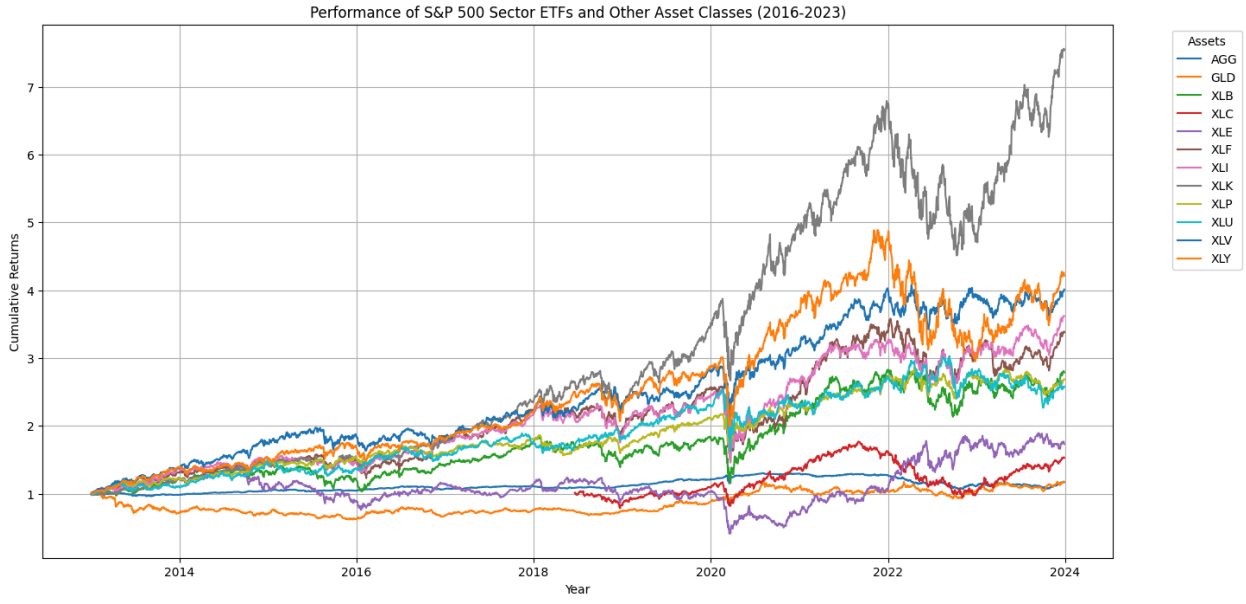
Introduction

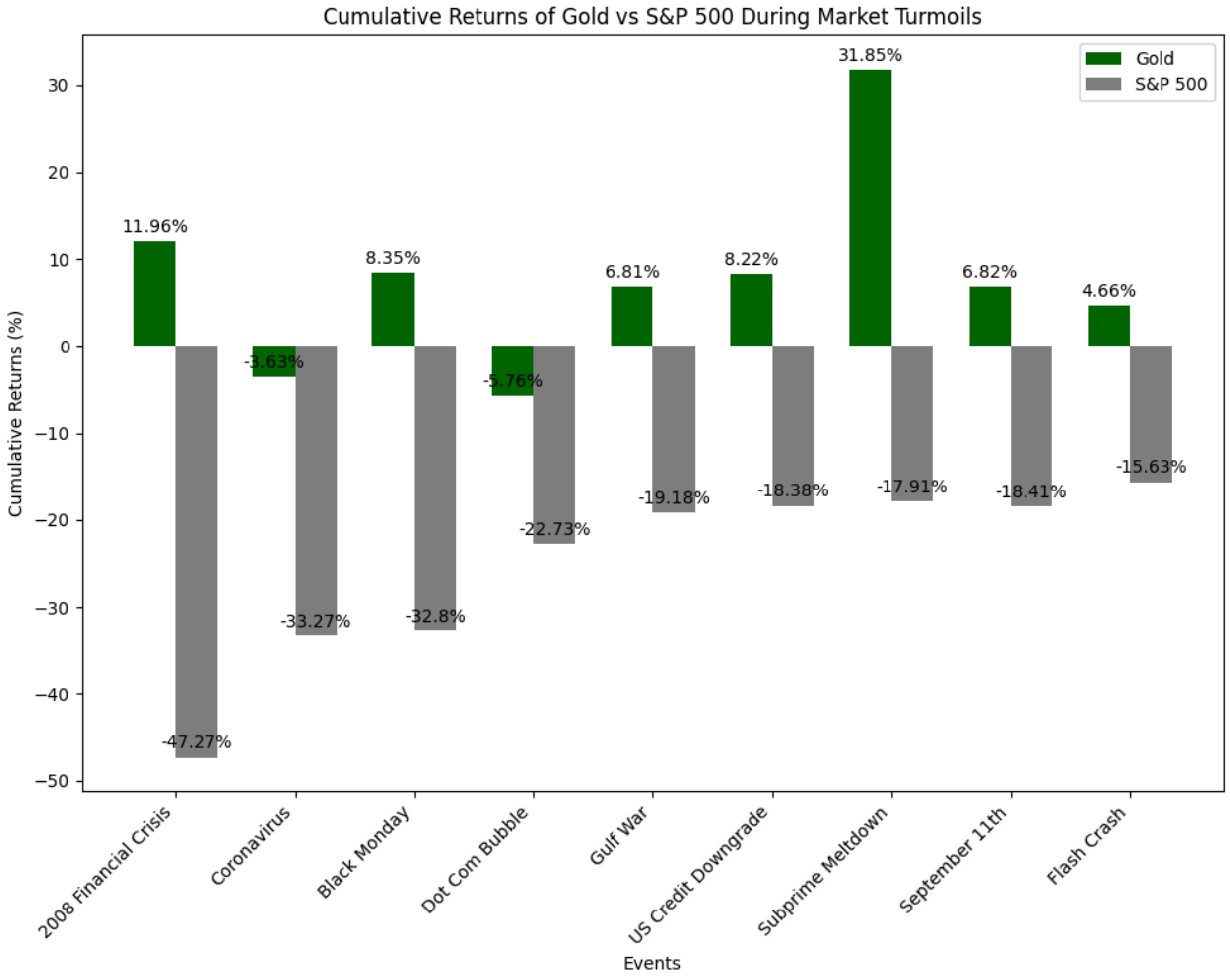
The following sector rotation investment strategy was created in an attempt to decrease risk during periods of market downturn while increasing exposure to higher return assets during times of market uptrend. In other words, during bullish market periods, the algorithm attempts to prioritize allocation into assets that have historically performed well during market uptrends, while prioritizing allocation into safer sectors and assets during bearish markets. This is done through the model outputting signals based off of a combination of indicators that will be discussed further below. These signals take the formats of 1 for bullish, -1 for bearish, and 0 for neutral, or neutral asset weights.

