STOCK PORTFOLIO ANALYSIS

Team Members

Abhishek Kumar Singh

Karishma Darla

Nithyashree Bandihalli Rangaswamy

Sanjay Sandhosh

INTRODUCTION

Stock:

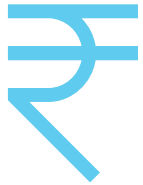
A stock represents ownership in a company and typically entitles the holder to a portion of the company's assets and profits.

Portfolio:

A portfolio is a collection of financial assets such as stocks, bonds, and other investments held by an individual or entity.

Portfolio analysis:

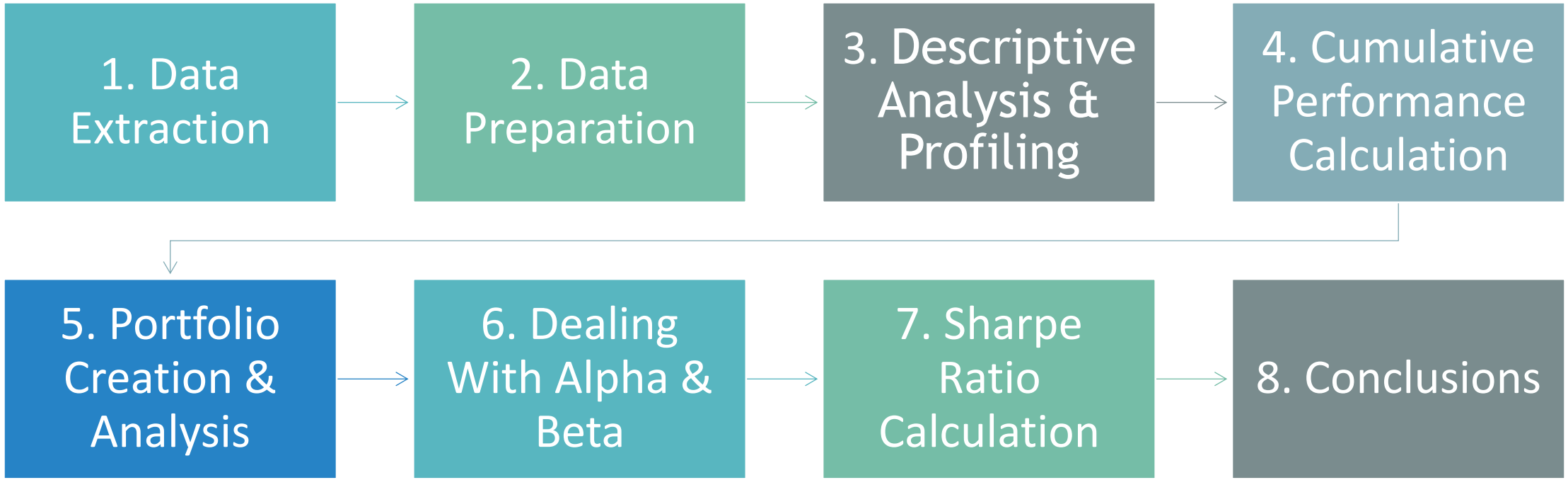
Portfolio analysis involves evaluating the composition, performance, and risk characteristics of a portfolio to make informed investment decisions.



CAPM (Capital Asset Pricing Model):

CAPM is a financial model that describes the relationship between expected return and risk for individual securities, helping investors determine the expected return on an investment given its risk.

STEPS TAKEN


1. Data Extraction
2. Data Preparation
3. Descriptive Analysis & Profiling
4. Cumulative Performance Calculation
5. Portfolio Creation & Analysis
6. Dealing With Alpha & Beta
7. Sharpe Ratio Calculation
8. Conclusions

DATA EXTRACTION & PREPARATION

Data Collection:

Extracted stock data from Yahoo Finance.

Company Selection:

Chose: Microsoft, Intel, Electronic Arts, IBM, Intuit, and Oracle, S&P 500 and T-Bill.

Data Cleaning:

Performed data cleaning by selecting top-level index & checked missing Values.

