumbents are positive and significant at the 90% confidence level and above for all spending measures in this intermediate range of vote shares. This is also the subsample where we have the most statistical power, since that the number of observations is the largest among all three panels. As a result, the standard errors for the estimates are also

[22]Full results for different vote share boundaries are available upon requests.

the smallest among all three subsamples. We see that the incumbent benefits from increasing his spending share in all measures, including political advertising. This is in contrast from the previous panel where elections are close. Hence, incumbents in this range should pursue more of both mobilization and persuasion spending to increase his vote share.

Finally, focusing on elections where the incumbent holds an overwhelming advantage over the challenger (Panel C), I find that incumbent spending does not help increase his vote share. Surprisingly, campaign materials and events activities (campaign rallies, canvassing, etc.) actually reduce an incumbent's vote share (columns 3 and 4), but is statistically insignificant. Standard errors of the point estimates are large since the sample size is small. The incumbents in this subsample are most likely to be established party members who hold important political roles. For example, Nancy Pelosi, the leader of the House Democratic members, has always obtained a vote share of at least 71 percentage points since 2004. Thus, it is unlikely that spending by these incumbents can bring in a significant number of additional votes as a large portion of the electorate are already supporting them. In addition, if the purpose of spending is to convey information on the incumbents to the public, then finding a minimal effect of spending is not surprising since these candidates are already well known to the voters.

2.4.7 Redistricting

In the United States, congressional district boundaries are redrawn every 10 years in order to equalize the population within a district. This is known as redistricting. Most U.S states are subjected to redistricting except for Delaware, North Dakota, South Dakota, and Wyoming since they only have a single representative for the entire state due to their low population count. Scholars have believed that gerrymandering, which is the act of strategic manipulation in the drawing of district boundaries can provide an unfair advantage to a single party in elections, which usually means the incumbent. They suspect that this played a major role in the pre-1960s House elections, which saw an over representation of Republicans in Congress. However, Erikson (1972) noted that there is little discernible evidence that partisan-inspired redistricting plans was behind the Republican advantage. McCarty et al. (2009) studied elections from early 1970s to early 2000s and also concluded that gerrymandering has played little role in deciding the election outcome.

I estimate the effects of redistricting for my sample of House elections, where district borders were redrawn after the 2010 Census. To do this, I modify the model to allow the spending effects to differ for elections in 2004 to 2010 from elections in 2012 to 2016. Formally, I estimate the following model:

$$IncVote_{d,t} = \alpha_0 + \alpha_1 IncShare_{d,t} + \alpha_2 IncShare_{d,t} * 2010_t + \Theta Z_{d,t} + \gamma_t + \delta_d + \nu_{d,t} \quad (7)$$

where 2010_t is an indicator variable that equals to 1 if the year is 2012 and beyond and equals to 0 if the year is 2010 and before. The base term of 2010_t is not explicitly included in the model as it is contained within the year fixed effects γ_t.

The results are reported in Table 2.10. There is strong evidence that the spending advantage held by an incumbent has decreased after district borders were redrawn. In particular, the increase in vote shares due to a 1 percentage point increase in total spending fell by 0.0667 percentage points from +0.2174 before 2010 . I also conduct an F-test to test whether an increase in the incumbent's share of spending have a significant impact on his vote share post redistricting. The value of the test statistic is reported in the middle panel of Table 2.10 just below the point estimates. The results for the first four spending categories, as reported in columns 1 through 4 are qualitatively similar. While there is a decrease in the effectiveness of incumbent's spending, their effects remain significant beyond the 95% confidence level. When we focus our attention to advertising spending, the effect of incumbent's spending relative to his challenger is significantly reduced after redistricting–from a positive estimate of 0.0507 to 0.0083 per increase of 1 percentage point of incumbent's advertising spending share. Based on the F-test, this effect is not significantly different from zero (the p-value is 0.3645).

From the perspective of political competition, this is a positive finding. The results point towards a decrease in incumbency spending advantage for all spending purposes. The advantage in political advertising for incumbents has also been completely eliminated by redistricting. This is in line with previous empirical findings that redistricting is not driven by partisan motivations (Erikson (1972); McCarty et al. (2009)), but rather serves its purpose in balancing the electorate. This creates a level playing field between incumbents and challengers and could encourage more citizens to run for office.

2.5 Repeated Incumbent and Challenger Races

In Section 2.3, two sources of endogeneity problems are discussed. This section focuses on addressing the problem of unobserved candidate quality. When the challenger is of high quality, the incumbent is expected to raise his spending in fear of losing the election. High quality challengers will also be able to attract more contributions from the public and interest groups, which in turn increases their spending levels. As a result, the effect of incumbent spending in the traditional model given by equation (3) will be underestimated while the effect of challenger spending will be overestimated. On the other hand, the direction of bias in the second specification is ambiguous since it depends on the relative magnitude of the change in incumbent's spending to the change in challenger's spending when there is a shock to the challenger's quality.

Levitt (1994) proposes a clever solution to this problem by focusing on races where the incumbent faces the challenger more than once. The identification of the spending effect relies on the assumption that candidate quality is unchanged over time. Hence, taking a first-difference or fixed effects transformation of the model will eliminate the need to estimate the effect of candidate quality upon vote shares, but more importantly, the spending estimates will now be free of confounding effects due to unobserved candidate characteristics. However, this assumption might not hold if there is a learning-by-doing component to the challenger's campaign strategy. Moreover, there might be selection bias within this more restricted sample. This would be the case if the challengers choose to run against the same incumbent multiple times as the latter is perceived as being weak. Hence, the estimates obtained using this empirical strategy are local average treatment effects and might not be externally valid. Nonetheless, this exercise allows us to gauge the severity of the bias due to unobserved challenger quality.

To do this, I use a two-step approach. First, I reestimate equations (3) and (4) using only observations in the repeated challenger sample. If the restricted sample is representative of the full sample, then the results from this estimation step should not be significantly different from the ones obtained using the full sample. Any discrepancies between the point estimates are caused by selection bias. To tease out the bias due to unobserved candidate quality, I estimate the following empirical model on the restricted sample as my second step and compare the results to the estimates obtained in step 1:

$$IncVote_{p,t} = \omega_0 + \Omega X_{p,t} + \Theta Z_{p,t} + \gamma_t + \delta_p + \epsilon_{p,t} \tag{8}$$

where p denotes the incumbent-challenger pair and X denotes a vector of spending variables that can take on the form of either the incumbent's and challenger's spending separately, or the incumbent's spending share in the race. I report results for both models. δ_p is a vector of pair specific characteristics, which includes incumbent and challenger quality. These are assumed to be invariant over time. The δ_p term is eliminated after taking a fixed effects transformation on p, so there is no need to estimate it and the spending variables will now be free from confounding effects due to unobserved candidate quality.

There are a total of 181 incumbent and challenger pairs who met each other at least twice from 2004 to 2016 and who I have full spending data on. The number of observations is 385, indicating that most pairs met only twice in my sample period.

2.5.1 Incumbent and Challenger Spending Effects

First, I focus on the specification where incumbent and challenger spending enters the spending equation separately, i.e. $\Omega X_{p,t} = \omega_1 IncSpend_{p,t} + \omega_2 ChalSpend_{p,t}$. Recall that we obtained negative estimates for ω_1 and ω_2 in the full sample due to endogeneity bias. This section provides insight on whether these results are primarily driven by the bias due to unobserved candidate quality. My findings do not suggest this to be the case regardless of the adopted measure.

Estimation results are shown in Table 2.11. The top panel (A) shows results from using raw spending levels while the bottom panel (B) uses the natural log-transformed spending variables. The results are further split into two groups–columns 1 through 5 report estimates from the first step, i.e. by simply restricting the sample to races where the incumbent faces the same challenger at least twice. Columns 6 through 10 report estimates from the second step, i.e. controlling for unobserved candidate characteristics.

While there are some differences between the point estimates in the restricted sample (columns 1 to 5 of Table 2.11) from the ones in the full sample (Table 2.2), they are not significantly different from each other for the most parts. Standard errors are also larger in the repeated challenger sample due to a reduction in sample size. If anything, the effects of incumbent spending on vote share are made even more negative, suggesting that incumbents in this sample could be weaker. Also, challenger spending appears to be less effective compared to the full sample. One potential reason is that these challengers have stamped their mark in the political scene and are relatively well known compared to many freshmen challengers in the full sample. Thus, spending done past the first election by these challengers could have a lower effect on the incumbent's vote share since the constituents are now better informed.

Focusing on columns 6 to 10, the estimates on incumbent spending are still negative after controlling for unobserved candidate characteristics, indicating that the bias due to candidate quality is not the major driving force behind the negative findings of the effect of incumbent's spending. In the linear spending panel, the estimates have remained relatively constant, except for the estimates on total spending, which decreases by 50% in magnitude from -0.006 to -0.003. The standard errors of the estimates of incumbent spending using direct, no administrative, communication and advertising measures have also gone down, which increases the significance of the negative estimates. On the other hand, we see that the estimates on challenger spending have significantly decreased for all measures after controlling for candidate quality, implying that the bias led to an overestimation of the challenger's spending effects. Surprisingly, the effect is so large that challenger direct spending is no longer significant at the 10% level.

Using the log-transformed spending variables (Panel B), we observe the opposite pattern: that the estimates on incumbent spending are significantly reduced but the estimates on challenger spending remain fairly constant. This result can be understood through the different weighting scheme applied by the log transformation. In particular, the log function assigns more weight towards incumbents who spend low amounts of money in the race. Hence, if the magnitude of the bias due to unobserved challenger quality is uniform across all spending levels, the log transformation exacerbates the bias for low-spending incumbents. The fact the the estimates remain largely unchanged for the linear specification indicates that the bias could very likely be of similar degrees at all incumbent's spending levels. On the contrary, the observation that the log estimates for challengers are fairly constant but not for the linear estimates could suggest that the bias mainly affects high spending challengers.

2.5.2 Incumbent Spending Share Effects

Next, I turn my attention to the specification where candidate expenditure is captured by the incumbent's spending share in a race, i.e. $\Omega X_{p,t} = \omega_1 IncShare_{p,t}$. The results are reported in Table 2.12. First, notice that the signs of the estimates match those of the full sample given in Table 2.4. However, the magnitudes are lower and many of the estimates are not statistically significant. If the sample of repeated challengers consist of incumbents with lower than average quality compared to the full sample and if the effectiveness of spending is positively correlated with incumbent quality, then one should expect a lower estimate of incumbent spending in the restricted sample. The results in Table 2.12 provide support for this hypothesis. Similarly, there might also be selection bias for challengers where the restricted sample consist of higher than average challenger quality. Thus, both effects work together to reduce the estimated effect of incumbent's spending share.

Properly controlling for candidate quality (columns 6 through 10) raises the point estimates of 4 out of the 5 spending measures (the exception being total spending), but not in a statistically significant manner. The standard errors have also increased, which further reduces the precision of my estimates. Only direct spending share has a marginally significant positive impact on vote shares. The estimates seem to point towards a null effect of incumbent's spending share, but I do not view this as a conclusive evidence for two reasons. First, there is an apparent difference in the distribution of candidates between the two samples. As pointed out previously, the spending share effects significantly decreased for all measures after restricting our sample to races with repeated challengers. This implies that the restrictive sample might not be representative of the true population. Second, the estimates suffer from small sample bias, given that there is only 385 races in the restricted sample.

Recall that while the estimates of incumbent and challenger spending in the traditional specification are unambiguously biased downwards due to unobserved candidate quality, the direction of the bias on incumbent's spending share is ambiguous. Fortunately, the results presented in the previous paragraph suggest that the bias has a rather minor impact on our estimates and if anything, the magnitudes have slightly increased after appropriately controlling for candidate quality, but not in a statistically significant manner. Hence, the main takeaway of this exercise is to demonstrate that the endogeneity bias due to unobserved candidate quality has minimal impact on the estimates of incumbent's spending share.

2.5.3 A Note On Levitt (1994)'s Implementation Strategy

Levitt (1994) estimates a slightly different empirical model than then one given in equation (3). The differences between our specifications are not critical to our results and readers interested in the details of his model should refer Levitt (1994) instead. Despite these differences, the main idea remains the same: to control for candidate quality, we restrict the sample to races where the incumbent repeatedly faces the same challenger. However, Levitt (1994) overlooked a minor detail that could, in certain cases, produce both qualitative and quantitatively different estimates. In particular, when executing this empirical strategy, Levitt takes a fixed effect transformation of his model at the *district* level. This will not be a problem in districts where there is a unique incumbent and challenger pair that face each other across *all* elections in the sample period. However, when a district consists of multiple incumbent-challenger pairs, simply taking a first-difference or fixed effects transformation of the empirical model *does not* sufficiently control for unobserved candidate quality. Different candidates have plausibly different levels of abilities. Hence, the quality term is not constant over time, which is a violation of the identification assumption. For example, Kenneth Calvert, the Republican incumbent on California's 44th congressional district faced Louis Vandenberg, a Democrat in 2004 and 2006. However, Mr Calvert went on to face William Hendrick, also a Democrat in 2008 and 2010. It is difficult to argue that the "quality" of Mr Vandenberg is the same as Mr Hendrick, so taking a fixed-effect transformation of the model will most likely introduce an additional source of bias. To circumvent this problem, we have to redefine each observation at the pair-year level, instead of the district-year level.

Tables 2.11 and 2.12 have implicitly showed the differences in estimates using the incorrect implementation (columns 1 through 5) and the correct implementation (columns 6 through 10). The discrepancies in point estimates and statistical significance are by no means negligible. The point estimates can decrease by more than half of its size (incumbent's log total spending estimates and challenger's linear spending estimates in Table 2.11), or that the significance level of estimates can decrease (incumbent's total and direct spending share estimates in Table 2.12) or increase (incumbent's linear spending estimate in Table 2.11) because of this error. Hence, this highlights the importance of careful selection of our panel variable, in which a minor slip up can potentially lead us to very different conclusions.

2.6 Robustness Checks

In this section, I present two robustness checks, starting with using Cook Political ratings as the set of controls for expected closeness to splitting spending estimates by general and primary election spending.

2.6.1 Cook Political Ratings

Besides using party committee contribution to the candidates and lagged presidential vote shares in the congressional district as controls for expected closeness, I also explore the use of race ratings published by the Cook Political Report. The ratings are released on an irregular basis, with the time between updates becomes increasingly shorter as the general election approaches. Fortunately, race ratings are available at least once per month starting from August of the election year for every election cycle in my sample. Hence, I compiled monthly ratings using the first report available in each month. Each race is classified as either a strong Democrat, likely Democrat, lean Democrat, toss-up Democrat favored, toss-up Republican favored, lean Republican, likely Republican, and strong Republican. I recode each rating on a scale of 0 to 7, with 0 being the safest district for an incumbent, i.e. classified as a strong Democratic district if the incumbent is a Democrat or classified as a strong Republican district if the incumbent is a Republican, and 7 being the least safe district for the incumbent, for example a strong Democratic district for a Republican incumbent.

Table 2.13 shows the results from a regression of the incumbent's vote share on incumbent and challenger spending with the regular controls such as district and year fixed effects, lagged presidential vote share, party committee contributions *and* a separate dummy variable for each rating category by month. The estimates on the linear spending variables shown in Panel A have lower magnitude and significance level compared to those in Table 2.2. However, if Cook Political Reports are predicting the closeness of each race based on the candidate's observed spending amount, the difference in estimates might be driven by multicolinearity. Unfortunately, the exact criteria and methodology of race classification is not made available to the public. Nonetheless, the estimated effect of incumbent's spending, although insignificant for many parts, remain negative. Turning attention to the log spending effects in panel B, the estimates are all negative and significant regardless of measures used. This indicates that even with this many dimensions of covariates that attempt to control for race expectations, the problem of simultaneity bias is not entirely solved.

Table 2.14 presents results on incumbent's spending share, with dummy variables for Cook Political House ratings added as extra controls. The effects remain positive but the magnitudes have decreased from those reported in Table 2.4. Multicollinearity is again very likely to be a problem since we are now adding in 32 extra covariates into the spending equation.[23] Despite this setback, the estimates on incumbent spending share remains positive, which is consistent with previous results.

2.6.2 General and Primary Election Spending

The dependent variable used in all models is the incumbent's share of the two-party votes in *general election*. Thus, there might be differential effects between money spent before the primary election and after the primary election for a candidate. Pre-primary election spending is primarily driven by the competitiveness of the primary election and could have little impact on the general election results. There could also be a long term impact of spending where the effect of spending done prior to the primary election persist into the general election period. For example, candidates may choose to start advertising heavily during the primary election in order to reach out to a larger set of audience throughout their political campaign.

To identify if there is a timing differential in spending, I split both incumbent and challenger spending into primary and general election expenditures according to the state primary dates. Since the actual date of the primary election could be different across states, I normalize candidate spending by the number of days between any two consecutive elections. Specifically, for primary election spending, I count the number of days from the start of the off-election year to the primary election day. Whenever a runoff election is held, I extend the period of primary election to the runoff election

[23] There are 8 categories for each month and I use 4 months of House ratings.

date. Pre-primary spending is then given by the sum of candidate spending up to the primary election day normalized by the number of days in this period. Similarly for general election spending, I count the number of days after the primary election leading up to the general election and normalize the sum of candidate spending in this period by the number of days. Hence, the spending variables in this section are interpreted as the average candidate spending *per* day. I only use races between 2010-2016 since spending data is unavailable by date for several types of spending such as transfers, political contributions and donations. I find that the incumbent's vote share is primarily affected by general election spending with little evidence that primary election spending influences outcomes. On the other hand, I find that both pre-primary and post-primary spending for challengers reduce the incumbent's general election vote share.

Detailed results are presented in Table 2.15. "Full" indicates candidate spending for the entire election cycle, i.e. candidate expenditures are not distinguish based on their timing. "GE" indicates general election spending, which is spending done between the primary and general election. "PE" indicates primary election spending, which is spending done from the start of the off-election year up to the primary election. All spending variables are measured in units of \$1000 and are normalized by the number of days leading up to the election. For incumbents, the estimates of general election spending are all significant at the 95% confidence level regardless of measure, but it is insignificant for 4 out of the 5 measure for primary election spending. Incumbent's primary election spending is only marginally significant at the 90% confidence level (column 6), indicating that the spending effects reported in previous sections are driven primarily by general election spending and not money spent before the primary election. On the other hand, the challenger spending estimates are significant for both general and primary election spending regardless of measure. The discrepancy between the effectiveness of primary election spending for incumbents and challengers can be understood through the spread of information. Incumbents are generally well known to the public and there might be little need to convey additional information to the voters. On the other hand, a newcomer to the election can benefit from increased publicity early in the election cycle in order to communicate her platforms to the voter. If we also think about the persistence in spending effects, then this suggest that there is no long-lasting impact of campaign money for incumbents, consistent with the view of Gerber et al. (2011), but this does not apply to challengers.

2.7 Conclusion

In this chapter, I study the differential impact of disaggregated campaign spending on election outcomes. I also show that previous methods of estimating the impact of incumbent and challenger spending separately suffer from endogeneity bias using data from more recent elections. I propose a separate empirical model using the incumbent's spending share in the race as the main variable of interest that is arguably less prone to such bias.

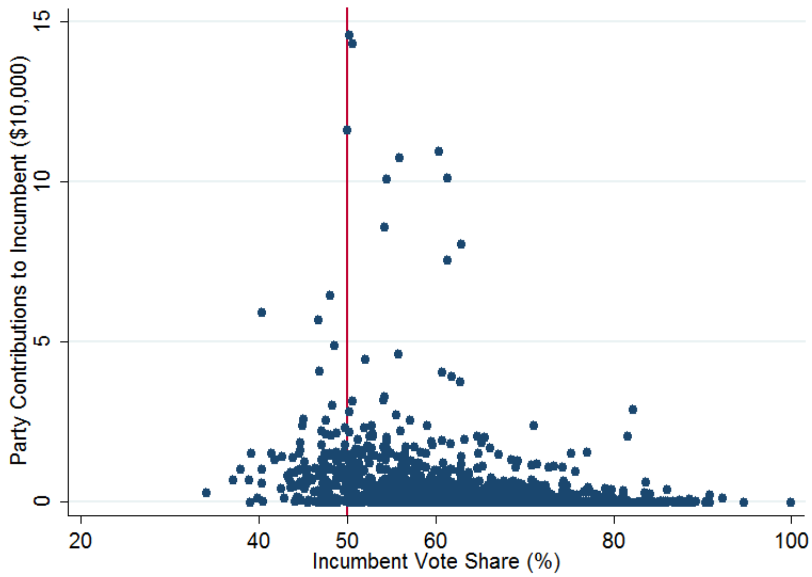
I go on to show that the incumbent's vote share increases in his share of spending in fundraising, advertising, campaign events (e.g. rallies, GOTV efforts) and indirect expenditures. I also found that administrative spending helps the incumbent to an extent that it increases the effectiveness of money spent on labor intensive activities, such as fundraising and campaign events, but does not affect the effectiveness of advertising spending, which could be carried out independently of campaign size. I also investigate how the effectiveness of spending change with several electoral and candidate characteristics, such as the incumbent's political party, the total spending level in a race, electoral closeness in the district, and the redrawing of district borders.

My work opens up several avenues of research on the role of campaign money in elections. Previous studies have focused primarily on the effects of political advertising (Larreguy et al. (2014); Spenkuch and Toniatti (2016)) and canvassing activities (Gerber and Green (2000)). However, little research has been done to analyze the role of indirect spending, such as the spillover effects of spending done in neighboring districts on one's own district, or how the size of campaign might affect the effectiveness of money on election outcomes.

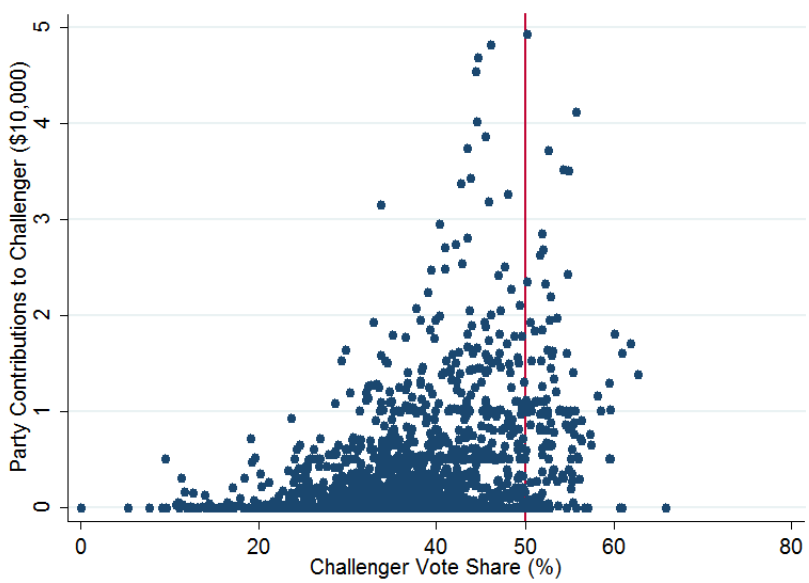
Another direction of research that is equally important is to develop a convincing empirical strategy to solve the problem of reverse causality. So far, none of the previous studies have successfully address all the criticisms in the literature.

Figure 2.1: Party Committee Contributions to Candidates

(a) To Incumbents

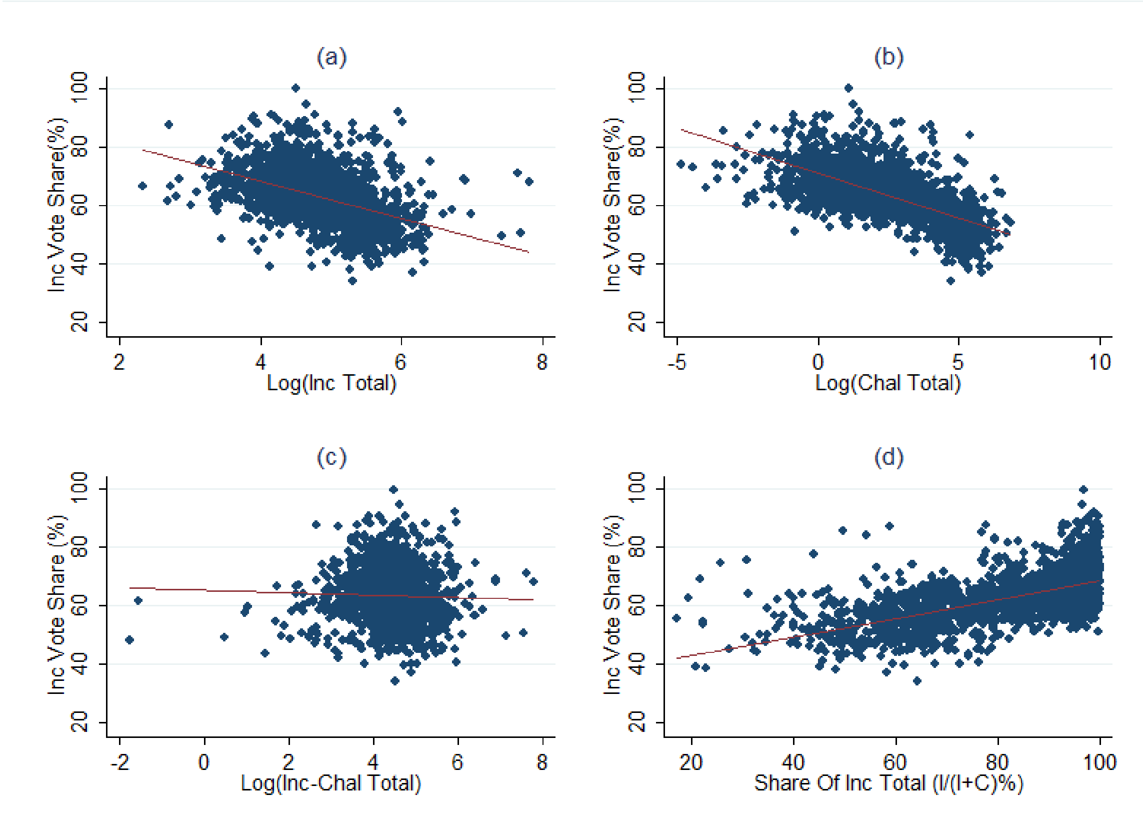


(a) To Challengers



Notes: This figure shows the amount of contributions made to a candidate by party committees by the candidate's vote share. Panel (a) shows the scatter plot for incumbents while panel (b) shows the scatter plot for challengers. Contribution amounts are in 2010 dollars and in units of $10,000s.

Figure 2.2: Level vs Relative Spending



Notes: Panel (a) and (b) show the scatter plots of incumbent's vote share versus the natural log of incumbent's spending and the natural log of challenger's spending respectively. Panel (c) shows the natural log of the difference between the incumbent's and the challenger's spending. Panel (d) shows the incumbent's spending as a percentage of the spending sum by both the incumbent and the challenger. The red line represents the best linear fit line.

