FINANCE AND FINTECH - PROJECT REPORT

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A) Introduction

We have selected Novartis (NYSE: NVS) and Walmart (NYSE: WMT) as the companies for analysis in our project. Let's give a brief overview of these companies, to have a background of the subjects of our analysis.

Novartis is led by CEO Vas Narasimhan, who has been in the role since 2018. With a medical background and extensive experience in strategic operations, Narasimhan focuses on leveraging innovative science and digital technologies to drive the company forward. Novartis is a global healthcare company specializing in pharmaceutical drugs and other healthcare products.

The company has recently undergone some organizational changes to improve its growth and productivity. It has combined its Pharmaceuticals and Oncology business units into an Innovative Medicines business, with a focus on enhancing competitiveness and operational efficiency. These changes are expected to have a significant impact on the company's position in the pharmaceutical market, and it is projected to become the world's leading drug seller by 2024. Furthermore, under the guidance of CEO Vas Narasimhan, Novartis is leveraging digital technologies to streamline drug testing and improve R&D outcomes, which will undoubtedly contribute to the company's success in the long run.

Meanwhile, Walmart is led by CEO Doug McMillon, who has been in the position since 2014. With a career at Walmart spanning several decades, McMillon has emphasized e-commerce and technology investments, expanding the company's operations globally. Walmart is a retail giant offering a wide range of products and is known for its low-price model and extensive physical store presence.

It's worth noting that Walmart had an impressive financial performance in FY24, with a total revenue of $648.1 billion, which is a 6% increase from the previous year. On top of that, the company also increased its annual dividend by 9%, which is the biggest increase in over a decade and a demonstration of their 51 consecutive years of dividend growth. Looking forward, Walmart plans to expand its store network significantly over the next five years by building or converting more than 150 stores and remodeling 650 existing ones. This growth strategy is expected to create numerous job opportunities and further enhance customer service across all its locations.

Both companies are leaders in their respective industries and have adapted to changes in the global market landscape through strategic initiatives and strong leadership.

B) Stock Valuation

As an investor, it is important to understand the true value of a company's shares. This process is known as stock valuation, and it helps you determine whether a stock is overpriced, underpriced, or fairly valued.

In this project, stock valuation has been performed with three different methods: by comparables and the Dividend Discount Model (DDM). Each approach provides a unique perspective on the stock's potential worth, giving a comprehensive understanding of its value. Comparables involve comparing the company's financial ratios to those of similar companies. DDM evaluates the present value of expected future dividends and helps us understand the stock's potential for generating income for investors.

First of all, the stock valuation by comparables was performed using the Average P/E Ratio method and the Average P/B Ratio method, using the formulas:

$$Stock_{P/E} = EPS \times Avg(\frac{P}{E} ratio) \qquad \text{and} \qquad Stock_{P/B} = EPS \times Avg(\frac{P}{B} ratio)$$

*forwardPE and forwardEPS were used for the calculations

Novartis' chosen comparables are Sanofi, AstraZeneca, GSK, and Merck & Co. Its estimated stock value based on Average P/E Ratio was 89.98$, which turned out to be more accurate than the P/B Ratio formula that computed a stock value of 120.04$. The excessiveness in this number can be justified by Novartis' elevated book value, but also by the differences between the comparables' price to book. For example, Sanofi has a price to book of 0.8, while for GSK it amounts to 12.5.

Moving on to Walmart, for comparables we chose Target, Costco, Dollar General, and Johnson & Johnson. The estimated stock value based on Average P/E Ratio was 51.14$, which, also in this case, was a more precise method compared to the P/B Ratio, that outputted an estimated stock value of 80.81$.

Next, we assessed the Dividend Discount Model (DDM) for the stock valuation. We started by finding all the necessary elements: r, which is the CAPM, calculated by doing:

CAPM= Risk-Free Rate of Return + Beta(Market Rate of Return - Risk-Free Rate of Return)*

As Risk-Free Rate of Return we used the US10Y Treasury rate, which was 4.351%, and the market Risk Premium was taken from Aswath Damodaran, which is 4.60% for the United States. The CAPM resulted to be 6.495%. Following, we calculated g. How did we do that?

$$g = Annual\ Inflation\ Rate + Real\ Growth\ Rate$$

The US annual inflation rate is 3.1%, however, we will use 2% as it is the goal for all economies. Following, we chose the Real Growth rate. We kept the choice in an interval between 0% and 3%, in order to avoid a "logical absurd" situation.

