

Multi-Stock Performance and Portfolio Construction: An Empirical Study of Netflix Inc, Altair Engineering Inc, and Torchlight Resources Inc

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Section 1. Introduction

Modern Portfolio Theory (MPT) states effective portfolio construction requires a balance between return maximisation and risk management (Markowitz, 1991). This study evaluates the financial performance of three publicly traded stocks (Netflix Inc., Altair Engineering Inc., and Torchlight Resources Inc.) from 2015 to 2020, assessing individual stock characteristics and their role in portfolio construction. By analysing different weighting methodologies, the study examines how each approach influences return, volatility, and diversification. Unlike traditional market-capitalisation-weighted strategies, this research explores the impact of alternative allocations on risk-adjusted performance.

The study utilises financial data from CRSP and Yahoo Finance to ensure a comprehensive assessment of historical trends, sector-specific risk, and stock performance. The inclusion of a market benchmark (S&P 500) allows for a comparative analysis of portfolio performance relative to broader market conditions. By integrating these elements, the study provides the framework for investment decision-making, offering insights into the trade-offs between risk and return across different portfolio weighting strategies.

The data retrieval, processing, and portfolio analysis were conducted using R. The complete scripts, including data cleaning, portfolio construction, and visualisation, have been submitted separately in the required .zip format.

Section 2. Performance Overview

2.1. Stock Overview

Figure 1: Stock Information from CRSP (Wharton Research Data Services, 2024; Center for Research in Security Prices, 2024).

PERMNO	Company_Name	Stock_Exchange	siccd	Industry_Sector
14358	Torchlight Energy Resources Inc.	NASDAQ	7997	Oil & Gas & Exploration
17034	Altair Engineering Inc.	NASDAQ	9999	Software & Technology Services
89393	Neflix Inc.	NASDAQ	7841	Motion Picture Distribution

Note: The SIC codes assigned to Netflix, Altair Engineering, and Torchlight Resources were manually adjusted to ensure accurate industry classification and meaningful sector comparisons.

The three assigned stocks in this analysis are Netflix Inc., Altair Engineering Inc., and Torchlight Resources Inc., each operating in a distinct industry and listed on NASDAQ. Netflix is classified under the motion picture distribution sector (SIC code 7841), Altair Engineering under software and technology services (SIC code 9999), and Torchlight Resources within oil and gas drilling and exploration (SIC code 7997).

Netflix, founded in 1997, initially operated as a DVD rental service before evolving into a global streaming leader. By 2020, it had surpassed 200M subscribers worldwide, driven by extensive investment in original content, digital infrastructure, and international expansion (Lobato & Lotz, 2020). Its ability to capitalise on the shift toward on-demand media consumption solidified its dominant market position.

Altair Engineering, established in 1985, specialises in simulation-driven design and artificial intelligence solutions across high-performance computing industries. The company has maintained a strong foothold in engineering analytics, leveraging computational technology to remain competitive in the rapidly evolving technology sector.

Torchlight Resources operates in the oil and gas exploration industry, where financial performance is highly dependent on commodity price fluctuations and regulatory policies. Torchlight has faced significant challenges due to volatile crude oil prices, shifting energy regulations, and the capital-intensive nature of exploration operations. These structural constraints have limited its long-term growth potential, making it more susceptible to macroeconomic and geopolitical factors (Demirer et al., 2020).

2.2 Historical Performance Trends

The analysis covers the period from 2015 to 2020, as several companies in the study underwent mergers or structural changes that affected their classification and availability in financial databases. Selecting this timeframe ensures that stock performance, risk assessments, and sector comparisons remain valid without disruptions from corporate restructuring.

Figure 2: Average Monthly Return from CRSP (Wharton Research Data Services, 2024; Center for Research in Security Prices, 2024).



Note: Each stock is identified by its unique PERMNO in the CRSP database: Netflix Inc. (89393), Altair Engineering Inc. (17034), and Torchlight Resources Inc. (14358)

Netflix recorded one of the highest average returns among the three stocks, reflecting its dominant position in the global streaming industry. Its stock price followed a consistent upward trend, supported by sustained revenue growth and investor confidence in its market leadership.