Figure 2.3: Predicted Vote Share by Incumbent's Spending Share for All Measures

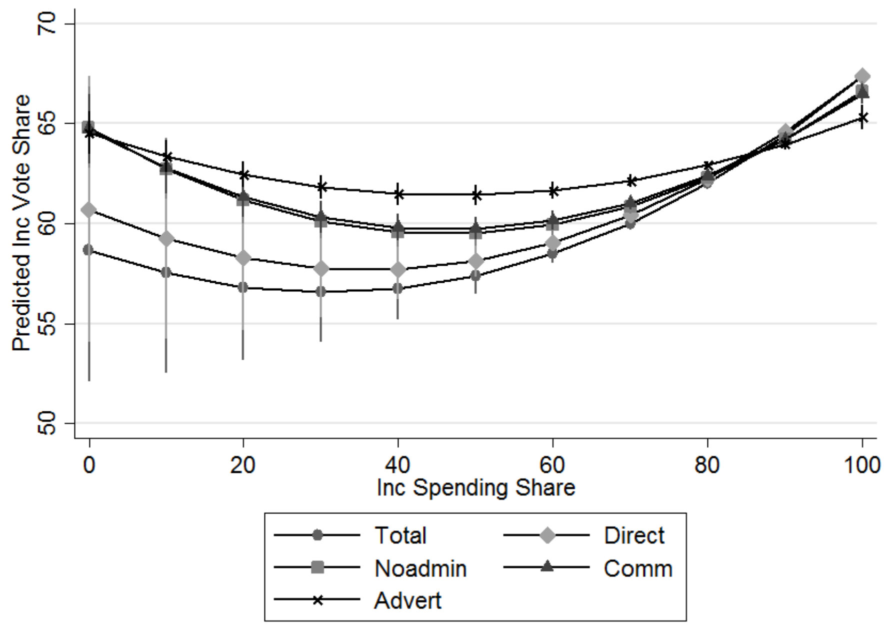


Table 2.1: Total Spending Effects on Incumbent Vote Share

	Dependent Variable: Incumbent's Vote Share							
	Linear Spending				Log Spending			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Inc Total	-0.006**	-0.006**	-0.006**	-0.005*	-2.080***	-2.269***	-2.045***	-1.625***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.347)	(0.427)	(0.421)	(0.422)
Chal Total	-0.050***	-0.036***	-0.031***	-0.027***	-2.690***	-1.974***	-1.832***	-1.694***
	(0.004)	(0.005)	(0.004)	(0.004)	(0.137)	(0.132)	(0.139)	(0.110)
Inc Party Contrib			-0.393**	-0.174			-0.377*	-0.164
			(0.178)	(0.168)			(0.198)	(0.168)
Chal Party Contrib			-1.959***	-1.787***			-1.348***	-1.206***
			(0.339)	(0.345)			(0.261)	(0.281)
President				0.313***				0.286***
				(0.079)				(0.070)
Constant	66.895***	63.244***	64.075***	45.526***	80.114***	79.125***	78.335***	59.154***
	(0.479)	(0.440)	(0.453)	(4.560)	(1.398)	(1.802)	(1.778)	(5.205)
Year FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
District FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Observations	1928	1928	1927	1926	1928	1928	1927	1926
R^2	0.312	0.702	0.712	0.740	0.451	0.746	0.751	0.775

Notes: Standard errors clustered by state reported in parentheses. All spending measures are in units of $10,000. "Party contrib" denotes party committee contributions to the candidate. "President" denotes the lagged vote share of the presidential candidate who is in the same party as the incumbent. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.2: Spending Effects on Incumbent Vote Share for Various Measures

	Dependent Variable: Incumbent's Vote Share									
	Linear Spending					Log Spending				
	(1) Total	(2) Direct	(3) No Admin	(4) Comm	(5) Advert	(6) Total	(7) Direct	(8) No Admin	(9) Comm	(10) Advert
Incumbent	-0.005*	-0.008**	-0.015***	-0.018***	-0.034***	-1.625***	-1.960***	-1.273***	-1.191***	-0.602***
	(0.002)	(0.003)	(0.004)	(0.005)	(0.004)	(0.422)	(0.355)	(0.160)	(0.150)	(0.073)
Challenger	-0.027***	-0.028***	-0.029***	-0.028***	-0.023***	-1.694***	-1.519***	-1.326***	-1.272***	-0.835***
	(0.004)	(0.006)	(0.007)	(0.007)	(0.008)	(0.110)	(0.097)	(0.092)	(0.083)	(0.067)
Constant	45.526***	46.254***	44.902***	44.641***	44.929***	59.154***	60.372***	54.071***	53.279***	48.344***
	(4.560)	(4.401)	(4.347)	(4.314)	(4.332)	(5.205)	(5.115)	(4.434)	(4.424)	(4.228)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1926	1926	1926	1926	1926	1926	1926	1926	1926	1925
R^2	0.740	0.745	0.740	0.739	0.743	0.775	0.779	0.771	0.772	0.760

Notes: Standard errors clustered by state reported in parentheses. All spending measures are in units of $10,000. All regressions include party committee contribution and lagged presidential vote share as controls. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.3: Spending Effects Broken Down Into Categories

	Linear Spending				Log Spending			
	(1)	(2)	(3)		(4)	(5)	(6)	
Inc Direct	-0.008**	-0.012***			-1.960***	-2.017***		
	(0.003)	(0.003)			(0.355)	(0.339)		
Chal Direct	-0.028***	-0.024***			-1.519***	-1.441***		
	(0.006)	(0.005)			(0.097)	(0.090)		
Inc Indirect		0.029***	0.021**			0.623***	0.619**	
		(0.009)	(0.009)			(0.227)	(0.252)	
Chal Indirect		-0.003	-0.005			-0.017	-0.022	
		(0.006)	(0.004)			(0.044)	(0.051)	
			Incumbent	*Challenger*			*Incumbent*	*Challenger*
Admin			-0.005	-0.036***			-0.972***	-0.394***
			(0.004)	(0.009)			(0.206)	(0.143)
Travel			-0.033	-0.031			0.067	0.027
			(0.022)	(0.050)			(0.188)	(0.046)
Fundraise			0.008	-0.009			0.374	-0.053
			(0.006)	(0.012)			(0.232)	(0.085)
Advert			-0.021***	-0.006			-0.542***	-0.381***
			(0.004)	(0.010)			(0.104)	(0.082)
Polling			-0.173**	-0.139			-0.093*	-0.069**
			(0.066)	(0.169)			(0.051)	(0.031)
Material			-0.100***	-0.010			0.016	-0.022
			(0.026)	(0.015)			(0.070)	(0.091)
Event			0.034	-0.259***			0.033	-0.111*
			(0.051)	(0.091)			(0.132)	(0.057)
Observations	1926	1926	1926		1926	1926	1925	
R^2	0.745	0.751	0.763		0.779	0.782	0.779	

Notes: Standard errors clustered by state reported in parentheses. All spending measures are in units of $10,000. All regressions include party committee contribution and lagged presidential vote share as controls. "Indirect" spending consists of transfers to another political committee, contribution refunds, loan repayments and donations. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.4: Effect of Incumbent Spending Share on Vote Share, by Measure

	Dependent Variable: Incumbent's Vote Share									
	Total		Direct		Noadmin		Comm		Advert	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
IncShare	0.1900***	-0.1385	0.1707***	-0.1691*	0.0888***	-0.2304***	0.0781***	-0.2162***	0.0286***	-0.1321***
	(0.0126)	(0.0851)	(0.0135)	(0.0872)	(0.0113)	(0.0299)	(0.0106)	(0.0265)	(0.0080)	(0.0211)
IncShare^2		0.0023***		0.0024***		0.0025***		0.0023***		0.0014***
		(0.0005)		(0.0006)		(0.0002)		(0.0002)		(0.0002)
Constant	29.6392***	41.3802***	30.2006***	42.3267***	34.4564***	44.6449***	35.1002***	44.4383***	37.7211***	42.2364***
	(4.2407)	(5.0566)	(4.0962)	(4.3301)	(4.4359)	(4.2718)	(4.3678)	(4.1951)	(4.4919)	(4.8180)
Observations	1926	1926	1926	1926	1926	1926	1926	1926	1925	1925
R^2	0.756	0.764	0.749	0.764	0.719	0.750	0.716	0.749	0.701	0.748

Notes: Standard errors clustered by state reported in parentheses. All regressions include party committee contribution and lagged presidential vote share as controls. "IncShare" denotes the incumbent's spending as a percentage of the total expenditure in the race, depending on measure. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.5: The Effects of Incumbent Spending Share on Vote Shares with Administrative Spending Share

	Dependent Variable: Incumbent's Vote Share		
	(1) Noadmin	(2) Comm	(3) Advert
IncShare	0.1611	0.0959	-0.1200
	(0.1980)	(0.1735)	(0.1493)
IncShare $\times$ AdminShare	-0.0036	-0.0027	0.0005
	(0.0022)	(0.0019)	(0.0017)
IncShare^2	-0.0011	-0.0006	0.0010
	(0.0014)	(0.0012)	(0.0012)
IncShare$^2 \times$ AdminShare	0.00003**	0.00002*	0.00000
	(0.00001)	(0.00001)	(0.00001)
AdminShare	0.1690*	0.1496*	0.0944**
	(0.0887)	(0.0775)	(0.0447)
Observations	1926	1926	1926
R^2	0.752	0.751	0.745

Notes: Standard errors clustered by state reported in parentheses. All models include lagged presidential vote share and party committee contributions as controls. *AdminShare* denotes the incumbent's share (in percentage) of administrative spending in the race. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.6: Effect of Incumbent Spending Share on Vote Share Broken Down into Spending Components

	Dependent Variable: Incumbent's Vote Share		
	(1)	(2)	(3)
Direct	0.1707***	0.1509***	
	(0.0135)	(0.0152)	
Indirect		0.0368***	0.0366***
		(0.0131)	(0.0116)
Admin			0.0946***
			(0.0120)
Travel			-0.0040
			(0.0096)
Fundraise			0.0240**
			(0.0112)
Poll			0.0004
			(0.0008)
Material			0.0047
			(0.0061)
Event			0.0159**
			(0.0067)
Advert			0.0091*
			(0.0051)
Observations	1926	1926	1845
R^2	0.749	0.753	0.753

Notes: Standard errors clustered by state reported in parentheses. All regressions include party committee contribution and lagged presidential vote share as controls. Each spending variable represents the percentage of total expenditure in the race for that measure that is attributed to the incumbent. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.7: Effect of Incumbent Spending Share on Vote Share by Political Party

	Dependent Variable: Incumbent's Vote Share				
	(1) Total	(2) Direct	(3) Noadmin	(4) Comm	(5) Advert
Inc Share	0.2011***	0.1799***	0.1172***	0.1033***	0.0340***
	(0.0188)	(0.0152)	(0.0170)	(0.0144)	(0.0097)
Rep	1.9723	1.7203	4.2477**	3.8620**	1.2781
	(2.0545)	(1.8383)	(1.7182)	(1.5618)	(1.1118)
Rep $\times$ Inc Share	-0.0206	-0.0168	-0.0429*	-0.0389*	-0.0074
	(0.0281)	(0.0243)	(0.0236)	(0.0217)	(0.0152)
Constant	28.4222***	29.0739***	31.3609***	32.2747***	36.5125***
	(4.7557)	(4.5473)	(4.9854)	(4.8672)	(4.7528)
Observations	1926	1926	1926	1926	1925
R^2	0.757	0.750	0.722	0.718	0.702

Notes: Standard errors clustered by state reported in parentheses. All regressions include party committee contribution and lagged presidential vote share as controls. "IncShare" denotes the incumbent's spending as a percentage of the total expenditure in the race, depending on measure. "Rep" is an indicator variable that equals 1 if the incumbent is a Republican and 0 otherwise. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.8: Effect of Incumbent Spending Share on Vote Share by Spending Level

	Dependent Variable: Incumbent's Vote Share				
	(1) Total	(2) Direct	(3) Noadmin	(4) Comm	(5) Advert
Inc Share	0.1803***	0.1485***	0.0705***	0.0645***	0.0318***
	(0.0200)	(0.0241)	(0.0148)	(0.0137)	(0.0097)
$Sum	-0.0003	-0.0029	-0.0120	-0.0112	-0.0115
	(0.0059)	(0.0078)	(0.0090)	(0.0093)	(0.0094)
$Sum × Inc Share	-0.0001	-0.0001	-0.0001	-0.0001	-0.0003**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Constant	32.0802***	34.9229***	39.8997***	40.2054***	42.6774***
	(4.5347)	(3.8073)	(4.2224)	(4.0548)	(4.0638)
Observations	1926	1926	1926	1926	1925
R^2	0.764	0.764	0.750	0.749	0.748

Notes: Standard errors clustered by state reported in parentheses. All regressions include party committee contribution and lagged presidential vote share as controls. "IncShare" denotes the incumbent's spending as a percentage of the total expenditure in the race, depending on measure. "$Sum" denotes the sum of incumbent and challenger spending by measure. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.9: Effect of Incumbent Spending Shares, by Closeness

	Dependent Variable: Incumbent's Vote Share				
	(1) Total	(2) Direct	(3) No Admin	(4) Comm	(5) Advert
	Panel A: Close Elections (Inc Vote Share≤60%)				
Inc Share	0.0770***	0.0725***	0.0084	0.0049	-0.0005
	(0.0178)	(0.0180)	(0.0170)	(0.0166)	(0.0150)
Observations	671	671	671	671	671
	Panel B: Incumbents Favored (60%<Inc Vote Share<70%)				
Inc Share	0.0579***	0.0480***	0.0266**	0.0234**	0.0102*
	(0.0150)	(0.0129)	(0.0106)	(0.0089)	(0.0054)
Observations	857	857	857	857	857
	Panel C: Lopsided (Inc Vote Share≥70%)				
Inc Share	0.0315	0.0293	-0.0061	-0.0071	0.0088
	(0.0388)	(0.0343)	(0.0362)	(0.0318)	(0.0199)
Observations	398	398	398	398	397

Notes: Standard errors clustered by state reported in parentheses. All regressions include party committee contribution and lagged presidential vote share as controls. The sample is split according to the incumbent's vote share given in each panel. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.10: Effect of Incumbent Spending Share on Vote Share: Redistricting

	Dependent Variable: Incumbent's Vote Share				
	(1) Total	(2) Direct	(3) Noadmin	(4) Comm	(5) Advert
Inc Share	0.2174***	0.1955***	0.1428***	0.1293***	0.0507**
	(0.0145)	(0.0218)	(0.0241)	(0.0251)	(0.0192)
2010 × Inc Share	-0.0667**	-0.0604*	-0.0964***	-0.0909**	-0.0424*
	(0.0294)	(0.0344)	(0.0350)	(0.0348)	(0.0245)
Constant	26.7915***	27.6830***	29.7857***	30.6476***	35.7653***
	(3.4409)	(3.0754)	(3.2486)	(3.1560)	(3.8251)
F-Test					
$\alpha_1 + \alpha_2 = 0$	38.20***	39.83***	7.49***	6.37**	0.84
Observations	1926	1926	1926	1926	1925
R^2	0.759	0.752	0.728	0.724	0.704

Notes: Standard errors clustered by state reported in parentheses. All regressions include party committee contribution and lagged presidential vote share as controls. "Inc Share" denotes incumbent's spending as a percentage of total expenditure in the race by measure. "2010" is an indicator variable that equals 1 if the year is between 2012 and 2016, and equals 0 if the year is between 2004-2010. The F-test is conducted to test whether the effect of incumbent's spending share upon incumbent's vote share is significantly different from 0, i.e. $\alpha_1 + \alpha_2 = 0$. The test statistics are reported for each spending measure. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.11: Repeated Challengers - Effect of Incumbent and Challenger Spending

	Dependent Variable: Incumbent's Vote Share									
	District Fixed Effects					Pair Fixed Effects				
	(1) Total	(2) Direct	(3) Noadmin	(4) Comm	(5) Advert	(6) Total	(7) Direct	(8) Noadmin	(9) Comm	(10) Advert
	Panel A: Linear Spending									
Incumbent	-0.006	-0.011	-0.015*	-0.016*	-0.021*	-0.003	-0.010*	-0.015**	-0.016**	-0.020**
	(0.005)	(0.007)	(0.008)	(0.009)	(0.011)	(0.005)	(0.005)	(0.006)	(0.007)	(0.008)
Challenger	-0.019**	-0.018*	-0.020	-0.021	-0.028	-0.006**	-0.003	-0.007	-0.008	-0.010
	(0.009)	(0.011)	(0.014)	(0.014)	(0.024)	(0.003)	(0.004)	(0.005)	(0.005)	(0.008)
	Panel B: Log Spending									
Incumbent	-2.316*	-1.908***	-1.396***	-1.364***	-0.666***	-1.034	-1.185***	-1.207***	-1.200***	-0.542***
	(1.259)	(0.491)	(0.335)	(0.305)	(0.146)	(0.847)	(0.344)	(0.254)	(0.233)	(0.100)
Challenger	-1.120***	-1.045**	-1.053***	-0.999***	-0.479***	-1.147***	-1.040***	-0.868***	-0.803***	-0.381***
	(0.325)	(0.396)	(0.246)	(0.236)	(0.163)	(0.242)	(0.284)	(0.156)	(0.143)	(0.102)
Observations	385	385	385	385	385	385	385	385	385	385

Notes: Standard errors clustered by state reported in parentheses. All regressions include party committee contribution and lagged presidential vote share as controls. Columns 1 to 5 uses district level fixed effects. The results are from an estimation that reduces the sample to races where there is a repeated challenger, but do not sufficiently control for unobserved candidate quality. Columns 6 to 10 reports the estimates in the model that uses pair fixed effects, which now eliminates the confounding effects on the spending variables. Panel A reports the estimation results from the specification where incumbent and challenger spending are in terms of their levels. Panel B resports the estimation results from after taking a natural log-transformed variables on incumbent and challenger spending. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.12: Repeated Challengers - Effect of Incumbent Spending Share

	Dependent Variable: Incumbent's Vote Share									
	District Fixed Effects					Pair Fixed Effects				
	(1) Total	(2) Direct	(3) Noadmin	(4) Comm	(5) Advert	(6) Total	(7) Direct	(8) Noadmin	(9) Comm	(10) Advert
Inc Share	0.152*	0.106**	0.036	0.024	0.009	0.121	0.108*	0.044	0.029	0.009
	(0.076)	(0.048)	(0.022)	(0.018)	(0.011)	(0.088)	(0.057)	(0.028)	(0.018)	(0.012)
Observations	385	385	385	385	385	385	385	385	385	385

Notes: Standard errors clustered by state reported in parentheses. All regressions include party committee contribution and lagged presidential vote share as controls. Sample is restricted to only races where the incumbent faces a challenger more than once. Columns 1 to 5 uses district level fixed effects. The results are from an estimation that reduces the sample to races where there is a repeated challenger, but do not sufficiently control for unobserved candidate quality. Columns 6 to 10 reports the estimates in the model that uses pair fixed effects, which now eliminates the confounding effects on the spending variables. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.13: Cook Political Ratings - Effect of Incumbent and Challenger Spending

	Dependent Variable: Incumbent's Vote Share				
	(1) Total	(2) Direct	(3) Noadmin	(4) Comm	(5) Advert
	Panel A: Linear Spending				
Incumbent	-0.002	-0.004*	-0.005**	-0.007**	-0.012***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Challenger	-0.011**	-0.011*	-0.011	-0.010	-0.009
	(0.005)	(0.006)	(0.007)	(0.007)	(0.008)
	Panel B: Log Spending				
Incumbent	-0.686*	-1.154***	-0.667***	-0.647***	-0.355***
	(0.351)	(0.251)	(0.140)	(0.129)	(0.061)
Challenger	-1.332***	-1.209***	-1.028***	-0.993***	-0.620***
	(0.129)	(0.122)	(0.089)	(0.081)	(0.058)
Lagged Pres	Y	Y	Y	Y	Y
Party Contrib	Y	Y	Y	Y	Y
Cook Ratings	Y	Y	Y	Y	Y
Observations	1926	1926	1926	1926	1926

Notes: Standard errors clustered by state reported in parentheses. All spending measures are in units of $10,000. All models include lagged presidential vote share, party committee contributions, and dummy variables for each category of the coded Cook Political House Ratings from August to November of the election year as controls. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.14: Cook Political Ratings - Effect of Incumbent Spending Share

	Dependent Variable: Incumbent's Vote Share				
	(1) Total	(2) Direct	(3) Noadmin	(4) Comm	(5) Advert
Inc Share	0.118***	0.104***	0.051***	0.045***	0.017***
	(0.018)	(0.012)	(0.009)	(0.008)	(0.005)
Constant	39.149***	40.134***	44.417***	44.990***	47.086***
	(6.010)	(5.483)	(5.557)	(5.439)	(5.346)
Lagged Pres	Y	Y	Y	Y	Y
Party Contrib	Y	Y	Y	Y	Y
Cook Ratings	Y	Y	Y	Y	Y
Observations	1926	1926	1926	1926	1925

Notes: Standard errors clustered by state reported in parentheses. All models include lagged presidential vote share, party committee contributions, and dummy variables for each category of the coded Cook Political House Ratings from August to November of the election year as controls.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2.15: Effect of Incumbent and Challenger Spending: General and Primary Election

	Dependent Variable: Incumbent's Vote Share									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Total	Direct	Noadmin	Comm	Advert	Total	Direct	Noadmin	Comm	Advert
Inc Full	-0.428*	-0.660**	-1.126***	-1.332***	-2.612***					
	(0.235)	(0.297)	(0.303)	(0.336)	(0.289)					
Chal Full	-1.391***	-1.472***	-1.434***	-1.352**	-0.774					
	(0.352)	(0.462)	(0.569)	(0.580)	(0.565)					
Inc GE						-0.532**	-0.722***	-1.410***	-1.733***	-3.014***
						(0.266)	(0.311)	(0.412)	(0.531)	(0.529)
Inc PE						-0.144*	-0.161	-0.624	-0.889	-1.033
						(0.082)	(0.099)	(0.442)	(0.649)	(0.689)
Chal GE						-1.839***	-1.721***	-1.733***	-1.521***	-1.095*
						(0.427)	(0.482)	(0.611)	(0.637)	(0.660)
Chal PE						-0.899**	-0.786**	-0.679***	-0.690**	-0.640*
						(0.433)	(0.401)	(0.288)	(0.339)	(0.380)
Observations	1144	1144	1144	1144	1144	1144	1144	1144	1144	1144

Notes: Standard errors clustered by state reported in parentheses. All models include lagged presidential vote share and party committee contributions as controls. Spending variables are measured in units of $1,000 per day. "Full" denotes spending per day for the entire election cycle. "GE" denotes general election spending, which is the sum of candidate spending after primary election up to general election, normalized by the number of days in this period. "PE" denotes primary election spending, which is the sum of candidate spending at the start of the off-election year up to the primary election, normalized by the number of days in this period. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

CHAPTER 3 Ideology, Uncertainty, and Checks and Balances

> "In framing a government which is to be administered by men over men, the great difficulty lies in this: you must first enable the government to control the governed; and in the next place, oblige it to control itself."
>
> — James Madison, The Federalist 51, 1788

3.1 Introduction

There are two contradictory yet important parts to this famous quote. First and foremost, the government should be allowed freedom to take any political actions.[24] If the government is a benevolent social planner who seeks to maximize aggregate citizen welfare, there would be little argument against this claim. More realistically, in a democratic society, a government with little power defeats the purpose of elections, which serve as a mechanism to aggregate voters' preferences.[25] In such situations, bills in favor of the majority will be hard to pass and the majority will lose its representation. Hence, governmental authority is important to enable implementation of policies supported by the majority.

However, men are no angels and are susceptible to greed. Once elected to power, politicians can freely decide on policies if there are no external forces that prevent them from doing so. Hence, Madison's second point concerns finding the proper institutional structure to balance the government's power. Formally, checks and balances (CBs hereafter)–a system where government branches are empowered to restrain each

[24] This statement might sound controversial as it implies that the government should be given dictatorial power. However, in a democratic society, the government is chosen by the majority of voters and hence should (arguably) represent them. Moreover, there has been a vast literature that argues that politicians hold superior information and make better collective decisions (e.g. see Austen-Smith and Banks (1996); Condorcet (1785); Maskin and Tirole (2004)).

[25] As an example, see Feddersen and Pesendorfer (1997).

other from becoming too powerful, is incorporated into the U.S. constitution to prevent branches from single-handedly taking selfish political actions. For example, the War Powers Resolution of 1973 was introduced as a control on the president's power over the military during the periods of the Vietnam war. Prior to the passing of the resolution, the president can choose to deploy troops in war zones at their discretion. The resolution shifts political power away from the Executive by requiring the president to seek Congress' approval prior to taking any military actions without a declaration of war. President Nixon, not surprisingly vetoed the bill but the Congress gathered enough support to overturn the veto.[26]

The literature on checks and balances has traditionally focused on studying the benefits of the system, which is in line with Madison's intents. Persson et al. (1997) studies a rent-seeking problem and showed that CBs unambiguously benefit the citizens on average if there are sufficient checks on the Executive. In a follow up paper (Persson et al. (2000)), they went on to show, using a public finance model, that the amount of rents extracted by politicians decreases as the decision-making power over spending and taxes are split across government branches.

However, in October 2013, the US federal government was forced to a 16-day shutdown when the two chambers of Congress failed to agree on the appropriations bill for fiscal year 2014. This was largely due to political stalemate between the Democratic-led Senate and the Republican-led House of Representatives on the funding of the Affordable Care Act. The cost to this shutdown was substantial. The Office of Management and budget estimated that the 4th quarter real GDP growth was lowered by 0.2-0.6 percentage points.[27] Most government employees are also furloughed

[26] There are also controversies over the War Powers Resolution. President Nixon pointed out in his veto statement that the law is unconstitutional as it imposes a strict limit on the president, who serves as the commander-in-chief of the U.S. army himself. He further argues that Congress will have too much power if this resolution passes since the Legislature already has constitutional checks on the president's power with its appropriations power. The statement can be accessed at: http://www.presidency.ucsb.edu/ws/?pid=4021.

[27] The report can be accessed at: https://www.whitehouse.gov/sites/default/files/omb/reports/impacts-and-costs-of-october-2013-federal-government-shutdown-report.pdf

and remain uncertain on their job security throughout this period of time. Furthermore, most agencies suffered from huge negative productivity shocks. Data access from government website was temporarily curtailed, preventing ground-breaking researches from taking place. To the best of my knowledge, this points to a gap in the literature on the undesirability of CBs that has yet to be filled and this article attempts to address this concern.

An element that is missing in the literature, yet important to explain such events is a measure of ideological differences among politicians. Although CBs was not intended as a system to control the liberals and the conservatives, the difference in policy preferences across political parties arguably plays a major role when deciding whether to exercise one's veto power. In the US for example, the amount of checks that the Congress has over the President is ultimately determined by the voters. Figure 3.1 shows the number of regular vetoes of non-private bills per congress from 1945 to 2008 (79th to 110th congresses), which I pull directly form Cameron (2009). Notice that there is a stark difference in the frequency of Presidential vetoes over legislation between unified and divided government. In particular, divided government leads to higher usage of veto power. This is not surprising. As the government moves from unified to divided, conflict of interest between branches rises and the President more frequently resorts to exercising his veto rights to drive outcomes in favor of his party. This shows that ideological differences, or in other words, disagreement between branches of government is an important factor in understanding the effects of CBs.

While Persson et al. (1997) fails to quantitatively estimate the degree of conflict of interest (due to ideological differences) between government branches, this chapter accounts for this by constructing a model with horizontal differences in ideology on a single policy space. I also allow ideological differences within members of the same political party conditional on that they lie in the same half of the political spectrum.

This captures the differential intensity in ideologies among the members. For example, Zell Miller, the former Governor of Georgia and also a senator, is well known for his conservative views although he originates from the Democratic party. This feature of the model implies that there will still be disagreement between branches in a unified government, which can lead to vetoes and gridlock. This is in line with Figure 3.1 and Krehbiel (1996) where he notes that gridlock occurs due to moderate status quo and its relative location to the ideal policies of political pivots, and not because of the distinction between unified and divided government.

The reader should bear in mind that this article does not attempt to distinguish the implications of different forms of CBs on citizens' welfare. The model presented can be easily extended to study this alternate question. Thus, I employ the simplest form of CBs where I assume that there is a single veto player (known as the checker) who has the power to block proposed bills (written by the proposer). The problem faced by the single representative voter is to select the optimal form of government (distributions of proposal and veto powers across political parties).

I find that CBs reduce the welfare of extremist voters when the status quo and the checker are sufficiently moderate relative to the proposer. The reason is that CBs promotes power sharing between government branches whenever they disagree on policies. As a result, a compromise has to be reached and the resulting policy will lie further away from the extreme voters' bliss points. Conversely, moderate voters benefit from such a system due to policy moderation. When the status quo is extreme, it loses its effectiveness as a threat point, which reduces the degree of power sharing between government branches. For sufficiently extreme status quo, CBs become irrelevant as the proposer can now unilaterally implement his ideal policy.

