

Finance and Risk Analytics

A Case study on Investor's Portfolio

Objectives

- Assess the financial goals and risk tolerance of two investors to develop personalized investment strategies aligned with their individual requirements.
- Analyze the current portfolio of stocks to identify opportunities for optimizing returns while managing risks according to each investor's preferences.
- Provide tailored investment recommendations by selecting suitable stocks, asset allocations, and strategies to meet the long-term financial objectives of both investors independently.

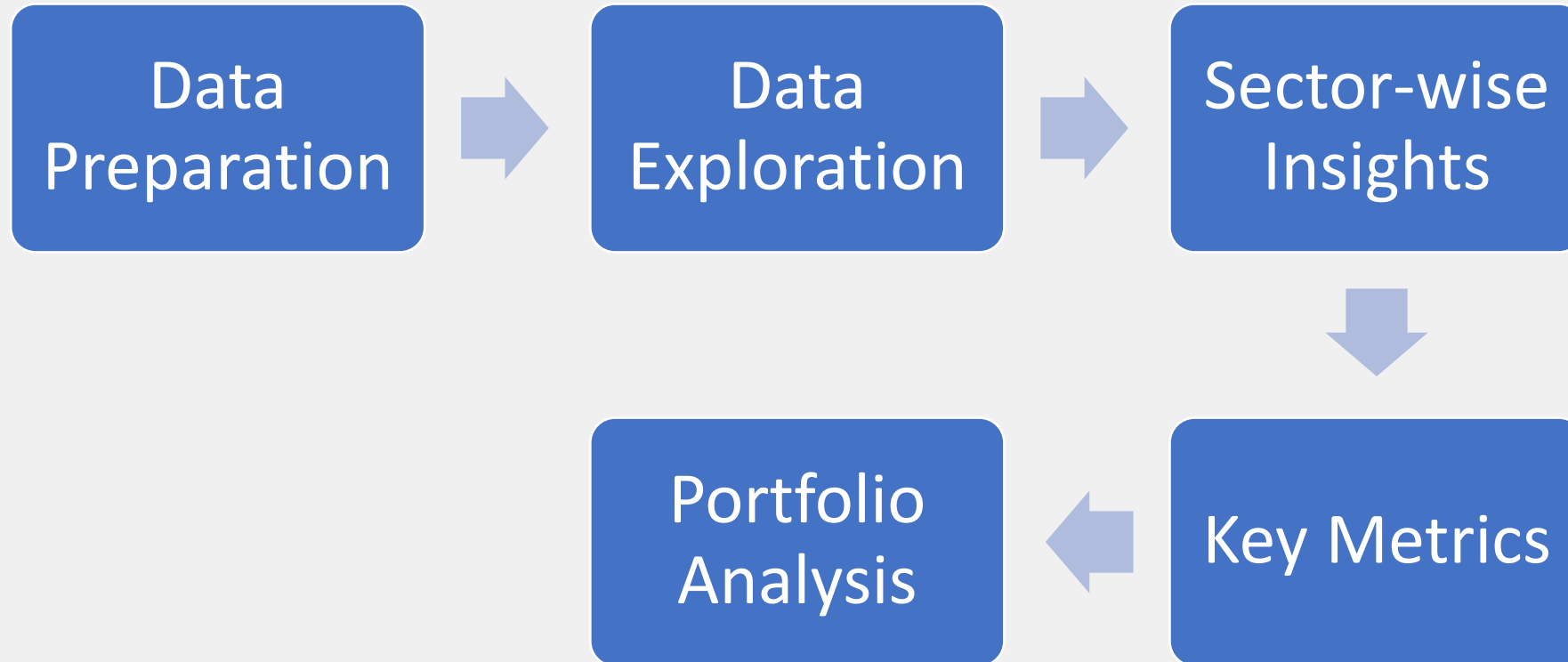
Problem Scenario