Altair Engineering exhibited the lowest average returns despite operating in the high-growth technology sector. Its performance remained steady but moderate, contrasting with more aggressively expanding software firms. The company's returns reflect its focus on specialised engineering simulation solutions, leading to more measured stock appreciation.

Torchlight Resources experienced the highest average returns but with extreme volatility. Its performance was heavily influenced by oil price fluctuations and broader energy market trends (Demirer et al., 2020). While the company saw occasional price surges, its long-term outlook remained uncertain due to the cyclical nature of the oil industry and external macroeconomic pressures.

Several major market events influenced these companies' stock performance. Netflix faced increased competition in 2019 with the entry of Disney+ and HBO Max but retained investor confidence through its extensive content portfolio and continued global expansion (Lobato & Lotz, 2020). Altair Engineering benefited from rising investments in AI-driven software and cloud computing, as industries adopted high-performance simulation tools. Conversely, Torchlight Resources was significantly impacted by downturns in the energy sector, particularly the crude oil price collapse in 2016 and the COVID-19 pandemic's disruption of global energy demand in 2020, which contributed to heightened stock price volatility.

2.3 Performance Metrics

The financial performance of Netflix, Altair Engineering, and Torchlight Resources is evaluated using key quantitative metrics. These indicators provide insights into each stock's risk-return characteristics and investment appeal.

Figure 3: Data from CRSP (Wharton Research Data Services, 2024; Center for Research in Security Prices, 2024).

PERMNO	Avg_Return	Volatility	Avg_Volume	Market_Cap_Avg	Sharpe_Ratio
14358	0.04320775	0.348874009242355	52450.2	63.2340514583333	0.123849151428144
17034	0.0248918	0.110350314903644	72517.12	1261.4731804	0.225570720135553
89393	0.0390919333333333	0.124066321379493	2065824.48333333	87928.351381823	0.315089001581335

Note: Each stock is identified by its unique PERMNO in the CRSP database: Netflix Inc. (89393), Altair Engineering Inc. (17034), and Torchlight Resources Inc. (14358)

Average returns show that Torchlight Resources recorded the highest average return at 4.32% accompanied by significant volatility. Netflix followed with an average return of 3.91%, reflecting strong and sustainable growth. Altair Engineering had the lowest average return at 2.49%, but this was offset by its greater stability.

Volatility levels indicate that Torchlight Resources experienced the highest volatility (34.89%), reflecting its sensitivity to market shocks. Netflix displayed moderate volatility (12.41%), as its strong market position balanced high returns with relative stability. Altair Engineering had the lowest volatility (11.04%), making it the least risky stock and an attractive option for risk-averse investors. This trend is further visualised in the Volatility Bar Plot, demonstrating the disparity in risk levels across the stocks.

Figure 4: Stock Volatility from CRSP (Wharton Research Data Services, 2024; Center for Research in Security Prices, 2024).



Note: Each stock is identified by its unique PERMNO in the CRSP database: Netflix Inc. (89393), Altair Engineering Inc. (17034), and Torchlight Resources Inc. (14358)

Trading volume data shows that Netflix had the highest liquidity, with an average daily trading volume exceeding 2M shares, significantly surpassing Torchlight at 52,450 and Altair at 72,517. This indicates stronger investor demand for Netflix, reinforcing its position as a more actively traded stock.

Netflix had the highest average market cap (\$87.93B), reinforcing its dominant market position. Altair followed with \$1.26B, reflecting its stable presence in the technology sector, while Torchlight had the smallest market cap at \$63.23M, classifying it as a high-risk, small-cap stock.

Netflix achieved the highest Sharpe ratio (0.3151), indicating the best risk-adjusted performance. Altair had a moderate Sharpe ratio (0.2255), balancing returns with low volatility. Torchlight had the lowest Sharpe ratio (0.1238), suggesting that its high risk was not sufficiently compensated by returns.

