

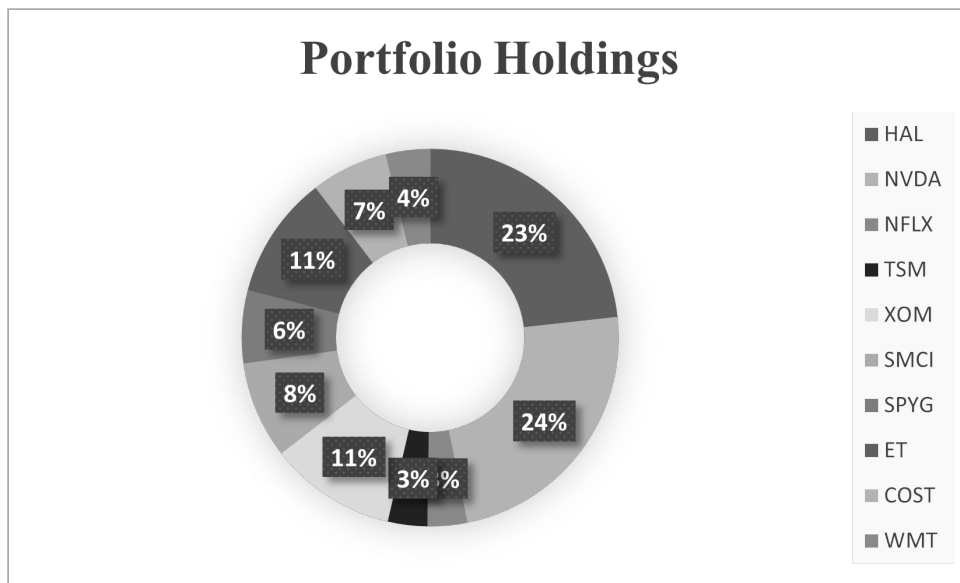
HFC Team 6 Portfolio Risk Analysis Report

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1 Brief Overview

Team 6's portfolio includes a diversified range of equities, focusing on technology, energy, consumer staples, entertainment, and ETFs. The portfolio's major holdings are energy stocks *HAL* (*Halliburton*), *XOM* (*ExxonMobil*), *ET* (*Energy Transfer*), technology stocks *NVDA* (*NVIDIA*), *SMCI* (*Super Micro Computer*), *NFLX* (*Netflix*), *TSM* (*Taiwan Semiconductor Manufacturing*), and consumer staples *WMT* (*Walmart*), *COST* (*Costco*). Additionally, the *SPYG* ETF offers exposure to broader market growth. Starting with an initial investment of \$1,000,000, the team allocated 99.93% of their capital to these positions. Their buying strategy earned them 8th place out of 15 teams.



2 Methodology

2.0.1 Risk Metrics and Their Relevance

Each metric was calculated using historical return data for close price for S&P 500 and each stock from March 11th 2024 to March 12th 2025 for individual stocks and the portfolio as a whole. In this report we focus on the following metrics: To assess the portfolio's risk profile, we analyzed key quantitative risk metrics:

Basic Metrics:

- **S&P Yearly Variance** – Variance of S&P over 1 year(1.0751)

- **Risk free rate**– 4.32% used in calculating Sharpe ratio and expected return.
- **Market Risk Premium** – 4.33% used in calculating information ratio and expected return.
- **S&P 1 year return** –calculated over the change % over 1 year(8.4%).
- **Actual Portfolio Return** – the weighted actual return found to be 2.43%
- **S&P Standard Deviation** – square root of S&P yearly variance(1.0368)

Key Metrics:

- **Standard Deviation & Variance** – Take the sum of the squared differences between each return and the average return, divide by the total number of returns, and then take the square root of that result. Variance is just std. dev. squared.
- **Beta** – Beta is calculated by dividing the covariance of the asset’s returns with the market’s returns by the variance of the market’s returns.
- **Alpha** – is the actual return of the asset minus the expected return based on its beta and the market’s return, adjusted for the risk-free rate.
- **Sharpe Ratio** –is calculated by subtracting the risk-free rate from the return of the asset or portfolio, and then dividing the result by the standard deviation of the asset’s returns.
- **Information Ratio** – The Information Ratio is found by subtracting the return of the benchmark from the return of the portfolio, then dividing the result by the standard deviation of the difference between the portfolio and benchmark returns.

