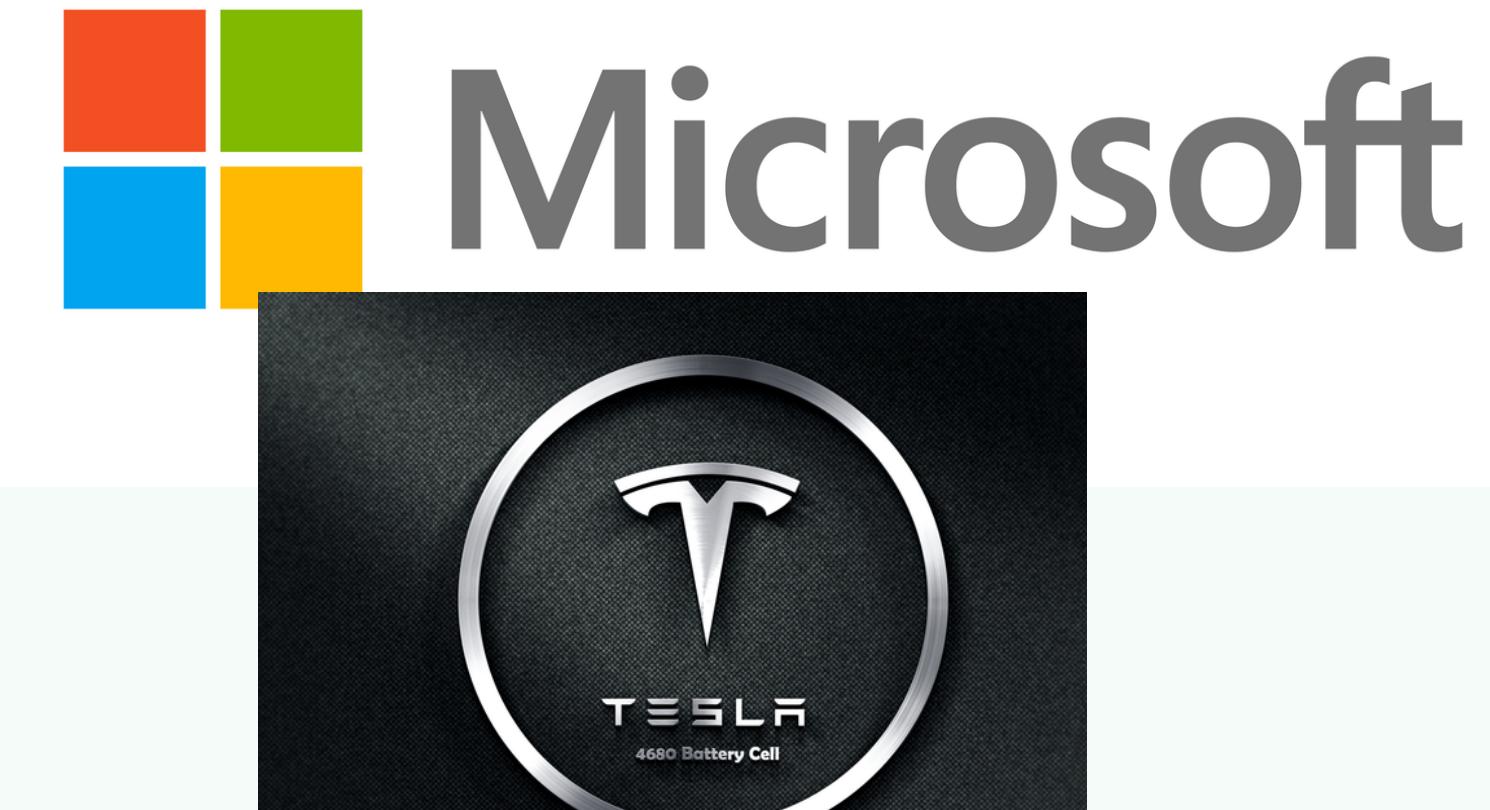




# ASSESSING RISK INVESTMENT FOR FOR MICROSOFT, APPLE, AND TESLA

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# PROBLEM STATEMENT

The problem addressed in this project is the need to assess and compare the risk levels associated with three major technology companies: Microsoft, Apple, and Tesla. The project aims to calculate the Beta coefficients for these companies, utilizing the Capital Asset Pricing Model (CAPM) framework. By doing so, we seek to understand how sensitive these stocks are to market fluctuations, as represented by the S&P 500 index. The key challenge lies in effectively quantifying the relationship between the companies' stock returns and market returns, which is essential for making informed investment decisions. This analysis will provide insights into the relative risk and expected returns associated with these stocks.

# GOALS

The primary goal of this project is to calculate the Beta coefficients for three prominent technology companies: Microsoft, Apple, and Tesla. Beta coefficients serve as essential indicators of each company's sensitivity to market fluctuations, thereby quantifying their relative risk compared to the overall market, as represented by the S&P 500 index.