Conservative Investor – Mr. Patrick Jyengar

1. Initial investment: 500k
2. Risk : Low
3. Term: 5 years
4. Goal: Steady returns

Aggressive Investor – Mr. Peter Jyenger

1. Initial investment: 1 million
2. Risk : High
3. Term: 5 years
4. Goal: High returns



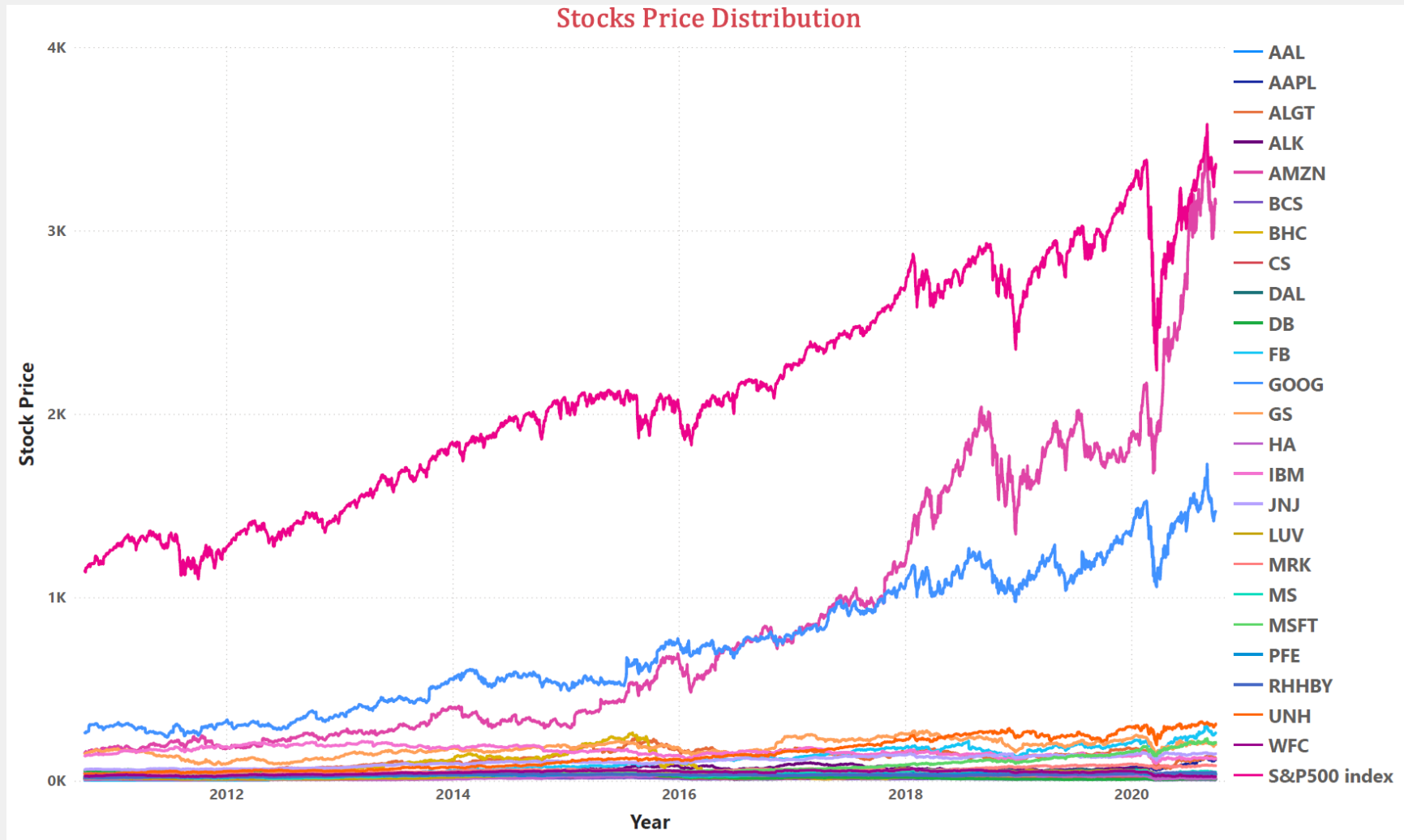
Data Preparation

Data Cleaning:

- Missing/Null values were identified and addressed by imputing them with zero.
- Converted the 'Date' column to the appropriate Date time format

Data Exploration

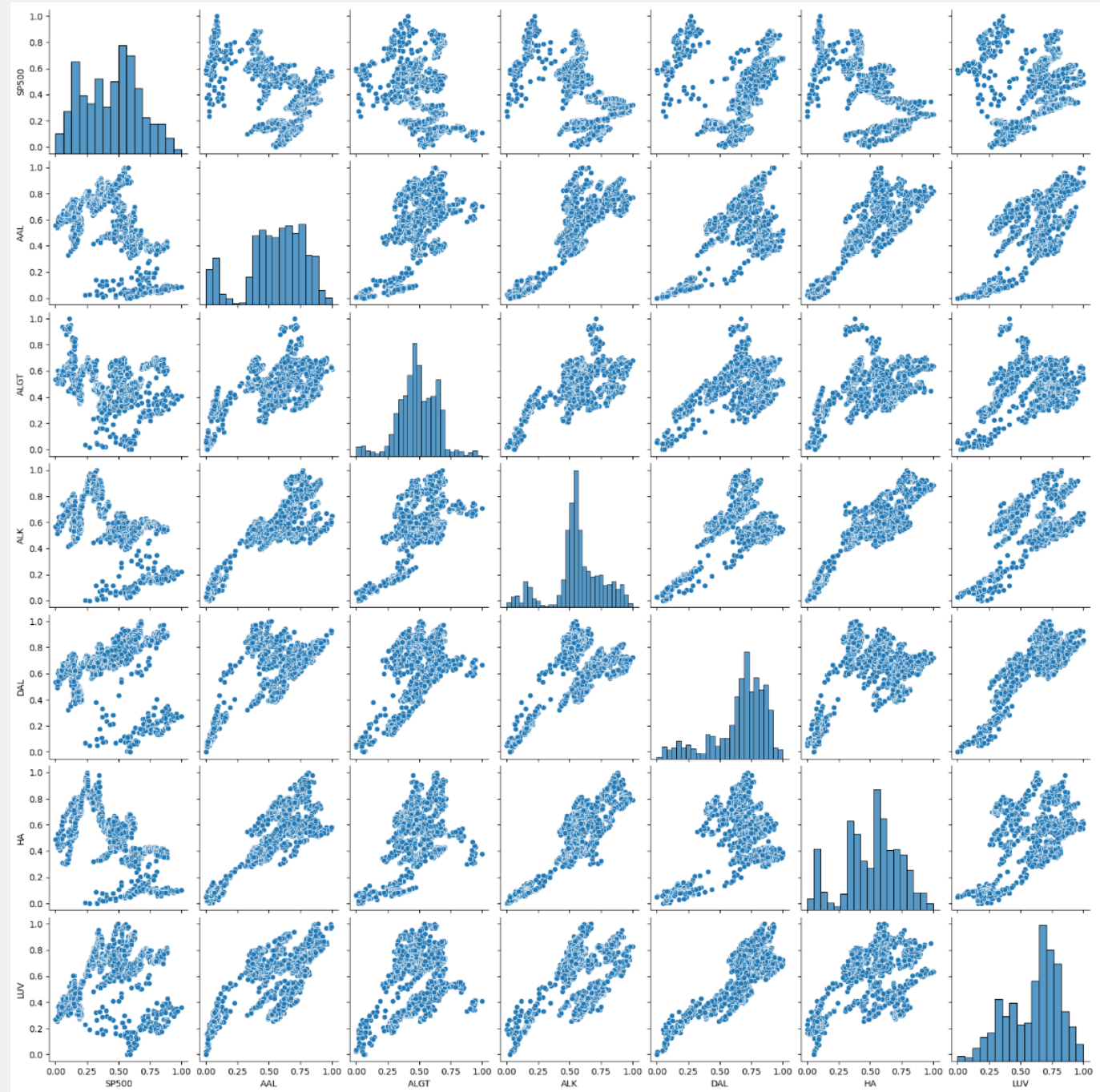
Created a Power BI dashboard for Visualizing the Stock Price distribution of all stocks [Stock Analysis.pbix](#)



