

Stock Correlation with SP500: A Statistical Analysis

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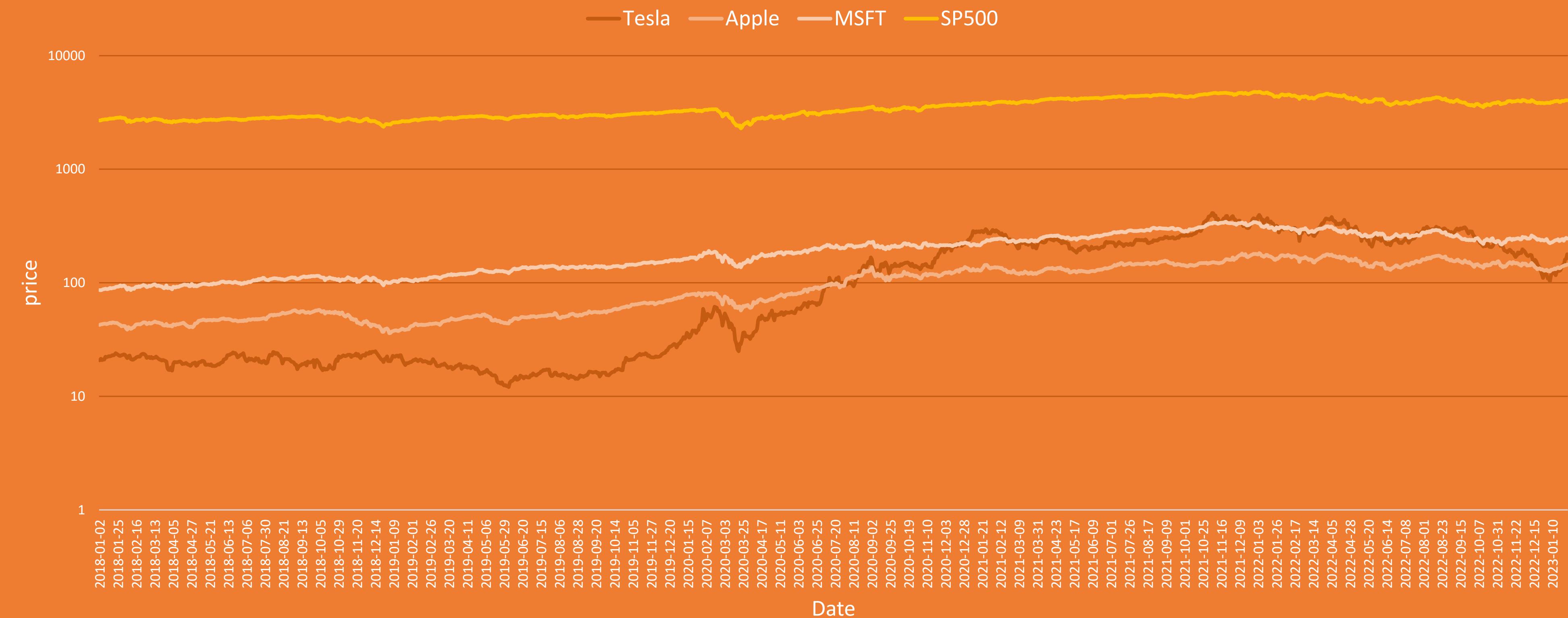
Project Overview

Our objective is to analyze and compare the stock prices of Microsoft, Apple, and Tesla from January 2018 to 2023. By identifying correlation patterns and trends, we aim to provide valuable insights that can guide investors in making informed investment decisions.

Stock Price Evaluation

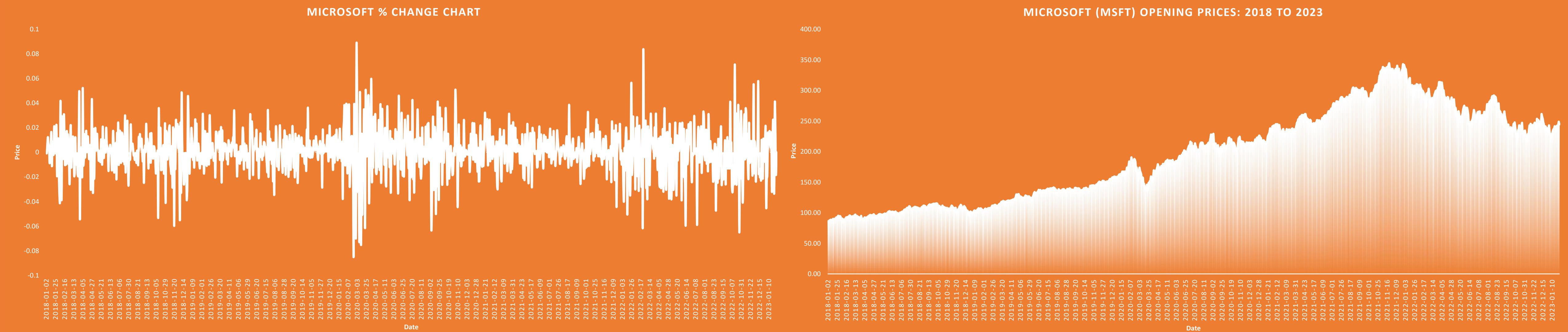
In the stock price evaluation section, we will examine the price movements and percentage changes of Microsoft, Apple, and Tesla stocks to identify the months with significant volatility.

