Etoro Alpha Pods Take Home Assignment - Finalist Round

Task 1: CVaR Strategy

For this task, I developed and compared three different portfolio strategies based on the top 60 companies from the S&P 100 index. My goal was to replicate index performance while optimizing for downside risk, using Conditional Value at Risk (CVaR) as the core metric.

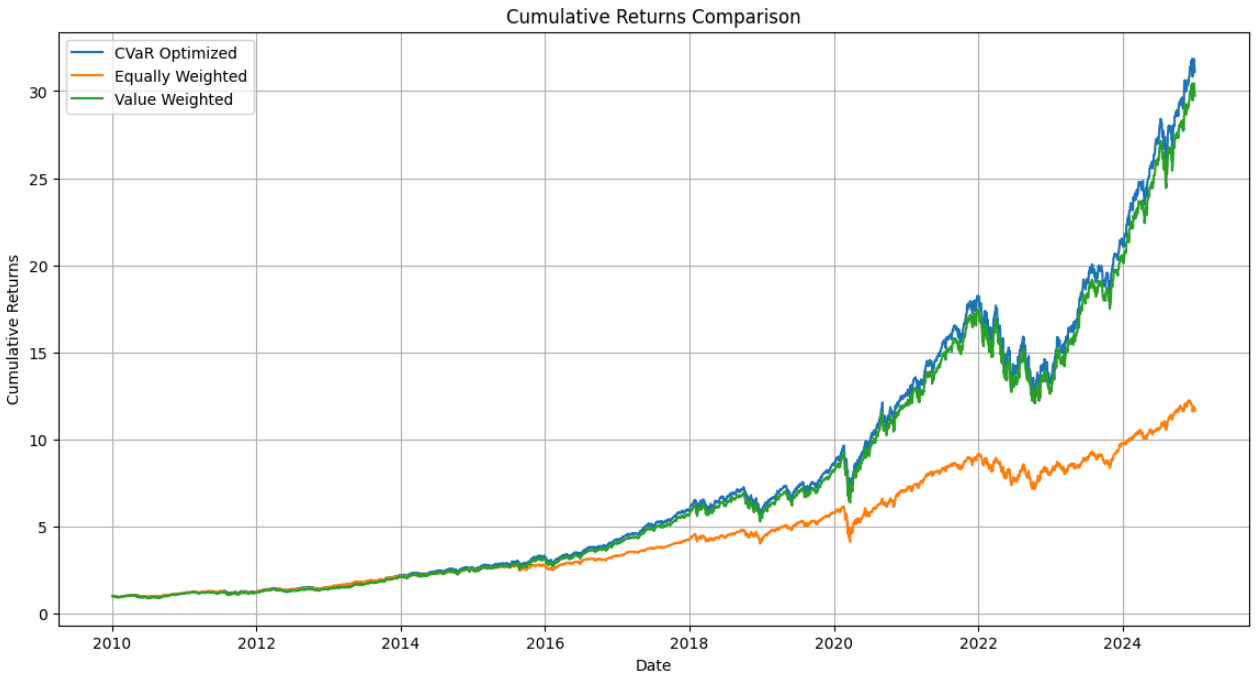
I implemented the following strategies:

Equally Weighted Portfolio; I assigned equal weights to each of the 60 stocks.

Value Weighted Portfolio; I allocated weights based on the latest available market capitalizations.

CVaR-Optimized Portfolio; I applied the methodology from the *CVaR-LASSO Enhanced Index Replication* paper. This strategy minimizes the CVaR of the tracking error relative to the benchmark, with a LASSO-style regularization to encourage sparsity in the portfolio. Rebalancing was done quarterly using a rolling one-year window of daily returns.

I plotted the cumulative returns from 2010-1-1 to 2024-12-31. The CVaR-optimized strategy consistently outperformed both the equally weighted and value weighted benchmarks. This outperformance was especially notable during volatile market periods, where risk management is crucial.



Portfolio Performance Metrics for the three different cases:

Portfolio Perormance Metrics	CVaR Optimized	Equally Weighted	Value Weighted
Annual Return	17.16%	11.96%	16.89%
Annual Volatility	0.196	0.167	0.197
Sharpe Ratio	0.873	0.714	0.854
95% CVaR (Daily)	-2.93%	-2.53%	-2.95%
Max Drawdown	-30.86%	-32.81%	-30.91%

