

Impact of Campaign Finance on Election Results

Authors

Fouz ul Azeem Lassaam (0828030) and Hamza Mahmood (0796503)

Abstract

The study will look into the impact of different variables on result of the election through exploratory data analysis, visualizations and predictive modelling. The study will be analyzing the performance of the both major parties in lower house, Senate and presidential race. The data set used for this project has been obtained from kaggle (an open source) which will examine integral financial indicators including (not limited to) net contribution, net contribution, cash on hand at the beginning and end of the period to predict the outcome of the electoral process. A logistic regression model has been used to analyze these aforementioned variables, with the data set divided into training (80%) and testing (20%) to ensure the validity of the model's performance. The outcome of the model showcased high predictive accuracy and reliability in predicting the election outcome, which has been discussed in detail in the results section. The model's performance was analyzed via a confusion matrix and ROC curve.

Introduction

The impact of campaign finance on the electoral outcome has been an intriguing topic. There is an identifiable pattern of every election being more costly and competitive than the preceding one, it is important to understand the dynamics that the finances play in the success of the candidates and policymakers. Campaign finance entail no of different financial elements, including fundraising, expenses and cash in hand (cash management), which together mold the direction of a particular political campaign. This study focuses to figure out how these different financial variables and their correlation

with the outcome, through EDA process, visualizations and predictive modelling.

Money plays a multidimensional role. Finances are important for several campaign related activities some of them include advertising, organization of events and reaching out to the voter base. These activities play an integral role in making a certain candidate favorite, by communication their vision and engaging the supporters. That being so, the candidate with greater financial resources in most of the cases have a significant advantage. However, this particular thought does not result in a sure shot victory, it is important how the campaign management team uses their resources in

an efficient manner and strategize to have an impact on the general public and ensure victory of their candidate. The 2016 election was an example of aforementioned correlation, while Hillary Clinton of Democratic nominee was a favorite with significant advantage over her rival of Republican Party, Donald Trump, the results did not translate the financial strength of her campaign into electoral victory.

The findings obtained from the research will provide important insights to the campaign management teams and offer recommendation based on the outcomes. By comprehending the financial variables that convert to electoral success, campaigns can be more efficient in creating strategies that increases their likelihood to win. Additionally, via this research the emphasis will be placed on highlighting the power of data analysis to ensure the competitiveness in the election, enhancing the understanding of the electoral financing process.

Previous Work

The previous research on the campaign finance and electoral victory has been a subject of debate among the political science and economics expert. The literature explores some of the key themes in this domain:

1. Campaign Finance and Electoral Success
2. Role of Small and Large Donations
3. Financial Contributions and Ideology
4. Voter Perception and Campaign Finance

5. Regulations

Campaign Finance and Electoral Success

One of the central theme in the literature is the direct relationship between finance and electoral performance. Many studies have pointed out how integral is the role of financial resources for the campaign activities, mobilize the people, enhancing the candidates visibility and vote bank. Schuster [1] and Meirowitz [2] play down the role of money in the outcome, according to their research the affect varies for incumbents and challengers as challengers get more out of spending because they have built their base. Same goes for Avis et al. [3], where the state level election and have been studied in detail and influence of money has not one consistent outcome, the outcomes have significant variations.

Role of Small and Large Donations

The type and source of donation also has the bearing on the outcome of the election. Le et al. [4] and Lasley et al. [5] point out the importance of the small but large no of donations, classifying it as *grassroots* support, which can be a strong predictor of the success in the election in comparison with the total among of money. The grassroots model encompasses number of donors, which can better predict the election outcome [5].

Financial Contributions and Ideology

The relationship between the Ideology and finances is an important part of our literature. Frank and Martinez [6] compares the different finance based related and vote based metrics, showing that the financial contributions provide a different perspective on the candidate's

alignment. While Barber [7] mentions the correlation between legislative and fundraising over the long period of time.

