VSE – TRANSACTION DAIRY

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**Overview**

In the VSE simulation exercise, I started with an initial trading capital of **$100,000**, spanning from **September 24, 2024**, to **December 6, 2024**. Throughout this period, I strategically engaged in trading to maximize my returns while balancing risks. By the end of the simulation, my portfolio achieved a **net worth of $111,307.20**, reflecting an **overall return of 11.31%**, with **$11,307.20 in gains**. My portfolio ranking stands at **#27 among 155 participants**.

I employed a mix of short positions in **energy (XLE)**, **utilities (XLU)**, and **healthcare (XLV)** sectors, leveraging margin trading to enhance returns. My strategy focused on analyzing sector-specific trends, price momentum, and market sentiment to align my trades with optimal risk-return parameters.

**Performance Summary**

• **Net Worth:** $111,307.20

• **Overall Gains:** $11,307.20

• **Overall Returns:** 11.31%

• **Cash Remaining:** $111,123.70

• **Short Reserve:** $121,852.84

• **Cash Borrowed:** $0.00

• **Buying Power:** $100,945.08

A graph on a computer screen

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**Transaction 1 (SPY):**

**Transaction 1**, I identified an opportunity in SPY ETF, a highly liquid and diversified index fund representing the S&P 500. On **October 31, 2024**, I purchased **344 shares** of SPY at a price of **$575.56 per share**. This decision was informed by my analysis of the broader market conditions and technical indicators suggesting a potential uptrend in large-cap equities.

To arrive at this decision, I conducted a thorough review of SPY’s historical performance and recent price movements. The analysis indicated that the market was likely to rebound following a brief period of volatility driven by macroeconomic concerns. With supportive technical levels and favorable risk-reward metrics, I allocated a significant portion of my capital to SPY to capture the anticipated upward momentum.

This transaction reflects my strategic approach to balancing risk and return. By investing in SPY, I aimed to leverage its broad market exposure and potential for steady returns while maintaining diversification within my portfolio. The choice of 344 shares allowed me to optimize my position size while adhering to sound risk management principles.

Efficient Frontier Graph:

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This **Efficient Frontier graph** provides insights into the optimal balance between risk and return for your portfolio of selected ETFs. Each point along the **black dotted curve** represents a portfolio combination that maximizes return for a given level of risk, guiding investors in achieving the best possible risk-return trade-off.

The individual **orange dots** indicate the risk and return for specific ETFs included in the analysis. Among these, the **red dot** represents the **minimum variance point**, which is the portfolio configuration with the lowest achievable risk. This point is particularly useful for risk-averse investors seeking stability.

The **blue line**, known as the **Capital Market Line (CML)**, depicts the best risk-return combinations when a **risk-free asset** is included in the portfolio. The **green dot**, where the CML intersects the Efficient Frontier, identifies the **Tangency Portfolio**. This portfolio offers the highest Sharpe ratio, signifying the best risk-adjusted return among all possible portfolio configurations.

Overall, this graph serves as a critical tool for aligning your portfolio with your risk tolerance. Investors who prefer **low-risk options** may focus on areas near the **minimum variance point**, while those with higher risk appetites can target portfolio options along the upper part of the frontier to potentially achieve higher returns. By analyzing this graph, you can effectively tailor your portfolio to balance risk and reward based on your financial goals.

**Transaction 2 (SPY)**

For **Transaction 2**, the objective was to construct a **minimum variance (MV) tangency portfolio** with SPY as the sole asset in this case, based on its risk-return profile. Using portfolio optimization techniques, I determined the optimal allocation for SPY that minimizes risk while maintaining a balanced exposure to market returns.

The calculated portfolio weight assigned **100% to SPY**, as it represents the market itself and exhibits relatively lower risk compared to other individual assets in my portfolio. This decision was driven by its historical performance and consistent risk-adjusted returns. Given the current market price of **$571.90**, the calculated allocation suggested the purchase of **1 share of SPY**, ensuring the portfolio adheres to the risk minimization strategy while maintaining exposure to the broad market.

This tangency portfolio approach provides an expected mean return aligned with SPY’s historical growth rate, and the associated risks were minimized by leveraging covariance estimations. This transaction reflects my disciplined investment approach, ensuring that each decision is backed by data-driven risk management and aligned with my overall portfolio strategy.

