STATISTICAL STOCK PERFORMANCE ANALYSIS

Microsoft, Tesla, Apple vs. S&P 500

PRESENTED BY,
SWETHA KIZHAVANA JOSEPH
BUSINESS ANALYST INTERN

INTRODUCTION

- The stock market is a place where people buy and sell shares of companies. It enables companies to raise money and investors to grow their wealth.

- Stock analysis involves evaluating the performance and financial health of companies to make informed decisions. By analysing historical data and trends, investors can identify potential opportunities and risks.

- This project aims to analyse and compare the stock performance of three major companies—Microsoft, Tesla, and Apple with the S&P 500 index, by examining their price trends, moving averages, and correlations with the S&P 500, conducting regression analyses to assess the influence of market changes, and evaluating trading volumes to derive actionable investment insights.

DATASET DESCRIPTION

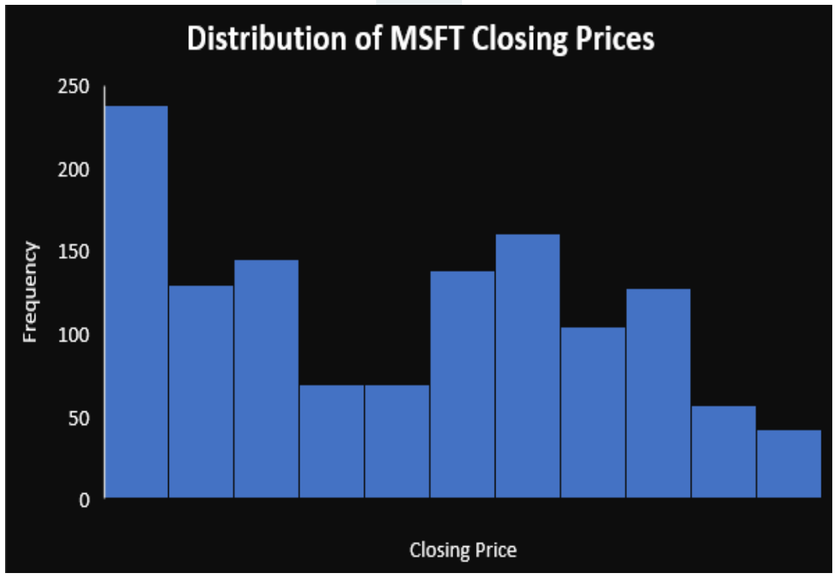
- The dataset covers daily live stock values of Microsoft, Tesla, and Apple and S&P 500 index over the period 2018-2023, providing a comprehensive view of the stock performance over the last five years.

- The data for this analysis was obtained from Yahoo Finance, a trusted source for historical stock prices and financial information.

- The dataset includes metrics such as Date, Open, High, Low, Close, Adj Close prices, and percentage change of Microsoft, Apple, Tesla, and S&P 500 which is a stock market index.

STATISTICAL OVERVIEW OF MICROSOFT

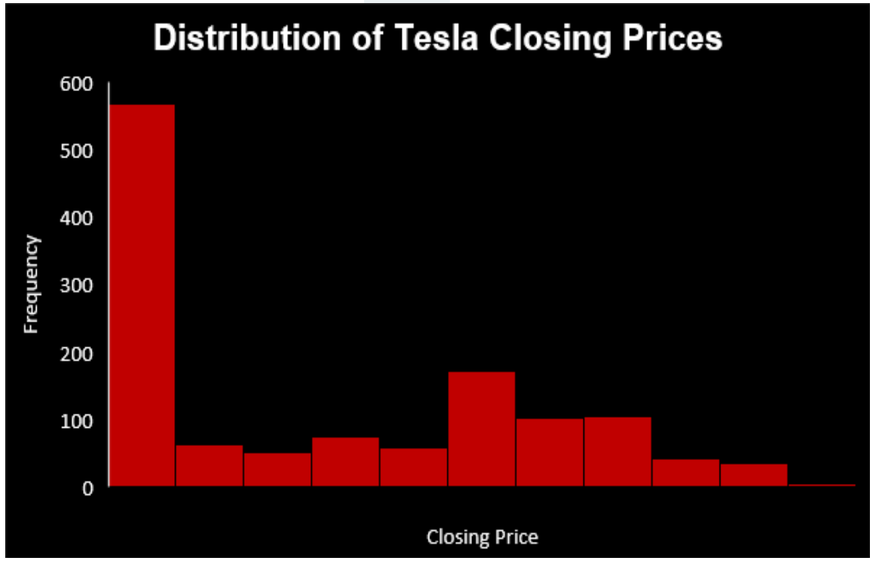
MSFT (Close)	
Mean	194.5105477
Standard Error	2.076748161
Median	203.050003
Mode	92.330002
Standard Deviation	74.2419314
Sample Variance	5511.864378
Kurtosis	-1.290677547
Skewness	0.147216579
Range	258.099983
Minimum	85.010002
Maximum	343.109985
Sum	248584.4799
Count	1278



- The dataset contains data of 1278 trading days.
- On observing descriptive statistics, the high standard deviation (74.24) and range (258.10) indicate significant variability of stock prices.
- Moreover, the mean ($194.51) being lower than the median ($203.05) suggests a slight right skew, confirmed by the skewness value and histogram shape.
- The mode ($92.33) is much lower than the mean and median, indicating many higher values in the distribution.
- The histogram's shape and negative kurtosis indicate a flat distribution with lighter tails than a normal distribution.
- Investors should be aware of the stock's variability and potential for price fluctuations.

STATISTICAL OVERVIEW OF TESLA

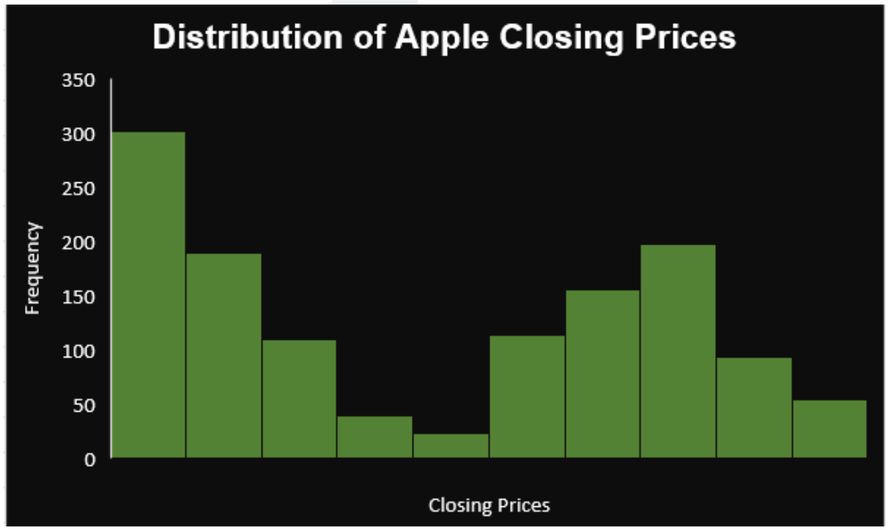
Tesla (Close)	
Mean	131.79028
Standard Error	3.2722192
Median	97.640004
Mode	23.620667
Standard Deviation	116.97898
Sample Variance	13684.081
Kurtosis	-1.260371
Skewness	0.4687923
Range	398.03867
Minimum	11.931333
Maximum	409.97
Sum	168427.98
Count	1278



