

PORTFOLIO OPTIMIZATION PROJECT

INVESTMENT INSIDERS

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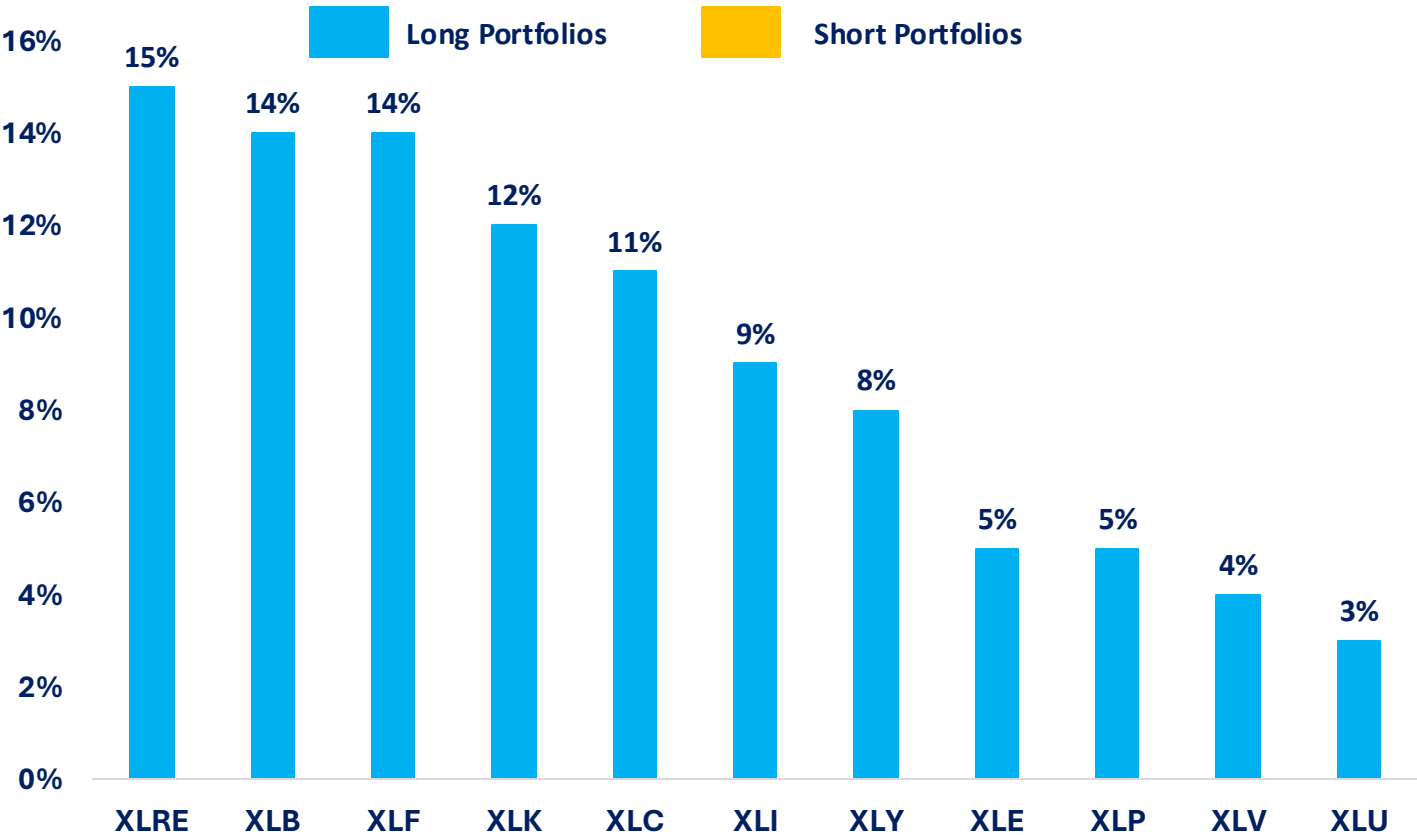
Agenda

1. Current Portfolio review
2. Data Analysis
3. Global Minimum Variance Portfolio
4. Efficient Portfolio
5. Optimal Risky Portfolio
6. Constrained ORP S1
7. Constrained ORP S2
8. Capital Allocation & Portfolio Summary
9. Recommendations