Sector wise Insights

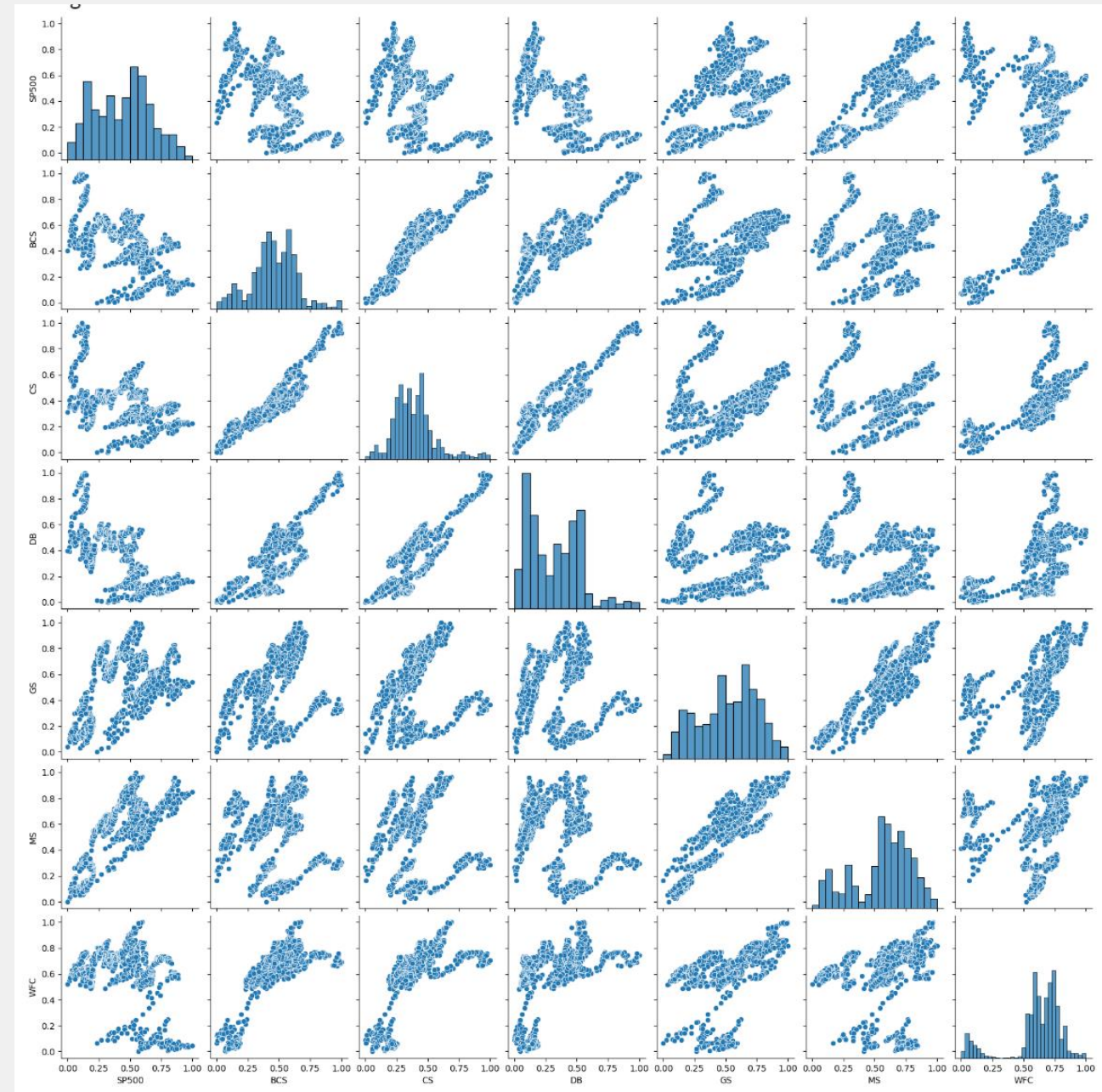
Aviation Sector

- S&P500 Market index shows a moderate positive correlation with Airlines stocks as most scatterplot shows upward trend, but not as strongly as the stocks influence each other within the aviation sector.
- American Airlines(AAL) shows strong positive correlation with the other Airlines particularly ALGT.
- Delta Airlines(DAL) shows a strong correlation with other airlines such as LUV, HA, and ALGT.
- The airlines in the plot are highly correlated, reflecting similar responses to market or industry trends.