- Tesla shows higher variability (116.98) and volatility in stock prices than MSFT and Apple.
- The mean ($131.79) is higher than the median ($97.64), indicating a positive skew. This suggests that there are more days with higher-than-average increases in closing prices than days with decreases.
- The negative kurtosis and histogram's shape indicate a flatter distribution compared to a normal distribution.
- This suggests that while the stock often closed at lower prices, there were also notable periods of high closing prices, contributing to its overall variability.

STATISTICAL OVERVIEW OF APPLE

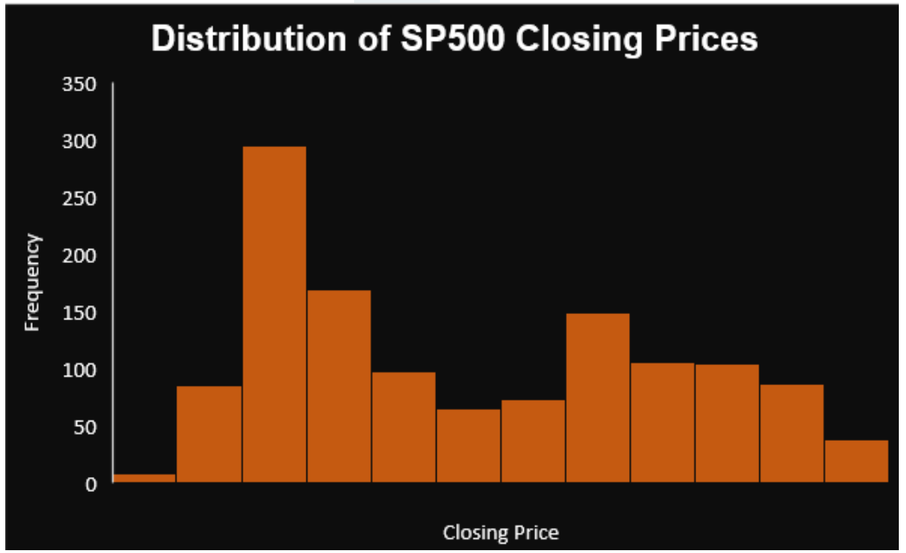
Apple(Close)	
Mean	98.64651602
Standard Error	1.292090365
Median	95.6150015
Mode	145.860001
Standard Deviation	46.19110109
Sample Variance	2133.61782
Kurtosis	-1.579983416
Skewness	0.121783854
Range	146.462494
Minimum	35.547501
Maximum	182.009995
Sum	126070.2475
Count	1278



- Apple shows moderate volatility with a standard deviation of 46.191101, which is lower than both Microsoft and Tesla.
- The mean ($98.65) is slightly higher than the median ($95.62), indicating a slight positive skew in the data, which is verified by the histogram's shape.
- The range of 146.46 between the minimum and maximum daily changes indicates the presence of outliers & Apple's stock experienced significant fluctuations during the analysed period.
- The overall flat distribution implies occasional high and low-price extremes.

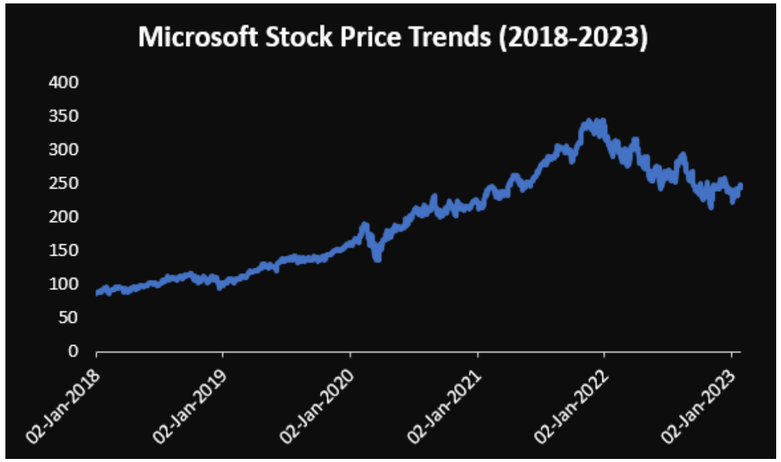
STATISTICAL OVERVIEW OF SP500

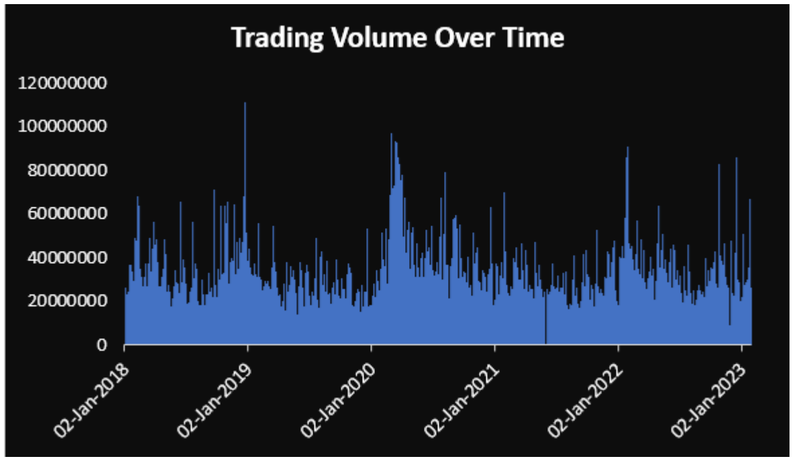
SP500 (Close)	
Mean	3457.230055
Standard Error	18.65160759
Median	3298.025
Mode	2783.02
Standard Deviation	666.7786672
Sample Variance	444593.7911
Kurtosis	-1.298909977
Skewness	0.33118575
Range	2559.16
Minimum	2237.4
Maximum	4796.56
Sum	4418340.01
Count	1278