Current Portfolio review

Least Risky Portfolio

Portfolio composition



Key insights

- **Annualized volatility: 18.70%**
 - **Annualized expected return: 14.22%**
 - **Annualized Sharpe ratio: 0.55**
 - Both the volatility and expected return are the lowest of all portfolios.
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- The portfolio's largest sector contributor is **Real Estate (XLRE, 15%)**
 - The portfolio achieves diversification by spreading weightings across multiple sectors
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- The **12% spread** in weightings between **Real Estate (15%)** and **Utilities (3%)** highlights a growth-focused strategy with balanced exposure to stable, low-volatility sectors

Data Analysis

Using Python

- **Data Collection:**

- Used Yahoo Finance (yfinance module)
- Time range for monthly returns from August 2018 to September 2024 to maintain consistency of analysis for all sector ETFs.
- Missing values (NAs) were removed for consistency.

- **Data Computation:**

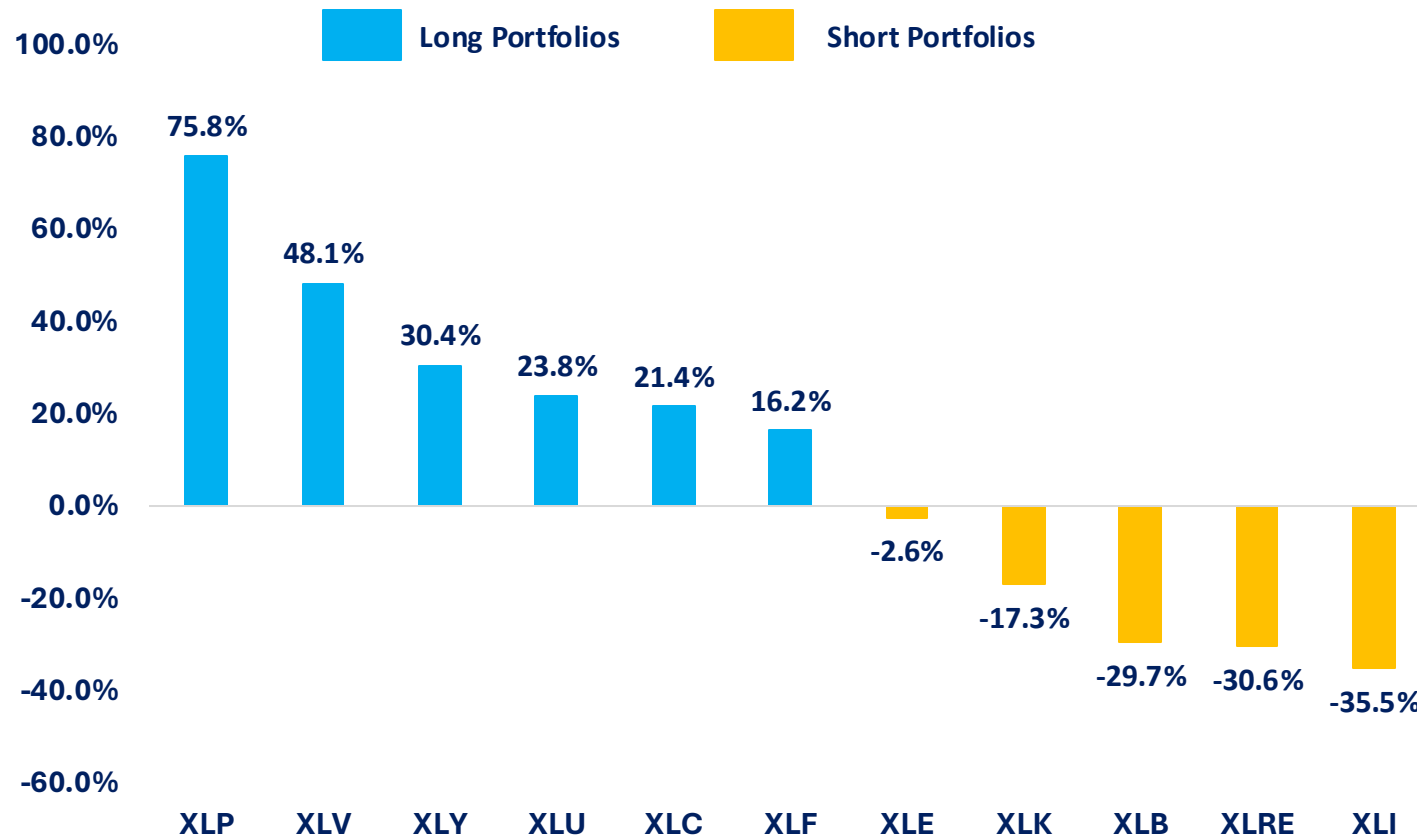
- Calculated expected returns, standard deviations, and covariance matrix.
- Computed portfolio metrics such as expected return, variance, standard deviation & Sharpe Ratio.



