Analyzing the Impact of Campaign Spending and Party Affiliation on Election Outcomes

Introduction

In Presidential election years, substantial amounts of money are spent in politics. The US Federal Election Commission estimates that the total expenditure for the 2020 election cycle was approximately $14.4 billion. For context, Twitter's 2020 annual revenue was about $3.5 billion.

Data

The dataset for this analysis comes from the fec16 package, which includes spending and results from the 2016 election cycle. This dataset contains information on candidates, race attributes, and campaign finances, specifically utilizing the results_house and campaigns data frames.

Datasets

- **Candidates:** Attributes such as name, unique ID, election year, and office sought.

- **Results_House:** Attributes such as candidate names, unique IDs, number of general votes garnered, and other information.

- **Campaigns:** Financial information including unique candidate IDs, total receipts, total disbursements, and total contributions by party central committees.

Questions

This analysis seeks to understand the relationship between campaign spending and election outcomes, measured by the votes received by candidates. Specifically, the following key questions are addressed:

1. **What is the relationship between total disbursements and general votes?**

   o Using a regression model, we investigate how campaign spending (total disbursements) correlates with the number of votes a candidate receives.

2. **Does adding party affiliation to the model provide additional information about general votes?**

   o We examine whether incorporating party affiliation into the regression model enhances its explanatory power regarding the number of votes.

3. **What is the statistical significance of the models?**

   o We evaluate the statistical significance of the regression models to determine the reliability and validity of the relationships observed between the variables.

Regression Model

The linear regression model with **general_votes** as the outcome and ttl_disb and party affiliation (candidate_party) as predictors demonstrates the following:

Table 1: Regression Results for General Votes on Total Disbursements and Candidate Party

	Dependent variable:
	General Votes
Total Disbursements	0.013*** (0.002)
Other Party	−113,100.600*** (6,154.125)
Republican	6,534.041 (4,832.733)
Constant	140,075.900*** (3,741.500)
Observations	880
R^2	0.359
Adjusted R^2	0.357
Residual Std. Error	64,486.840 (df = 876)
F Statistic	163.499*** (df = 3; 876)
Note:	*p<0.1; **p<0.05; ***p<0.01 Standard errors are in parentheses.

The linear model results indicate that for every additional dollar spent on a campaign, the number of votes increases by approximately 0.013, and this relationship is statistically significant. Additionally, candidates from "Other Party" affiliations receive significantly fewer votes compared to Democrats, while the effect of being a Republican is not statistically significant.

Hypothesis Testing - Money's Relationship with Votes

To determine if ttl_disb has a statistically significant relationship with general_votes, we perform a hypothesis test on the regression model:

Hypothesis Test:

1. Null Hypothesis (H0): There is no relationship between total disbursements and general votes

2. Alternative Hypothesis (Ha): There is a relationship between total disbursements and general votes.

The test conducted was a **t-test for the coefficients** of a linear regression model. This test evaluates whether each predictor variable in the model significantly contributes to predicting the outcome variable. Specifically, we tested the null hypothesis that each coefficient is equal to zero (i.e., no effect) against the alternative hypothesis that the coefficient is not equal to zero (i.e., there is an effect).

Evaluation of Test Results:

The t-test results for the coefficient of ttl_disb show a p-value of 6.899e-14, which is significantly less than 0.05, indicating that ttl_disb is statistically significant. The coefficient estimate of 0.01326 implies that for every additional dollar spent, the number of votes increases by approximately 0.01326. Meaning, an increase in campaign spending, such as $1,000,000, would result in approximately 13,260 additional votes, demonstrating the practical importance of campaign expenditures in influencing election outcomes.

Hypothesis Testing - Party's Relationship with Votes

We test if adding the party affiliation variable (candidate_party) to our model provides additional information about the votes (general_votes).

Hypothesis Test:

- **Null Hypothesis (H0):** Adding candidate party affiliation to the model does not provide additional information about general votes.

- **Alternative Hypothesis (Ha):** Adding candidate party affiliation to the model provides additional information about general votes.

Evaluation of Test Results:

- The ANOVA test comparing the reduced model to the full model shows that including party affiliation variable significantly improves the model, with a large F-statistics of 210.58 and p-value less 2.2e-16. This indicates that including the variable provides important additional information about general votes, underscoring the relevance of party affiliation in explaining election outcomes.

Conclusion

This analysis demonstrates a significant relationship between campaign spending and election outcomes, specifically the votes received by candidates. The findings reveal that there is a positive correlation between total disbursements and general votes, indicating that increased campaign spending generally results in a higher number of votes for candidates. Additionally, incorporating candidate party affiliation into the regression model enhances its explanatory power, suggesting that party affiliation significantly influences the number of votes a candidate receives.

The statistical significance of these relationships is confirmed by t-tests, which show that the slope coefficient for total disbursements is statistically significant, thereby verifying a reliable relationship between campaign spending and votes. Moreover, the ANOVA test indicates that the model including party affiliation is significantly better than the model without it, underscoring the importance of party affiliation in explaining election outcomes.

In summary, the analysis underscores the critical roles of both financial resources and party support in determining election results. These insights can guide campaign strategies and inform electoral policies to promote a more equitable and transparent voting process.