Choosing a 0.5% real growth rate for Novartis is a wise decision for mainly two reasons:

- This low growth rate shows that we're being careful, especially if there are uncertainties in the economy or challenges the company might face.
- The pharmaceutical industry can be unpredictable because of changes in government regulations and health policies. A 0.5% real growth rate takes into account these potential ups and downs.

Hence, Novartis' growth rate will be 2.5%. The company's 2024 DPS is 3.7836. Now that we have everthing we need, we apply the formula:

$$DDM = \frac{3.7836}{6.5\% - 2.5\%} = 98.62$$

This method resulted extremely precise for Novartis. However, it isn't really the case for Walmart. We calculated the same elements, the CAPM is 6.6234%, and for the growth rate, we chose a real growth rate of 3% for several reasons:

- Walmart has a history of consistent dividend payments and gradual increases, indicating a stable growth strategy. The dividends show an increase from 0.76$, to 1.16$ over a period of four years, suggesting a growth orientation.

- Walmart is a leading global retail corporation with a diversified business model. Its broad market presence and adaptability contribute to its resilience and steady growth, supporting a reasonable assumption of continuous dividend growth.
- Consider Walmart's potential for growth in both domestic and international markets, as well as its investment in e-commerce and technological innovations.

After applying all the elements to the DDM formula, the output was 46.84$, slightly lower than Walmart's actual stock value.

C) Bond Valuation

To perform the Bond Valuation, we used Bloomberg to see if the companies had any bonds, and, if so, which ones we could take. For Novartis, we chose a bond issued in 2015, with maturity 2035, so the remaining period to maturity is 11 years. Notice that this bond has been issued in Novartis' domestic market, which is in Switzerland, so the currency is not dollars but CHF. The bond has a coupon rate of 1.05% and an AA- rating, which means it has a very good credit quality. This bond also has a credit spread of 0.82%. To calculate the Yield to Maturity (YTM) of this bond, we need to consider the yield of the Swiss 10-year government bond, which is currently at 0.703%. By adding this base yield to the bond's credit spread, we can determine the YTM. So, the YTM for this Novartis bond is 1.523%. Now, the discount factor is 1.01523 and the outputted estimated bond price is:

$$\frac{1.05}{1+1.523\%}+\frac{1.05}{(1+1.523\%)^2}+\cdots+\frac{101.05}{(1+1.523\%)^{11}}=95.24CHF$$

*actual price: 96.548CHF

For Walmart, we chose a bond issuing in 2023, with maturity in 2033. The bond is semianually compounded, with an annual coupon of 4.1, and a rating of AA. The YTM was calculated in the same as before, of course by taking the US10Y Treasury rate (4.645%) and summing it to a spread of 0.83%, which amounts to a YTM of 5.475%

$$\frac{2.05}{(1+5.475\%)^{1/2}}+\frac{2.05}{(1+5.475\%)^{1}}+\cdots+\frac{102.05}{(1+5.475\%)^{9}}=90.82\$$

*actual price: 95.249$

The price here is slightly lower than the actual one, because the actual YTM is lower than the one we calculated.

D) Beta calculation

Now, we will compute the betas of the firms based on the last 5 years series of stock prices. For both Novartis and Walmart, we chose S&P 500 as stock market index.

$$\beta=\frac{Covariance\ (Stock\ Returns, Market\ Returns)}{Variance\ (Market\ Returns)}$$

Novartis received a beta of approximately 0.45, and Walmart 0.49. These values indicates that both stocks are considerably less volatile than the broader market, particularly the index it's compared against. This means that Novartis and Walmart exhibit lower risk compared to the general market. In other words, the stock's price movements are not as pronounced during market swings, making it a potentially safer investment during volatile periods.