Global Minimum Variance Portfolio

Least Risky Portfolio

Portfolio composition



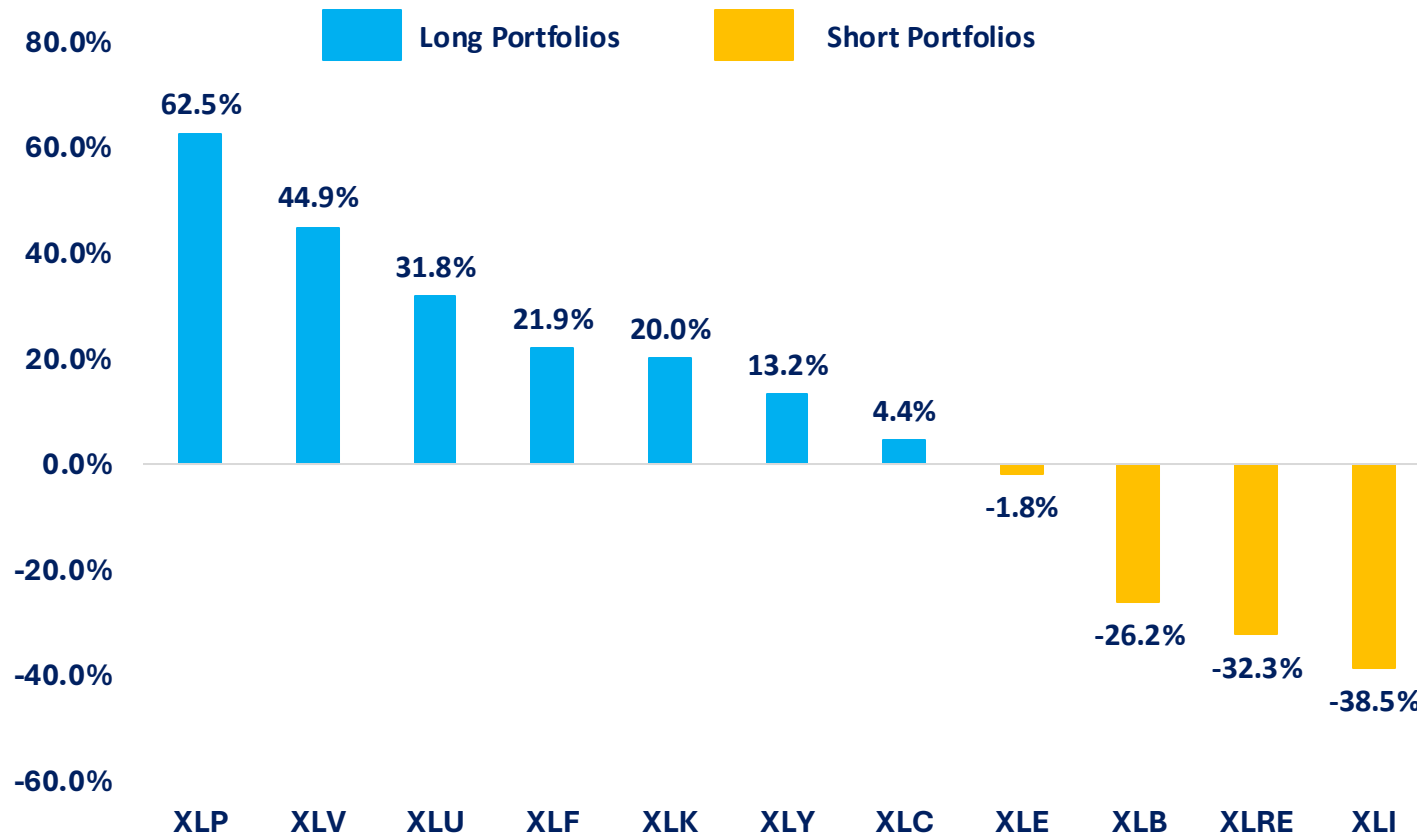
Key insights

- **Annualized volatility: 12.06%**
 - **Annualized expected return: 10.16%**
 - **Annualized Sharpe ratio: 0.56**
 - Both the volatility and expected return are the lowest of all portfolios.
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- The GMV portfolio's **most significant contributor is consumer staples (75.8%)**
 - This could be indicative of low growth potential, which is reflected in the low expected returns
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- **Negative weightings in 5 securities vs positive weightings in 6 securities** indicates a neutral outlook on the overall market, another effort to minimize risk..