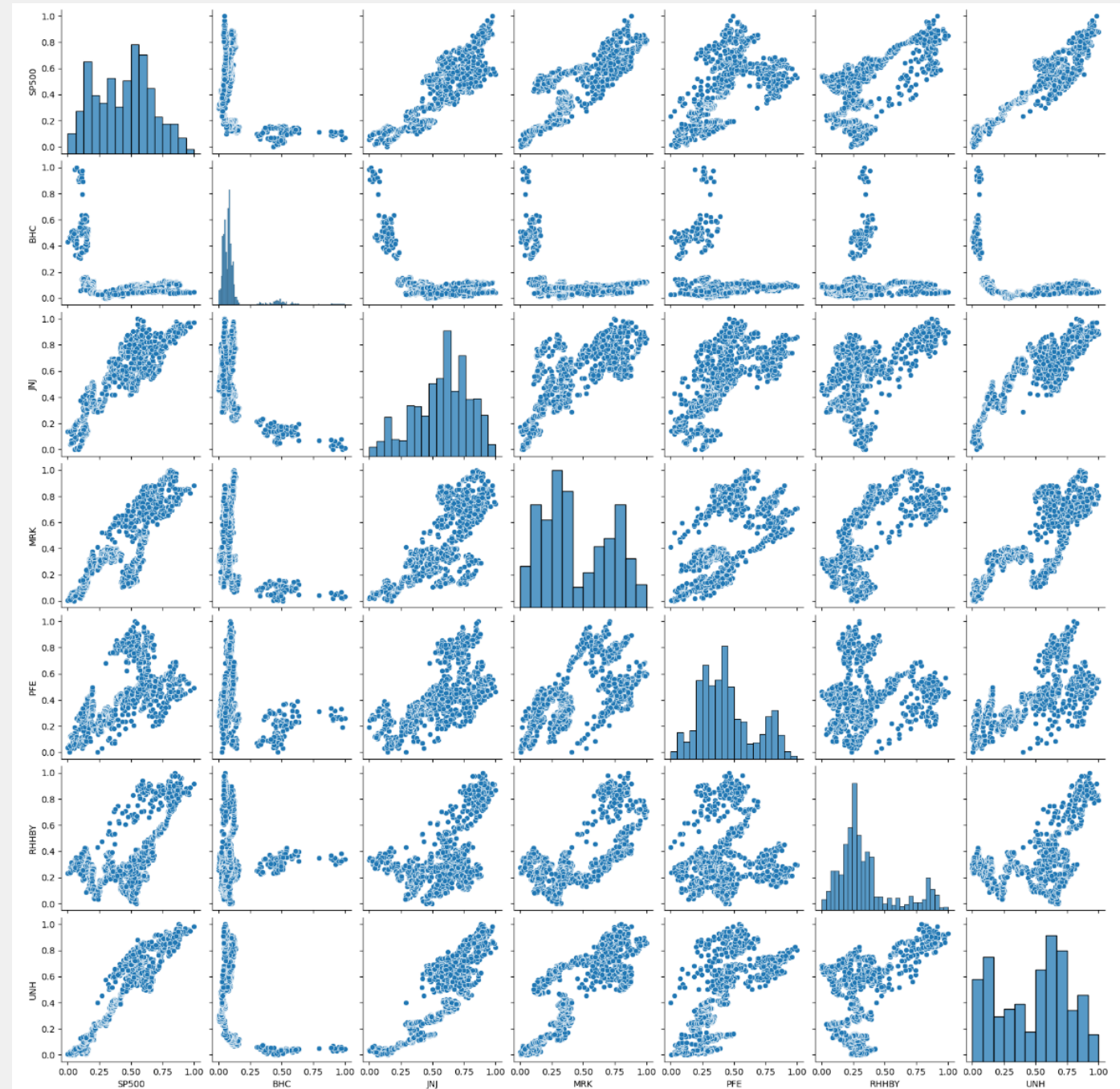
Finance Sector

- Strong Correlation: SP500, GS, and MS move closely together, indicating synchronized price movements.
- Moderate to Weak Correlation: BCS and DB show scattered relationships, reflecting more independent behaviors.
- Distribution: WFC has a focused price range, while SP500 and GS show broader volatility.
- In summary: SP500, GS, and MS are correlated, while BCS and DB offer more diversification potential.



Healthcare Sector

- **SP500 Correlation:** Several stocks strongly correlate with the SP500, aligning their performance with market trends.
- **Independent Stocks:** BHC and RHHBY show weaker correlations, indicating more independent behavior from the broader market.
- **Clustering vs. Volatility:** UNH and PFE exhibit clustering, signaling stability, while others display wider spreads, suggesting higher volatility.
- **Diversification Potential:** The varying stock relationships highlight opportunities for portfolio diversification.

