

Stock Price Analysis

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Introduction

- The dataset in focus provides livestock values of three major companies: Microsoft, Apple, and Tesla.
- This data has been sourced from Yahoo Finance, a reputable platform for financial information.
- The dataset offers a thorough view of stock performance over the years from 2018 to 2023.
- Alongside individual stock values, the dataset also incorporates the values of the S&P 500, a primary stock market index.
- Key columns in the dataset include Date, Open, High, Low, Close Price, Adjusted Close Price, Volume, and Percentage Change (%chng).

Date: The specific day on which the stock data is recorded.

Open: The price of the stock at the beginning of the trading day.

High: The highest price of the stock during the trading day.

Low: The lowest price of the stock during the trading day.

Close Price: The price of the stock at the end of the trading day.

Adjusted Close Price: The closing price adjusted for any corporate actions (e.g., dividends, stock splits).

Volume: The number of shares traded during the trading day.

Percentage Change (%chng): The percentage change in the stock's price from the previous trading day.

- [Link to Data set](#)

Objectives



The main objective is to perform a descriptive statistical analysis on stock prices of Microsoft, Apple, and Tesla from 2018 to 2023, utilizing linear regression and beta coefficients to assess risk. This involves visualizing trends through charts, including scatter plots and histograms, and calculating key descriptive statistics like mean, median, and standard deviation, to offer an in-depth insight into stock price dynamics for strategic decision-making.

Descriptive Statistics

MICROSOFT 

Microsoft	
Mean	190.82678
Standard Error	2.1032224
Median	198.82471
Mode	89.883148
Standard Deviation	75.188361
Sample Variance	5653.2896
Kurtosis	-1.310574
Skewness	0.1402608
Range	259.86961
Minimum	80.055191
Maximum	339.92481
Sum	243876.63
Count	1278

table 1

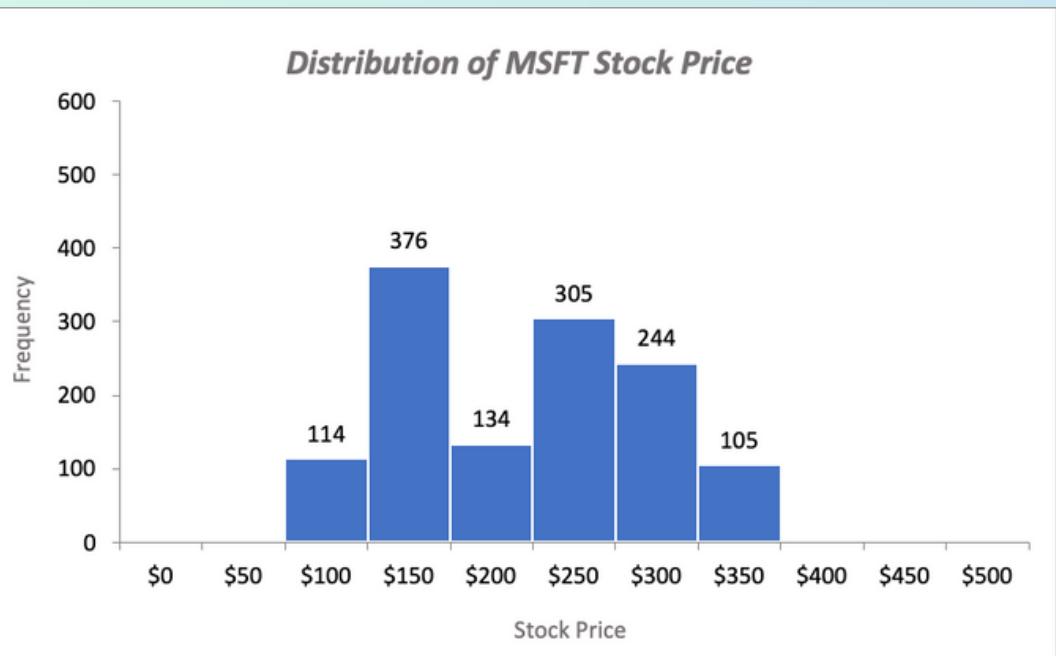


figure 1

- The average adjusted stock price is approximately \$190.83, indicating a moderate level of stock value over the observed period.
- A standard deviation of \$75.19 suggests significant price volatility, indicating potential opportunities for traders but also higher risk for investors.
- A skewness of 0.14 confirms this slight negative skew, indicating that there are more days with stock prices below the mean.
- A kurtosis of -1.31 suggests a flatter distribution of stock prices, implying fewer extreme values than a normal distribution.
- The range of \$259.87 shows a substantial spread between the highest and lowest adjusted stock prices.
- The average trading volume is around 30,267,789 shares, showing a high level of trading activity.
- A standard deviation of 12,847,020.8 indicates significant fluctuations in trading volume.
- The median trading volume is lower than the mean (27,062,700 vs. 30,267,789), suggesting a positive skew in trading volume distribution.
- A skewness of 2.02 confirms this positive skew, indicating more days with trading volumes below the mean.