## OBJECTIVES

1. Assess historical stock data for Microsoft, Apple, and Tesla (2018-2023).
2. Perform linear regression analysis to derive Beta coefficients.
3. Compare and interpret Beta values for risk assessment.
4. Provide investment recommendations based on the analysis.

| Open  | High  | Low   | Close | Adj Clc    | Volum    | MS%chng  | SP%chng  | Exces |
|-------|-------|-------|-------|------------|----------|----------|----------|-------|
| 86.06 | 86.51 | 85.97 | 86    | 81.31709   | 26061400 | -0.00081 | 0.005261 |       |
| 86.59 | 87.66 | 86.57 | 87    | 82.03278   | 21912000 | 0.00158  | 0.007954 |       |
| 87.66 | 88.41 | 87.43 | 88    | 83.04984   | 23407100 | 0.00177  | 0.00442  |       |
| 88.2  | 88.58 | 87.6  | 88    | 83.13459   | 22113000 | 0.00155  | 0.004152 |       |
| 88.65 | 88.73 | 87.86 | 88    | 83.07809   | 19484300 | 0.00155  | 0.003092 |       |
| 87.86 | 88.19 | 87.41 | 88    | 82.70139   | 18652200 | -0.00141 | -0.00204 |       |
| 88.13 | 88.13 | 87.24 | 88    | 82.94626   | 17805000 | 0.00307  | 0.002703 |       |
| 88.67 | 89.78 | 88.45 | 90    | 84.37765   | 20000000 | 0.00651  | 0.006251 |       |
| 90.1  | 90.79 | 88.01 | 88    | 83.20052   | 19700000 | 0.01127  | 0.010389 |       |
| 89.08 | 90.28 | 88.75 | 90    | 84.88517   | 21000000 | 0.01132  | -0.00111 |       |
| 89.8  | 90.67 | 89.66 | 90    | 84.41111   | 19100000 | 0.008083 | 0.00111  |       |
| 90.14 | 90.61 | 89.66 | 90    | 84.75431   | 18750000 | 0.003781 | 7.14E-05 |       |
| 90    | 91.62 | 89.74 | 90    | 84.27041   | 1901600  | -0.00175 | 0.001341 |       |
| 91.9  | 92.3  | 91.54 | 92    | 84.3412800 | 19110000 | 0.009216 |          |       |
| 92.55 | 93.43 | 92.54 | 92    | 86.40826   | 33277500 | 0.00173  | 0.003658 |       |
| 92.47 | 93.24 | 92.54 | 92    | 86.94854   | 2631400  | 0.00086  | 0.000288 |       |
| 93.12 | 94.06 | 92.54 | 94    | 88.57771   | 17000000 | 0.007029 | 0.000436 |       |
| 95.14 | 94.72 | 92.54 | 94    | 88.14411   | 310900   | 0.021692 | 0.006936 |       |
| 93.3  | 94.6  | 92.54 | 94    | 87.346     | 3635100  | -0.01934 | -0.01203 |       |
| 93.   | 94.1  | 92.54 | 94    | 89.413     | 48756300 | 0.004823 | -0.00012 |       |
| 94.7  | 96.38 | 93.58 | 94    | 87.6604    | 47227900 | 0.011093 | -0.00563 |       |
| 92.64 | 93.97 | 91.5  | 92    | 86.4306    | 47867800 | -0.01213 | -0.00267 |       |
|       | 93.24 | 88    | 88    | 82.87091   | 51031500 | -0.03289 | -0.02416 |       |
| 86.8  | 87.48 | 85.25 | 91    | 86.00683   | 67998600 | -0.04053 | -0.04607 |       |
| 90.49 | 87.77 | 89.2  | 90    | 84.38705   | 41107600 | 0.041432 | 0.029131 |       |
| 89.71 | 89.88 | 84.76 | 85    | 80.05519   | 55628700 | -0.00862 | -0.00221 |       |
| 86.3  | 88.93 | 83.83 | 88    | 83.04042   | 63499100 | -0.03801 | -0.031   |       |
| 88.74 | 89.78 | 87.93 | 89    | 83.93505   | 35720300 | 0.028273 | 0.013441 |       |
| 88.93 | 90    | 87.8  | 90    | 84.59425   | 26407700 | 0.002141 | 0.003611 |       |
| 88.51 | 90.99 | 88.41 | 91    | 85.91885   | 34960900 | -0.00472 | 0.001867 |       |
| 91.21 | 92.72 | 90.62 | 93    | 87.6692    | 27823900 | 0.030505 | 0.02348  |       |
| 92.45 | 93.5  | 91.8  | 92    | 87.04474   | 30596900 | 0.013595 | 0.005042 |       |
| 91.48 | 93.06 | 91.01 | 93    | 87.72596   | 30911700 | -0.01049 | -0.00152 |       |
| 92.98 | 93.36 | 91.49 | 91    | 86.5622    | 26922500 | 0.016397 | -0.0009  |       |

## DATA DESCRIPTION

The dataset is sourced from Yahoo Finance, which provides real-time stock information for Microsoft, Apple, and Tesla. It spans the period from 2018 to 2023, encompassing daily data points.

- Date: Records the specific date for each daily stock data entry.
- Open: Represents the opening stock price at the beginning of the trading day.
- High: Records the highest price the stock reached during the trading day.
- Low: Indicates the lowest stock price observed during the trading session.
- Close: Reflects the closing stock price at the end of the trading day.
- MS%chng: This column is critical for the project, as it calculates the daily percentage change in Microsoft's stock price.