More often than not, voters are uninformed about the exact political stand of candidates (Austen-Smith and Banks (1996); Budge (1994); Callander (2008); Maskin and Tirole (2004)). This plays a huge role in election and could sway votes in one way or another depending on the information on the candidates' ideology that the voters possess. Therefore, I analyze the costs and benefits of CBs on voter expected welfare when either the Executive's ideology *or* the Legislature's ideology is unknown.[28] In these models, the only information that voter has is the party of each candidate, so he knows that a Democratic (Republican) politician is left (right) wing but is unsure about the intensity of her preferences. In other words, the voter knows which half the candidates lie on the political spectrum but is unable to pinpoint the exact location of their ideologies.

I find that the effectiveness of CBs differs depending on which channel the uncertainty operates on. In particular, I find that uncertainty on the Legislature's ideology may exacerbate the detrimental effects of CBs on extremist voters. In particular this happens whenever the status quo lies between the checker and the proposer's bliss points, with the proposer's ideal policy closest to the middle. Without uncertainty, the voter knows that the status quo will be maintained. However, when he is unsure about the checker's bliss point, moderate policies might arise (such as the proposer's ideal policy) which decreases his expected welfare. On the other hand, uncertainty on the Executive's preferences enhances the benefits of CBs to all voters regardless of their ideology. This is mainly due to the reduction in policy uncertainty when a veto player with known ideology is introduced to the policy-making game. As a result, the system of CBs weakly increases the expected welfare of all citizens

The rest of the chapter is organize as follows: Section 3.2 contains a brief literature review on veto players and checks and balances. It also lists the contributions of this chapter. Section 3.3 lays out the general model. Section 3.4 analyzes the model with one-sided variation on the checker's bliss point. It also contains a comparison of results between a model with complete information and a model where voter is uncertain about the checker's bliss point. This allows us to distinguish the effects

[28] The case where both branches' ideologies are unknown has yet to be solved. I briefly discuss on this in the conclusion.

on uncertainty from the effects of having a veto player on expected voter welfare. Section 3.5 takes a similar approach to Section 3.4 but the variation is now on the the proposer's side. Finally, section 3.6 concludes.

3.2 Literature Review and Contribution

3.2.1 Checks and Balances

The literature on checks and balances is limited and has traditionally been focused on the benefits of the system. Persson et al. (1997) one of the first to analyze the benefits of CBs in a rent-seeking model. They find that the system unambiguously improves on voter welfare when there are sufficient checks on the Executive branch. My work takes on a new approach in analyzing the costs and benefits of CBs when politicians are attached to political parties and have different ideologies. There are two reasons that make this approach interesting. The first is that *Persson et al. (1997)* fails to account for cases where the system of CBs reduces voter's utility, which I argued in the introduction, occurs in real life. The second is that CBs crucially depends on political stands of the government officials. For example, political gridlock happens more frequently when the government is divided and parties are highly polarized. This chapter accounts for that by modeling ideologies on a uni-dimensional policy space. This allows us to measure the degree of polarization or conflict of interest between government branches by simply computing the distance between their bliss points. Introducing this feature in the model generates cases where CBs is detrimental to the public, which serves as a first step in understanding the negative aspects of the system.

To the best of my knowledge, Acemoglu et al. (2013) was the first paper to study the negative effects of CBs. They argue that countries like Bolivia, Ecuador and Venezuela chose to dismantle checks on the Executive branch to make it harder for rich lobbies and elites to bribe politicians. My work does not build on their framework, but rather complements it by providing a more fundamental reason–ideological differences, on why CBs may be undesirable. On top of that, this chapter also ties the model closer to the real world by studying the impact of ideological uncertainty on the effectiveness of CBs. I show that the channel of uncertainty is important as it generates very different implications depending on which side it operates on. In general, most voters gain from CBs when uncertainty is on the proposer's bliss point whereas some voters are hurt from CBs when uncertainty is on the checker's bliss point.

3.2.2 Veto Players and Gridlock

The approach of this work is very similar to Tsebelis (2002). He studies the structure of political systems, specifically about the number of veto players with ideological distances between them on the policies that may arise in the policy-making game. However, his analysis on gridlock is non-standard in the literature as he employs non-game theoretic approach to explain his findings. This article, on the other hand, offers an equilibrium explanation to the implications of veto players which allows us to perform standard comparative static exercises to further understand the importance of each parameter in the model. Therefore, readers who seek a more formal treatment on the costs and benefits of granting veto rights to a decision-maker will find this chapter more appealing.

Krehbiel (1996) looks at a comparative theory of political outcomes under unified and divided government. He argues that political stalemate happens far too often even under strong partisanship in a unified government (see Figure 3.1). This chapter supports his view that gridlock is not an implication of unified or divided government, but is rather a result driven by the relative distances between ideologies of Legislative pivots and the status quo. This provides yet another reason on why government officials' ideologies (and their distance from the status quo) matter when analyzing the costs and benefits of CBs.

3.3 Model

I start out with providing the description of the general model, and in subsequent sections analyze specific forms of this model. Policies are uni-dimensional and represented by the real line $\mathbb{R}$. There is a single representative voter who prefers the policy $\tilde{\tau}$, that is, $\tilde{\tau}$ is the unique policy which gives him the highest level of utility. I refer to this as his bliss point. There are two political parties R and D (representing the Republican and the Democratic party, respectively) with a continuum of members in each party. The preferred policy (bliss point) of each member i in party R, $\tilde{\tau}_R^i$, is uniformly distributed on the interval $[\alpha-\gamma, \alpha+\gamma]$, i.e. $\tilde{\tau}_R^i \sim U[\alpha-\gamma, \alpha+\gamma]$, where $\alpha > 0$ is party R's mean bliss point and $0 < \gamma \leq \alpha$ is a measure of the party members' ideological dispersion, which can be interpreted as the strength of party synergy or party discipline. Likewise, bliss points for members in party D is uniformly distributed on the interval $[-\alpha-\gamma, -\alpha+\gamma]$, i.e. $\tilde{\tau}_D^i \sim U[-\alpha-\gamma, -\alpha+\gamma]$, where party D's mean bliss point is $-\alpha$.[29] Figure 3.2 depicts the distribution of party members' bliss points along the political spectrum.

3.3.1 Checks and Balances

There are two government branches: the Executive (E) and the Legislature (L). The executive holds proposal power and can propose a bill $\hat{\tau}$. The legislature, depending on the constitutional structure, may hold veto power to block the executive's proposals.[30]

[29]The assumption that $\gamma \leq \alpha$ implies that the intersection of the two intervals is empty. If we think about the policy space as representing the political spectrum, then this assumption means that any member from party D is guaranteed to be more left-wing than any member from party R. I find this assumption to be relatively harmless as recent empirical findings show that there is increased political polarization between the Democrats and the Republicans.

[30]In the U.S. however, the roles of government branches are reversed. It is the Congress who proposes bills and the President who vetoes. The main reason that the model is formulated this way is to be consistent with Persson et al. (1997).

There are two states of the world. In the first state $\mathbb{V} = 0$, the constitution specifies that the legislature holds no veto power and cannot block bills proposed by the executive. We refer to this as a government without checks and balances. In the second state $\mathbb{V} = 1$, the constitution specifies that the legislature can veto bills proposed by the executive. We refer to this as a government with checks and balances. Under this state, if the legislature chooses to block the bill $\hat{\tau}$, the status quo policy $S \in \mathbb{R}$ will be triggered. If he chooses to accept the bill, it will then be implemented.[31]

3.3.2 Utilities

The utility for the voter and each member of a party depends on the actual implemented policy and their respective bliss points. For any policy τ, the utility function for politician i with bliss point $\tilde{\tau}^i$ is given by the quadratic loss function:

$$U^i(\underbrace{\tau}_{implemented}, \underbrace{\tilde{\tau}^i}_{bliss\ point}) = -(\tau - \tilde{\tau}^i)^2$$

The voter's utility function takes on a similar structure and is given by:

$$V(\tau, \tilde{\tau}) = -(\tau - \tilde{\tau})^2$$

3.3.3 Strategies

In each state $\mathbb{V} = 0, 1$ the **voter** chooses the winner vector $\{E_{\mathbb{V}}, L_{\mathbb{V}}\}$ where $E_{\mathbb{V}} \in \{D, R\}$ and $L_{\mathbb{V}} \in \{D, R\}$ represent the parties who win the Executive and Legislative seat in state $\mathbb{V}$ respectively. This vector then represents the form of government chosen by the voter.[32]

[31] An alternative model where only the Executive branch is present under no checks and balances can be formulated. All results in this chapter remain the same independent of this modeling choice.

[32] If in state $\mathbb{V}$, the voter's choice is $E_{\mathbb{V}} = L_{\mathbb{V}}$, the government will be unified. If $E_{\mathbb{V}} \neq L_{\mathbb{V}}$, then the government is divided.

After election, the winning parties select, for each seat that they win, a representative from among its members as the branch leader.[33] The identities of the two representatives (one for each branch) are then publicly announced to the voter. In other words, the voter will learn, through this announcement, the bliss points of the representatives and all uncertainty will be resolved at this point of time. Let $\tilde{\tau}^p$ and $\tilde{\tau}^c$ denote, respectively, the bliss points of the representative for the Executive branch (known as the proposer p) and the representative for the Legislative branch (known as the checker c). The **proposer** p then proposes a policy $\hat{\tau}(\tilde{\tau}^p|S, \tilde{\tau}^c) \in \mathbb{R}$ and the **checker** decides on the action $d(\tilde{\tau}^c, \hat{\tau}|S) \in \{a, b\}$ where a is the acceptance while b is the blockage of proposal $\hat{\tau}(\cdot)$. In state $\mathbb{V}$ =0 where CBs are not present, the checker's decision has no effect on the final policy, i.e. $\tau(\hat{\tau}, d|\mathbb{V}=0, S) = \hat{\tau}$. In state $\mathbb{V}$ =1 where CBs are present in the government, the status quo S will be triggered if the checker chooses to block the proposal whereas the proposal will be implemented if he chooses to accept it.

3.3.4 Timeline of Events

The layout of events are as follows. In state $\mathbb{V} = 0$ (1):

1. Voter selects the winning party for the Executive E_0 (E_1) and the Legislature L_0 (L_1).

2. For each government branch, the winning party randomly selects a representative as the branch leader. The bliss points of the two officials are publicly announced.

3. The proposer proposes a policy $\hat{\tau}$.

[33] This might seem odd as we usually know the identity of the running candidates prior to elections. However, the idea here is to capture uncertainty of the elected official's preferences, which might be different from the platforms that they choose to run on. An alternative interpretation is that this captures uncertainty of implemented policies.

4. Upon observing $\hat{\tau}$, the checker chooses to accept or block the proposal.

5. In $\mathbb{V} = 0$, $\hat{\tau}$ is always implemented. In $\mathbb{V} = 1$, $\hat{\tau}$ is implemented iff the checker accepts it. Status quo S is triggered otherwise.

6. All utilities are realized.

3.3.5 Equilibrium

Given the state of the world $\mathbb{V} = 0, 1$ and the status quo S, an equilibrium of the game is a vector of votes $\{E^*_{\mathbb{V}}, L^*_{\mathbb{V}}\}$, proposed policies $\{\hat{\tau}^*_{\mathbb{V}}(\tilde{\tau}^p|S, \tilde{\tau}^c)\}$, and veto decisions $\{d^*_{\mathbb{V}}(\tilde{\tau}^c, \hat{\tau}|S)\}$ such that in state $\mathbb{V}$:

1. The government $\{E^*_{\mathbb{V}}, L^*_{\mathbb{V}}\}$ maximizes the representative voter's expected utility:

$$\{E^*_{\mathbb{V}}, L^*_{\mathbb{V}}\} = \underset{\{e,l\}}{argmax} \int\int V(\tau(\hat{\tau}^*_{\mathbb{V}}(\tilde{\tau}^p), d^*_{\mathbb{V}}(\tilde{\tau}^c, \hat{\tau}^*_{\mathbb{V}})|\mathbb{V}, S), \tilde{\tau})dF_e(\tilde{\tau}^p)dG_l(\tilde{\tau}^c) \quad (9)$$

   where F_e represents the bliss point distribution of a proposer from party e and G_l represents the bliss point distribution of a checker from party l.

2. The proposal $\hat{\tau}^*_{\mathbb{V}}(\tilde{\tau}^p|S, \tilde{\tau}^c)$ maximizes the proposer's utility:

$$\hat{\tau}^*_{\mathbb{V}}(\tilde{\tau}^p|S, \tilde{\tau}^c) = \underset{\hat{\tau}_{\mathbb{V}} \in \mathbb{R}}{argmax} U^p(\tau(\hat{\tau}_{\mathbb{V}}, d^*_{\mathbb{V}}(\tilde{\tau}^c, \hat{\tau}_{\mathbb{V}}|S)), \tilde{\tau}^p) \quad (10)$$

3. Given the proposal $\hat{\tau}$, $d^*_{\mathbb{V}}(\tilde{\tau}^c, \hat{\tau}|S)$ maximizes the checker's utility:

$$d^*_{\mathbb{V}}(\tilde{\tau}^c, \hat{\tau}|S) = \underset{d_{\mathbb{V}} \in \{a,b\}}{argmax} U^c(\tau(\hat{\tau}, d_{\mathbb{V}}|S), \tilde{\tau}^c) \quad (11)$$

In Section 3.4, I analyze a simple version of the general model where the only variation is on the checker's bliss point. I further separate the model into two cases: One with complete information where the voter knows the exact position of both representatives' bliss points prior to voting and the other where he is uncertain about the checker's preferences. In Section 3.5, I analyze a similar model to the one in Section 3.4 but now the only variation is on the proposer's bliss point.

3.4 One-sided Variation on Checker's Ideology

I first start with analyzing the effects of a single channel of ideological variation on the Legislative branch. Formally, I assume that $\gamma = 0$ on the Executive branch so that the distribution of the proposer's ideology collapses down to a single element, which is the party mean. This implies that if the voter casts his vote for party D for the Executive position, the representative's (proposer's) bliss point is known to be $-\alpha$ with probability 1. Similarly, if party R is to win the Executive election, the representative's ideal policy is known to be α with certainty. To simplify the analysis, I further assume that the checker's bliss point can vary on the largest distributional support, i.e. $\gamma = \alpha$. This implies that a Democratic checker has ideal policy drawn from $U[-2\alpha, 0]$ while a Republican checker's ideal policy is drawn from $U[0, 2\alpha]$.

3.4.1 No Checks and Balances ($\mathbb{V}$ =0)

Without CBs, the Executive holds absolute power in policy-making. Since he faces no resistance or threat from the Legislature, he will exercise his authority in equilibrium by proposing (and implementing) his bliss point, i.e. $\hat{\tau}_0^*(\tilde{\tau}^p) = \tilde{\tau}^p$. The checker's action does not influence policies, so any decision that he makes can be part of an equilibrium for the game.

The voter's decision problem then boils down to just choosing the party for the Executive branch to maximize his utility. In equilibrium, he casts his vote for the proposer from the party which his bliss point $\tilde{\tau}$ is closer to. Recall that since the proposer's ideology is fixed at the party mean (no variation), a Democratic proposer's bliss point is $-\alpha$ whereas a Republican proposer's bliss point is α. This implies that he votes for party D for the Executive position whenever $\tilde{\tau} \leq 0$ and votes for party R whenever $\tilde{\tau} > 0$. Proposition 1 characterizes all possible equilibria.

Proposition 1. *Without checks and balances* ($\mathbb{V}$ =0), *the equilibrium when the voter is uncertain about the Legislature's ideology is given by:*

$$\{E_0^*, L_0^*, \hat{\tau}_0^*(\tilde{\tau}^p), d_0^*(\tilde{\tau}^c, \hat{\tau})\} = \begin{cases} \{D, L_0, \tilde{\tau}^p, d_0\} & if \quad \tilde{\tau} \leq 0 \\ \{R, L_0, \tilde{\tau}^p, d_0\} & if \quad \tilde{\tau} > 0 \end{cases}$$

for any $L_0 \in \{D, R\}$ *and* $d_0 \in \{a, b\}$.

Proof. In text. □

The representative voter's pre-election expected welfare in equilibrium is given by:

$$EV_{\mathbb{V}=0}(\tau^*, \tilde{\tau}) = \begin{cases} -(\alpha + \tilde{\tau})^2 & if \quad \tilde{\tau} \leq 0 \\ -(\alpha - \tilde{\tau})^2 & if \quad \tilde{\tau} > 0 \end{cases} \tag{12}$$

3.4.2 Checks and Balances ($\mathbb{V} = 1$)

When CBs are present, the Legislature's problem becomes non-trivial. Specifically, the outcome depends on whether the checker chooses to exercise his veto rights. Due to the symmetry of the model, I can without loss of generality focus on status quo policies that are on the left of the spectrum, i.e. $S \leq 0$. All results presented in this chapter holds for $S > 0$ when the parameters are flipped around 0. I first provide a general characterization of equilibrium policies that may arise when there is one-sided variation in the checker's preferred policy and then discuss each case in greater detail.

The checker's problem trivial. He simply accepts the proposal $\hat{\tau}$ if it generates a higher utility to him compared to the status quo S. Given his utility function, this happens if and only if $\hat{\tau}$ lies closer to his bliss point $\tilde{\tau}^c$ compared to S. Formally, his equilibrium strategy is given as follows:

$$d_1^*(\tilde{\tau}^c, \hat{\tau}|S) = \begin{cases} a \quad if \quad |\hat{\tau} - \tilde{\tau}^c| \leq |S - \tilde{\tau}^c| \\ b \quad if \quad |\hat{\tau} - \tilde{\tau}^c| > |S - \tilde{\tau}^c| \end{cases} \tag{13}$$

Since the proposer is fully aware of the checker's preferences when he decides on a proposal, he chooses a policy that is weakly preferred by the checker over the status quo S in equilibrium.[34] As a result, 3 types of policies can be generated in the policy-making game. They are (and cases where they occur follows after):

1. **Proposer's bliss point $\tilde{\tau}^p$:** Arises when the checker's bliss point is closer to the proposer's bliss point than to S, i.e $\tilde{\tau}^c \leq \tilde{\tau}^p \leq S$ or $S \leq \tilde{\tau}^p \leq \tilde{\tau}^c$ or ($\tilde{\tau}^p \leq \tilde{\tau}^c \leq S$ and $|\tilde{\tau}^p - \tilde{\tau}^c| \leq |S - \tilde{\tau}^c|$) or ($S \leq \tilde{\tau}^c \leq \tilde{\tau}^p$ and $|\tilde{\tau}^p - \tilde{\tau}^c| \leq |S - \tilde{\tau}^c|$).

2. **Compromise policy $2\tilde{\tau}^c - S$:** Arises when the checker's bliss point is between S and the proposer's bliss point, and the checker's bliss point is closer to S than to the proposer's bliss point, i.e. ($\tilde{\tau}^p \leq \tilde{\tau}^c \leq S$ and $|\tilde{\tau}^p - \tilde{\tau}^c| > |S - \tilde{\tau}^c|$) or ($S \leq \tilde{\tau}^c \leq \tilde{\tau}^p$ and $|\tilde{\tau}^p - \tilde{\tau}^c| > |S - \tilde{\tau}^c|$).

3. **Status quo S**: Arises when S is between the checker's and the proposer's bliss point, i.e. $\tilde{\tau}^p < S < \tilde{\tau}^c$ or $\tilde{\tau}^c < S < \tilde{\tau}^p$.

Figure 3.3 provides a visualization of the cases under which each type of policy arises in equilibrium.

In case 1 above, the Executive has full reign over the policy choice since he knows that the checker will prefer his platform over the default policy S. He can then exploit the political situation and implement his preferred policy. In the rest of the cases, the relative positions of the status quo and the policy-makers' platforms forces the Executive to share political power. As a result, a compromise will be reached between

[34] There are multiple equilibria when the maintenance of the status quo S is Pareto optimal. The proposer can propose any policy that is not preferred by the checker over S and it will always be blocked, triggering the status quo S.

the branches and the resulting policy can either be the status quo S or the alternative 'compromise' policy $2\tilde{\tau}^c - S$. The latter policy occurs whenever S lies very far from the proposer's ideal policy and the checker can utilize it as a threat point. As a result, the proposer chooses the policy $2\tilde{\tau}^c - S$ which is weakly preferred by the checker over S, but is much closer to his bliss point than S is. Therefore, he is made strictly better off by proposing $2\tilde{\tau}^c - S$ than simply choosing to maintain S.[35]Note that the degree of power-sharing depends on the relative positions of both bliss points and S. If the checker refuses to accept the proposer's ideal policy (cases 2 and 3 above), the shift of power towards the checker increases as S tends towards $\tilde{\tau}^c$.

Given these proposals, the checker cannot be better off by blocking the implementation of the bills in any cases. Thus, in equilibrium, the checker will never exercise his veto rights.[36]

We are now in line to analyze the voter's optimal strategy. I split the analysis into two parts. In the next subsection, I study the case where there is complete information. That is, the exact location of the checker's bliss point is known to the voter before the election. This corresponds to reshuffling the order of events in Section 3.3.4 by swapping items #1 and #2 and the announcement is made on all candidates' (one per branch per party) ideal policies. In the subsequent section, I analyze the model with events consistent with the initial timeline listed in Section 3.3.4. Splitting up the analysis into two allows us to disentangle the effects of uncertainty and its importance on the impact of CBs on the voter's welfare.

[35]It is also true that the proposer can choose not to compromise in case 2. However, equilibrium policy outcomes will still be the same as the checker will simply exercise his veto power and this triggers the status quo. We can eliminate such concern by introducing a small $\epsilon > 0$ cost for the proposer (or both parties) if the checker chooses to block the proposal.

[36]In the model, both branches are fully aware of each others' bliss points. This mirrors the open-amendment rule where both parties bargain until a compromise is reached.

3.4.3 Checks and Balances ($\mathbb{V}$ =1) with Complete Information

As mentioned prior to this, the model that I analyze here has a different information structure than the one presented in Section 3.3.4. Specifically, the voter knows the bliss points of the candidates for each government branches prior to making a decision.[37] This implies that he would also know the resulting unique policy that will arise in equilibrium for every form of government (E_1, L_1). Recall that there are 3 different types of policies that can be implemented as listed in Section 3.4.2 (and in Figure 3.3). Further recall that under one-sided variation on the checker's ideology, a party D (R) proposer's bliss point is known to be $-\alpha$ (α) and a party D (R) checker's bliss point is distributed uniformly on $[-2\alpha, 0]$ $([0, 2\alpha])$ with its realization known since the voter has complete information. Policy outcome largely depends on the position of the status quo S. For that, I consider 3 distinct regions on S: Centrist S $(-\alpha \leq S \leq 0)$, moderate-left S $(-2\alpha \leq S < -\alpha)$, and extreme-left S $(S < -2\alpha)$. Table 3.1 show the different policies that will arise in equilibrium for all 3 cases, respectively.

In Table 3.1a, the status quo is near middle of the political spectrum. We see that the proposer is able to implement his ideal policy only under a unified government ((D,D) and (R,R)). The reason is straightforward. In a divided government setting ((D,R) or (R,D)), the status quo S lies between the proposer's and the checker's bliss point in most cases. The proposer can never propose his preferred policy as S serves as a threat point that the checker can use against the proposer by exercising his veto rights. Therefore, the proposer is pinned down to S and this effectively causes political power to be shifted from the proposer to the checker. When S is not between the bliss points, the proposer can always choose the policy $2\tilde{\tau}^c - S$ that is weakly preferred by the checker to S and yet strictly benefits himself. Under the government (D,D),

[37] Recall that each party is only allowed to field 1 candidate for each branch, so there can be at most 2 candidates running for the same seat.

the proposer holds full executive power whenever the checker lies sufficiently close to the proposer in terms of ideology. This happens when $-2\alpha \leq \tilde{\tau}^c \leq \frac{S-\alpha}{2}$. Similarly, the proposer holds full executive power under the government (R,R) whenever the checker is sufficiently right-wing ($\frac{\alpha+S}{2} \leq \tilde{\tau}^c \leq 2\alpha$).

When S is moderate and not too far left from the Democratic proposer's bliss point, i.e. $-2\alpha \leq S < -\alpha$ (Table 3.1b), we see that the proposer can hold full executive power in all forms of government. A Republican checker always prefers the proposer's bliss point policy over S regardless of which party the proposer originates from. In contrast to the previous case ($-\alpha \leq S \leq 0$), the status quo S now loses its effectiveness as a threat point as it is more left-wing than a Democratic proposer. Therefore, there will be no power sharing in the case where the voter selects a Republican checker.

As S moves further to the left on the spectrum and becomes extreme, i.e. case in Table 3.1c ($S < -2\alpha$), power sharing effectively disappears and CBs become irrelevant. A checker from party D will even choose to accept a right-wing policy if S is too extreme ($S < -5\alpha$).

Voter's Optimal Strategy and Welfare Comparison between States

To simplify the analysis and exposition, I assume that $\tilde{\tau}^c_D = -\tilde{\tau}^c_R$ so that a Democratic checker's bliss point is always symmetric to a Republican checker's bliss point around 0. The voter's problem is to select a form of government (E_1, L_1) to maximize his utility. Given that there is no uncertainty in the candidates' bliss points, this amounts to selecting the optimal policy. Since there is a 1-1 mapping from government to policy type as shown in Table 3.1, the voter prefers the government (e, l) over (e', l') if his bliss point $\tilde{\tau}$ lies closer to the policy that arises under (e, l) than the policy that arises under (e', l'). Formally, let $\tau(e, l)$ and $\tau(e', l')$ denote the unique policy under governments (e, l) and (e', l') respectively. The voter then prefers (e, l) if $\tilde{\tau}$ lies on the same side of the spectrum as $\tau(e, l)$ where the policy space is divided into 2 regions by the midpoint policy $\frac{\tau(e,l)+\tau(e',l')}{2}$.

The voter's equilibrium strategy is characterized as follows: Let $(\tau_1, ..., \tau_k)$ be the sorted (from left to right) vector of distinct policies that arise under all forms of government (E_1, L_1) for given (known) values of S, $\tilde{\tau}_D^c$, and $\tilde{\tau}_R^c = -\tilde{\tau}_D^c$, and where $2 \leq k \leq 4$ ($k = 2$ when proposer holds full power regardless of the structure of government and k=4 when policies are all different for every form of government). Define the $k+1$ vector of midpoints as $(m_{0,}m_1, ..., m_{k-1}, m_k)$ where $m_0 = -\infty$, $m_j = \frac{\tau_j+\tau_{j+1}}{2}$ for $j = 1, ...k-1$, and $m_k = \infty$. The proposer then selects the government which gives rise to τ_j if and only if his bliss point $m_{j-1} < \tilde{\tau} < m_j$ where $j = 1, ...k$.

As an example, consider the case where $S \in [-\alpha, 0]$ (see Table 3.1a), $\tilde{\tau}_D^c \in [-2\alpha, \frac{S-\alpha}{2}]$ and $\tilde{\tau}_R^c = -\tilde{\tau}_D^c \in [\frac{\alpha-S}{2}, 2\alpha]$. There are $k = 3$ distinct policies that can arise: $\tau_1 = -\alpha$ from (D,D), $\tau_2 = S$ from (D,R) or (R,D), and $\tau_3 = \alpha$ from (R,R). In equilibrium, the voter casts his vote for (D,D) if and only if his bliss point $\tilde{\tau} < m_1 = \frac{S-\alpha}{2}$, (D,R) or (R,D) iff $m_1 \leq \tilde{\tau} \leq m_2 = \frac{S+\alpha}{2}$, and (R,R) iff $\tilde{\tau} > m_2$.