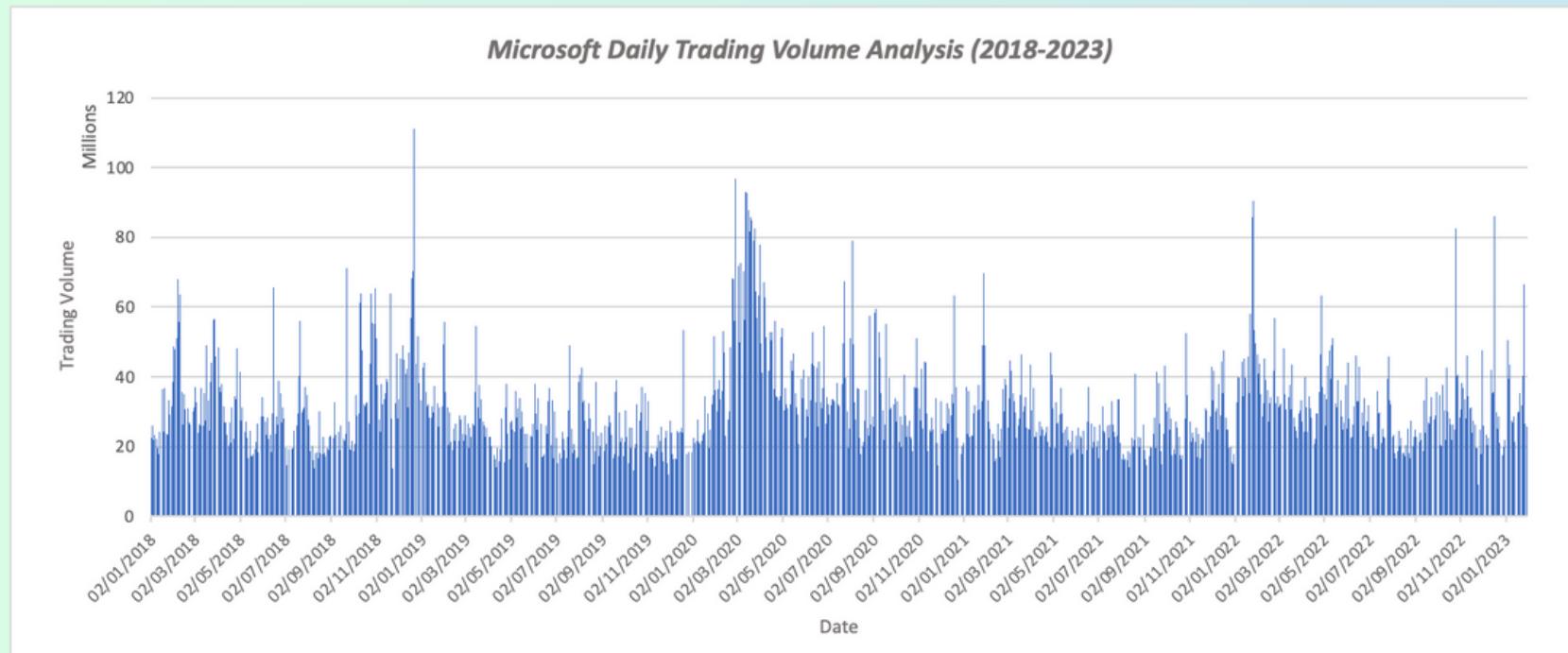


figure 2

Descriptive Statistics

TELSA 

Tesla	
Mean	131.7902812
Standard Error	3.272219195
Median	97.6400035
Mode	23.620667
Standard Deviation	116.9789759
Sample Variance	13684.08079
Kurtosis	-1.260371058
Skewness	0.468792298
Range	398.038668
Minimum	11.931333
Maximum	409.970001
Sum	168427.9793
Count	1278