E) Capital Structure and Weighted Average Cost of Capital (WACC)

When a company wants to raise money for its operations and growth, it can either borrow money (debt) or sell ownership shares (equity) to investors. The way a company chooses to combine debt and equity is called its "capital structure." Choosing the right capital structure is important because it affects the company's financial risk, flexibility, and overall cost of raising money. The cost of capital, for example, is an important factor to consider. This cost is the amount of money a company pays to its lenders or shareholders in return for their investment. Companies want to minimize this cost, and they do so by balancing the cost of debt (interest payments) with the cost of equity (dividends and potential dilution of share value). Hence, we calculated the WACC (Weighted Average Cost of Capital):

$$WACC = \frac{MARKET\ CAP}{FIRM\ VALUE} \times COST\ OF\ EQUITY + \frac{NET\ DEBT}{FIRM\ VALUE} \times COST\ OF\ DEBT$$

Let's analyze each component of this formula and understand its importance:

- Market Cap (Market Capitalization): This represents the total value of a company's equity, calculated as the current stock price multiplied by the total number of outstanding shares. It's 206717.2$ for Novartis and 443641.17$ for Walmart
- Net Debt: It is the sum of all debts a company owes (short-term and long-term) minus its cash and cash equivalents. Net Debt is used instead of total debt to account for liquid assets that can be used to pay down debt immediately. For Novartis, the Net Debt is 12275$, and 51454$ for Walmart
- Firm Value: It is the sum of the Market Capitalization and the Net Debt, representing the total market value of both debt and equity financing of the company. For Novartis, the outputted Firm Value amounts to 218992,2$, while it's 495095.17$ for Walmart
- Cost of Equity (Re): The return rate that equity investors expect to receive on their investment. We estimated it using by Capital Asset Pricing Model (CAPM) model. We obtained 7.4% for Novartis and 8% for Walmart.
- Cost of Debt (Rd): The effective rate that a company pays on its borrowed funds. We calculated it by dividing the interest expense by the total debt. For Novartis' Rd equals 3.25%, while for Walmart it's 4.375%

With all of this information, we can calculate the WACC. We first calculated it without including taxes, which amounted to 7.18% for Novartis and 7.63% for Walmart, and then we considered taxes, 7.179% and 7.6198%, respectively.

F) Portfolios

On the next part of the project, we will talk about portfolios. A portfolio is a collection of investments that an investor puts together to achieve a specific investment goal. The idea is to find the right balance between risk and return based on how much risk you're willing to take, how long you want to invest for, and what your goals are.

The first thing that we did was computing the Correlation Matrix. A correlation of 0.34 between NVS and WMT suggests a moderate positive correlation. This means that while the two stocks tend to move in the same direction, the relationship is not very strong. They do not perfectly track each other, but there is some relationship in their movements.

Following, we started by performing the Maximum Sharpe Ratio Portfolio Allocation. This portfolio strategy aims to maximize the Sharpe Ratio, which essentially selects a combination of investments that give you the highest possible return for the least amount of risk. In this case, we can see that the allocation suggets investing 14.37% in Novartis and 85.63% in Walmart to achieve an expected annualized return of 15% with a corresponding volatility (risk level) of 20%. Notice how Novartis has a relatively small allocation, this is due to a lower expected return or a less favorable risk-adjusted return

compared to Walmart. Walmart, on the other hand, has a much larger allocation, suggesting that it contributes more positively to the portfolio's risk-adjusted return, justifying its dominance in the portfolio.

We then moved on to computing the Minimum Volatility Portfolio Allocation: The strategy here focuses on minimizing risk, irrespective of the return. It seeks to construct a portfolio with the lowest possible volatility, which is ideal for risk-averse investors. This allocation recommends putting 56.25% in NVS and 43.75% in WMT, aiming for a lower expected annualized return of 12% but also with reduced volatility of 17%. This portfolio might not have the highest returns, but it's structured to fluctuate less in value, aiming to preserve capital and minimize potential losses. In this case, Novartis has the majority allocation, implying that it contributes to a lower overall portfolio volatility, which is the goal of this portfolio. Walmart's allocation is less than Novartis', which may suggest that while it still plays a significant role, it potentially contributes to higher volatility.

After that, we computed the 50/50 Portfolio. It provides an equal-weighted investment strategy where both Novartis (NVS) and Walmart (WMT) make up half of the portfolio each. This type of portfolio does not optimize based on historical performance or projected risk and return but instead assumes that a balanced approach will yield favorable results.

