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Bachelor's Thesis in Economics, specialization in Data Handling and Data Analytics

Examining the Influence of Fossil Fuel Industry Contributions on US Congressional Voting Behaviour: A Data-Driven Analysis of Campaign Financing and Environmental Voting

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Abstract

Wealthy donors such as the Koch brothers of Koch Industries have contributed over 27 million USD to various congressional candidates in the 2022 election. This paper analyses whether such contributions from anti-environmental interest groups such as Koch Industries influence congressional voting on environmental issues. Building on the work of Stratmann (2002), it examines repeated roll-call votes on methane pollution and the corresponding campaign contributions received by US representatives within six months of these votes. Using a causal identification strategy, the analysis attempts to determine the impact of pro- and anti-environmental contributions on voting behavior. The analysis shows that pro- (anti-)environmental contributions have a positive (negative) effect on voting behavior, although no causal relationship can be definitively established due to the small number of representatives who change their voting behavior.

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[1] Since the 2024 election cycle is due in November 2024, the contributions are not comparable to 2022 yet

[2] where * stands for a Presidential Election Cycle, 1990-2022

[3] The variable Instance refers to the Votes. The Instances are 3, 4, 51, 52, 6, and 7, where 3 stands for the vote in the 113th Congress, 51 stands for the first vote in the 115th Congress, 52 for the second vote in the 115th congress, etc. The district variable refers to the district that the legislators represented. Sadly not all representatives had the district information.

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List of Abbreviations

***DW-Nominate* – Dynamic Weighted Nominate.**

***EPA* – Environmental Protection Agency.**

***FEC* – Federal Election Commission.**

***LCV* – League of Conservation Votes.**

***LPM* – Linear Probability Model.**

***PAC* – Political Action Committee.**

***VIF* – Variance Inflation Factor.**

1 Introduction

The United States has seen a dramatic increase in wealth and income gaps in recent decades, with the wealthy and powerful seeking to shape the political environment (Skocpol & Hertel-Fernandez, 2016), alongside the Two-Party system becoming more polarized (Mccarty et al., 2006). The public's perceptions mirror these trends: 84 percent of US residents think that money influences politics excessively and express a desire to see changes made to the campaign finance system to lessen the influence of wealthy donors (Bonica & Rosenthal, 2015, p. 1).

But how do campaign donors influence politics? The prime example is the brothers David and Charles Koch, who are one of the most influential donors who have a multifaceted approach when it comes to their involvement in US politics. On the one hand, they shape the mindset of the US population through organized groups, think tanks, and networks of other mega-donors with similar political and social ideologies, such as the Koch Network (Hertel-Fernandez et al., 2018).

On the other hand, the fossil fuel conglomerate Koch Industries, headed by Charles Koch, funds the electoral campaigns of Republican presidential and congressional candidates (Skocpol & Hertel-Fernandez, 2016) and have spent more than 123 million USD on elections. Especially over the past ten years, Koch Industries have increased their campaign contributions by at least 10% per election cycle, amounting to 28 million USD in the 2022 election cycle, with approximately 90-97% of these congressional contributions going to Republican candidates (https://www.opensecrets.org/orgs/koch-industries/summary?id=d000000186).

Given the participation that wealthy fossil fuel donors like the Koch brothers have in US elections, the question is why donors such as these contribute immense sums to congressional elections. Surely, profit-maximizing firms such as the Koch Industries do not merely contribute millions of USD to congressional campaigns without considering their return on investment (Stratmann, 2017). Thus, the question is what campaign contributors are to receive in return for their donations. Given Charles Koch's position at Koch Industry and fossil fuel related conglomerate Koch Industries and David Koch's history in climate change denial (Doreian

& Mrvar, 2022, pp. 2-8), and their donor and advocacy roles in the United States make one wonder what the consequences of fossil fuel-related campaign contributions to the US Congress could mean for US environmental policies.

These questions will be analyzed in this paper. The influence of fossil fuel and environmentally related contributions on the voting behavior of US House members on methane pollution bills will be analyzed. The analysis is based on the paper of Stratmann (2002), who exploits the time series nature of campaign contributions and roll-call votes to approach a causal identification strategy to measure the effect of financial contributions on roll-call votes. Regarding campaign contribution, however, Stratmann (2002) uses the aggregate contributions for each election cycle, whereas, in his 1995 paper, only the contributions leading up to the vote are included, regardless of election cycle (Stratmann, 1995). Although both contribution types are explored, this paper will focus on the latter contribution type for the final analysis.

Chapter 2 will give a short literature review on the economics and political science perspectives on money in politics, with a focus on the causal relationship between campaign contributions and the representatives' voting decisions. Chapter 3 presents the research design, details the reasoning behind analyzing environmental legislation and the methane pollution roll-call votes in particular, and presents the hypotheses regarding the effect of contribution on voting decisions. Chapter 4 presents the data types and processing for the analysis and Chapter 5 presents the models used. Chapter 6 reports the results and Chapter 7 provides the discusses the results and concludes the paper.

2 Money in Politics

To understand the relationship between campaign contributions and representatives' voting decisions, the concept for money in US politics needs to be introduced. Weschle (2022a) defines three types of money in politics, namely self-enrichment, campaign contribution, and golden parachute jobs. The first type happens when politicians are in office, and receive resources from special interest groups. The second is when politicians receive campaign contributions during elections to fund their campaigns. According to Weschle, the last type of money in politics is the golden parachute jobs, which are financially lucrative positions offered to ex-politicians.

2.1 Campaign Contributions

Although each type of political funding has significant and distinct repercussions for democracy and the voting behavior of politicians (Weschle, 2022a), campaign contributions in US politics are of particular importance for the analysis presented in this paper. One reason for this, is that there has been a stark increase in contributions to political campaigns over time (Stratmann, 2005, p.141; 2017, p.1) and understanding the reasons behind contributors donating this money to fund campaigns could help policymakers deal with this issue. The average contributions to members of Congress have increased as well within the last 40 years.

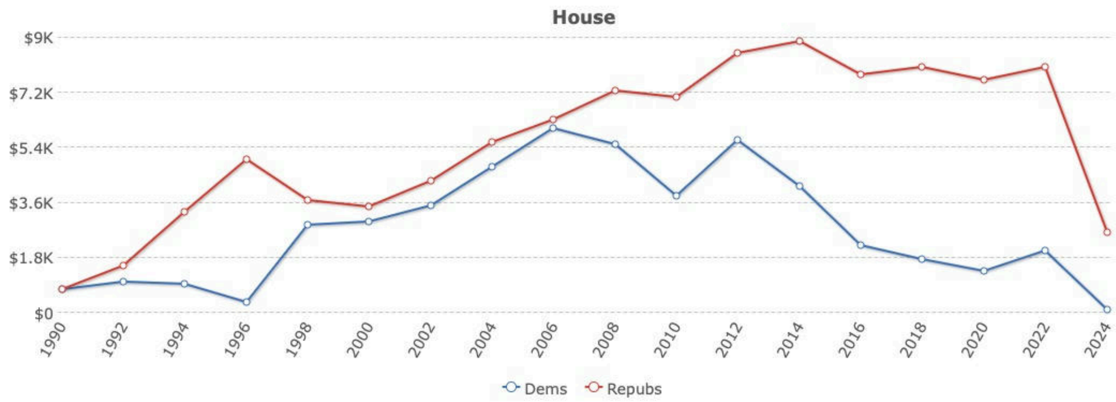

Figure 1: Average Contributions to House Members[4], 1990-2022, Source: (Center for Responsive Politics, 2024a)

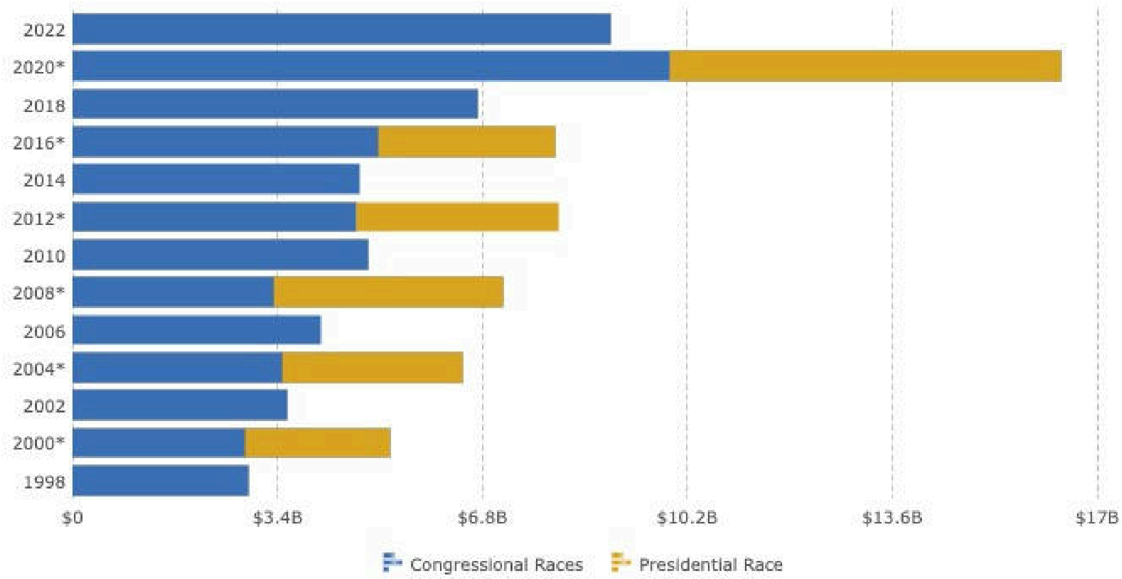

Figure 2: Total Cost of Election[5], Source: (Center for Responsive Politics, 2024b)

One of the primary reasons for the noted increase in both the total costs of presidential and congressional elections over the last 30 years, as well as the average campaign contributions per representative, is a significant change in legislation. In 2010, the US Supreme Court ruled on the landmark case Citizens United v. Federal Election Commission (FEC). This decision addressed whether Congress could limit independent expenditures by corporations. Traditionally, campaign contributions are structured as individual and Political Action Committee (PAC) contributions, as shown in Center for Responsive Politics (2023) data. Individual contributions are those over 200 USD made by natural persons or their family members who are employed in the industry (Grier et al., 2023). PACs represent corporate or labor interests (Weschle, 2022b). The Citizens United v. FEC ruling affirmed that both natural and legal persons—individuals and corporations—possess equivalent rights to spend on US congressional campaigns (Foreman, 2018,

[4]Since the 2024 election cycle is due in November 2024, the contributions are not comparable to 2022 yet

[5]where * stands for a Presidential Election Cycle, 1990-2022

p.194). This decision ultimately allowed for unlimited independent expenditures related to elections[6].

Even if campaign contributions have risen over time, the reason as to why politicians receive them should be clarified. US Citizens who would like to become members of the United States Congress, such as the House of Representatives, which is the chamber of Congress which this analysis focuses on, need to become elected through a bi-yearly congressional election. To improve the chances of election, these candidates get financial contributions, which they spend on advertisements, rallies, and flyers to attract more votes (Weschle, 2022a, p. 24).