Proposition 2 compares the representative voter's welfare between the two states $\mathbb{V}$ =0 (no CBs) and $\mathbb{V}$ =1 (CBs) when there is complete information.

Proposition 2. *Under one-sided variation in checker's ideal policy and complete information:*

1. *Checks and balances strictly reduce voter's welfare only if* ***S is centrist*** $(-\alpha \leq S \leq 0)$*. In particular, the voter is strictly hurt by CBs under the government (D,D) when the voter is far-left* ($\tilde{\tau} < \frac{\tau(D,D)-\alpha}{2}$*, where* $\tau(D,D)$ *is the equilibrium policy under (D,D)) and when the checker is moderate* ($\tilde{\tau}_D^c \in [\frac{S-\alpha}{2}, 0]$ *and* $\tilde{\tau}_R^c = -\tilde{\tau}_D^c \in [0, \frac{\alpha-S}{2}]$)*. The voter is strictly hurt by CBs under the government (R,R) when the voter is far-right* ($\tilde{\tau} > \frac{\tau(R,R)+\alpha}{2}$*, where* $\tau(R,R)$ *is the equilibrium policy under (R,R)) and the checker is a centrist* ($\tilde{\tau}_D^c \in [max\{-\frac{\alpha+S}{2}, S\}, 0]$ *and* $\tilde{\tau}_R^c = -\tilde{\tau}_D^c$)*. For all other cases, CBs weakly increase voter's welfare when S is centrist.*

2. *Checks and balances weakly increases voter's welfare if* ***S is sufficiently extreme*** $(S < -\alpha)$.

The results are symmetric for $S > 0$.

Proof. See Appendix. □

The general idea that drives the result above is that equilibrium policies may differ depending on the location of S when blocking rights are assigned to the checker. In the first case where S is near middle, centrist voters (voters with ideology close to 0) benefits from the maintenance of S. On the other hand, far-left voters will suffer as the presence of a checker with veto power effectively drives the policy closer towards the center. In other words, a Democratic proposer who initially has full executive power under the state where there is no CBs ($\mathbb{V}$ =0) is now forced to share power and reach a compromise with the checker who is more moderate than himself. This results in the decrease in welfare of a far-left voter. Similarly, a far-right voter will also be hurt by the system of CBs if the Republican checker is a centrist due to the same compromise effect that works against him.

When S is more extreme than a Democratic proposer, maintenance of the status quo now works in favor of the far-left voters who were hurt under a more moderate S. This group of voters would benefit from the assignment of veto power to the checker whose ideal policy is closer to theirs as this allows the selection of a government that gives rise to extreme policies. On the broader picture, all voters will never be hurt by CBs because there always exist a choice for them to select a government under CBs that perfectly mimics the system without CBs. Referring back to Table 3.1b, the divided government (D,R) under CBs is identical to that of a Democratic proposer under no CBs. Similarly, the unified government (R,R) under CBs mimics the case of a Republican proposer without CBs. Note that this is solely due to the location of the status quo policy which now loses its effectiveness as a threat point. As a result, the checker is unable to control the proposer and the Executive has free reign over policy outcomes.

3.4.4 Checks and Balances ($\mathbb{V}$ =1) with One-sided Uncertainty on Checker's Bliss Point

I now relax the assumption that the identity of the candidates are known before the election. The difference between this model and the one in Section 3.4.3 is the reversion of the sequence of events (and hence, the information structure) to that listed in Section 3.3.4. Given that there is no variation in the proposer's bliss point, the voter is able to perfectly pinpoint his ideal policy ($-\alpha$ for a Democratic proposer and α for a Republican proposer). Also, recall that a Democratic (Republican) checker's ideal policy is distributed uniformly on $[-2\alpha, 0]$ ($[0, 2\alpha]$). In this section, I compare the expected welfare of a voter under the government without CBs ($\mathbb{V}$ =0) and under the system with CBs ($\mathbb{V} = 1$) when the representative voter is uncertain about the checker's bliss point prior to electing a government. At the end of the section, I disentangle the effects of assigning veto rights to a decision-maker and the effect of uncertainty on the voter's expected welfare by comparing the implications of CBs across the two models with different information structure. This enables us to understand the importance of ideological uncertainty on the effectiveness of CBs.

Policies that will be implemented in equilibrium (once uncertainty is resolved), is identical to that given in Table 3.1. Therefore, it is one again convenient to split the values of S into 2 broad categories: Centrist status quo ($-\alpha \leq S \leq 0$) and left-wing status quo ($S < -\alpha$).

Centrist status quo ($-\alpha \leq S \leq 0$)

A rational voter computes his expected welfare under each case and chooses the optimal form of government (E_1^*, L_1^*) consistent with (9). Define $\bar{\tau}_{e,l}^{e',l'}$ as the ideology of a voter who is indifferent between forms of government (e, l) and (e', l'), for $(e,l),(e',l') \in \{(D,D),(D,R),(R,D),(R,R)\}$ and $(e,l) \neq (e',l')$.[38] The voter's equilibrium strategy can then be characterized by 3 cutoffs: $\bar{\tau}^{D,R}_{D,D}$, $\bar{\tau}^{R,D}_{D,R}$, and $\bar{\tau}^{R,R}_{R,D}$, where:

$$(E_1^*, L_1^*) = \begin{cases} (D,D) & if \quad \tilde{\tau} \leq \bar{\tau}^{D,R}_{D,D} \\ (D,R) & if \quad \bar{\tau}^{D,R}_{D,D}, < \tilde{\tau} \leq \bar{\tau}^{R,D}_{D,R} \\ (R,D) & if \quad \bar{\tau}^{R,D}_{D,R}, < \tilde{\tau} \leq \bar{\tau}^{R,R}_{R,D} \\ (R,R) & if \quad \tilde{\tau} > \bar{\tau}^{R,R}_{R,D} \end{cases} \tag{14}$$

The closed form of each cut points is given in the Appendix. Proposition 3 characterizes the equilibrium of the game for a centrist S. All results are flipped (including the diagram in Figure 3.4) for $S > 0$.

Proposition 3. *When there is uncertainty on the checker's bliss point and when the status quo is near the center* $(-\alpha \leq S \leq 0)$*, the vector of optimal proposal* $\hat{\tau}_1^*(\tilde{\tau}^c|S,\tilde{\tau}^p)$ *given in Table 3.1a, the checker's veto decision* $d_1^*(\tilde{\tau}^c,\hat{\tau}|S)$ *given in* (13) *and the voter's choice* (E_1^*, L_1^*) *given in* (14) *constitute an equilibrium of the game. Results are symmetric for* $0 \leq S \leq -\alpha$.

Proof. See Appendix. □

Figure 3.4 shows the different forms of government that are chosen by the voter. The next result compares the expected voter welfare across both systems–with and without CBs when S is near the middle.

Proposition 4. *When there is uncertainty on the checker's bliss point and when the status quo is centrist* $(-\alpha \leq S \leq 0)$*, checks and balances strictly hurts the voter on average if he is an extremist* $(\tilde{\tau} < \bar{\tau}^{D_{no\,CBs}}_{D,D}$ *or* $\tilde{\tau} > \bar{\tau}^{R_{no\ CBs}}_{R,R})$ *, and strictly benefits the voter on average if he is a moderate* $(\bar{\tau}^{D_{no\,CBs}}_{D,D} \leq \tilde{\tau} \leq \bar{\tau}^{R,R}_{R,D})$*. Results are symmetric for* $0 \leq S \leq -\alpha$.

[38] As a technical note, $(e,l) \neq (e',l')$ if $e \neq e'$ or $l \neq l'$ or both are simultaneously unequal. Also note that $\bar{\tau}^{e',l'}_{e,l} = \bar{\tau}^{e,l}_{e',l'}$.

Proof. See Appendix. □

This result and the different regions are made clear in Figure 3.4. To see why CBs strictly hurt the extremists, we need to understand how the system changes policy outcomes. In the first double-lined region where the voter is left-wing ($\tilde{\tau} < \bar{\tau}_{D,D}^{D_{no\ CBs}}$), party D wins both the Executive and the Legislative branches. Although both proposer and checker are from the same political party, a center-left status quo means that there are possibilities where both sides will be in disagreement with each other over the policy choice. This effectively creates a shift in power from the Executive to the Legislature and results in policy moderation.[39] The extremists are hurt because the status quo is now further away from their ideal policy compared to the proposer's platform $-\alpha$. This group of voters would prefer full executive power for party D, as in the case of no CBs, but the position of the status quo means that this cannot be achieved in any form of government when there are CBs. A similar reasoning applies to the case where the voter is extreme-right whose ideal policy is located within the second double-lined region ($\tilde{\tau} > \bar{\tau}_{R,R}^{R_{no\ CBs}}$). Under the unified government (R,R), a checker who is moderately right-wing prefers S over the proposer's policy α since S is located close to 0. Once again, CBs allocates power to the checker which forces the proposer to choose a more moderate policy in order to reach mutual agreement on policy outcomes. Since these situations occur with positive probability, the extremist voters are hurt in expectation by the resulting policy moderation.

The voters who benefit from the system of CBs are those with bliss points close to the middle of the spectrum ($\bar{\tau}_{D,D}^{D_{no\ CBs}} \leq \tilde{\tau} \leq \bar{\tau}_{R,R}^{R_{no\ CBs}}$). This group of voters is represented by the solid-lined region in Figure 3.4. All forms of government–DD, DR, RD and RR result in the policies that lie closer towards the middle of the spectrum

[39]Recall that a Democratic checker's bliss point is uniformly distribution on $[-2\alpha, 0]$ so S will lie in the middle of the proposer's and the checker's preferred policy if $S < \tilde{\tau}^c \leq 0$.

for certain range of the checker's platform (see Table 3.1a for such policies). Therefore on expectation, policy moderation due to CBs works in favor of centrist voters.

Left-wing status quo ($S < -\alpha$)

When the status quo is more left-wing than a Democratic proposer ($S < -\alpha$), the effect of policy moderation diminishes. The left-wing voters who were hurt by the system of CBs under a centrist status quo ($-\alpha \leq S \leq 0$) will now benefit from the implementation of a more extreme status quo policy.

Proposition 5. *When there is uncertainty on the checker's bliss point and when the status quo is sufficiently left wing* ($S < -\alpha$)*, checks and balances is weakly beneficial to all voters on average.*

Proof. In text. □

The intuition is straightforward. When the status quo is extreme, a change is highly desirable. Thus, having a checker in most cases does not alter the distribution of political power. The proposer who holds absolute power in these situations will implement his bliss point without fear of being blocked by the checker.

A key to understanding the welfare implications of checks and balances in this case lies in the alignment of interests between the proposer and the checker. Consider the divided government (D,R) where the Executive branch is controlled by party D and the Legislative branch is controlled by party R. When the status quo is more extreme than that of a Democratic proposer ($S < -\alpha$), a Republican checker will always agree on a change in the default policy as long as the bill is to the right of S.[40] Hence, the proposer can implement his bliss point $-\alpha$ and it will not be blocked by the Republican checker. In equilibrium, there will be no conflict of interest between government branches in the divided government (D,R).

[40] Recall that a checker from party R always has platform to the right of 0.

This important observation implies that the voter can always provide the Democratic party full executive power by choosing (D,R), which isn't possible when the status quo is center left. Moreover, note that he can choose to give the Republican party full power by selecting (R,R). Coincidentally, these two forms of government have the same welfare implications as a voter who prefers a Democratic proposer and a Republican proposer under no CBs ($\mathbb{V} = 0$) respectively. Since there is always a mechanism in which the voter can achieve identical levels of utility across the two systems, he can never be worse off.

The benefits of such a system, then rely on the existence of conflict of interest and hence, the degree of power sharing between both branches of government. If the status quo is not too extreme, i.e $-2\alpha \leq S < -\alpha$, there will be a shift in proposal power in the unified government (D,D). Very left wing voters (extremists) will benefit from having a checker since this encourages the maintenance of the status quo. However, as S becomes more extreme, i.e. moves further to the left on the political spectrum, the degree of power shift decreases as there will be less conflict of interest. The Executive will once again have full political power and the benefits of CBs disappear.

Combining the results, we get the following Corollary.

Corollary 1. *When there is uncertainty on the Legislature's ideology, CBs strictly hurt the voters on average only if the status quo lies between the Democratic Executive's and the Republican Executive's bliss points, i.e.* $\tilde{\tau}_D^p < S < \tilde{\tau}_R^p$.

Proof. Follows directly from Propositions 4 and 5, and the symmetry of the model. □

As noted before, moderate status quo induces an effective shift in power and extremists voters will suffer from increased policy moderation.

3.4.5 Disentangling the Effects of Uncertainty and Veto Power on Voter Welfare

With one-sided uncertainty on the checker's ideology, I have shown that the system of CBs negatively affects voters who are extremists when the status quo S is moderate. In all other cases, CBs weakly benefits the voter. However, it remains unclear whether these effects are due to assigning veto power to a decision-maker or that it is coming from the voter's uncertainty about the checker's bliss point. In order to separate these effects, I compare the expected welfare of a voter in Section 3.4.3 where information is complete and in Section 3.4.4 where there is uncertainty on the checker's bliss point. I can then conclude that the difference in welfare is solely due to the uncertainty effect. Figure 3.5 summarizes the basic idea and Proposition 6 provides a necessary condition under which the uncertainty effect lowers the voter's expected welfare for moderate S and when the degree of ideological extremism of representatives from both parties are identical, i.e. $\tilde{\tau}_D^c = -\tilde{\tau}_R^c$. Once again, all results are hold and are symmetric around 0 when $S > 0$.

Proposition 6. *When the status quo S is moderate ($-\alpha \leq S \leq 0$) and the checkers' bliss points are symmetric around 0 ($\tilde{\tau}_D^c = -\tilde{\tau}_R^c$), uncertainty on the checker's bliss point decreases voter's expected welfare only if the closest checker's bliss point under complete information is not too far from the voter's most preferred policy $\tilde{\tau}$ (refer to the Appendix for the cutoff distance).*

Proof. See Appendix. □

Under complete information, the voter is essentially selecting the actual policy when choosing the government. However, when the voter is uncertain about the position of the checker's bliss point, he assigns probability weights to the set of policies that could arise under each potential checker when computing his expected utility. Therefore, the effect of uncertainty on the voter's expected welfare depends on two channels: the manner in which the weights are distributed across potential policies in a given form of government and the distance of each policy from the voter's ideal point.

Proposition 6 provides a big picture of when uncertainty on the checker's bliss point negatively affects the voter. This occurs only when the voter is sufficiently satisfied with the policy outcome under complete information and uncertainty forces the redistribution of the probability weights from this policy to alternative policies which he dislike. Therefore, when he knows that checker's preferences is very much aligned with his preferences, i.e $\tilde{\tau}^c$ close to $\tilde{\tau}$, electing the checker will most likely lead to a policy closer to the voter's bliss point. Removing this information leaves the voter in the dark as he is now unsure about the actual policy that will be implemented. Therefore, when a representative whose bliss point is much further away to $\tilde{\tau}$ is elected as the checker, this might result in a policy that is also further away from $\tilde{\tau}$ and the voter is hurt by this uncertainty.

An example will perhaps help in illustrating this point. Consider the case where under complete information, the Democratic checker is the most extreme representative from party D, i.e. $\tilde{\tau}^c_D = -2\alpha$. Under the unified government (D,D), the proposer holds full power and implements his ideal policy $-\alpha$ since S lies to the right of $-\alpha$. When $\tilde{\tau}^c_D$ is unknown, the probability weights are distributed among all 3 policy types (see Table 3.1a). Note that both the status quo S and the compromise policy $2\tilde{\tau}^c - S$ are closer to 0 than $-\alpha$ is. For sufficiently extreme voters with bliss point $\tilde{\tau} < \bar{\tau}^{D_{no}\,CBs}_{D,D}$ (where $-\alpha < \bar{\tau}^{D_{no}\,CBs}_{D,D}$, see Figure 3.4), the redistribution of probability weights reduces their expected utility because these policies lie further away from their bliss point.

In contrast with the effects of veto power, uncertainty on the checker's bliss point can also decrease the expected welfare of a moderate voter. This occurs whenever a centrist compromise policy is reached under complete information but under incomplete information, a more extreme policy that lies further from $\tilde{\tau}$ (for instance, the proposer's bliss point whenever he holds full executive power) can arise under the same form of government. However, from Proposition 4, we see that the benefits of assigning a veto player in the decision-making game outweighs the costs of uncertainty on the moderate voter's expected welfare, so that they weakly benefit from CBs.

The next result ties down the effect of uncertainty when S is more extreme.

Proposition 7. *When the status quo S is left-wing ($S < -\alpha$), the cost of uncertainty on the checker's bliss point, if any, is less than the benefits of the inclusion of veto power to the checker.*

Proof. Comparing the results in Proposition 2 and 5, we see that the voter will never be hurt even after uncertainty is introduced on the checker's side. □

As S moves further to the left ($S < -\alpha$), the maintenance of status quo is now preferred by far-left voters. They are hurt when uncertainty is introduce precisely because of the redistribution of probability weights to more moderate policies when computing expectations. However, the overall effect points towards the direction of increased welfare because the allocation of veto rights allow the implementation of a more extreme policy (S) which would otherwise not be possible if the proposer holds full power. Uncertainty merely dampens the degree of benefits of the system but is not sufficient to drive it in the opposite direction.

3.4.6 Discussion

A necessary condition for CBs to affect the representative voter's welfare is that conflict of interest between the Executive and the Legislative branch must exist. This result is in line with Krehbiel (1996) where he notes that the distinction between unified and divided government does not give rise to political gridlocks. Moreover, the founding fathers of the U.S. did not include the system of CBs as a mean to control the Democrats and the Republicans. Rather, its main purpose is to act as a mechanism which provides government branches means to prevent each other from taking selfish political actions.

When voters are uncertain about the political stand or decisions that will be taken by the veto player prior to electing him, they face a non-trivial problem in trying to balance the stability of policies (uncertainty effect) and the positions of the policies relative to their preferred point (veto effect). These two effects in turn depends crucially on the position of the status quo relatively to the proposer's and the checker's ideal policies. Hence, the differential voter welfare as a result of CBs lies in the position of the status quo, not the competition between political parties.

3.5 One-Sided Variation on Proposer's Ideology

Reversing the channel of variation, I now analyze the model where the checker's bliss point is fixed at the party mean but the proposer's bliss point is allowed to vary. Recall that the bliss point for a proposer from party D (R) is now drawn from the Uniform distribution $U[-2\alpha, 0]$ ($U[0, 2\alpha]$) whereas the bliss point for a checker from party D (R) is known to be located at the party mean $-\alpha$ (α).

3.5.1 No Checks and Balances ($\mathbb{V}$ =0) with Asymmetric Information on Proposer's Ideology

Without CBs, the problem for the voter is to select the optimal party that holds proposal power. Before this, when the sole variation in ideology is on the checker's side, uncertainty plays no role when there is no CBs because the checker's decision is irrelevant in policy making. However, when the voter is unsure about the proposer's ideology, his decision is based on the *expected* policy that arises under each party, not the actual policy. Hence, the difference in results in this model from that in Section 3.4 (when the uncertainty is on the checker's ideal policy) is an additional term in voter's expected utility$-\frac{\alpha^2}{3}$, which captures the utility loss due to the uncertainty in policy outcome. The equilibrium strategy is identical to that given in Proposition 1.

Proposition 8. *Without checks and balances* ($\mathbb{V}=0$)*, the equilibrium when the voter is uncertain about the Executive's platform is given by:*

$$\{E_0^*, L_0^*, \hat{\tau}_0^*(\tilde{\tau}^p), d_0^*(\tilde{\tau}^c, \hat{\tau})\} = \begin{cases} \{D, L_0, \tilde{\tau}^p, d_0\} & if \quad \tilde{\tau} \leq 0 \\ \{R, L_0, \tilde{\tau}^p, d_0\} & if \quad \tilde{\tau} > 0 \end{cases}$$

for any $L_0 \in \{D, R\}$ *and* $d_0 \in \{a, b\}$.

Proof. Identical to proof of Proposition 1. □

The representative voter's pre-election expected welfare in equilibrium is given by:

$$EV_{\mathbb{V}=0}(\tau^*, \tilde{\tau}) = \begin{cases} -(\alpha + \tilde{\tau})^2 - \frac{\alpha^2}{3} & if \quad \tilde{\tau} \leq 0 \\ -(\alpha - \tilde{\tau})^2 - \frac{\alpha^2}{3} & if \quad \tilde{\tau} > 0 \end{cases} \tag{15}$$

3.5.2 Checks and Balances ($\mathbb{V}=1$) with Complete Information

Once again, the symmetry of the model buys us no loss of generality in analyzing the model where the status quo policy is on the left half of the political spectrum, i.e. $S \leq 0$. I first start with analyzing the model where the realization of the candidates' bliss points are publicly announced before the election. In this model, the same 3 types of policies listed in Section 3.4.2 may arise in equilibrium. They are: the proposer's bliss point $\tilde{\tau}^p$ which can now vary, the status quo S, and the compromise policy $2\tilde{\tau}^c - S$.

Similarly, the checker will never exercise his veto rights in equilibrium because he gains nothing by triggering the status quo. We split the values of S into 3 separate regions. Table 3.2a characterizes the types of policies that arise in equilibrium when

S is center-left ($-\alpha \leq S \leq 0$), while Tables 3.2b and 3.2c look at the case where S is moderate-left ($-2\alpha \leq S < -\alpha$) and extreme left ($S < -2\alpha$) respectively.

Comparing the policies across Tables 3.1 and 3.2, both models share a common feature that CBs loses its effectiveness of controlling the proposer as S becomes more extreme. Furthermore with the checker's bliss point now fixed at the party mean, the proposer is able to retain its political power much easier since he knows that there won't be an extreme checker who can block his policies.

One important feature of the equilibrium policies worth mentioning is that certain forms of government produce identical policies under different values of S. For example, consider the policies that arise under the divided government (R,D) when S is centrist (Table 3.2a) and when S is moderate left (Table 3.2b). In the former case, the status quo S is maintained. In the latter case, the proposer and checker reaches a compromise and implements the policy $-2\alpha - S$. Although these two policies look different at face value, they are in fact the same (with the exact same location on the spectrum) when S is chosen appropriately under both cases. To see this, choose any centrist S from the interval [$-\alpha$,0]. Next, select an $S' = -2\alpha - S \in [-2\alpha, -\alpha]$ to be the moderate left status quo. In the latter case, the policy that arises in equilibrium is a result of the compromise between the government branches, $-2\alpha - S'$. Rewriting what this policy in terms of S, we get that $-2\alpha - S' = S$, so the implemented policy under both cases are in fact identical. This happens because the proposer (from party R) never gets full power in the divided government (R,D) and hence chooses a policy that is closest to his preferred point. This policy will always be weakly preferred by the Democratic checker over the threat point S. Therefore, for every value of a centrist S (in $[-\alpha, 0]$), there exists a unique moderate-left S' (in $[-2\alpha, -\alpha]$) where (R,D) gives rise to the same policy under both status quo. In particular, S' is the policy that is symmetric to S around the checker's bliss point. Similarly, one could also show that (D,D) shares this same feature. This observation is important in explaining the results when the voter elects the government prior to learning the proposer's ideology, which we analyze in Section 3.5.3.

The characterization of the voter's equilibrium strategy is identical to that in Section 3.4.3 and I omit the details here. The next result compares the representative voter's welfare across the two states $\mathbb{V}=0$ (no CBs) and $\mathbb{V}=1$ (CBs) when information is complete.

Proposition 9. *Under one-sided variation in proposer's ideal policy and complete information, checks and balances strictly hurt the representative voter if and only if he is sufficiently left-wing ($\tilde{\tau} < \frac{\tau(D,D)+\tilde{\tau}^p_D}{2}$, where $\tau(D,D)$ is the equilibrium policy under government (D,D)), the proposer is sufficiently extreme ($\tilde{\tau}^p_D \in [-2\alpha, min\{S, -2\alpha - S\}]$ and the status quo is moderate ($S \in [-2\alpha, 0]$). For all other cases, checks and balances weakly benefits the voter. The result is symmetric for $S > 0$.*

Checks and balances induce power sharing between the government branches when the status quo is moderate and the proposer's bliss point is far away from the checker's ideal policy. As a result, the extremist proposer is forced to implement a more moderate policy which hurts a voter who is far-left. For all other cases, there exists at least a form of government that gives the proposer full power which mimics the system where CBs are absent. Hence, the voter cannot be worse off.

One notable difference between the results in Proposition 2 (when the variation is on the checker's ideology) and 9 is that far-right voters are no longer hurt by CBs when ideological variation is on the proposer's side. This group of voters would choose (R,R) in equilibrium in both scenarios and the difference in voter welfare is due to fixed ideological extremeness of the checker in the latter case. Put it differently, a Republican checker is known to be moderate-right (with bliss point at α) when there is no variation in her preferences and she will always prefer a right-wing policy implemented by the Republican proposer over the left-wing status quo. This means that the proposer has relatively free reign over policy outcome in this scenario. This, however, is not true when the checker is a centrist (when her ideology can vary). Under certain cases, the left-wing status quo will be maintained and far-right voters will suffer.

3.5.3 Checks and Balances ($\mathbb{V}$ =1) with One-Sided Uncertainty on Proposer's Bliss Point

I now study the case where the voter is uncertain about the proposer's preferred policy prior to selecting a government. Since there is no variation in the checker's bliss point, it is known to the voter that a Democratic (Republican) checker's most preferred policy is $-\alpha$ (α). On the other hand, he only knows that a Democratic (Republican) proposer's bliss point is distributed uniformly on $[-2\alpha, 0]$ ($[0, 2\alpha]$). Following the same structure of Section 3.4.3, I first present welfare results of this model and then separate the effects of veto power and uncertainty towards the end.

Policies that arise when uncertainty on the proposer's bliss point is added to the model do not change and are identical to the cases given in Table 3.2. Once again, it is convenient to split the range of S into 3 distinct regions: Centrist status quo ($-\alpha \leq S \leq 0$), moderate-left status quo ($-2\alpha \leq S < -\alpha$) and far-left status quo ($S < -2\alpha$).

Centrist Status Quo ($-\alpha \leq S \leq 0$)

If the status quo is centrist, we know from previous results that there will be power sharing between government branches in most cases.[41]

Taking the equilibrium outcomes as given, a rational voter solves (9) and we obtain

[41] The exception is the Republican unified government where all political power rests on the Executive branch. This is due to our assumption that the status quo S is left-wing, i.e. $S \leq 0$.

the following optimal forms of government:

$$(E_1^*, L_1^*) = \begin{cases} (D,D) & if \quad \tilde{\tau} \leq \bar{\tau}_{D,D}^{R,D} \\ (R,D) & if \quad \bar{\tau}_{D,D}^{R,D} < \tilde{\tau} \leq \bar{\tau}_{R,D}^{D,R} \\ (D,R) & if \quad \bar{\tau}_{R,D}^{D,R} < \tilde{\tau} \leq \bar{\tau}_{D,R}^{R,R} \\ (R,R) & if \quad \tilde{\tau} > \bar{\tau}_{D,R}^{R,R} \end{cases} \tag{16}$$

Interestingly, left-wing voters will prefer a divided government with a Republican Executive over a divided government with a Democratic Executive. The reasoning lies entirely within the policy outcomes in each form of divided government. Referring to table 3.2a, the status quo will always be maintained in (R,D) independent of the proposer's platform. The reason its that the Democratic checker will never accept a right-wing policy given that the default policy S is closer to her bliss point. On the other hand, the (D,R) government allows cases where the Executive holds full proposal power. This happens whenever the status quo lies to the left of the proposer's bliss point, $\tilde{\tau}_D^p$. Given that this only occurs when the proposer is a centrist, the expected policy when the Executive holds full power will be closer to the middle than S is. Therefore, a left-wing voter would rather go with (R,D) as it generates less policy moderation. The equilibrium of the game is given in Proposition 10.