- Expected Annual Return: The portfolio has an expected annual return of 12.38%. This is a blended return that reflects the average performance of the two stocks, given that the portfolio is equally split between them.
- Annual Volatility: The portfolio's annual volatility is 17.37%. It reflects the portfolio's overall risk as measured by the standard deviation of its returns. Given that both stocks are equally weighted, the volatility of the portfolio would fall between the volatilities of the individual stocks if they were not correlated. However, with a correlation of 0.34, the combined volatility of the portfolio is likely to be less than the average volatility of NVS and WMT individually. This is because the less-than-perfect correlation means that price movements in NVS are only partially matched by price movements in WMT, leading to less overall fluctuation in the portfolio value.

Novartis' Annual Return amounted to 8.41%, which is lower than Walmart's return, which is 16:35%. This suggests that Novartis, as a standalone investment, would contribute to a lower portfolio return compared to Walmart. Novartis' Volatility resulted in 20.31%, indicating that Novartis is a slightly less volatile stock than Walmart, which has a volatility of 22.06%. While this might be beneficial for reducing the portfolio's overall risk, it also comes with a trade-off of lower returns. This portfolio balances the lower return and slightly lower volatility of NVS with the higher return and higher volatility of WMT.

Now, let's talk about the optimal portfolio. An optimal portfolio is the ideal combination of risk and return that aligns with your financial goals and risk tolerance. To create such a portfolio, you need to consider diversification, which means investing your money in different types of assets to reduce the risk of losing all your money in case one type of asset performs poorly. The mix of assets in your portfolio depends on factors like your investment goals, time horizon, and risk. The computed optimal portfolio reached an expected annual return of 14.55%, and a volatility of 19.54%. The Portfolio allocation is approximately 19.04% in Novartis and 80.96% in Walmart.

G) Dividend Policy: Value or Growth firms?

One of the most important parts of a company's financial strategy is its dividend policy. It identifies whether profits are shared with owners or plowed back into the business for future growth. By looking at dividend payment procedures, we can tell companies' financial health, stability, and growth priorities in terms of shareholder return.

We will evaluate our firms' dividend policies under trends in past earnings, dividend yield ratio, payout ratio, and growth rate. The goal is to determine whether companies are either Value or Growth.

We found the payout ratio and yield on Yahoo Finance, and we computed the Dividend Compound Annual Growth Rate (CAGR) using the following formula:

$$CAGR = \left(\frac{Ending\ Value}{Beginning\ Value}\right)^{\frac{1}{Number\ of\ Years}} - 1$$

The yearly growth rate of Novartis's Dividends is 3.14% which represents a steady growth in cash outlays that are made to the shareholders by the company over time which do not endanger financial security. This percentage implies that there can be sustainable and predictable increases in dividends paid out by Novartis, making it attractive for those who have long-term investments as they value incremental income streams too. Additionally, this shows effective management of cash flow by a firm like Novartis because enough liquid resources are always available for both business operations and dividend payment needs.

The Yield of Novartis of 3.97% offers significant appeal for investors looking for stable income in sectors such as healthcare. While some companies may use high yields as screens for poor financial health or unsustainable dividends, in Novartis's case, it reflects the company's strong financial health and its capability to generate ample cash flows to support its dividends. Maintaining such a yield indicates that Novartis strategically prioritizes steady returns to shareholders.

At present, the payout ratio of Novartis is 85.33%. This means that most gains are returned to shareholders. This underscores Novartis's role as a dependable income-generating asset. As a matter of fact, in 2023 was announced that Novartis raised its profit outlook and announced plans to buy back as much as $15 billion in shares as it prepares to spin off its Sandoz generics unit. Forcing yourself into keeping payouts at levels like these calls for prudent financial planning aimed at ensuring that enough cash remains available for essential capital expenditures and running costs. Although it may appear desirable for people looking forward to earning more from dividends only, this can also raise doubts about sustainability and reinvesting in growth by retaining many earnings.

The Dividends Compound Annual Growth Rate of Walmart is 11.15%, which suggests an aggressive strategy for increasing dividend payments. This shows that not only does Walmart sustain its dividends but also raises them by large percentages reflecting strong financial position and profitability. Such an enormous increase in dividends each year is very interesting to investors who want income growth. To control this growth, strategic financial management planning is required while balancing between reinvestment for expansion of its operations and improvement of share value appreciation.

Walmart's forward-looking yield is 1.38%. This figure is important in terms of understanding anticipated dividends over the next year relative to stock prices. A yield of 1.38% is considered small but represents Walmart's attempt at balancing payouts against reinvestment into the business. The yield might attract those investors who seek higher capital gains through price increases instead of getting substantial income from dividends.