Figure 5: Stock Sharpe Ratios from CRSP (Wharton Research Data Services, 2024; Center for Research in Security Prices, 2024).

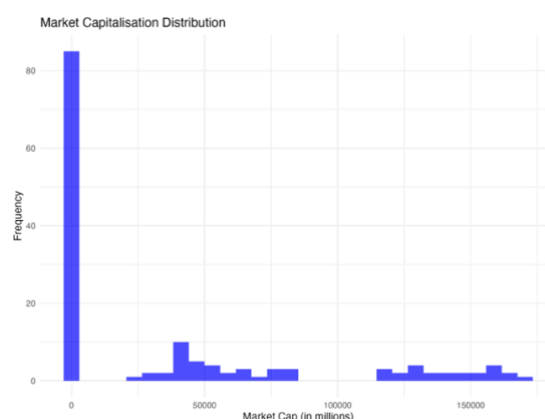


Note: Each stock is identified by its unique PERMNO in the CRSP database: Netflix Inc. (89393), Altair Engineering Inc. (17034), and Torchlight Resources Inc. (14358)

2.4 Sector Comparison

The analysis of market capitalisation provides insights into company valuation trends and industry positioning. The market capitalisation histogram highlights significant disparities, with Torchlight consistently classified as a small-cap stock, reinforcing its high-risk and speculative nature. In contrast, Netflix maintained a dominant market position, reflecting strong investor confidence, while Altair Engineering demonstrated mid-range stability within the technology sector.

Figure 6: Market Capitalisation Histogram from CRSP (Wharton Research Data Services, 2024; Center for Research in Security Prices, 2024).



The trend chart further illustrates these differences. Netflix's valuation surged past \$150B by 2020, solidifying its market leadership. Altair remained steady, benefiting from consistent demand for engineering software, while Torchlight showed sharp fluctuations.

Figure 7: Market Capitalisation Trend from CRSP (Wharton Research Data Services, 2024; Center for Research in Security Prices, 2024).



Note: Each stock is identified by its unique PERMNO in the CRSP database: Netflix Inc. (89393), Altair Engineering Inc. (17034), and Torchlight Resources Inc. (14358)

Figure 8: Market Capitalisation Data from CRSP (Wharton Research Data Services, 2024; Center for Research in Security Prices, 2024).

Min_MktCap	Max_MktCap	Mean_MktCap	Min_Lagged_MktCap	Max_Lagged_MktCap	Mean_Lagged_MktCap
7.51296	170451.32058542	36627.8065897026	7.51296	170451.32058542	35826.8021851478

Summary statistics confirm these trends. Torchlight had the lowest recorded market cap at \$7.51M, emphasising its financial instability, whereas Netflix reached a peak of \$170.45B, reflecting its industry dominance. The mean market cap of \$36.63B was largely influenced by Netflix, while Altair maintained a moderate valuation. Lagged values show similar patterns, reinforcing the stability of Netflix and Altair versus the volatility of Torchlight.

These findings align with broader sector trends. Netflix outperformed its streaming competitors, maintaining strong fundamentals. Altair remained resilient in the technology sector, benefiting from steady demand. Torchlight struggled in the energy sector, unable to compete with larger, diversified oil firms, leaving it vulnerable to market fluctuations and investor scepticism.

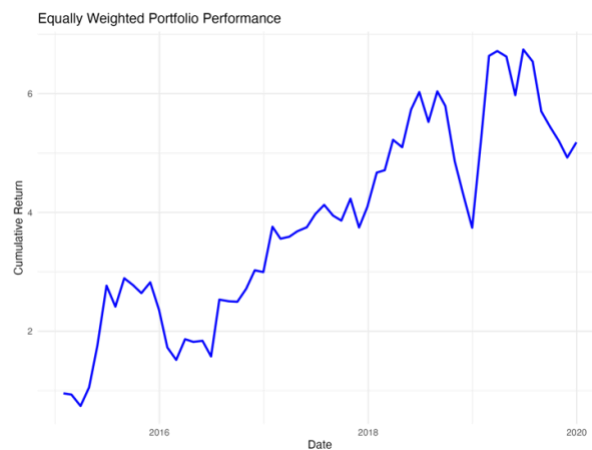
Section 3. Portfolio Investment & Evaluation

3.1 Portfolio Construction

This analysis considers three portfolio methodologies: an equal-weighted portfolio, a value-weighted portfolio, and an optimised mean-variance (M-V) portfolio.