Proposition 10. *When there is uncertainty on the proposer's platform and when the status quo is near the center of the political spectrum* ($-\alpha \leq S \leq 0$), *the vector of optimal proposal* $\hat{\tau}_1^*(\tilde{\tau}^c|S, \tilde{\tau}^p)$ *given in Table 3.2a, the checker's veto decision* $d_1^*(\tilde{\tau}^c, \hat{\tau}|S)$ *given by* (13)*, and the voter's choice* (E_1^*, L_1^*) *given in* (16) *constitute an equilibrium of the game. The result is symmetric for* $S > 0$.

Figure 3.6 shows the equilibrium forms of government. The next result gives us the welfare comparison between both systems–with and without CBs when the status quo S is near middle.

Proposition 11. *When there is uncertainty on the proposer's preferred policy and when the status quo is centrist* ($-\alpha \leq S \leq 0$), *checks and balances is weakly beneficial to all voters on average.*

Proof. See Appendix. □

To help in the exposition of these results, I isolate the effects of uncertainty on the proposer's bliss point on extremist voters when CBs are present.

Corollary 2. *When the status quo is near center* ($-\alpha \leq S \leq 0$), *one-sided uncertainty on the proposer's bliss point increases the expected welfare of a far-left voter* ($\tilde{\tau} < \bar{\tau}_{D,D}^{D_{no\,CBs}}$) *when checks and balances are present.*

Proof. Direct comparison of Proposition 9 and 11. □

Proposition 11 and Corollary 2 imply that the uncertainty effect eliminates regions where a far-left voter is strictly hurt by CBs under complete information. To understand why ideological uncertainty on the proposer benefits this group of voters, we need to consider 2 channels. The first is the utility loss due to uncertainty in policy outcomes (a term similar to $-\frac{\alpha^2}{3}$ in (15)) which uniformly decreases *every* voter's expected welfare. The second channel is the redistribution of probability weights towards policies that can potentially rise under a given form of government. If sufficient weights are transferred to a policy that lies closer to the voter's bliss point, then the benefits of the second channel outweighs the cost of policy uncertainty. For example, consider the case where the voter is far-left with bliss point $\tilde{\tau} = -2\alpha$ and when the status quo is in $[-2\alpha, -\alpha]$. Referring back to Proposition 9, he is hurt by the system of CBs under complete information if the proposer is sufficiently left-wing ($\tilde{\tau}^p < S$). The happens because the allocation of veto rights to the checker forces the proposer to maintain the status quo, which by construction, is more moderate than $-2\alpha = \tilde{\tau}_D^p$. Once uncertainty on the proposer's ideology is introduced, the voter suffers from an immediate decrease in expected utility due to policy uncertainty when there is no

CBs. Granting veto rights to the checker helps ameliorate the degree of uncertainty. Moreover, this voter further gains from the possibility that a more extreme policy (S) than $-\alpha$ is implemented. Together, these two effects act in a way that net effect of CBs with uncertainty on proposer's ideology is a weak improvement over all citizens' expected welfare.

Moderate Left Status Quo $(-2\alpha \leq S < -\alpha)$

For status quo that are moderately left, or more precisely, more left-wing than the Democratic checker (with ideal policy $-\alpha$), most of the equilibrium outcomes will be identical to that under a centrist S.

As noted in Section 3.5.2, the compromise policy $2\tilde{\tau}^c - S$ and the status quo S are always symmetric around the checker's platform. For governments (D,D) and (R,D), although there exists a technical difference in terms of types of policies that may arise when S is centrist and when S is moderate left, this difference has no real effect on the voter's expected welfare. Put it differently, for every S in $[-\alpha, 0]$, there is a unique S' in $[-2\alpha, -\alpha]$ such that the policy outcome under the governments (D,D) or (R,D) is identical under both status quo. Furthermore, the proposer always holds full power in (R,R) regardless of the position of S. Hence, there exists no real differences in expected utility of the voter for all 3 forms of government (D,D), (R,D) and (R,R) under a centrist S and a moderate-left S.

Proposition 12. *When there is uncertainty on the proposer's bliss point and when the status quo is moderately left* $(-2\alpha \leq S < -\alpha)$, *checks and balances are weakly beneficial to all voters on average.*

Proof. See Appendix. □

Following the reasoning above, any changes in the welfare implications should all be attributed to situations where (D,R) is the optimal form government under a centrist S. First note that as S becomes more extreme, the expected utility for moderate voters decreases as S now lies further away from their ideal policies. If S is sufficiently extreme, the loss in utility is large enough such that moderate voters switch from choosing (D,R) to (R,D) since the latter implements a more moderate policy. This switch has two effects: Increased policy stability and increased policy moderation. Policies are more stable because the only type of policy that arise under (R,D) is the compromise policy $-2\alpha - S$. There is policy moderation because this policy is closer to 0 than S is. Both effects work in favor of a centrist voter hence he will be better of with CBs.

For the remaining forms of government, I have argued that expected welfare of the voter is identical to that of a more moderate S. By Proposition 11, the voters cannot be worse off under CBs.

Extreme Left Status Quo ($S < -2\alpha$)

Proposition 13. *When there is uncertainty on the proposer's bliss point and when the status quo is extreme left* ($S < -2\alpha$), *checks and balances are weakly beneficial to all voters on average.*

Proof. In text. □

The intuition for this result is straightforward. When the status quo is extreme, a change to the default policy is desirable. In most cases, the Executive holds full proposal power. The voters who benefit from CBs are the moderate voters who would choose the government (R,D) to achieve a centrist policy, provided that the status quo is not too far off from the Democratic checker's ideal policy, i.e. $S > -2\alpha - \tilde{\tau}^p$. CBs becomes irrelevant if S is too extreme, i.e. $S < -2\alpha - \tilde{\tau}^p$.

3.5.4 Discussion

Corollary 3. *When voters are uncertain about the Executive's ideology but has full information on the Legislature's bliss point, checks and balances are weakly beneficial* *to all voters on average, independent of their ideologies.*

Proof. Follows directly from Proposition 11-13 and the symmetry of the model. □

There are substantial differences of the effect of CBs across the two models with one-sided ideological variation. In particular, I find that CBs may be detrimental to the voter on average if there is heterogeneity in the Legislature's policy preferences whereas it will only benefit the voter on average if the ideological variation lies within the Executive branch, who holds proposal power. By separating out the effects of veto power and ideological uncertainty on voter's expected welfare, the channel through which CBs alter voter's welfare can be made clear. In the model where ideological uncertainty lies solely within the Legislative branch, we see that the uncertainty effect can exacerbate the negative impact CBs on extremist voters. However, when ideological uncertainty lies within the Executive branch, CBs benefit all voters on average by increasing policy stability. Put it differently, uncertainty on the proposer's ideology plays a huge role in that it enhances the effectiveness of CBs such that every citizen, regardless of his/her ideology weakly benefits from the system.

3.6 Conclusion and Further Research

By including the system of CBs when first designing the U.S. constitution, Madison hoped that it could prevent government branches' from committing selfish deeds. However, little did he know that parties might abuse this shared power. Motivated by recent events such as the impact of the 2013 government shutdown on the well-being of government employees, I seek an explanation as to why such a system performed so poorly in recent years.

Persson et al. (1997) studied a rent seeking model that does not explain why the system of CBs are bad for the public. This chapter contributes to the literature by pointing out one such reason: ideological differences across politicians. By looking at a simple model where ideology is represented as elements on the real line, I show that the inclusion of a decision-maker with veto power can hurt certain groups of voters. In particular, I find that it is the extremists who are hurt by this system when the status quo is sufficiently moderate. Furthermore, I close the gap between the details in the model and the real world by introducing one-sided uncertainty on either the checker's or the proposer's ideology, but not both. Uncertainty operates very differently across the two scenarios and have substantially different implications on voter's expected welfare. When the Legislature's ideology is unknown, the detrimental effects of CBs on the extremists might be exacerbated. However, if the uncertainty lies within the Executive branch, CBs are desirable for every voter regardless of his ideology as it increases policy stability.

Although this chapter provides an analysis of the costs and benefits of CBs in a simple framework, its predictions are not consistent with certain real world events. For example, it fails to explain why Ted Cruz, a Republic Senator for Texas so strongly opposes the Affordable Care Act which lead to the government shutdown in 2013. Supposed that the status quo, the government shutdown, is bad for a majority of the U.S citizens, why did he still remain firm in his pursuit of defunding the ACA? Therefore, I view this chapter as a first-step towards understanding these events by providing a general setup for future studies. More research has to be conducted on the effects of political polarization (and competition) and the use or misuses of veto power to generate predictions that are closer to the real world.

It is also interesting to look at the implications of the model when there is two-sided uncertainty (on each branches' preferences). We have seen that with uncertainty on the proposer's policy preference, CBs will unambiguously benefit the voters whereas it might hurt the voters if the checker's preference is unknown. The net effect of CBs is then unclear and this might lead to renewed intuition that could explain these events.

3.7 Appendices

This appendix contains proofs of Lemmas and Propositions in Chapter 3.

3.7.1 One-Sided Uncertainty on Checker's Platform

In this section, I provide proofs for Propositions 2-4 and 6.

Proposition (2). *Under one-sided variation in checker's ideal policy and complete information:*

1. *Checks and balances strictly reduce voter's welfare only if* ***S is centrist*** $(-\alpha \leq S \leq 0)$*. In particular, the voter is strictly hurt by CBs he is far-left* ($\tilde{\tau} < \frac{\tau(D,D)-\alpha}{2}$*, where* $\tau(D,D)$ *is the equilibrium policy under (D,D)) and when the checker is moderate* ($\tilde{\tau}^c_D \in [\frac{S-\alpha}{2}, 0]$ *and* $\tilde{\tau}^c_R = -\tilde{\tau}^c_D \in [0, \frac{\alpha-S}{2}]$)*. The voter is also strictly hurt by CBs when he is far-right* ($\tilde{\tau} > \frac{\tau(R,R)+\alpha}{2}$*, where* $\tau(R,R)$ *is the equilibrium policy under (R,R)) and the checker is a centrist* ($\tilde{\tau}^c_D \in [max\{-\frac{\alpha+S}{2}, S\}, 0]$ *and* $\tilde{\tau}^c_R = -\tilde{\tau}^c_D$)*. For all other cases, CBs weakly increase voter's welfare when S is centrist.*

2. *Checks and balances weakly increases voter's welfare if* ***S is sufficiently extreme*** $(S < -\alpha)$.

The results are symmetric for $S > 0$.

Proof. I first show the checks and balances cannot reduce voter welfare when it is sufficiently extreme, i.e. $S < -\alpha$. Consider the sub-case where S lies in $[-2\alpha, -\alpha)$. From Table 3.1b, the divided government (D,R) gives the Democratic proposer full power to implement his ideal policy $\tilde{\tau}^p_D = -\alpha$ even when there are CBs. Similarly, the unified government (R,R) gives rise to the Republican proposer's ideal policy $\tilde{\tau}^p_R = \alpha$ under CBs. Since these two forms of government provide full power to the proposer, the voter can always resort to choosing one of them to mimic the policy outcome under the absence of CBs. Therefore, the voter cannot be worse off under CBs. When $S < -2\alpha$, (D,R) and (R,R) are not the only forms of government which always provide the proposer with full power to implement his preferred policy, but is sufficient to guarantee that voters will not be hurt under the system of CBs.

Conversely, when $S \in [-a, 0]$, there is no form of government that always provide the proposer free reign to choose his ideal policy (refer to Table 3.1a). Therefore outcomes under CBs may be distinct from that when there are no CBs. As a result, voter's welfare might change. Thus, it is sufficient to show that there is at least one case that decreases voter welfare in order to proof the necessary condition. Suppose that $S = -\frac{\alpha}{2}$, $\tilde{\tau}_D^c = -\frac{\alpha}{3}$ and $\tilde{\tau}_R^c = \frac{\alpha}{3}$. We also know that the proposer's bliss point is located at the party mean, so $\tilde{\tau}_D^p = -\alpha$ and $\tilde{\tau}_R^p = \alpha$. Referring to Table 3.1a the policies that arise under this parameter configuration and CBs are: Status quo S under (D,D) and (D,R), the compromise policy $2\tilde{\tau}_D^c - S$ under (R,D), and the Republican proposer's bliss point α under (R,R). When there are no CBs, the Democratic proposer implements $-\alpha$ while the Republican proposer implements α. Consider the voter with bliss point $\tilde{\tau} = -\alpha$. He would be worse off under CBs as $S = -\frac{\alpha}{2}$ is further away from his ideal policy. This concludes our proof of the necessary condition.

What remains is to show the cases in #1 under which the voter is strictly hurt by CBs. I have argued previously that when $-\alpha$ and α can be achieve under certain forms of government, CBs will never reduce voter welfare. This occurs whenever $\tilde{\tau}_D^c \in [-2\alpha, \frac{S-\alpha}{2}]$ when S is centrist. Focusing on the case where the checker is moderate, i.e. $\tilde{\tau}_D^c \in (\frac{S-\alpha}{2}, 0]$ and $\tilde{\tau}_R^c = -\tilde{\tau}_D^c$, Table 3.3 shows the policy that arise under each form of government for every parameter configuration. Note that for any given set of parameter values, there are always 3 policies that arise in equilibrium. Note that the first midpoint m_1, as defined in Section 3.4.3, is always $\tilde{\tau}_D^c < 0$, whereas the second midpoint m_2 is given by $\frac{\tau(R,D)+\tau(R,R)}{2}$, where $\tau(e, l)$ denotes the equilibrium policy that arises under government (e, l).

When $S \in [-\alpha, -\frac{\alpha}{3})$ (Table 3.3a) and $\tilde{\tau}_D^c \in [\frac{S-\alpha}{2}, S]$, voters with ideal policy $\tilde{\tau} < m_1 = \tilde{\tau}_D^c$ vote for (D,D), $\tilde{\tau}_D^c < \tilde{\tau} < m_2 = \frac{S+\alpha}{2}$ vote for (D,R) or (R,D), and finally, $\tilde{\tau} > \frac{S+\alpha}{2}$ vote for (R,R). Comparing expected utilities, we see that voters with bliss point $\tilde{\tau} < \frac{\tau(D,D)-\alpha}{2} = \frac{2\tilde{\tau}_D^c - S - \alpha}{2}$ are strictly hurt by CBs, voters with bliss point $\frac{\tau(D,D)-\alpha}{2} < \tilde{\tau} < \frac{\tau(R,R)-\alpha}{2} = \frac{S+\alpha}{2}$ strictly benefit from CBs, and voters with bliss point $\tilde{\tau} > \frac{\tau(R,R)-\alpha}{2}$ are not affected by CBs. Similarly, when $\tilde{\tau}_D^c \in (S, \frac{-\alpha-S}{2}]$, voters with ideal policy $\tilde{\tau} < m_1 = \tilde{\tau}_D^c$ vote for (D,D) or (D,R), $\tilde{\tau}_D^c < \tilde{\tau} < m_2 = \frac{2\tilde{\tau}_D^c - S + \alpha}{2}$ vote for (R,D), and finally, $\tilde{\tau} > \frac{2\tilde{\tau}_D^c - S + \alpha}{2}$ vote for (R,R). Voters with bliss point $\tilde{\tau} < \frac{\tau(D,D)-\alpha}{2} = \frac{S-\alpha}{2}$ are strictly hurt by CBs, voters with bliss point $\frac{\tau(D,D)-\alpha}{2} < \tilde{\tau} < \frac{\tau(R,R)-\alpha}{2} = \frac{2\tilde{\tau}_D^c - S + \alpha}{2}$ strictly benefits from CBs, and voters with bliss point $\tilde{\tau} > \frac{\tau(R,R)-\alpha}{2}$ are not affected by CBs. Finally, when $\tilde{\tau}_D^c \in (\frac{-\alpha-S}{2}, 0]$, voters with ideal policy $\tilde{\tau} < m_1 = \tilde{\tau}_D^c$ vote for (D,D) or (D,R), $\tilde{\tau}_D^c < \tilde{\tau} < m_2 = -S$ vote for (R,D), and finally, $\tilde{\tau} > -S$ vote for (R,R). Voters with bliss point $\tilde{\tau} < \frac{\tau(D,D)-\alpha}{2} = \frac{S-\alpha}{2}$ are strictly hurt, voters with bliss point $\frac{\tau(D,D)-\alpha}{2} < \tilde{\tau} < \frac{\tau(R,R)-\alpha}{2} = \frac{-2\tilde{\tau}_D^c - S + \alpha}{2}$ strictly benefits, and voters with bliss point $\tilde{\tau} > \frac{\tau(R,R)-\alpha}{2}$ are strictly hurt by CBs.

Performing the same analysis for $S \in [-\frac{\alpha}{3}, 0]$, we get that voters are strictly hurt by CBs if their ideal policies are $\tilde{\tau} < \frac{\tau(D,D)-\alpha}{2}$ for all $\tilde{\tau}_D^c \in [\frac{S-\alpha}{2}, 0]$ or when $\tilde{\tau} > \frac{\tau(R,R)+\alpha}{2}$ for $\tilde{\tau}_D^c \in [\frac{-\alpha-S}{2}, 0]$. Combining these results completes the proof. □

Lemma 1. *When there is uncertainty on the checker's platform and for $-\alpha \leq S \leq 0$, the ideology $\bar{\tau}_{e,l}^{e',l'}$ for the voter indifferent between forms of government (e,l) and (e',l') where $(e,l) \neq (e',l')$ is given in Table 3.4.*[42]

Proof. The voter's expected utility for each form of government

$(e,l) \in \{(D,D),(D,R),(R,D),(R,R)\}$ as computed based on equilibrium out-

[42]See footnote 38 for formal definition of the inequality operator.

comes given in Table 3.1a is:

$$\begin{aligned}
EV_{D,D}(\tau,\tilde{\tau}) &= -\int_{-2\alpha}^{\frac{S-\alpha}{2}} \frac{(\alpha+\tilde{\tau})^2}{2\alpha} d\tilde{\tau}^c - \int_{\frac{S-\alpha}{2}}^{S} \frac{(2\tilde{\tau}^c - S - \tilde{\tau})^2}{2\alpha} d\tilde{\tau}^c - \int_{S}^{0} \frac{(S-\tilde{\tau})^2}{2\alpha} d\tilde{\tau}^c \\
&= -\left(\frac{\frac{S-\alpha}{2}+2\alpha}{2\alpha}\right)(\alpha+\tilde{\tau})^2 - \frac{1}{2\alpha}\left[\frac{(S-\tilde{\tau})^3}{6} + \frac{(\alpha+\tilde{\tau})^3}{6}\right] - \left(\frac{-S}{2\alpha}\right)(S-\tilde{\tau})^2 \\
EV_{D,R}(\tau,\tilde{\tau}) &= -(S-\tilde{\tau})^2 \\
EV_{R,D}(\tau,\tilde{\tau}) &= -\int_{-2\alpha}^{S} \frac{(S-\tilde{\tau})^2}{2\alpha} d\tilde{\tau}^c - \int_{S}^{0} \frac{(2\tilde{\tau}^c - S - \tilde{\tau})^2}{2\alpha} d\tilde{\tau}^c \\
&= -\left(\frac{S+2\alpha}{2\alpha}\right)(S-\tilde{\tau})^2 - \frac{1}{2\alpha}\left[\frac{-(S+\tilde{\tau})^3}{6} - \frac{(S-\tilde{\tau})^3}{6}\right] \\
EV_{R,R}(\tau,\tilde{\tau}) &= -\int_{\frac{\alpha+S}{2}}^{2\alpha} \frac{(\alpha-\tilde{\tau})^2}{2\alpha} d\tilde{\tau}^c - \int_{0}^{\frac{\alpha+S}{2}} \frac{(2\tilde{\tau}^c - S - \tilde{\tau})^2}{2\alpha} d\tilde{\tau}^c \\
&= -\left(\frac{2\alpha - \frac{\alpha+S}{2}}{2\alpha}\right)(\alpha-\tilde{\tau})^2 - \frac{1}{2\alpha}\left[\frac{(\alpha-\tilde{\tau})^3}{6} + \frac{(S+\tilde{\tau})^3}{6}\right] \qquad (17)
\end{aligned}$$

The ideology for the indifferent voter $\bar{\tau}_{e,l}^{e',l'}$ is then computed by setting the expected utility for government (e,l) equal to the expected utility for government (e',l'), i.e.

$$EV_{e,l}(\tau,\hat{\tau}) = EV_{e',l'}(\tau,\hat{\tau})$$

Tedious but straightforward algebra yields the cutpoints in Table 3.4. □

Lemma 2. *For the cutpoints given in Table 3.4,* $\bar{\tau}_{D,D}^{D,R} < \bar{\tau}_{D,D}^{R,D} < \bar{\tau}_{D,R}^{R,D} < \bar{\tau}_{D,D}^{R,R} < \bar{\tau}_{D,R}^{R,R} < \bar{\tau}_{R,D}^{R,R}$.

Proof. We first show that $\bar{\tau}_{D,D}^{D,R} < \bar{\tau}_{D,D}^{R,D}$. Note that since $S \in [-\alpha, 0]$, we can rewrite the status quo as $S = -k\alpha$, where $0 \leq k \leq 1$ so S is a convex combination of the upper and lower bound of the support. Rewriting the cutoffs, we get

$$\begin{aligned}
\bar{\tau}_{D,D}^{D,R} &= \frac{-10 - 7k + 5k^2}{3(7-2k)}\alpha \\
\bar{\tau}_{D,D}^{R,D} &= \frac{-10 + 3k + 12k^2 - 9k^3}{3(7 - 10k + 7k^2)}\alpha
\end{aligned}$$

Note that the denominators are both positive and moreover, the denominator of $\bar{\tau}_{D,D}^{D,R}$ is smaller than the denominator of $\bar{\tau}_{D,D}^{R,D}$ since

$$7 - 10k + 7k^2 < 7 - 10k + 7k = 7 - 3k < 7 - 2k$$

Therefore, it is sufficient to show that

$$\bar{\tau}_{D,D}^{D,R} = \frac{-10 - 7k + 5k^2}{3(7-2k)}\alpha < \frac{-10 + 3k + 12k^2 - 9k^3}{3(7-2k)}\alpha < \bar{\tau}_{D,D}^{R,D}$$

Comparing the numerators:

$$\begin{aligned} -10 + 3k + 12k^2 - 9k^3 &= -10 - 7k + 5k^2 + k(10 + 7k - 9k^2) \\ &> -10 - 7k + 5k^2 + k(1 + 7k) \\ &> -10 - 7k + 5k^2 \end{aligned}$$

So, $\bar{\tau}_{D,D}^{D,R} < \bar{\tau}_{D,D}^{R,D}$. Rewriting $\bar{\tau}_{D,R}^{R,D} = \frac{-k}{3}\alpha$ and comparing it to $\bar{\tau}_{D,D}^{R,D}$, we get that $\bar{\tau}_{D,D}^{R,D} < \bar{\tau}_{D,R}^{R,D}$ since:

$$\begin{aligned} \bar{\tau}_{D,D}^{R,D} = \frac{-10 + 3k + 12k^2 - 9k^3}{3(7 - 10k + 7k^2)}\alpha &< \frac{-k}{3}\alpha = \bar{\tau}_{D,R}^{R,D} \\ 0 &< (2k^2 - 10)(k - 1) \end{aligned}$$

and the expressions in both parentheses are negative. Rewriting $\bar{\tau}_{D,D}^{R,R} = \frac{2+3k-5k^3}{3(15-2k+9k^2)}\alpha$ and comparing it to $\bar{\tau}_{D,R}^{R,D}$, we get that $\bar{\tau}_{D,R}^{R,D} < \bar{\tau}_{D,D}^{R,R}$ since:

$$\begin{aligned} \bar{\tau}_{D,R}^{R,D} = \frac{-k}{3}\alpha &< \frac{2 + 3k - 5k^3}{3(15 - 2k + 9k^2)}\alpha = \bar{\tau}_{D,D}^{R,R} \\ 0 &< k(18 - 10k) + 4k^3 + 2 \end{aligned}$$

and the expression in the parenthesis is positive. Rewriting $\bar{\tau}_{D,R}^{R,R} = \frac{1-k}{2}\alpha$ and comparing it to $\bar{\tau}_{D,D}^{R,D}$, we get that $\bar{\tau}_{D,D}^{R,R} < \bar{\tau}_{D,R}^{R,R}$ since:

$$\begin{aligned}
\bar{\tau}_{D,D}^{R,R} = \frac{2+3k-5k^3}{3(15-2k+9k^2)}\alpha &< \frac{1-k}{2}\alpha = \bar{\tau}_{D,R}^{R,R} \\
17k^3 - 33k^2 + 57k - 41 &< 0
\end{aligned}$$

and note that

$$\begin{aligned}
17k^3 - 33k^2 + 57k - 41 &< 17k - 33k^2 + 57k - 41 \\
&= (k-1)(41-33k) < 0
\end{aligned}$$

Finally, rewriting $\bar{\tau}_{R,D}^{R,R} = \frac{3-3k^2+k^3}{3(2+2k-k^2)}\alpha$ and comparing it to $\bar{\tau}_{D,R}^{R,R}$, we get that $\bar{\tau}_{D,R}^{R,R} < \bar{\tau}_{R,D}^{R,R}$ since:

$$\begin{aligned}
\bar{\tau}_{D,R}^{R,R} = \frac{1-k}{2}\alpha &< \frac{3-3k^2+k^3}{3(2+2k-k^2)}\alpha = \bar{\tau}_{R,D}^{R,R} \\
k^2(k-3) &< 0
\end{aligned}$$

□

Proposition (3). *When there is uncertainty on the checker's bliss point and when the status quo is near the center* ($-\alpha \leq S \leq 0$)*, the vector of optimal proposal* $\hat{\tau}_1^*(\tilde{\tau}^c|S, \tilde{\tau}^p)$ *given in Table 3.1a, the checker's veto decision* $d_1^*(\tilde{\tau}^c, \hat{\tau}|S)$ *given in* (13) *and the voter's choice* (E_1^*, L_1^*) *given in* (14) *constitute an equilibrium of the game. Results are symmetric for* $0 \leq S \leq -\alpha$.

Proof. The proofs of $d_1^*(\tilde{\tau}^c, \hat{\tau}|S)$ and $\hat{\tau}_1^*(\tilde{\tau}^c|S, \tilde{\tau}^p)$ are trivial and hence omitted. In what follows, we show the optimal government structure (E_1^*, L_1^*) chosen by the voter in equilibrium. The voters who most prefer (D,D) over the other forms of government must satisfy:

$$EV_{D,D}(\cdot) > EV_{e,l}(\cdot)$$

for all $(e, l) \neq (D, D)$. Using cutoffs in Lemma 1 and the expected utilities given in (17), it is easy to show that the voter prefers (D,D) over (D,R) if $\tilde{\tau} < \bar{\tau}^{D,R}_{D,D}$, prefers (D,D) over (R,D) if $\tilde{\tau} < \bar{\tau}^{R,D}_{D,D}$, and prefers (D,D) over (R,R) if $\tilde{\tau} < \bar{\tau}^{R,R}_{D,D}$. Therefore, (D,D) is the preferred type of government for voters with ideology

$$\tilde{\tau} < min\{\bar{\tau}^{D,R}_{D,D}, \bar{\tau}^{R,D}_{D,D}, \bar{\tau}^{R,R}_{D,D}\} = \bar{\tau}^{D,R}_{D,D}$$

where the equality follows by Lemma 2.

Moving on, the voter prefers (D,R) over (D,D) if $\tilde{\tau} > \bar{\tau}^{D,D}_{D,R}$, prefers (D,R) over (R,D) if $\tilde{\tau} < \bar{\tau}^{R,D}_{D,R}$, and prefers (D,R) over (R,R) if $\tilde{\tau} < \bar{\tau}^{R,R}_{D,R}$. Therefore, (D,R) is the preferred type of government for voters with ideology

$$\bar{\tau}^{D,D}_{D,R} < \tilde{\tau} < min\{\bar{\tau}^{R,D}_{D,R}, \bar{\tau}^{R,R}_{D,R}\} = \bar{\tau}^{R,D}_{D,R}$$

where the equality follows by Lemma 2.