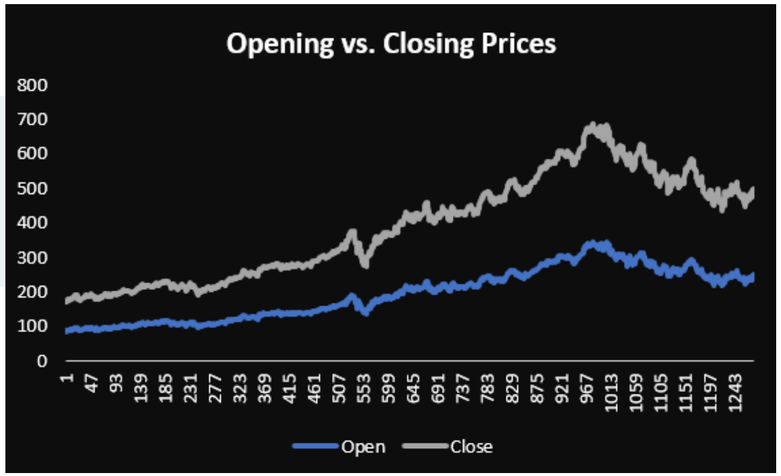


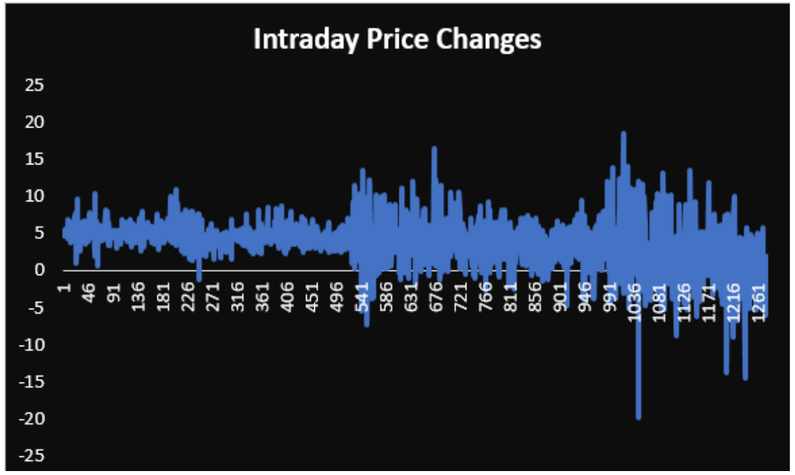
- The mean (3457.23) is slightly higher than the median (3298.03).
- The S&P 500 has a higher standard deviation compared to the individual stocks, indicating greater variability in the index's closing prices.
- The S&P 500’s widest range shows the broad market's movement.
- The S&P 500 has negative kurtosis, which suggests fewer extreme values in both directions.
- The S&P 500's distribution reflects the collective performance of 500 companies, showing less dramatic peaks compared to individual stocks.

MICROSOFT STOCK ANALYSIS (2018-2023)



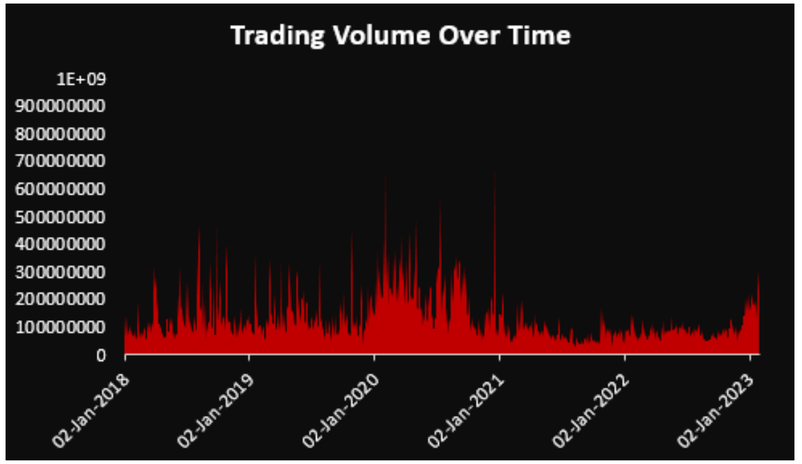


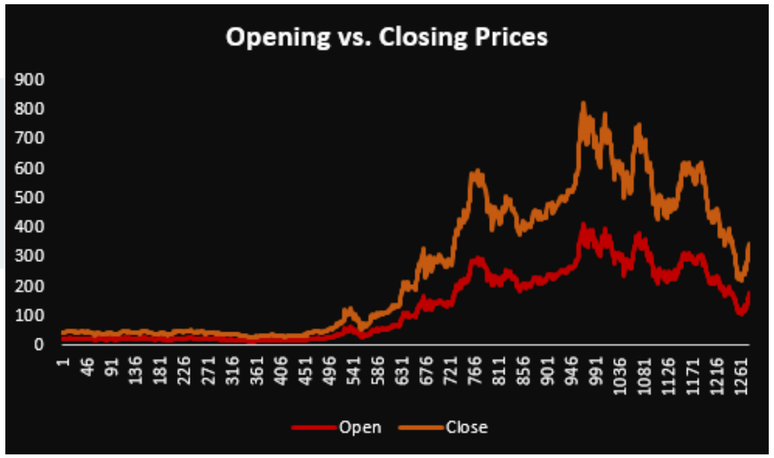


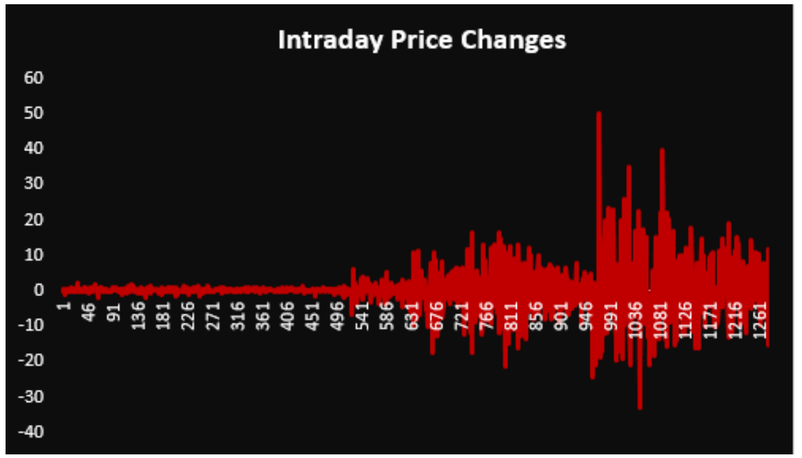


- Microsoft's stock has shown robust growth over the five years, reflecting overall company strength and positive market sentiment. The chart shows volatility, particularly in 2020 and 2021, likely due to global events like the COVID-19 pandemic but it peaked in around early 2022.
- The ‘Trading Volume’ chart shows several spikes in trading volume, indicating periods of heightened trading activity, notable spikes occurred around early 2019 and 2020.
- Microsoft's closing prices were consistently higher than its opening prices, indicating an overall bullish trend.
- Intraday price volatility shows notable spikes in both directions, highlighting periods of intense market fluctuations.