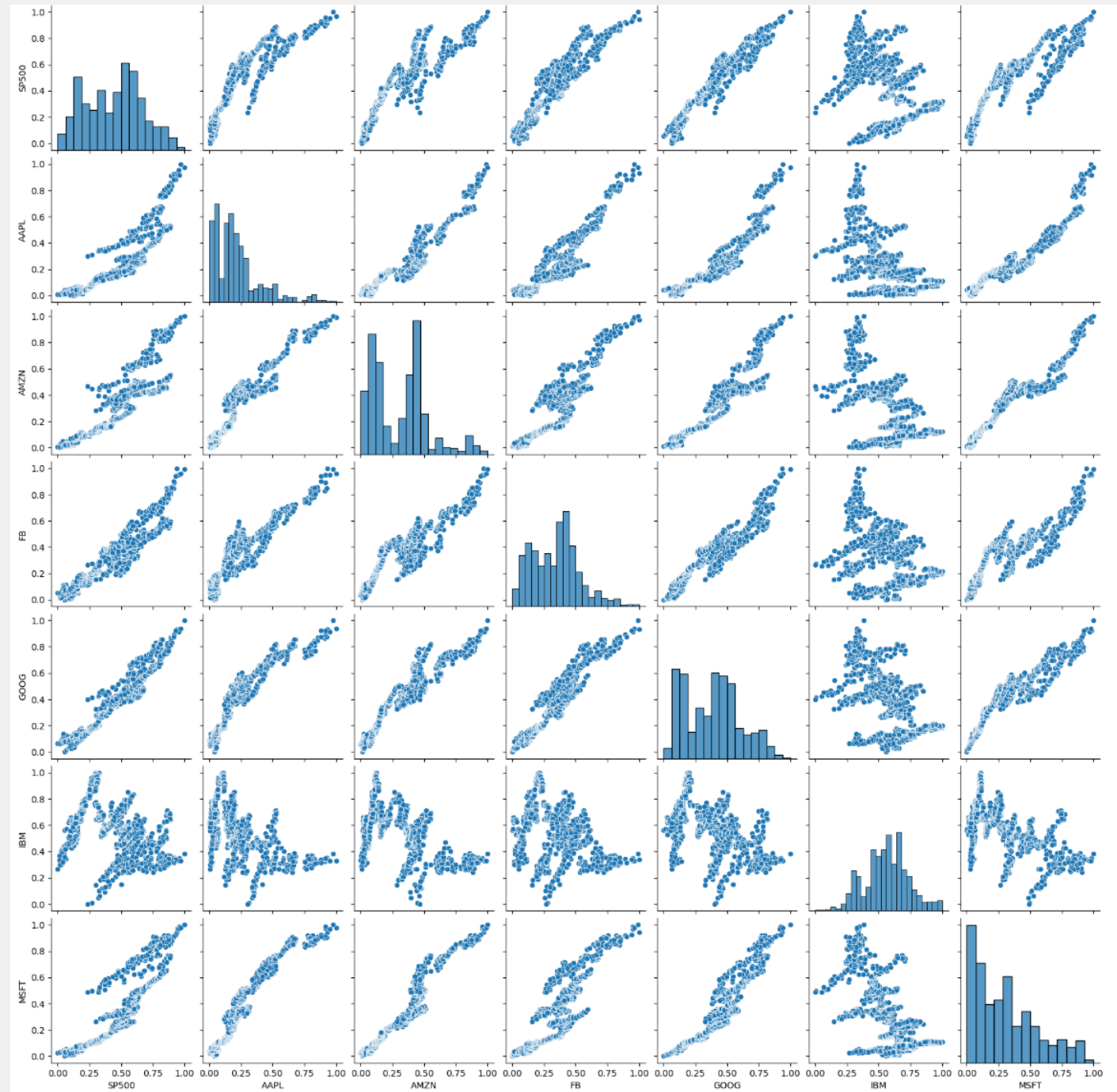


Technology Sector

•**High Correlation:** SP500 & AAPL, SP500 & FB, AAPL & AMZN, and GOOG & MSFT all show strong linear relationships, indicating these stocks tend to move together.

•**Moderate Correlation:** AMZN & FB, AAPL & GOOG, and FB & IBM pairs show moderate clustering, suggesting some level of co-movement but not as strong as the above pairs.

•**Low Correlation:** IBM & MSFT and GOOG & IBM have more scattered points, indicating weaker correlations.