Yet, why would corporations give money to candidates via PACs or individual contributions, which these will not return? Stratmann makes the assumption that since corporations are inherently for-profit, they do not donate to organizations without wanting to profit from doing so. Economists and political scientists hypothesize, that companies' campaign spending is strategic (Denzau & Munger, 1986; Stratmann, 2017; Weschle, 2022a, p. 25). What exactly these companies receive in return for their contribution, however, is unclear (Stratmann, 2017). Stratmann defines three motives for contributions: the first is access to the candidate, the second is to influence elections and the third is to contribute to the candidate most likely to win (Stratmann, 2005, p. 146; 2017, p. 13). Weschle (2022a) determines that what campaign donors receive in return for contributing to candidates is either influence, meaning they change the opinion of the candidate by contributing to their campaign, or the support of a candidate that has your interest at heart, with specifically small scale contributors following both methods.

Besides discussing the reasons for campaign contributions, the question is also whether there is a positive correlation between candidates receiving contributions and receiving increased vote shares. If this were the case, then campaign spending would be more straightforward, since this would mean that successful election can be assumed.

[6] United States Citizens United v. Federal Election Commission, January 21, 2010

2.2 Contributions and Candidates' Election successes

One would assume that receiving more campaign contributions would relate to a higher chance of getting elected, yet there is no clear correlation between campaign contributions and the vote shares which candidates receive (Stratmann, 2005; Weschle, 2022a, p. 24). In fact, there are a host of factors that influence the amount of campaign contributions politicians receive, which are often endogenous to a candidate's vote shares (Weschle, 2022a, p. 24).

Geographical factors play a role in contribution, for example. A contribution amount is worth more in some congressional districts than in others, since costs like rallying and advertising are priced differently (Stratmann, 2009). Similarly, contribution limits imposed on certain US states cap the contribution amount candidates may receive (Weschle, 2022a, p. 25), and candidates from states with larger governments receive more contributions on average (Bronars & Lott, 1997; Stratmann, 2005, p.148). Factors that depend on the nature of the election also influence the level of contributions, since the expected competitiveness of the election outcome also changes the average contribution amounts, i.e. incumbents[7] who expect their position to be threatened will be incentivized to gather more donations[8] (Weschle, 2022a, p. 8), (Stratmann, 2017, p. 25). The partisan lean of a state also determines which candidates are up for race (Stratmann, 2017, p. 9). PAC contributions in particular depend on the incumbency status of the candidate, since incumbents receive more contributions on average (Fouirnaies & Hall, 2014; Selling, 2023). When academic papers like that of Weschle (2022b) examine factors such as those mentioned above, they find that increased campaign spending is associated with higher vote shares for representatives.

2.3 Campaign Contributions and Representatives' Voting Decisions.

When it comes to the relationship between campaign contributions from special interests and representative's voting decisions in that interest's favor, many re-

[7]A current office holder seeking re-election.

[8]Donations and contributions are used synonymously in this paper.

searchers see a correlation. Yet, the deduction of what that means for the relationship between campaign contributions and votes is difficult to make. Do incumbents cater to the wishes of special interest groups, because of their contribution or do they get contributions because their views coincide with the special interest groups (Kau et al., 1982, p. 275; Stratmann, 2005, p. 143)? Similarly, it is difficult to distinguish between two possible explanations for donations to politicians: either donors merely sympathize with and support politicians who share their views, or donations actually influence the politicians' decisions (i.e., donations actually buy votes) (Bronars & Lott, 1997; Chappell, 1982, p.83).

To overcome these challenges, causality must be established. Yet determining causality when there is a positive association between donations and roll-call votes is one of the most challenging issues in the literature on campaign finance. The idea that money may be exchanged for votes is contested by two competing causal theories. Firstly, donors often provide to organizations and individuals that are inclined to support their policy ideas (Burris, 2001). Secondly, it is possible that donations function more as rewards or punishments for previous roll-call votes than as catalysts for more voting (Stratmann, 1991). In the first case, the ideology of the lawmaker acts as a confusing factor, making the link between money and votes fictitious. The second situation involves the concept of reverse causality (Selling, 2023; Stratmann, 2017).

Given the importance of determining causal relationships for money in politics, several researchers have tried to identify such a relationship between voting and contributions and have not found effects, such as Bronars & Lott (1997), who analyzed how the voting behavior of politicians changed when they did not stand for re-election. Ideally, politicians should represent their ideology, even without facing the threat of re-election, yet if their vote is 'bought' then their contributions and voting behavior change, since the cost of shirking decreases (Bronars & Lott, 1997, p.319). Ansolabehere et al. (2003) analyzed 40 empirical papers and concluded in a seminal paper that there is limited evidence indicating interest group contributions have an impact on roll-call votes (Grier, Grier, & Mkrtchian, 2023).

Others, however, have found that contributions do change voting behavior: Stratmann analyzed the timing of contributions, and instead of analyzing how the contributions of the previous cycle relates to the voting behavior of politicians, Stratmann took the contributions from current election cycles, since short term contributions are more relevant for voting behavior, according to him (Stratmann, 1995). Bertrand et al. (2014) finds indirect evidence of lobbying companies providing special interest groups access to politicians when these groups contribute (as opposed to giving only issue-specific information to congress members) (Matter et al., 2019). Baldwin & Magee (2000) also find linkages of roll-call votes on specific trade agreement-related bills and the contributions from businesses and labor groups. McAlexander & Urpelainen (2020), in their paper on the electoral gap in environmental voting determines that since the public's inclination for environmental protection is greater than the oil and gas sector's, candidates who get large campaign contributions from businesses tend to vote more in favour of the environment when elections come around.

Given that some results find causal relationships between contributions and others find no effect, most researchers can conclude that there is no academic consensus on this matter (Stratmann, 2017, p.13). Part of the reason there is no academic consensus on causal relationships is because of the nature of the studies, which are cross-sectional in design, where the correlation between contributions and votes is given due to the support of similar interests, so we have simultaneous equation bias (Burris, 2001; Chappell, 1982; Stratmann, 2002, p.1).

The studies which found causal links between campaign contributions and voting behavior have a common denominator: research in particular fields or legislation. Baldwin & Magee (2000), for example analyzed trade agreement related bills, Stratmann (2002) analyzed financial bills (Kang, 2015; Stratmann, 1995; 1995) and the timing of financial contributions, and found significant effects. Hence, one needs to analyze distinct roll-call votes and a rather restricted policy setting (Chappell, 1982; Kang, 2015; Stratmann, 1991, p.607).

Moreover, Stratmann criticizes that most studies done in the field lack a convincing identification strategy to determine the causal relationship between legislative voting behavior and campaign contributions. One significant problem is from the possibility of reverse causation, “meaning that while contributions have an impact on roll call votes, it is also possible that legislators who cast roll call votes which are favorable to interest groups receive contributions from these groups” (Stratmann, 2017, p.14).Common criticism in the field is attributed not only to studies whose analysis does not focus on a specific legislation or account for reverse causality, but also those who do not control for individual counties and geographical areas (Grier, Grier, & Mkrtchian, 2023; Stratmann, 2005, p.142). Moreover, only by looking at repeated votes and thus changes in voting behavior, a link can be determined between contribution and voting (Stratmann, 2002; 2005, pp.143-144). Considering a closer time-frame for contribution has also proven to increase plausibility (Stratmann, 1995).

Given the extensive research done on money in politics, and the (causal) relationship between campaign contributions and roll-call voting behavior, this paper will aim to take the above stated specifications to analyze a causal relationship between campaign contributions and roll-call votes in the environmental context.

3 Research Design

This section will deal with the reasoning behind the chosen roll-call votes and campaign contributions, and the hypothesis which are set up for the analysis.

3.1 Stratmann's Specifications

Stratmann (2002) follows a similar methodology to determine the causal relationship between campaign contributions and the representative's vote shares, defines the following roll-call votes preconditions for his research: the votes are not only repeated but also exhibit changes in voting behavior (Kau, Keenan, & Rubin, 1982, p.276; Stratmann, 2002). Moreover, the winners and losers of the votes need to be defined, the precise subject voted on should not be repeated again. This way patterns in contribution and voting behavior can be deduced more easily. These conditions are met in this analysis. There are six roll-call votes which are related to methane pollution safeguards (i.e. the methane emissions of fossil fuel companies), and these are not repeated to this date, since the vote relates to the acceptance or rejection of an increase in environmental regulation, the winners and losers of the votes are clearly defined.

There are conditions, however, which Stratmann sets up which are not met in this paper. On the one hand, he stipulates that the research should treat a topic where representatives do not typically take clear stance in their election campaigns (Stratmann, 2002, p.4). This is not met here, since environmental positions are usually quite polarizing, and most legislators have clear positions on environment, due to their party line and also their personal conviction (McAlexander & Urpelainen, 2020).

Stratmann argues that it is crucial for representatives to secure campaign contributions from pertinent interest groups, such as those advocating for and against environmental and fossil fuel interests. In this paper, a significant distinction is made because a large number of legislators receive contributions from the fossil fuel industry. Specifically, the Energy and Natural Resources interest groups, predominantly linked to fossil fuels, ranked as the ninth largest contributor in the

2022 congressional elections, donating a total of 196 million USD. In contrast, contributions from environmental groups were considerably smaller (Center for Responsive Politics, 2023).

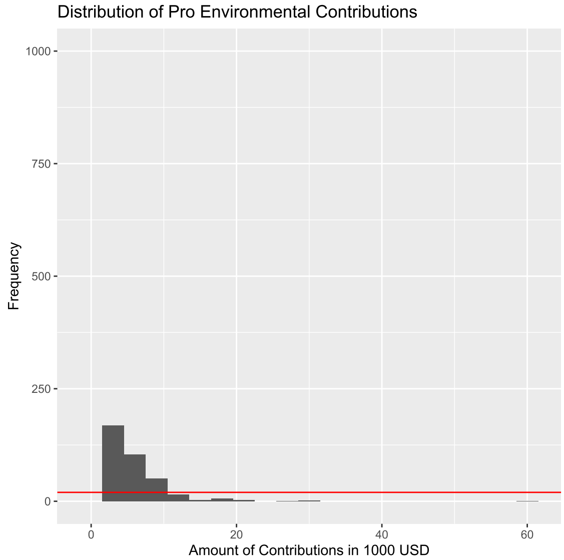

Figure 3: Histogram of pro-environmental contributions among representatives

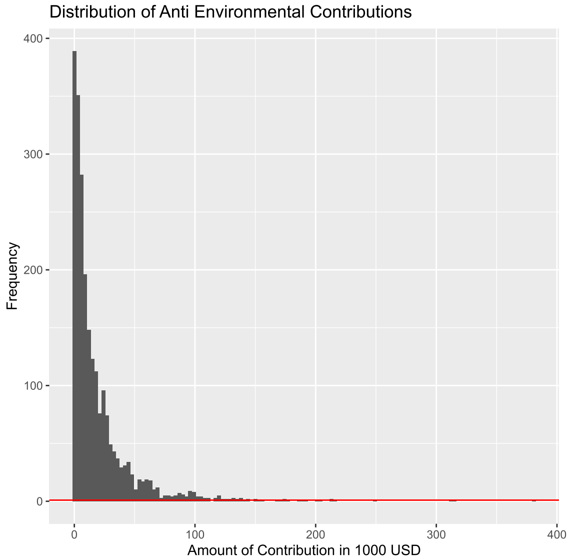

Figure 4: Histogram of anti-environmental contributions among representatives

Examining the figures above reveals distinct differences in the distribution of pro and anti-environmental campaign contributions. Pro-environmental contributions are generally smaller, while anti-environmental contributions tend to be larger and more spread out. This variance is also illustrated by the y-intercept line in the plots, which represents the average contribution to representatives from both groups.