Efficient Portfolio

Least Risky Portfolio for a given Expected Return

Portfolio composition



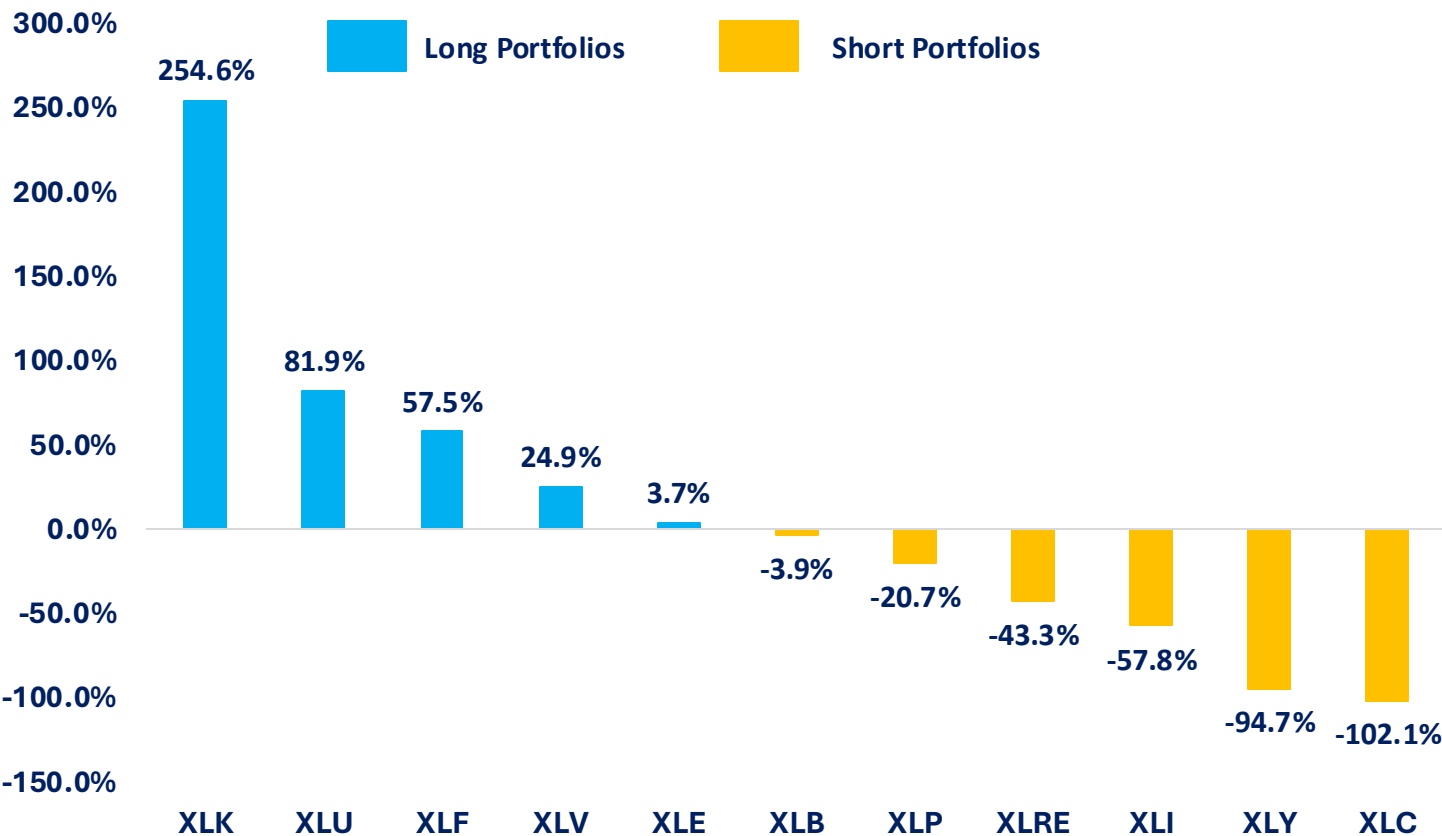
Key insights

- **Annualized volatility: 12.48%**
 - **Annualized expected return: 14.22%**
 - **Annualized Sharpe ratio: 0.83**
 - Slightly higher volatility and expected return than the GMV portfolio
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- The Efficient Portfolio's **most significant contributor is consumer staples (62.5%)**, indicating stability and low risk in this sector. expected returns rose.
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- There are **negative weightings in only 4/11 securities**, indicating a slightly positive outlook on the overall market.