table 2

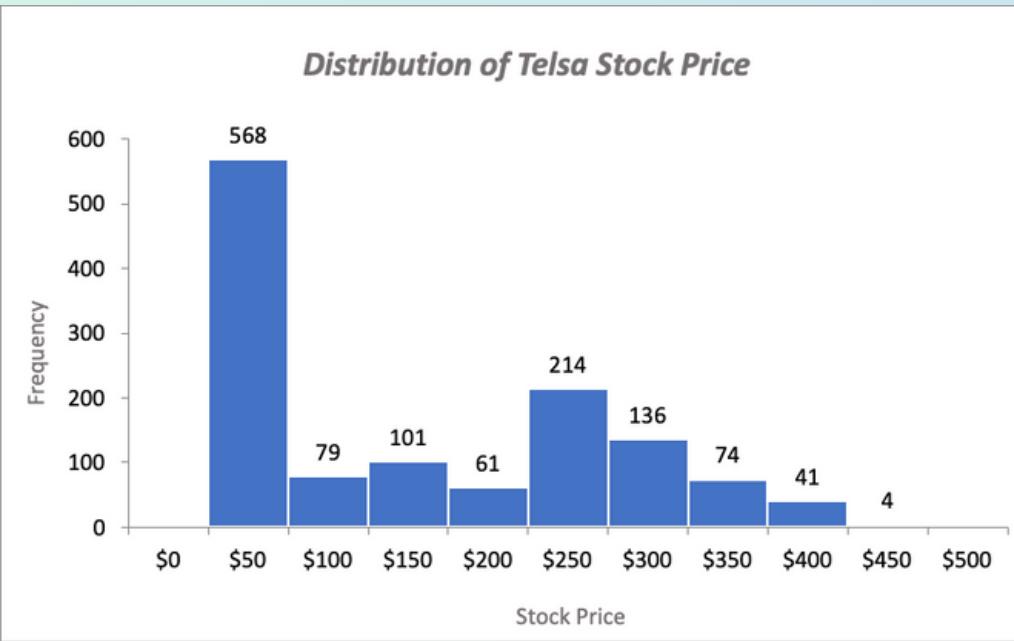


figure 3

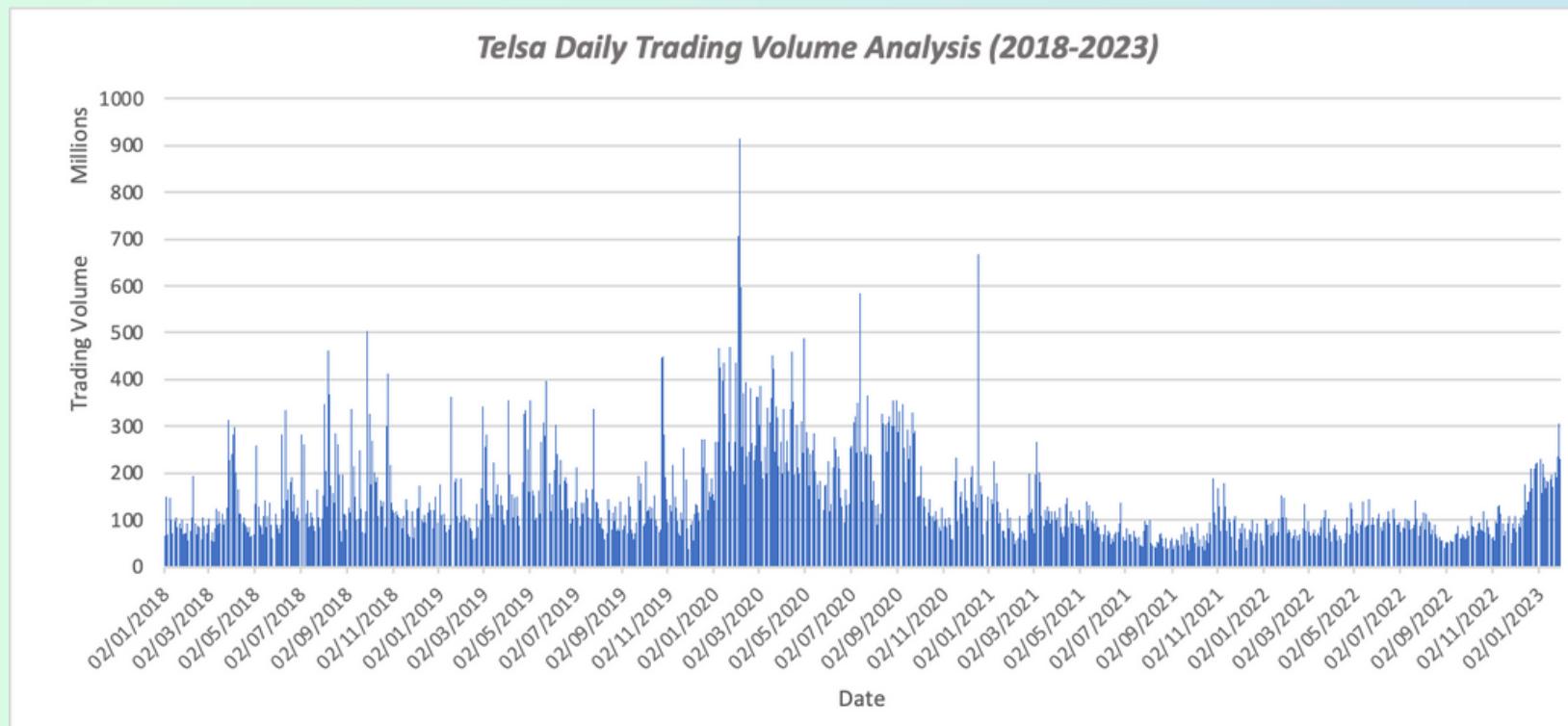


figure 4

- The mean adjusted stock price is approximately \$131.79, indicating a moderate level of stock value over the observed period.
- A substantial standard deviation of \$116.98 highlights significant price volatility, suggesting potential for high-risk, high-reward trading scenarios.
- A skewness of 0.47 indicates a slight positive skew in stock prices, with more days experiencing prices above the average.
- A kurtosis of -1.26 suggests a flatter distribution of stock prices, implying fewer extreme values than a normal distribution.
- The range of \$398.04 shows a considerable spread between the highest and lowest adjusted stock prices, indicating potential for large price swings.
- The stock demonstrates extremely high trading activity, with an average volume of around 133.4 million shares.
- A standard deviation of 89.9 million indicates substantial variations in trading volume.
- A skewness of 2.46 shows a positive skew, indicating more days with trading volumes below the mean but occasional spikes in trading activity.

Descriptive Statistics



Apple	
Mean	97.38823308
Standard Error	1.302620443
Median	94.1483495
Mode	41.246353
Standard Deviation	46.56754217
Sample Variance	2168.535984
Kurtosis	-1.580637888
Skewness	0.123055369
Range	146.650146
Minimum	34.309586
Maximum	180.959732
Sum	124462.1619
Count	1278