Key Metrics

Stock Price Dispersion from Mean using Histogram Plots

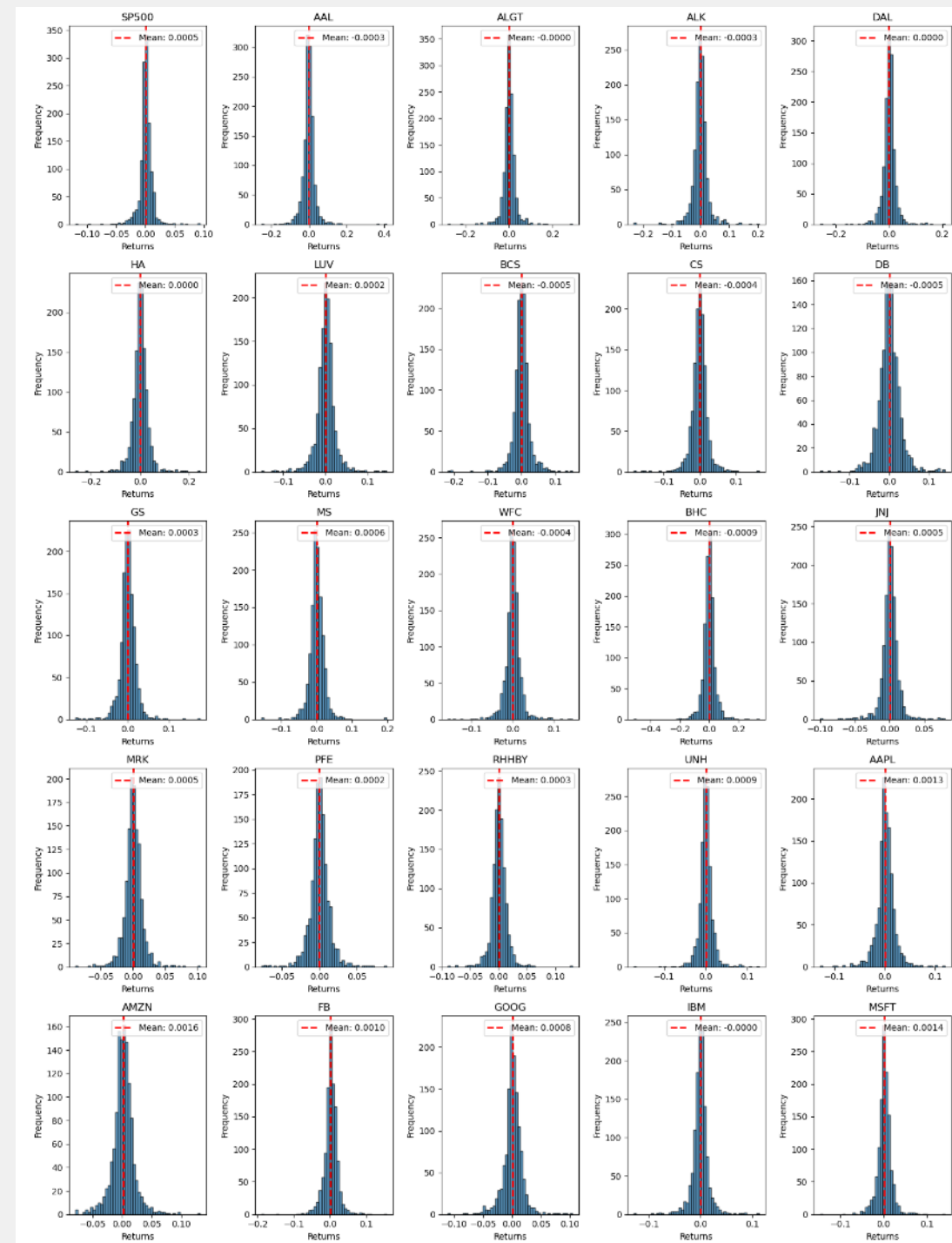
S&P 500 - Small, stable returns with a mean centered around 0.0005 indicating low volatility.

Aviation sector - Negative or near-zero means, suggesting weak performance and low volatility.

Finance sector - Negative and slightly positive mean returns, showing consistent underperformance with limited volatility.

Healthcare sector - Mostly positive means, with consistent performance. JNJ and UNH show stronger stability.

Technology sector - Strong positive mean returns, with tech leaders like AMZN, AAPL, and MSFT standing out with higher performance.



Cumulative Returns

- AMZN, MSFT, and AAPL show the highest cumulative returns, indicating strong performance over the period.
- BHC, AAL, and DB have the most significant negative returns, reflecting poor performance and substantial losses.

Cumulative returns	
AMZN	504.687770
MSFT	371.486208
AAPL	322.741369
FB	187.960421
UNH	167.361278
GOOG	140.409630
SP500	74.808459

CS	-58.613533
BCS	-66.622252
DB	-68.325792
AAL	-68.647960
BHC	-91.347439

Annualized returns, Annualized risk and Sharpe ratio

	Average daily returns	Risk	Min	Max	Annualized_returns	Annualized_risk	Sharpe_ratio
SP500	0.000517	0.012080	-0.119841	0.093828	0.130407	0.191765	0.640923
AAL	-0.000336	0.034725	-0.252246	0.410970	-0.084701	0.551240	-0.167260
ALGT	-0.000047	0.029101	-0.283300	0.292428	-0.011863	0.461962	-0.041916
ALK	-0.000256	0.026907	-0.232385	0.203079	-0.064446	0.427134	-0.168439
DAL	0.000042	0.026478	-0.259924	0.210171	0.010536	0.420326	0.007222
HA	0.000034	0.033132	-0.264971	0.245837	0.008629	0.525950	0.002146
LUV	0.000245	0.022913	-0.151094	0.144441	0.061638	0.363737	0.148839
BCS	-0.000548	0.025119	-0.218519	0.151042	-0.138190	0.398747	-0.365370

Annualized Returns

Positive Values such as AMZN at 40.59% and AAPL at 33.32% indicate expected gains, while BHC at -22.60% suggest potential losses.

