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## **Introduction**

The adjusted closing prices of ten NSDAQ assets (EBAY, SBUX, ABNB, CSCO, ADBE, CROX, INTU, QCOM, BIIB, and NFLX) from 2014 to 2024 are shown in the graph below. This graph illustrates how these assets perform over the past decade. Notably, NFLX and ADBE show notable rise in the years 2021–2022, that is followed by a fall.

A graph of a number of stocks

Description automatically generated with medium confidence

Figure 3. Adjusted. closing prices of all 10 assets from 2014-24

The stock with the most growth, NFLX (Netflix), indicates the best returns over the specified time frame. This is reinforced by the distribution graphs, which display a comparatively high frequency of positive returns for NFLX.

A graph of data in different sizes

Description automatically generated with medium confidence

Figure 4. Distribution of returns of all assets from 2014-24

The cumulative returns graph for Netflix shows a general upward trend accompanied by an apparent degree of volatility. The stock price increased rapidly, reaching its peak in 2021–2022, particularly between 2017 and 2021. The price had a sharp decline in 2022, but it began to increase once again in 2023. The overall trend indicates considerable long-term growth, although sporadic volatility. This is consistent with Netflix's strong performance and market valuation during the previous 10 years.

A graph of a line graph

Description automatically generated with medium confidence

Figure 5. Cumulative return of NFLX

Since, NFLX shows high liquidity and trading volumes, and significant fluctuations in volatility, it is selected for identifying trends and generating buy/sell signals in momentum strategy.

## **Momentum Strategy**

A momentum trading strategy for NFLX is developed using the Simple Moving Average (SMA) technique, with the short and long windows set at 50 and 250 days, respectively. The strategy creates buy signals when the short-term moving average (blue) passes above the long-term moving average (orange), and sell signals when it crosses below, with the intention of profiting from the price swings of the company. The following chart supports in the analysis of the strategy's efficacy and the changes in the stock's price over the last ten years.

A graph of a graph showing the growth of the stock market

Description automatically generated

Figure 6. Simple Moving Average (SMA) - Momentum Strategy

## **Backtesting**

This graph, labelled "NFLX Momentum Strategy Backtest," shows how momentum trading strategy is applied to Netflix stock performed between 2014 and 2024. The aggregate portfolio value is depicted by the blue line, which starts at about $100,000 and varies over time with peaks and troughs until reaching a maximum of $130,000 (30% growth). The buy signals (purple triangles) and sell signals (black triangles) on the graph represent the points at which the strategy suggested entering or leaving positions, respectively. These signals show how well the approach captures market movements and reduces losses when they align with shifts in the portfolio value. The strategy's historical performance analysis is shown visually in this graphic, which offers insights into the strategy's prospective profitability and risk management skills.

A graph with blue lines and arrows

Description automatically generated

Figure 7. Equity curve for backtesting momentum strategy

The pros and cons of the momentum strategy used are listed below:

A table with text on it

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Figure 8. Pros and cons of above strategy

## **Strategy optimisation**

The metric used to quantify the risk-adjusted return of an investing strategy is the Sharpe ratio. A higher Sharpe ratio suggests a more efficient strategy since it yield more return per unit of risk. The following comparison shows the Sharpe ratios of two distinct sets of moving average windows used in a momentum strategy for Netflix. The strategy with a 200-day short-term window and a 300-day long-term window has a slightly higher annualised Sharpe ratio of 0.3094 than the strategy with a 50-day short-term window and a 250-day long-term window, which has an annualised Sharpe ratio of 0.3085. There is a slight increase in Sharpe ratio by 0.0009. Based on risk-adjusted returns, this shows that the approach with the 200/300 window design is slightly more efficient, however not tremendously significant. Therefore, this change alone may not be a significant optimization. A more detailed optimisation of portfolio is done in subsequent section of this essay.

The robustness of the approach varies; there are times when it aligns with the general trend of the stock and other times when it generates poor indications. The strategy's high maximum drawdown of 30% emphasises the need for improved risk management approaches to improve performance and lower drawdown.