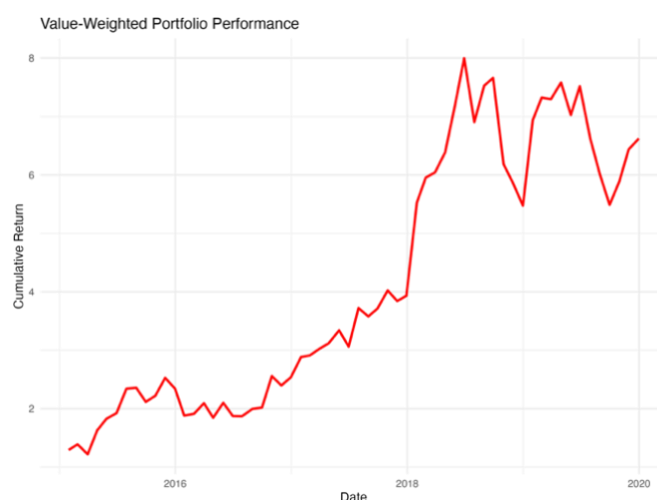
An equal-weighted portfolio assigns equal importance to each stock, ensuring that all assets contribute equally regardless of their market capitalisation. While this prevents over-exposure to a single stock, it also introduces higher volatility, as smaller stocks like Torchlight Resources receive the same weighting as large-cap stocks such as Netflix. This effect is particularly evident in the portfolio's performance trend, as shown in the graph below, where fluctuations in smaller stocks contribute to increased overall volatility.

Figure 9: Equal-Weighted Portfolio Performance from CRSP (Wharton Research Data Services, 2024; Center for Research in Security Prices, 2024).



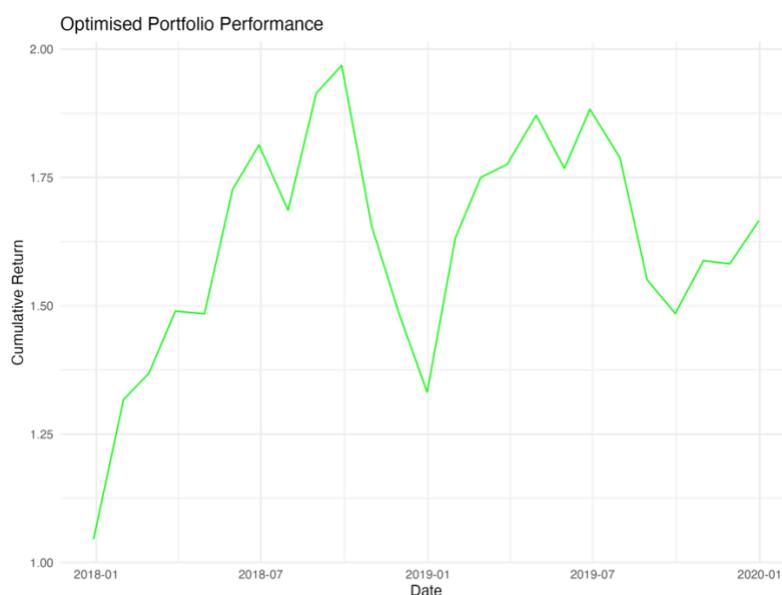
A value-weighted portfolio, in contrast, assigns weights based on market capitalisation, giving dominant stocks like Netflix a larger influence on overall returns. While this approach more accurately reflects market conditions, it can become skewed toward large-cap stocks, reducing diversification benefits. The graph below illustrates this effect, where Netflix's market dominance drives the portfolio's performance, potentially overshadowing the impact of smaller stocks like Torchlight Resources.