Voter Perception

Voter perception is one of the most important component of election campaign which can make or break for the candidate. Robinson [8] has an interesting stance on this topic, they talk about finance being the influencing factor in candidates getting good enough response that translates into the actual result.

Campaign Finance Regulations

The work of La et al. [9] talks about the effect of spending bans and other relevant regulatory checks, these bans might reduce the cost of campaign, but they have the same field as the incumbent have an upper hand in this regard. While Fakhrudin and Riyan [10] adds to this by emphasizing to improve the laws to make sure, no such tactic used by a candidate can bypass the existing relations. These findings suggest for a more dynamic regulatory framework as it is essential for reducing the financial differences in the election.

Methodology

The dataset was obtained from Kaggle, which has financial information of candidates who participated in the 2016 election cycle in US. The data includes financial variables such as Net Contribution, Cash on Hand at the beginning and end of the period and net operating expenditures as well. These all variables provide an insight into the spending patterns and income to run the campaign operations. The data also includes categorical variables such as

party affiliation, incumbent status and outcome. Making it suitable for both the EDA and predictive modelling. Key financial variables were analyzed through EDA, visualizations like bar graphs, scatter plots and correlation matrix. A logistic regression model with Lasso regularization (predictive model) was used to predict election outcomes using different libraries in R.

Results

Exploratory Data Analysis (EDA):

Candidates in each Party

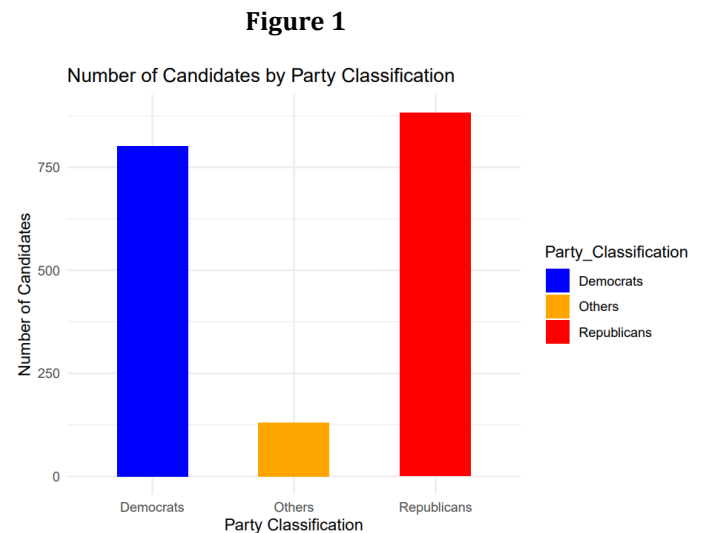


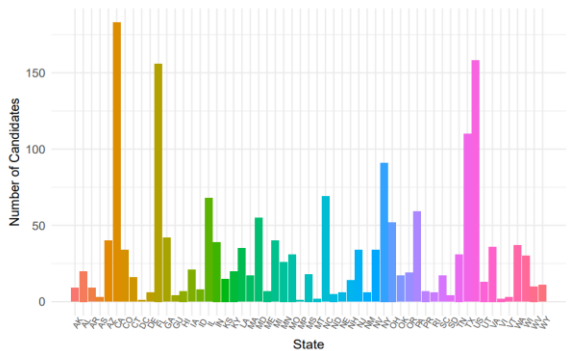
Figure 1 displays the number of candidates that participated in the US election cycle of 2016. The graph shows that the Republicans had the most number of candidates participating in 2016 elections, 882, while the Democratic party fielded around just under 800 candidates.

Candidates in each State

Figure 2

Number of Candidates by State

The bar chart in Figure 2 illustrates the number of candidates from each state. It shows significant variations across states, with California (CA) and Texas (TX) having the highest number of candidates, exceeding 150 each. This distribution highlights the disparity in candidate representation, possibly reflecting the population size and political engagement in each state. States like Delaware (DE) and Vermont (VT) have notably fewer candidates, indicating a lower level candidate participation.