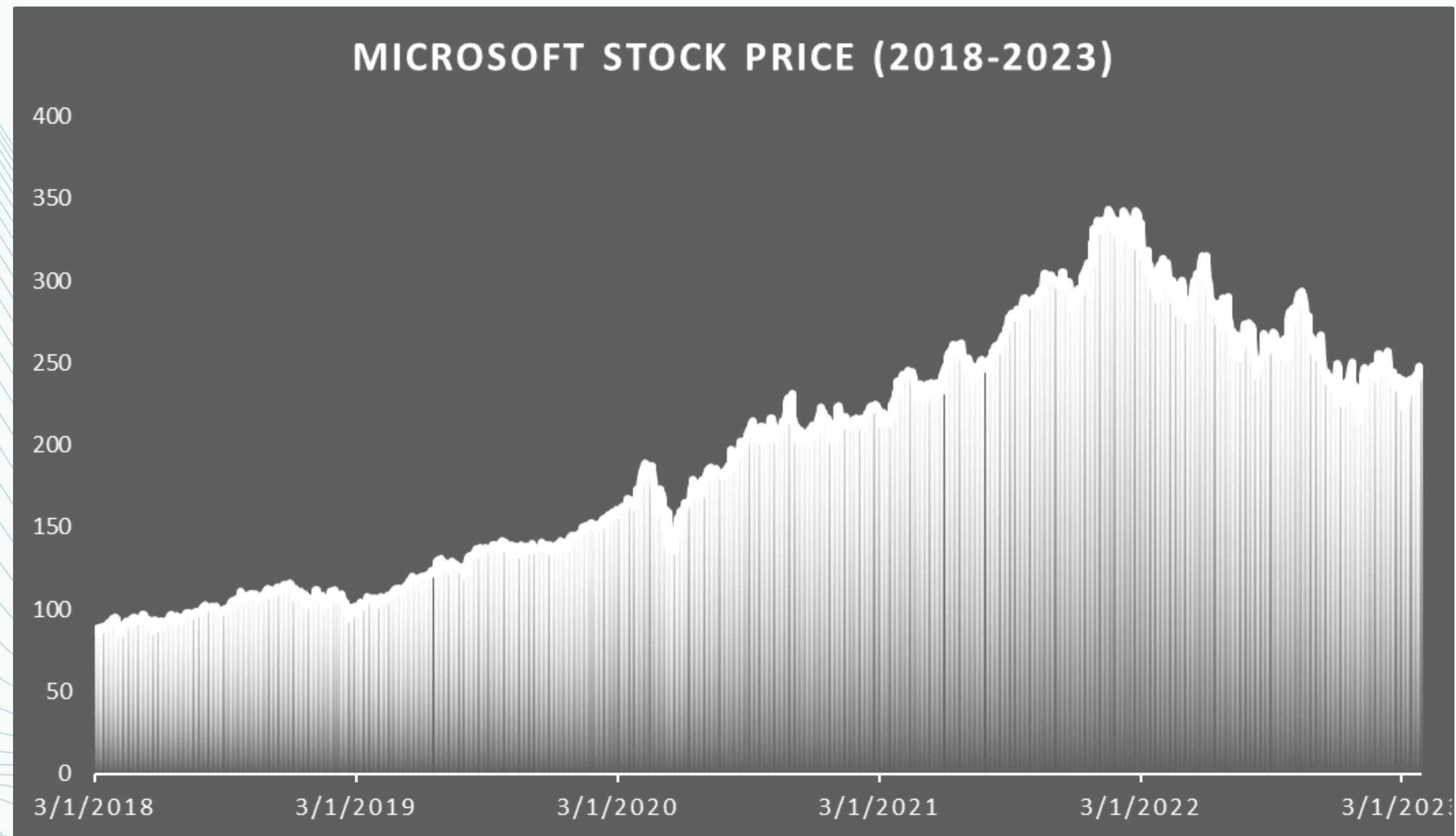
# MICROSOFT SUMMARY STATISTIC

- **Mean:** The average daily percentage change for Microsoft's stock over the analyzed period is approximately 0.001, suggesting a small positive daily return on average.
- **Median:** The median daily percentage change is around 0.001, indicating that the dataset is roughly symmetric and not heavily influenced by outliers.
- **Standard Deviation:** The standard deviation of 0.018 implies that the daily returns exhibit moderate volatility, with fluctuations around the mean.
- **Skewness:** With a slightly negative skewness of approximately -0.213, the data distribution is slightly skewed to the left, indicating a slightly higher frequency of smaller positive returns.
- **Range:** The range of daily percentage changes spans from -0.084 to 0.085, showcasing the variability in daily returns.
- **Count:** The dataset contains 1,277 data points, providing a substantial sample size for analysis.

In summary, the data suggests that Microsoft's daily percentage returns have a relatively low average return with moderate volatility, and they are slightly skewed to the left, implying a slightly higher frequency of smaller positive returns.

| % in Microsoft     |              |
|--------------------|--------------|
| Mean               | 0.000979958  |
| Median             | 0.001226943  |
| Standard Deviation | 0.018016473  |
| Kurtosis           | 2.377098634  |
| Skewness           | -0.213391547 |
| Range              | 0.168714945  |
| Sum                | 1.251405994  |
| Count              | 1277         |

# HISTORICAL TREND OF MICROSOFT STOCK PRICE



## SUMMARY STATISTIC

- **Mean:** The average daily percentage change for Tesla's stock over the analyzed period is approximately 0.003, indicating a small positive daily return on average.
- **Median:** The median daily percentage change is around 0.002, suggesting that the dataset is somewhat positively skewed, with a higher frequency of smaller positive returns.
- **Standard Deviation:** The standard deviation of 0.044 reflects a moderate level of volatility in Tesla's daily returns.
- **Skewness:** With a positive skewness of approximately 0.413, the data distribution is positively skewed, indicating that there is a tendency for slightly larger positive returns compared to the mean.
- **Range:** The range of daily percentage changes spans from -0.211 to 0.311, demonstrating a relatively wide range of fluctuations in daily returns.