Data Processing:

Calculated Monthly returns & Visualized.

```
1  data.tail()
2
3  # Here, we have used .tail() to display the last 5 rows of the data.
```

Price	Adj Close								Close		...	Open		Volume
Ticker	EA	IBM	INTC	INTU	MSFT	ORCL	^GSPC	^IRX	EA	IBM	...	^GSPC	^IRX	EA
Date														
2023-08-01	119.465462	142.234985	34.797279	539.300903	325.802582	119.103706	4507.660156	5.298	119.980003	146.830002	...	4578.830078	5.270	5046430
2023-09-01	120.072945	137.473358	35.329929	508.573853	314.528778	104.788307	4288.049805	5.300	120.400002	140.300003	...	4530.600098	5.288	460624(
2023-10-01	123.453743	141.725922	36.274052	492.657928	336.802307	102.295242	4193.799805	5.320	123.790001	144.639999	...	4284.520020	5.310	3980760
2023-11-01	137.635101	155.365463	44.423290	569.804688	377.444519	115.389069	4567.799805	5.238	138.009995	158.559998	...	4201.270020	5.318	413561(
2023-12-01	136.627686	162.072403	50.103138	623.219543	375.345886	104.685226	4769.830078	5.180	136.809998	163.550003	...	4559.430176	5.230	363173(

DESCRIPTIVE ANALYSIS & PROFILING

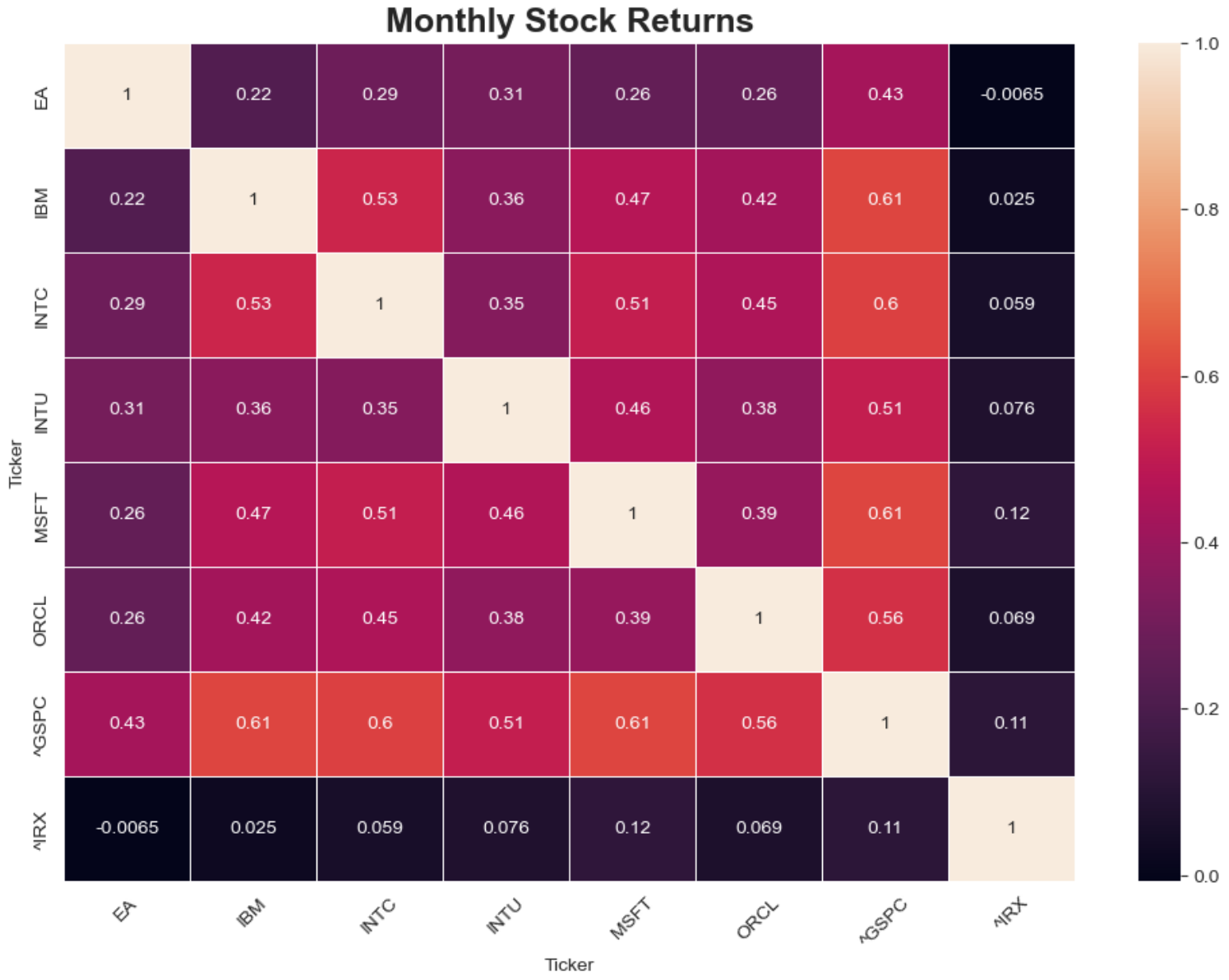
To understanding the data, we used various functions:

isnull().sum() : for finding NULL values

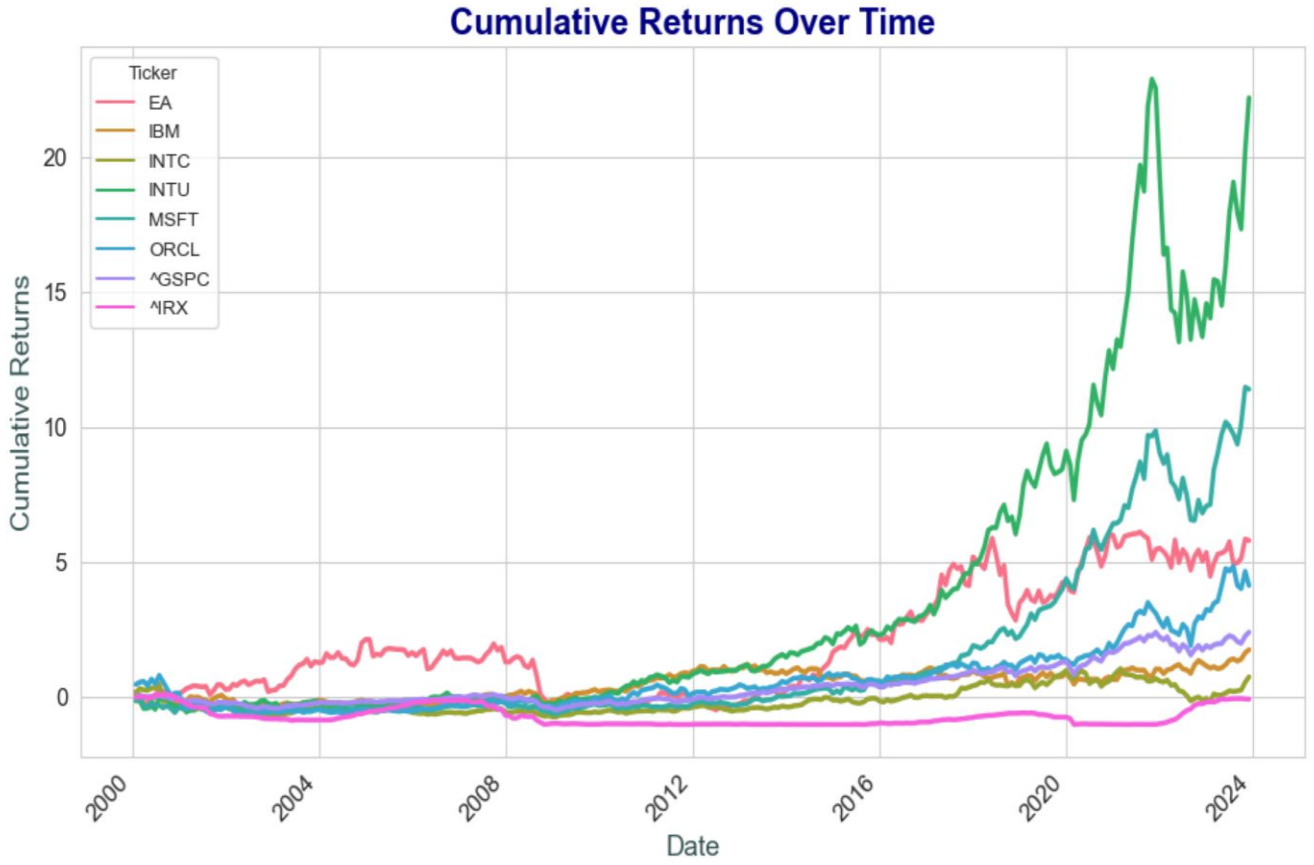
.describe() : for looking at the statistical data such as mean, mode etc.