Figure 10: Value-Weighted Portfolio Performance from CRSP (Wharton Research Data Services, 2024; Center for Research in Security Prices, 2024).



The mean-variance (M-V) optimised portfolio, grounded in Modern Portfolio Theory (MPT), aims to maximise returns for a given level of risk. This approach determines the optimal asset allocation by balancing expected returns, volatility, and correlations among stocks, ultimately constructing an efficient portfolio. The derived optimal weights are as follows: Netflix at 51.17%, Altair Engineering at 48.82%, and Torchlight Resources at nearly 0%. The graph below highlights how this optimised allocation enhances overall portfolio efficiency by reducing exposure to excessive risk while maintaining strong return potential.

Figure 11: Mean-Variance Optimised Portfolio Performance from CRSP (Wharton Research Data Services, 2024; Center for Research in Security Prices, 2024).



3.2 Portfolio Performance Metrics & Comparison

Figure 12: Equal-Weighted Portfolio vs Value-Weighted Portfolio Data from CRSP (Wharton Research Data Services, 2024; Center for Research in Security Prices, 2024).

Portfolio	Mean_Return	Volatility	Sharpe_Ratio
Equal-Weighted	0.0420749583333333	0.186224034317096	0.225937315167867
Value-Weighted	0.0390355067791066	0.12374054550241	0.315462539950952

The equal-weighted portfolio achieves a higher mean return than the value-weighted approach but at the cost of greater volatility. Its exposure to smaller, more volatile stocks increases fluctuations, leading to a lower Sharpe ratio, indicating inefficient risk-adjusted returns.

The value-weighted portfolio, while yielding a slightly lower mean return, offers a more stable performance due to the dominance of large-cap stocks like Netflix, which reduces overall volatility. This results in a higher Sharpe ratio of 0.3155 compared to 0.2259, making it a more efficient option for risk-averse investors seeking a better risk-return trade-off.

The mean-variance optimised portfolio generates lower returns than both the equal- and value-weighted strategies due to specific constraints such as the prohibition of short selling and the requirement that portfolio weights sum to one. These constraints prevent the portfolio from fully capitalising on high-return opportunities and hedging against underperforming assets. While this method minimises volatility and ensures portfolio stability, it also limits upside potential, resulting in subdued returns. The accompanying graphs illustrate these trends.

Figure 13: Equal-Weighted Portfolio vs Value-Weighted Portfolio Performance from CRSP (Wharton Research Data Services, 2024; Center for Research in Security Prices, 2024).