The voter prefers (R,D) over (D,D) if $\tilde{\tau} > \bar{\tau}^{D,D}_{R,D}$, prefers (R,D) over (D,R) if $\tilde{\tau} > \bar{\tau}^{D,R}_{R,D}$, and prefers (R,D) over (R,R) if $\tilde{\tau} < \bar{\tau}^{R,R}_{R,D}$. Therefore, (R,D) is the preferred type of government for voters with ideology

$$max\{\bar{\tau}^{D,D}_{R,D}, \bar{\tau}^{D,R}_{R,D}\} = \bar{\tau}^{D,R}_{R,D} < \tilde{\tau} < \bar{\tau}^{R,R}_{R,D}$$

where the equality follows by Lemma 2.

Finally, the rest of the voters prefer (R,R), which implies that they have ideology

$$\tilde{\tau} > \bar{\tau}^{R,D}_{R,R}.$$

Recalling that $\bar{\tau}^{e',l'}_{e,l} = \bar{\tau}^{e,l}_{e',l'}$ yields the results. □

Proposition (4). *When there is uncertainty on the checker's bliss point and when* *the status quo is centrist* ($-\alpha \leq S \leq 0$), *checks and balances strictly hurts the voter on average if he is an extremist* ($\tilde{\tau} < \bar{\tau}_{D,D}^{D_{no\,CBs}}$ *or* $\tilde{\tau} > \bar{\tau}_{R,R}^{R_{no\ CBs}}$) , *and strictly benefits the voter on average if he is a moderate* ($\bar{\tau}_{D,D}^{D_{no\,CBs}} \leq \tilde{\tau} \leq \bar{\tau}_{R,D}^{R,R}$). *Results are symmetric for* $0 \leq S \leq -\alpha$.

Proof. Recall from Proposition 1 that under no CBs, the voter chooses a Democratic executive iff $\tilde{\tau} < 0$. Hence to compare welfare between the 2 regimes, we need the signs of each ideology cutoff in 14. Referring to Table 3.4, $\bar{\tau}_{D,D}^{D,R} < 0$ since the numerator is negative:$-10\alpha^2+7\alpha S+5S^2 < -10\alpha^2+7\alpha(0)+5\alpha^2 = -5\alpha^2 < 0$ and the denominator is positive: $3(7\alpha+2S) > 3(7\alpha-2\alpha) > 0$.

$\bar{\tau}_{D,R}^{R,D} < 0$ since the numerator is negative: $-10\alpha^3-3\alpha^2S+12\alpha S^2+9S^3 < -10\alpha^3-15\alpha^2S+9S^3 < -10\alpha^3-6\alpha^2S < 0$ and the denominator is positive: $3(7\alpha^2+10\alpha S+7S^2) = 3(7(\alpha+S)^2-4\alpha S) > 0$.

$\bar{\tau}_{R,D}^{R,R} > 0$ since the numerator is positive: $10\alpha^3-3\alpha^2S-12\alpha S^2-3S^3 > -13\alpha^2S-12\alpha S^2-3S^3 > 0$ and the denominator is also positive: $3(7\alpha^2-10\alpha S-S^2) > 0$.

Next, we compare the voter's expected utility between the state $\mathbb{V}$ =0 where there is no CBs and the state $\mathbb{V}$ =1 where there is CBs $\forall\tilde{\tau}$. Starting with far-left voters who prefers (D,D) in $\mathbb{V}$ =1 and (D,$\cdot$) in $\mathbb{V}$ =0, i.e. $\tilde{\tau} < \bar{\tau}_{D,D}^{D,R}$, we find that $EV_{D,D}(\mathbb{V}=1) > EV_{D,\cdot}(\mathbb{V}=0)$ iff

$$-\left(\frac{\frac{S-\alpha}{2}+2\alpha}{2\alpha}\right)(\alpha+\tilde{\tau})^2-\frac{1}{2\alpha}\left[\frac{(S-\tilde{\tau})^3}{6}+\frac{(\alpha+\tilde{\tau})^3}{6}\right]-\left(\frac{-S}{2\alpha}\right)(S-\tilde{\tau})^2 > -(\alpha+\tilde{\tau})^2$$

or that

$$\tilde{\tau} > \frac{-2\alpha^2+5\alpha S-5S^2}{3(\alpha-3S)} \equiv \bar{\tau}_{D,D}^{D_{no\,CBs}}$$

Rewriting S as the convex combination of $-\alpha$ and 0, we find that $\bar{\tau}_{D,D}^{D_{no\,CBs}} < \bar{\tau}_{D,D}^{D,R}$ since

$$\bar{\tau}_{D,D}^{D_{no\,CBs}} = \frac{-2-5k-5k^2}{3(1+3k)}\alpha < \frac{-10-7k+5k^2}{3(7-2k)}\alpha = \bar{\tau}_{D,D}^{D,R}$$

or that $5k^3 + 9k^2 + (4 - 2k) > 0$ which is always true. Therefore, for voters are strictly worse off with CBs as $\tilde{\tau} < \bar{\tau}_{D,D}^{D_{no\,CBs}}$ and strictly better off with CBs as $\bar{\tau}_{D,D}^{D_{no\,CBs}} < \tilde{\tau} < \bar{\tau}_{D,D}^{D,R}$.

Similarly, comparing voters who prefer (D,R) in $\mathbb{V}$ =1 and (D,$\cdot$) in $\mathbb{V}$ =0, i.e. $\bar{\tau}_{D,D}^{D,R} < \tilde{\tau} < \bar{\tau}_{D,R}^{R,D}$, we find that $EV_{D,R}(\mathbb{V}=1) > EV_{D,\cdot}(\mathbb{V}=0)$ iff

$$-(S-\tilde{\tau})^2 > -(\alpha+\tilde{\tau})^2$$

or that

$$\tilde{\tau} > \frac{S-\alpha}{2} \equiv \bar{\tau}_{D,R}^{D_{no\,CBs}}$$

Comparing $\bar{\tau}_{D,R}^{D_{no\,CBs}}$ and $\bar{\tau}_{D,D}^{D,R}$, we get that $\bar{\tau}_{D,R}^{D_{no\,CBs}} < \bar{\tau}_{D,D}^{D,R}$ since:

$$\bar{\tau}_{D,R}^{D_{no\,CBs}} = \frac{-k-1}{2}\alpha < \frac{-10-7k+5k^2}{3(7-2k)}\alpha = \bar{\tau}_{D,D}^{D,R}$$

or that $4k^2 + k + 1 > 0$ which is always true. Therefore, all voters are strictly better off with CBs if they prefer (D,R) in $\mathbb{V}$ =1.

Next, comparing voters who prefer (R,D) in $\mathbb{V}$ =1 and (D,$\cdot$) in $\mathbb{V}$ =0, i.e. $\bar{\tau}_{R,D}^{D,R} < \tilde{\tau} < 0$, we find that $EV_{R,D}(\mathbb{V}=1) > EV_{D,\cdot}(\mathbb{V}=0)$ iff

$$-\left(\frac{S+2\alpha}{2\alpha}\right)(S-\tilde{\tau})^2 - \frac{1}{2\alpha}\left[\frac{-(S+\tilde{\tau})^3}{6} - \frac{(S-\tilde{\tau})^3}{6}\right] > -(\alpha+\tilde{\tau})^2$$

or that

$$\tilde{\tau} > \frac{-3\alpha^3 + 3\alpha S^2 + S^3}{3(2\alpha^2 + 2\alpha S + S^2)} \equiv \bar{\tau}_{R,D}^{D_{no\,CBs}}$$

Comparing $\bar{\tau}_{R,D}^{D_{no\,CBs}}$ and $\bar{\tau}_{R,D}^{D,R}$, we get that $\bar{\tau}_{R,D}^{D_{no\,CBs}} < \bar{\tau}_{R,D}^{D,R}$ since:

$$\bar{\tau}_{D,R}^{D_{no\,CBs}} = \frac{-3+3k^2-k^3}{3(2-2k+k^2)}\alpha < \frac{-k}{3}\alpha = \bar{\tau}_{D,D}^{D,R}$$

or that $k^2 + 2k - 3 < 0$ which is always true. Therefore, all voters are strictly better off with CBs if they prefer (D,R) in $\mathbb{V}$ =1 and whose ideologies are situated on the left half of the political spectrum, i.e. $\tilde{\tau} < 0$.

For voters who are moderate-right, that is $0 < \tilde{\tau} < \bar{\tau}_{R,D}^{R,R}$, (R,D) is still the preferred form of government under CBs. However, this group of voters would've chosen a Republican executive under the state of the world where CBs do not exist. Therefore, comparing their expected utilities, we find that $EV_{R,D}(\mathbb{V}=1) > EV_{R,\cdot}(\mathbb{V}=0)$ iff

$$-\left(\frac{S+2\alpha}{2\alpha}\right)(S-\tilde{\tau})^2 - \frac{1}{2\alpha}\left[\frac{-(S+\tilde{\tau})^3}{6} - \frac{(S-\tilde{\tau})^3}{6}\right] > -(\alpha-\tilde{\tau})^2$$

or that

$$\tilde{\tau} < \frac{3\alpha^3 - 3\alpha S^2 - S^3}{3(2\alpha^2 - 2\alpha S - S^2)} \equiv \bar{\tau}_{R,D}^{R_{no\,CBs}}$$

Comparing $\bar{\tau}_{R,D}^{R_{no\,CBs}}$ and $\bar{\tau}_{R,D}^{R,R}$, we get that $\bar{\tau}_{R,D}^{R,R} < \bar{\tau}_{R,D}^{R_{no\,CBs}}$, so all voters under (R,D) are made strictly better off when there are CBs.

Finally, for far-right voters ($\tilde{\tau} > \bar{\tau}_{R,D}^{R,R}$) comparing their expected utility under (R,R) when CBs are present and (R,$\cdot$) when CBs are absent, we find that $EV_{R,R}(\mathbb{V}=1) > EV_{R,\cdot}(\mathbb{V}=0)$ iff

$$-\left(\frac{2\alpha - \frac{\alpha+S}{2}}{2\alpha}\right)(\alpha-\tilde{\tau})^2 - \frac{1}{2\alpha}\left[\frac{(\alpha-\tilde{\tau})^3}{6} + \frac{(S+\tilde{\tau})^3}{6}\right] > -(\alpha-\tilde{\tau})^2$$

or that

$$\tilde{\tau} < \frac{2\alpha - S}{3} = \tilde{\tau}_{R,R}^{R_{no\ CBs}}$$

Comparing $\bar{\tau}_{R,R}^{R_{no\,CBs}}$ and $\bar{\tau}_{R,D}^{R,R}$, we get that $\bar{\tau}_{R,D}^{R,R} < \bar{\tau}_{R,R}^{R_{no\,CBs}}$. So that voters with ideal point $\tilde{\tau} \in [\bar{\tau}_{R,D}^{R,R}, \bar{\tau}_{R,R}^{R_{no\,CBs}}]$ strictly benefits from CBs while voters with ideal point $\tilde{\tau} > \bar{\tau}_{R,R}^{R_{no\,CBs}}$ are made strictly worse off under CBs, which completes the proof. □

Proposition (6). *When the status quo S is moderate ($-\alpha \leq S \leq 0$) and the checkers' bliss points are symmetric around 0 ($\tilde{\tau}_D^c = -\tilde{\tau}_R^c$), uncertainty on the checker's bliss point decreases voter's expected welfare only if the closest checker's bliss point under* *complete information is not too far from the voter's most preferred policy $\tilde{\tau}$ (refer to the Appendix for the cutoff distance).*

Proof. The idea for the proof is that if the checker is close to the voter, then electing him is beneficial under complete information. Once this information is taken away, the voter will no longer have a reliable politician to push for policies in his favor. Here, we need to consider all configurations of policies that can arise when there is complete information (as shown in Table 3.3) and compare voter's expected utility between the scenarios where the checker's bliss point is known and when it is unknown (as given in 17).

First note that when the same policy always arises under the same form of government regardless of the information structure, then uncertainty does not alter voter's expected welfare. This happens under (D,R) where the status quo S is always maintained. We first start with $S \in [-\alpha, -\frac{\alpha}{3}]$. When the checker's bliss point is known to be an element in $[-2\alpha, \frac{S-\alpha}{2}]$, policies that arise are: $-\alpha$ under (D,D), S under (D,R) and (R,D), and α under (R,R) when there is complete information. Therefore, CBs under complete information is ineffective under (D,D) and (R,R) because the proposer is free to choose his preferred policy. Therefore, comparing expected utilities across models where the information structure differs is the same as comparing expected utilities of the voter where there are and there aren't CBs. As shown in proof of Proposition 4, CBs hurt voters who chose (D,D) when $\tilde{\tau} < \bar{\tau}_{D,D}^{D_{no\ CBs}}$. This implies that the same set of voters is hurt when uncertainty is introduced under CBs as the expected policy is now more moderate. Similarly $\tilde{\tau} > \bar{\tau}_{R.R}^{R_{no\ CBs}}$ voters are hurt when they are unsure about the Republican checker's ideal policy. When voters choose S as the policy outcome under complete information (which corresponds to voters having bliss point between $\frac{S-\alpha}{2} < \tilde{\tau} < \frac{S+\alpha}{2}$), the $\frac{S-\alpha}{2} < \tilde{\tau} < \bar{\tau}_{D,D}^{D,R}$ voters will vote for (D,D) under asymmetric information. Comparing their expected utilities, we see that

$$
\begin{aligned}
E_1(D,D) &> -(S-\tilde{\tau})^2 \\
-\left(\frac{\frac{S-\alpha}{2}+2\alpha}{2\alpha}\right)(\alpha+\tilde{\tau})^2 - \frac{1}{2\alpha}\left[\frac{(S-\tilde{\tau})^3}{6}+\frac{(\alpha+\tilde{\tau})^3}{6}\right] & \\
-\left(\frac{-S}{2\alpha}\right)(S-\tilde{\tau})^2 &> -(S-\tilde{\tau})^2
\end{aligned}
$$

whenever $\tilde{\tau} < \frac{-10\alpha^2+7\alpha S+5S^2}{21\alpha+9S} \equiv \bar{\tau}_{DD}(S)$. Given that $\bar{\tau}^{D,R}_{D,D} < \bar{\tau}_{DD}(S)$, these voters always benefit from uncertainty. For $\bar{\tau}^{R,D}_{D,R} < \tilde{\tau} < \frac{\alpha+S}{2}$ voters, they benefit from a known S policy whenever:

$$
\begin{aligned}
E_1(R,D) &> -(S-\tilde{\tau})^2 \\
-\left(\frac{S+2\alpha}{2\alpha}\right)(S-\tilde{\tau})^2 - \frac{1}{2\alpha}\left[\frac{-(S+\tilde{\tau})^3}{6}-\frac{(S-\tilde{\tau})^3}{6}\right] &> -(S-\tilde{\tau})^2
\end{aligned}
$$

or that $\tilde{\tau} > \frac{S}{3}$. Given that $\frac{S}{3} < \bar{\tau}^{R,D}_{D,R}$, these voters always benefit from uncertainty.

When the checker's bliss point is known to be an element in $[\frac{S-\alpha}{2}, S]$, policies that arise under complete information are: $2\tilde{\tau}^c_D - S$ under (D,D), S under (D,R) and (R,D), and α under (R,R). The only difference between this case and the case before is when (D,D) is selected under complete information. This occurs for voters with bliss point $\tilde{\tau} < \tilde{\tau}^c_D$. In this case, the voter's expected utility under uncertainty is higher whenever:

$$
\begin{aligned}
EV_1(D,D) &> -(2\tilde{\tau}^c_D - S-\tilde{\tau})^2 \\
-\left(\frac{\frac{S-\alpha}{2}+2\alpha}{2\alpha}\right)(\alpha+\tilde{\tau})^2 - \frac{1}{2\alpha}\left[\frac{(S-\tilde{\tau})^3}{6}+\frac{(\alpha+\tilde{\tau})^3}{6}\right] & \\
-\left(\frac{-S}{2\alpha}\right)(S-\tilde{\tau})^2 &> -(2\tilde{\tau}^c_D - S-\tilde{\tau})^2
\end{aligned}
$$

Using Mathematica to solve, we get that this occurs whenever:

1. $\tilde{\tau}^c_D \in [\frac{S-\alpha}{2}, \frac{-10\alpha^2+7\alpha S+5S^2}{21\alpha+9S}]$ and $\tilde{\tau} \in [\frac{-10\alpha^3+48\alpha(\tilde{\tau}^c_D)^2-3\alpha^2 S-48\alpha\tilde{\tau}^c_D S+12\alpha S^2+5S^3}{21\alpha^2+48\alpha\tilde{\tau}^c_D-18\alpha S+9S^2}, \tilde{\tau}^c_D]$ or

2. $\tilde{\tau}^c_D \in [\frac{-10\alpha^2+7\alpha S+5S^2}{21\alpha+9S}, S]$ and $\tilde{\tau} < \frac{-10\alpha^3+48\alpha(\tilde{\tau}^c_D)^2-3\alpha^2 S-48\alpha\tilde{\tau}^c_D S+12\alpha S^2+5S^3}{21\alpha^2+48\alpha\tilde{\tau}^c_D-18\alpha S+9S^2}$.

When the checker's bliss point is known to be an element in $[S, \frac{-\alpha-S}{2}]$, policies that arise under complete information are: S under (D,D) and (D,R), $2\tilde{\tau}_D - S$ under (R,D), and α under (R,R). Voter benefits from uncertainty under (D,D) if

$$
\begin{aligned}
EV_1(D,D) &> -(S-\tilde{\tau})^2 \\
-\left(\frac{\frac{S-\alpha}{2}+2\alpha}{2\alpha}\right)(\alpha+\tilde{\tau})^2 - \frac{1}{2\alpha}\left[\frac{(S-\tilde{\tau})^3}{6}+\frac{(\alpha+\tilde{\tau})^3}{6}\right] & \\
-\left(\frac{-S}{2\alpha}\right)(S-\tilde{\tau})^2 &> -(S-\tilde{\tau})^2
\end{aligned}
$$

which we have already shown to be true for all voters $\tilde{\tau} < \bar{\tau}^{D,R}_{D,D}$. Voter does not benefit under (D,R) because S is always the implemented policy even after uncertainty is added. Voter benefits from (R,D) whenever:

$$
\begin{aligned}
EV_1(R,D) &> -(2\tilde{\tau}^c_D - S - \tilde{\tau})^2 \\
-\left(\frac{S+2\alpha}{2\alpha}\right)(S-\tilde{\tau})^2 - \frac{1}{2\alpha}\left[\frac{-(S+\tilde{\tau})^3}{6}-\frac{(S-\tilde{\tau})^3}{6}\right] &> -(2\tilde{\tau}^c_D - S - \tilde{\tau})^2
\end{aligned}
$$

Using Mathematica to solve, we get that this occurs whenever:

1. $\tilde{\tau}^C_D \in [S, \bar{\tau}^{R,D}_{D,R}]$ and $\tilde{\tau} \in [\frac{12\alpha(\tilde{\tau}^C_D)^2-12\alpha\tilde{\tau}^C_D S-S^3}{12\alpha\tilde{\tau}^C_D-12\alpha S-3S^2}, \bar{\tau}^{R,R}_{R,D}]$ or

2. $\tilde{\tau}^C_D \in [\bar{\tau}^{R,D}_{D,R}, \frac{-\alpha-S}{2}]$ and $\tilde{\tau} \in [\tilde{\tau}^c_D, \frac{12\alpha(\tilde{\tau}^C_D)^2-12\alpha\tilde{\tau}^C_D S-S^3}{12\alpha\tilde{\tau}^C_D-12\alpha S-3S^2}]$.

Finally, when the checker's bliss point is known to be an element in $[\frac{-\alpha-S}{2}, 0]$, policies that arise under complete information are: S under (D,D) and (D,R), $2\tilde{\tau}_D - S$ under (R,D), and $-2\tilde{\tau}^c_D - S$ under (R,R). The difference between this case and the one before is in the (R,R) government, so looking at this case, uncertainty benefits the voter if:

$$
\begin{aligned}
EV_1(R,R) &> -(2\tilde{\tau}^c_D + S + \tilde{\tau})^2 \\
-\left(\frac{2\alpha - \frac{\alpha+S}{2}}{2\alpha}\right)(\alpha-\tilde{\tau})^2 - \frac{1}{2\alpha}\left[\frac{(\alpha-\tilde{\tau})^3}{6} + \frac{(S+\tilde{\tau})^3}{6}\right] &> -(2\tilde{\tau}^c_D + S + \tilde{\tau})^2
\end{aligned}
$$

Using Mathematica to solve, we get that this occurs whenever:

1. $\tilde{\tau}^C_D \in [\bar{\tau}^{R,D}_{D,R}, -\sqrt{\frac{5\alpha^3+9\alpha^2S+3\alpha S^2-S^3}{24\alpha}}]$ and $\tilde{\tau} \in [\bar{\tau}^{R,R}_{R,D}, \frac{10\alpha^3-48\alpha(\tilde{\tau}^c_D)^2-3\alpha^2S-48\alpha\tilde{\tau}^c_D S-12\alpha S^2+S^3}{21\alpha^2+48\alpha\tilde{\tau}^c_D+18\alpha S-3S^2}]$

   or

2. $\tilde{\tau}^C_D \in [-\sqrt{\frac{5\alpha^3+9\alpha^2S+3\alpha S^2-S^3}{24\alpha}}, 0]$ and $\tilde{\tau} > \frac{10\alpha^3-48\alpha(\tilde{\tau}^c_D)^2-3\alpha^2S-48\alpha\tilde{\tau}^c_D S-12\alpha S^2+S^3}{21\alpha^2+48\alpha\tilde{\tau}^c_D+18\alpha S-3S^2}$

Combining these results, we see that uncertainty benefits the voter only if he lies sufficiently far away from the checker's known ideal policy. In particular, voters who are sufficiently left-wing and who vote for (D,D)

$(\tilde{\tau} < min\{\bar{\tau}^{D_{no\ CBs}}_{D,D}, \frac{-10\alpha^3+48\alpha(\tilde{\tau}^c_D)^2-3\alpha^2S-48\alpha\tilde{\tau}^c_D S+12\alpha S^2+5S^3}{21\alpha^2+48\alpha\tilde{\tau}^c_D-18\alpha S+9S^2}\})$ are strictly hurt when there is ideological uncertainty on the checker if the checker's ideal policy, under complete information, is to the left of $\frac{-10\alpha^2+7\alpha S+5S^2}{21\alpha+9S}$. On the other hand, voters who are sufficiently right-wing and who vote for (R,R)

$(\tilde{\tau} > max\{\frac{10\alpha^3-48\alpha(\tilde{\tau}^c_D)^2-3\alpha^2S-48\alpha\tilde{\tau}^c_D S-12\alpha S^2+S^3}{21\alpha^2+48\alpha\tilde{\tau}^c_D+18\alpha S-3S^2}, \bar{\tau}^{R_{no\ CBs}}_{R,R}\})$ are strictly hurt by uncertainty whenever the Republican checker is sufficiently right-wing ($\tilde{\tau}^c_R > \sqrt{\frac{5\alpha^3+9\alpha^2S+3\alpha S^2-S^3}{24\alpha}}$ and recall that $\tilde{\tau}^c_R = -\tilde{\tau}^c_D$). Voters who are moderate and who vote for (R,D) are also made strictly worse off when uncertainty is present whenever the checkers are sufficiently moderate as seen above. □

3.7.2 One Sided Variation on Checker's Platform

In this section, I provide proofs for Proposition 9-12. Some of these require us to solve for roots of quartic (4th order polynomial) equations. The closed form of these roots are too complicated and buy us little to no tractability in determining the ideology cutoffs. Instead, I present the methods in estimating these roots using Mathematica. For a more formal treatment, see King 1996.

Numerical Estimation Methodology of Quartic Equation Roots

The relevant form of quartic equations to solve is of the the form $a\alpha^4 + b\alpha^3 S + c\alpha^2 S^2 + d\alpha S^3 + eS^4$, where a, b, c, d, e are some real constants. $\alpha > 0$ is the spread of party ideology while $S < 0$ is the status quo. The problem involves solving for the quartic roots of S. Note that similar to the previous section, S can be written as a contraction of expansion of the Democratic party mean $-\alpha$, that is $S = -k\alpha$ for $k \geq 0$. Rewriting the status quo within the quartic equation, we get:

$$(a - bk + ck^2 - dk^3 + ek^4)\alpha^4 = 0$$

or simply:

$$a - bk + ck^2 - dk^3 + ek^4 = 0$$

Hence by rewriting S in the way describe above, the two parameter problem is reduced to a single dimension problem. Since the values for the coefficients a, b, c, d, e are known, we can use any software to numerically estimate the real roots of the quartic equation. Our choice of software is MATHEMATICA. The numerical estimations provided are correct up to 4 decimal digits.

Lemma 3. *When there is uncertainty on the proposer's platform and for $-\alpha < S < 0$, the ideology $\bar{\tau}_{e,l}^{e',l'}$ for the voter indifferent between forms of government (e,l) and (e',l') where $(e, l) \neq (e', l')$ is given in Table 3.5.*

Proof. The voter's expected utility for each form of government

$(e, l) \in \{(D, D), (D, R), (R, D), (R, R)\}$ as computed based on equilibrium outcomes given in Table 3.2a is

$$\begin{aligned}
EV_{D,D}(\tau,\tilde{\tau}) &= -\int_{-2\alpha}^{-2\alpha-S}\frac{(2\alpha+S+\tilde{\tau})^2}{2\alpha}d\tilde{\tau}^p - \int_{-2\alpha-S}^{S}\frac{(\tilde{\tau}^p-\tilde{\tau})^2}{2\alpha}d\tilde{\tau}^p \\
&\quad -\int_{S}^{0}\frac{(S-\tilde{\tau})^2}{2\alpha}d\tilde{\tau}^p \\
&= -\left(\frac{-S}{2\alpha}\right)(2\alpha+S+\tilde{\tau})^2 - \frac{1}{2\alpha}\left[\frac{(S-\tilde{\tau})^3}{6}+\frac{(2\alpha+S+\tilde{\tau})^3}{6}\right] \\
&\quad -\left(\frac{-S}{2\alpha}\right)(S-\tilde{\tau})^2 \\
EV_{D,R}(\tau,\tilde{\tau}) &= -\int_{-2\alpha}^{S}\frac{(S-\tilde{\tau})^2}{2\alpha}d\tilde{\tau}^p - \int_{S}^{0}\frac{(\tilde{\tau}^p-\tilde{\tau})^2}{2\alpha}d\tilde{\tau}^p \\
&= -\left(\frac{S+2\alpha}{2\alpha}\right)(S-\tilde{\tau})^2 - \frac{1}{2\alpha}\left(-\frac{\tilde{\tau}^3}{3}-\frac{(S-\tilde{\tau})^3}{3}\right) \\
EV_{R,D}(\tau,\tilde{\tau}) &= -(S-\tilde{\tau})^2 \\
EV_{R,R}(\tau,\tilde{\tau}) &= -(\alpha-\tilde{\tau})^2 - \frac{\alpha^2}{3} \qquad (18)
\end{aligned}$$

The ideology for the indifferent voter $\bar{\tau}_{e,l}^{e',l'}$ is then computed by setting the expected utility for government (e,l) equal to the expected utility for government (e',l'), i.e.

$$EV_{e,l}(\tau,\hat{\tau}) = EV_{e',l'}(\tau,\hat{\tau})$$

Tedious but straightforward algebra yields the cutpoints in Table 3.5. □

Lemma 4. *For the cutpoints given in Table 3.5,* $\bar{\tau}_{D,D}^{R,D} < \bar{\tau}_{D,D}^{D,R} < \bar{\tau}_{D,R}^{R,D} < \bar{\tau}_{D,D}^{R,R} < \bar{\tau}_{R,D}^{R,R} < \bar{\tau}_{D,R}^{R,R}$.