These metrics collectively provide insight into the volatility, risk-adjusted performance, and downside exposure of the portfolio, guiding investment decisions.

3 Quantitative Risk Analysis

Table 1: Calculated Risk Metrics Summary

(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stock	Weight	Varianve	Std. dev.	Covar w/ S&P	Beta	Alpha	Exp. Return	Act. Return
HAL	23.23%	0.0838	0.2895	0.0094	0.009	-36.7%	4.36%	-32.36%
NVDA	23.56%	0.3128	0.5593	0.0224	0.021	22.93%	4.41%	27.34%
NFLX	3.41%	0.0948	0.3079	0.0117	0.011	46.54%	4.37%	50.90%
TSM	3.39%	0.1833	0.4282	0.0188	0.017	20.25%	4.40%	24.64%
XOM	10.85%	0.0406	0.2015	0.0073	0.007	-4.71%	4.35%	-0.37%
SMCI	8.31%	1.2809	1.1318	0.0223	0.021	-68.66%	4.41%	-64.25%
SPYG	6.24%	0.0357	0.1890	0.0127	0.012	8.26%	4.37%	12.63%
ET	10.55%	0.0451	0.2125	0.0082	0.008	17.5%	4.35%	21.85%
COST	6.58%	0.0376	0.1939	0.0075	0.007	21.92%	4.35%	26.27%
WMT	3.81%	0.0438	0.2093	0.0038	0.004	34.7%	4.34%	39.03%

3.0.1 Standard Deviation and Variance

Standard Deviation : Measures the dispersion of stock/portfolio returns from the mean. A higher standard deviation means greater volatility and risk, while a lower standard deviation suggests more stability. Referring to 8 of 10 stocks individually have a lower std. dev (except SMCI TSM).

To measure the Portfolio's std. deviation, we'll use weighted std. dev. - calculated by summing the product of % weight of a stock and individual std.dev. A well-diversified portfolio should have a **lower standard deviation** than the average of its individual stocks.

Variance: The squared standard deviation, used to compare relative risk among assets. A high variance means large swings in returns.

Table 2: Std. dev and Variance

(0)	(1)	(2)	(3)	(4)
Stock	Weight	Variance	Std. dev.	Weighted Std. dev.
HAL	23.23%	0.0838	0.2895	0.0094
NVDA	23.56%	0.3128	0.5593	0.0224
NFLX	3.41%	0.0948	0.3079	0.0117
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ET	10.55%	0.0451	0.2125	0.0082
COST	6.58%	0.0376	0.1939	0.0075
WMT	3.81%	0.0438	0.2093	0.0038
Portfolio				0.3949

A potfolio std.dev value of **0.39** suggests a moderate level of volatility on its own. On comparison with S&P 500's std. dev of 1.036, it indicates significantly **lower volatility** than the S&P 500. This suggests **greater stability and reduced risk**. This may reflect **strong diversification** but could also mean **lower potential for large returns**.

3.0.2 Alpha & Beta

Alpha represents the excess return of a stock relative to its expected performance based on beta. A positive alpha indicates outperformance, while a negative alpha suggests underperformance.

The portfolio's weighted alpha of -1.29 percent indicates overall underperformance compared to the market. Some stocks contributed positively, while others had a negative impact. A negative weighted alpha may suggest inefficient stock selection or increased exposure to underperforming assets, requiring a reassessment of the portfolio's risk-return balance.

Table 3: Alpha and Beta Summary

(0)	(1)	(2)	(3)	(4)
Stock	Weight	Beta	Alpha	Weighted Alpha
HAL	23.23%	0.009	-36.7%	-8.53%
NVDA	23.56%	0.021	22.93%	5.40%
NFLX	3.41%	0.011	46.54%	1.59%
TSM	3.39%	0.017	20.25%	0.69%
XOM	10.85%	0.007	-4.71%	-0.51%
SMCI	8.31%	0.021	-68.66%	-5.71%
SPYG	6.24%	0.012	8.26%	0.52%
ET	10.55%	0.008	17.5%	1.85%
COST	6.58%	0.007	21.92%	1.44%
WMT	3.81%	0.004	34.7%	1.32%
Portfolio				-1.94%

Beta measures a stock's sensitivity to market movements, where a beta greater than one suggests higher volatility and risk, while a beta less than one indicates lower risk and reduced market correlation.