Created correlation heatmap of the data, visualizing the correlations between all the company stocks, S&P500 and Treasury Bills.

Correlation Matrix:



CUMULATIVE PERFORMANCE CALCULATION



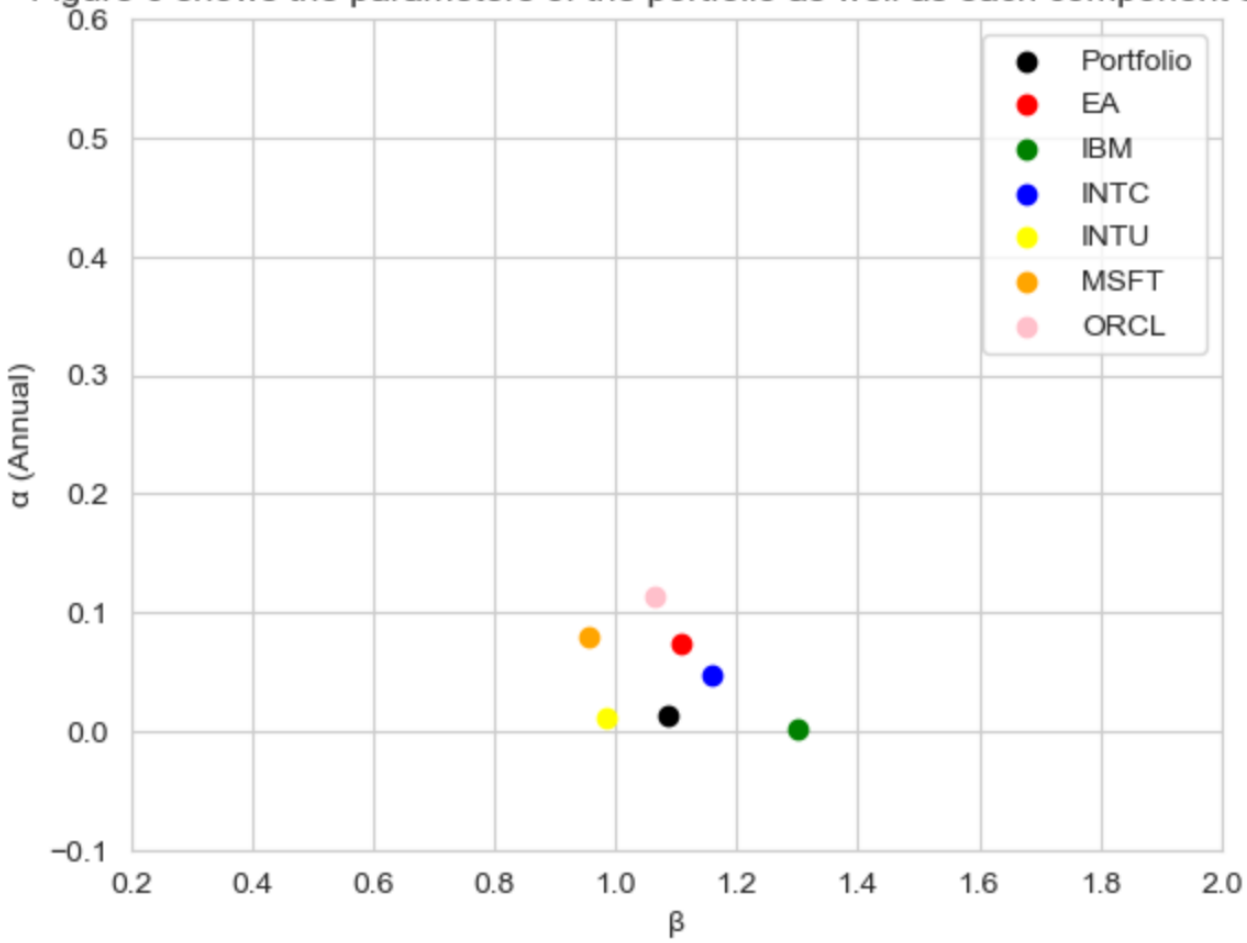
- Transformed the data from monthly adjusted closing price to monthly returns by using the .pct_change() method.
- This process allows us to analyze the relative price movements of stocks over time, providing insights into their performance dynamics and facilitating comparative analysis.

