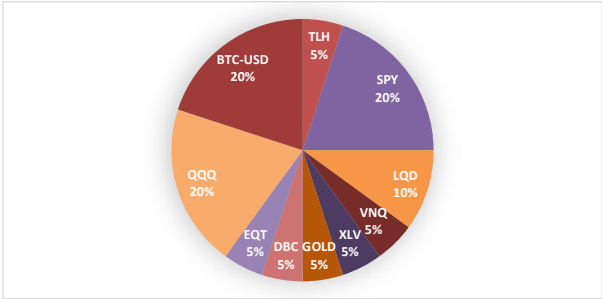


Optimal Portfolio

Portfolio of 10 High- and Low-Risk Assets for Sharpe Ratio Analysis Based on Two Years of Data

| | TLH | SPY | LQD | VNQ | XLV | GOLD | DBC | EQT | QQQ | BTC-USD |
|---------------------------|------------|---------|-----------|----------|------------------|---------|---------------|-------------|------------|---------|
| Security | 10 T-yield | S&P 500 | ETF Bonds | Vanguard | Health Care Fund | Barrick | ETF commodity | Natural Gas | ETF NASDAQ | BTC-USD |
| Annual Return | 0.26% | 23.07% | 3.99% | 7.98% | 5.53% | 10.06% | -6.31% | -7.63% | 35.46% | 94.44% |
| Standard Deviation (Risk) | 14% | 14% | 9% | 19% | 11% | 32% | 16% | 36% | 19% | 51% |
| Minimum Weight | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% |
| Maximum Weight | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% |
| Optimal Weight | 5% | 20% | 10% | 5% | 5% | 5% | 5% | 5% | 20% | 20% |

| Portfolio Summary | |
|---------------------------|-------|
| Expected Return | 31.5% |
| Standard Deviation (Risk) | 16.2% |
| Free risk Rate (^TNX) | 4.42% |
| Total Weight | 100% |
| Sharp Ratio | 167% |



| Covariance Matrix | | | | | | | | | | |
|-------------------|--------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|-------------|-------------|
| | TLH | SPY | LQD | VNQ | XLV | GOLD | DBC | EQT | QQQ | BTC-USD |
| TLH | 7.54259E-05 | 1.0802E-05 | 4.58848E-05 | 3.71787E-05 | 1.11473E-05 | 5.07041E-05 | -4.50334E-06 | -9.46889E-06 | 1.41753E-05 | 9.19475E-06 |
| SPY | 1.0802E-05 | 7.6602E-05 | 1.82684E-05 | 6.97412E-05 | 3.99383E-05 | 5.62287E-05 | 2.33674E-05 | 7.564E-05 | 9.86338E-05 | 8.63821E-05 |
| LQD | 4.58848E-05 | 1.82684E-05 | 3.26366E-05 | 3.33543E-05 | 1.21352E-05 | 3.95193E-05 | 2.43317E-06 | 8.6471E-06 | 2.34106E-05 | 2.16075E-05 |
| VNQ | 3.71787E-05 | 6.97412E-05 | 3.33543E-05 | 0.000143836 | 4.80398E-05 | 8.43373E-05 | 1.69535E-05 | 0.000100063 | 7.2285E-05 | 9.49389E-05 |
| XLV | 1.11473E-05 | 3.99383E-05 | 1.21352E-05 | 4.80398E-05 | 5.16608E-05 | 3.95733E-05 | 7.5874E-06 | 3.64942E-05 | 3.90707E-05 | 4.78804E-05 |
| GOLD | 5.07041E-05 | 5.62287E-05 | 3.95193E-05 | 8.43373E-05 | 3.95733E-05 | 0.000404689 | 4.93898E-05 | 8.4113E-05 | 6.41563E-05 | 0.000123379 |
| DBC | -4.50334E-06 | 2.33674E-05 | 2.43317E-06 | 1.69535E-05 | 7.5874E-06 | 4.93898E-05 | 9.80011E-05 | 8.17834E-05 | 2.42324E-05 | 1.81592E-05 |
| EQT | -9.46889E-06 | 7.564E-05 | 8.6471E-06 | 0.000100063 | 3.64942E-05 | 8.4113E-05 | 8.17834E-05 | 0.000518364 | 7.31404E-05 | 0.000101109 |
| QQQ | 1.41753E-05 | 9.86338E-05 | 2.34106E-05 | 7.2285E-05 | 3.90707E-05 | 6.41563E-05 | 2.42324E-05 | 7.31404E-05 | 0.000145252 | 0.000113846 |
| BTC-USD | 9.19475E-06 | 8.63821E-05 | 2.16075E-05 | 9.49389E-05 | 4.78804E-05 | 0.000123379 | 1.81592E-05 | 0.000101109 | 0.000113846 | 0.00103499 |

- Expected Portfolio Return: The portfolio is expected to achieve a return of 31.5% over the analyzed period. This return is relatively high, indicating a strong performance from the selected assets.
- Risk (Standard Deviation): The portfolio's standard deviation, a measure of risk, is 16.2%. This suggests moderate risk, balancing between high-risk and low-risk assets.
- Sharpe Ratio: The Sharpe Ratio of 167% (or 1.67 when expressed as a decimal) is quite robust. A higher Sharpe Ratio indicates that the portfolio offers a favorable return for the level of risk taken. This result suggests effective diversification and risk management in the portfolio construction.
- Asset Allocation: The portfolio allocates weights across various asset classes, with BTC-USD, QQQ, and SPY each holding a higher weight of 20%, while other assets like TLH, LQD, VNQ, XLV, GOLD, DBC, and EQT have lower weights, reflecting a balanced approach between different sectors (e.g., stocks, bonds, commodities, and crypto).
- Covariance Matrix: The covariance values show how each asset correlates with others in the portfolio. Lower and mixed covariance values indicate a level of diversification that helps reduce overall risk, as the assets do not move entirely in sync.

Conclusion

The portfolio has been optimized to achieve a high return relative to its risk, as evidenced by the high Sharpe Ratio. The combination of high-risk and low-risk assets has contributed to effective diversification, supporting an overall return of 31.5% with a controlled risk level. This portfolio structure would be attractive to investors seeking a strong return while managing exposure to risk.