Thus, it is more difficult to compare the contribution sizes of these interest groups. Lastly, Stratmann determines that there need to be a substantial amount of changes in voting behaviors of the representatives, yet in this case, only 23 representatives out of 529 change their vote over time, see Table 2.

3.2 Methane Pollution Votes

Although as shown in the section above, the roll-call bills do not fit all of the preconditions stipulated by Stratmann (2002), analyzing environmental policy and the propensity for representatives to deviate based on contributions is still a relevant topic and has significant repercussions for democracy if a causal relationship does exist.

While environmental issues are polarizing for both the public and representatives, suggesting that representatives might have fewer incentives to change their positions McAlexander & Urpelainen (2020) found that most environmental policies shift the cost burden to industries. Consequently, the general public tends to hold a more favorable view of environmental issues compared to the average interest group. This discrepancy suggests that if campaign contributions were to influence voting behavior, representatives might be more inclined to adopt positions that align more closely with the interests of their contributors, often resulting in weaker environmental stances (McAlexander & Urpelainen, 2020).

Moreover, the reason to choose these bills for the analysis can be attributed to the fact that, as stated above, the Energy and Natural Resources interest groups are some of the biggest contributors to congressional elections (Center for Responsive Politics, 2023) and thus also have the biggest potential to be analyzed, since these contributions are not only large in volume but also in distribution, as stated in Chapter 1.

Legislation	Roll-Call Vote	Session	Year	Subject
H. R. 2728	601	113	2013	would maintain the authority of the Department of the Interior to cut back on methane emissions from gas and oil development on public lands.
H. R. 5538	434	114	2016	includes a rider to prevent the Environmental Protection Agency (EPA) from implementing the first-ever limitations on methane emissions from new and modified sources in the oil and gas industry, which are the newly decided methane pollution standards.
H. R. 3354	488	115	2017	would obstruct the EPA's attempts to regulate methane emissions from sources that are newly developed and modified inside the oil and gas industry.
H. R. 6147	346	115	2018	would hinder the EPA efforts to decrease methane emissions in the oil and gas industry from both new and modified sources from the oil and gas industry
H. R. 3055	385	116	2019	would impede the EPA's attempts to reduce methane emissions from both new and modified sources related to the oil and gas industry.
S.J. Res. 14	185	117	2021	would have reversed the EPA's 2016 methane rules for sources from the oil and gas sector, both new and amended.

Table 1: The Six Roll-Call Votes on Methane Pollution Safeguards analyzed in this paper

The six roll-call votes which will be analyzed in this paper, sourced at (https://scorecard.lcv.org) can be seen in Table 1. The reasoning behind choosing these six bills is that they all amend the resources allocated to the EPA and the Department of Interior. Since the legislation enacted by Congress governs the executive wing including the EPA (McAlexander & Urpelainen, 2020, p.43), these roll-call votes are fundamental in gauging the environmental opinions of representatives. Moreover, the bills are quite similar in nature, since they not only all concern the same departments, but also precisely the methane pollutions and -emissions, generated through the oil and gas industries, and are thus industry specific.

Although in the Stratmann (2002) paper the two roll-call votes all pertained to the amendment of the same bill. This paper uses multiple, closely related, roll-call votes, and thus ensures that there is more variation in voting behavior than there would be, if only two roll-call votes were available.

	No Change in Voting	**Change in Voting**
Pro-Environmental Vote	259	8
Anti-Environmental Vote	278	23

Table 2: Representative's Voting Positions

Out of 568 representatives who voted on more than one of the six roll-call votes, only 23 representatives changed their voting behavior, and of these 23 representatives, there were 31 vote changes in total, as seen in Table 2. Moreover, the frequency of these successively scheduled votes—held in 2013, 2016, 2017, 2018, 2019, and 2021—increases the likelihood that representatives participate in multiple voting sessions, unlike in the Stratmann (2002) paper, where the two roll-call votes were in 1991 and 1998, which are 3 congressional sessions apart. Thus, the chance of a representative partaking in multiple votes decreased substantially.

3.3 Hypotheses

Given the topics of the roll-call votes, see Section 3.2, which are environmental in nature, and the fact that environmental issues are topics which are usually of public interest indicates that most representatives have predetermined environmental positions and are less likely to change these throughout their time in office (McAlexander & Urpelainen, 2020). This can also be seen in the data from the roll-call votes in Table 2. Therefore, the first hypothesis posits that if the coefficients are statistically significant, the impact of pro-environmental or anti-environmental contributions on the environmental voting behavior of representatives will be minimal.

Considering the differences in contributions among pro- and anti- environmental individuals and groups, as highlighted in Section 3.1, it's evident that anti-environmental entities, such as those in the oil and gas sector, financially support congressional elections more substantially than pro-environmental advocates. Consequently, the second hypothesis posits a stronger positive correlation between shifts from pro-environmental to anti-environmental voting patterns and anti-environmental contributions. In contrast, pro-environmental contributions, though less substantial, are hypothesized to have a reduced and less effective influence on voting behaviors, given the limited financial input from pro-environmental groups and individuals

In his paper, Stratmann (2002) demonstrates that junior representatives experience a greater marginal effect from contributions, whereas their senior counterparts maintain more steadfast positions. Similarly, the third hypothesis states that legislators in their early congressional terms are more susceptible to altering their environmental voting behaviors.

Lastly, since partisan affiliation and ideology is rather polarized in the United States (Mccarty, Poole, & Rosenthal, 2006), and that usually, Republicans receive higher campaign contributions on average, see Figure 1, the fourth hypothesis states that contributions on voting behavior will be more effective for Republican representatives than for Democratic representatives.

4 Data

The empirical framework stipulated in Chapter 3 requires the comparison of voting behavior of the US representatives and the campaign contributions which they received. Hence, the data for the analysis consists of three different types of data joined together: data on the representatives, their contribution data and the roll-call data of the six votes. The following chapter gives a short description of the data types, where they were sourced, and the data processing for the analysis.

4.1 Representative data

In order to conduct the analysis, a comprehensive dataset of all US representatives who attended the relevant congressional sessions (113th-117th), including biographical information to control for age, gender, etc. was used for the analysis[9]. Identification was also required in order to be able to unambiguously attribute each roll-call vote and each contribution to a particular representative and not have to deal with matching problems.

Given these requirements, the data on the US representatives was sourced from the github repository congress-legislators (https://github.com/unitedstates/congress-legislators), which is created and managed by a shared commons, and includes detailed information for all historical and current US congressional members, including various IDs they have across US legislative data providing platforms. Since the above data is not ordered according to congressional sessions which each representative partook in, data from the Biographical Directory of the United States Congress (https://bioguide.congress.gov) was used to match the data on current and historical legislators with a list of the representatives participating in each separate congress.

4.2 Roll-call data

As Stratmann stipulated in his paper, to be able to analyze changes in voting behavior, the cross-sectionality of panel data needs to be exploited, and the votes

[9]For reference, the biographical and financial data of US congressional members needs to be disclosed publicly, thus this is not classified information.

need to be categorized clearly into winners and losers (Stratmann, 2002). This also means, that one needs to be able to deduce from the votes which candidates voted pro- one special interest group, and anti- the other one.

Due to this specification, the data from the League of Conservation Votes (LCV) Scorecard (https://scorecard.lcv.org) was used throughout this paper. The website categorizes roll-call votes as either pro-environmental or anti-environmental. However, using this data presented challenges, primarily because the LCV Scorecard did not include representatives' IDs before 2021. About 60% of the representatives in the latest roll-call vote were also present in earlier votes and could be matched using their IDs. For the remaining 40%, matching had to rely solely on first names, last names, party affiliations, and state representations. This approach led to several merging errors, which will be detailed more in Section 4.4.

Considering these circumstances, utilizing one of the many other roll-call data providing websites, such as Govtrack US, Congress.gov and C-Span would have been more useful, since these match representatives with a unique identifier. This was not possible, however, because these websites do not publish all roll-call votes but only the most relevant, i.e. the roll-call votes which passed a bill. For this analysis, however, only the environmentally related roll-call votes are relevant and these are often not published on the aforementioned websites. Thus, the LCV Scorecard Website was used to source roll-call data, despite their incomplete use of IDs for representatives.

Considering the circumstance that the 2021 votes had a different format than the 2013-2019 votes, the representative's names were often different, and thus could not be joined easily to create an aggregate roll-call data frame.

```r
fuzzy_match <- function(x, y, max_dist = 5) {
    return(stringdist::stringdist(x, y) <= max_dist)
}
roll_call_full_<- fuzzy_full_join(
    methane_116,
    methane_117,
    by = c("name", "Party", "District"),
    match_fun = list(fuzzy_match, `==`, `==`)
)
```

Listing 1: Fuzzy join used to join Representative Data

To overcome this, the R package `fuzzyjoin` Listing 1 was used. Using the functions `clean_strings` to remove special characters and `fuzzy_match` and `fuzzy_full_join` to join, a maximum distance between two values can be determined. In the `fuzzy_full_join` function, I defined that the names between the two data frames can be matched if they are at most 5 characters distance from one another, while the variables Party and District need to be identical to match.

4.3 Contribution data

4.3.1 Time Frame of Contributions

As discussed in Chapter 1, Stratmann uses two different approaches to measuring the effect of campaign contributions on voting behavior. In his paper, Stratmann (1995) explores whether contributions closer to the vote are more important in determining voting behavior than contributions of previous congressional elections. He concludes that current election contributions, in his case of dairy legislation, play a larger role in determining voting behavior than that of the previous election. In the Stratmann (2002) paper, Stratmann uses the aggregate campaign contributions allocated to representatives in the election post and prior to the congressional session, i.e. contributions from the 1989-1990 and 1995-96 vote to explain the 1991 and 1998 vote and the contributions from the election happening parallel to the vote i.e. Stratmann uses the 1991-92 and 1997-98 contributions to gauge whether there are punishments or rewards for the representative's voting behaviors. In both cases he finds a positive correlation between contributions from special interest groups and a vote in their favor.