In summary, the data suggests that Tesla's daily percentage returns have a small positive average return with moderate volatility, a slight positive skewness, and a wide range of fluctuations in daily returns.

| % Change in Tesla  |             |
|--------------------|-------------|
| Mean               | 0.002625015 |
| Median             | 0.001981709 |
| Standard Deviation | 0.043616865 |
| Kurtosis           | 4.115033068 |
| Skewness           | 0.413470908 |
| Range              | 0.521556883 |
| Sum                | 3.352144439 |
| Count              | 1277        |

# HISTORICAL TREND OF TESLA STOCK PRICE



## APPLE SUMMARY STATISTIC

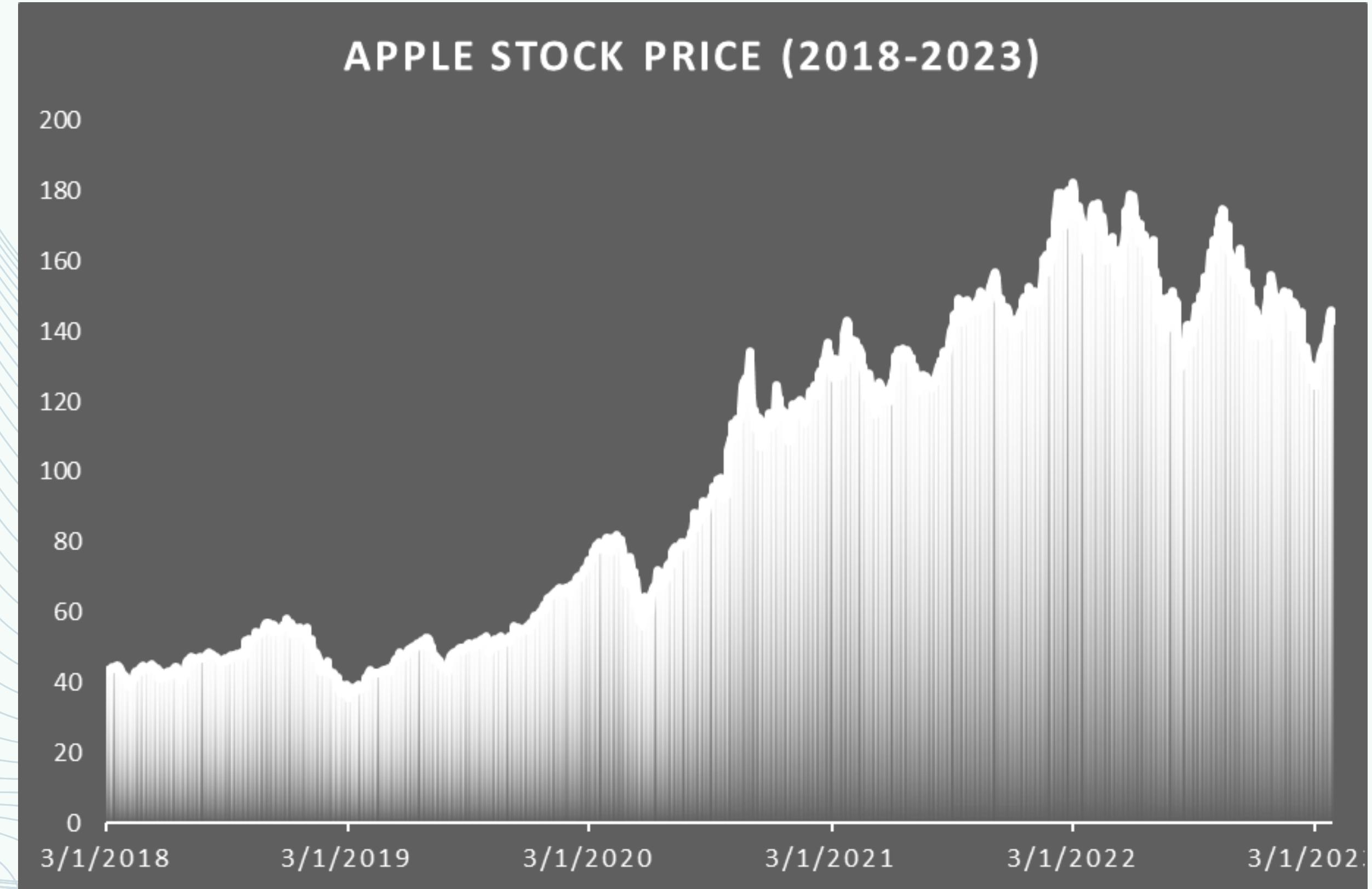
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In summary, the data suggests that Tesla's daily percentage returns have a small positive average return with moderate volatility, a slight positive skewness, and a wide range of fluctuations in daily returns.

| % Change In Apple  |              |
|--------------------|--------------|
| Mean               | 0.001174999  |
| Standard Error     | 0.000579216  |
| Median             | 0.001992699  |
| Standard Deviation | 0.02069837   |
| Kurtosis           | 2.480630179  |
| Skewness           | -0.151267285 |
| Range              | 0.183857717  |
| Sum                | 1.500473993  |
| Count              | 1277         |

# HISTORICAL TREND OF TESLA STOCK PRICE

APPLE STOCK PRICE (2018-2023)