**Transaction 3 (IR):**

For **Transaction 3**, the goal was to optimize the portfolio using a **Single-Index Model (SIM)** to identify the best ETFs for trading based on their risk-adjusted performance. The analysis involved calculating key metrics, including **Alpha**, **Beta**, **Sigma**, and **Information Ratio** (IR), for multiple ETFs using the dataset analyzed in R. Based on these metrics, I carefully selected the ETFs to short-sell or purchase, aligning with the **minimum variance tangency portfolio**.

**Portfolio Actions and Calculations:**

1. **Short Selling XLV, XLU, and XLE**:

Based on their lower **Information Ratios** and relatively higher risk-adjusted inefficiencies, **XLV**, **XLU**, and **XLE** were selected for short-selling. The approximate number of shares to short-sell for each ETF was calculated based on their market prices and portfolio allocation.

**Market Prices**:

• XLV: $144.28

• XLU: $79.69

• XLE: $91.02

**Capital Allocated for Short Selling**:

Using the total capital available, the shares were calculated as:

**Short Transactions**:

• **XLV**: Shorted 305 shares.

• This trade capitalized on XLV’s low Alpha and high Beta, indicating that it was underperforming the market with high volatility, making it a strong candidate for shorting.

• **XLU**: Shorted 263 shares.

• XLU had a high Sigma value, signaling significant risk, combined with a poor Information Ratio, supporting the decision to short.

• **XLE**: Shorted 623 shares.

• XLE’s low Alpha and negative ratio aligned with the strategic objective to benefit from its declining relative performance.

2. **Selling SPY**:

SPY was partially sold with **345 shares** at $607.99 per share. This decision was supported by its high market price, which provided an opportunity to realize gains from its prior performance. The capital freed from SPY was reinvested in the tangency portfolio.

3. **Analysis and Rationale**:

The remaining allocation focused on creating a minimum variance portfolio. Based on the R analysis results, **XLV, XLU, and XLE** were among the most underperforming ETFs (low IR and Alpha values), making them prime candidates for short-selling. SPY’s high price and role in the portfolio as a market proxy justified its partial sale to diversify further and align with risk-adjusted returns.

**Market Prices and Calculations for Short Selling:**

• XLV: **$144.28**, shorted **305 shares** = $ 44005.40

• XLU: **$79.69**, shorted **263 shares** = $ 20958.47

• XLE: **$91.02**, shorted **623 shares** = $ 56705.46

**Total Capital from Short Selling**:

**Market Prices and Calculations for Selling SPY:**

• SPY: **$607.99**, sold **345 shares** = $ 209756.55

**Optimized Portfolio Construction:**

The capital generated from these transactions was used to refine the portfolio further by adhering to the **minimum variance portfolio principles**. The calculated risk metrics, including **CVaR** and **VaR**, ensured a balance between returns and risk minimization.

**Supporting R Analysis:**

The following section includes the R outputs, including Alpha, Beta, Sigma, Information Ratios, and the covariance matrix, that justify the ETF selection for short-selling and portfolio adjustments. These outputs provide a data-driven foundation for all decisions made.

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**Portfolio Performance - Sharpe Ratio Analysis**

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**Explanation of the Graph**

The graph above illustrates the percentage return of the portfolio over time, with the x-axis representing the timeline of trading activity (from late September to early December 2024) and the y-axis showing the percentage return. The data was derived from the “Player Performance” CSV file, and the % Return column was plotted to visualize how the portfolio performed during the trading period. The graph reflects periods of steady returns interspersed with sharp upward and downward movements, which represent market fluctuations and the impact of specific trading decisions. This visualization aids in understanding risk-adjusted performance and aligns with the calculation of the **Sharpe Ratio**, which measures returns relative to risk.

**Analysis of Portfolio Performance**

The portfolio demonstrated a steady return trajectory initially, with no significant movements in percentage returns for the first month, reflecting a cautious approach to trading and capital allocation. However, a sharp drop in returns in early November 2024 marked a period of recalibration in trading strategy. This decline corresponded to adjustments in asset allocation to manage exposure to underperforming ETFs while seeking new opportunities for gains. The subsequent recovery in mid-November shows the success of this strategy, with returns steadily climbing thereafter.

By December 2024, the portfolio showcased robust performance, achieving an overall return of **11.31%**, as shown in the final point on the graph. The strategic trades executed, including short-selling underperforming ETFs and reinvesting in high-performing ones, contributed significantly to this growth. Despite periods of market volatility, the portfolio maintained an upward trajectory by leveraging **risk-adjusted metrics** and adhering to the principles of the **minimum variance portfolio**.

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