Proof. We first show that $\bar{\tau}_{D,D}^{R,D} < \bar{\tau}_{D,D}^{D,R}$. Note that since $S \in (-\alpha, 0)$, we can rewrite the status quo as $S = -k\alpha$, where $0 < k < 1$ so S is a convex combination of the upper and lower bound of the support. Rewriting the cutoffs, we get

$$\begin{aligned}
\bar{\tau}_{D,D}^{D,R} &= \frac{-8+12k^2-6k^3}{3(4-4k+k^2)}\alpha \\
\bar{\tau}_{D,D}^{R,D} &= \frac{-2-2k+k^2}{3}\alpha
\end{aligned}$$

Notice that the denominator of $\bar{\tau}_{D,D}^{D,R}$ is positive and after some algebra $\bar{\tau}_{D,D}^{R,D} < \bar{\tau}_{D,D}^{D,R}$ implies that $k^2(k^2-2) < 0$ which is always true. So, $\bar{\tau}_{D,D}^{R,D} < \bar{\tau}_{D,D}^{D,R}$.

Rewriting $\bar{\tau}_{D,R}^{R,D} = \frac{-2k}{3}\alpha$ and comparing it to $\bar{\tau}_{D,D}^{D,R}$, we get that $\bar{\tau}_{D,D}^{D,R} < \bar{\tau}_{D,R}^{R,D}$ since:

$$\begin{aligned}
\bar{\tau}_{D,D}^{D,R} = \frac{-8+12k^2-6k^3}{3(4-4k+k^2)}\alpha &< \frac{-2k}{3}\alpha = \bar{\tau}_{D,R}^{R,D} \\
0 &< (4k^2-8)(k-1)
\end{aligned}$$

and the expressions in both parentheses are negative. Rewriting $\bar{\tau}_{D,D}^{R,R} = \frac{3k^2-2k^3}{12}\alpha$ and comparing it to $\bar{\tau}_{D,R}^{R,D}$, we get that $\bar{\tau}_{D,R}^{R,D} < \bar{\tau}_{D,D}^{R,R}$ since:

$$\begin{aligned}
\bar{\tau}_{D,R}^{R,D} = \frac{-2k}{3}\alpha &< \frac{3k^2-2k^3}{12}\alpha = \bar{\tau}_{D,D}^{R,R} \\
-8k &< 3k^2-2k^3
\end{aligned}$$

where the last inequality is always true. Rewriting $\bar{\tau}_{R,D}^{R,R} = \frac{4-3k^2}{6(1+k)}\alpha$ and comparing it to $\bar{\tau}_{D,D}^{R,R}$, we get that $\bar{\tau}_{D,D}^{R,R} < \bar{\tau}_{R,D}^{R,R}$ since:

$$\begin{aligned}
\bar{\tau}_{D,D}^{R,R} = \frac{3k^2-2k^3}{12}\alpha &< \frac{4-3k^2}{6(1+k)}\alpha = \bar{\tau}_{D,R}^{R,R} \\
2k^4-k^3-9k^2+8 &> 0
\end{aligned}$$

which is always satisfied since

$$\begin{aligned}
2k^4-k^3-9k^2+8 &> 2k^4-10k^2+8 \\
&= 2(-2+k)(-1+k)(1+k)(2+k) > 0
\end{aligned}$$

where the first two terms in the parentheses are negative while the last two terms are positive.

Finally, rewriting $\bar{\tau}_{D,R}^{R,R} = \frac{8-6k^2+2k^3}{3(4+4k-k^2)}\alpha$ and comparing it to $\bar{\tau}_{R,D}^{R,R}$, we get that $\bar{\tau}_{R,D}^{R,R} <$

$\bar{\tau}^{R,R}_{D,R}$ since:

$$\begin{aligned} \bar{\tau}^{R,R}_{R,D} = \frac{4-3k^2}{6(1+k)}\alpha &< \frac{8-6k^2+2k^3}{3(4+4k-k^2)}\alpha = \bar{\tau}^{R,R}_{D,R} \\ k^2(k^2+4k+4) &> 0 \end{aligned}$$

and the last inequality holds true. □

Proposition (10). *When there is uncertainty on the proposer's platform and when the status quo is near the center of the political spectrum* ($-\alpha \leq S \leq 0$), *the vector of optimal proposal* $\hat{\tau}^*_1(\tilde{\tau}^c|S, \tilde{\tau}^p)$ *given in Table 3.2a, the checker's veto decision* $d^*_1(\tilde{\tau}^c, \hat{\tau}|S)$ *given by* (13), *and the voter's choice* (E^*_1, L^*_1) *given in* (16) *constitute an equilibrium of the game. The result is symmetric for* $S > 0$.

Proof. The proofs of $d^*_1(\tilde{\tau}^c, \hat{\tau}|S)$ and $\hat{\tau}^*_1(\tilde{\tau}^c|S, \tilde{\tau}^p)$ are trivial and hence omitted. In what follows, we show the optimal government structure (E^*_1, L^*_1) chosen by the voter in equilibrium. The voters who most prefer (D,D) over the other forms of government must satisfy:

$$EV_{D,D}(\cdot) > EV_{e,l}(\cdot)$$

for all $(e, l) \neq (D, D)$. Using cutoffs in Table 3.5 and the expected utilities given in (18), it is easy to show that the voter prefers (D,D) over (D,R) if $\tilde{\tau} < \bar{\tau}^{D,R}_{D,D}$, prefers (D,D) over (R,D) if $\tilde{\tau} < \bar{\tau}^{R,D}_{D,D}$, and prefers (D,D) over (R,R) if $\tilde{\tau} < \bar{\tau}^{R,R}_{D,D}$. Therefore, (D,D) is the preferred type of government for voters with ideology

$$\tilde{\tau} < min\{\bar{\tau}^{D,R}_{D,D}, \bar{\tau}^{R,D}_{D,D}, \bar{\tau}^{R,R}_{D,D}\} = \bar{\tau}^{R,D}_{D,D}$$

where the equality follows by Lemma 4.

Moving on, the voter prefers (D,R) over (D,D) if $\tilde{\tau} > \bar{\tau}^{D,D}_{D,R}$, prefers (D,R) over (R,D) if $\tilde{\tau} > \bar{\tau}^{R,D}_{D,R}$, and prefers (D,R) over (R,R) if $\tilde{\tau} < \bar{\tau}^{R,R}_{D,R}$. Therefore, (D,R) is the preferred type of government for voters with ideology

$$max\{\bar{\tau}^{R,D}_{D,R}, \bar{\tau}^{D,D}_{D,R}\} = \bar{\tau}^{R,D}_{D,R} < \tilde{\tau} < \bar{\tau}^{R,R}_{D,R}$$

where the equality follows by Lemma 4.

The voter prefers (R,D) over (D,D) if $\tilde{\tau} > \bar{\tau}^{D,D}_{R,D}$, prefers (R,D) over (D,R) if $\tilde{\tau} < \bar{\tau}^{D,R}_{R,D}$, and prefers (R,D) over (R,R) if $\tilde{\tau} < \bar{\tau}^{R,R}_{R,D}$. Therefore, (R,D) is the preferred type of government for voters with ideology

$$\bar{\tau}^{D,D}_{R,D} < \tilde{\tau} < min\{\bar{\tau}^{D,R}_{R,D}, \bar{\tau}^{R,R}_{R,D}\} = \bar{\tau}^{D,R}_{R,D}$$

where the equality follows by Lemma 4.

Finally, the rest of the voters prefer (R,R), which implies that they have ideology

$$\tilde{\tau} > \bar{\tau}^{D,R}_{R,R}.$$

Recalling that $\bar{\tau}^{e',l'}_{e,l} = \bar{\tau}^{e,l}_{e',l'}$ yields the results. □

Proposition (11). *When there is uncertainty on the proposer's preferred policy and when the status quo is centrist* $(-\alpha \leq S \leq 0)$, *checks and balances is weakly beneficial to all voters on average.*

Proof. Recall from Proposition 8 that under no CBs, the voter chooses a Democratic executive iff $\tilde{\tau} < 0$. Hence to compare welfare between the 2 regimes, we need the signs of each ideology cutoff in 16. Referring to Table 3.5, $\bar{\tau}^{R,D}_{D,R} = \frac{2s}{3} < 0$ since $S \in (-\alpha, 0)$. By Lemma 4, $\bar{\tau}^{R,D}_{D,D} < 0$ as well. $\bar{\tau}^{R,R}_{D,R} > 0$ since the numerator is positive: $8\alpha^3 - 2\alpha S^2 - 2S^3 > 2\alpha^3 - 2S^3 > 0$ and the denominator is also positive: $3(4\alpha^2 - 4\alpha S - S^2) > 0$.

Next, we compare the voter's expected utility between the state $\mathbb{V}$ =0 where there is no CBs and the state $\mathbb{V}$ =1 where there is CBs $\forall\tilde{\tau}$. Starting with far-left wing voters who prefers (D,D) in $\mathbb{V}$ =1 and (D,$\cdot$) in $\mathbb{V}$ =0, i.e. $\tilde{\tau} < \bar{\tau}_{D,D}^{R,D}$, we find that $EV_{D,D}(\mathbb{V}=1) > EV_{D,\cdot}(\mathbb{V}=0)$ iff

$$-\left(\frac{-S}{2\alpha}\right)(2\alpha+S+\tilde{\tau})^2-\frac{1}{2\alpha}\left[\frac{(S-\tilde{\tau})^3}{6}+\frac{(2\alpha+S+\tilde{\tau})^3}{6}\right]-\left(\frac{-S}{2\alpha}\right)(S-\tilde{\tau})^2 > -(\alpha+\tilde{\tau})^2-\frac{\alpha^2}{3}$$

or that

$$\left(\frac{\alpha+S}{2\alpha}\right)\tilde{\tau}^2+(\alpha+S)\,\tilde{\tau}+2\alpha^2+\alpha S+\frac{3S^2}{2}+\frac{5S^3}{6\alpha} > 0$$

Note that the coefficient of the quadratic term $\left(\frac{\alpha+S}{2\alpha}\right)$ is positive and therefore a concave up function with minimum occurring at $\tilde{\tau} = -\alpha$. Hence, if we can show that at the minimum the function value is positive, then we can conclude that the function is positive everywhere. At the minimum, the function value is $\frac{3}{2}\alpha^2+\frac{S}{2}\alpha+\frac{3}{2}S^2+\frac{5}{6\alpha}S^3$ and is strictly positive since

$$\frac{3}{2}\alpha^2+\frac{S}{2}\alpha+\frac{3}{2}S^2+\frac{5}{6\alpha}S^3 > \frac{2}{3}\alpha^2+\frac{5}{2}\alpha+\frac{3}{2}S^2 > 0$$

Hence, $EV_{D,D}(\mathbb{V}=1) > EV_{D,\cdot}(\mathbb{V}=0)\ \forall\tilde{\tau}$.

Similarly, comparing voters who prefer (R,D) in $\mathbb{V}$ =1 and (D,$\cdot$) in $\mathbb{V}$ =0, i.e. $\bar{\tau}_{D,D}^{R,D} < \tilde{\tau} < \bar{\tau}_{R,D}^{D,R}$, we find that $EV_{R,D}(\mathbb{V}=1) > EV_{D,\cdot}(\mathbb{V}=0)$ iff

$$-(S-\tilde{\tau})^2 > -(\alpha+\tilde{\tau})^2-\frac{\alpha^2}{3}$$

or that

$$\tilde{\tau} > \frac{-4\alpha^2+3S^2}{6(\alpha+S)} \equiv \bar{\tau}_{R,D}^{D_{no\,CBs}}$$

Comparing $\bar{\tau}_{R,D}^{D_{no\,CBs}}$ and $\bar{\tau}_{D,D}^{R,D}$, we get that $\bar{\tau}_{D,R}^{D_{no\,CBs}} < \bar{\tau}_{D,D}^{R,D}$ since:

$$\bar{\tau}_{D,R}^{D_{no\,CBs}} = \frac{-4+k^2}{6(1-k)}\alpha < \frac{-2-2k+k^2}{3}\alpha = \bar{\tau}_{D,D}^{R,D}$$

or that $k^2(2k-5) < 0$ which is always true. Therefore, all voters are strictly better off with CBs if they prefer (R,D) in $\mathbb{V}=1$.

Next, comparing voters who prefer (D,R) in $\mathbb{V}=1$ and (D,·) in $\mathbb{V}=0$, i.e. $\bar{\tau}^{D,R}_{R,D} < \tilde{\tau} < 0$, we find that $EV_{D,R}(\mathbb{V}=1) > EV_{D,\cdot}(\mathbb{V}=0)$ iff

$$-\left(\frac{S+2\alpha}{2\alpha}\right)(S-\tilde{\tau})^2 - \frac{1}{2\alpha}\left(-\frac{\tilde{\tau}^3}{3} - \frac{(S-\tilde{\tau})^3}{3}\right) > -(\alpha+\tilde{\tau})^2 - \frac{\alpha^2}{3}$$

or that

$$\tilde{\tau} > \frac{2}{3}(S-\alpha) \equiv \bar{\tau}^{D_{no\,CBs}}_{D,R}$$

Comparing $\bar{\tau}^{D_{no\,CBs}}_{D,R}$ and $\bar{\tau}^{D,R}_{R,D}$, we get that $\bar{\tau}^{D_{no\,CBs}}_{D,R} < \bar{\tau}^{D,R}_{R,D}$ since:

$$\bar{\tau}^{D_{no\,CBs}}_{D,R} = -\frac{2}{3}(k+1)\alpha < \frac{-2k}{3}\alpha = \bar{\tau}^{D,R}_{R,D}$$

Therefore, all voters are strictly better off with CBs if they prefer (D,R) in $\mathbb{V}=1$ and whose ideologies are situated on the left half of the political spectrum, i.e. $\tilde{\tau} < 0$.

For voters who are moderate-right, that is $0 < \tilde{\tau} < \bar{\tau}^{R,R}_{D,R}$, (R,D) is still the preferred form of government under CBs. However, this group of voters would've chosen a Republican executive under the state of the world where CBs do not exist. Therefore, comparing their expected utilities, we find that $EV_{D,R}(\mathbb{V}=1) > EV_{R,\cdot}(\mathbb{V}=0)$ iff

$$-\left(\frac{S+2\alpha}{2\alpha}\right)(S-\tilde{\tau})^2 - \frac{1}{2\alpha}\left(-\frac{\tilde{\tau}^3}{3} - \frac{(S-\tilde{\tau})^3}{3}\right) > -(\alpha-\tilde{\tau})^2 - \frac{\alpha^2}{3}$$

or that

$$\tilde{\tau} < \frac{8\alpha^3 - 6\alpha S^2 - 2S^3}{3(4\alpha^2 - 4\alpha S - S^2)} \equiv \bar{\tau}^{R_{no\,CBs}}_{D,R} = \bar{\tau}^{R,R}_{D,R}$$

So these voters are always strictly better off under CBs. Finally, the expected utility for far-right voters ($\tilde{\tau} > \bar{\tau}^{R,R}_{D,R}$) is the same across both states $\mathbb{V}=0,1$ since the executive always holds full power regardless of whether the checker holds veto power.

Therefore CBs have no effect on voter's welfare in this region. This completes the proof. □

Lemma 5. *When there is uncertainty on the proposer's platform and for $-2\alpha \leq S < -\alpha$, the ideology $\bar{\tau}_{e,l}^{e',l'}$ for the voter indifferent between forms of government (e,l) and (e',l') where $(e,l) \neq (e',l')$ is given in Table 3.6.*

Proof. The voter's expected utility for each form of government

$(e,l) \in \{(D,D),(D,R),(R,D),(R,R)\}$ as computed based on equilibrium outcomes given in Table 3.2b is

$$\begin{aligned}
EV_{D,D}(\tau,\tilde{\tau}) &= -\int_{-2\alpha-S}^{0} \frac{(2\alpha+S+\tilde{\tau})^2}{2\alpha} d\tilde{\tau}^p - \int_{S}^{-2\alpha-S} \frac{(\tilde{\tau}^p-\tilde{\tau})^2}{2\alpha} d\tilde{\tau}^p \\
&\quad - \int_{-2\alpha}^{S} \frac{(S-\tilde{\tau})^2}{2\alpha} d\tilde{\tau}^p \\
&= -\left(\frac{2\alpha+S}{2\alpha}\right)(2\alpha+S+\tilde{\tau})^2 - \frac{1}{2\alpha}\left[-\frac{(S-\tilde{\tau})^3}{6} - \frac{(2\alpha+S+\tilde{\tau})^3}{6}\right] \\
&\quad - \left(\frac{S+2\alpha}{2\alpha}\right)(S-\tilde{\tau})^2 \\
EV_{D,R}(\tau,\tilde{\tau}) &= -\int_{-2\alpha}^{S} \frac{(S-\tilde{\tau})^2}{2\alpha} d\tilde{\tau}^p - \int_{S}^{0} \frac{(\tilde{\tau}^p-\tilde{\tau})^2}{2\alpha} d\tilde{\tau}^p \\
&= -\left(\frac{S+2\alpha}{2\alpha}\right)(S-\tilde{\tau})^2 - \frac{1}{2\alpha}\left(-\frac{\tilde{\tau}^3}{3} - \frac{(S-\tilde{\tau})^3}{3}\right) \\
EV_{R,D}(\tau,\tilde{\tau}) &= -(2\alpha+S+\tilde{\tau})^2 \\
EV_{R,R}(\tau,\tilde{\tau}) &= -(\alpha-\tilde{\tau})^2 - \frac{\alpha^2}{3}
\end{aligned} \tag{19}$$

The ideology for the indifferent voter $\bar{\tau}_{e,l}^{e',l'}$ is then computed by setting the expected utility for government (e,l) equal to the expected utility for government (e',l'), i.e.

$$EV_{e,l}(\tau,\hat{\tau}) = EV_{e',l'}(\tau,\hat{\tau})$$

Tedious but straightforward algebra yields the cutpoints in Table 3.6. □

Lemma 6. *For the cutpoints given in Table 3.6, $\bar{\tau}_{D,D}^{R,D} < \bar{\tau}_{D,D}^{D,R} < \bar{\tau}_{D,R}^{R,D} < \bar{\tau}_{D,D}^{R,R} <$*

$\bar{\tau}^{R,R}_{R,D} < \bar{\tau}^{R,R}_{D,R}$ *when* $S \in [-p\alpha, -\alpha]$, $\bar{\tau}^{R,D}_{D,D} < \bar{\tau}^{D,R}_{D,D} < \bar{\tau}^{R,R}_{D,D} < \bar{\tau}^{R,R}_{D,R} < \bar{\tau}^{R,R}_{R,D} < \bar{\tau}^{R,D}_{D,R}$ *when* $S \in [(-4+2\sqrt{2})\alpha, -p\alpha)$, *and* $\bar{\tau}^{R,D}_{D,R} < \bar{\tau}^{R,D}_{D,D} < \bar{\tau}^{D,R}_{D,D} < \bar{\tau}^{R,R}_{D,D} < \bar{\tau}^{R,R}_{D,R} < \bar{\tau}^{R,D}_{R,R}$ *when* $S \in [-2\alpha, (-4+2\sqrt{2})\alpha)$, *where* $-p\alpha$ *is the root for* $-80\alpha^4 - 32\alpha^3 S + 80\alpha^2 S^2 + 48\alpha S^3 + 7S^4$ *for* $1 < p < 2$.

Proof. Using MATHEMATICA to numerically estimate the value of p, I get that $p \approx -1.1233$. First now that when $S \in [-p\alpha, -\alpha]$, the rank of the cutpoints are identical to the ones in Lemma 4. We can once again rewrite S as $-k\alpha$, where $1 < k < 2$. Therefore $\bar{\tau}^{R,D}_{D,D} < \bar{\tau}^{D,R}_{D,D}$ since:

$$\bar{\tau}^{R,D}_{D,D} = \frac{-2-2k+k^2}{3}\alpha < \frac{-2(2-k)}{3}\alpha = \bar{\tau}^{D,R}_{D,D}$$

or that $k^2 - 4k + 2 < 0$ which is always true for $1 < k < 2$.

$\bar{\tau}^{D,R}_{D,D} < \bar{\tau}^{R,R}_{D,D}$ since:

$$\bar{\tau}^{D,R}_{D,D} = \frac{-2(2-k)}{3}\alpha < \frac{-4+12k-9k^2+2k^3}{12}\alpha = \bar{\tau}^{R,R}_{D,D}$$

or that $2k^3 - 9k^2 + 4k + 12 > 0$ which is satisfied for $1 < k < 2$.

Next, $\bar{\tau}^{R,R}_{D,R} < \bar{\tau}^{R,D}_{R,R}$ for $S \in [-2\alpha, -p\alpha]$ since:

$$\bar{\tau}^{R,R}_{D,R} = \frac{8-6k^2+2k^3}{3(4+4k-k^2)}\alpha < \frac{-8+12k-3k^2}{6(3-k)}\alpha = \bar{\tau}^{R,D}_{R,R}$$

or that $7k^4 - 48k^3 + 80k^2 + 32k - 80 > 0$. Using MATHEMATICA to numerically solve for a root between 1 and 2, we obtain $k^* = p \approx -1.1233$ and it is satisfied for $p < k < 2$.

Next, we show that for $S \in [-2\alpha, (-4+2\sqrt{2})\alpha]$, $\bar{\tau}^{R,D}_{D,R} < \bar{\tau}^{R,D}_{D,D}$ and $\bar{\tau}^{R,R}_{D,D} < \bar{\tau}^{R,R}_{D,R}$, hence proving the first result. $\bar{\tau}^{R,D}_{D,R} < \bar{\tau}^{R,D}_{D,D}$ whenever:

$$\bar{\tau}^{R,D}_{D,R} = \frac{-2(12-12k+k^3)}{3(8-8k+k^2)}\alpha < \frac{-2-2k+k^2}{3}\alpha = \bar{\tau}^{R,D}_{D,D}$$

The denominator of $\bar{\tau}_{D,R}^{R,D}$ is positive only when $1 < k < 4-2\sqrt{2}$. Under this case, the inequality cannot hold as it requires $8 - 24k + 22k^2 - 8k^3 + k^4 > 0$ which cannot hold for all $1 < k < 2$. Therefore, it must be that $4 - 2\sqrt{2} < k < 2$. Next, we get $\bar{\tau}_{D,D}^{R,R} < \bar{\tau}_{D,R}^{R,R}$ whenever:

$$\bar{\tau}_{D,D}^{R,R} = \frac{-4 + 12k - 9k^2 + 2k^3}{12}\alpha < \frac{8 - 6k^2 + 2k^3}{3(4 + 4k - k^2)}\alpha = \bar{\tau}_{D,R}^{R,R}$$

or when $7k^4 - 48k^3 + 80k^2 + 32k - 80 > 0$, which we know is satisfied for $p < k < 2$. This completes the proof for the first case.

Next, $\bar{\tau}_{R,R}^{R,D} < \bar{\tau}_{D,R}^{R,D}$ whenever:

$$\bar{\tau}_{R,R}^{R,D} = \frac{-8 + 12k - 3k^2}{6(3-k)}\alpha < \frac{-2(12 - 12k + k^3)}{3(8 - 8k + k^2)}\alpha = \bar{\tau}_{D,R}^{R,D}$$

The denominator of $\bar{\tau}_{D,R}^{R,D}$ is positive only when $1 < k < 4 - 2\sqrt{2}$. In this range, the inequality is satisfied whenever $7k^4 - 48k^3 + 80k^2 + 32k - 80 > 0$ which we know is satisfied for $p < k < 2$. Therefore, $\bar{\tau}_{R,R}^{R,D} < \bar{\tau}_{D,R}^{R,D}$ if $p < k < 4 - 2\sqrt{2}$. Which completes the proof of the rest of the cases. □

Proposition (12). *When there is uncertainty on the proposer's bliss point and when the status quo is moderately left* ($-2\alpha \leq S < -\alpha$), *checks and balances are weakly beneficial to all voters on average.*

Proof. In Section 3.5.2, I showed that the governments (D,D) and (R,D) generate the same expected utility to the voter under a centrist S ($-\alpha \leq S \leq 0$) and a moderate-left S' ($-2\alpha \leq S' < -\alpha$) for appropriately chosen S and S'. In particular, if $S' = 2\tilde{\tau}^c - S$ then the claim holds. Therefore, voters who chose (D,D), (R,D) and (R,R) as their optimal government under the centrist S will fare no worse under the moderate-left S'. This corresponds to $\tilde{\tau} < \bar{\tau}_{D,D}^{D,R}$ and $\tilde{\tau} > \bar{\tau}_{D,R}^{R,D}$ under a centrist S ($-\alpha \leq S \leq 0$). Hence we only need to show that voters who chose (D,R) under a centrist S ($\bar{\tau}^{D,R}_{D,D} < \tilde{\tau} < \bar{\tau}^{R,D}_{D,R}$) are not made worse off under CBs. From Table 3.4, we know that under a centrist S, $\bar{\tau}^{D,R}_{D,D} = \frac{-10\alpha^2+7\alpha S+5S^2}{3(7\alpha+S)}$ and $\bar{\tau}^{R,D}_{D,R} = \frac{S}{3}$. Hence, it suffices to show that voters with bliss point $\tilde{\tau} < 0$ (since $\frac{S}{3} < 0$) weakly benefits from CBs.

When $S \in [-2\alpha, -p\alpha)$, where $p \approx -1.1233$ as shown in Lemma 6. It is easy to show that voters choose (D,D) when $\tilde{\tau} < \bar{\tau}^{R,D}_{D,D}$ and voters with $\bar{\tau}^{R,D}_{D,D} < \tilde{\tau} < 0$ choose (R,D) as their optimal form of government (identical to the proof of Proposition 3). For the voters who chose (D,D), they benefit from CBs whenever

$$\begin{aligned} EV_1(D,D) &> EV_0(D,\cdot) \\ -\left(\frac{2\alpha+S}{2\alpha}\right)(2\alpha+S+\tilde{\tau})^2 - \frac{1}{2\alpha}\left[-\frac{(S-\tilde{\tau})^3}{6} - \frac{(2\alpha+S+\tilde{\tau})^3}{6}\right] & \\ -\left(\frac{S+2\alpha}{2\alpha}\right)(S-\tilde{\tau})^2 &> -(\alpha+\tilde{\tau}) - \frac{\alpha^2}{3} \end{aligned}$$

or that $\alpha(2\alpha+S)^2(\alpha+2S) < 0$, which is always satisfied. Hence extreme voters ($\tilde{\tau} < \bar{\tau}^{R,D}_{D,D}$) strictly benefit from CBs.

For voters who chose (R,D), they benefit from CBs whenever

$$\begin{aligned} EV_1(R,D) &> EV_0(D,\cdot) \\ -(2\alpha+S+\tilde{\tau})^2 &> -(\alpha+\tilde{\tau}) - \frac{\alpha^2}{3} \end{aligned}$$

or that

$$\tilde{\tau} > \frac{-8\alpha^2 - 12\alpha S - 3S^2}{6(\alpha+S)} = \bar{\tau}^{D_{no\ CBs}}_{R,D}$$

Note that $\bar{\tau}^{D_{no\ CBs}}_{R,D} < \bar{\tau}^{R,D}_{D,D}$ since:

$$\bar{\tau}^{D_{no\ CBs}}_{R,D} = \frac{-8+12k-3k^2}{6(1-k)}\alpha < \frac{-2-2k+k^2}{3}\alpha = \bar{\tau}^{R,D}_{D,D}$$

or that $(-2+k)^2(-1+k)(-1+2k) > 0$, which is always true. So voters who selected (R,D) strictly benefit from CBs.