table 3

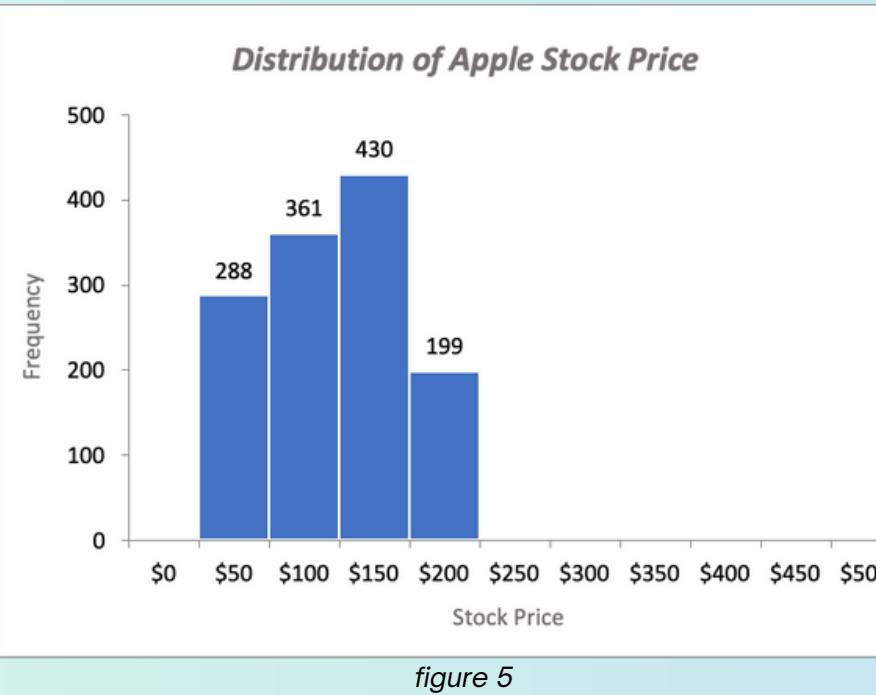


figure 5

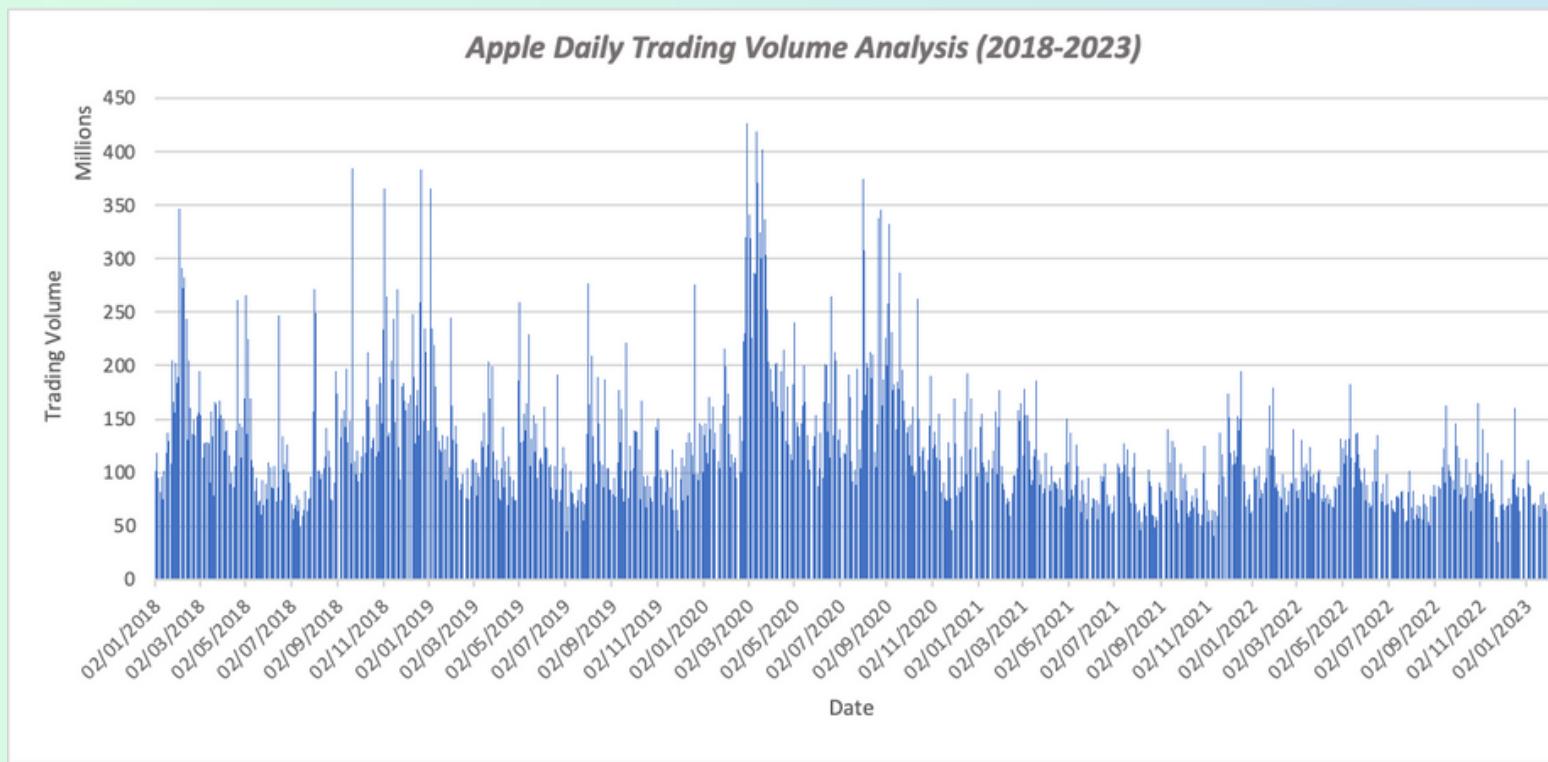


figure 6

- The mean adjusted stock price stands at approximately \$97.39, showcasing a moderate valuation over the observed period.
- A standard deviation of \$46.57 indicates a moderate level of price volatility, suggesting a balanced risk-reward scenario for traders and investors.
- The skewness of 0.12 points to a slight positive skew in stock prices, with more days experiencing prices above the average.
- A kurtosis of -1.58 suggests a flatter distribution of stock prices, indicating fewer extreme values than a normal distribution.
- The range of \$146.65 highlights a substantial spread between the highest and lowest adjusted stock prices, pointing to potential for significant price movements.
- Apple's stock exhibits high trading activity, with an average volume of around 116.2 million shares, though with noticeable fluctuations.
- A standard deviation of 54.9 million indicates substantial variations in trading volume.
- A skewness of 2.03 shows a positive skew, indicating more days with trading volumes below the mean but occasional spikes in trading activity.

Descriptive Statistics

S&P 500	
Mean	3457.230055
Standard Error	18.65160759
Median	3298.025
Mode	2783.02