A graph of blue and orange lines

Description automatically generated

Figure 9. Maximum drawdown

## **Comparison between shares**

The market bottom and the pre-COVID peak are two important moments that are shown in the figure. The graph suggests distinctly that Starbucks and Netflix recovered from the COVID-19 impact among the first companies. Among stocks recovering from the COVID-19 outbreak, Netflix has done so the quickest. Netflix's stock price dropped significantly during the onset of the pandemic, but it quickly rebounded and surpassed its pre-COVID high levels before the other stocks did. By the middle of 2020, Netflix's stock had recovered to its pre-pandemic levels and continued to rise, indicating a strong and swift recovery. Even if it recovered more slowly, Starbucks did as well. Though it recovered slower than NFLX, SBUX's stock price did finally reach its pre-COVID levels.

After the market bottom in 2020, the prices of both assets demonstrate a sharp recovery, hitting their pre-COVID high levels rather rapidly in comparison to other stocks. The expeditious recoveries of these businesses suggests a robust resilience and investor trust during the pandemic. On the other side, certain stocks like Cisco and Adobe, had a slower recovery trajectory, taking longer to return back to and exceed their pre-COVID levels.

A graph of a stock market

Description automatically generated

Figure 10. Performance of stocks during and post COVID-19

## **Portfolio optimisation**

The Python Riskfolio-Lib package is used to optimise the portfolio. In this analysis, the portfolio has been evaluated against the mean-variance risk measure/scenario; however, other risk measures have also been included in the accompanying Python file. In portfolio theory, mean-variance is a metric used to express a portfolio's risk (or volatility). It is computed as the mean of the squared departures from the portfolio mean return. Mean-variance helps investors comprehend how rewards are distributed and the risk involved. Each slice of the pie represents a distinct investment choice, and the pie chart illustrates the mean-variance risk measure of the assets in the optimised portfolio.

A diagram of a pie chart

Description automatically generated

Figure 11. Portfolio composition of mean variance

Asset allocation and portfolio optimisation choices can benefit from fig. 11’s chart visual depiction of the relative contributions of several investment alternatives to the portfolio's overall mean variance.

With respect to the efficient frontier graph, the horizontal axis shows the portfolio's risk as determined by the returns on the portfolio's standard deviation. On vertical axis, higher risk is indicated by moving to the right. The portfolio's predicted return is shown on this axis. Elevations along this axis signify increased anticipated yields. Every dot on the graph denotes a distinct portfolio with a particular collection of assets. The risk-adjusted return ratio is indicated by the colour of the dots, and an interpretive scale is provided by the colour bar on the right. The efficient frontier is shown by the curved line on the graph. The set of ideal portfolios that provide the maximum expected return for a particular degree of risk is represented by this line. This category of portfolios is regarded as efficient since they offer the highest return relative to their degree of risk. The "Max Risk Adjusted Return Portfolio" is indicated by the red star on the graph. This portfolio gives the best return in relation to risk since it has the highest risk-adjusted return. The portfolio with the greatest Sharpe ratio is the term by which it is commonly referred to. By balancing the trade-off between risk and return to maximise investment strategy, investors can identify and choose the most efficient portfolios with the use of the efficient frontier graph.

A graph with a dotted line

Description automatically generated

Figure 12. Efficient frontier of mean variance

The efficient frontier composition graph shows how the distribution of assets varies as it moves along the frontier. For instance, the portfolio may be more heavily weighted in the direction of less volatile assets at lower risk levels, and more heavily weighted in more volatile assets with greater predicted returns at higher risk levels. The portfolio's diversity is made easier to see by the graph. A portfolio that is well-diversified will contain a variety of assets, which lowers overall risk. Investors can determine the best combination of assets for varying risk levels by looking at the graph. This helps investors in building portfolios that match their expected returns and risk tolerance.

A graph showing a different color line

Description automatically generated with medium confidence

Figure 13. Composition of efficient frontier

The other risk measures that has been considered for optimising portfolio are listed below:

A table of text with white text

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Figure 14. Different risk measures

The percentages of different assets allocated to each risk indicator are shown on the weighted graph. The table illustrates the differing importance of assets under various risk measurements by showing the percentage of each asset in the portfolio optimised for each particular risk measure. The table's various green hues indicate how much each asset's value is worth in relation to each risk metric. Green hues that are darker denote greater values, whereas those that are lighter denote lower values. In portfolio management, this color-coding makes it easier to immediately determine whether assets have greater or lower risk measurements, allowing for comparative assessment and decision-making.

A graph with numbers and a number of percentages

Description automatically generated with medium confidence

Figure 15. Optimal portfolio for several risk measures

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