Stock Price Comparison: Microsoft, Tesla, and Apple (2018-2023)



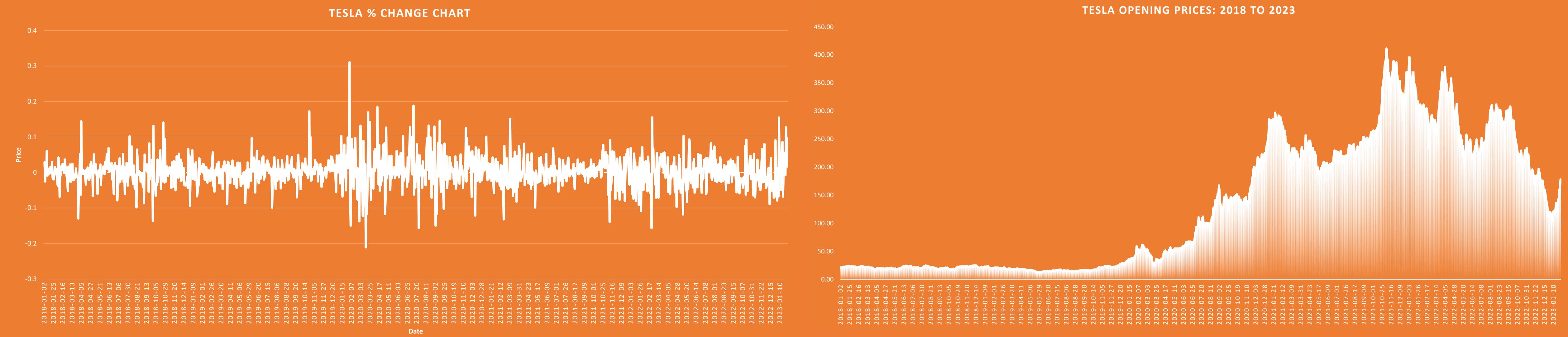
- The stock price movement from 2018 to 2023 indicates notable volatility in Tesla stocks compared to Microsoft and Apple.
- Microsoft's price movement appears to be more closely correlated with the SP500, as observed in the price trends.
- Tesla's stock demonstrates higher fluctuations, suggesting greater market sensitivity.
- Apple's stock prices show relatively stable movements when compared to Tesla and Microsoft.

Microsoft Monthly Percentage Change and Price Correlation



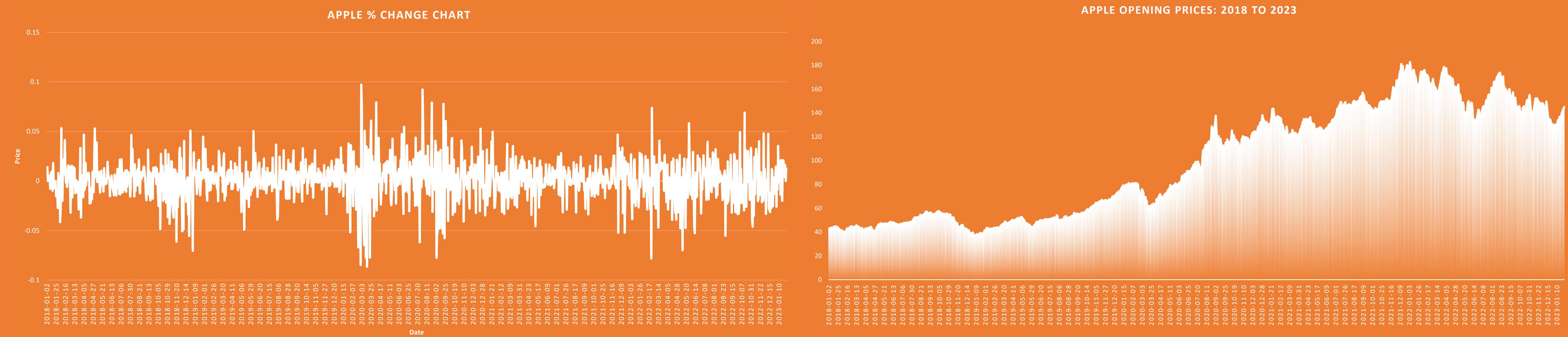
- The percentage change chart for Microsoft indicates that the most significant price volatility occurred in February, March, October, and November over the three-year period.
- During these months, stock prices also showed notable declines.

Tesla Monthly Percentage Change and Price Correlation



- The percentage change chart for Tesla indicates that the most significant price volatility occurred in March, September, October, and November.
- March experienced the largest volatility and price drop among these months.