The beta values for the portfolio stocks are all significantly lower than 1, indicating that the stocks have minimal sensitivity to overall market movements. This suggests that the portfolio carries low risk and is less likely to experience large fluctuations in response to market changes. A low beta portfolio is generally more stable but may also have limited growth potential during strong market upswings.

3.0.3 Portfolio Sharpe Ratio & Information Ratio

Table 4: Sharpe ratio and IR

	Sharpe Ratio	Information Ratio
Portfolio	-0.05	0.093

The Sharpe Ratio measures how well the return of a portfolio compensates for the risk taken. A higher Sharpe Ratio indicates better risk-adjusted returns.

Sharpe Ratio (-0.05): This measures the portfolio's risk-adjusted return. A negative Sharpe ratio suggests that the portfolio is underperforming the risk-free rate, meaning the risk taken is not being rewarded with sufficient returns.

The Information Ratio measures the excess return of a portfolio relative to a benchmark (S&P 500). A higher Information Ratio indicates that the portfolio has generated more consistent outperformance compared to its benchmark.

Information Ratio (0.093): This evaluates the portfolio's excess return relative to a benchmark, adjusted for volatility. A low positive value indicates the portfolio is only marginally outperforming its benchmark after accounting for risk.

The **risk exposure might not be well-compensated**, and adjustments may be needed, such as reconsidering asset allocation, diversification strategies, or revisiting the underlying investments. This suggests that the **portfolio's risk management** and **return generation strategy** need to be revisited and optimized for better performance.

4 Qualitative Analysis

Team 6's main pitch is for HAL stock. Halliburton Company (HAL) is a leading provider of products and services to the energy industry worldwide. In the oilfield services industry, it is a firm whose roots reach back to 1919, now a worldwide leader in energy services. It operates in over 80 countries.

4.0.1 Strengths

- Halliburton's leading position in completion and production services, coupled with its extensive global presence, positions the company to swiftly capitalize on any recovery in drilling activity, potentially driving substantial revenue growth.
- The company's established relationships with major exploration and production firms give it a competitive edge in securing large service contracts, ensuring stable revenue streams even amid industry cycles.
- Halliburton's continued investment in digital technologies and automated drilling solutions could set it apart from competitors, fostering cost efficiencies and strengthening its pricing power over the long term.

4.0.2 Risks

- Halliburton's heavy dependence on North American shale operations makes it highly susceptible to any prolonged downturn in drilling and completion expenditures, which could result in significant revenue drops and squeezed profit margins.
- The company is also confronted with fierce price competition from global competitors like Schlumberger and Baker Hughes, challenging Halliburton's ability to sustain its traditional pricing power and potentially diminishing its profitability.
- In addition, increasing regulatory and environmental scrutiny surrounding unconventional drilling and hydraulic fracturing could raise operational costs and limit future project opportunities, posing a considerable threat to Halliburton's core service offerings.

5 Overall Recommendation

Position: Caution and Not Satisfactory

Based on the analysis of Team 6's key portfolio metrics, the recommendation is to approach the stock with caution, particularly for risk-averse investors. The **Sharpe Ratio** of -0.05 suggests that the stock

has underperformed on a risk-adjusted basis, offering negative returns relative to its volatility. This implies that, in its current state, Portfolio is not delivering sufficient return for the amount of risk taken, making it a less attractive option for investors prioritizing stability. Additionally, the **Alpha** of -1.94 indicates that Portfolio has underperformed its benchmark significantly, pointing to risks in generating returns above what would be expected based on its market risk exposure. This further reinforces the notion of weak performance relative to market conditions.

On the other hand, the **Information Ratio** of 0.093, while modest, suggests that Portfolio has managed to generate some degree of risk-adjusted alpha, inconsistently. However, given the negative Sharpe and Alpha values, Portfolio allocation appears to be a riskier investment, with limited upside potential in the short term. The main pitched stock HAL company's reliance on cyclical oil markets, price competition, and regulatory challenges compounds its risk, making it an unattractive option for conservative portfolios. While its long-term prospects could improve if it capitalizes on its technological innovations and customer relationships, the current metrics indicate that it would be important for investors to minimize exposure until the risk profile improves.