Standard Deviation	666.7786672
Sample Variance	444593.7911
Kurtosis	-1.298909977
Skewness	0.33118575
Range	2559.16
Minimum	2237.4
Maximum	4796.56
Sum	4418340.01
Count	1278

table 4



figure 7

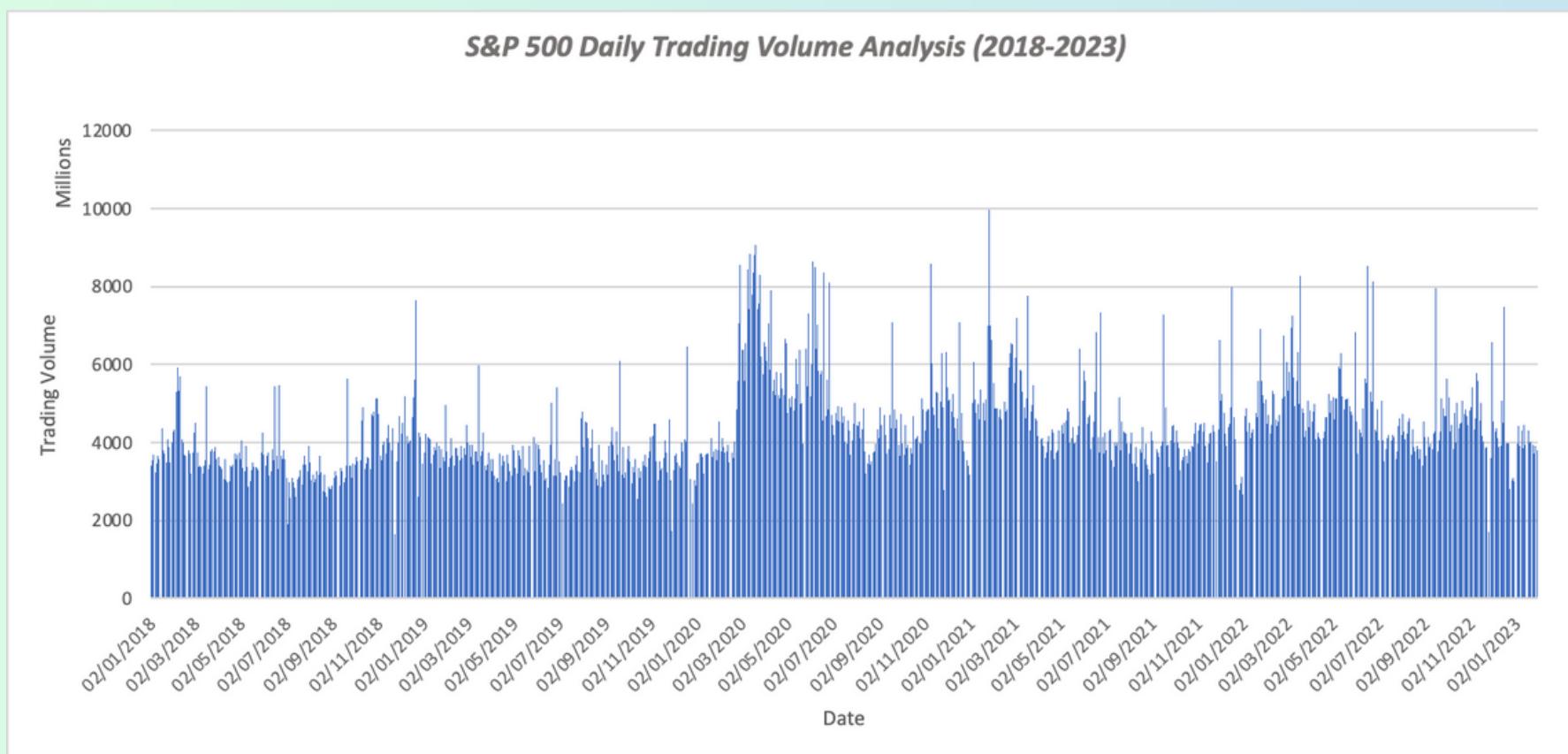


figure 8

S&P 500

- The S&P 500 shows a stable average index value of approximately 3457.23, indicating a consistent performance over the observed period.
- A standard deviation of 666.78 suggests a moderate level of volatility, balancing potential for growth with stability.
- The skewness of 0.33 points to a slight positive skew in index values, with more days experiencing values above the average.
- A kurtosis of -1.30 indicates a flatter distribution of index values, suggesting fewer extreme values than a normal distribution.
- The range of 2559.16 highlights a substantial spread between the highest and lowest index values, pointing to potential for significant market movements.
- The S&P 500 exhibits extremely high trading activity, with an average volume of around 4.23 billion shares, though with noticeable fluctuations.
- A standard deviation of 1.07 billion indicates substantial variations in trading volume.
- A skewness of 1.57 shows a positive skew, indicating more days with trading volumes below the mean but occasional spikes in trading activity.