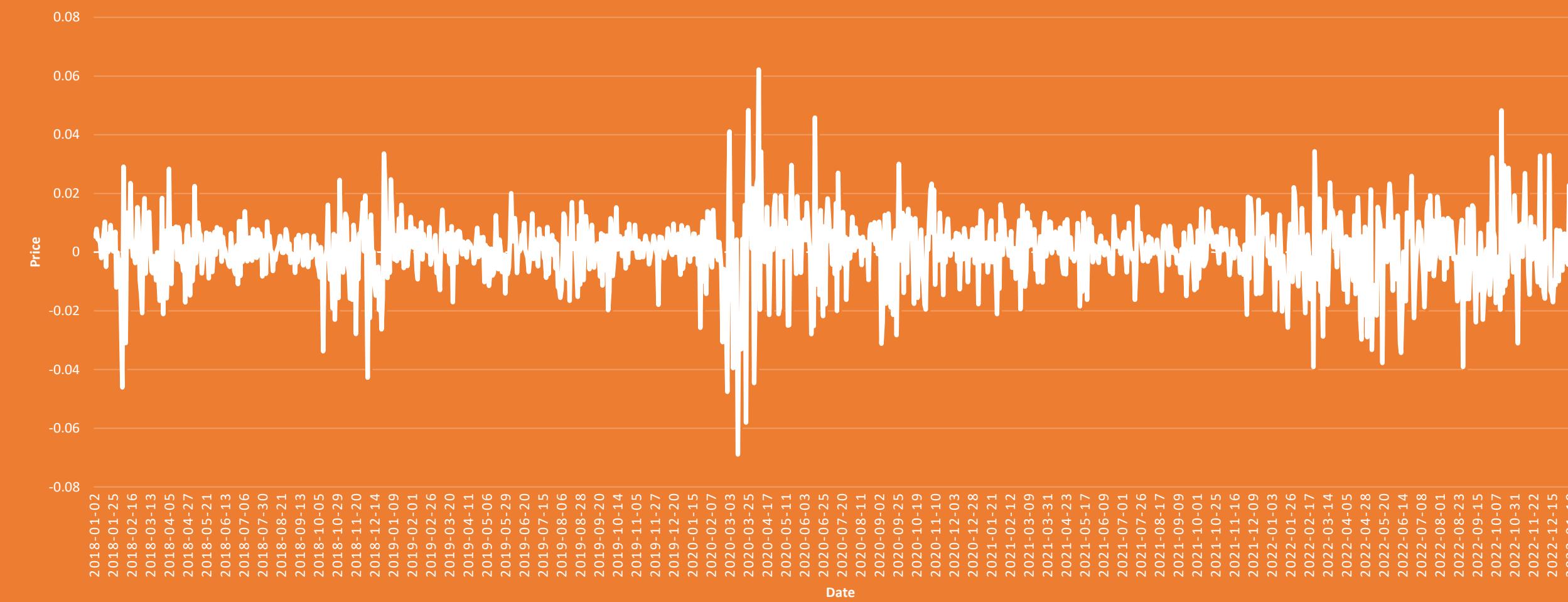
Apple Monthly Percentage Change and Price Correlation



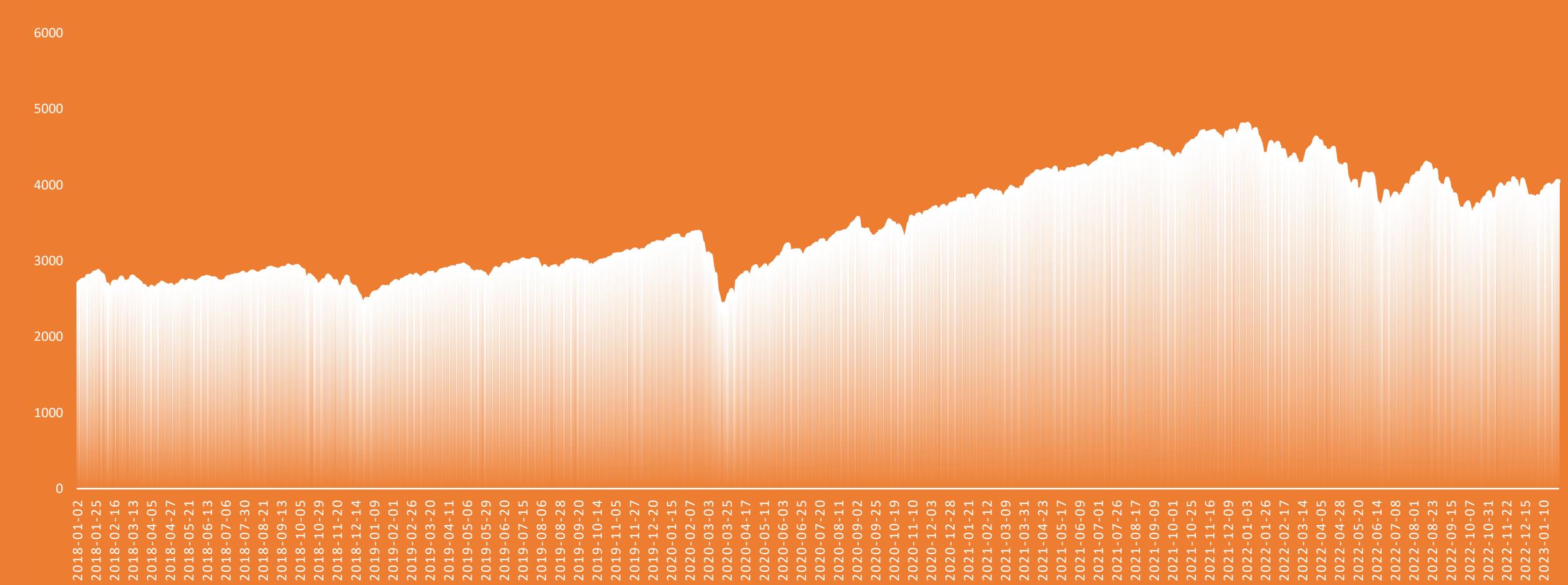
- The percentage change chart for Apple shows that the most significant price volatility occurred in February, March, November, and December.
- February and March experienced the highest frequency of volatility, with notable price drops observed during these months.

