ECON 0150 Final Project

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Introduction & Question

Gasoline prices are one of the most closely watched indicators of economic conditions in the United States. Many people believe that increases in gas prices reduce how confident consumers feel about the economy. This suggests a negative relationship between gas prices and consumer sentiment. Our research question is: Is an increase in gas prices associated with a subsequent decrease in consumer sentiment?

Data Description & Sources

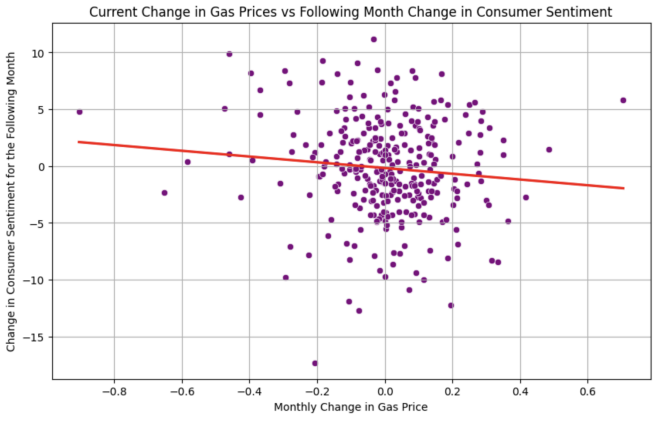
To answer this question, we used monthly data from 2000 to 2025 from the Federal Reserve Economic Database (FRED). These datasets included consumer sentiment, U.S. retail gas prices, and food-at-home CPI. Because all three series trend upward over time, we converted them to month-to-month changes. For sentiment, we used the following month's change to allow time for consumer responses. The datasets were then merged by date and cleaned by dropping the initial differenced observations, which gave us measures of short-run fluctuations rather than long-run trends.

Statistical Methods:

To analyze whether changes in gas prices predict next-month changes in sentiment, we estimated two regression models. Model 1 is a simple linear regression as follows:

$$\text{FollowingSentimentChange} = \beta_0 + \beta_1 \cdot \text{GasChange} + \epsilon$$

Figure 1 shows the difference between these two variables:



Model 2 was a multiple linear regression controlling for a third variable (change in food price) as follows:

$$\text{FollowingSentimentChange} = \beta_0 + \beta_1 \cdot \text{GasChange} + \beta_2 \cdot \text{FoodChange} + \epsilon$$

The control variable was an attempt to help isolate the unique relationship between gas prices and sentiment. Limitations include the possibility of unobserved variables (i.e., inflation expectations, unemployment, news sentiment) and mild skewness in the residuals.

Results & Analysis

The linear regression for Model 1 produced the following output:

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	−0.1679	0.247	−0.680	0.497	−0.654	0.318
change_gas	−2.5271	1.436	−1.759	0.080	−5.353	0.299

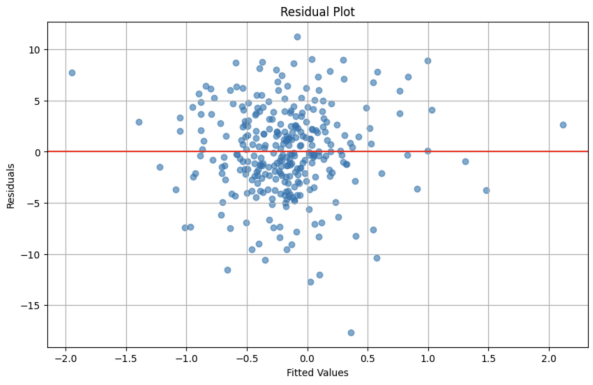
And the multiple linear regression for Model 2:

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	0.1153	0.324	0.355	0.723	−0.523	0.754
change_gas	−2.5488	1.435	−1.777	0.077	−5.372	0.274
change_food	−0.4948	0.369	−1.342	0.181	−1.220	0.231

Model 1 shows that a one-dollar increase in gas prices is associated with a 2.5271 unit decline in next-month consumer sentiment. However, this effect is not statistically significant ($p = 0.080$) at the 5% significance level. The intercept is also insignificant.

In Model 2, adding food-price changes does not improve the model since neither gas prices nor food prices are significant predictors. The food-price coefficient ($p = 0.181$) is also clearly insignificant. Because the control variable does not contribute meaningfully, we base our final interpretation on Model 1, the simpler model.

Residual Plot:



The residual plot shows a random scatter around zero, indicating that linearity and constant variance assumptions are reasonably met. There is little concern for heteroskedasticity because the scatter seems consistent and shows no clear pattern of movement. The widespread occurrence of residuals reflects substantial month-to-month volatility, which helps explain why changes in gas prices are weakly significant predictors of sentiment.

Conclusion

Our project examined whether monthly changes in gas prices are associated with changes in consumer sentiment in the following month. Using more than 20 years of monthly U.S. data, we find **no statistically significant evidence** that gas price changes affect next month's consumer sentiment. Although we explored a control variable (food price inflation), it was insignificant and did not meaningfully change the results.

Overall, despite the public attention paid to gasoline prices, our findings suggest that short-run sentiment fluctuations are driven by other factors, and gas price changes alone do not meaningfully predict changes in consumer sentiment.

References

Federal Reserve Economic Data (FRED), Federal Reserve Bank of St. Louis

U.S. Bureau of Labor Statistics (CPI data)

University of Michigan Surveys of Consumers