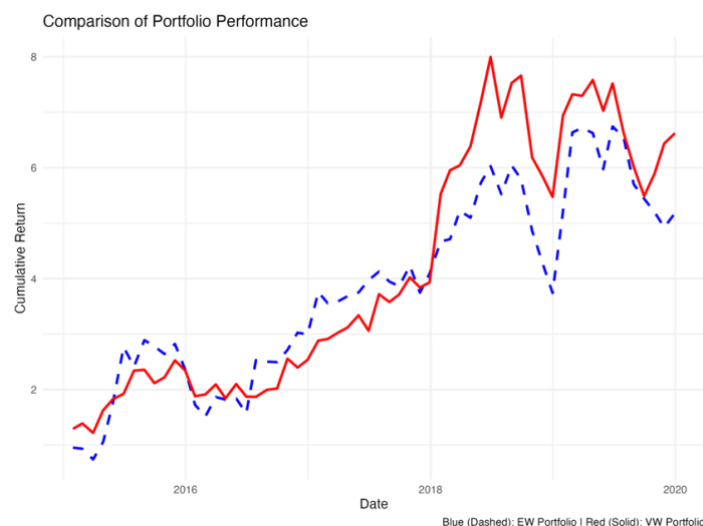
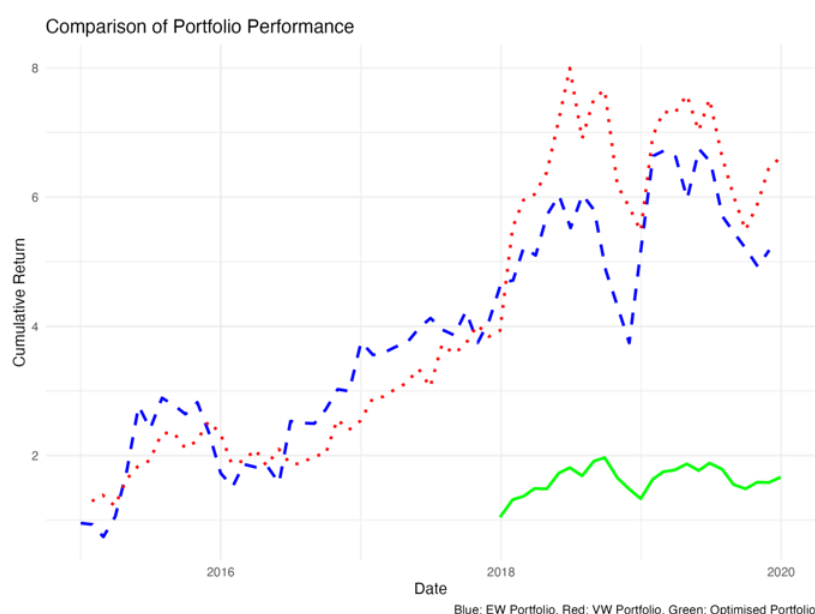


Figure 14: The Three Portfolio's Performances from CRSP (Wharton Research Data Services, 2024; Center for Research in Security Prices, 2024).



3.3 Market Sensitivity & CAPM Analysis of Equal-Weighted Portfolio

The Capital Asset Pricing Model (CAPM) provides insight into the relationship between the equal-weighted portfolio and overall market movements. Analysing the equal-weighted portfolio allows for an unbiased assessment of systematic risk exposure, as it evenly distributes weight across all assets, preventing any single stock from dominating performance. This makes it a suitable baseline before considering the effects of alternative weighting strategies.

Figure 15: CAPM Results (Yahoo Finance, 2024)

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Call:
lm(formula = Portfolio_Return ~ Return, data = capm_data)

Residuals:
    Min       1Q   Median       3Q      Max
-0.22311 -0.10369 -0.03162  0.03447  0.61966

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.03059    0.02447   1.250   0.2163
Return       1.47595    0.69349   2.128   0.0376 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