For $S \in [-p\alpha, -\alpha]$, voters who choose (D,D) are $\tilde{\tau} < \bar{\tau}^{R,D}_{D,D}$, (R,D) are $\bar{\tau}^{R,D}_{D,D} < \tilde{\tau} < \bar{\tau}^{R,D}_{D,R}$ and (D,R) are $\bar{\tau}^{R,D}_{D,R} < \tilde{\tau} < 0$. We have shown that voters under (D,D) and (R,D) strictly benefit from CBs. What remains is to show that voters under (D,R) cannot be worse off under CBs. They benefit from CBs whenever:

$$\begin{aligned} EV_1(D,R) &> EV_0(D,\cdot) \\ -\left(\frac{S+2\alpha}{2\alpha}\right)(S-\tilde{\tau})^2 - \frac{1}{2\alpha}\left(-\frac{\tilde{\tau}^3}{3} - \frac{(S-\tilde{\tau})^3}{3}\right) &> -(\alpha+\tilde{\tau}) - \frac{\alpha^2}{3} \end{aligned}$$

or that

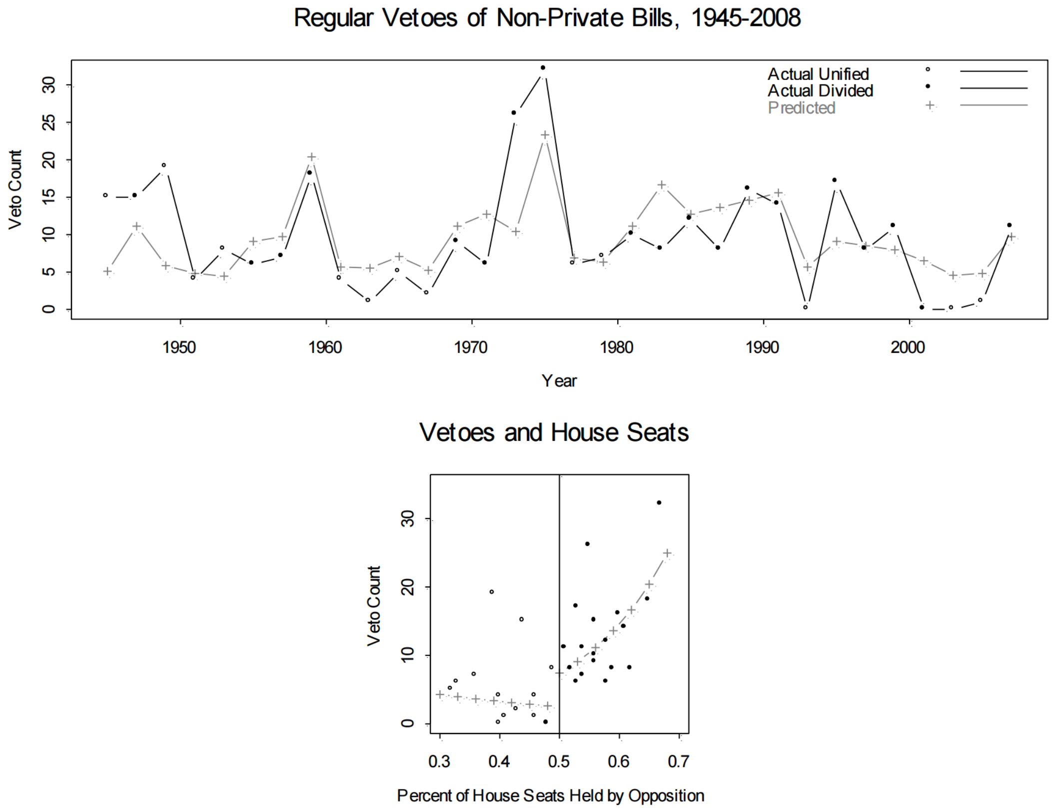
$$\tilde{\tau} > \frac{-2\alpha+2S}{3} = \bar{\tau}^{D_{no\ CBs}}_{D,R}$$

Note that $\bar{\tau}^{D_{no\ CBs}}_{D,R} < \bar{\tau}^{R,D}_{D,R}$ since:

$$\bar{\tau}^{D_{no\ CBs}}_{D,R} = \frac{-2-2k}{3}\alpha < \frac{-2(12-12k+k^3)}{3(8-8k+k^2)}\alpha = \bar{\tau}^{R,D}_{D,R}$$

or that $(8-8k+k^2)(4-12k+7k^2) < 0$, which is satisfied for $1 < k < p$. Hence, voters under (D,R) strictly benefits from CBs. This completes the proof. $\square$

Figure 3.1: Presidential Vetoes of Non-Private Bills for 1945-2008



Notes: This figure is an exact copy of Figure 1 in Cameron (2009) “The Presidential Veto.” All credit should be given to Charles Cameron.

Figure 3.2: Distribution of Party Members' Bliss Points

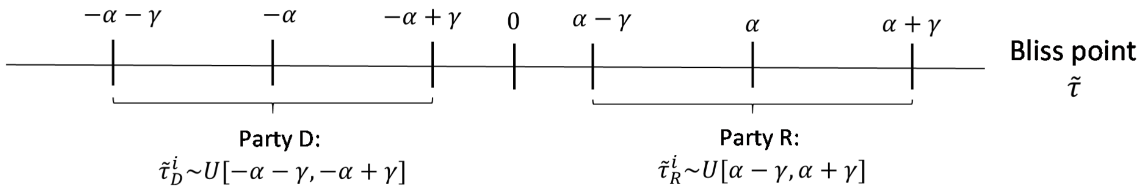
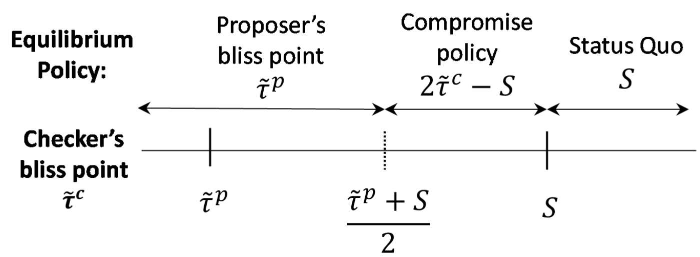


Figure 3.3: Equilibrium policies

(a) $\tilde{\tau}^p < S$



(b) $\tilde{\tau}^p > S$

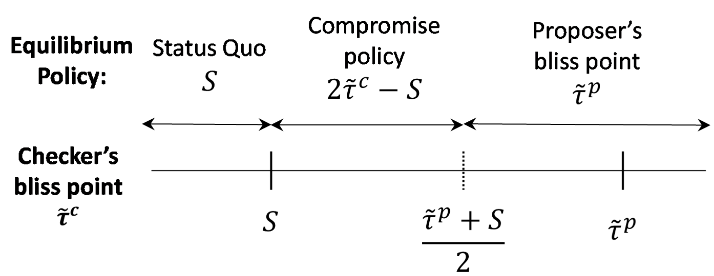


Figure 3.4: Expected welfare comparison between $\mathbb{V}$ =0 and $\mathbb{V}$ =1 under one-sided uncertainty on checker's bliss point, when S is center-left ($-\alpha \leq S \leq 0$)

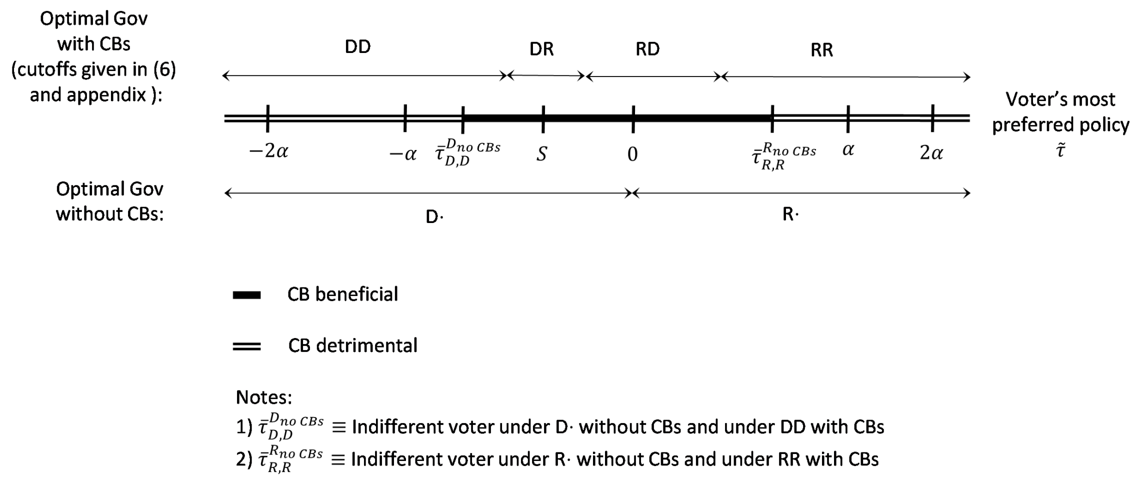


Figure 3.5: Methodology on disentangling the effects of uncertainty and veto power on voter welfare

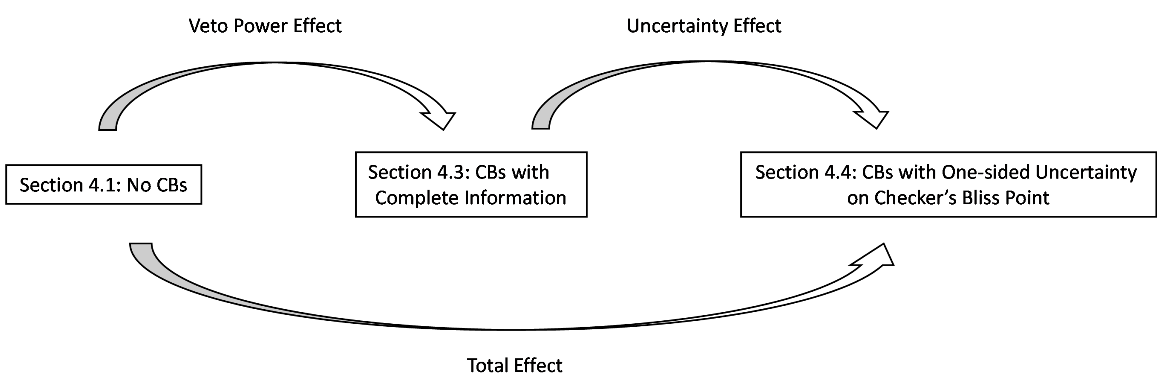


Figure 3.6: Expected welfare comparison between $\mathbb{V}$ =0 and $\mathbb{V}$ =1 under one-sided uncertainty on proposer's bliss point, when S is center-left ($-\alpha \leq S \leq 0$)

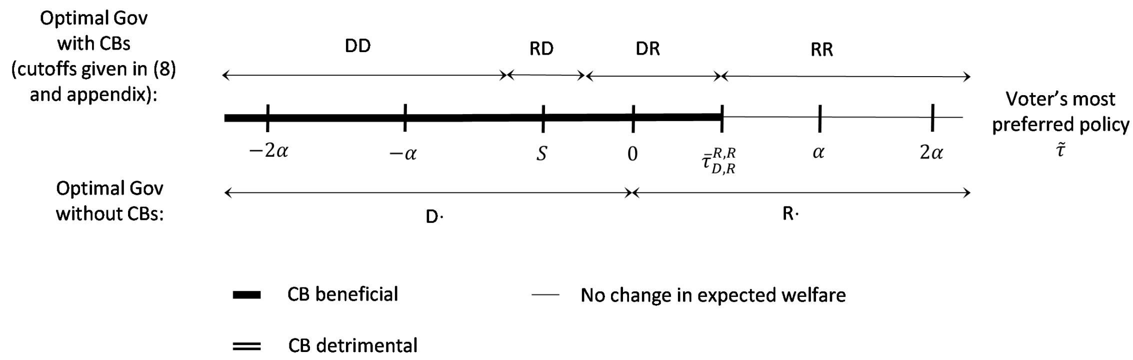


Table 3.1: Equilibrium policies under one-sided variation on checker's bliss point $\tilde{\tau}^c$.

(a) Centrist S: $-\alpha \leq S \leq 0$

	Policy		
Government (E_1, L_1)	**P:** $\tilde{\tau}^p$	**CP:** $2\tilde{\tau}^c - S$	**SQ:** S
D,D	$-2\alpha \leq \tilde{\tau}^c \leq \frac{S-\alpha}{2}$	$\frac{S-\alpha}{2} < \tilde{\tau}^c < S$	$S \leq \tilde{\tau}^c \leq 0$
D,R	-	-	$0 \leq \tilde{\tau}^c \leq 2\alpha$
R,D	-	$S < \tilde{\tau}^c \leq 0$	$-2\alpha \leq \tilde{\tau}^c \leq S$
R,R	$\frac{\alpha+S}{2} \leq \tilde{\tau}^c \leq 2\alpha$	$0 \leq \tilde{\tau}^c < \frac{\alpha+S}{2}$	-

(b) Moderate-left S:$-2\alpha \leq S < -\alpha$

	Policy		
Government(E_1, L_1)	**P:** $\tilde{\tau}^p$	**CP:** $2\tilde{\tau}^c - S$	**SQ:** S
D,D	$\frac{S-\alpha}{2} \leq \tilde{\tau}^c \leq 0$	$S < \tilde{\tau}^c < \frac{S-\alpha}{2}$	$-2\alpha \leq \tilde{\tau}^c \leq S$
D,R	$0 \leq \tilde{\tau}^c \leq 2\alpha$	-	-
R,D	$\frac{S+\alpha}{2} \leq \tilde{\tau}^c \leq 0$	$S < \tilde{\tau}^c < \frac{S-\alpha}{2}$	$-2\alpha \leq \tilde{\tau}^c \leq S$
R,R	$0 \leq \tilde{\tau}^c \leq 2\alpha$	-	-

(c) Extreme left S: $S < -2\alpha$

Government	**Policy**		
(E_1, L_1)	**P:** $\tilde{\tau}^p$	**CP:** $2\tilde{\tau}^c - S$	**SQ:** S
D,D	$\frac{S-\alpha}{2} \leq \tilde{\tau}^c \leq 0 \quad if \quad -3\alpha \leq S < -2\alpha$ $-2\alpha \leq \tilde{\tau}^c \leq 0 \quad if \quad S < -3\alpha$	$-2\alpha \leq \tilde{\tau}^c < \frac{S-\alpha}{2} \quad if \quad -3\alpha \leq S < -2\alpha$	-
D,R	$0 \leq \tilde{\tau}^c \leq 2\alpha$	-	-
R,D	$\frac{S+\alpha}{2} \leq \tilde{\tau}^c \leq 0 \quad if \quad -5\alpha \leq S < -2\alpha$ $-2\alpha \leq \tilde{\tau}^c \leq 0 \quad if \quad S < -5\alpha$	$-2\alpha \leq \tilde{\tau}^c < \frac{S+\alpha}{2} \quad if \quad -5\alpha \leq S < -2\alpha$	-
R,R	$0 \leq \tilde{\tau}^c \leq 2\alpha$	-	-

Notes: **P**=Proposer's Bliss Point, **CP**=Compromise Policy, **SQ**=Status Quo

Table 3.2: Equilibrium policies under one-sided variation on proposer's bliss point $\tilde{\tau}^p$.

(a) Centrist S: $-\alpha \leq S \leq 0$

	Policy		
Government (E_1, L_1)	**P:** $\tilde{\tau}^p$	**CP:** $2\tilde{\tau}^c - S$	**SQ:** S
D,D	$-2\alpha - S \leq \tilde{\tau}^p \leq S$	$-2\alpha \leq \tilde{\tau}^p < -2\alpha - S$	$S < \tilde{\tau}^p \leq 0$
D,R	$S \leq \tilde{\tau}^p \leq 0$	-	$-2\alpha \leq \tilde{\tau}^p < S$
R,D	-	-	$0 \leq \tilde{\tau}^p < 2\alpha$
R,R	$0 \leq \tilde{\tau}^p < 2\alpha$	-	-

(b) Moderate-left S: $-2\alpha \leq S < -\alpha$

	Policy		
Government (E_1, L_1)	**P:** $\tilde{\tau}^p$	**CP:** $2\tilde{\tau}^c - S$	**SQ:** S
D,D	$S \leq \tilde{\tau}^p \leq -2\alpha - S$	$-2\alpha - S < \tilde{\tau}^p \leq 0$	$-2\alpha \leq \tilde{\tau}^p \leq S$
D,R	$S \leq \tilde{\tau}^p \leq 0$	-	$-2\alpha \leq \tilde{\tau}^p < S$
R,D	-	$0 \leq \tilde{\tau}^p < 2\alpha$	-
R,R	$0 \leq \tilde{\tau}^p < 2\alpha$	-	-

(c) Extreme left S: $S < -2\alpha$

Government	**Policy**		
(E_1, L_1)	**P:** $\tilde{\tau}^p$	**CP:** $2\tilde{\tau}^c - S$	**SQ:** S
D,D	$-2\alpha \leq \tilde{\tau}^p \leq 0$	-	-
D,R	$-2\alpha \leq \tilde{\tau}^p \leq 0$	-	-
R,D	$0 \leq \tilde{\tau}^p \leq -2\alpha - S \quad if \quad -4\alpha \leq S < -2\alpha$ $0 \leq \tilde{\tau}^p \leq 2\alpha \quad if \quad S < -4\alpha$	$-2\alpha - S \leq \tilde{\tau}^p \leq 2\alpha \quad if \quad -4\alpha \leq S < -2\alpha$	-
R,R	$0 \leq \tilde{\tau}^p < 2\alpha$	-	-

Notes: **P**=Proposer's Bliss Point, **CP**=Compromise Policy, **SQ**=Status Quo

Table 3.3: Equilibrium Policies under Complete Information

(a) $S \in [-\alpha, -\frac{\alpha}{3})$

	Equilibrium Policy			
$\tilde{\tau}_D^c$	(D,D)	(D,R)	(R,D)	(R,R)
$[-2\alpha, \frac{S-\alpha}{2})$	$-\alpha$	S	S	α
$[\frac{S-\alpha}{2}, S]$	$2\tilde{\tau}_D^c - S$	S	S	α
$(S, \frac{-\alpha-S}{2}]$	S	S	$2\tilde{\tau}_D^c - S$	α
$(\frac{-\alpha-S}{2}, 0]$	S	S	$2\tilde{\tau}_D^c - S$	$-2\tilde{\tau}_D^c - S$

(b) $S \in [-\frac{\alpha}{3}, 0]$

	Equilibrium Policy			
$\tilde{\tau}_D^c$	(D,D)	(D,R)	(R,D)	(R,R)
$[-2\alpha, \frac{S-\alpha}{2})$	$-\alpha$	S	S	α
$[\frac{S-\alpha}{2}, \frac{-\alpha-S}{2}]$	$2\tilde{\tau}_D^c - S$	S	S	α
$(\frac{-\alpha-S}{2}, S]$	$2\tilde{\tau}_D^c - S$	S	S	$-2\tilde{\tau}_D^c - S$
$(S, 0]$	S	S	$2\tilde{\tau}_D^c - S$	$-2\tilde{\tau}_D^c - S$

Table 3.4: Ideology of indifferent voters $\bar{\tau}_{e,l}^{e',l'}$ when $S \in [-\alpha, 0]$

Gov (e,l) \ Gov (e',l')	D,D	D,R	R,D	R,R
D,D	-	$\frac{-10\alpha^2+7\alpha s+5s^2}{3(7\alpha+2s)}$	$\frac{-10\alpha^3-3\alpha^2 s+12\alpha s^2+9s^3}{3(7\alpha^2+10\alpha s+7s^2)}$	$\frac{-s(\alpha^2+s^2)}{7\alpha^2+s^2}$
D,R	*	-	$\frac{s}{3}$	$\frac{10\alpha^3-3\alpha^2 s-12\alpha s^2+s^3}{3(7\alpha^2-10\alpha s-s^2)}$
R,D	*	*	-	$\frac{10\alpha^3-3\alpha^2 s-12\alpha s^2-3s^3}{3(7\alpha^2-10\alpha s-5s^2)}$
R,R	*	*	*	-

Notes: Table is symmetric.

Table 3.5: Ideology of indifferent voters $\bar{\tau}_{e,l}^{e',l'}$ when $S \in [-\alpha, 0]$

Gov (e,l) \ Gov (e',l')	D,D	D,R	R,D	R,R
D,D	-	$\frac{-8\alpha^3+12\alpha s^2+6s^3}{3(4\alpha^2+4\alpha s+s^2)}$	$\frac{-2\alpha^2+2\alpha s+s^2}{3\alpha}$	$\frac{3\alpha s^2+2s^3}{12\alpha^2}$
D,R	*	-	$\frac{2s}{3}$	$\frac{8\alpha^3-6\alpha s^2-2s^3}{3(4\alpha^2-4\alpha s-s^2)}$
R,D	*	*	-	$\frac{4\alpha^2-3s^2}{6(\alpha-s)}$
R,R	*	*	*	-

Notes: Table is symmetric.

Table 3.6: Ideology of indifferent voters $\bar{\tau}_{e,l}^{e',l'}$ when $S \in [-2\alpha, -\alpha]$

Gov (e', l') / Gov (e, l)	D,D	D,R	R,D	R,R
D,D	-	$\frac{-2(2\alpha+s)}{3}$	$\frac{-2\alpha^2+2\alpha s+s^2}{3\alpha}$	$\frac{-4\alpha^3-12\alpha^2 s-9\alpha s^2-2s^3}{12\alpha^2}$
D,R	*	-	$\frac{-2(12\alpha^3+12\alpha^2 s-s^3)}{3(8\alpha^2+8\alpha s+s^2)}$	$\frac{8\alpha^3-6\alpha s^2-2s^3}{3(4\alpha^2-4\alpha s-s^2)}$
R,D	*	*	-	$\frac{-8\alpha^2-12\alpha s-3s^2}{6(3\alpha+s)}$
R,R	*	*	*	-

Notes: Table is symmetric.

Bibliography

Abelson, R. P., E. F. Loftus, and A. G. Greenwald (1992). Attempts to improve the accuracy of self-reports of voting. *Questions about questions*, 138–53.

Abramowitz, A. I. (1991). Incumbency, campaign spending, and the decline of competition in u.s. house elections. *The Journal of Politics 53*(1), 34–56.

Acemoglu, D., J. A. Robinson, and R. Torvik (2013). Why do voters dismantle checks and balances? *The Review of Economic Studies 80*(3 (284)), 845–875.

Alesina, A. and H. Rosenthal (1989). Partisan cycles in congressional elections and the macroeconomy. *American Political Science Review 83*(2), 373–398.

Ansolabehere, S. and A. Gerber (1994). The mismeasure of campaign spending: Evidence from the 1990 u.s. house elections. *The Journal of Politics 56*(4), 1106–1118.

Ansolabehere, S., S. Iyengar, A. Simon, and N. Valentino (1994). Does attack advertising demobilize the electorate?. *American political science review 88*(04), 829–838.

Ashworth, S., J. D. Clinton, et al. (2007). Does advertising exposure affect turnout? *Quarterly Journal of Political Science 2*(1), 27–41.

Austen-Smith, D. and J. S. Banks (1996). Information aggregation, rationality, and the condorcet jury theorem. *The American Political Science Review 90*(1), 34–45.

Bernstein, R., A. Chadha, and R. Montjoy (2001). Overreporting voting: Why it happens and why it matters. *Public Opinion Quarterly 65*(1), 22–44.

Budge, I. (1994). A new spatial theory of party competition: Uncertainty, ideology and policy equilibria viewed comparatively and temporally. *British Journal of Political Science 24*(4), 443–467.

Callander, S. (2008). Political motivations. *The Review of Economic Studies 75*(3), 671–697.

Cameron, C. (2009). The presidential veto. *The Oxford Handbook of the American Presidency*, 362–382.

Campbell, A. and W. E. Miller (1957). The motivational basis of straight and split ticket voting. *American Political Science Review 51*(2), 293–312.

Chari, V. V., L. E. Jones, and R. Marimon (1997). The economics of split-ticket voting in representative democracies. *The American Economic Review 87*(5), 957–976.

Condorcet, M. d. (1785). Essay on the application of analysis to the probability of majority decisions. *Paris: Imprimerie Royale*.

Erikson, R. S. (1972). Malapportionment, gerrymandering, and party fortunes in congressional elections. *American Political Science Review 66*(4), 1234–1245.

Erikson, R. S. and T. R. Palfrey (2000). Equilibria in campaign spending games: Theory and data. *American Political Science Review 94*(3), 595–609.

Feddersen, T. and W. Pesendorfer (1997). Voting behavior and information aggregation in elections with private information. *Econometrica: Journal of the Econometric Society*, 1029–1058.

Fowler, E. F. and T. N. Ridout (2012). Negative, angry, and ubiquitous: Political advertising in 2012. In *The Forum*, Volume 10, pp. 51–61.

Gentzkow, M. and J. M. Shapiro (2010). What drives media slant? evidence from us daily newspapers. *Econometrica 78*(1), 35–71.

Gerber, A. (1998). Estimating the effect of campaign spending on senate election outcomes using instrumental variables. *American Political Science Review 92*(2), 401–411.

Gerber, A. S., J. G. Gimpel, D. P. Green, and D. R. Shaw (2011). How large and long-lasting are the persuasive effects of televised campaign ads? results from a randomized field experiment. *American Political Science Review 105*(01), 135–150.

Gerber, A. S. and D. P. Green (2000). The effects of canvassing, telephone calls, and direct mail on voter turnout: A field experiment. *American political science review 94*(03), 653–663.

Green, D. P. and J. S. Krasno (1988). Salvation for the spendthrift incumbent: Reestimating the effects of campaign spending in house elections. *American Journal of Political Science 32*(4), 884–907.

Jacobson, G. C. (1978). The effects of campaign spending in congressional elections. *American Political Science Review 72*(2), 469–491.

Krasno, J. S. and D. P. Green (2008). Do televised presidential ads increase voter turnout? evidence from a natural experiment. *The Journal of Politics 70*(1), 245–261.

Krebs, T. B. (2001). Political experience and fundraising in city council elections. *Social science quarterly 82*(3), 536–551.

Krehbiel, K. (1996). Institutional and partisan sources of gridlock: a theory of divided and unified government. *Journal of Theoretical Politics 8*(1), 7–=40.

Larreguy, H., J. Marshall, and J. M. Snyder Jr (2014). Political advertising in consolidating democracies: Radio ads, clientelism, and political development in mexico. Technical report, Working Paper.

Levitt, S. D. (1994). Using repeat challengers to estimate the effect of campaign spending on election outcomes in the u.s. house. *Journal of Political Economy 102*(4), 777–798.

Maskin, E. and J. Tirole (2004). The politician and the judge: Accountability in government. *The American Economic Review 94*(4), 1034–1054.

McCarty, N., K. T. Poole, and H. Rosenthal (2009). Does gerrymandering cause polarization? *American Journal of Political Science 53*(3), 666–680.

Persson, T., G. Roland, and G. Tabellini (1997). Separation of powers and political accountability. *The Quarterly Journal of Economics 112*(4), 1163–1202.

Persson, T., G. Roland, and G. Tabellini (2000). Comparative politics and public finance. *Journal of political Economy 108*(6), 1121–1161.

Porter, M. F. (1980). An algorithm for suffix stripping. *Program 14*(3), 130–137.

Schuster, S. (2015). What we talk about when we talk about campaign spending. Working paper.

Shaw, D. R. (1999). The effect of tv ads and candidate appearances on statewide presidential votes, 1988-96. *The American Political Science Review 93*(2), 345–361.

Spenkuch, J. L. and D. Toniatti (2016). Political advertising and election outcomes.

Stratmann, T. (2005). Some talk: Money in politics. a (partial) review of the literature. In *Policy Challenges and Political Responses*, pp. 135–156. Springer.

Stratmann, T. (2009). How prices matter in politics: the returns to campaign advertising. *Public Choice 140*(3), 357–377.

Tsebelis, G. (2002). *Veto players: How political institutions work*. Princeton University Press.