

Final Project

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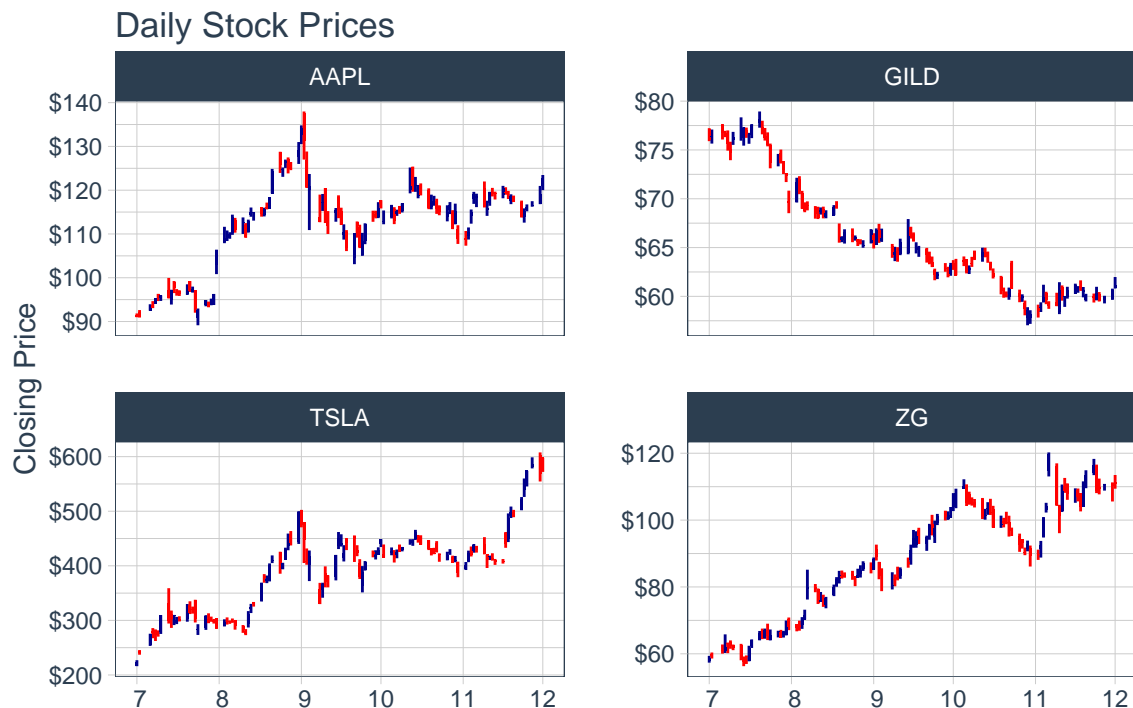
Introduction

In this project, stock selection was based on an article from capital.com website. According to this article, I selected Apple (AAPL), Tesla (TSLA), Gilead (GILD), and Zillow (ZG) stock. For this project, I assumed an initial position of \$250,000 in cash starting on 1 July 2020 and calculated returns on 1 December 2020.

Portfolio

Daily Stock Price

Firstly, I needed to have a look at daily price for each stock. The following is the Candlestick Chart of daily stock price.

