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Introduction

Understanding how changes in gasoline prices affect household spending is a core aspect of macroeconomics and consumer behavior. Gasoline is a necessity for most households in the United States, and fluctuations in fuel prices can directly affect disposable income. When gas prices rise, consumers may have less money available for other goods and services, potentially reducing their overall consumption. On the other hand, low gas prices may free up resources for additional spending. Policymakers, energy economists, and businesses closely monitor energy prices because they influence both short-term consumption behavior and broader macroeconomic trends.

In this project, I will examine whether gasoline prices are associated with real consumer spending in the United States. Specifically, I will investigate the relationship between real gas prices and Real Personal Consumption Expenditures (PCE) from the years 2000 to 2024. My goal is not to establish causation but to examine whether changes in gas prices correlate with changes in spending. This question can be answered using publicly available economic data and provides insights into how energy markets interact with household budgets.

Data Description and Sources

This analysis draws on monthly U.S. economic data from 2000 to 2024 from two primary sources. First, gas price data come from the Federal Reserve Economic Data (FRED) series GASREGW, which shows the United States Regular All Formulations Retail Gas Price. Although the original data are weekly, I will convert them to monthly averages for consistency with the consumption data.

Second, real consumer spending is measured using the Bureau of Economic Analysis (BEA) series for Real Personal Consumption Expenditures (PCE), accessible via FRED under the series ID PCECC96. Real PCE measures aggregate household spending adjusted for inflation, making it appropriate for studying purchasing behavior over time.

To provide context, I will include a figure showing the monthly trends in gasoline prices since 2000. This will highlight significant events such as the 2008 oil price spike, the collapse in prices during the start of the COVID-19 pandemic, and the surge in 2022. I will also compute summary statistics: means, standard deviations, and minimum/maximum values, for both gas prices and real PCE. These descriptive measures help reveal patterns and variability in the data before estimating a formal statistical model.

Methodology

To assess the relationship between gasoline prices and consumer spending, I estimate a generalized linear model using ordinary least squares. The dependent variable is the real PCE, and the primary independent variable is the retail gasoline price. Because macroeconomic conditions can influence both gas prices and consumer spending, I include the U.S. unemployment rate as a control variable.

Results and Analysis

Although the results will be generated after running the model, the analysis section will summarize the estimated coefficients, their signs, and their statistical significance. For example, if β_1 is negative and significant, it will indicate that higher gas prices correspond with lower real consumer spending, holding unemployment constant. The interpretation will focus on real-world meaning.

I will also evaluate the residual plot to determine whether the model assumptions hold. If residuals display patterns over time, this may suggest omitted variables or nonlinearity. Additional limitations, such as time-series dependence or shocks like a recession, will also be mentioned.

Conclusion

This project aims to provide a clear and data-driven study of how gasoline prices relate to real consumer spending in the United States. Using monthly data from 2000 to 2024, I examine whether movements in gas prices correspond with changes in household expenditures. The analysis will examine whether gas prices influence consumer spending behavior on a broad scale.

While the model is limited and not causal, the findings will offer insight into how sensitive consumer spending is to fluctuations in a significant household expense. Understanding this relationship can help policymakers and businesses anticipate shifts in economic activity when energy markets experience changes.

6. References

Federal Reserve Bank of St. Louis (FRED). “U.S. Regular All Formulations Retail Gas Price (GASREGW).”

Bureau of Economic Analysis (BEA). “Real Personal Consumption Expenditures (PCECC96).”

Bureau of Labor Statistics (BLS). “Unemployment Rate (UNRATE).”