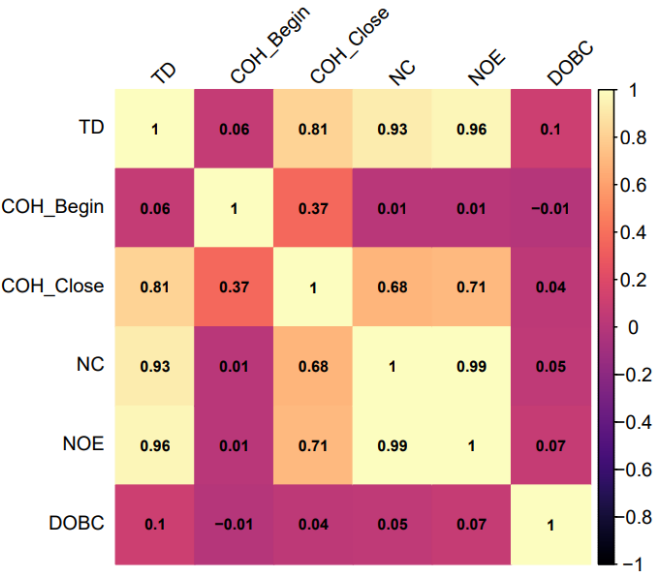


Correlation Analysis

Figure 3

Correlation Matrix of Key Financial Variables

Figure 3 presents the correlation matrix of key financial variables in the dataset. The matrix reveals strong positive correlations between Total Disbursements (TD) and Net Contributions (NC) at 0.93, as well as between TD and Net Operating Expenditures (NOE) at 0.96. Cash on Hand at the Beginning (COH_Begin) shows a moderate correlation with Cash on Hand at the Close (COH_Close) at 0.37. Debt Owed by Committee (DOBC) has minimal correlations with other financial metrics,



with the highest being with TD at 0.10, indicating it operates relatively independently of the other variables. Moreover, NC and NOE also have a high correlation at 0.99. This indicates as the money raised for a political campaign increases, the candidates tend to increase their expenditure as well, implying the majority is spent on running their campaign operations.

Net expenditures by Party

Figure 4a

Republican Net Expenditures by State

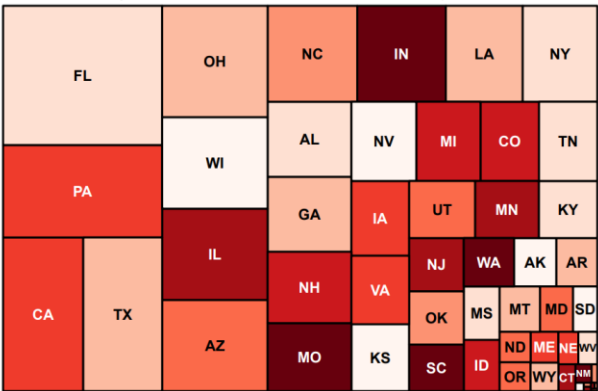
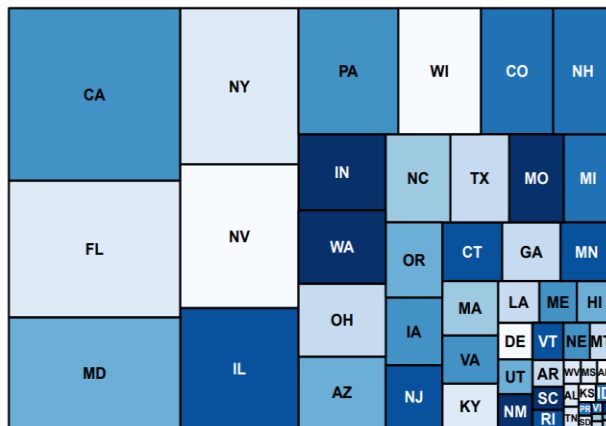