Optimal Risky Portfolio

A high-risk, high-return portfolio

Portfolio composition



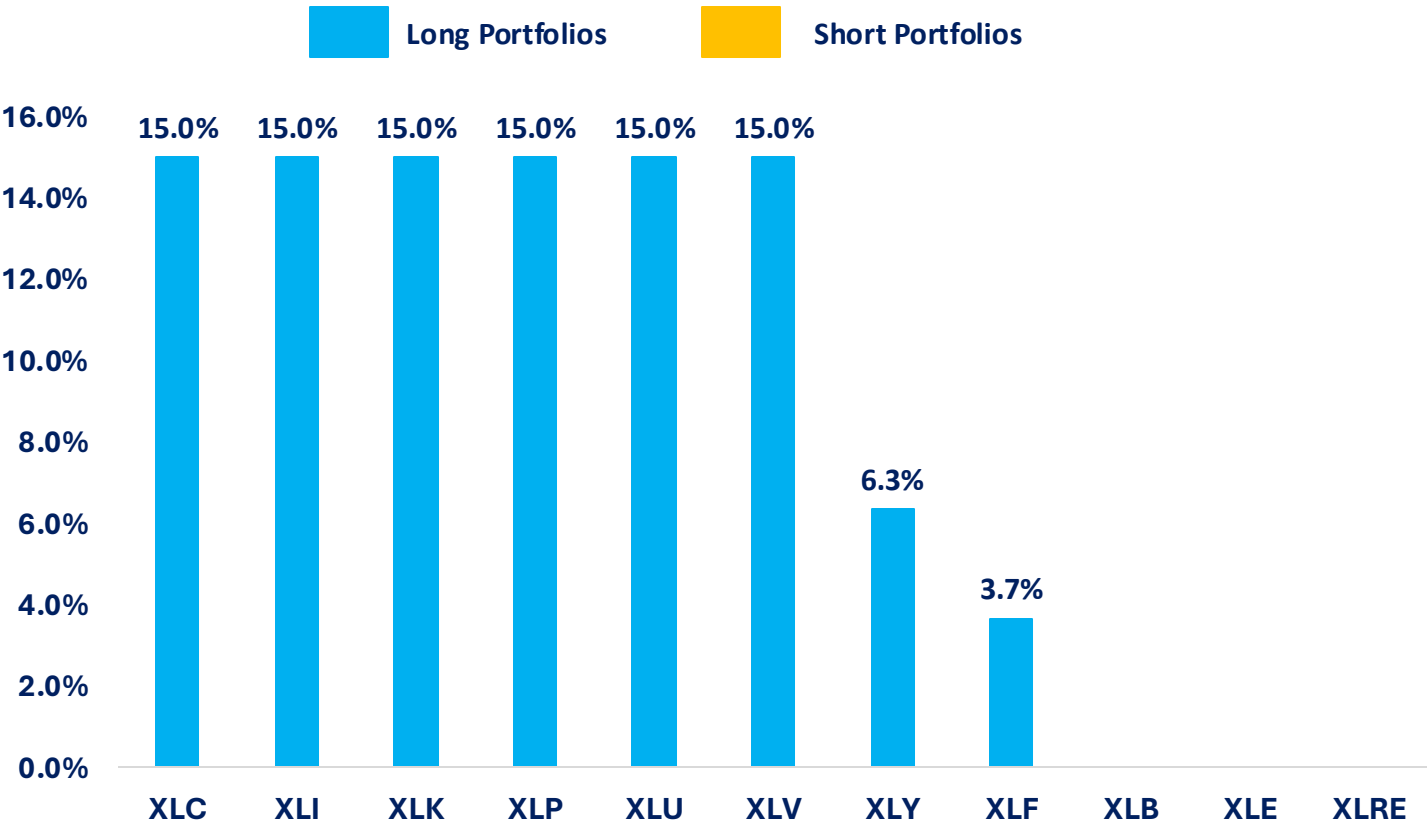
Key insights

- **Annualized volatility: 26.71%**
 - **Annualized expected return: 42.81%**
 - **Annualized Sharpe ratio: 1.24**
 - Aggressive strategy focused on high risk and high reward
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- A significant **overweight in technology (254.6%)** reflects strong confidence in the sector's growth potential and its ability to drive returns
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- **Negative weightings in communication services (-102.1%) and consumer discretionary (-94.7%)** suggest a bearish outlook, possibly reflecting shorting strategies based on economic concerns.