To account for the variability in campaign contribution selection, I employed two distinct approaches, see Appendix A3. Firstly, I calculated the contribution variables using data from the previous election cycle, following the methodology outlined in several academic studies, including (Chappell, 1982; Kau, Keenan, & Rubin, 1982; Selling, 2023; Stratmann, 1991; 2002). This approach evaluates whether aggregate contributions from past election cycles may influence representatives' voting behavior in environmental matters. Secondly, I focused exclusively on campaign contributions from individuals and interest groups that supported either pro-environmental or anti-environmental positions, received by representatives within the six months leading up to the relevant vote. Unlike the first approach, this method does not consider contributions from specific election periods, such as those during which the legislator was elected or those concurrent with the legislative session, but rather concentrates on contributions directly preceding the vote.

Vote Date	**Cutoff Date**	**Cycle**	**Nr. of Contributions**
June 25th 2021	Dec 25th 2020	2022	4965
		2020	34
June 20th 2019	Dec 19th 2018	2020	5191
		2018	30
Jul 18th, 2018	Jan 17th 2018	2018	7749
Sep 13th 2017	Feb 12th 2017	2018	7148
Jul 13th 2016	Jan 12th 2016	2018	1
		2016	7142
Nov 20th 2013	Mar 19th 2013	2014	7085

Table 3: Consolidated contribution data with vote and cutoff dates

In analyzing the timing of contributions relative to congressional votes, a clear pattern emerges as detailed in Table 3. Since most votes occur late in the session, contributions from the six months preceding each vote mostly originate from the current Congress. Occasionally, they also include contributions from the previous Congress.

A discussion of these two types of campaign contributions-aggregate contributions from the previous election and the use of contributions from the current election-shows that these papers (Stratmann, 1995; 2002) both give the total contributions of an industry to candidates in an election and that only the time of relevance is different. Yet what these two papers, and many with similar methodology, neglect to analyze is whether more timely contributions are more effective in affecting the voting behavior of candidates. After all, most contributors who are profit-maximizing contribute strategically and in close temporal proximity to roll-calls to maximize their influence on voting behavior (Selling, 2023) and thus contribute closer to the vote, in order to assure that representatives do not back out of their promises to support the special interest groups' causes (Stratmann, 1998). By including a more restricted time frame for contribution, such as six months prior to the vote, these trends can be captured (Grier, Grier, & Mkrtchian, 2023), without extending the time frame to such an extent that the contributions of the closely paced votes (September 13, 2017 and July 18, 2018) in the 115th congressional session overlap. Which is why, albeit analyzing both strategies in this paper, for the main analysis, only the contributions within six months prior to the votes will be included.[10]

4.3.2 Contribution Data Sources and Processing

Campaign contribution data is readily available through a multitude of open source platforms[11]. Among those is the Center for Responsive Politics which provides contribution data in Bulk Data form (https://www.opensecrets.org/open-data/bulk-data), which includes PAC contributions to US representative candidates and individual contributions to candidates.

The oil&gas-, methane-, natural gas-, coal-, environmental- and alternative energy contributions were imported for all incumbents, and then cleaned and cat-

[10] A comparison of both the aggregate and the timely contributions included in the models can be found in the appendix.

[11] such as Sunlightlabs: https://sunlightlabs.github.io/datacommons/bulk_data.html and the Database on Ideology, Money in Politics, and Elections (DIME), but which were not suitable for this analysis

egorized into pro-environmental and anti-environmental contributions and joined with a list of all representatives per session[12].

After the pre-cleaning process through the scripts, only Individual and PAC contributions were kept which were allocated to incumbents. Using the OpenSecrets RealCodes (https://www.opensecrets.org/downloads/crp/CRP_Categories.txt), only the non-negative contributions contributions from pro-environmental and anti-environmental (fossil fuel) donors were kept.

4.4 Merging

To merge the three types of aforementioned data together, two types of merges (or joins, synonymous in R) were done. About 60% of the data was able to be merged together based on a set of Unique Identifiers, which was Bioguide ID for the roll-call data. Post primary merge, the rest of the data, which was not able to be merged was filtered out and merged based on the `fedmatch` (Friedrichs et al., 2021) package's functions `fuzzy_match` and `fuzzy_join` functions as shown in Listing 1. Finally, the two merged data frames were concatenated.

Finally, only about 30 representatives were not able to be merged and thus removed. The reason for this is because these anomalies either joined or left Congress halfway through the session or switched from one congressional chamber to the next, and thus these members appeared in some data frame, but not in the others, i.e. incumbents are marked as representatives but were not included in the vote and did not receive contribution, since they were not part of a regular election.

[12]Cleaning the bulk data for the timely contributions was more complex due to the size of the files and the comparatively small 8 GB RAM I had available. Given that the PAC and individual contribution text files had over 2 million rows and were over 15 GB large at times made the importing let alone processing tedious, even when including the state-of-the-art tidyverse (Wickham et al., 2019) package's tools and functions, such as piping and lazyloading. To resolve this, I wrote several shell scripts which check whether a cleaned file exists, and if not, cleans the file anew. This saved time and RAM space in two ways: On the one hand, cleaned files would not be re-cleaned uselessly, and on the other hand, shell scripting ensures a better utilization of RAM space when working with large files, such as these of individual and PAC campaign contributions.

For the final data frame used for analysis, the 731 representatives (over 113th-117th congresses) were further decreased, to only include representatives relevant to the analysis. This includes representatives, who voted on more than one relevant bill. Without this specification, one couldn't analyze differences in voting behavior. Moreover, only Republicans and Democrats were included, since Independent and Libertarians are too few to be able to compare.

5 Econometric Models

In order to test the changes in voting behavior due to campaign contributions, the model setup must allow for a dichotomous dependent variable, i.e. pro-environmental vote (1) or anti-environmental vote (0) and for the non-negativity of contributions (Chappell, 1982; Stratmann, 1991; 2002).

Two types of models are the linear probability model (LPM) and the logit, both of which are widely used in the economic literature, but both of which have some drawbacks. The LPM is an ordinary least squared multiple linear regression with binary dependent variables. The benefits of using a LPM to analyze the effect of campaign contributions on voting behavior is the fact that the linear regression can be used to estimate the effects on the observed dependent variable, so coefficients are comparable over models and groups. One downside of the LPM, however, is the possibility for the predicted probability to be out of range, by being either higher than 1 or lower than 0 (Mood, 2009).

In order to counter this, one can use a nonlinear regression model, such as the logit regression or logit model, which also measures dichotomous dependent variables but the predicted probability will always stay within range of 0 to 1. Comparing models with various independent variables or significantly interpreting the results is challenging when using logistic regression since the underlying cumulative distribution function of this model is a standard logistic distribution. Thus, changes in log-odds are not as intuitive to interpret as direct probabilities in a linear regression. Moreover, Mood (2009) explains that logistic effect measures can capture unobserved heterogeneity even in cases where there is no correlation between the omitted variables and the independent variables (Selling, 2023).

Although the linear regression sometimes predicts probabilities outside of the range, LPMs usually fit about as well as logit models, even in cases of nonlinearities (Long, 1997; Selling, 2023), and their results are easier to predict than those of logit models (Mood, 2009), which is why the LPM will be used as a main model for this paper. To encompass the major downsides of the LPM, however, the logit Model will be included as a robustness check.

5.1 LPM and Logit

As discussed above, the LPM and logit models will be used for the analysis[13]. The model shown in Equation 1 is the multivariate linear regression, whereas the model shown in Equation 2 is the conditional logit regression. For both models, let: X_1 be the pro-environmental contributions, and X_2 be the anti-environmental contribution, $\boldsymbol{x}$ be the vector of control variables, δ_t the time fixed effect (FEs) and γ_i the individual fixed effects, all of which are shown in Section 5.2.

$$\mathrm{Vote}_{\mathrm{i,t}} = \alpha + \beta_1 X_{1,\mathrm{t}} + \beta_2 X_{2,\mathrm{t}} + \gamma_i + \delta_t + \boldsymbol{x}' \zeta_{\mathrm{i,t}} + \varepsilon_{\mathrm{i,t}} \tag{1}$$

$$P(\mathrm{Vote}_{\mathrm{i,t}} = 1 | \boldsymbol{x}, \beta_{1,2}, \gamma_i) = F(\beta_{1,2}' \boldsymbol{x}_{\mathrm{it}}, \gamma_i) \tag{2}$$

In their most basic specification, both Equation 1 and Equation 2 include the entire sample of representatives who voted more than once on the set of the six roll call votes, without discriminating based on voting behavior. When moving from most generous to the strictest models, the main difference between the two models is that in the LPM model, both legislator and year fixed effects are used, whereas in the conditional logit model, specified by Stratmann (2002), only legislator fixed effects are used.

Using these models as a base, I explored different ways of measuring the relationship between voting behavior and contributions. One variation is to isolate each vote and include all time-relevant contributions from previous votes and those from the current vote, see Figure 9 in the appendix for these results. This tests the assumptions made in Section 4.3.1, and takes into account not only the short term contributions when an environmental vote is coming up, but also the previous contributions on the same topic, to measure whether voting is also affected by contributions for previous relevant votes.

In one model specification, only representatives who maintained consistent environmental voting behavior across the six roll-call votes were included. This

[13]Throughout my analysis, I replicated Stratmann's (2002) probit model, which includes only those representatives who changed their votes over time, and takes the changes in contribution level as explanatory variables, without control variables or fixed effects (FE)s. Given my small sample, however, the contribution change coefficients could not be estimated, which is why this model is not included in neither the model specification nor the results.

approach allows for an analysis of whether the presence or amount of contributions influences legislators, even when no changes in voting behavior occur. Essentially, this assesses whether interest groups contribute regardless of voting changes. Conversely, all models were applied solely to representatives who altered their voting throughout the six roll-call votes. This method facilitates a causal identification strategy, enabling conclusions to be drawn only when there are variations in voting behavior (Stratmann, 2002), see Figure 8 for these results.

5.2 Model specification

Using the models outlined in Section 5.1, this paper analyzes the relationship of votes and campaign contributions ranging from using the most generous model specifications, such as using control variables, to the strictest, using individual (legislator) fixed effects.

To control for confounding influence between a treatment and an outcome and approach a consistent causal interpretation (Hünermund & Louw, 2020), the following control variables are used: the legislator's party and whether their party had House Majority during that term (McAlexander & Urpelainen, 2020; Stratmann, 2002). These control variables are used since party is a good determinant for a legislator's ideological leaning, and whether their party has the majority in the House determines the power which the group has over the House of Representatives.

To control for the junior/senior legislators stipulated in Section 3.3, I decided to add both the `birth year` and `seniority`, which is number of terms in House the representative served, to control for the difference in age and experience which might distort the voting behavior (Selling, 2023; Stratmann, 2002). By controlling for differences in geographical residence of the representatives, using `district`[14],

[14] As to be seen in Figure 7, about 300 rows lack the variable district, since this information was only available selectively in the above mentioned data sources. After careful consideration, I decided to include the variable regardless, since it is significant and improves the model, albeit observations with NA-values for district not being included for three of the models shown in Figure 5.