Time Series Analysis

MSFT, Tesla, Apple & S&P500
(2018 - 2023)

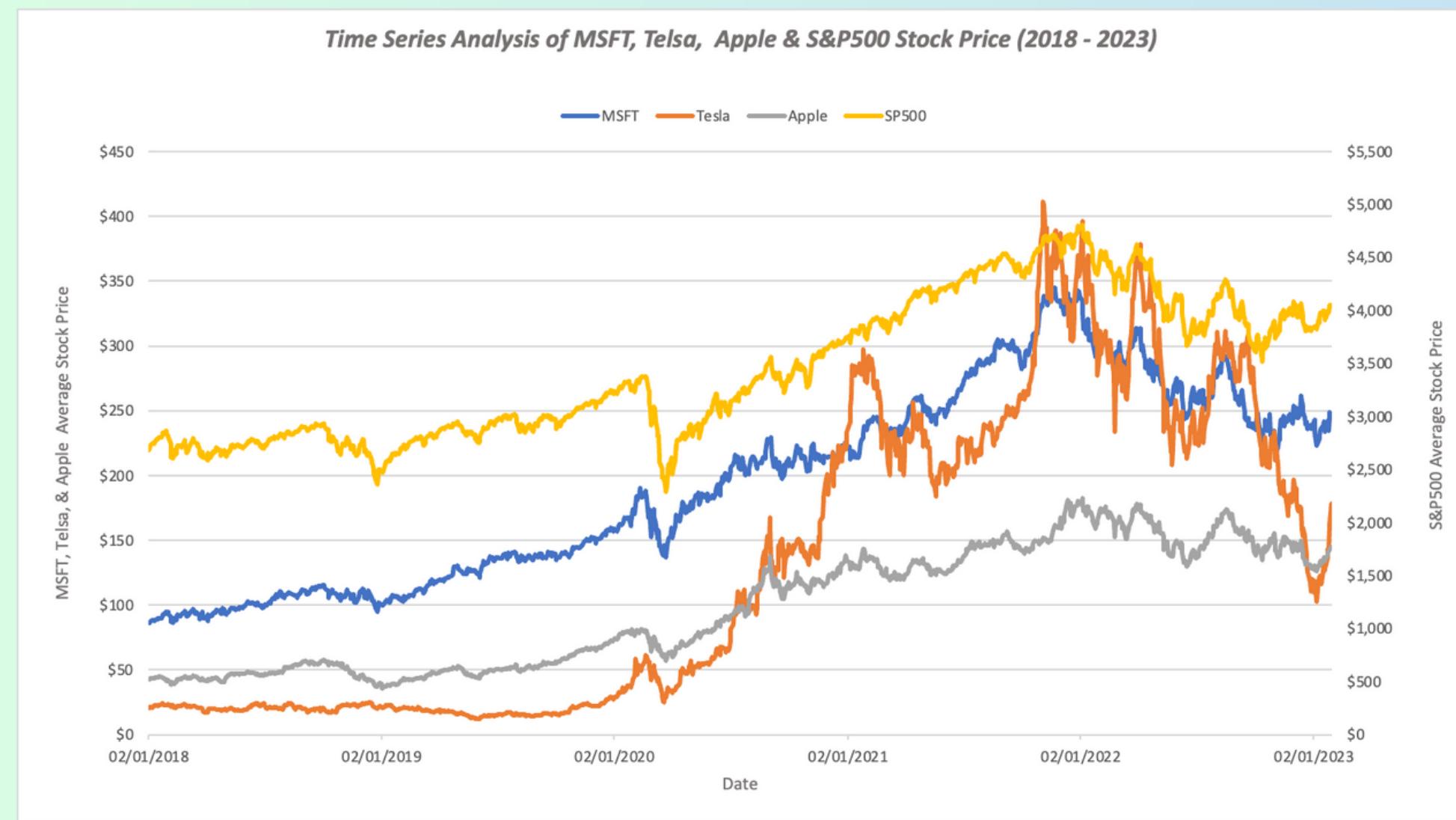


figure 9

Microsoft:

- Displayed consistent growth since 2018.
- The growth trajectory accelerated in early 2020.
- The stock reached its zenith near \$300 towards the end of 2021.
- The stock price distribution is platykurtic, indicating a moderate range of price fluctuations.

Apple:

- Witnessed modest growth, starting at half of Microsoft's price in 2018.
- From late 2020 onwards, Apple's growth pattern became more stable, showing resilience against abrupt price changes.

Tesla:

- Underwent remarkable growth starting in 2020, especially during the pandemic period.
- The stock surged from \$40 in Q1 2020 to a staggering \$400 by the end of 2021, albeit accompanied by increased volatility.
- While its stock price distribution is also platykurtic, Tesla experiences more pronounced price variations, indicating higher volatility.

General Trend:

- All three companies, Microsoft, Tesla, and Apple, showcased significant growth during this period.
- A notable downturn was observed at the beginning of 2020, attributed to the pandemic's initial impact. However, a swift rebound and impressive growth ensued.

