## Interpretation of Intercept and Coefficients

Intercept Value: `-242.91686457`

**Interpretation:** This is the predicted value of the Home Price Index when all features (federal funds rate, unemployment rate, CPI, housing starts) are zero. While this scenario might not be realistic, it provides a baseline for the model.

Federal Funds Rate Coefficient: `4.81516435`

**Interpretation**: For each unit increase in the federal funds rate, the Home Price Index is expected to increase by approximately 4.82 units, holding all other factors constant. This indicates a positive relationship between the federal funds rate and home prices.

Unemployment Rate Coefficient: `1.7364448`

**Interpretation**: For each percentage point increase in the unemployment rate, the Home Price Index is expected to increase by approximately 1.74 units, holding all other factors constant. This suggests a positive relationship, although this might be counterintuitive, and could indicate other underlying factors affecting the home prices.

CPI Coefficient: `1.56420765`

**Interpretation**: For each unit increase in CPI, the Home Price Index is expected to increase by approximately 1.56 units, holding all other factors constant. This positive relationship indicates that higher consumer prices (inflation) are associated with higher home prices.

Housing Starts Coefficient: `0.03871267`

**Interpretation**: For each unit increase in housing starts, the Home Price Index is expected to increase by approximately 0.039 units, holding all other factors constant. This relatively small coefficient suggests a weak positive relationship between housing starts and home prices.

## Analysis and Insights

1. Relationship Strength:
    - The strongest positive influence on the Home Price Index is the federal funds rate
    - The unemployment rate and CPI also have positive coefficients, indicating they positively influence home prices, but less so than the federal funds rate.
    - Housing starts have a very small positive effect, indicating that the number of new housing projects has a relatively minor impact on the Home Price Index in this model.
2. Intercept Context:
    - The negative intercept suggests that if all features were zero (which is not realistic), the baseline home price index would be negative. This value should be interpreted within the context of the model fitting rather than a real-world scenario.
3. Model Validity:
    - It's crucial to validate the model to ensure the relationships make sense. For example, the positive relationship between the unemployment rate and home prices might indicate multicollinearity or other underlying economic factors not captured by the model

## For Further Analysis

1. Check Multicollinearity
2. Residual Analysis
3. Feature Importance

## Conclusion

The coefficients and intercept provide insights into how each feature affects the Home Price Index. The federal funds rate has the strongest positive impact, while the unemployment rate, CPI, and housing starts also contribute positively to home prices. Ensure to validate the model and consider domain knowledge to interpret these results accurately.

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