At the end Walmart pays out 39.79% of its earnings as dividends, suggesting that the business has a strong liquidity position and can afford to return cash to shareholders regularly without sacrificing its ability to finance internal initiatives or respond quickly to shifts in the market. The payout ratio of Walmart suggests a good balance between immediate income generation and long-term capital appreciation. So, Walmart not only pays steady high dividends, but it also enact frequent stock buyback to compensate its shareholders and signal a positive message to the market. the activity decreased during the pandemic (2020) but became increased again after the condition of the market improved.

*Annex

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Calculating estimated price for NVS based on forwardPE:

forwardPE for each company:
SNY: forwardPE = 9.914761
AZN: forwardPE = 13.810916
GSK: forwardPE = 9.184856
MRK: forwardPE = 12.907426
Average forwardPE: 11.45448975
NVS forwardEps: 7.85
Estimated Price based on Average forwardPE: 89.9177445375

Calculating estimated price for NVS based on priceToBook:

priceToBook for each company:
SNY: priceToBook = 0.80601
AZN: priceToBook = 2.8058295
GSK: priceToBook = 12.534955
MRK: priceToBook = 8.546986
Average priceToBook: 6.173445125
NVS bookValue: 19.445
Estimated Price based on Average priceToBook: 120.04264045562499
```

Year	Novartis' Dividends
FY 2024 Est	3.7836
FY 2025 Est	3.9373
FY 2026 Est	4.1025
FY 2027 Est	4.1518

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Calculating estimated price for WMT based on forwardPE:

forwardPE for each company:
TGT: forwardPE = 15.858095
COST: forwardPE = 41.48565
DG: forwardPE = 17.27966
JNJ: forwardPE = 14.492249
Average forwardPE: 22.278913499999998
WMT forwardEps: 2.43
Estimated Price based on Average forwardPE: 54.137759805

Calculating estimated price for WMT based on priceToBook:

priceToBook for each company:
TGT: priceToBook = 5.723173
COST: priceToBook = 15.44056
DG: priceToBook = 4.6454024
JNJ: priceToBook = 5.234495
Average priceToBook: 7.7609076
WMT bookValue: 10.412
Estimated Price based on Average priceToBook: 80.80656993120002
```
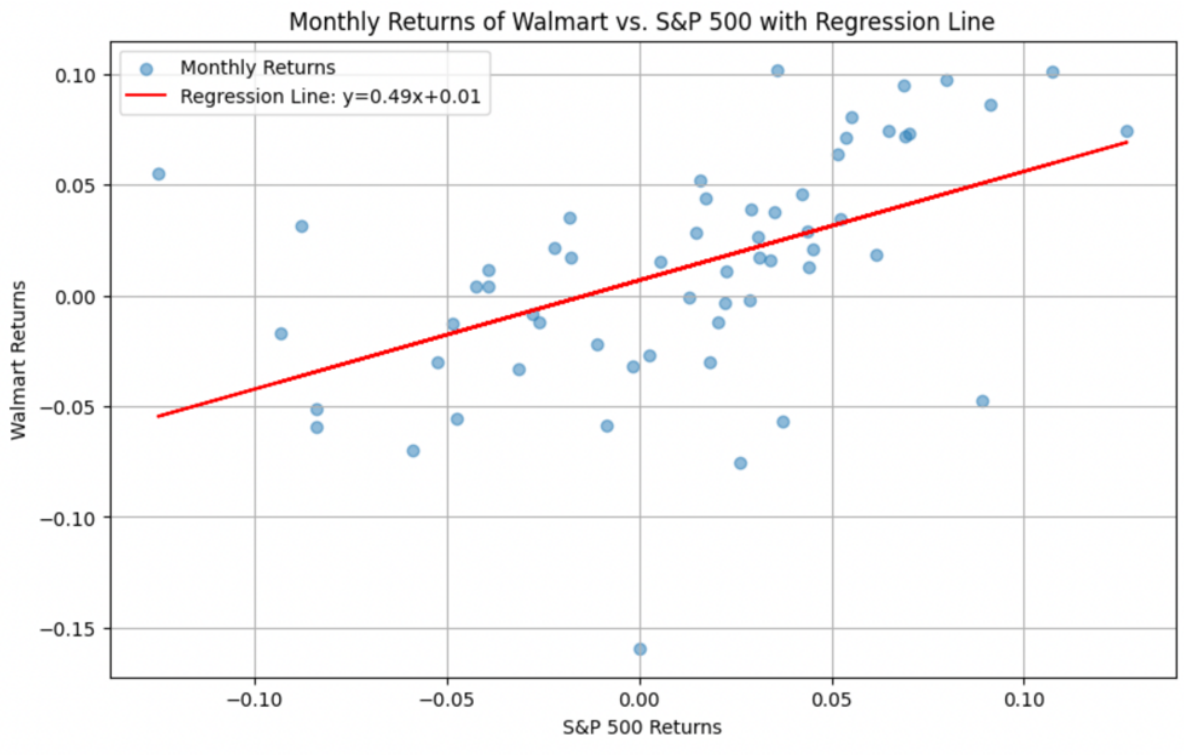