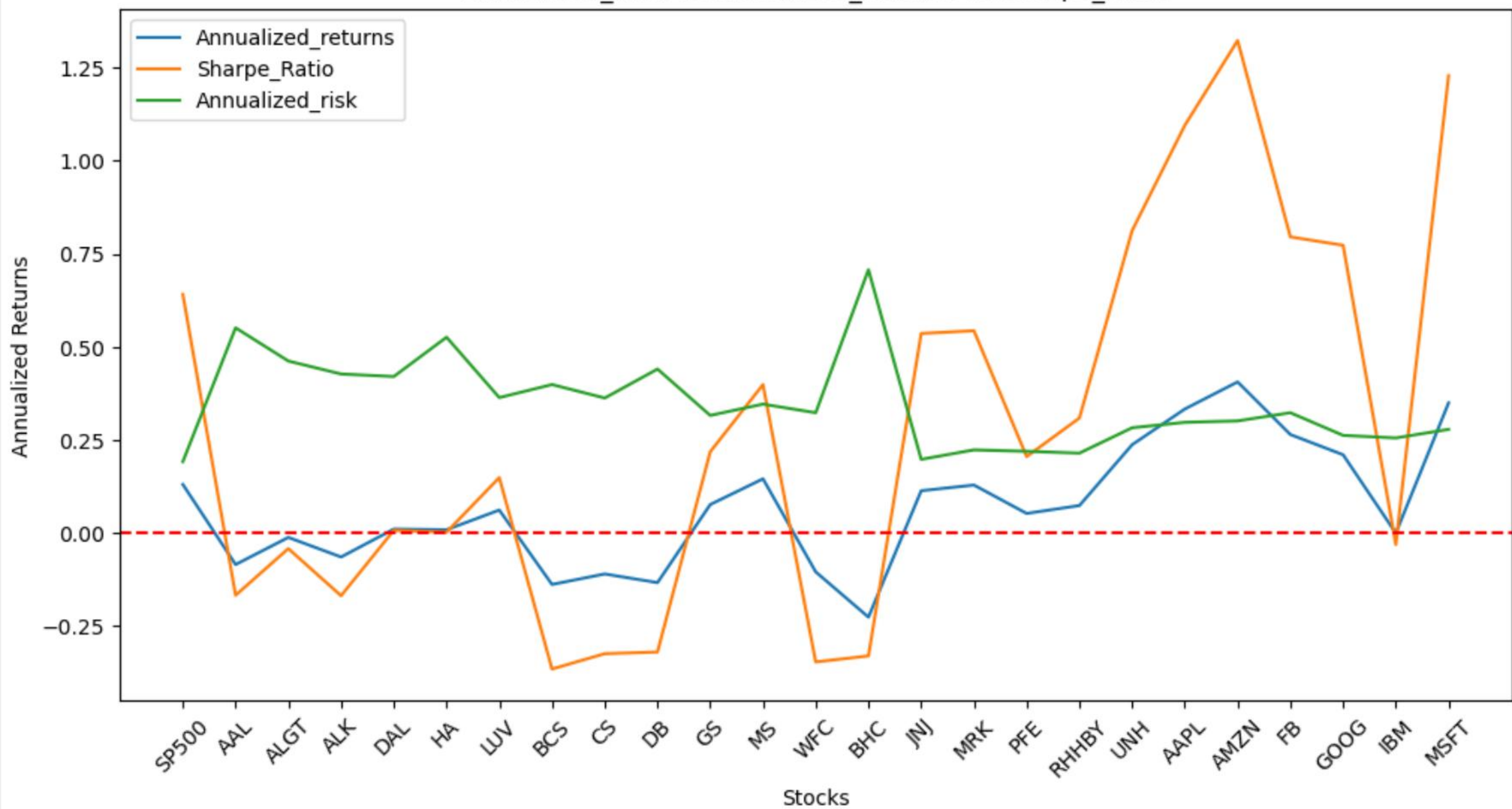
Annualized Risk

High values such as BHC at 70.72% and AAL at 55.12% indicate greater uncertainty and risk, while low values like S&P500 index at 13.04% suggest more stable returns, suitable for conservative investors.

Sharpe Ratio

High Sharpe Ratios such as AMZN at 1.32 and AAPL at 1.10 indicate excellent risk-adjusted performance, while low or negative Sharpe Ratios such as BHC at -0.33 and AAL at -0.17 suggest inadequate returns for the risks involved, making the latter less desirable investments.

Annualized_Risk Vs Annualized_Returns Vs Sharpe_Ratio



Portfolio Analysis - Recommendations

Conservative Portfolio for Mr. Patrick Jyengar: The portfolio includes stable and lower-risk investments enabling steady growth. Suggested Conservative Portfolio:

- JNJ - Annualized Returns: 11.35%, Annualized Risk: 19.78%, Sharpe Ratio: 0.536
- MRK - Annualized Returns: 12.88%, Annualized Risk: 22.33%, Sharpe Ratio: 0.543
- PFE - Annualized Returns: 5.25%, Annualized Risk: 21.95%, Sharpe Ratio: 0.205
- RHHBY- Annualized Returns: 7.38%, Annualized Risk: 21.45%, Sharpe Ratio: 0.309

Aggressive Portfolio for Mr. Peter Jyengar: The portfolio is filled with high-performing tech giants focusing on maximizing returns even with higher associated risks. Suggested Aggressive Portfolio:

- AMZN - Annualized Returns: 40.59%, Annualized Risk: 30.11%, Sharpe Ratio: 1.323
- AAPL - Annualized Returns: 33.32%, Annualized Risk: 29.73%, Sharpe Ratio: 1.095
- MSFT - Annualized Returns: 34.95%, Annualized Risk: 27.84%, Sharpe Ratio: 1.228
- FB - Annualized Returns: 26.45%, Annualized Risk: 32.31%, Sharpe Ratio: 0.795
- GOOG - Annualized Returns: 21.02%, Annualized Risk: 26.23%, Sharpe Ratio: 0.773

This approach aligns with each investor's risk tolerance and financial goals over the next 5 years.