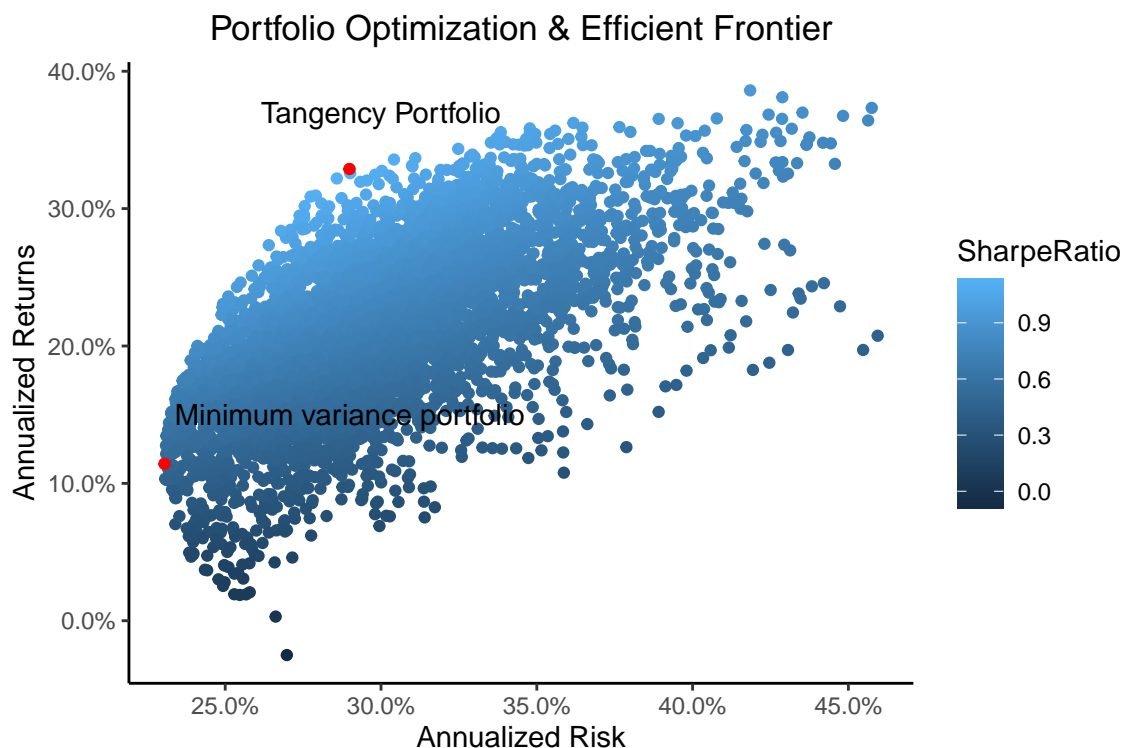


From this plot, we could find that the daily price of Apple, Tesla, and Zillow stock had an upward trend in five months. However, the daily price of Gilead had a downward trend in five months. Therefore, we needed to reduce the weight of Gilead stock in the portfolio.

Portfolio Optimization

Based on modern portfolio theory, investors are risk averse and given a level of risk, they will choose the portfolios that offer the most return. Thus, it is necessary to optimize the portfolio. To perform the optimization, We used historical data from January 1, 2016 to June 30, 2020.

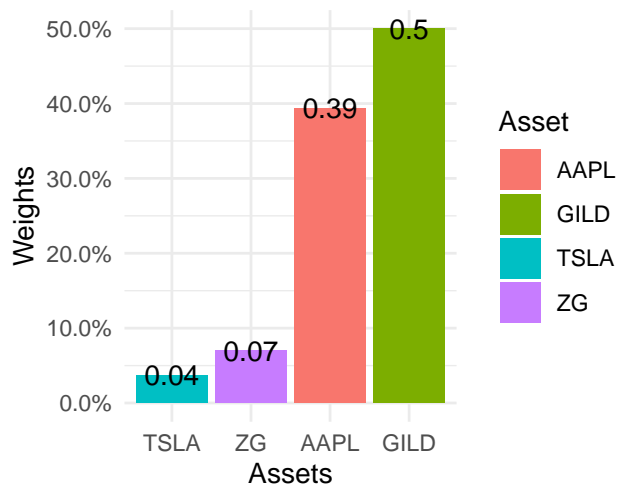
There are two ways to optimize the portfolio. One is the minimum variance portfolio, and the other is the portfolio with highest sharpe ratio (tangency portfolio). Therefore, in order to find these two portfolios, I chose 4000 portfolios with different weights randomly to get the efficient frontier. The following is the result.