TESLA STOCK ANALYSIS (2018-2023)

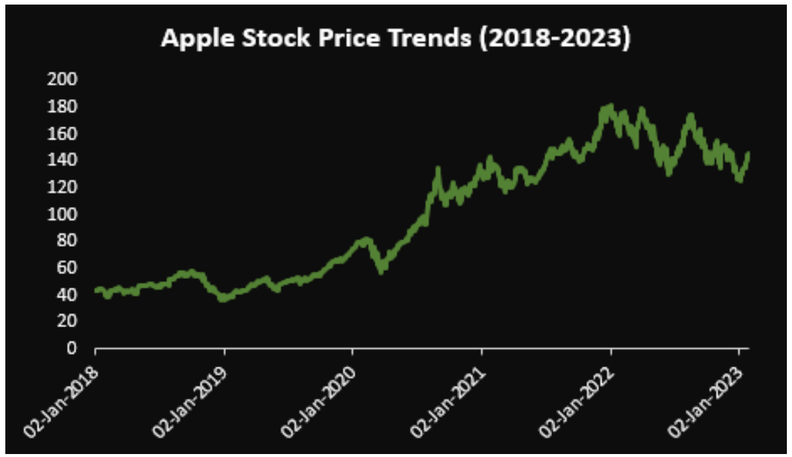


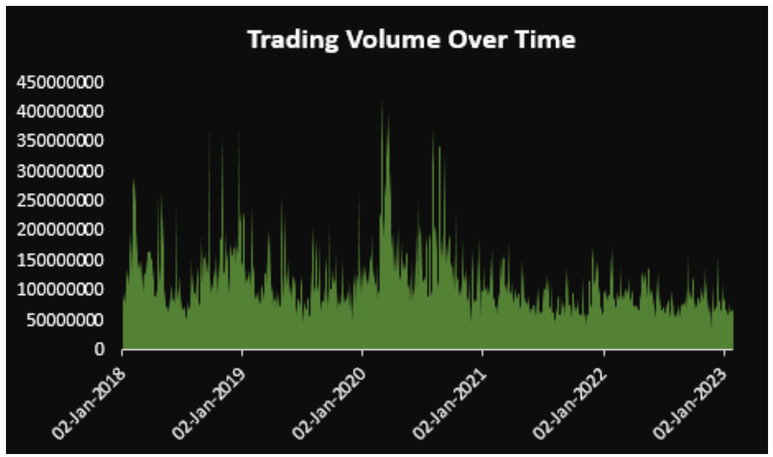


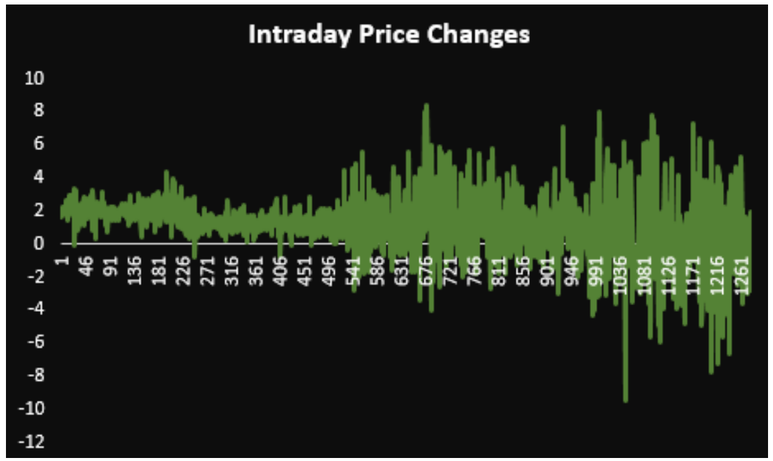


- Tesla’s stock price remained stable from 2018 to mid-2019, then experienced significant growth from late 2019 to early 2021, driven by strong financial performance. stock peaked in early 2021 and has been in decline since mid-2022.
- The significant increase in trading volume from late 2019 to early 2021 aligns with Tesla’s rapid stock price growth.
- Both the opening and closing prices of Tesla's stock show a general upward trend and closing prices are higher than opening prices.
- Intraday price fluctuations suggest high volatility in Tesla's stock.

APPLE STOCK ANALYSIS (2018-2023)

