MULTI-FACTORIAL ASSESMENT OF ECONOMIC DATA

Team number-13

Amulya Reddy Datla, Chaitali Thakkar, Jagruthi Reddy Ghanapati, Rohan Thorat

INTRODUCTION

In fast-paced economic environment, policymakers, businesses, and stakeholders face complex issues that require detailed, data-driven solutions. Our thorough economic analysis incorporates a wide range of indicators to uncover key trends, relationships, and insights. By examining variables across labor markets, monetary policy, housing trends, inflation dynamics, employment patterns, and demographic shifts, valuable information can be obtained to shape policies.

METHODS

Our method combines in-depth research and advanced economic analysis to comprehensively evaluate minimum wage policies, integrating data from employment, inflation, and regional differences. We collected and cleaned data on key indicators such as StateMinimumWage, FederalMinimumWage, CPIAverage, GDP, and UnemploymentRate, and conducted exploratory data analysis. Our analytical framework included statistical analysis, handling multicollinearity with VIF, and training models using Random Forest, Lasso, and Ridge Regression, validated with 20-fold cross-validation. We identified Linear Regression as the most effective model through MSE comparison and incorporated time series analysis to understand long-term trends. This holistic approach enhances prediction accuracy, policy recommendations, and understanding of economic complexities.

DATASET

This dataset contains annual data for U.S. states, encompassing key economic indicators such as state and federal minimum wages, the effective minimum wage adjusted to 2020 dollars, Consumer Price Index (CPI) averages, federal funds rate, Gross Domestic Product (GDP), home price index, mortgage rates, population growth, and unemployment rates. It allows for comprehensive analysis of economic trends and policies at both state and federal levels, including the impact of minimum wage laws, inflation, monetary policy, housing market trends, and overall economic performance and labor market conditions.

EXPLORATORY DATA ANALYSIS

Exploratory data analysis (EDA) is done for the examination of the relationships between key economic indicators in the United States, including the Federal Funds Rate, unemployment rate, GDP, home prices, and the federal minimum wage. By visualizing these variables, we uncovered trends and correlations that highlight the impacts of economic policies on growth and stability
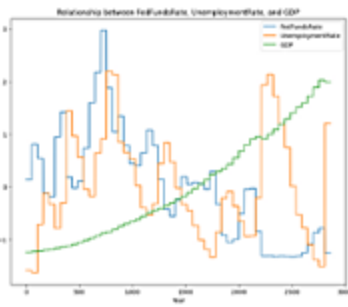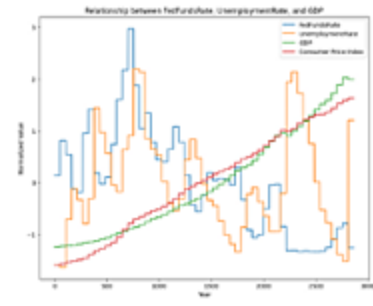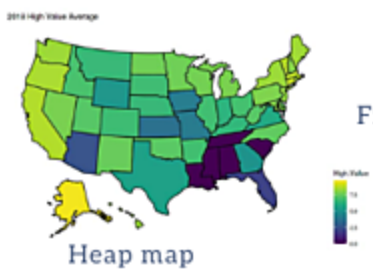

Figure 1

Figure 2

Figure 3

Figure 4

Heap map

The figures illustrates a complex relationship between the Federal Funds Rate, unemployment rate, GDP, and the Consumer Price Index (CPI). An inverse relationship between the Federal Funds Rate and unemployment rate. The figures sheds light on the factors influencing the housing market, highlighting the Home Price Index, mortgage rates, population growth, and the Federal Minimum Wage. The data suggests that high mortgage rates often coincide with high home prices, indicating strong housing demand despite higher borrowing costs. The heap map gives the analysis of 2018 high average value.

EXPERIMENTS AND EVALUATIONS

Our experiments investigated the impact of changes in minimum wage laws on various economic aspects. By analyzing numerous variables, we identified key factors and their relationships with employment and pricing. Recognizing the close correlation between StateMinimumWage and FederalMinimumWage, we excluded one to streamline our analysis. Using regression models, we determined that Linear Regression provided the most accurate predictions for economic outcomes. Our findings highlight the crucial role of managing interest rates in controlling unemployment and maintaining economic stability. Despite overall economic growth, persistent inflation poses challenges. Additionally, we observed that minimum wage changes do not immediately affect home prices or mortgage rates, indicating other factors play a more significant role in these areas.

Model	MSE
Linear Regression	1.5333
Random Forest	4.148
Lasso Regression	9.645
Ridge Regression	2.697

Table 1

Overall, our experiments gave us a better understanding of how minimum wage policies affect the economy. This knowledge can help policymakers make better decisions to keep the economy growing while also making sure it's fair for everyone

CONCLUSION

Our study reveals that minimum wage policies interact with various economic aspects, with interest rate management playing a crucial role in controlling unemployment and ensuring economic stability. Despite steady economic growth, inflation remains a significant challenge for policymakers. In the housing market, factors like mortgage rates and population growth require careful navigation to maintain affordability and stability. Although increasing the Federal Minimum Wage promotes social equity, its immediate macroeconomic impact is less significant than expected. This highlights the need for a balanced approach to economic policy, considering multiple factors beyond minimum wage adjustments. Future research should refine our methods and explore additional variables to better understand these dynamics, aiding policymakers in fostering sustainable growth and equitable outcomes.