SP500

SP500 % CHANGE CHART



SP500 OPENING PRICES: 2018 TO 2023



- The percentage change chart for the SP500 indicates that the most significant price volatility occurred in February, March, November, and December.
- February and March exhibited the highest frequency of volatility, coinciding with notable price drops.

Stock Price Evaluation : Outcome

- The data indicates that the volatility of Microsoft, Tesla, and Apple is correlated with the SP500, particularly regarding price fluctuations.
- Significant volatility typically occurs in March and November.
- Based on these results, investors should consider a cautious approach during these months.
- Alternatively, investors may take advantage of potential stock price discounts during these periods.

Statistical Analysis

- Using Statistical analysis enables us to simplify and summarize complex data sets, making interpretation and conclusion drawing more straightforward.
- By utilizing statistical methods, we enhance our understanding of phenomena, which supports research and development across various fields.
- Furthermore, it offers evidence-based insights that guide strategic decision-making.

MSFT

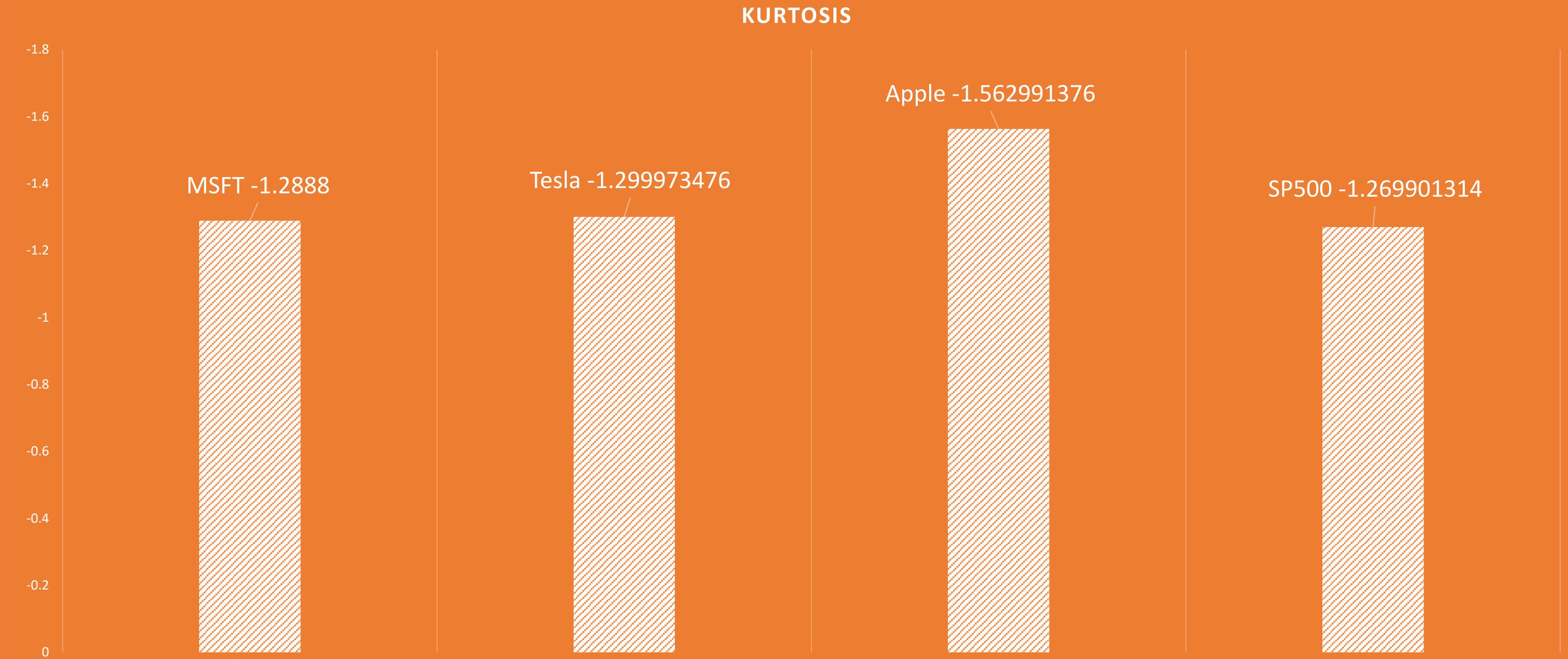
TESLA

APPLE

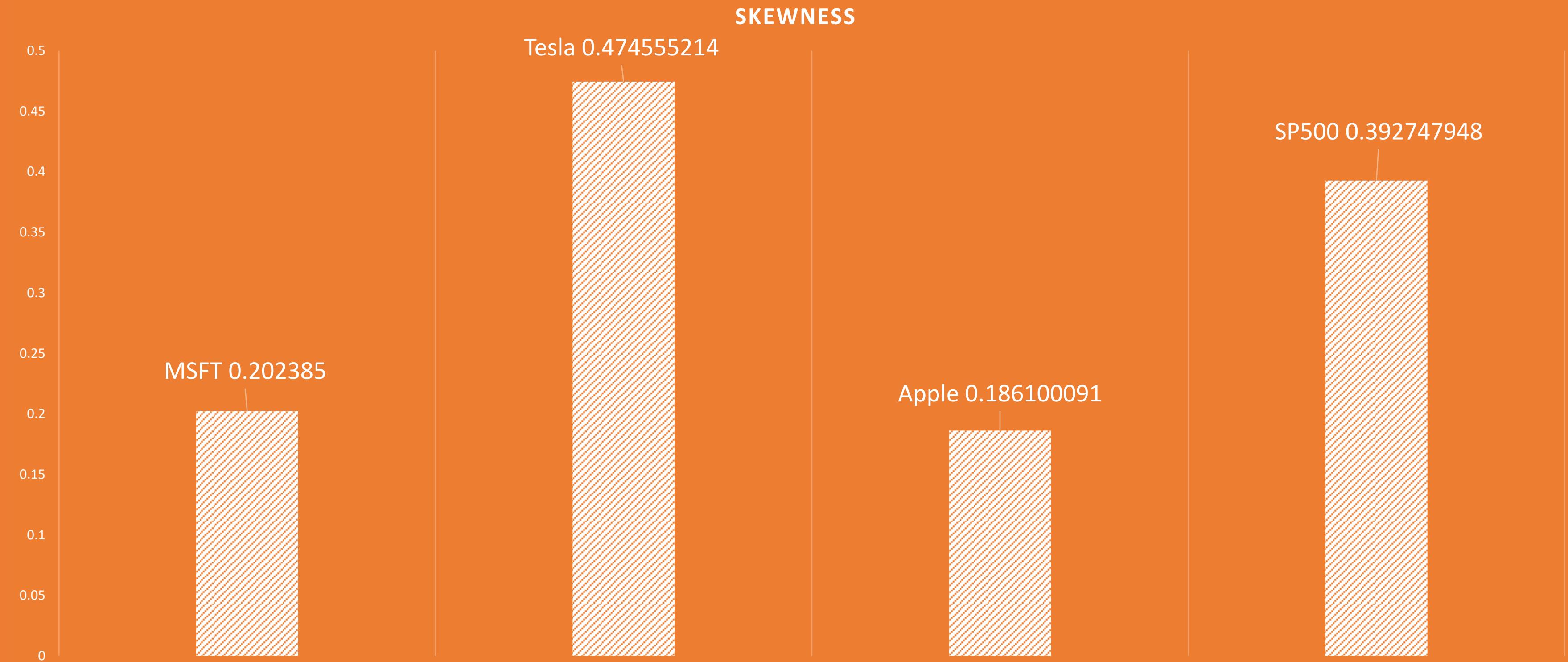
SP500

	Mean	Mean	Mean	Mean	Mean
Median	194.51	66.01	87.85	3251.05	3441.66
Mode	95.14	24.00	127.82	2832.41	
Count	1238.00	1237.00	1237.00	1238.00	
Maximum	344.62	411.47	182.63	4804.51	
Minimum	86.06	12.07	35.99	2290.71	
Variance	5608.79	14142.81	2149.28	450521.49	
Standard Deviation	74.92	118.97	46.38	671.48	
Kurtosis	-1.29	-1.30	-1.56	-1.27	
Skewness	0.20	0.47	0.19	0.39	
Range	258.56	399.40	146.64	2513.80	
Standard Error	2.13	3.38	1.32	19.08	
Standard Deviation					
Kurtosis					
Skewness					
Range					
Standard Error					