`state` and `geographical`[15] and the district level I remove possible differences in voting behavior attributed to the location of representatives.

Based on roll-call records, the Dynamic Weighted (DW)-Nominates are a widely used indicator of a representative's ideology in a multidimensional policy space, which serve as a strong predictor of the voting decisions of representatives (Matter, Roberti, & Slotwinski, 2019; Poole & Rosenthal, 1985). By including the absolute value of the first and second dimension of the `DW-Nominate` (https://voteview.com) as control variables, I control for differences in ideology that might explain voting behavior. It is easier to prove causality when a variable for legislator ideology is included, as this eliminates the variation in roll-call voting that might be attributed to the lawmaker's ideological inclination (Selling, 2023). Furthermore, according to Roscoe & Jenkins (2005), adding an ideology variable to the equation is the only practical approach to account for the influence of friendly donating.

I also control for the gender of the legislator, as the gender pay gap tends to apply not only to income but also to campaign contributions. Furthermore, to account for voting consistency, I introduce another dummy variable indicating whether the legislator changed their vote on on or more of the six votes. This helps to determine whether vote-changing behavior affects the volume of campaign contributions they receive. Finally, I define dummy variables which indicate whether representatives received pro- or anti-environmental contributions in the time-period before the votes. This allows me to measure the extensive margin of contribution, i.e. how the fact that a representative received a contribution relates to their voting behavior. By including these dummy variables and the amount of the donation, I also measure the intensive margin. In this way, I can analyze whether the actual amount of the contribution changes the voting behavior of a representative who has received a contribution in the first place.

[15]the variable `geographical` has the 50 US states grouped into four categories: Northwest (NW), South (SO), West (WE), Midwest (MW), according to the United States Census Bureau at https://www2.census.gov/geo/pdfs/reference/GARM/Ch6GARM.pdf

Regarding roll-call votes, the six roll-call votes included do not amend the same bills, but I assume that they are all the same bill as they all relate to the same subject and institutions, see Section 4.2, and therefore I will not control for differences in bills (Grier, Grier, & Mkrtchian, 2023).

By including the aforementioned control variables, I am able to fix certain factors that I can measure and assume have confounding effects on the predicted probability. Were I to leave the regressions as is, then there could still be potential omitted variable bias in my analysis. I am bound to miss either variables that I did not know affect my results, or variables that I cannot measure. Unobservables, or the inability to include in a model every variable that influences a result, are the root cause of the issues. The variance in the dependent variable resulting from unobserved or omitted variables is known as unobserved heterogeneity (Mood, 2009).

Applying two-way fixed effects to the LPM[16] (Imai & Kim, 2019), one can account for unobservable elements that remain constant across time and another unit (such as party or state), and thus remove unit and time invariant confounding (Grier, Grier, & Mkrtchian, 2023). In this paper, four types of two way FEs are used: In the more generous version, I fix for the variables geographical region and year, since this measures only the change in contributions within a year and same geographical location. By fixing for the geographical region of a state and not the actual state, I am controlling for some differences within the US, such as culture and migration, but not making the model so strict as to account for all differences in states. By controlling for years, on the other hand, time-variant differences such as environmental perception or disasters are not taken out of context and compared with years with little environmental happenings.

In a stricter version, I fix for year and state. This provides more accurate results on the geographical level. As mentioned above in Section 2.2, differences in states and their election such as the size of government or the competitiveness

[16]As stated in Section 5.1, the conditional logit model only includes one-way fixed effects, due to the nature of the multinomial model. Thus, I have decided to include only geographical, state, party and legislator fixed effects for each logit regression.

of the election influence the amount of contributions which incumbents receive. By controlling for states, not only the differences in elections and contributions are fixed, but differences in economic conditions, population sizes and possible differences in state ties to the fossil fuel industries and severely environmentally affected states are not compared to one another, since these differences are important enough to influence both contributions and voting behavior.

The third type of fixed effects employed are the party and year FEs. This way, I can adjust for the the influence that political party orientation might have on the results, along with the same temporal factors as before. This may capture differences in policies, ideologies, or priorities that vary systematically between parties (Selling, 2023).

Lastly, in the strictest model, I fix for both legislators and years. The reason behind fixing for something as small as a single representative, is because it gives the ability to control for omitted variables which are constant over time for each legislator such as the representative's background, which is complex and high dimensional and bound to affect the individuals voting behavior (Huntington-Klein, 2021; Stratmann, 2002). Not only am I thus able to address the omitted variable bias which I was not able to address through my previous two-way fixed effects, such as the representative's eloquence and negotiation skills, proximity to the fossil fuel industry and environmental industry, but I am able to remove previous FEs[17], such as the state or geographical fixed effects, since these usually do not change for a representative over time. Therefore, to determine the impact of donations on voting changes, I only use the change in donations within a year and specific member, which allows me to predict the impact of donations most accurately (Grier, Grier, & Mkrtchian, 2023).

[17] And almost all control variables used in the previous models, which do not change over time and over the same legislator. Only the `seniority` variable changes within representatives over time, which is why it is included in this model specification.

6 Results

6.1 Effectiveness of Contributions

One of the hypotheses stated in Section 3.3 is that the effect of pro and anti-environmental campaign contributions, if statistically significant, would be minimal. As visible from the regression outputs in the appendix, this was not the case. Using control variables to state and year fixed effects in the LPM with all representatives, the campaign contributions from environmental sources and non-environmental sources were highly significant.

The most generous LPM shown in as the first model in Figure 5, which includes only control variables shows that when increasing the pro-environmental contribution to representatives by 1000 USD, the probability of the representative voting pro-environmentally increases by 0.7214 percent on average, ceteris paribus. In return, when increasing anti-environmental contribution by 1000 USD, the probability of a representative voting pro-environmentally decreases by an average of 0.06 percent, holding all else constant. Both of these coefficients are highly significant. Given that the contributions from both anti and pro-environment are highly skewed, I applied a logistical transformation on the contribution variables, and found that the effect of the anti-environmental contribution variable increases to -0.015 ceteris paribus and the significance of the pro-environmental contribution variable is est. to be an average of 0.027 ceteris paribus, on the same significance level. See Figure 10 for these results.

When including the dummy variables of pro- or anti- environmental contributions leading up to each vote, the results show no significance in the most general linear regression with control variables. Only when including state and year fixed effects does the anti-environmental dummy show statistical significance on a 0.05 level. For the state and year fixed effects model, the interpretation is as follows: A representative receiving anti-environmental contributions decreases their probability of voting pro-environmentally by 2.6 percent on average, and for each additional 1000 USD, the probability of a pro-environmental vote decreases further by 0.05 percent, ceteris paribus.

As shown in Figure 5, when fixing the LPM model by US state and year, the contribution coefficients remain highly significant with a 1000 USD increase in pro-environmental contribution increasing the probability of a pro-environmental vote by 0.7 percent and a 1000 USD increase in anti-environmental contribution decreasing the probability of a pro-environmental vote by 0.05 percent. When applying individual (legislator) and year fixed effects, a 1000 USD increase in pro-environmental contribution increase the probability of a pro-environmental vote by 0.4 percent on average, ceteris paribus. The anti-environmental contribution coefficient, however is not significant at all.

	Dependent variable:				
	Vote				
	OLS	*panel linear*			
	(1)	(2)	(3)	(4)	(5)
Anti-Env Contributions Amount	-0.001***	-0.001***	-0.001***	-0.0005***	-0.0002
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
Pro-Env Contributions Amount	0.007***	0.007***	0.007***	0.007***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Anti-Env Contribution Dummy	-0.021	-0.021	-0.021	-0.026**	
	(0.013)	(0.013)	(0.013)	(0.013)	
Pro-Env Contribution Dummy	-0.007	-0.007	-0.007	-0.0005	
	(0.009)	(0.009)	(0.009)	(0.009)	
District	0.001**	0.001**	0.001**		
	(0.0004)	(0.0004)	(0.0004)		
PartyR	-0.901***	-0.901***		-0.895***	
	(0.009)	(0.009)		(0.009)	
Birthyear	0.001*	0.001*	0.001*	0.001***	
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	
GenderM	-0.025***	-0.025***	-0.025***	-0.029***	
	(0.009)	(0.009)	(0.009)	(0.009)	
1st dimension DW Nominate	-0.141***	-0.141***	-0.141***	-0.144***	
	(0.029)	(0.029)	(0.029)	(0.029)	
2nd dimension DW Nominate	-0.070***	-0.070***	-0.070***	-0.057***	
	(0.021)	(0.021)	(0.021)	(0.021)	
GeographicalNE	0.073***		0.073***		
	(0.011)		(0.011)		
GeographicalSO	0.009		0.009		
	(0.009)		(0.009)		
GeographicalWE	0.019*		0.019*		
	(0.011)		(0.011)		
Vote Number	0.0005***				
	(0.0002)				
Seniority	0.002	0.002	0.002	0.002*	0.017
	(0.001)	(0.001)	(0.001)	(0.001)	(0.044)
Democratic Majority in House	0.024***				
	(0.009)				
Constant	-0.416				
	(0.782)				
Year Fixed effects	No	Yes	Yes	Yes	Yes
Geographical Fixed Effects	No	Yes	No	No	No
Party Fixed effects	No	No	Yes	No	No
State Fixed effects	No	No	No	Yes	No
Individual Fixed effects	No	No	No	No	Yes
Observations	1,901	1,901	1,901	2,217	2,217
R^2	0.909	0.895	0.081	0.869	0.006
Adjusted R^2	0.908	0.894	0.072	0.866	-0.311
Residual Std. Error	0.152 (df = 1884)				
F Statistic	1,172.471*** (df = 16; 1884)	1,454.509*** (df = 11; 1881)	12.778*** (df = 13; 1881)	1,432.629*** (df = 10; 2153)	3.657** (df = 3; 1679)
Note:					*p<0.1; **p<0.05; ***p<0.01

Figure 5: Main Linear Probability Models summarized

The results in Figure 5 show, that there is a highly significant relation between a pro-vote and pro-contributions, and vice versa. As discussed in Section 3.1, the average pro-environmental contributions for the representatives within six months prior to the vote was approximately 1,000 USD whereas the anti-environmental contributions averaged out to 19,800 USD. Putting this into the context of the results shown in Figure 5, where a 1,000 USD pro-environmental contributions increases environmental voting by 0.7 percent and anti-environmental contributions decreasing it by 0.06 percent, the impact of anti-environmental contributions is likely more effective due to their higher average amount—approximately 19,800 USD compared to 1,000 USD for pro-environmental contributions. Therefore, anti-environmental contributions appear to have a stronger effect on environmental voting, reflecting the disparity in average contribution amounts.