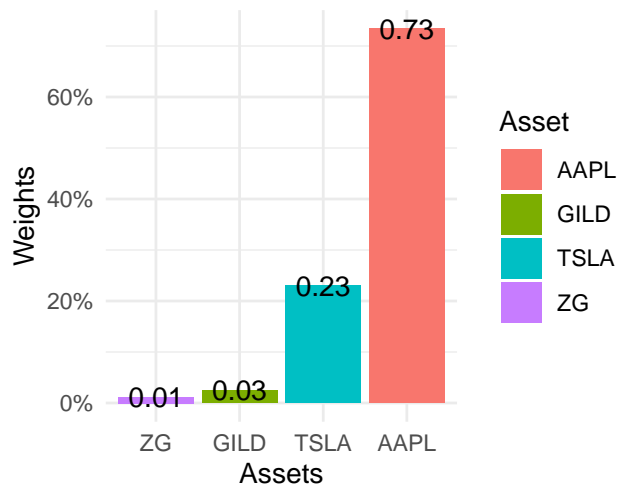
Based on the plot of efficient frontier, we could found that minimum variance portfolio has lower risk and returns than tangency portfolio.

Now, we visualized the the two portfolio to get the weights.

Minimum Variance Portfolio Weights

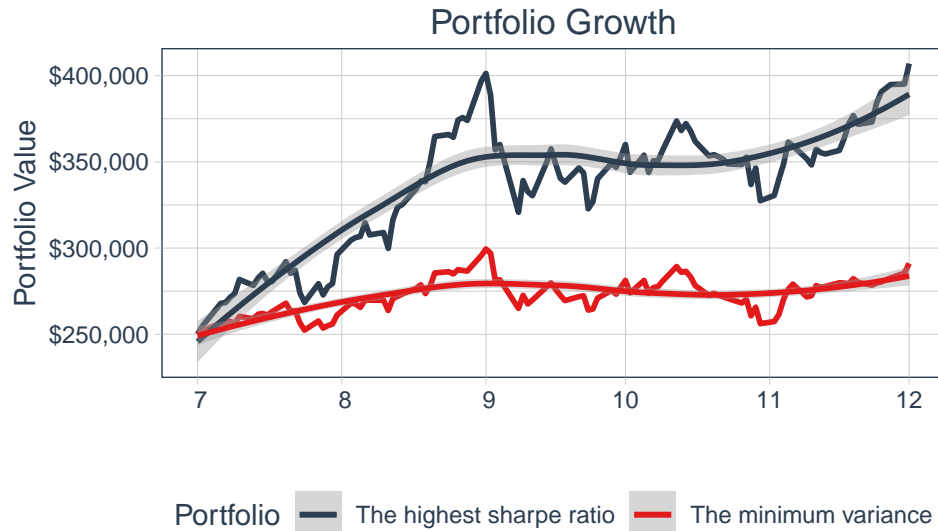


Tangency Portfolio Weights



From the visualization, weights had a big difference between the two portfolios. Minimum variance portfolio was mostly invested in Apple and Gilead stock. However, tangency portfolio was mostly invested in Apple and Tesla stock.

Then, we visualized the returns of the two portfolios from July 1, 2020 to December 1, 2020.



Discussion

As for me, I preferred to choose the portfolio with the highest sharpe ratio which has high risk and high returns. The weights of Apple, Tesla, Gilead, Zillow was 0.73, 0.23, 0.03, 0.01. The final portfolio value was 406954.3 dollars and the return was 156954.3 dollars.

References

1. Capital.com [online]. Available from: <https://capital.com/best-stocks-to-invest-in-right-now> [accessed 10 December 2020]
2. Coding finance [online]. Available from: <https://www.codingfinance.com/post/2018-05-31-portfolio-opt-in-r/> [accessed 10 December 2020]
3. Hadley Wickham (2019). tidyverse: Easily Install and Load the ‘Tidyverse’. R package version 1.3.0. <https://cloud.r-project.org/package=tidyverse>
4. Matt Dancho, Davis Vaughan (2020). tidyquant: Tidy Quantitative Financial Analysis. R package version 1.0.2. <https://cran.r-project.org/web/packages/tidyquant/index.html>