The goal of this portfolio is to decrease overall risk while prioritizing achieving sustainable high returns. In addition, by increasing exposure to safe haven assets during market downturns, the model hopes to achieve a lower max drawdown than that of its comparison portfolios. For this portfolio, the included assets or sectors are communication service, consumer discretionary, consumer staples, energy, financials, health care, industrials, materials, technology, utilities, gold, and US bonds. A cumulative returns chart of all the assets have been included below to help visualize their returns over the past ten years.



Before discussing the model, it is first important to understand what information was utilized to quantify the safe assets that the portfolio allocates into when given a bearish signal. From an economic standpoint, sectors such as consumer staples, utilities, bonds, and gold perform better than other sectors and assets during bearish markets, hence a heavy weight towards them when given a bearish signal. This is because consumer staples and utilities are mandatory for people to

pay for, regardless of the state of the economy. In other words, these sectors do not rely on discretionary income for their success. In addition, bonds tend to perform better than equities during market downturns as their demand tends to increase as investors look to move their money into less volatile asset classes. Due to its hedge against inflation, inherent value, low correlation with other asset classes, and historical reliability, gold is also seen as a "safe haven" asset. Quantitatively, gold has performed extremely well during periods of downturn. A bar chart has been included below to illustrate gold's success during periods of market turmoil.



Sectors such as consumer discretionary, financials, and technology, will be heavily weighted in the portfolio when given bullish signals. Historically, these assets have performed well during bull markets due to their high sensitivity to economic cycles and consumer confidence. In bull markets, as economic conditions improve and consumer spending increases, these sectors often benefit from heightened demand.

Rotation Signal Algorithm

The constructed algorithm utilizes the VIX (Volatility Index), as well as RSI and MACD for the S&P 500. The algorithm computes the 50-day and 100-day moving average for the VIX, essentially being utilized to track short-term as well as long-term trends within the market. The RSI is being used as a momentum oscillator, measuring the speed and change of price movements. For the algorithm's context, it oscillates between 0 and 100. It is common knowledge that an RSI above 70 may indicate that a security is overbought, while an RSI under 30 may indicate that it is oversold. This information is useful in predicting potential market reversals. MACD (Moving Average Convergence Divergence) works in conjunction with RSI in the algorithm, illustrating the relationship between two moving averages of a security's price. A 'Signal Line' is used in conjunction with the 9-period estimated moving average of the MACD itself, identifying potential buy or sell opportunities when the two lines cross. In addition, a 3% buffer zone is defined to determine significant crossovers between the 50-day and 100-day moving averages of the VIX. If the 50-day average exceeds the 100-day average by more than 3%, it signals a potential increase in market volatility, suggesting a sell signal. On the other hand, if the 50-day average falls below the 100-day average by more than 3%, it suggests decreased volatility, indicating a buy signal. All the signals mentioned above are combined to produce a final signal. If the combined score is positive, the final signal is a buy. Conversely, if the combined score is negative, the final signal is a sell. A final score of 0 implies a neutral weight allocation.

Results

Overall, the demonstrated model boasted impressive results. Two portfolios were used as comparisons to the sector rotation portfolio. The first comparison portfolio was a traditional 60 / 40 portfolio (60% Bonds / 40% Stocks) and was constructed to be a benchmark. In addition, an equal weight portfolio (equal weights for the assets) was also constructed for comparison. The performances of all three portfolios have been assessed quantitatively and have been included below.