When looking at Figure 5, the adjusted R^2 values in the first four models are very high and might raise suspicion of multicolinearity within the predictor variables[18]. Yet, the Variance Inflation Factor (VIF) values of all variables are below 5, with most of them being between 1 and 1.25, and a correlation plot shows similar results, that no variables are suspiciously highly correlated with one another. This means that the high adjusted R^2 values are not due to multicolinearity, but rather due to the high explanatory power of the model, which can be attributed to the fact that most of the control variables are highly significant and have a high explanatory power on their own, such as the representative's party and DW-Nominate dimensions which are already very good predictors of the representatives voting decisions on their own. Hence, the first hypothesis from this paper can be rejected, since the effect of pro and anti-environmental contributions on voting behavior is not minimal, considering each effect is measured on a per 1000 USD scale and is also rather highly significant.

[18]Although the Individual Fixed Effects model shows an adjusted R-squared of -0.311, estimated with the `plm` function,the linear probability model estimated with the `lm` function with the exact same specifications,coefficients, standard errors and p-values has a much higher adjusted R-squared of 0.95. The reason as to why I still included this model and not the other, is that the fixed effects coefficients for the lm would show up in the model summary, and thus the model would be too long to be included in the stargazer output.

	Dependent variable:			
	Vote		Vote	
	logistic		*conditional logistic*	
	(1)	(2)	(3)	(4)
Anti-Env Contributions Amount	-0.022***	-0.020***	-0.016**	-0.021***
	(0.008)	(0.008)	(0.008)	(0.008)
Pro-Env Contributions Amount	0.106***	0.102***	0.088**	0.103***
	(0.035)	(0.034)	(0.039)	(0.034)
Anti-Env Contribution Dummy	-0.705	-0.591	-0.739	-0.595
	(0.611)	(0.587)	(0.578)	(0.589)
Pro-Env Contribution Dummy	0.264	-0.047	0.382	-0.049
	(0.432)	(0.406)	(0.400)	(0.407)
District	0.010	0.010	0.012	0.010
	(0.018)	(0.017)	(0.023)	(0.017)
PartyR	-8.399***	-8.050***	-23.804	
	(0.522)	(0.476)	(1,183.464)	
GenderM	-1.209**	-1.139**	-1.416**	-1.141**
	(0.494)	(0.469)	(0.610)	(0.469)
1st dimension DW Nominate	-3.161**	-2.698*	-3.395**	-2.708*
	(1.436)	(1.396)	(1.587)	(1.398)
2nd dimension DW Nominate	-3.267***	-3.004***	-1.924	-3.002***
	(1.089)	(1.023)	(1.201)	(1.024)
GeographicalNE	2.454***			2.432***
	(0.550)			(0.547)
GeographicalSO	0.144			0.116
	(0.483)			(0.484)
GeographicalWE	0.695			0.667
	(0.566)			(0.568)
Vote Number	0.028***	0.013*	0.031***	0.013*
	(0.009)	(0.008)	(0.008)	(0.008)
Seniority	0.047	0.070	0.006	0.070
	(0.047)	(0.045)	(0.043)	(0.045)
Democratic Majority in House	1.570***		1.742***	
	(0.474)		(0.391)	
Birthyear	0.023	0.039**	0.027*	0.039**
	(0.018)	(0.017)	(0.016)	(0.017)
Constant	-39.065			
	(35.163)			
Geographical Fixed Effects	No	Yes	No	No
State Fixed effects	No	No	Yes	No
Party Fixed effects	No	No	No	Yes
Observations	1,901	1,901	1,901	1,901
R^2		0.660	0.574	0.061
Max. Possible R^2		0.711	0.614	0.205
Log Likelihood	-156.347	-154.227	-95.343	-157.637
Akaike Inf. Crit.	346.694			
Wald Test		360.520*** (df = 12)	62.390*** (df = 13)	93.070*** (df = 14)
LR Test		2,053.508*** (df = 12)	1,620.253*** (df = 13)	119.769*** (df = 14)
Score (Logrank) Test		1,684.575*** (df = 12)	1,380.764*** (df = 13)	158.630*** (df = 14)
Note:				*p<0.1; **p<0.05; ***p<0.01

Figure 6: Main Conditional Logit Models summarized

The results from the conditional logit used as a robustness check, see Figure 6, show similar trends as the linear probability models above. When regressing Vote against the contribution and control variables, see column 1 in Figure 6, we see that pro-environmental contributions affect a pro-environmental vote positively, and anti-environmental contributions negatively. Given that these coefficients have the same signs and significance level, I conclude that these results are robust. When looking at the conditional logit from columns 2,3 and 4 in Figure 6, these results are also highly significant and show similar results to their corresponding LPM with fixed effects, thus these results are also robust.

Finally, as discussed in Section 5.2, the individual votes were regressed with the corresponding pro- and anti-contribution of the roll-call votes leading up to the vote in question. See Figure 9 in the appendix. Interestingly enough, when looking at the early votes, i.e. vote in the 113th and 114th congress, then the campaign contributions six months prior, no matter if anti- or pro-environmental, are insignificant, whereas in the votes in the 116th and 117th congress, the votes from the earlier sessions are more significant on average. This could indicate that especially when it comes to repeated votes on the same topics, not the actual short-term contribution within six months of the vote influences voting behavior, but the contributions from the earlier relevant votes is more effective in determining voting behavior. This could indicate, that representatives do form long term relationships with their contributors, but not necessarily within a congressional election[19], but over multiple, in this case, up to 5 congressional periods.

6.2 Contribution and Vote Changes

In the second hypothesis, changes from pro to anti-environmental votes are predicted to be more positively correlated with anti-environmental contributions, and pro-environmental contributions less effective. Considering, however, that only 23 representatives changed their votes over the course of the six roll-call votes, with

[19]as discussed in Section 4.3.1, where the effect contribution of an entire congressional prior to the vote had the same effect as the contributions six months prior to vote.

only 31 vote changes in total, no conclusions can be drawn from this LPM model, and in return, no conclusions can be drawn about the propensity of contributions, whether pro or anti-environmental in nature, to change the voting behavior of representatives.

6.3 Seniority on Vote Changes

The third hypothesis stated in Section 3.3 is that junior representatives are more likely to change their voting behavior due to campaign contributions than senior representatives, given that they are not experienced enough to have stable opinions on the matter, as shown by Stratmann (2002). To address this, I incorporated the previously mentioned seniority and birth year control variables into the regression models, as outlined in Section 5.2. Since seniority details the number of terms the representative has partaken in and the birth year represents the age of the legislator, I also checked that the correlation between the two variables would not be high enough to cause multicolinearity, which it was not, with a correlation of -0.57, and a VIF of 1.27 and 1.28 respectively.

When looking at the LPM model with all representatives, the seniority variable was not significant, and the birth year variable was significant at a 0.01 level, with a one year increase in birth year increasing the probability of a pro-environmental vote by 0.007 percent on average, holding all else constant. The same trends were found when fixing the model by state and year, with the birth year variable being significant at a 0.001 level and having an effect of 0.013 percent increase in pro-environmental voting for a one year increase in birth year, and the seniority variable being significant only at a 0.05 level with a one term increase in seniority increasing the environmental voting probability by 0.018 percent. When fixing the model by legislator and year (using plm instead of lm), the birth year variable was not significant at all, and the seniority variable was significant at a 0.01 level, with a one term increase in seniority decreasing the probability of a pro-environmental vote by 0.0001 percent on average, holding all else constant. Similar results and significance for the birth year variable emerge when fixing the legislator, whereas the seniority variable is not significant at all.

Since only birth year is mostly significant and seniority is not, one can conclude that younger representatives are more likely to vote pro environmentally in these votes holding all else constant, which compared to the results from the first hypothesis, the effect of a one year younger representative in voting pro-environmentally is larger than that of 1000 USD in pro-environmental contributions. Whereas seniority affects the voting only when fixing for state and year, which means that the more experienced the representative is, the more prone they are to vote pro-environmentally in these votes.

Still, although these results show the propensity of younger representatives to vote pro-environmentally in these votes, this does not mean that young people are more prone to vote changes. To determine this, the LPM model of only the representatives who changed their votes is taken into consideration, yet here neither birth year nor seniority are significant, and thus no conclusions can be drawn in respect to the third hypothesis.

6.4 Partisan Contributions

In the fourth hypothesis, the effect of contributions on voting behavior is stated to be more significant for Republican representatives than for Democratic representatives. To check whether this might be the case I fixed not only year but also party in the two way fixed effects LPM and logit models. The results in Figure 8 in the appendix show that the effect of anti- and pro- contribution does not change from the baseline LPM model without fixed effects, and the significance of these coefficients does not decrease either. When applying the conditional logit regression, on the other hand, the effects of contributions are higher, and show similar trends as the LPM model, on the same level of significance, ceteris paribus.

When it comes to the explanation of voting behavior, it is clear that Party has a huge impact on the voting decisions. In general, the `PartyR` coefficient in Figure 5, which is -0.901. Meaning, that a representative's (hypothetical) change from the Democratic to the Republican Party would decrease their environmental votes by 90%, ceteris paribus. Additionally, the average fossil fuel and environmental contributions which republicans receive is approximately 30 times higher than that of a Democrat. Republicans in this analysis receive an average of 30,000 USD in anti-environmental contributions in the cumulative time periods of the six roll-call votes, whereas Democrats receive only about 9,500 USD. Moreover, Republicans receive an average of 1,250 USD from pro-environmental sources, whereas Democrats receive only an average of approx. 750 USD from pro-environmental sources[20]. One conclusion which can be drawn when analyzing the effect of contributions on votes, and holding party constant, is that since Republicans receive more contributions, the effect of contribution on their voting behavior is higher.

[20]These results were calculated through the analysis, see the link to my github repository for these values.

7 Discussion and Conclusion

The main goals for the thesis was to explore the relationship of pro-environmental and anti-environmental, specifically fossil-fuel, campaign contributions have on the voting behavior of US Representatives on the topic of methane pollution safeguard related roll-call votes. Moreover, this paper contributes to the extensive academic literature on this topic, by analyzing the effect of environmentally related campaign contributions on the representative's voting on methane pollution safeguards, a topic on which there are few studies. By using not only Stratmann's logit models and aggregate election but also a linear probability model with time-related contribution, I am further extending this area of research. This paper finds that campaign contributions shape how the representatives votes on this particular matter. Elected officials are more likely to vote in agreement with the individual and PAC's contributions, if these interest groups contribute within six months of the vote.

Albeit including variables which track a representative's political ideology through roll-call votes (namely the DW-Nominate dimensions), and including legislator fixed effects to avoid omitted variable bias and thus including important metrics to measure causal relationships (Selling, 2023; Stratmann, 2002), no causal relationship between environmentally related campaign contributions and changes in environmental voting behavior could be significantly estimated.

Several reasons preclude establishing a causal relationship in this study, despite its methodology being heavily influenced by Stratmann (2002), who identified causality in his work. One significant limitation is the small sample size of representatives who altered their votes over the six roll-call votes, see Table 2. Additionally, the inherently polarizing and decisive nature of environmental issues among representatives means that changes in voting behavior are inherently rare. Moreover, the causality of the models used by Stratmann (2002) warrants scrutiny, especially given his questionable assumptions in selecting the Glass-Steagall Act for analysis—such as the presumption that financial legislation does not engage public interest, thereby affording representatives greater freedom in their voting decisions.