Conservative Portfolio - Mr Patrick Jyengar

Average Daily Return (0.0366%):

The portfolio earns a modest daily gain, reflecting a conservative strategy that focuses on steady, low-risk growth.

Daily Risk (1.35%):

With minimal daily fluctuations, the portfolio is stable, ensuring low volatility, which suits risk-averse investors.

Annualized Return (9.22%):

Over a year, the portfolio is expected to yield a 9.22% return, offering solid growth while maintaining a conservative risk profile.

Annualized Risk (21.38%):

The annualized risk, though higher due to compounding, remains moderate, balancing potential returns with controlled volatility.

Sharpe Ratio (0.396):

A Sharpe ratio of 0.396 indicates reasonable risk-adjusted returns, acceptable for a conservative portfolio but with room for capital growth

Final Value after 5 Years (\$777220.93): The portfolio will grow to approximately \$777 K in 5 years, achieving significant capital growth.

ROI after 5 Years – 55.44%:

The portfolio's 55.44% ROI over 5 years shows steady growth, making it a reliable investment for achieving long-term goals.

Aggressive Portfolio - Mr Peter Jyenger

Average Daily Return (0.1342%):

The portfolio achieves a relatively high daily return, indicating strong performance and growth potential.

Daily Risk (1.89%):

The portfolio experiences moderate daily fluctuations, but the returns justify the risk, suitable for investors with a slightly higher risk tolerance.

Annualized Return (33.83%):

Over the course of a year, the portfolio is expected to yield a substantial 33.83% return, indicating aggressive growth and effective investment choices.

Annualized Risk (29.99%):

While the annualized risk is relatively high, the portfolio compensates with proportionately higher returns, balancing risk and reward effectively.

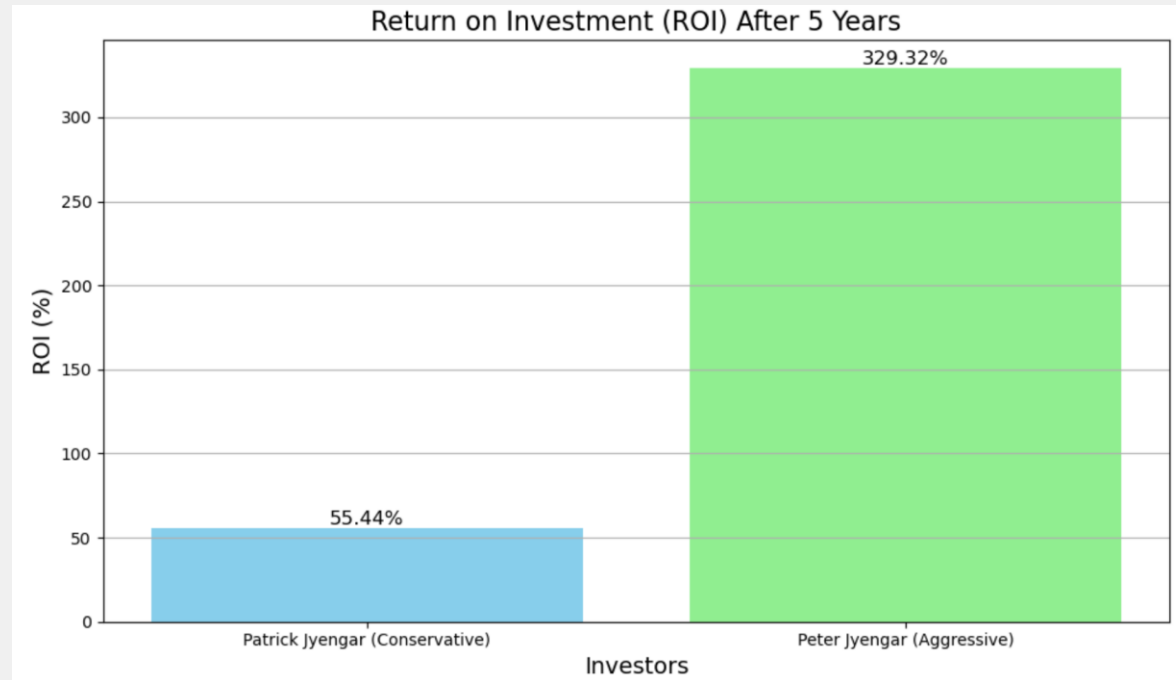
Sharpe Ratio (1.10):

A Sharpe ratio of 1.10 indicates excellent risk-adjusted returns, suggesting that the portfolio is highly efficient in generating returns relative to the risk taken.

Final Value after 5 Years (4293224.66) The Portfolio will grow to over \$4.29 million, reflecting strong capital appreciation over 5 years.

ROI after 5 Years – 329.32%

With an ROI of 329.32%, the portfolio demonstrates consistent growth, making it a solid performer over the investment horizon.



Key Insights:

- The **aggressive portfolio** greatly outperforms the conservative one in terms of final portfolio value and ROI, achieving **over 4 times the initial investment** with substantial returns. However, it carries much higher risk, which might be unsuitable for risk-averse investors.
- The **conservative portfolio** provided steady, low-risk returns with **55.44% growth over 5 years**, which aligns well with the goal of protecting capital while still achieving some growth.

Thank You

By
Harshavardhini J S