Constrained Optimal Risky Portfolio S1

Constrained allocation with no sector hedging

Portfolio composition



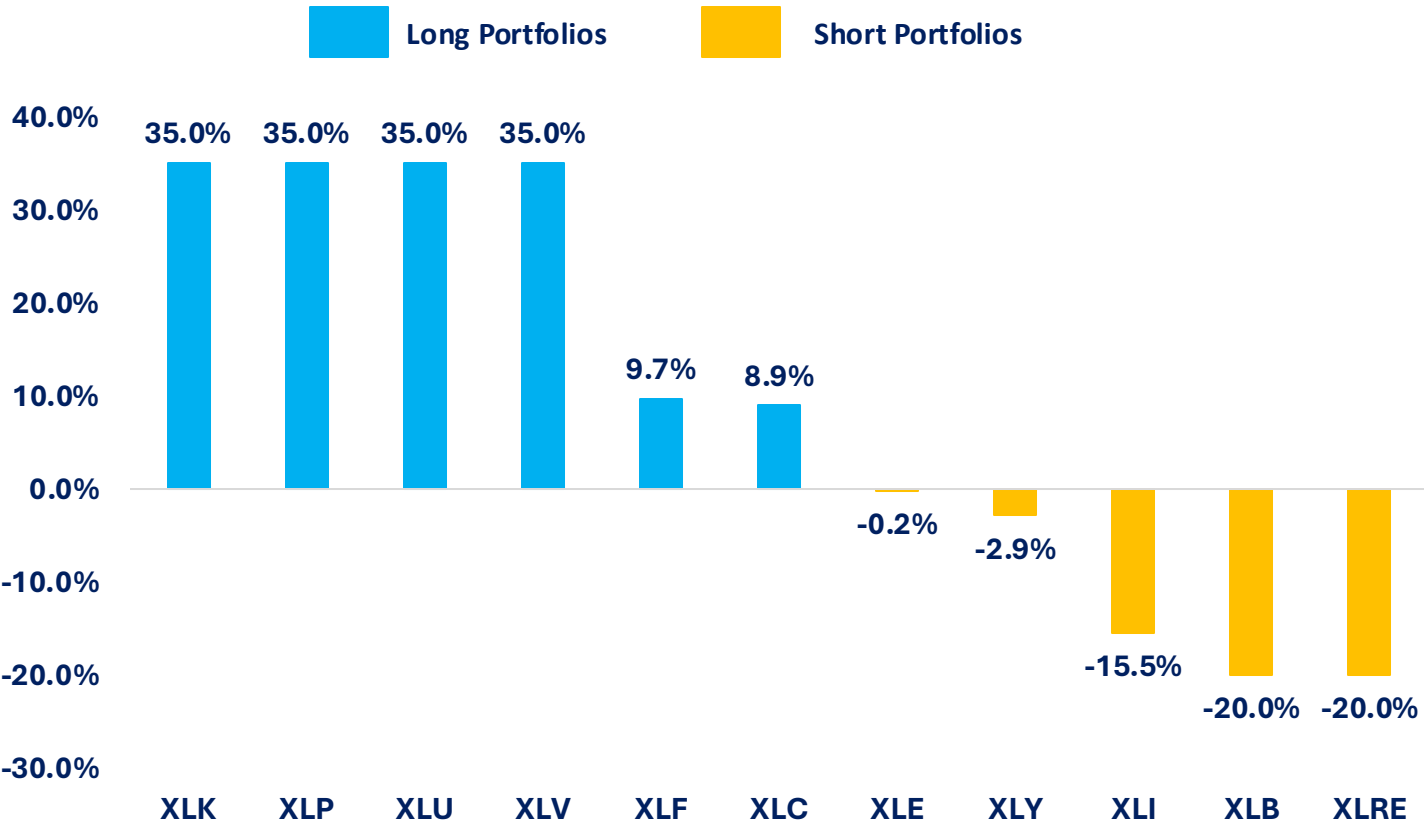
Key insights

- Annualized volatility: 16.12%
 - Annualized expected return: 14.57%
 - Annualized Sharpe ratio: 0.66
 - Heavily constrained portfolio
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- Six sectors (XLC, XLI, XLK, XLP, XLU, XLV) each have a 15% weighting, indicating a balanced and diversified strategy
 - Conservative stance on XLY (6%) and XLF(4%)
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- No investments in XLB,XLE & XLRE sectors