Year	Walmart's Dividends
FY 2024 Act	0.760000
FY 2025 Est	0.822222
FY 2026 Est	0.906190
FY 2027 Est	0.924615
FY 2028 Est	1.160000



Ticker	NVS	WMT
Date		
2019-04-01	70.494492	30.065102
2019-04-02	69.883156	29.794632
2019-04-03	69.942085	29.871475
2019-04-04	69.397034	30.154232
2019-04-05	69.227638	30.375530
...	...	...
2024-03-22	96.230003	60.869999
2024-03-25	95.730003	60.570000
2024-03-26	95.269997	60.509998
2024-03-27	95.879997	60.720001
2024-03-28	96.730003	60.169998

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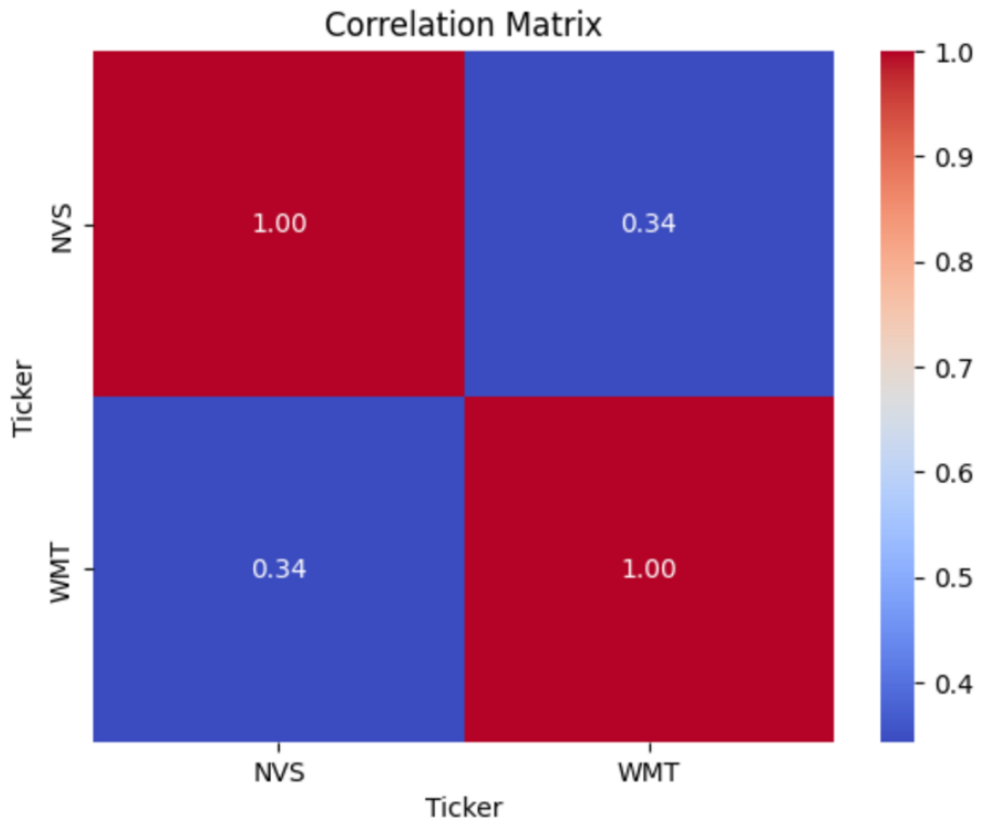