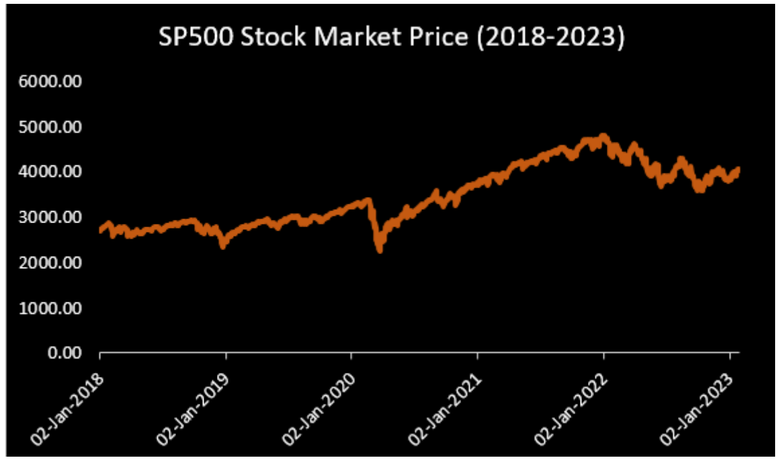


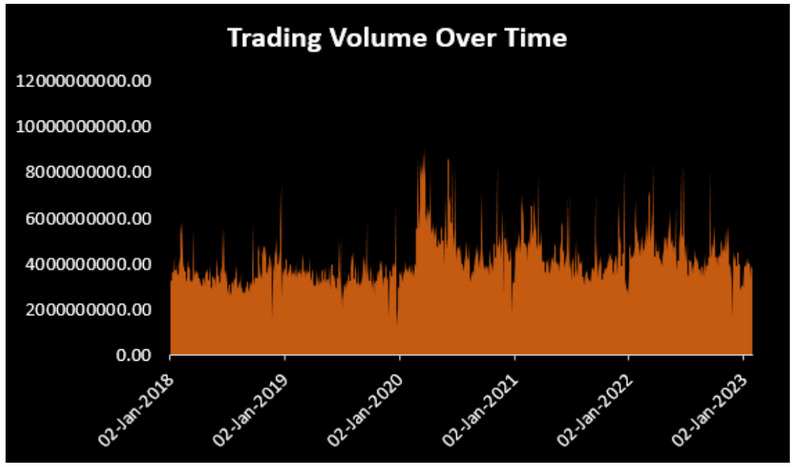


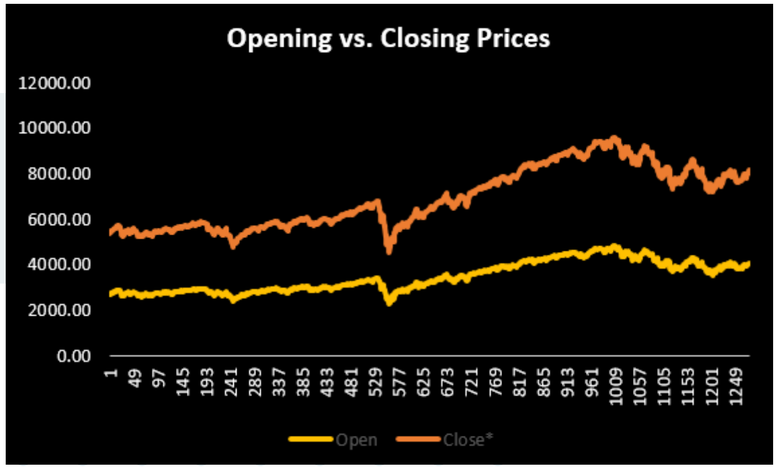


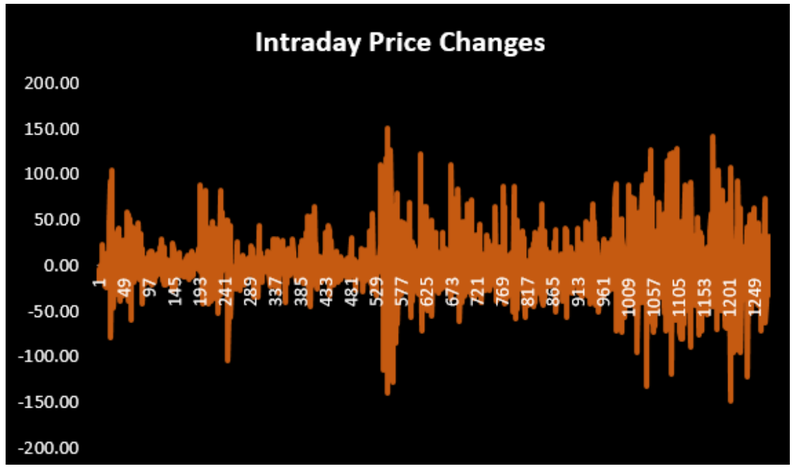
- Apple’s stock price shows a consistent upward trend with volatility and stabilization after early 2021.
- The trading volume chart shows significant spikes in 2020 and early 2021, showing high investor activity.
- Both opening and closing prices for Apple have generally increased over time.
- Intraday Price Changes show significant volatility with larger fluctuations in later periods, reflecting increased market activity.

SP500 STOCK ANALYSIS (2018-2023)



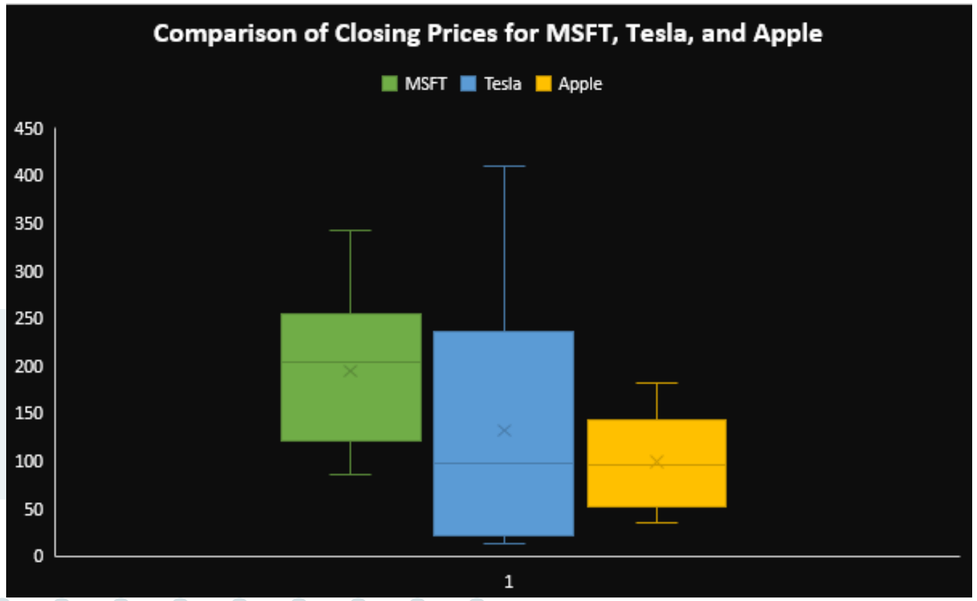






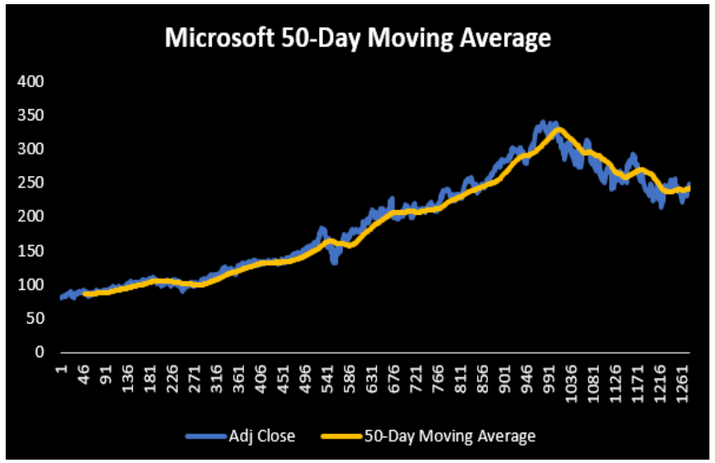
- The S&P 500 shows a significant upward trend from 2018 to 2023, indicating overall market growth, a noticeable dip around early 2020, likely due to the COVID-19 impact on the market.
- Trading volume remained relatively stable with periodic spikes, especially during market dips and recovery phases.
- Opening and closing prices follow parallel trends, indicating consistent daily trading patterns and closing prices higher than opening prices.
- Intraday Price Changes reflect the impact of market events on daily trading activities and investor behaviour.