Constrained Optimal Risky Portfolio S2

Balanced allocation with sector hedging

Portfolio composition

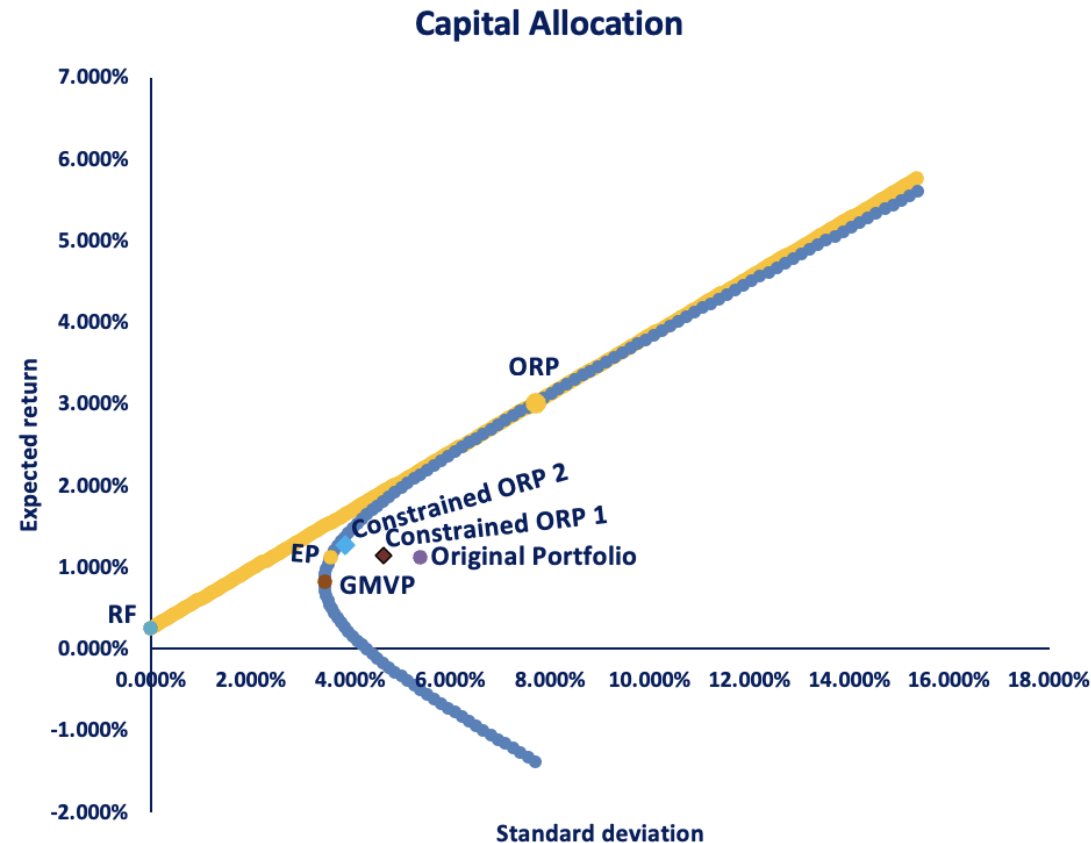


Key insights

- **Annualized volatility: 13.41%**
 - **Annualized expected return: 16.35%**
 - **Annualized Sharpe ratio: 0.91**
 - **Moderate risk strategy** focused on balanced growth and risk control
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- **4 sectors (XLK, XLP, XLU, XLV) each have a 35% weighting**, indicating a balanced and diversified strategy
 - Moderate allocation to **XLF (9.7%)** and **XLC (8.9%)**
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- Significant short positions in sectors **XLI (-15.5%)**, **XLB (-20%)**, and real estate **XLRE (-20%)**. Indicating an active **bearish stance** on these sectors

Capital Allocation

Exploring Key opportunities for Portfolio optimization



Opportunities for Portfolio Optimization

- **Global Minimum Variance (GMV) Portfolio** minimizes overall portfolio risk, offering the lowest possible volatility without prioritizing returns.
- **Efficient Portfolio** offers the best return for a given risk level, balancing both factors and lying on the efficient frontier, optimizing returns for specific risk preferences.
- **Optimal Risky Portfolio (ORP)** provides the highest Sharpe ratio, making it the best portfolio for maximizing returns for a given level of risk
- **Constraint ORP 1** more heavily constrained, leading to lower returns and higher volatility