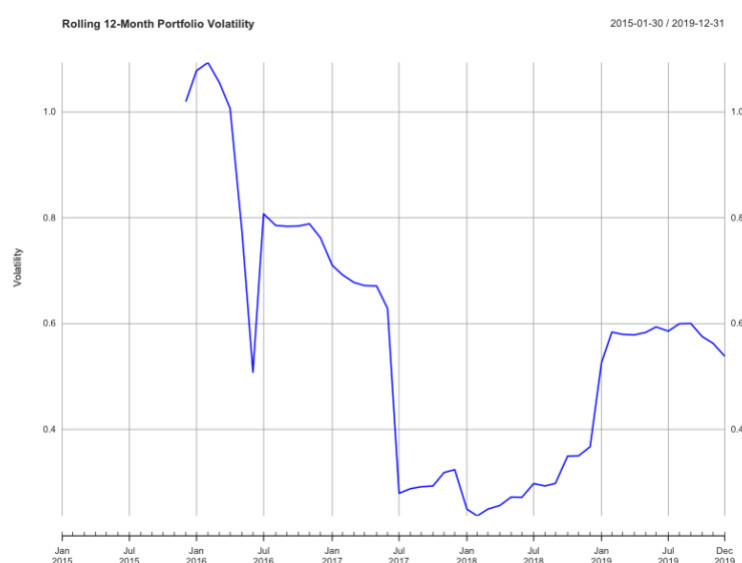
Residual standard error: 0.182 on 57 degrees of freedom
Multiple R-squared:  0.07362,    Adjusted R-squared:  0.05736
F-statistic: 4.53 on 1 and 57 DF,  p-value: 0.03765
```

The regression results indicate that the equal-weighted portfolio has a beta of 1.476, suggesting a strong reaction to market fluctuations. The elevated beta reflects exposure to high-volatility stocks, particularly smaller-cap firms, which contribute to larger swings in portfolio returns.

Despite its high beta, the R-squared value of 0.0736 highlights that only 7.36% of the variation in portfolio returns is explained by market movements. This indicates that factors beyond broad market trends play a significant role in portfolio fluctuations. The low explanatory power of market returns highlights the limitations of the CAPM model in capturing the drivers of portfolio performance, emphasising the role of non-systematic risk.

The intercept of the regression, at 0.0306, is not statistically significant ($p = 0.216$), suggesting that the portfolio does not generate consistent excess returns beyond what is expected based on its market exposure.

Figure 16: The Rolling 12-Month Portfolio Volatility (Yahoo Finance, 2024)



The rolling 12-month volatility analysis further illustrates the changing risk profile of the equal-weighted portfolio. Volatility remained elevated between 2015 and mid-2016, exceeding 1.0, where the portfolio exhibited strong reactions to market fluctuations. A decline in volatility followed in mid-2016, leading to a more stable period through 2017 and early 2018, before an increase in risk emerged in 2019. These fluctuations reinforce the CAPM findings that while market returns influence performance, additional stock-specific factors contribute significantly to risk levels.

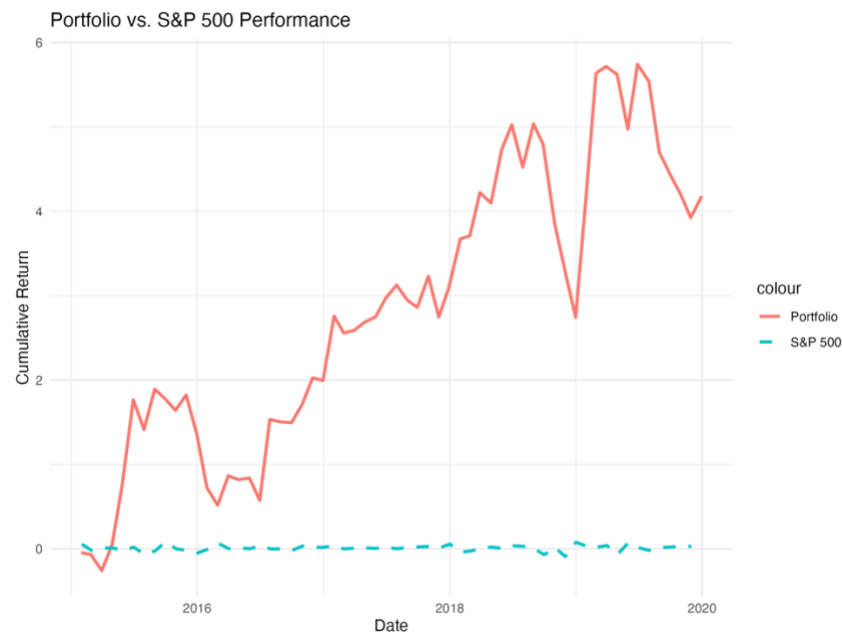
These results establish a foundation for evaluating alternative portfolio strategies, particularly the value-weighted and mean-variance optimised approaches, which aim to reduce excessive risk while maintaining return potential.

3.4 Equal-Weighted Portfolio Performance vs Market Benchmark

Assessing the performance of the equal-weighted portfolio relative to the S&P 500 provides insight into its risk-return characteristics and market sensitivity. The equal-weighted portfolio is analysed as it offers an undistorted representation of stock returns, without the influence of market capitalisation weighting or optimisation constraints. This provides a clearer understanding of how a neutral allocation strategy performs in comparison to a broad market index.

The cumulative return trajectory of the equal-weighted portfolio frequently exhibits sharper movements than the S&P 500, suggesting amplified reactions to market trends. In contrast, the S&P 500 follows a more stable return path, benefitting from its weighting towards larger, lower-volatility stocks. The divergence between the two return paths suggests that while the equal-weighted portfolio achieved higher returns at times, it also carried greater risk. The performance gap reinforces the findings that an equal-weighted approach, while offering potential rewards, exposes investors to higher volatility compared to market-weighted alternatives.

Figure 17: Equal-Weighted Portfolio Compared to the Market Index(Yahoo Finance, 2024)



Section 4. Data Limitations & Improvements

Despite the comprehensive analysis of stock performance and portfolio optimisation, there are certain limitations in the dataset and methodology. These constraints affect the accuracy, reliability, and broader applicability of the findings. Recognising these limitations provides a basis for potential improvements in future research and portfolio construction.