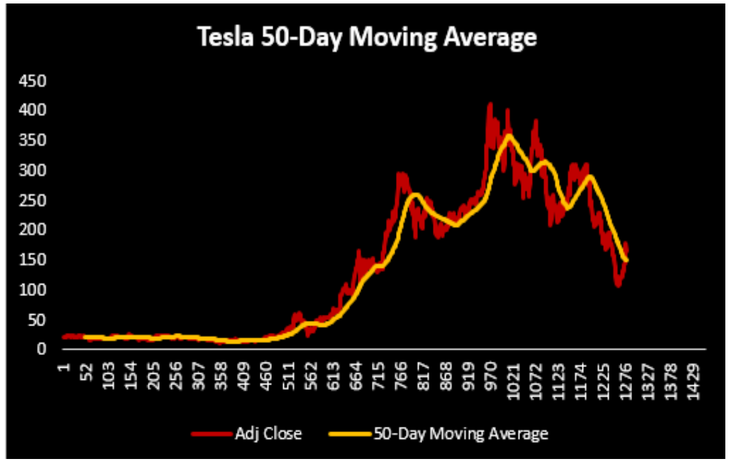
BOX PLOT ANALYSIS OF CLOSING PRICES

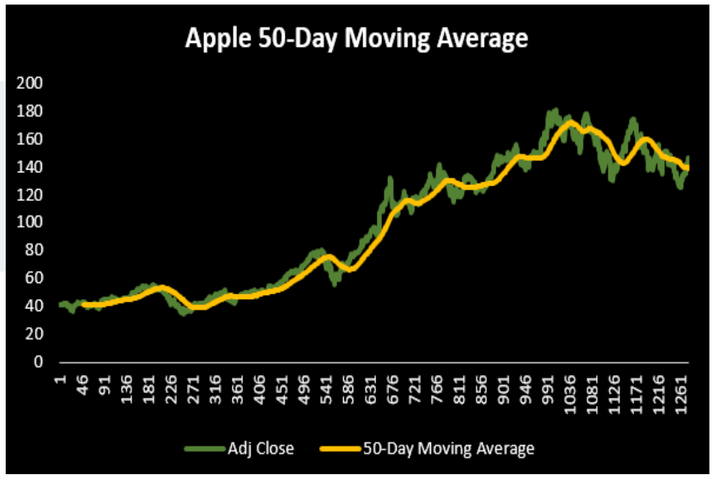


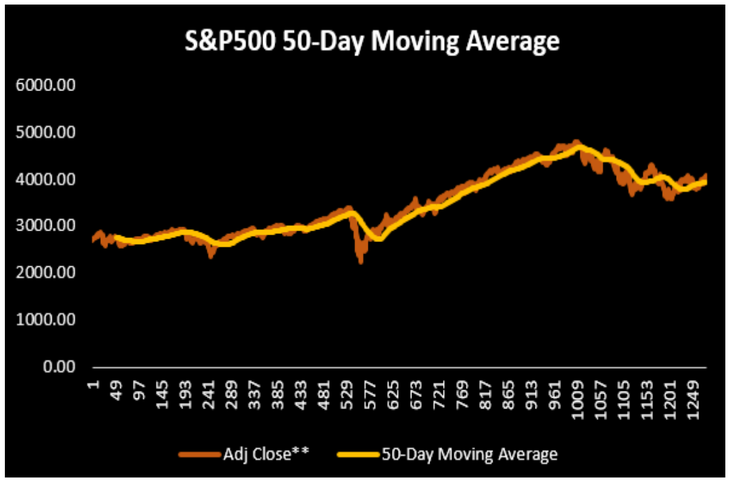
- Box Plot can be used to display the distribution of data based on a five-number summary: minimum, first quartile (Q1), median, third quartile (Q3), and maximum, and identify outliers.
- Tesla's median close price is higher than that of Microsoft and Apple, indicating that Tesla generally had higher closing prices during the period(2018-2023).
- Tesla's box (IQR) is taller and has longer whiskers than Microsoft's and Apple's, suggesting that Tesla's close prices were more variable. Whereas, Microsoft and Apple have more stable closing prices.
- Any dots outside the whiskers are outliers which represent days when the stock had unusually high or low closing prices.
- Among the three tech stocks, Tesla is the most volatile and sensitive to market changes, Microsoft shows steady growth with moderate volatility, and Apple maintains consistent growth with the least volatility.