PORTFOLIO CREATION & ANALYSIS

- Constructed a portfolio from the software sector : **1 share** of **EA**, **2 shares of IBM**, **3 shares of INTC**, **1 share of MSFT & 2 shares of ORCL**.
- Estimated CAPM parameters to gauge risk-adjusted performance and expected returns.
- MER & SER (Market & Stock Excess Return) are used to create CAPM models using smf.ols() function. From statsmodel library.
- **$Rs - Rf = \alpha + \beta(Rm - Rf) + \varepsilon$**

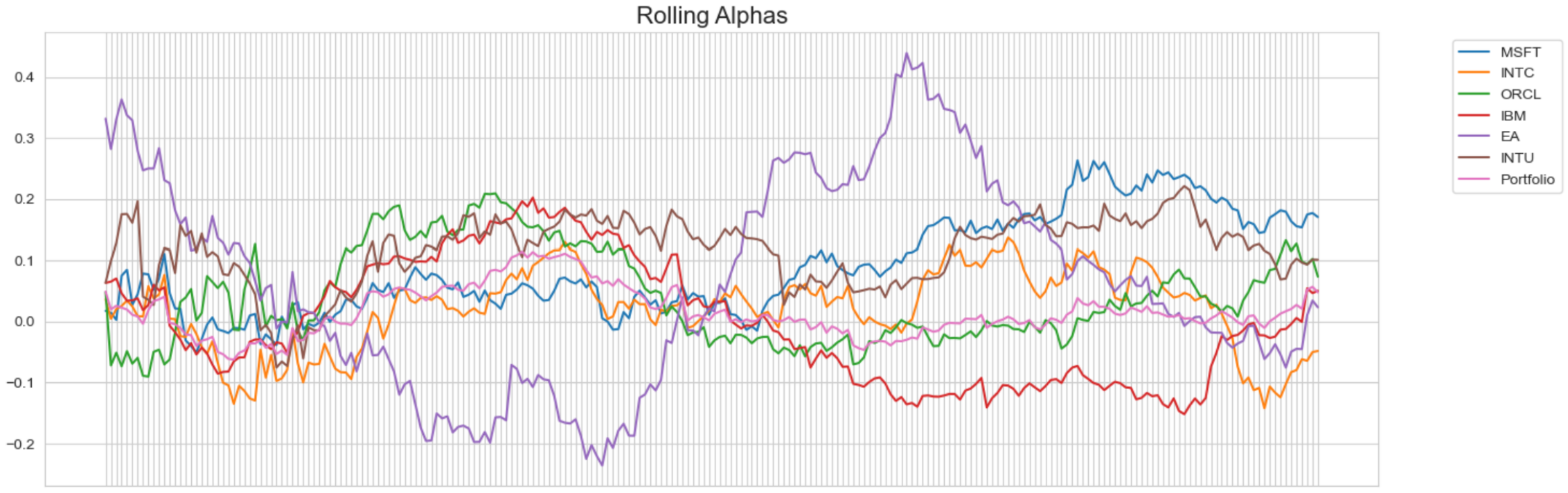
This graph clearly shows that our portfolio is the less volatile than its components. Although, we chose stocks from just one sector, our portfolio is diverse enough to generate non-volatile results.