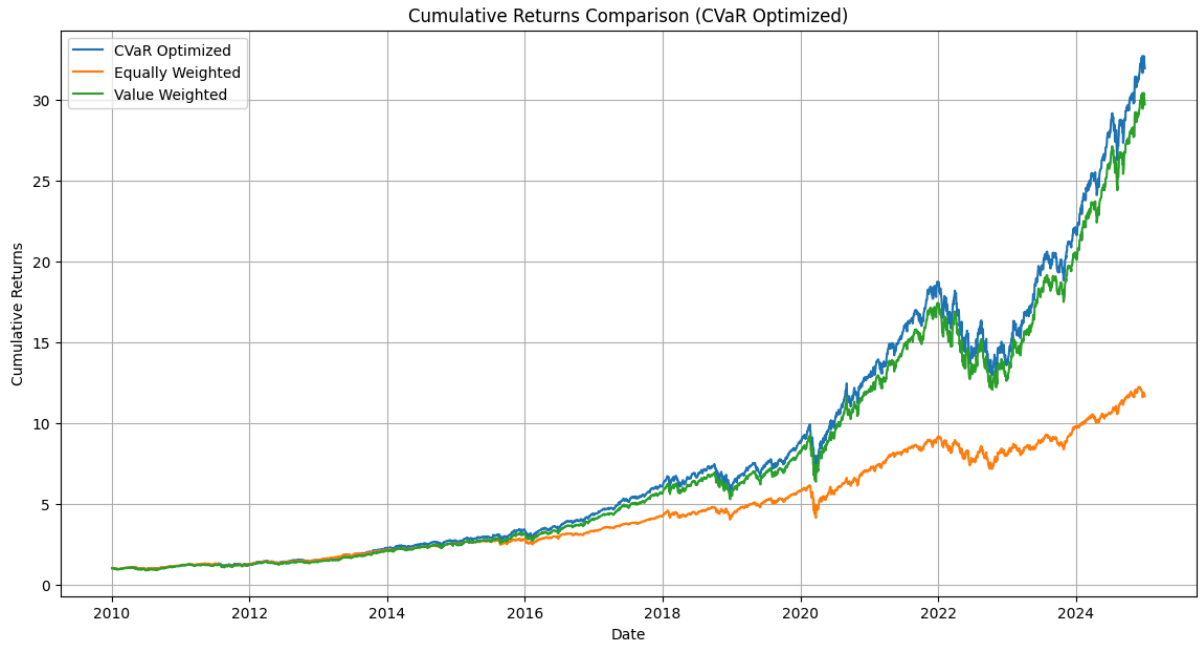
By comparing the annualized return of the CVaR-optimized portfolio to the value-weighted benchmark, I measured an **annualized alpha of +0.55%**. This shows that the strategy not only tracks the index but adds value through effective downside risk control and weight regularization.

Task 2: Statistical Implementation to CVaR strategy using Quantile Regression

This plot compares the out-of-sample performance of several strategies over time:

- **Quantile Regression Portfolio**: Uses historical predictors to estimate asset returns at specific quantiles , capturing asymmetric return behavior.

- **Benchmarks**: Include Equally Weighted (EW), Value Weighted (VW), and possibly CVaR-based portfolios.

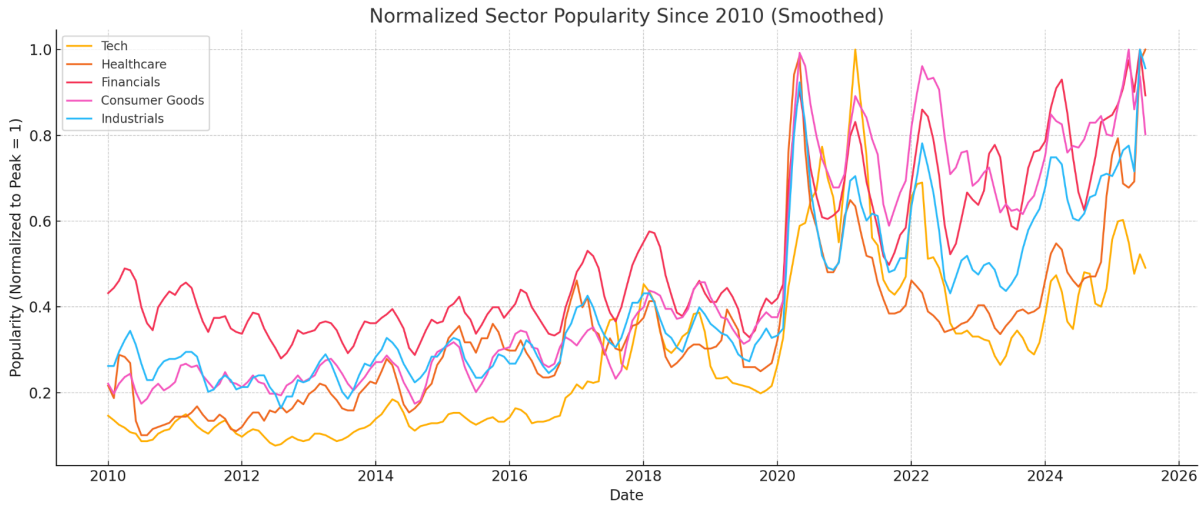


And the portfolio metrics are a follows:

Portfolio Perormance Metrics	CVaR Optimized	Equally Weighted	Value Weighted	CVaR + Quantile Regression
Annual Return	17.16%	11.96%	16.89%	26.04%
Annual Volatility	0.196	0.167	0.197	0.196
Sharpe Ratio	0.873	0.714	0.854	1.325
95% CVaR (Daily)	-2.93%	-2.53%	-2.95%	-2.93%
Max Drawdown	-30.86%	-32.81%	-30.91%	-30.92%

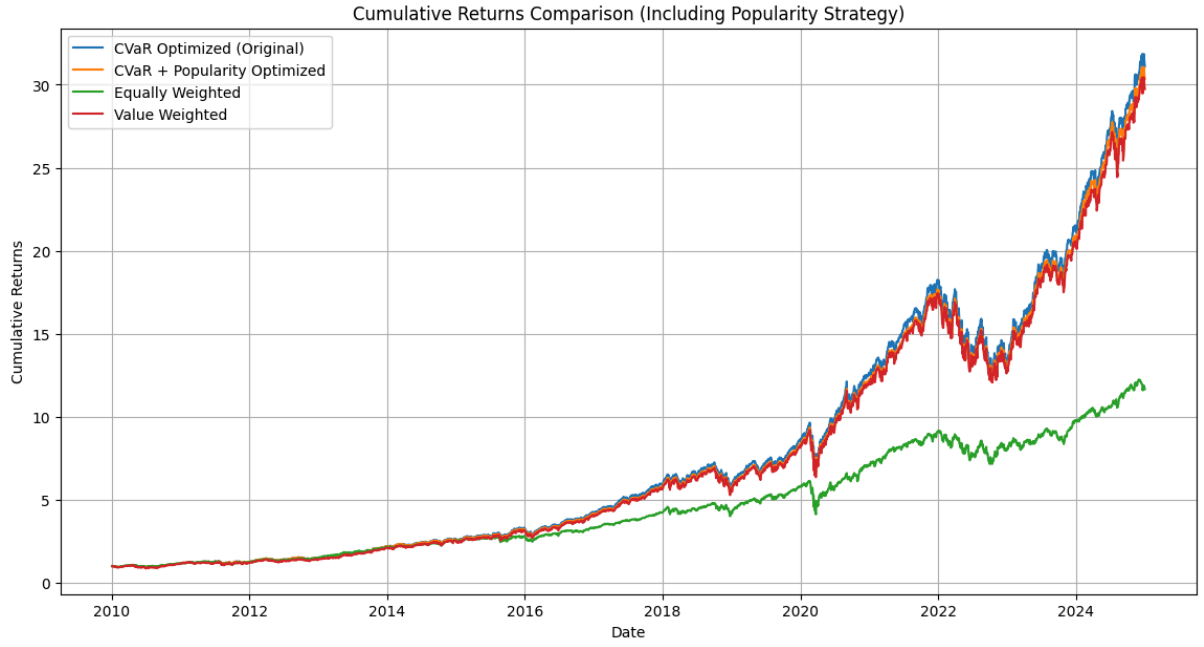
Task 3: Weight Redistribution Depending On Sector Popularity and Growth Trend

By using google trends and the relative popularity of the terms related to each of the sectors included in the batch of 60 stocks of the sp100 selected, an approach is used to favour momentum increasing sectors. The way this distribution is done is as follows:



By smoothing out the data and plotting them altogether, I can get a good understanding of the relative evolution from one sector to another, and apply this as another condition that the weightings have to be applied under. This way market trends can be followed more tightly taking advantage of market sentiment towards certain sectors, being conducive to a higher growth rate.

By introducing this extra condition it can be seen the effect it has is slight:



The Portfolio Performance Metrics for this last Task are:

Portfolio Perormance Metrics	CVaR Optimized	Equally Weighted	Value Weighted	CVaR + Google Trends
Annual Return	17.16%	11.96%	16.89%	17.02%
Annual Volatility	0.196	0.167	0.197	0.196
Sharpe Ratio	0.873	0.714	0.854	0.865
95% CVaR (Daily)	-2.93%	-2.53%	-2.95%	-2.93%
Max Drawdown	-30.86%	-32.81%	-30.91%	-30.77%

Showing to be slightly worse than only the CVaR optimized strategy. This does not immediately scream that it doesnt have potential, instead, i feel that with better optimization it could slightly improve upon previous strategies, especially if more data is used, and if a more global attention coefficient towards certain industries is created, in order to capture the psychological effect of herd mentality towards a certain sector pushing profits higher than currently achieved.