The implications of these results are that there is a clear relationship between anti(pro) environmental contributions and anti (pro) environmental voting behavior of representatives and that dependent on the positions which representatives take, they have the possibility to earn their campaigns incredible amounts of donations, from the fossil fuel industry, for example. In a system where legislation should be made with the population in mind, the possibility of incumbents receiving campaign contributions has a bad aftertaste for the health of the American democracy (Weschle, 2022c). Moreover, given the steep rise in expenditures for congressional elections over the past 20 years, the effect which moneyed interest will have on votes will likely increase.

While this paper provides valuable insights, it has several limitations, which point to opportunities for future work.First, more robustness checks should be included. By including more relevant models and relevant variables, such as each state's gdp per capita related to the fossil fuel industry, results could be concluded with more certainty. Touched upon briefly in this paper, by regressing the pro vote of representatives with the campaign contributions not only six months prior, but also the six months prior to vote contributions of all similar votes before might show that representatives take contributions of previous similar votes as a baseline to determine their current votes.

As shown in Chapter 6, methane related voting behavior can be explained very well given the representative's party and DW-Nominate, meaning that the party line and ideology is a strong influencer for a legislators vote, and that most representatives tend to keep within those party lines. Thus, it would be interesting to analyze the campaign contributions not to individuals but parties themselves, and how this affects the party's votes on certain issues (Selling, 2023)

Another interesting topic for research would be to analyze changes in voting behavior given by the nature of roll-call votes. Since these happen alphabetically, representatives whose names are further along the alphabet might be able to deviate from party lines given a vote is already won/lost.

Using different sources of campaign contributions would also be an interesting approach. These include not individual and PAC contributions, but Super PAC contributions, which can be unlimited in size and cannot be directly allocated to a political candidate (Grier, Grier, & Mkrtchian, 2023). Finally, another interesting approach would be to use more of the countless open source resources available to import campaign and representative data by using Application Platform Interfaces (API), which significantly ease the data collection process. Resources such as the congress API (https://github.com/LibraryOfCongress/api.congress.gov/), or the tidycensus R package (https://walker-data.com/tidycensus/).

Appendix A: Supplementary Material

A1. Code

The Data, Code, Analysis and Plots used to construct this paper can be found on my github profile: https://github.com/minnaheim/contribution_vote_data. This paper was written using typst, based on the template from the Technical University of Munich: https://github.com/ls1intum/thesis-template-typst.

A2. Additional Models

Descriptive statistics

Statistic	N	Mean	St. Dev.	Min	Max
District	1,984	9.191	9.803	0	53
Vote Change	2,314	0.062	0.342	0	4
Birthyear	2,314	1,958.587	11.147	1,929	1,989
1st dimension DW Nominate	2,314	0.439	0.137	0.110	0.848
2nd dimension DW Nominate	2,314	0.215	0.167	0.000	0.957
Vote Number	2,314	21.617	22.326	3	52
Vote Dummy	2,217	0.504	0.500	0	1
Seniority	2,314	5.546	4.205	1	18
Pro Env Contributions Amount	2,314	19.800	29.876	0.000	380.725
Anti Env Contributions Amount	2,314	0.991	2.877	0.000	60.550
Democratic Majority in House	2,314	0.321	0.467	0	1
Pro-Env Contribution Dummy	2,314	0.914	0.280	0	1
Anti-Env Contribution Dummy	2,314	0.307	0.461	0	1

Figure 7: the Main Dataset used for the Analysis[21]

[21] The variable Instance refers to the Votes. The Instances are 3, 4, 51, 52, 6, and 7, where 3 stands for the vote in the 113th Congress, 51 stands for the first vote in the 115th Congress, 52 for the second vote in the 115th congress, etc. The district variable refers to the district that the legislators represented. Sadly not all representatives had the district information.

	Dependent variable:	
	Vote	Vote
	panel	*conditional*
	linear	*logistic*
	(1)	(2)
Anti-Env Contributions Amount	-0.001^{***}	-0.021^{***}
	(0.0001)	(0.008)
Pro-Env Contributions Amount	0.007^{***}	0.103^{***}
	(0.001)	(0.034)
Pro-Env Contribution Dummy	-0.007	-0.049
	(0.009)	(0.407)
Anti-Env Contribution Dummy	-0.021	-0.595
	(0.013)	(0.589)
Vote Number		0.013^{*}
		(0.008)
District	0.001^{**}	0.010
	(0.0004)	(0.017)
Birthyear	0.001^{*}	0.039^{**}
	(0.0004)	(0.017)
1st dimension DW Nominate	-0.141^{***}	-2.708^{*}
	(0.029)	(1.398)
2nd dimension DW Nominate	-0.070^{***}	-3.002^{***}
	(0.021)	(1.024)
GeographicalNE	0.073^{***}	2.432^{***}
	(0.011)	(0.547)
GeographicalSO	0.009	0.116
	(0.009)	(0.484)
GeographicalWE	0.019^{*}	0.667
	(0.011)	(0.568)
Seniority	0.002	0.070
	(0.001)	(0.045)
GenderM	-0.025^{***}	-1.141^{**}
	(0.009)	(0.469)
Observations	1,901	1,901
R^2	0.081	0.061
Adjusted R^2	0.072	
Max. Possible R^2		0.205
Log Likelihood		-157.637
F Statistic	12.778^{***} (df = 13; 1881)	
Wald Test		93.070^{***} (df = 14)
LR Test		119.769^{***} (df = 14)
Score (Logrank) Test		158.630^{***} (df = 14)
Note:		*p<0.1; **p<0.05; ***p<0.01

Figure 8: The LPM with party and year fixed effects and Conditional Logit Model with party fixed effects.

	Dependent variable:					
	Vote in 113th Congress	Vote in 114th Congress	1st Vote in 115th congress	2nd Vote in 115ths congress	Vote 116th congress	Vote 117th congress
	(1)	(2)	(3)	(4)	(5)	(6)
Anti-Env Contributions for Vote 3	0.0004	0.001	0.001	-0.0004	-0.002^{***}	-0.002^{***}
	(0.0003)	(0.0005)	(0.001)	(0.001)	(0.001)	(0.001)
Pro-Env Contributions for Vote 3	0.001	-0.003	-0.008	-0.001	-0.005	-0.001
	(0.004)	(0.004)	(0.006)	(0.007)	(0.005)	(0.005)
Anti-Env Contributions for Vote 4		0.0001	-0.0004	0.00003	-0.0001	-0.003^{***}
		(0.0004)	(0.001)	(0.001)	(0.001)	(0.001)
Pro-Env Contributions for Vote 4		0.0004	-0.010^{*}	0.004	0.007^{*}	-0.020^{***}
		(0.005)	(0.005)	(0.006)	(0.004)	(0.004)
Anti-Env Contributions for Vote 51			0.001	0.006^{***}	0.005^{***}	0.006^{***}
			(0.001)	(0.002)	(0.001)	(0.001)
Pro-Env Contributions for Vote 51			0.002	0.009	0.001	-0.0003
			(0.005)	(0.006)	(0.006)	(0.006)
Anti-Env Contributions for Vote 52				-0.004^{**}	-0.003^{**}	-0.002^{*}
				(0.002)	(0.001)	(0.001)
Pro-Env Contributions for Vote 52				-0.014^{***}	-0.003	0.0003
				(0.003)	(0.005)	(0.005)
Anti-Env Contributions for Vote 6					0.0003	0.002^{***}
					(0.001)	(0.001)
Pro-Env Contributions for Vote 6					-0.002	-0.014^{*}
					(0.011)	(0.008)
Anti-Env Contributions for Vote 7						-0.001
						(0.001)
Pro-Env Contributions for Vote 7						0.017^{*}
						(0.009)
PartyR	0.951^{***}	0.924^{***}	0.936^{***}	0.905^{***}	0.979^{***}	0.955^{***}
	(0.019)	(0.024)	(0.028)	(0.033)	(0.022)	(0.023)
1st dimension DW Nominate	-0.183^{***}	-0.079	-0.079	-0.061	-0.011	0.035
	(0.061)	(0.077)	(0.091)	(0.110)	(0.075)	(0.079)
2nd dimension DW Nominate	0.208^{***}	0.178^{***}	0.110^{*}	0.064	0.026	0.081
	(0.046)	(0.057)	(0.065)	(0.078)	(0.056)	(0.055)
GenderM	0.032^{*}	0.036	0.007	0.017	0.024	0.004
	(0.018)	(0.022)	(0.025)	(0.030)	(0.020)	(0.019)
Pro-Env Contribution Dummy	-0.017	-0.007	0.017	0.012	0.010	-0.018
	(0.019)	(0.025)	(0.026)	(0.030)	(0.036)	(0.033)
Anti-Env Contribution Dummy	0.031	0.025	0.052	-0.036	0.007	0.009
	(0.032)	(0.036)	(0.036)	(0.047)	(0.030)	(0.027)
Observations	339	332	281	268	224	179
R^2	0.940	0.910	0.917	0.891	0.968	0.976
Adjusted R^2	0.912	0.866	0.869	0.824	0.943	0.954
F Statistic	451.407^{***} (df = 8; 231)	224.254^{***} (df = 10; 221)	163.850^{***} (df = 12; 178)	96.517^{***} (df = 14; 165)	235.046^{***} (df = 16; 126)	211.775^{***} (df = 18; 93)
Note:						*p<0.1; **p<0.05; ***p<0.01

Figure 9: The LPM analysing each individual vote and the relevant contributions leading up to it.