Figure 4b

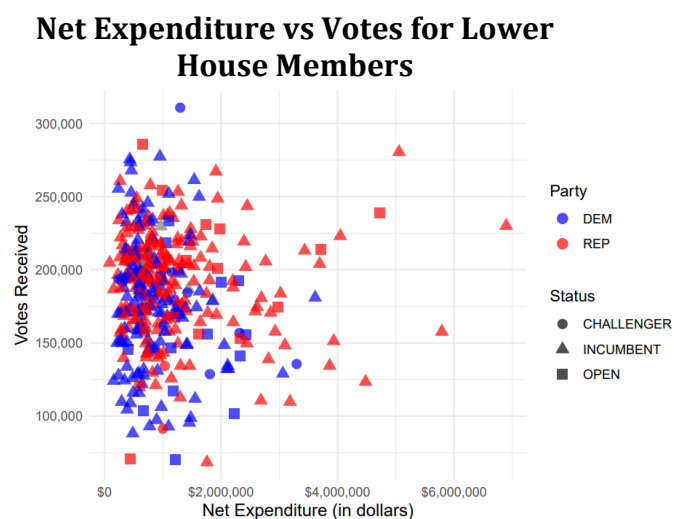
Democrat Net Expenditures by State



The Figures visualize the net expenditures of the republican candidates across various states. For the republicans Florida (FL), Pennsylvania (PA) and California (CA) have the highest net expenditures on the political activities which highlights the importance of these states for the outcome for the republican candidates and importance of winning them to ensure the seat at the Oval office. Meanwhile the democrats spent the most in California (CA), Florida (FL) and Maryland (MD).

Relationship between Votes and Net Expenditures for House of Representatives (Lower House)

Figure 5

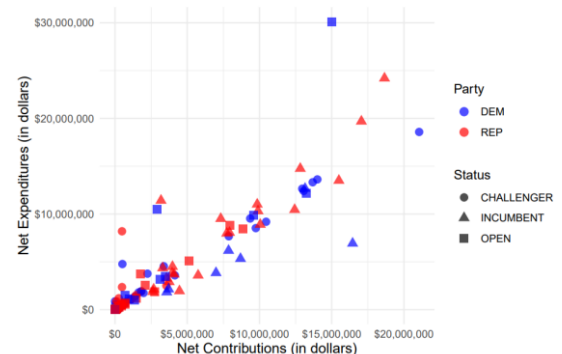


proportionally increase their respective votes bank, hence every additional vote requires more dollar to spent. While some of the candidates received a very high number of votes with lower expenditure (less than \$2 million), this shows the effectiveness of the political campaigns, making sure their message reaches the mass public. The incumbents, as the plot shows, have to spend relatively less then challengers as they are able to leverage their position and recognition to secure more votes. Candidates in open races show a varying trend, clustering around the moderate expenditure region. Democrats have a dense cluster of votes around the lower end while the republicans have a varying trend.

Relationship between Net Contribution and Net Operating Expenditures for the Senate

Figure 6

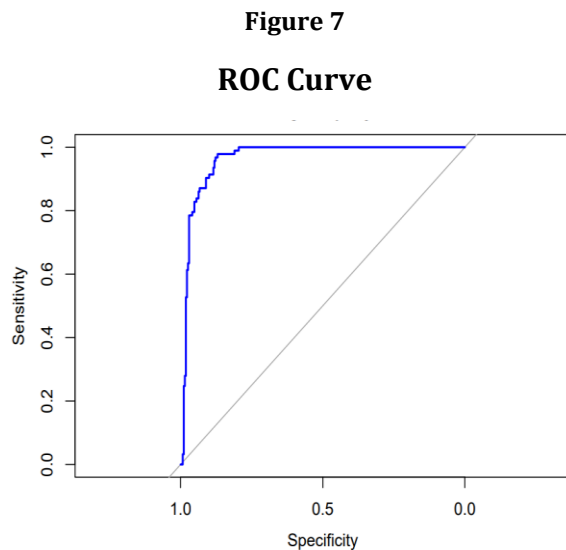
Net Contributions vs Net Expenditures for Senate



The scatter plot showcases the relationship between the net contributions and net operating expenditure by the Senate candidates of both the parties. The plot shows a positive correlation between both the variables. Both parties have similar trends, however there are some outlier cases, with some republican candidates spending up-to 25

million dollars approximately while generating around 19 million, same is the case for one of the democrat as well who spent 30 million while generating 15 million, implying hotly contested race. Incumbents seem to spend more and generate more compared to the challengers and open seat candidates, mainly due to their already establish positions.