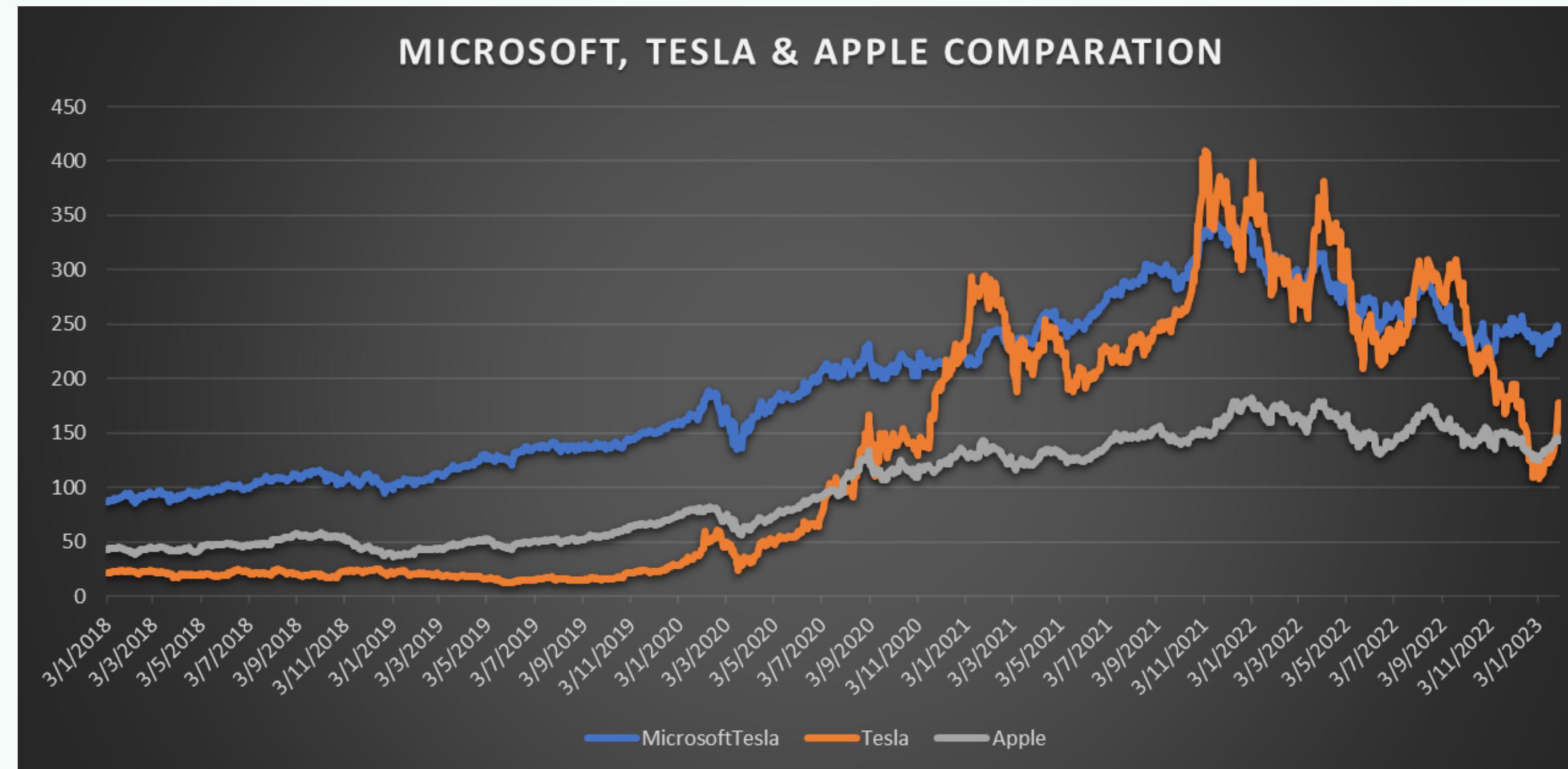


# MICROSOFT, TESLA, AND APPLE TRENDLINE CLOSE STOCK PRICE OVERTIME

**Microsoft exhibits a low average return and moderate volatility.**

**Tesla has a higher average return and moderate volatility, with a tendency for larger positive returns.**

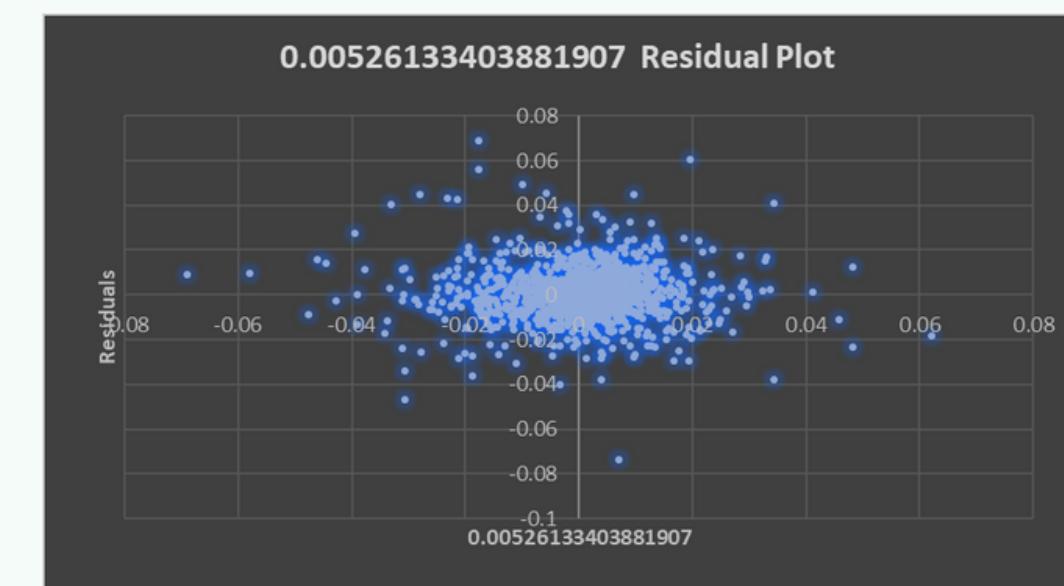
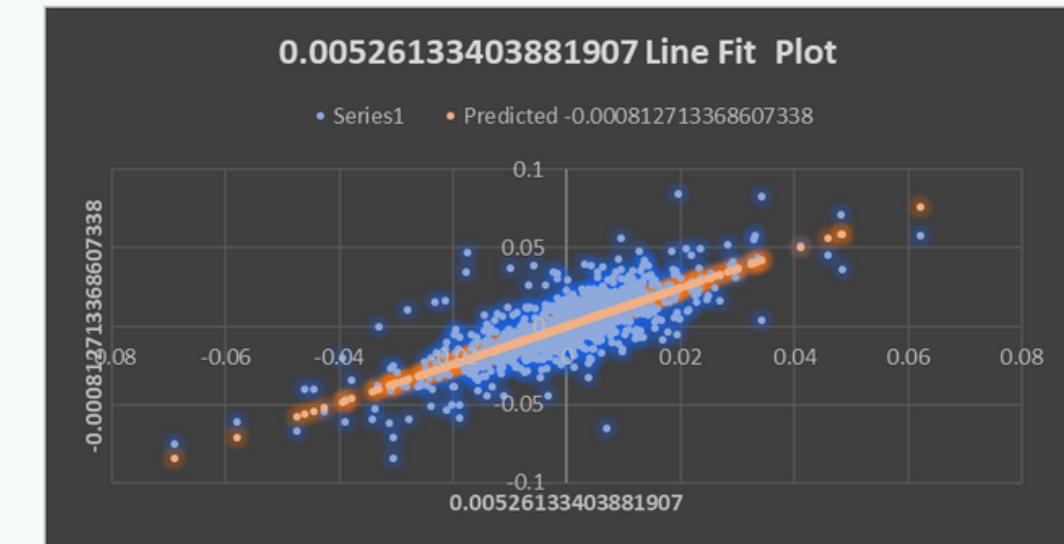
**Apple maintains small fluctuations and increases, which corresponds to a relatively stable pattern in daily returns.**



# MICROSOFT REGRESSION ANALYSIS

**Microsoft's daily returns exhibit a strong positive