	Dependent variable:	
	Vote	
	OLS	*logistic*
	(1)	(2)
Log. Anti-Env Contributions Amount	-0.015***	-0.532***
	(0.004)	(0.185)
Log. Pro-Env Contributions Amount	0.027***	0.839**
	(0.009)	(0.334)
Anti-Env Contribution Dummy	0.003	0.190
	(0.016)	(0.747)
Pro-Env Contribution Dummy	-0.015	-0.319
	(0.012)	(0.569)
District	0.001**	0.007
	(0.0004)	(0.017)
PartyR	-0.898***	-8.385***
	(0.009)	(0.530)
Birthyear	0.001*	0.022
	(0.0004)	(0.018)
GenderM	-0.023**	-1.138**
	(0.009)	(0.494)
1st dimension DW Nominate	-0.141***	-3.339**
	(0.029)	(1.454)
2nd dimension DW Nominate	-0.072***	-3.150***
	(0.021)	(1.112)
GeographicalNE	0.071***	2.460***
	(0.011)	(0.553)
GeographicalSO	0.006	0.127
	(0.009)	(0.477)
GeographicalWE	0.018	0.804
	(0.011)	(0.561)
Vote Number	0.001***	0.029***
	(0.0002)	(0.009)
Seniority	0.001	0.039
	(0.001)	(0.047)
Democratic Majority in House	0.023***	1.569***
	(0.009)	(0.476)
Constant	-0.434	-36.504
	(0.785)	(34.885)
Observations	1,901	1,901
R^2	0.908	
Adjusted R^2	0.907	
Log Likelihood		-157.266
Akaike Inf. Crit.		348.533
Residual Std. Error	0.152 (df = 1884)	
F Statistic	1,162.325*** (df = 16; 1884)	
Note:		*p<0.1; **p<0.05; ***p<0.01

Figure 10: The main LPM models with logistically transformed Contributions

A3. Comparison of Contribution types

	Dependent variable:					
	Anti-Env Vote in 113th	Anti-Env Vote in 114th	Anti-Env 1st Vote in 115th	Anti-Env 2nd Vote in 115ths	Anti-Env Vote 116th	Anti-Env Vote 117
	(1)	(2)	(3)	(4)	(5)	(6)
Party	0.950^{***}	0.931^{***}	0.894^{***}	0.899^{***}	0.928^{***}	0.951^{***}
	(0.015)	(0.017)	(0.021)	(0.022)	(0.018)	(0.016)
Anti-Env. Contribution (113th congress Vote)	0.0005^{*}					
	(0.0003)					
Pro-Env. Contribution (113th congress Vote)	-0.003					
	(0.003)					
Anti-Env. Contribution (114th congress Vote)		0.0004				
		(0.0003)				
Pro-Env. Contribution (114th congress Vote)		-0.003				
		(0.004)				
Anti-Env. Contribution (115th congress 1st Vote)			0.001^{*}			
			(0.0004)			
Pro-Env. Contribution (115th congress 1st Vote)			-0.006^{*}			
			(0.003)			
Anti-Env. Contribution (115th congress 2nd Vote)				0.001^{*}		
				(0.0003)		
Pro-Env. Contribution (115th congress 2nd Vote)				-0.010^{***}		
				(0.002)		
Anti-Env. Contribution (116th congress)					0.0003	
					(0.0003)	
Pro-Env. Contribution (116th congress)					-0.002	
					(0.008)	
Anti-Env. Contribution (117th congress)						-0.00003
						(0.0003)
Pro-Env. Contribution (117th congress)						0.003
						(0.006)
GeographicalNE	-0.022	-0.072^{***}	-0.138^{***}	-0.117^{***}	-0.079^{***}	-0.049^{**}
	(0.021)	(0.025)	(0.029)	(0.032)	(0.025)	(0.023)
GeographicalSO	0.012	-0.004	-0.016	-0.004	-0.005	-0.002
	(0.018)	(0.021)	(0.025)	(0.026)	(0.021)	(0.019)
GeographicalWE	-0.011	-0.032	-0.066^{**}	-0.024	0.002	-0.004
	(0.019)	(0.023)	(0.028)	(0.030)	(0.024)	(0.022)
Constant	0.035^{**}	0.051^{**}	0.077^{***}	0.059^{**}	0.025	0.014
	(0.017)	(0.020)	(0.024)	(0.025)	(0.020)	(0.018)
Observations	339	387	386	380	388	337
R^2	0.944	0.911	0.872	0.858	0.904	0.931
Adjusted R^2	0.943	0.910	0.870	0.856	0.903	0.930
Residual Std. Error	0.119 (df = 332)	0.149 (df = 380)	0.180 (df = 379)	0.190 (df = 373)	0.155 (df = 381)	0.131 (df = 330)
F Statistic	930.524^{***} (df = 6; 332)	651.327^{***} (df = 6; 380)	431.860^{***} (df = 6; 379)	377.152^{***} (df = 6; 373)	599.620^{***} (df = 6; 381)	741.917^{***} (df = 6; 330)
Note:						*p<0.1; **p<0.05; ***p<0.01

Figure 11: LPM results per votes with contributions within six months of vote

	Dependent variable:					
	Anti-Env. Vote 3	Anti-Env. Vote 4	Anti-Env. Vote 51	Anti-Env. Vote 52	Anti-Env. Vote 6	Anti-Env. Vote 7
	(1)	(2)	(3)	(4)	(5)	(6)
PartyR	0.918***	0.909***	0.921***	0.911***	0.954***	0.953***
	(0.024)	(0.023)	(0.023)	(0.030)	(0.022)	(0.021)
Pro-Env. Contributions (113)	0.0003*					
	(0.0001)					
Anti-Env. Contributions (113)	-0.001					
	(0.001)					
Pro-Env. Contributions (114)		0.0003**				
		(0.0001)				
Anti-Env. Contributions (114)		-0.0003				
		(0.001)				
Pro-Env. Contributions (1151)			0.0003*	-0.00002		
			(0.0002)	(0.0002)		
Anti-Env. Contributions (1151)			-0.0002	-0.0003		
			(0.001)	(0.001)		
Pro-Env. Contributions (1152)					0.0001	
					(0.0001)	
Anti-Env. Contributions (1152)					0.00002	
					(0.001)	
Pro-Env. Contributions (116)						-0.00004
						(0.0001)
Anti-Env. Contributions (116)						0.00002
						(0.0005)
Pro-Env. Contributions (117)	-0.041	-0.064**	-0.086***	-0.042	-0.023	-0.049*
	(0.033)	(0.032)	(0.031)	(0.041)	(0.029)	(0.027)
GeographicalNE	0.008	0.010	-0.010	0.026	0.001	0.011
	(0.026)	(0.025)	(0.026)	(0.034)	(0.023)	(0.023)
GeographicalSO	-0.038	-0.034	-0.046	-0.007	0.024	0.007
	(0.030)	(0.028)	(0.028)	(0.038)	(0.026)	(0.025)
GeographicalWE	0.002**	-0.0005	0.0002	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
District	0.051*	0.065**	0.061**	0.035	0.015	0.020
	(0.027)	(0.026)	(0.027)	(0.036)	(0.024)	(0.023)
Observations	229	263	260	255	262	238
R^2	0.921	0.914	0.913	0.852	0.926	0.936
Adjusted R^2	0.918	0.911	0.910	0.848	0.924	0.934
Residual Std. Error	0.142 (df = 221)	0.148 (df = 255)	0.149 (df = 252)	0.195 (df = 247)	0.137 (df = 254)	0.127 (df = 230)
F Statistic	366.322*** (df = 7; 221)	384.881*** (df = 7; 255)	377.073*** (df = 7; 252)	203.786*** (df = 7; 247)	456.183*** (df = 7; 254)	480.825*** (df = 7; 230)
Note:						*p<0.1; **p<0.05; ***p<0.01

Figure 12: LPM results per votes with contributions of entire election of vote

	Dependent variable:
	all_votes_minus All Anti-Env Votes
PartyR	0.307***
	(0.067)
District	0.006**
	(0.002)
GeographicalNE	0.048
	(0.096)
GeographicalSO	0.029
	(0.071)
GeographicalWE	0.0002
	(0.079)
Pro-Env. Contributions (113)	0.0001
	(0.004)
Anti-Env. Contributions (113)	-0.001
	(0.001)
Pro-Env. Contributions (114)	-0.002
	(0.004)
Anti-Env. Contributions (114)	-0.001
	(0.001)
Pro-Env. Contributions (1151)	0.006
	(0.006)
Anti-Env. Contributions (1151)	0.002
	(0.001)
Pro-Env. Contributions (1152)	-0.006
	(0.005)
Anti-Env. Contributions (1152)	0.002**
	(0.001)
Pro-Env. Contributions (116)	0.0005
	(0.003)
Anti-Env. Contributions (116)	-0.002***
	(0.001)
Pro-Env. Contributions (117)	-0.085
	(0.071)
Observations	150
R^2	0.342
Adjusted R^2	0.269
Residual Std. Error	0.304 (df = 134)
F Statistic	4.652*** (df = 15; 134)
Note:	*p<0.1; **p<0.05; ***p<0.01

Figure 13: LPM results with only consistent representatives, with contributions of entire election of vote

	Dependent variable:
	All Anti-Env. Votes
District	-0.001
	(0.002)
Party	0.007
	(0.042)
Anti-Env. Contribution (113th congress Vote)	-0.001
	(0.001)
Pro-Env. Contribution (113th congress Vote)	-0.014
	(0.011)
Anti-Env. Contribution (114th congress Vote)	-0.002
	(0.002)
Pro-Env. Contribution (114th congress Vote)	-0.019*
	(0.010)
Anti-Env. Contribution (115th congress 1st Vote)	0.007*
	(0.004)
Pro-Env. Contribution (115th congress 1st Vote)	0.021
	(0.019)
Anti-Env. Contribution (115th congress 2nd Vote)	-0.001
	(0.003)
Pro-Env. Contribution (115th congress 2nd Vote)	-0.014
	(0.017)
Anti-Env. Contribution (116th congress)	0.002
	(0.001)
Pro-Env. Contribution (116th congress)	-0.002
	(0.019)
Anti-Env. Contribution (117th congress)	-0.002
	(0.001)
Pro-Env. Contribution (117th congress)	0.007
	(0.015)
GeographicalNE	-0.022
	(0.056)
GeographicalSO	-0.038
	(0.045)
GeographicalWE	-0.014
	(0.052)
Constant	0.018
	(0.046)
Observations	144
R^2	0.304
Adjusted R^2	0.210
Residual Std. Error	0.192 (df = 126)
F Statistic	3.234*** (df = 17; 126)
Note:	*p<0.1; **p<0.05; ***p<0.01

Figure 14: LPM results with only consistent representatives, with contributions within six months of vote

A4. Declaration of Aids

Type of Aid	**Use of Aid**
Github Copilot	Used for coding repetitive things in R
DeepL Write	Applied over entire thesis to improve spelling and wording
ChatGPT	Applied over entire thesis to improve spelling
Quillbot	Applied over entire thesis to paraphrase text from sources

A5. Declaration of Authorship

I hereby declare,

- that I have written this thesis independently
- that I have written the thesis using only the aids specified in the index;
- that all parts of the thesis produced with the help of aids have been precisely declared;
- that I have mentioned all sources used and cited them correctly according to established aca- demic citation rules;
- that I have acquired all immaterial rights to any materials I may have used, such as images or graphics, or that these materials were created by me;
- that the topic, the thesis or parts of it have not already been the object of any work or examina- tion of another course, unless this has been expressly agreed with the faculty member in ad- vance and is stated as such in the thesis;
- that I am aware of the legal provisions regarding the publication and dissemination of parts or the entire thesis and that I comply with them accordingly;
- that I am aware that my thesis can be electronically checked for plagiarism and for third-party authorship of human or technical origin and that I hereby grant the University of St.Gallen the copyright according to the Examination Regulations as far as it is necessary for the administra- tive actions;
- that I am aware that the University will prosecute a violation of this Declaration of Authorship and that disciplinary as well as criminal consequences may result, which may lead to expul- sion from the University or to the withdrawal of my title.

By submitting this thesis, I confirm through my conclusive action that I am submitting the Declaration of Authorship, that I have read and understood it, and that it is true.

21.05.2024

Minna Emilia Hagen Heim

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