Predictive Model:



The predictive model has been created using the logistic regression with lasso regularization. The ROC curve illustrates the model's strong discriminatory power, as evidenced by the steep ascent and high sensitivity (true positive rate) reaching near 1.0 before a significant drop in specificity. The curve's proximity to the top-left corner indicates a high True Positive Rate and a low False Positive Rate, suggesting the model performs exceptionally well in distinguishing between the positive and negative classes. This performance is corroborated by the high sensitivity (0.9777), indicating the model's effectiveness in correctly

identifying positive cases, and the decent specificity (0.6129), reflecting its ability to recognize negative cases, albeit less robustly. The ROC curve thus visually confirms the model's overall effectiveness, balancing sensitivity and specificity to achieve a reliable prediction performance.

Conclusion

The study successfully demonstrates the significant impact of various financial variables on the 2016 US election outcome. By performing exploratory data analysis and utilizing different types of visualizations, we gained valuable insights into the financial dynamics of election campaigns. The logistic regression model with Lasso regularization exhibited high predictive accuracy and reliability, as further confirmed by the ROC curve. Overall, the findings provide a comprehensive understanding of the link between financial contributions, expenditures, and election outcomes.

References

- [1] S. S. Schuster, "Does campaign spending affect election outcomes? New evidence from transaction-level disbursement data," *Journal of Politics*, vol. 82, pp. 1502–1515, Oct. 2020, doi: [10.1086/708646](https://doi.org/10.1086/708646).
- [2] A. Meirowitz, "Electoral contests, incumbency advantages, and campaign finance," *The Journal of Politics*, vol. 70, pp. 681–699, Jul. 2008, doi: [10.1017/S0022381608080699](https://doi.org/10.1017/S0022381608080699).
- [3] E. Avis, C. Ferraz, F. Finan, and C. Varjão, "Money and politics: The effects of campaign spending limits on political competition and incumbency advantage."

National Bureau of Economic Research, 2017.

[4] T. Le, I. Onur, R. Sarwar, and E. Yalcin, "Money in politics: How does it affect election outcomes?" *SAGE Open*, Jun. 2024.

[5] B. Lasley, B. Shapero, and C. Soesanto, "Google (campaign) finance."

[6] R. W. Frank and F. M. i Coma, "Correlates of voter turnout," *Political Behavior*, vol. 45, pp. 607–633, Jun. 2023, doi: [10.1007/s11109-021-09720-y](https://doi.org/10.1007/s11109-021-09720-y).

[7] M. Barber, "Comparing campaign finance and vote-based measures of ideology," *The Journal of Politics*, vol. 84, pp. 613–619, Jan. 2022, doi: [10.1086/715247](https://doi.org/10.1086/715247).

[8] T. S. Robinson, "When do voters respond to campaign finance disclosure? Evidence from multiple election types," *Political Behavior*, vol. 45, pp. 1309–1332, Dec. 2023, doi: [10.1007/s11109-021-09766-y](https://doi.org/10.1007/s11109-021-09766-y).

[9] R. J. La Raja and B. F. Schaffner, "The effects of campaign finance spending bans on electoral outcomes: Evidence from the states about the potential impact of citizens united v. FEC," *Electoral Studies*, vol. 33, pp. 102–114, 2014.

[10] M. Fakhrudin and M. Riyan, "The role of money in presidential elections: Empirical evidence from democracies," *International Journal of Intersectionality: Law and Gender*, vol. 1, pp. 16–31, 2024.