MOVING AVERAGE ANALYSIS



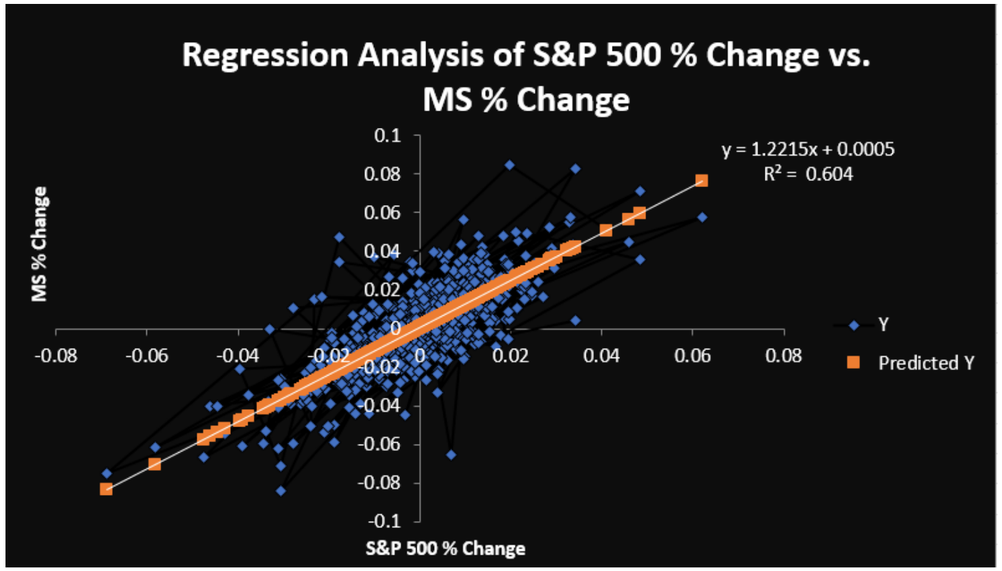






- The charts illustrate the 50-day moving average and Adjusted Closing prices of Microsoft, Tesla, Apple, and SP500 which smooths out short-term fluctuations, highlighting overall trends and potential buy/sell signals.
- Bullish trends occur when the stock price stays above a rising moving average, while Bearish trends occur when it stays below a falling moving average.
- All charts display a long-term upward trend, marked by periodic corrections and fluctuations.
- The early 2020 dip reflects the COVID-19 pandemic's impact on stock prices, showing global events' influence.
- Investors can use moving averages to identify long-term trends and make decisions based on crossovers and trends.

COMPARATIVE ANALYSIS USING LINEAR REGRESSION - MSFT



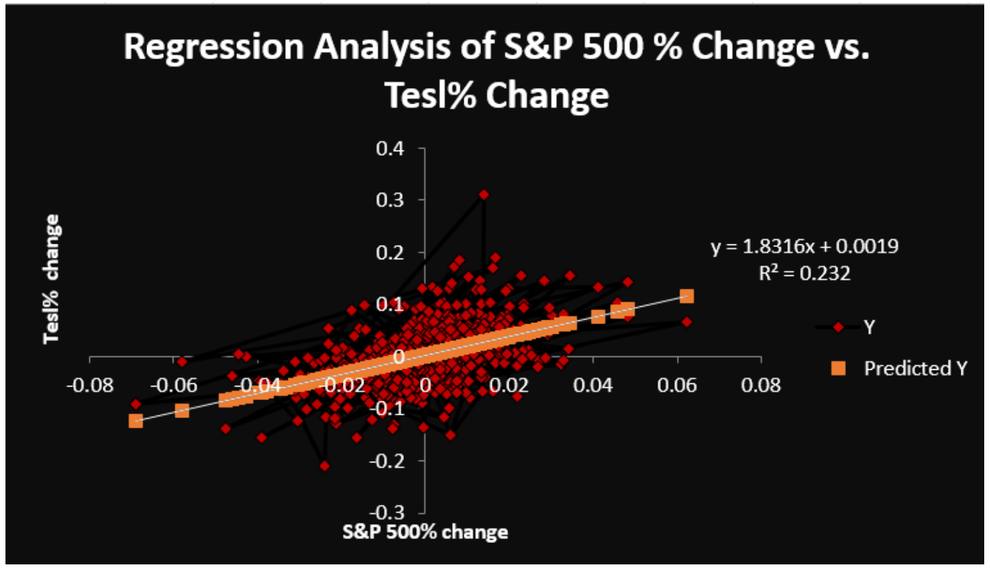
Regression Statistics	
Multiple R	0.777176063
R Square	0.604002633
Adjusted R Square	0.603692047
Standard Error	0.011341909
Observations	1277

ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.250166436	0.2501664	1944.718376	9.7095E-259
Residual	1275	0.1640146	0.0001286		
Total	1276	0.414181036			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.000505973	0.00031757	1.5932645	0.111348727	-0.000117044	0.001128991	-0.000117044	0.001128991
X Variable 1	1.221495021	0.027698952	44.098961	9.7095E-259	1.167154487	1.275835555	1.167154487	1.275835555

- The scatter plot with a fitted regression line shows the relationship between the percentage changes in the S&P 500 index and the percentage changes in Microsoft stock.
- The regression equation: y=1.2215x+0.0005
  Where y= %change in Microsoft's stock,
  x = %change in the S&P 500,
  slope= 1.2215
- With an R^2 of 0.604, the model shows that S&P 500 changes significantly influence Microsoft's stock price.
- A slope greater than 1 indicates that Microsoft's stock is more sensitive to market movements than the S&P 500.
- The R Square value in Regression Statistics shows that the model explains 60.4% of the variability in Microsoft's stock % change.
- The high F-statistic and extremely low p-value (Significance F) indicate that the regression model is statistically significant.
- This means Microsoft's stock rises more in bullish markets and falls more in bearish markets than the market. This helps investors understand how broader market changes might impact Microsoft's stock performance.

COMPARATIVE ANALYSIS USING LINEAR REGRESSION - TESLA



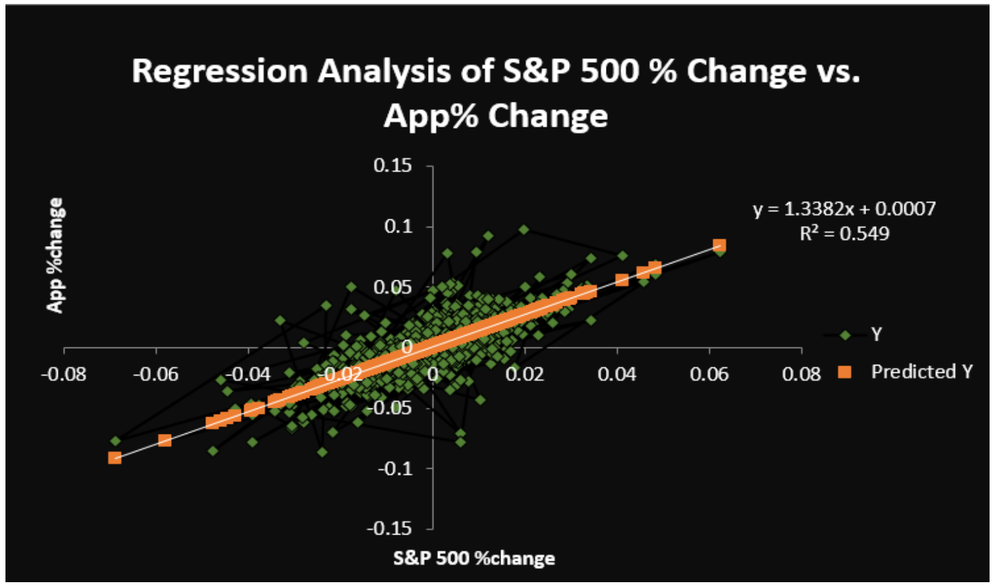
- The scatter plot shows the relationship between the percentage changes in the S&P 500 index and the percentage changes in Tesla's stock.
- The regression equation: y=1.8316x+0.0019
  Where y= %change in Tesla's stock,
  x = %change in the S&P 500,
  slope= 1.8316
- Tesla has the highest regression slope of 1.8316, indicating a higher sensitivity to market changes than Microsoft and Apple. While high-slope stocks are riskier, they also offer the potential for higher returns when the market is performing well.
- With an R^2 of 0.232, the S&P 500 moderately influences Tesla's stock price, indicating other factors have a substantial impact.
- The model explains 23.17% of Tesla's stock % change, indicating that other factors significantly impact Tesla's stock price.
- The high F-statistic and extremely low p-value (Significance F) indicate that the regression model is statistically significant overall.

