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Final Project Written Report

Introduction and Question: Minimum wage policy varies widely across the United States, many argue that political ideology plays a key role in shaping these differences. Some states set their minimum wage far above the federal level, while others maintain the federal minimum of $7.25. These patterns raise an important economic question: Is there a relationship between a state's minimum wage and its political affiliation? My final project explores this question by examining state level minimum wage data, categorizing states by political affiliation and then estimating a statistical model to test whether political ideology predicts minimum wage policy. The goal of my report is to use publicly available data and the tools learned in this course to evaluate how political factors are associated with minimum wage.

Data Description and Sources: For my initial analysis I used two data sets. The first contains the minimum wage for each US state in 2025, collected by the US Department of Labor. The second dataset categorizes each state's political affiliation, "Red" or "Blue," based on how each state voted in the 2024 presidential election from CNN. I merged these two data sources and then added a Cost of Living Index dataset from the World Population Review to control for economic differences across the states. To clean the data, I standardized all state names so the formatted matched across the data sets. Political affiliation in the dataset was originally a categorical variable written as "Red" and "Blue," so I created a dummy variable that coded Red states as 1 and Blue states as 0 for use in the regression model. After ensuring each dataset was consistently formatted, I merged them by state into a single file containing all relevant variables so I could construct a visualization. I created a box plot that compares minimum wages between Red and Blue states. It shows a clear pattern that Blue states tend to have substantially higher minimum wages than Red states, which tend to cluster near the federal minimum. This visualization provides early evidence that political affiliation may be related to minimum wage policy.

Methodology: To examine whether political affiliation is truly associated with a state's minimum wage, I estimated an ordinary least squares regression model where the dependent variable is each state's minimum wage, the independent variable is political affiliation and cost of living is included as a control variable. The model takes the form of: Minimum Wage = $\beta_0 + \beta_1$(Red State) + β_2(Cost of Living Index) + ε. The coefficient on political affiliation is 4.20, indicating that Red states have minimum wages approximately $4.20 lower than Blue States, holding the cost of living constant. The cost of living coefficient is 0.044, meaning that a one point increase in the cost of living index is associated with about only a 4 cent increase in the minimum wage, this low coefficient is only marginally significant. This GLM structure allows me to isolate the relationship between political affiliation and minimum wage levels while accounting for the cost of living.

Results and Analysis: The results of my regression model show a strong statistically significant relationship between political affiliation and state minimum wage levels. The coefficient on political affiliation is -4.20 and the associated p value is less than 0.001, meaning the probability of observing such a large difference between Red and Blue states purely by chance is extremely small. This low p-value indicates that political affiliation is a meaningful predictor of minimum wage levels, not just a random variation in the data. In contrast, the cost of living coefficient is 0.044 with a p-value of 0.072, which is only marginally significant. This suggests there is a weak relationship between the cost of living and a state's minimum wage. These statistical results align with the patterns shown in the box plot, where Blue states consistently display higher minimum wages than Red states. The residual Plot also supports this model's validity. The residuals are evenly scattered around zero, indicating no strong nonlinear patterns. This randomness is a good sign because it suggests that the relationship between political affiliation and minimum wage is reasonably linear, which supports the validity of the OLS model.

Conclusions: In conclusion, my analysis shows that there is a clear and meaningful relationship between a state's political affiliation and its minimum wage level. After merging data on minimum wages, political affiliation and cost of living and then estimating an OLS regression model, I found that political affiliation is the strongest and most statistically significant predictor. Red states have minimum wages that are, on average, about $4.20 lower than those in Blue states, even after accounting for differences in cost of living. The Box plot reinforces this result visually and the residual plot confirms that the model provides a good fit for the data. While cost of living plays a minor role, political affiliation appears to be the primary factor shaping minimum wage policy across states. These findings answer my research question that there is in fact a relationship between political affiliation and minimum wage.

References:

- State's Political Affiliation CSV:
  - https://drive.google.com/file/d/133KZwM-Z7Za_JZ8opUfIGDEDi5ijtCwi/view?usp=sharing
  - Data from: https://www.cnn.com/election/2024/results/president
- State's Minimum Wage CSV:
  - https://drive.google.com/file/d/1YDAgeeV9asLr2Fy5T9TEdZhx8-ZaZ6E0/view?usp=sharing
  - Data from: https://www.dol.gov/agencies/whd/minimum-wage/state
- States Cost of Living Index
  - https://drive.google.com/file/d/1s_NHM9-IvXTgKIFneRnL1sgVsyFarzSA/view?usp=sharing
  - Data from: https://worldpopulationreview.com/state-rankings/cost-of-living-index-by-state