- **Optimal Risky Portfolio constraint 2 is** Positioned between the Efficient Portfolio and ORP, this portfolio offers a good balance of risk and return

Final Portfolio Summary

Portfolio Name	XLB	XLC	XLE	XLF	XLI	XLK	XLP	XLRE	XLU	XLV	XLV	Expected Return	Volatility	Annualized Return	Annualized Volatility	Sharpe Ratio	Annualized Sharpe Ratio
ORIGPORT	0.14	0.11	0.05	0.14	0.09	0.12	0.05	0.15	0.03	0.04	0.08	1.11%	5.40%	14.22%	18.70%	0.16	0.55
GMVPORT	-0.30	0.21	-0.03	0.16	-0.35	-0.17	0.76	-0.31	0.24	0.48	0.30	0.81%	3.48%	10.16%	12.06%	0.16	0.56
EFPORT	-0.26	0.04	-0.02	0.22	-0.39	0.20	0.63	-0.32	0.32	0.45	0.13	1.11%	3.60%	14.22%	12.48%	0.24	0.83
ORP	-0.04	-1.02	0.04	0.58	-0.58	2.55	-0.21	-0.43	0.82	0.25	-0.95	3.01%	7.71%	42.81%	26.71%	0.36	1.24
Constrain ORP S1	0.00	0.15	0.00	0.04	0.15	0.15	0.15	0.00	0.15	0.15	0.06	1.14%	4.65%	14.57%	16.12%	0.19	0.66
Constrain ORP S2	-0.20	0.09	0.00	0.10	-0.15	0.35	0.35	-0.20	0.35	0.35	-0.03	1.27%	3.87%	16.35%	13.41%	0.26	0.91

Recommendations

Choose Focus: Decide if your priority is risk minimization (GMV), return maximization (ORP), or a balanced approach (EP).

Approve Adjustments: Confirm rebalancing based on the selected portfolio strategy; we'll provide updated allocations.

Reallocate Gradually: Shift assets in phases, aligned with your chosen portfolio, to minimize costs and market impact.

Monitor and Adjust: Continuously track performance and adjust as needed to meet long-term goals aligned with your selected portfolio.