Regression Statistics	
Multiple R	0.481352026
R Square	0.231699773
Adjusted R Square	0.231097184
Standard Error	0.038246366
Observations	1277

ANOVA	*df*	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.562451635	0.562451635	384.507514	4.91479E-75
Residual	1275	1.865050248	0.001462785		
Total	1276	2.427501882			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.001914305	0.001070887	1.787588839	0.074079808	-0.000186589	0.0040152	-0.000186589	0.0040152
X Variable 1	1.831554187	0.093404405	19.60886315	4.91479E-75	1.648310967	2.014797406	1.648310967	2.014797406

COMPARATIVE ANALYSIS USING LINEAR REGRESSION- APPLE



Regression Statistics	
Multiple R	0.741103689
R Square	0.549234678
Adjusted R Square	0.548881137
Standard Error	0.01390214
Observations	1277

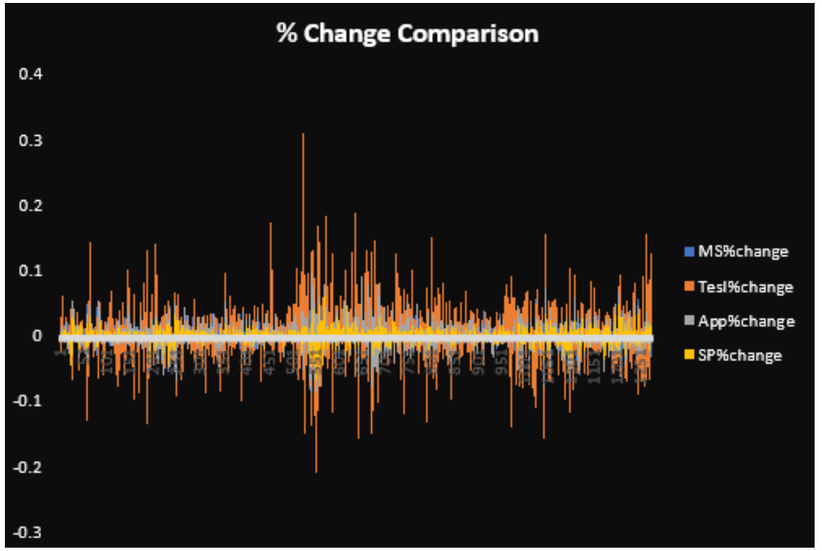
ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.300248556	0.300248556	1553.522823	7.4539E-223
Residual	1275	0.246418593	0.000193269		
Total	1276	0.546667149			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.000655733	0.000389256	1.68458103	0.092314173	-0.000107919	0.001419385	-0.000107919	0.001419385
X Variable 1	1.33818958	0.033951489	39.41475388	7.4539E-223	1.271582655	1.404796505	1.271582655	1.404796505

- The scatter plot shows a strong positive correlation between the S&P 500 %Change and Apple %Change, as indicated by the Multiple R-value of 0.7411.
- The regression equation: y=1.3382x+0.0007
  Where y= %change in Apple's stock,
  x = %change in the S&P 500,
  slope= 1.3382
- With an R^2 of 0.549, the model indicates the S&P 500 considerably influences Apple's stock price.
- The model explains 54.92% of Apple's stock % change, indicating S&P 500 % Change is a significant predictor.
- The high F-statistic and extremely low p-value (Significance F) indicate that the regression model is statistically significant overall.
- Understanding the strong correlation and explained variability helps Apple's stock risk management.

COMPARATIVE ANALYSIS – KEY FINDINGS

- This comparative analysis highlights the significant influence of market movements and economic factors on the stock prices of the 3 companies.
- All three stocks (Microsoft, Tesla, and Apple) show a positive correlation with the S&P 500 index, they tend to move in the same direction as the broader market.
- All three regression models are statistically significant, with Microsoft's model showing the highest significance, followed by Apple and Tesla.
- Microsoft and Apple: Offers strong correlation and high explained variability, but Microsoft's model is the most reliable. Both the stocks are suitable for more conservative investors looking for predictable performance.
- Tesla: Indicates high sensitivity and volatility, Suitable for risk-tolerant investors looking for high returns.



CONCLUSIONS AND RECOMMENDATIONS

- In this project, Microsoft, Tesla, Apple and S&P 500’s stock performance was analysed through price trends, moving averages, correlations with the S&P 500, regression analyses, and trading volume evaluation, providing insights into their volatility and overall performance.
- All stocks show an upward trend over time with short-term fluctuations.
- Spikes in trading volume coincide with major market events, providing strategic entry and exit opportunities.
- Moving Averages are useful for spotting long-term trends and buy/sell signals.
- Microsoft, Tesla, and Apple follow the S&P 500 index, with Tesla showing the most volatility with higher Beta value, while Microsoft and Apple are more stable. The regression models indicate that the S&P 500 significantly predicts these stocks' price changes, with Microsoft's model having the strongest explanatory power.
- Tesla's high sensitivity is ideal for risk-tolerant investors aiming for higher returns, while Microsoft's and Apple's more stable performance makes them better options for conservative investors.
- Regular monitoring of the market indices like the S&P 500 and balancing the portfolio with high-volatility stocks like Tesla with stable ones like Microsoft and Apple is important to anticipate broader market movements and adjust investments accordingly.
- Further analysis can be conducted incorporating other technical indicators and market factors to derive informed decisions.


Bitcoin (USD)
3 Monate
Voreinstellungen
Mittel
Forum
1 Tag
7 Dez.
21 Dez.
4 Jan.
18 Jan.
1 Feb.

THANK YOU