A notable limitation of the portfolio optimisation analysis is the reduced sample period for the optimised portfolio. Since the mean-variance optimisation required complete return data for all three stocks, any date with missing values was omitted from the analysis. As a result, the optimised portfolio only spans the period during which all stocks had valid return data, which is shorter than the full 2015–2020 sample used for the equal-weighted and value-weighted portfolios. This discrepancy may affect direct comparisons and should be taken into account when interpreting the risk-return trade-offs of the optimised portfolio.

Another key limitation is the sample period from 2015 to 2020. While this timeframe captures various market cycles, it does not account for long-term market behaviour. Excluding more recent economic developments, may limit the study's relevance to current market conditions. A longer dataset could improve the robustness of return and risk estimations.

The reliance on historical data from CRSP and Yahoo Finance presents another constraint. Although these databases provide reliable stock price, trading volume, and market capitalisation data, they do not fully capture external factors such as corporate actions, regulatory changes, or macroeconomic shocks.

The portfolio construction methodology also has limitations. The study relies on mean-variance optimisation, which assumes that historical returns and volatilities are reliable predictors of future performance. This assumption may not hold in dynamic market environments where risk-return relationships evolve. Exploring alternative portfolio optimisation techniques could enhance adaptability to changing market conditions.

To address these limitations, future research should extend the dataset to cover a longer time horizon, incorporate additional stocks for broader diversification, integrate macroeconomic indicators, and explore more advanced optimisation techniques. These improvements would enhance the robustness and applicability of the portfolio analysis, providing stronger insights for investment decision-making.

Section 5. Conclusion

This study evaluates the financial performance of Netflix Inc., Altair Engineering Inc., and Torchlight Resources Inc., examining their individual stock characteristics and their impact on portfolio construction. The analysis applies three portfolio methodologies to assess how different allocation strategies influence return, volatility, and risk-adjusted performance.

The findings reveal that the equal-weighted portfolio achieves higher raw returns but is exposed to greater volatility, largely due to its inclusion of high-risk small-cap stocks. The value-weighted portfolio, in contrast, provides a more stable return trajectory by prioritising larger, more established companies. The M-V optimised portfolio further refines allocation by reducing exposure to volatile assets, resulting in a more efficient risk-return trade-off.

Market sensitivity analysis through the Capital Asset Pricing Model (CAPM) highlights the strong market dependence of the equal-weighted portfolio. However, the low R-squared value suggests that non-systematic factors play a substantial role in portfolio fluctuations. Comparisons with the S&P 500 further reinforce the fact that equal-weighted approach delivers high returns but also introduces greater exposure to market volatility compared to market-weighted alternatives.

Despite providing valuable insights, the study acknowledges certain limitations, including the exclusion of recent market events and long-term time frame, and the assumptions inherent in mean-variance optimisation. Future research could enhance portfolio modelling by incorporating a broader dataset, integrating macroeconomic indicators, and exploring alternative optimisation techniques such as machine learning-based asset allocation.

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