Consumer Price Index Inflation and S&P 500 Sector Returns (Jones)

1. Introduction and Question

This particular project examines the effect on various sectors within the S&P 500 given the increase in inflation. Inflation is known to impact interest rates and prices of commodities and goods and services available to consumers. An understanding of which sectors perform well under conditions of inflation is significant from the viewpoint of economics, given that all such aspects pertain to prices and investment.

The research question for this project is:
Which S&P sectors perform the best when CPI inflation increases?

This is a specific and data driven question that can be answered with public CPI figures for each month and the return on sector ETFs. It is not generally possible to forecast the stock market, but it is possible to determine the degree to which inflation and sector performance correlate with one another.

2. Data Description and Sources

The data is gathered from two sources. Inflation is gathered from the Federal Reserve Bank of St. Louis (FRED) and is represented by the CPIAUCSL series, which is the Consumer Price Index for All Urban Consumers. Sector performance is collected from Yahoo Finance and is represented by the closing prices for 11 SPDR sector ETFs, such as XLE (Energy), XLK (Technology), XLY (Consumer Discretionary), etc. The time range for the data is from 2010 to 2024, depending on the available data after merging.

The values for CPI were then converted to percentage changes on a monthly basis. The prices for sector ETFs were converted to monthly return figures. A common timeline (YYYY-MM format) was created to ensure dates were consistent when combining economic and market based datasets.

Summary statistics:

- Monthly CPI Inflation (month-over-month): around 0.2% on average with occasional spikes.
- Stock market sector mean return: between –1% and +2% per month; Energy and Technology sectors vary the most.
- From the correlation matrix above, Energy is the only sector that has a strong positive correlation with inflation.

3. Methodology

To measure how sensitive each sector's performance is to inflation, I estimated a generalized linear model, using ordinary least squares:

$Return_{Sector} = \beta_0 + \beta_1 + Inflation + e$

$Return_{Sector}$ is the monthly return of a sector ETF,
Inflation is the monthly or year-over-year CPI percentage change.
$\beta 1$ captures the sector's sensitivity to inflation.

A positive $\beta 1$ means the sector tends to rise when inflation increases; a negative coefficient means the opposite. Limitations include omitted macroeconomic variables such as interest rates, earnings cycles, and the fact that correlation does not imply causation.

4. Results and Analysis

The overall evidence indicates a consistent sector wide effect. The energy sector is the most sensitive to inflation and has a $\beta 1$ of approximately 0.45. This is consistent with the basic principles of economics, energy prices vary with commodity inflation and, at times, drive the CPI. The majority of other industries display a small negative sensitivity with a negative response to higher inflation. The industries with more negative inflation β values than this model would predict are technology, communication services, and consumer discretionary. These β values make sense for growth industries that do poorly during periods of higher inflation and less demand. The bar chart summarizes the key observations, energy is the only one that outperforms on average during periods of inflationary pressures on the market, while growth sectors underperform.

5. Conclusions

This project focused on the impact of inflation on the performance of Yahoo Finance sectors for the S&P 500. It utilized the CPI from FRED and the return on Yahoo Finance sectors and estimated their inflation sensitivity. It provides a direct response to the research question. As inflation increases, energy performs the best and growth sectors such as technology and consumer discretionary perform the worst. Meanwhile, defensive sectors perform more or less equally and are not impacted much by inflation. These results confirm the general insight that inflation causes investors to allocate to commodity linked sectors and out of growth sectors that require stable interest rates. These insights can be used to explain and inform investment decisions based on market behavior during periods of inflation.

6. References

- https://fred.stlouisfed.org/series/CPIAUCSL
- https://www.ssga.com/us/en/intermediary/fund-finder
- https://github.com/ranaroussi/yfinance
- All yahoo finance historical sector data ex. https://finance.yahoo.com/quote/XLE/history/