correlation ( $R = 0.778$ ) with the S&P 500, suggesting significant influence. Approximately 60.5% of Microsoft's return variability can be attributed to the S&P 500. The model is a good fit (adjusted R Square), and it's highly significant (low F-statistic p-value).**

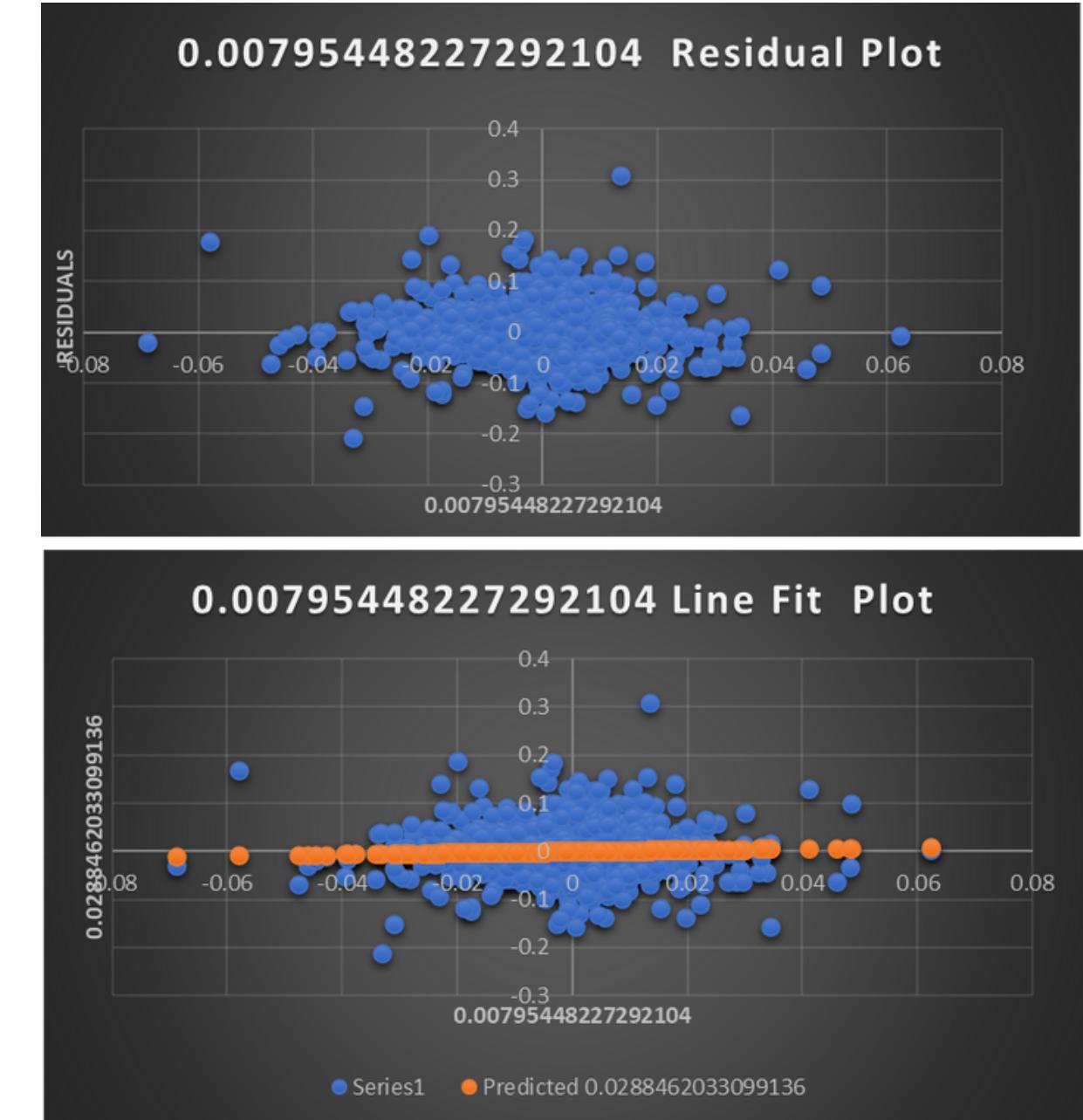
| Regression Statistics |             |
|-----------------------|-------------|
| Multiple R            | 0.777503308 |
| R Square              | 0.604511393 |
| Adjusted R Square     | 0.60372708  |
| Standard Error        | 0.01135138  |
| Observations          | 1276        |



