

# Correlation Between Stock Market Trends and Political Party in Office

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## 1 Research Question and Motivation

- Clearly state the research question you aim to answer.
  - "How does the stock market performance change when under Democratic presidencies vs when under Republican presidencies?"
- Provide context and motivation for why this question is important or interesting.
  - The relationship between the performance of the stock market, and the party that is in office, is a topic that is widely debated. This is because it gives a very meaningful insight to the level of success that party had during it's term in office. The clear cut differences in political parties lead to different sides of the debate privy that each party can positively effect some aspect of the market. We see that it is commonly believed that the deregulation of the Republican party creates an environment that is favorable for a positive overall trend of the economic business and the stock market mirrors that. While on the other hand, some may say that the the stock market seems to diversify and impact different sectors than usual, when the United states in under the presidency of the Democratic Party.
  - The motivation for this project is to make statistically significant claims about the state of the stock market, differentiated by the parties. Some examples of what we may find in the data is whether one party may perform significantly better than the other, or maybe some sections of the stock market do better, as well as the stability and general bear/bull trend of the market. We are able to use data science by analyzing this data to create a better understanding of these perspectives of the debates.
- Discuss any relevant background knowledge or prior work (optional but encouraged).
  - We are doing this project our of curiosity of the subject.

## 2 Data Sources

- Identify the data sources you plan to use.
  - Our primary data source would be the Yahoo Finance API. This is an ideal choice, as it makes data acquisition and transformation easy. One highlight while researching was being able to easily filter through different sectors of the stock market using Yahoo, whether it be tech, medicine, energy, etc.. We'll also need to add to our data frame information about the presidential party of the time. We can do this by scraping the presidential terms from any history-based, valid website.
- Explain how you will obtain, clean, and preprocess the data.
  - Data acquisition here will require us both learning/getting comfortable with the Yahoo Finance API. Once we do, we will be able to utilize API calls in order to get the information we want for analysis. As for the presidential information, we may want to utilize some form of webscraping like BeautifulSoup. There will be quite a few preprocessing steps we need to take. For example, as I mentioned earlier our data frame needs to include a value that shows whether the party in office at the time was Democratic or Republican. We will also want to make some other variables that will be useful for future analysis and differentiation.
- If applicable, discuss potential challenges in data access, quality, or preprocessing.
  - One issue that may be present in our data acquisition/usability is that as the history records of the stock market go farther and farther back, it is more likely that there was no organized record-keeping of the sections within the stock market such as tech or medicine. Also there are going to be some outliers in the data, we can think of crisis' that don't have strong correlation with the political party of the time, such as the housing crisis in the late 2000s, or even the Great Depression - if we go back that far.

## 3 Methodology and Analysis Plan

- Data Exploration.
  - Perform exploratory data analysis (EDA) on the stock market returns over time.
  - Visualize the data to identify broad trends, outliers, or unusual market behaviors.
- Modeling

- Label data points, daily or monthly, according to the political party in office during each period.
- Create summary statistics such as mean return or volatility for each presidency and aggregate summaries for Democratic vs. Republican administrations.
- Evaluation
  - Hypothesis testing: Compare average returns under Democratic vs. Republican presidencies to see if differences are statistically significant.
  - Regression Analysis: Implement a time-series or regression model that includes a categorical variable representing the party in power. Also, we will include control for other factors such as interest rates or market volatility to better see impacts of the political party.
  - Python, Pandas, NumPy, SciPy, Matplotlib, Statsmodels

## 4 Expected Outcome

• Anticipated findings ◦ We expect to present whether or not there is a meaningful difference in Stock Market(SP 500) performance during Democratic vs. Republican presidencies. ◦ Analysis may reveal nuances such as certain periods of economic expansion or recession correlated with specific presidencies. • Evaluation Criteria ◦ Return metrics: Average annualized return, cumulative returns, Sharpe ratio, and volatility (standard deviation of returns). ◦ Statistical significance: p-values from hypothesis testing on the difference in mean returns. ◦ Model accuracy(using regression): Goodness-of-fit measures such as  $R^2$ . • Potential Extensions ◦ Extending the analysis to include additional economic indicators, such as GDP growth, unemployment rates, and interest rate policies, to see if party affiliation remains a significant factor when controlling for broader macroeconomic variables. ◦ Exploring alternative indices (e.g., Dow Jones, NASDAQ) or sector-based performances to see if party-driven patterns differ by market segment. By completing this project, we will generate data-driven insights into whether political leadership correlates significantly with market performance. This research can serve as a foundation for further exploration of economic policy impacts on financial markets.

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