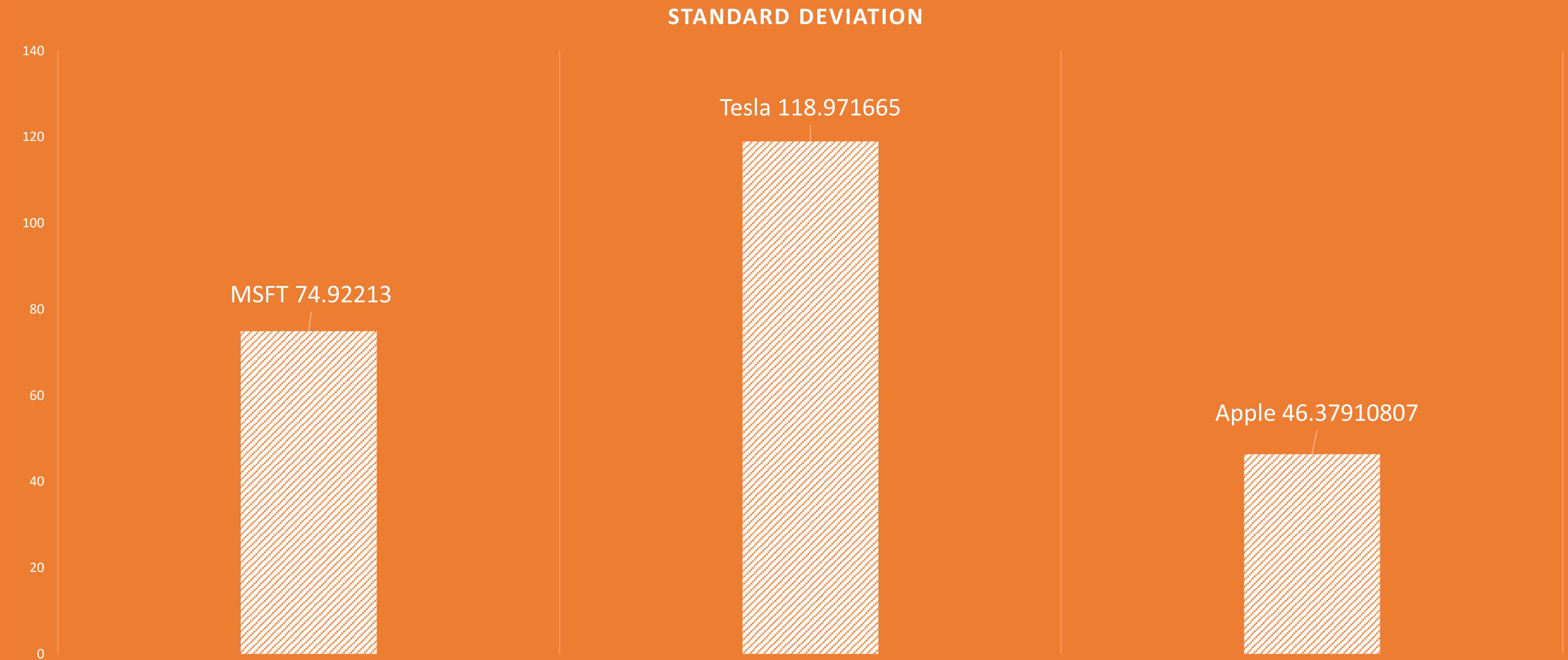
- Result shows that Tesla has the highest volatility among the stocks, with a mean of 131.47, a median of 66.01, and a mode of 24, indicating significant price fluctuations and higher investment risk.
- Tesla has the highest variance, indicating that its stock prices fluctuate the most.



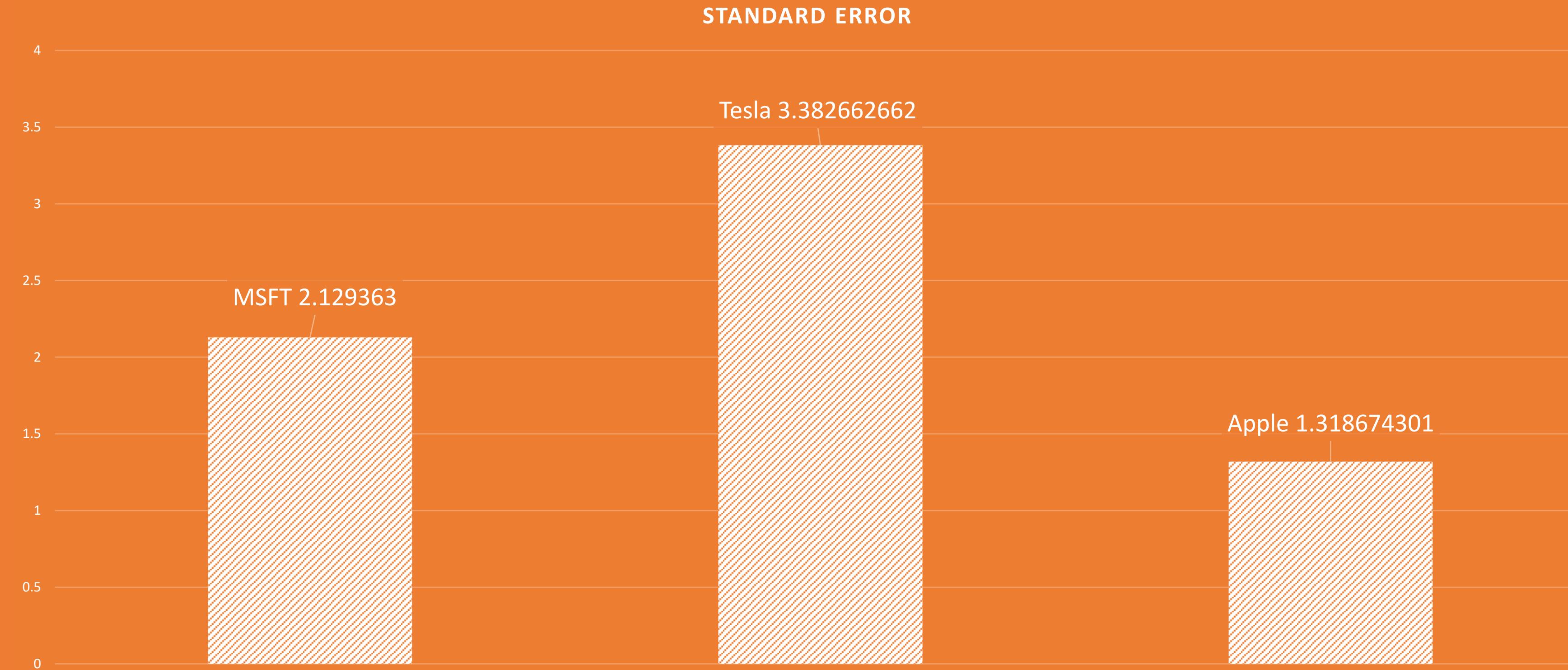
- Apple has the least potential for big price swings compared to the SP500, Microsoft, and Tesla.
- Tesla and Microsoft have risk levels more similar to the SP500.
- Based on kurtosis, Tesla and Microsoft have risk levels that are more similar to the SP500 than Apple's.