# TESLA REGRESSION ANALYSIS

The analysis indicates that the relationship between Tesla's returns and the S&P 500's returns is weak, with minimal influence from the S&P 500. The Beta coefficient is not statistically significant, suggesting that the S&P 500 does not strongly explain fluctuations in Tesla's returns.

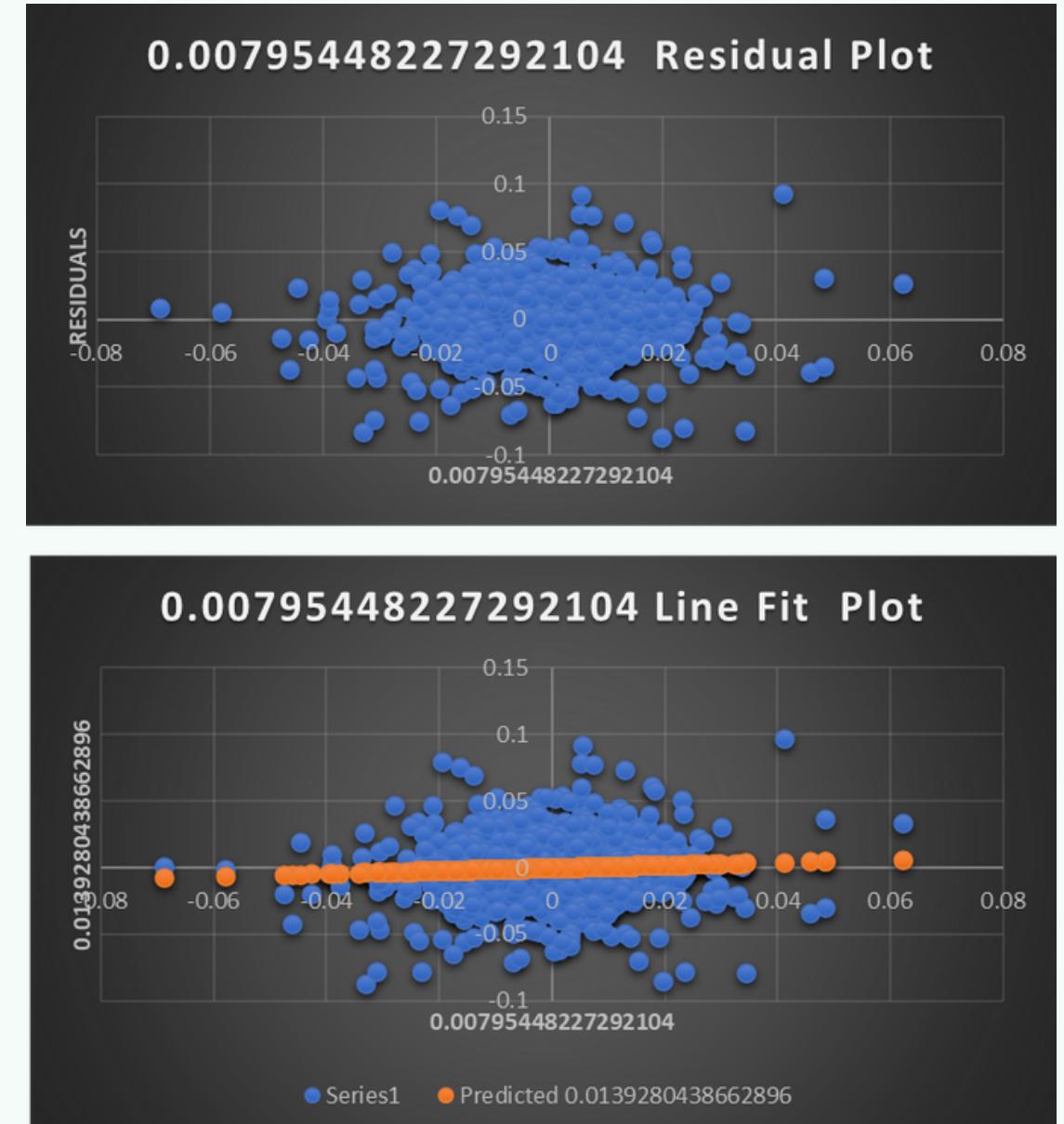
| Regression Statistics |             |
|-----------------------|-------------|
| Multiple R            | 0.04001653  |
| R Square              | 0.001601323 |
| Adjusted R Square     | 0.00081639  |
| Standard Error        | 0.04360462  |
| Observations          | 1275        |



