Comparing Company's stock

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December 26, 2024

1 Introduction

This document outlines the process and results of analyzing a company's stock performance and creating an efficient frontier with Microsoft. The analysis is based on 156 weeks of data ending 10/7/24.

2 Data Collection and Preparation

I began by gathering weekly historical prices for my assigned company, covering 157 weeks and ending on October 7, 2024, using Yahoo Finance. I focused on the "Adj. Close" price, which accounts for splits and dividends, ensuring consistency with current prices. I calculated weekly percentage returns using the formula [P(t) - P(t-7)] / P(t-7) with adjusted close prices. I repeated this process for the Wilshire 5000 index to use as a market benchmark.

3 Company Analysis

3.1 Scatterplot: Netflix vs Wilshire 5000

Figure 1: Scatterplot of Netflix and Wilshire 5000

The scatterplot shows the weekly stock price returns of Netflix vs. Wilshire 5000 returns. The x-axis represents Wilshire 5000 returns, while the y-axis represents Netflix's returns.

3.1.1 Steps for plotting

1. I created a new column with returns using the formula [P(t) - P(t-7)] / P(t-7)*100 for both the companies.
2. Using the returns column of Netflix as y-axis and Wilshire's as x-axis, I created a scatter plot.

3.2   Regression Analysis

3.2.1   Steps

1. Add linear trendline to the scatterplot.
2. Enable "Display equation on chart" and "Display R-squared value on chart."

3. Using the regression formula: y = [slope]x + [intercept], find beta from this equation.
   Beta = slope

3.3   Analysis of Microsoft vs Wilshire 5000

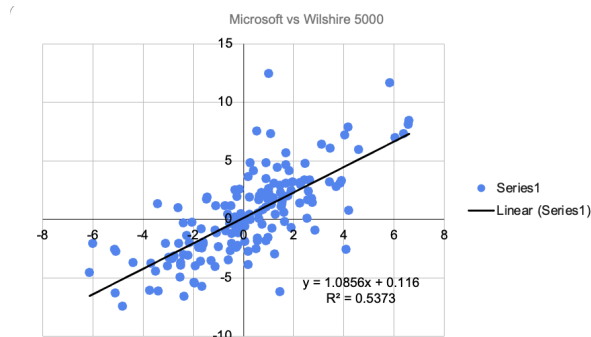repeat the same steps as above for Microsoft and Wilshire 5000.

Figure 2: Microsoft vs Wilshire 5000

4   Efficient Frontier Analysis

4.1   Assumptions

I assumed Risk-free rate as 4.875% and Equity risk premium as 7.8%.

4.2   Standard Deviation

Calculated standard deviation for all the values in column "Returns" for Netflix, Wilshire 5000 and Microsoft.

4.2.1   Formulas

Netflix: =STDEV(H3:H159)
Wilshire 5000: =STDEV(Q3:Q159)
Microsoft: =STDEV(Z3:Z159)

4.3   Correlation

I calculated correlation between Netflix and Microsoft and stored in a cell.

4.3.1   Formula

=CORREL(H3:H159,Z3:Z159)

4.4   Betas

Beta values are the slopes in the regression formula. From the regression equations in the graphs,
Beta Netflix = 1.62
Beta Microsoft = 1.09

4.5 Returns

I found the returns using the formula: **risk free rate + beta * equity risk premium**
Netflix's return = 0.17511
Microsoft's return = 0.13377

4.6 Portfolio Calculations

4.6.1 Steps to calculate

1. For each of the 11 portfolio weightings (0%/100% to 100%/0%), I calculated the portfolio's annual standard deviation based on the weightings, correlation, and standard deviations of Netflix and Microsoft.
2. I calculated the expected return for each portfolio weighting.

4.6.2 Formulas

$$\sigma_{portfolio} = \sqrt{w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2 w_1 w_2 \rho_{1,2} \sigma_1 \sigma_2}$$

Figure 3: Formula for portfolio standard deviation

$$\sigma_{portfolio} = \sqrt{w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2 w_1 w_2 \rho_{1,2} \sigma_1 \sigma_2}$$

Figure 4: Formula for portfolio return

4.7 Efficient Frontier Graph

The shape of the efficient frontier graph can be explained by:

Curvature: The curvature in the graph is due to the diversification effect. As we combine two assets with less than perfect correlation, we can achieve better risk-return tradeoffs than simply interpolating between the two individual assets.

Concavity: The graph is concave (bowed outward) because of the risk reduction benefits of diversification. This shape indicates that investors can achieve a better return per unit of risk by combining the assets rather than investing in them individually.

Endpoints: The two endpoints of the curve represent 100% investment in either Netflix or Microsoft. All other points on the curve represent various combinations of the two assets.

Optimal portfolios: Points along the upper edge of the curve represent optimal portfolios that offer the highest expected return for a given level of risk.

The specific shape of your efficient frontier may vary depending on:

- The relative risk and return characteristics of Netflix and Microsoft

- The correlation between the two assets

- The difference in expected returns between the two assets

If the graph shows little curvature (largely linear), it could indicate:

- High correlation between the two assets

- Similar risk-return profiles of the two assets

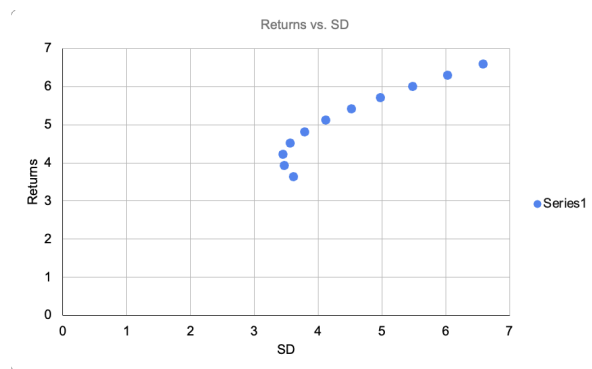- Limited diversification benefits from combining the two assets

Figure 5: Formula for portfolio return

4.8   Conclution

This analysis provides insights into [Your Company]'s stock performance relative to the market and its potential role in a diversified portfolio with Microsoft. The efficient frontier demonstrates the risk-return tradeoffs available to investors when combining these two assets.