- Tesla (0.4746) and the SP500 (0.3927) both have higher skewness, meaning they are more tilted toward positive returns (right-skewed).
- Microsoft (0.2024) and Apple (0.1861) have lower skewness, meaning their returns are more balanced but still slightly skewed to the right.
- Tesla and the SP500 have a higher correlation in price movements, showing a greater chance of big positive changes.



- Tesla has the highest standard deviation (118.97), indicating the most price fluctuations among the stocks.
- Microsoft (74.92) and Apple (46.38) have lower fluctuations compared to Tesla.
- Microsoft and Apple's stock prices move more closely with the SP500, showing less fluctuation compared to Tesla's stock.



- Tesla has the highest standard error (3.38), indicating more variability in its average price.
- Microsoft (2.13) and Apple (1.32) have lower standard errors, meaning their average prices are more stable.
- This means Microsoft and Apple's average stock prices are more stable and closely correlated with the SP500.

Statistical Analysis : Outcome

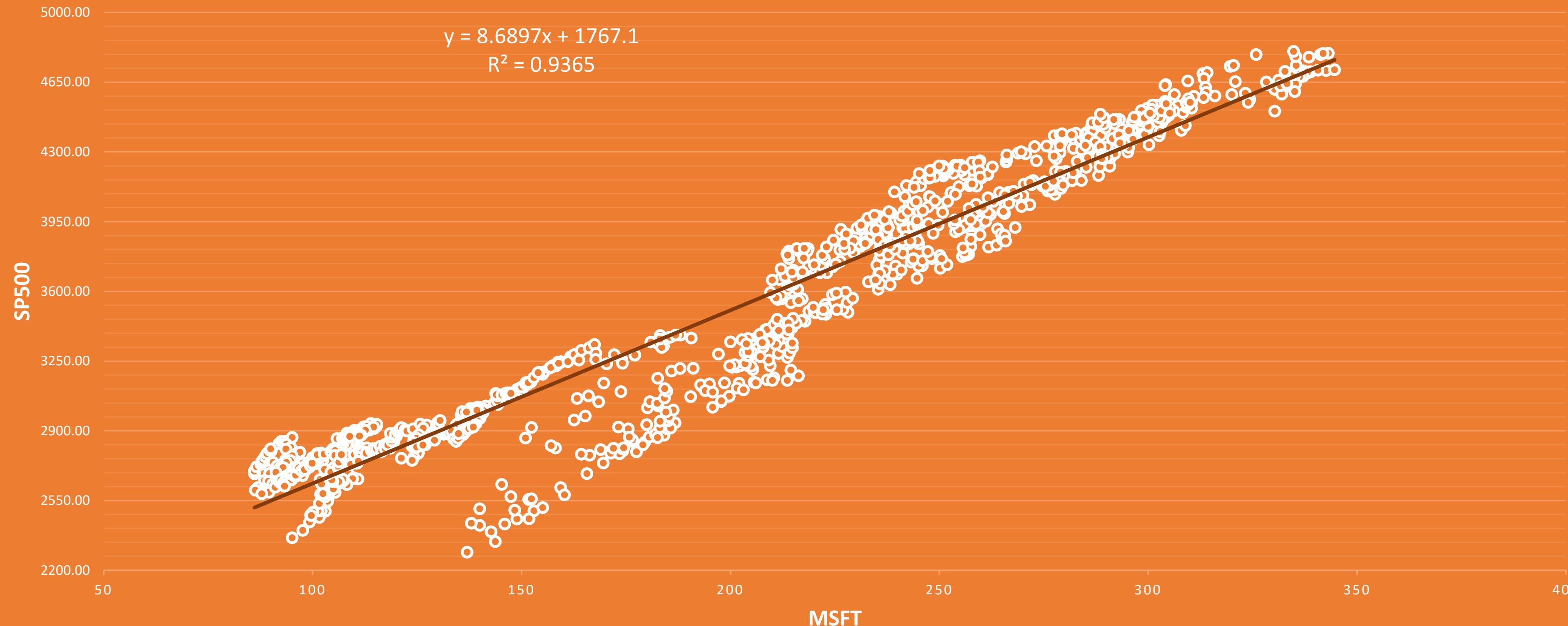
- Overall, all three are blue-chip stocks that are relatively safe investments, but Microsoft and Apple closely follow the SP500, showing less fluctuation compared to Tesla.
- The results show that MSFT has the most similar price movements to the SP500 compared to Tesla and Apple.
- Although Tesla is the riskiest stock to invest in, it offers a greater potential for higher returns compared to Microsoft and Apple. High risk often means high reward.

Regression Analysis

- How changes in the SP500 (as the independent variable) affect the stock prices of MSFT, Tesla, and Apple (as dependent variables).
- We will show if there is a positive or negative correlation between the stock prices and the SP500.
- By comparing the regression results for each stock, investors can assess which stock is more sensitive to market movements.