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Maximum Sharpe Ratio Portfolio Allocation

Annualized Return: 0.15
Annualized Volatility: 0.2


        allocation
Ticker
NVS          14.37
WMT          85.63
----------------------------------------
Minimum Volatility Portfolio Allocation

Annualized Return: 0.12
Annualized Volatility: 0.17


        allocation
Ticker
NVS          56.26
WMT          43.74
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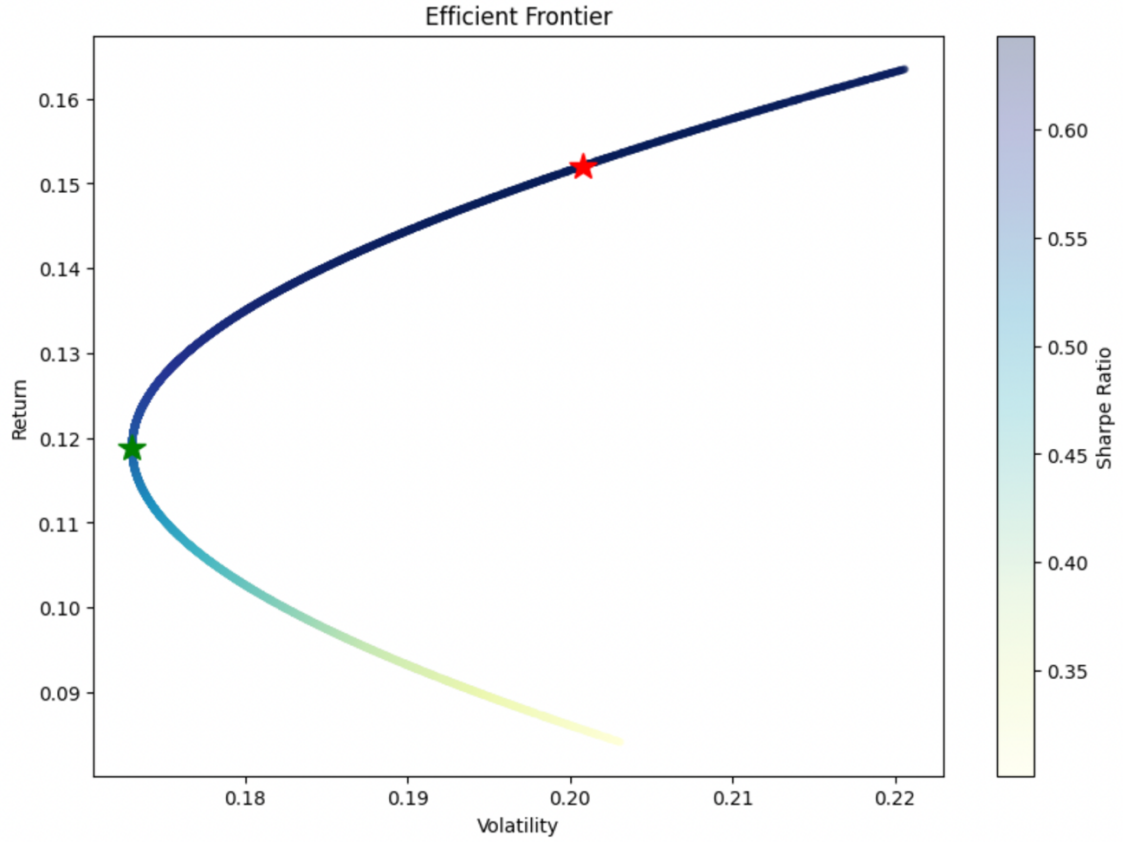

```
Ticker
NVS    0.000334
WMT    0.000649
dtype: float64
Expected annual return of the 50/50 portfolio: 0.1238
Annual volatility of the 50/50 portfolio: 0.1737
        Annual Return  Volatility
Ticker
NVS          0.084095    0.203148
WMT          0.163476    0.220608
```

```
The optimal portfolio return is: 0.14553449110875027
The optimal portfolio volatility is: 0.19535138864510562
Portfolio Allocation with the Highest Sharpe Ratio: {'NVS': 0.19042650414315138, 'WMT': 0.8095734958568487}
```