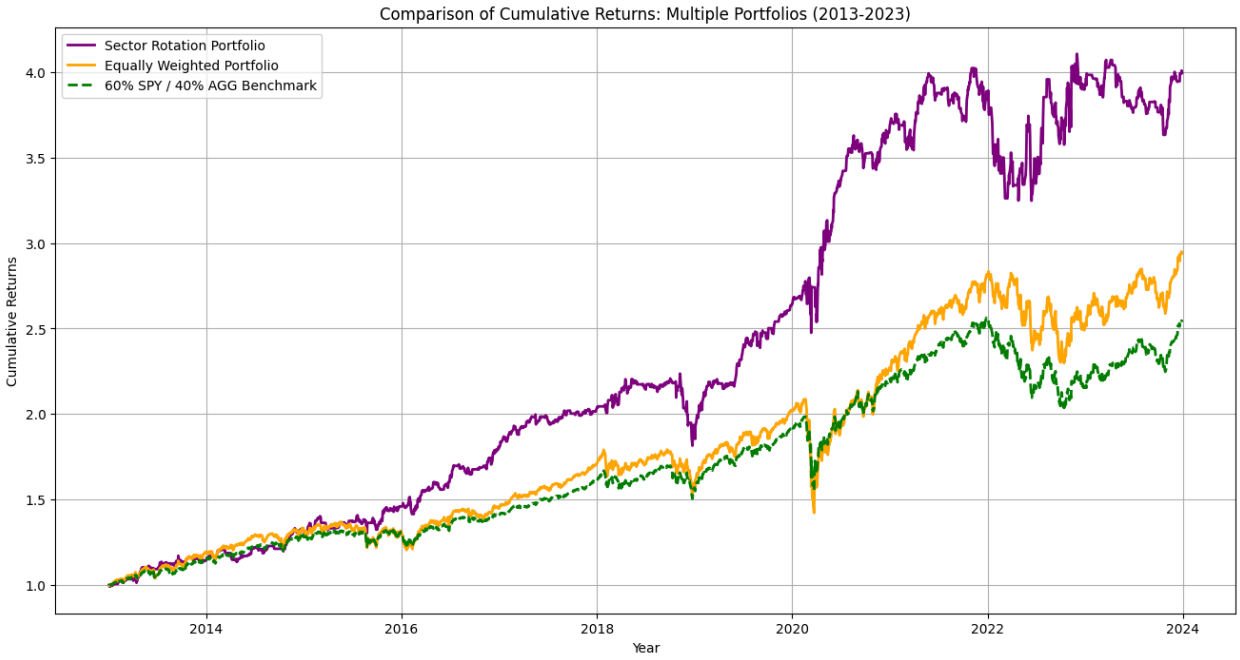
Performance Metrics Comparison:

60/40 Benchmark Metrics:
Annual Return: 9.04%
Annual Volatility: 10.56%
Sharpe Ratio: 0.86
Max Drawdown: -21.72%

Equally Weighted Portfolio Metrics:
Annual Return: 10.85%

Annual Volatility: 14.31%
Sharpe Ratio: 0.80
Max Drawdown: -31.90%

Sector Rotation Portfolio Metrics:
Annual Return: 13.61%
Annual Volatility: 14.14%
Sharpe Ratio: 0.96
Max Drawdown: -19.28%



The cumulative returns chart above as well as the metrics compared to the 60 / 40 portfolio and the equally weighted portfolio portrays promising results. The portfolio boasts higher annual returns than its competitors, as well as a lower volatility than the equally weighted portfolio. Most impressively, it demonstrates a low max drawdown of -19.28%, lower than that of even the 60 / 40. Having a lower max drawdown than that of a 40% bond portfolio, while maintaining almost 4% higher annual returns is extremely impressive. It was mentioned in the introduction of this article that the goal of this portfolio was to achieve higher returns than that of its competitors, while maintaining a low max drawdown, and clearly this has been achieved.

Areas For Improvement

Although impressive and successful, the constructed sector rotation strategy has areas for improvement. To start, transaction costs were not taken into consideration during the interpretation of this portfolio. It goes without saying that constant shifts in asset allocations will result in high amounts of transactions, and the current model's results may be skewed due to failure in representing these costs. In addition, although mostly successful, there are rare times when market bottoms have a bearish signal while market tops have a bullish signal. The signals can seem quite sporadic at times as well. Inevitably, the algorithm will never be perfectly accurate with its signals, but a refined approach can lead to even better results.

Also, although the constructed portfolios max drawdown is lower than that of its competitors, looking at the cumulative returns chart, one can see that the portfolio still faces relatively large downturns. If returns were not a high priority, then a more aggressive approach can be taken to better weather the downturns. Whether this consists of allocating a higher weight to gold during bearish markets, or taking a safer approach in the algorithm, it can be possible to achieve an even lower max drawdown. Obviously, entirely predicting market downturns is no simple task, but the model demonstrates a potential for improvement. Despite this, the portfolio still delivers extremely promising results, with a potential to be even better.