MSFT / SP500 REGRESSION CHART

r 0.968
slope 8.69
intercept 1767



Microsoft / SP500

- The slope indicates that for every 1-point increase in the SP500, MSFT stock price increases up by 8.69 points.
- The intercept suggests that the model predicts the SP500 would be around 1767 if Microsoft's price were 0.
- The high "r" value (0.968) reflects a strong correlation between MSFT and SP500 prices.

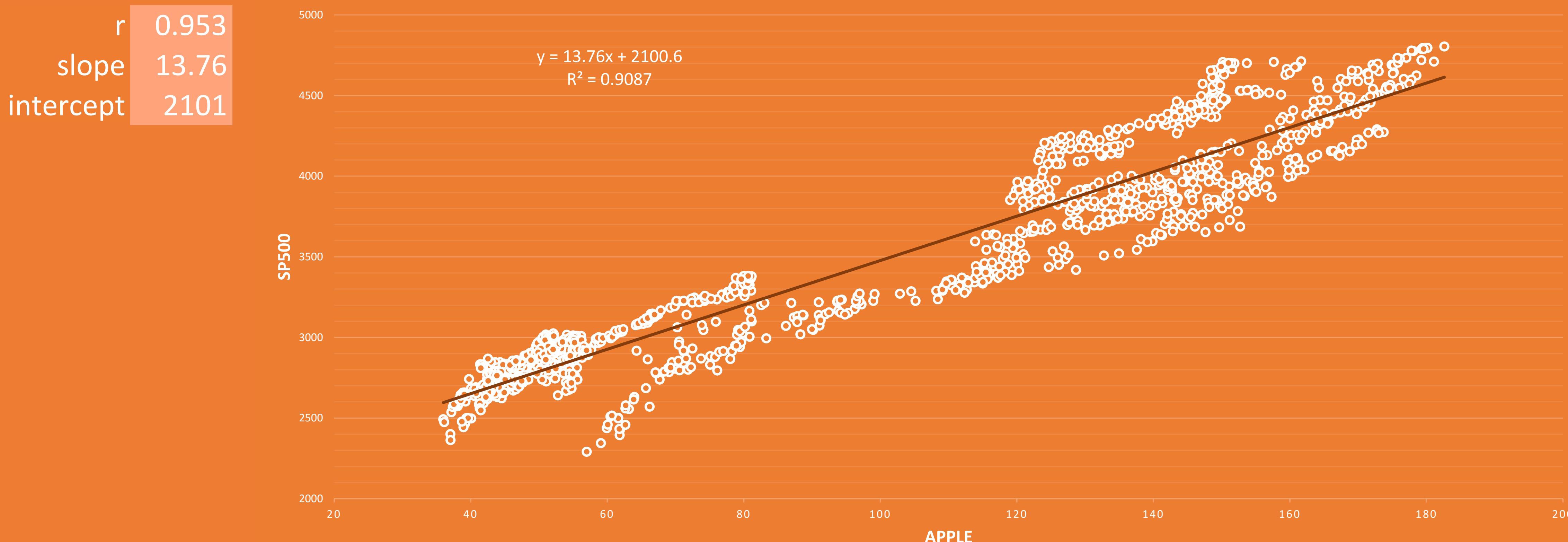
TESLA / SP500 REGRESSION CHART



Tesla / SP500

- The slope indicates that For every 1-point increase in Tesla, the SP500 increases by 5.359 points.
- The intercept suggests that the model predicts that If Tesla's value is 0, the SP500 would be 2750.
- The high "r" value (0.942) reflects a Strong positive relationship; Tesla and SP500 move closely together.

APPLE / SP500 REGRESSION CHART



Apple / SP500

- The slope indicates that For every 1-point increase in Apple, the SP500 increases by 13.76 points.
- The intercept suggests that the model predicts that If Apple's value is 0, the SP500 would be 2101.
- The high “r” value (0.953) indicates a strong positive relationship, meaning Apple and the SP500 tend to move closely in sync.

Regression Analysis : Outcome

- **Microsoft** has the strongest correlation ($r = 0.968$), suggesting it's less risky and more stable like the SP500.
- **Tesla** has the lowest correlation ($r = 0.942$) and could be seen as more volatile.
- **Apple** has a high slope (13.76), indicating bigger impacts on the SP500 but also more potential risk.

Conclusion

- **Microsoft:**

- Strongest correlation with the SP500 ($r = 0.968$), making it less volatile and a safer investment.
- Closely follows the SP500 with minimal price fluctuations.

- **Tesla:**

- Lowest correlation ($r = 0.942$), indicating higher volatility and more risk.
- Riskier, but with potential for higher returns.

- **Apple:**

- High slope (13.76), meaning its price movements have a bigger impact on the SP500.
- Strong correlation ($r = 0.953$), but more potential risk compared to Microsoft due to larger price swings.

- **Overall:**

- All three stocks are relatively safe as blue-chip stocks.
- Microsoft and Apple follow the SP500 more closely and are less risky than Tesla.
- Significant volatility is noted in March and November; investors should be cautious or take advantage of potential price discounts during these periods.
- Tesla presents the highest risk but also the potential for greater returns.