Linear Regression

Daily % Changes of MSFT, Tesla, Apple VS. S&P 500

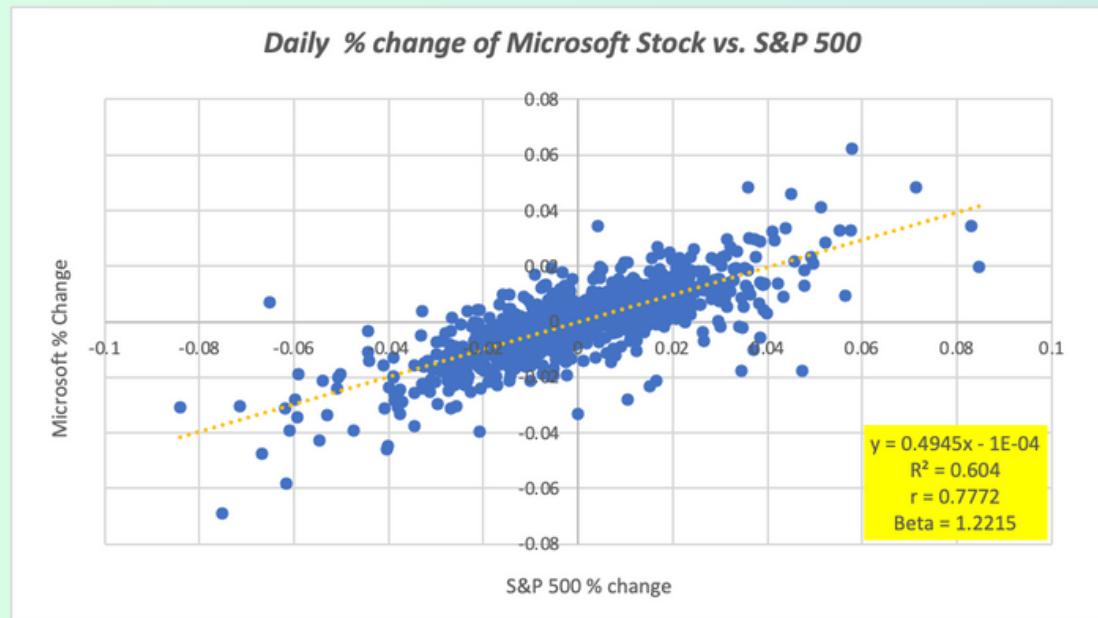


figure 10

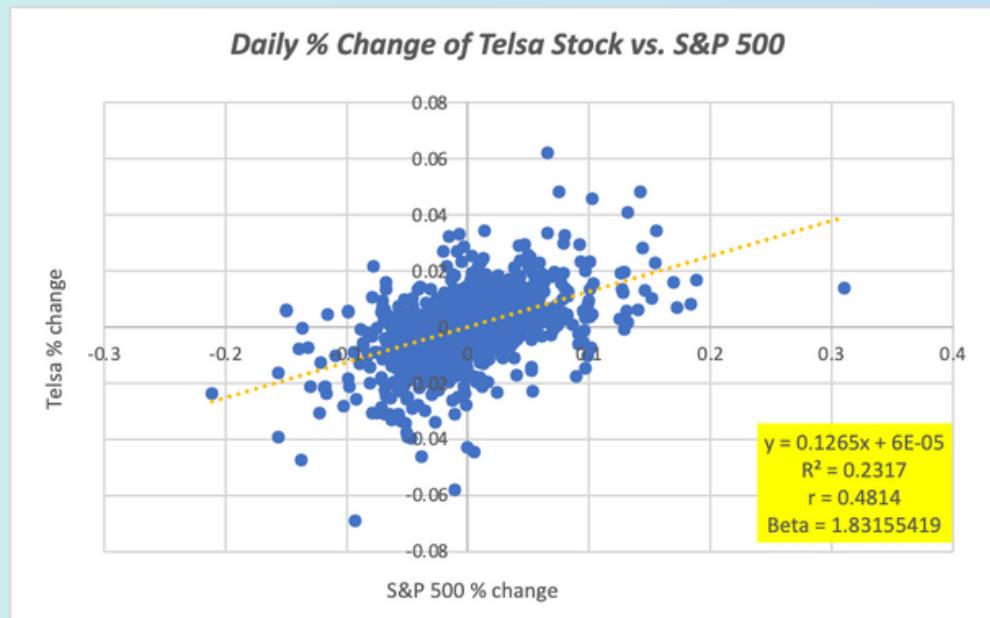


figure 11

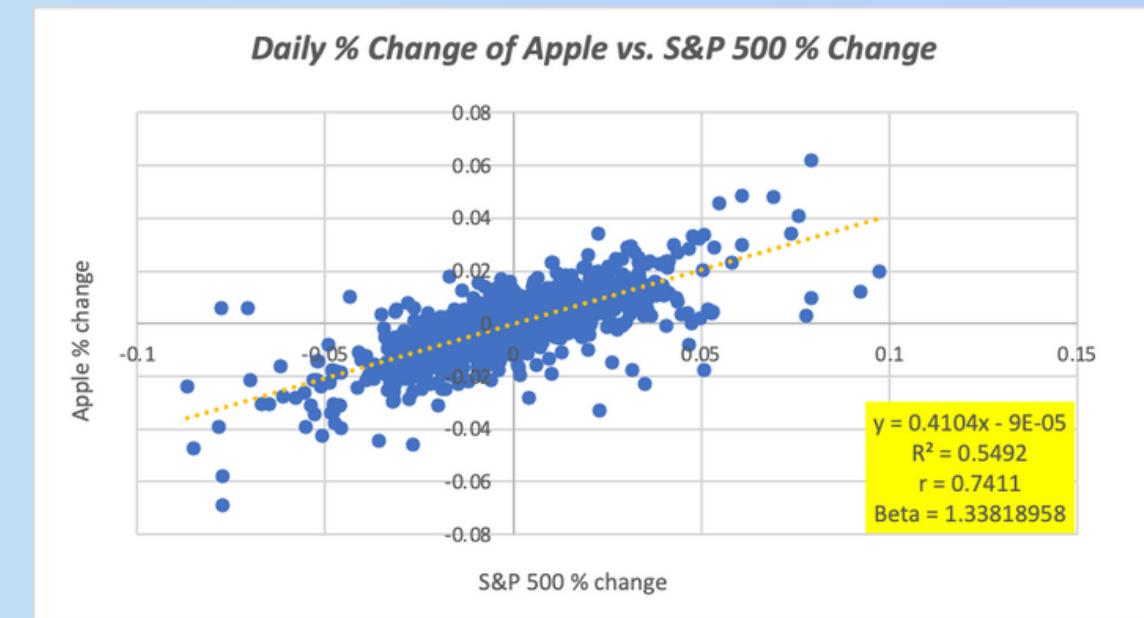


figure 12

- **R² Value = 0.604:** indicates that 60.4% of the variability in Microsoft's returns can be explained by the S&P 500's returns.
- **Beta : 1.2215:** indicates Microsoft has a Beta greater than 1, suggesting that it tends to be more volatile than the market.
- **r = 0.7772:** indicates there is a strong positive correlation between Microsoft's returns and the S&P 500's returns.

Insight: Microsoft has a significant positive relationship with the S&P 500, showing higher volatility compared to the market. Investors in Microsoft can expect larger fluctuations in returns.

- **R² Value = 0.2317:** indicates only about 23.17% of the variability in Tesla's returns can be explained by the S&P 500's returns.
- **Beta = 1.8316:** indicates Tesla has a very high Beta, suggesting that it is significantly more volatile than the market.
- **r = 0.4814:** indicates there is a moderate positive correlation between Tesla's returns and the S&P 500's returns.

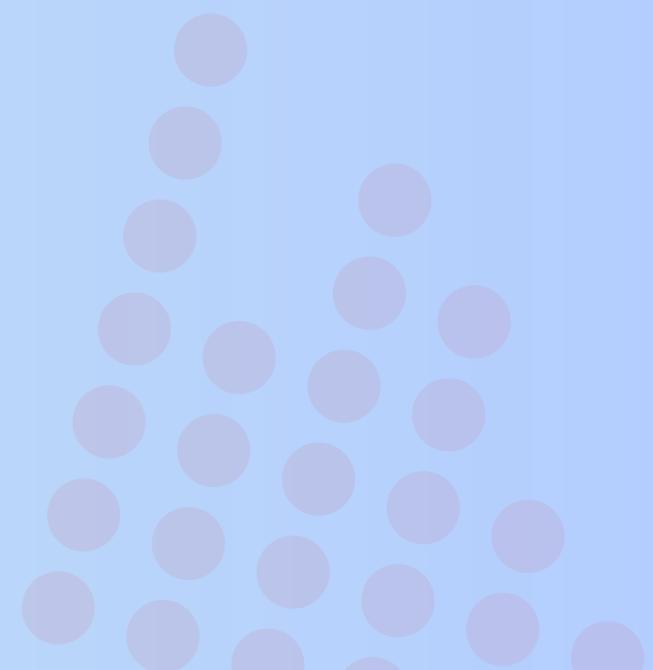
Insight: Tesla shows a moderate positive relationship with the S&P 500 but is highly volatile. Investors should be prepared for substantial fluctuations in returns.