# TESLA REGRESSION ANALYSIS

The regression analysis for Apple reveals a weak positive correlation with the S&P 500 ( $R = 0.0587$ ) and limited influence, as indicated by a low R-squared value of 0.0034. The model is statistically significant ( $p\text{-value} = 0.036$ ), suggesting some effect of the S&P 500 on Apple's returns.

| Regression Statistics |             |
|-----------------------|-------------|
| Multiple R            | 0.058684445 |
| R Square              | 0.003443864 |
| Adjusted R Square     | 0.002658935 |
| Standard Error        | 0.02070558  |
| Observations          | 1275        |



# FINDINGS

The analysis assessed the relationship between Microsoft, Tesla, and Apple's stock returns and the S&P 500

## 1 MICROSOFT

Strong positive correlation, significant S&P 500 influence, and lower market sensitivity.

## 2 TESLA

Weaker relationship with the S&P 500, limited impact on Tesla's returns.

## 3 APPLE

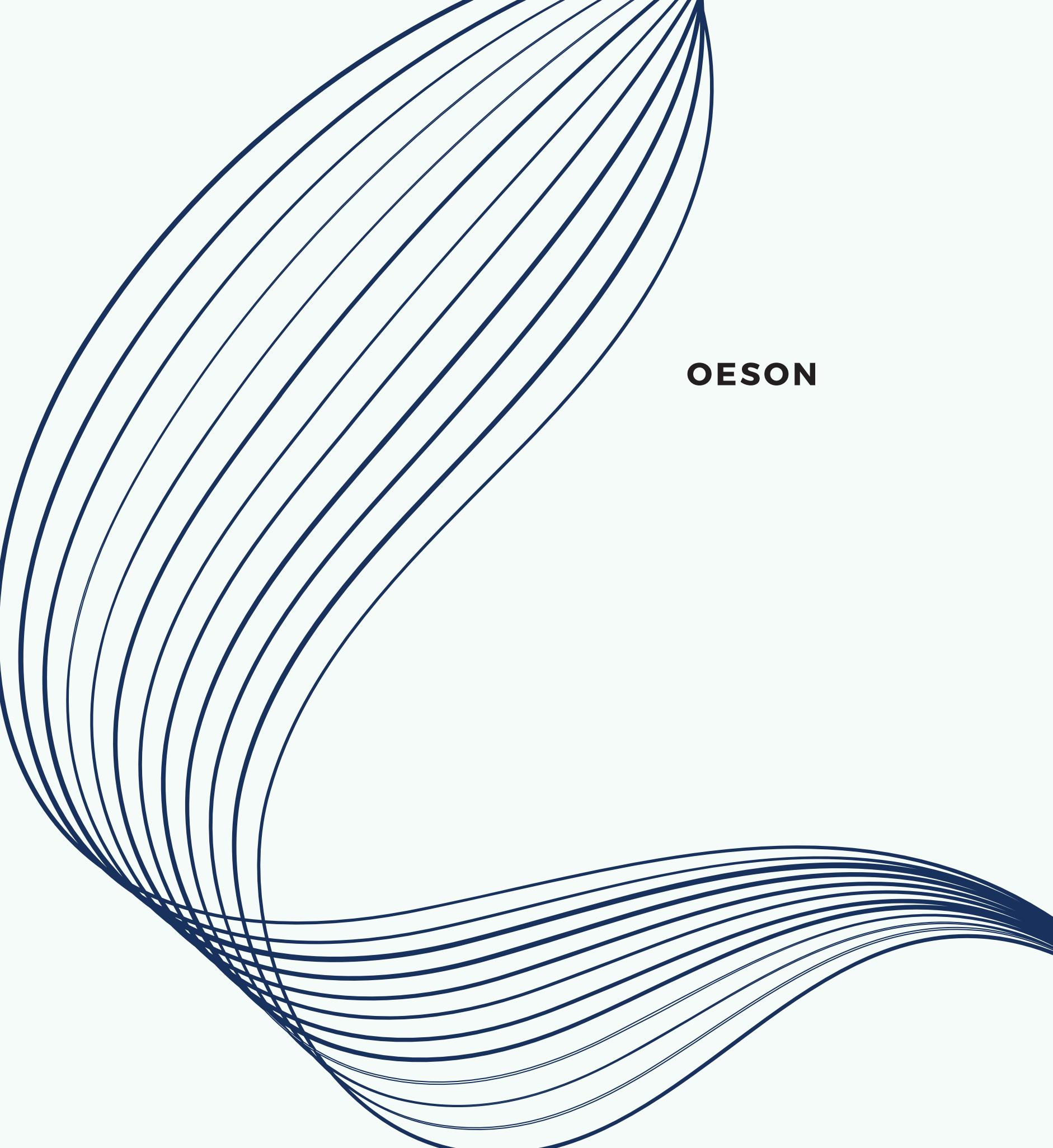
Limited correlation with the S&P 500, modest influence on Apple's returns.

# RECOMMENDATIONS

- Invest in Microsoft for stability and lower market sensitivity.
- Diversify portfolios when investing in Tesla and Apple for risk mitigation.
- Consider investment horizons: Microsoft for long-term, Tesla and Apple for short-term opportunities.
- Monitor market conditions for timing your investments.
- Consult a financial advisor for personalized strategies based on your goals and risk tolerance.



**THANK'S FOR  
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