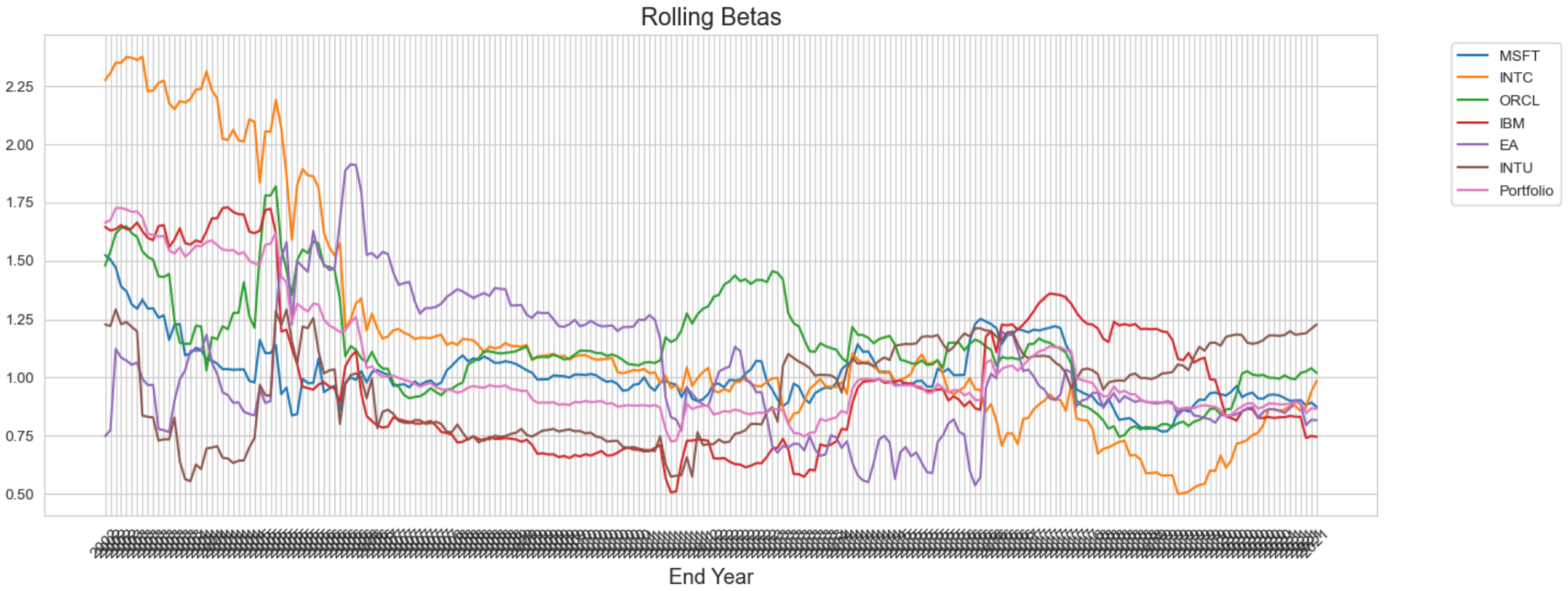
Figure 6 shows the parameters of the portfolio as well as each component stock



DEALING WITH ALPHA & BETA

- Assessed alpha and beta to evaluate the performance and risk exposure of individual stocks and the portfolio.
- Calculated annualized alpha and beta coefficients for each stock and the portfolio using the CAPM model.
- Tested for the significance of alpha to determine if stocks outperform or underperform the market.
- Analyzed changes in alpha and beta over time through rolling window analysis, providing insights into evolving risk-return dynamics.


Rolling Alphas
0.4
0.3
0.2
0.1
0.0
−0.1
−0.2
MSFT
INTC
ORCL
IBM
EA
INTU
Portfolio


Rolling Betas
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
End Year
MSFT
INTC
ORCL
IBM
EA
INTU
Portfolio

SHARPE RATIO CALCULATION

- Evaluates the risk-adjusted return of the portfolio and individual stocks over the past 5 years.
- Computed Sharpe ratios for each stock and the portfolio using recent 5 years of monthly data.
- Sharpe ratio quantifies the excess return earned per unit of volatility or risk, providing insights into the performance efficiency of investments.

Results:

- MSFT: 1.356
- INTC: 0.2855
- ORCL: 0.8184
- IBM: 0.6549
- EA: 0.5863
- INTU: 0.9734
- Portfolio: 0.91788
- GSPC: 0.7892

CONCLUSION

- The portfolio has a positive alpha, indicating it generates excess returns above the market.
- The portfolio's beta is close to 1, suggesting it has similar volatility to the market.
- The portfolio's Sharpe ratio is higher than the S&P 500, indicating better risk-adjusted returns.
- Diversification has helped reduce the portfolio's volatility compared to individual stocks like INTU.


thank
you