- **R² Value = 0.5492:** indicates that 54.92% of the variability in Apple's returns can be explained by the S&P 500's returns.
- **Beta = 1.3382:** indicates that Apple has a Beta greater than 1, suggesting that it is more volatile than the market.
- **r = 0.7411:** indicates that there is a strong positive correlation between Apple's returns and the S&P 500's returns.

Insight: Apple has a significant positive relationship with the S&P 500 and is more volatile than the market. Investors can expect larger but consistent fluctuations in returns.

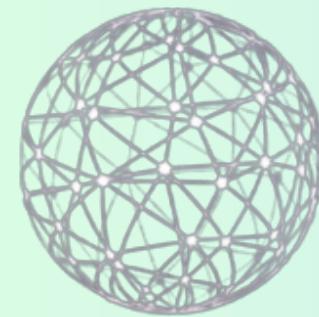
Summary

- All three companies (Microsoft, Tesla, and Apple) have a positive relationship with the S&P 500, indicating that their returns generally move in the same direction as the market.
- Microsoft and Apple have strong positive correlations with the S&P 500, while Tesla has a moderate positive correlation.
- Tesla is the most volatile among the three when compared to the market, followed by Microsoft and then Apple.
- The R² values suggest that the S&P 500's returns explain a significant portion of the variability in Microsoft's and Apple's returns, but less so for Tesla.
- Investors in these companies, especially Tesla and Microsoft, should be prepared for higher volatility compared to the market.



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Inspiring generation

Thank You!!

