Stock Prices Analysis:

Apple, Microsoft, and Tesla

Project 2 - Statistical Analysis

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Agenda

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Introduction

Goal: Analyse and compare the historical daily stock prices of Apple, Microsoft, and Tesla from January 2018 to January 2023 to identify patterns and trends, providing valuable insights for investors.

Task: Conduct comparative descriptive statistics on the price values of these three stocks to understand central tendencies and variability; Create visualisations to depict price trends between 2018 and 2023; Perform Linear Regression on Stock Returns against the Index (S&P 500) to determine beta and R-squared, key measures of relative stock risk.

Data: It contains stock market data of Apple, Microsoft, and Tesla over the period from January 2018 to January 2023, extracted from Yahoo Finance. The features utilised include Stock Prices for Microsoft, Tesla, Apple, and the benchmark Index S&P 500 (columns: MSFT, Tesla, Apple, and SP500) and the its percentage changes (columns: MS%chng, Tesl%chng, App%chng, and SP%chng), which represents the calculation of daily return.

Figure 1

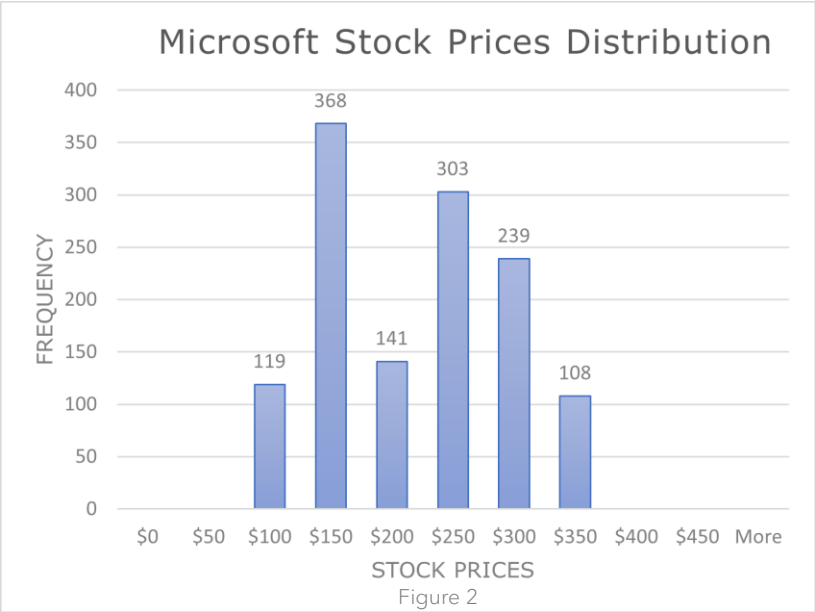

Figure 2

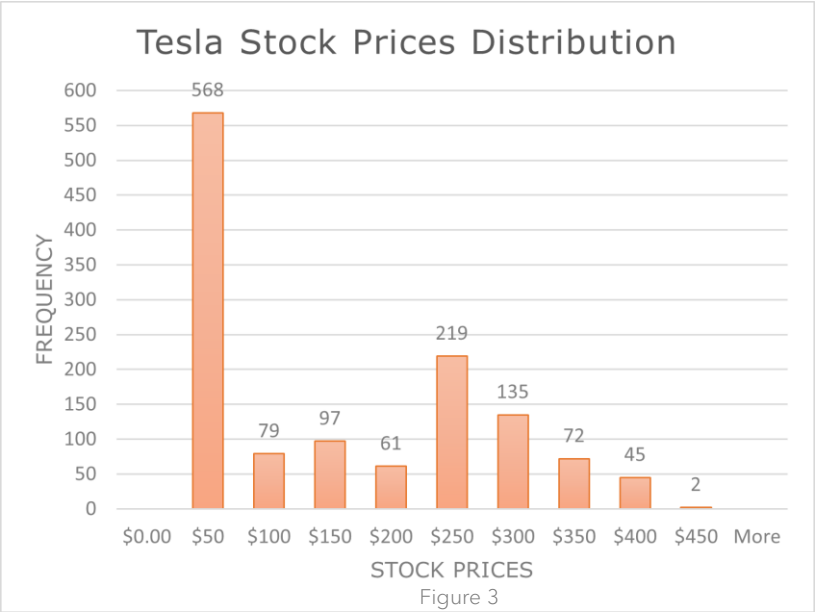

Figure 3

- **Apple**'s prices ranged between $50 and $200, with a frequent value at $150 (34%), the lowest range.
- **Microsoft**'s prices spanned $100 to $350, frequently at $150 (29%), wider range than Apple.
- **Tesla** exhibited the largest range, $10 to $410, with the most frequent value at $50 (44%).

Stock Prices Analysis:
Distribution

Stock Prices Analysis: Statistics

Apple: with a mean price of $99, close to a $95 median, displaying a well-centred distribution. Its slight positive skewness of 0.12 suggests occasional higher prices. Apple's stability is evident in its low standard deviation of $46, making it less volatile compared to Microsoft and Tesla

Apple	
Mean	98.57
Median	95.09
Mode	127.82
Standard Deviation	46.18
Kurtosis	-1.58
Skewness	0.12
Range	146.64
Minimum	35.99
Maximum	182.63
Sum	125977.71
Count	1278.00

Table 1

Microsoft: with a mean price of $194, just below the $203 median, indicating a relatively balanced distribution. A modest positive skewness of 0.15 implies a slight rightward tail. However, Microsoft's stock carries a higher standard deviation of $74, signifying higher price volatility compared to Apple.

Microsoft	
Mean	194.47
Median	203.58
Mode	95.14
Standard Deviation	74.23
Kurtosis	-1.29
Skewness	0.15
Range	258.56
Minimum	86.06
Maximum	344.62
Sum	248533.81
Count	1278.00

Table 2

Tesla: with a mean of $132 and a median of $97, indicating a more dispersed price distribution. Its notable skewness of 0.5 suggests a pronounced rightward tail, attractive for its potential higher returns. Tesla records the highest standard deviation at $117, indicating significant stock price volatility.

Tesla	
Mean	131.90
Median	96.57
Mode	24.00
Standard Deviation	117.17
Kurtosis	-1.26
Skewness	0.47
Range	399.40
Minimum	12.07
Maximum	411.47
Sum	168562.08
Count	1278.00

Table 3

Time Series Stock Prices Analysis:

Apple, Microsoft, and Tesla vs. Index

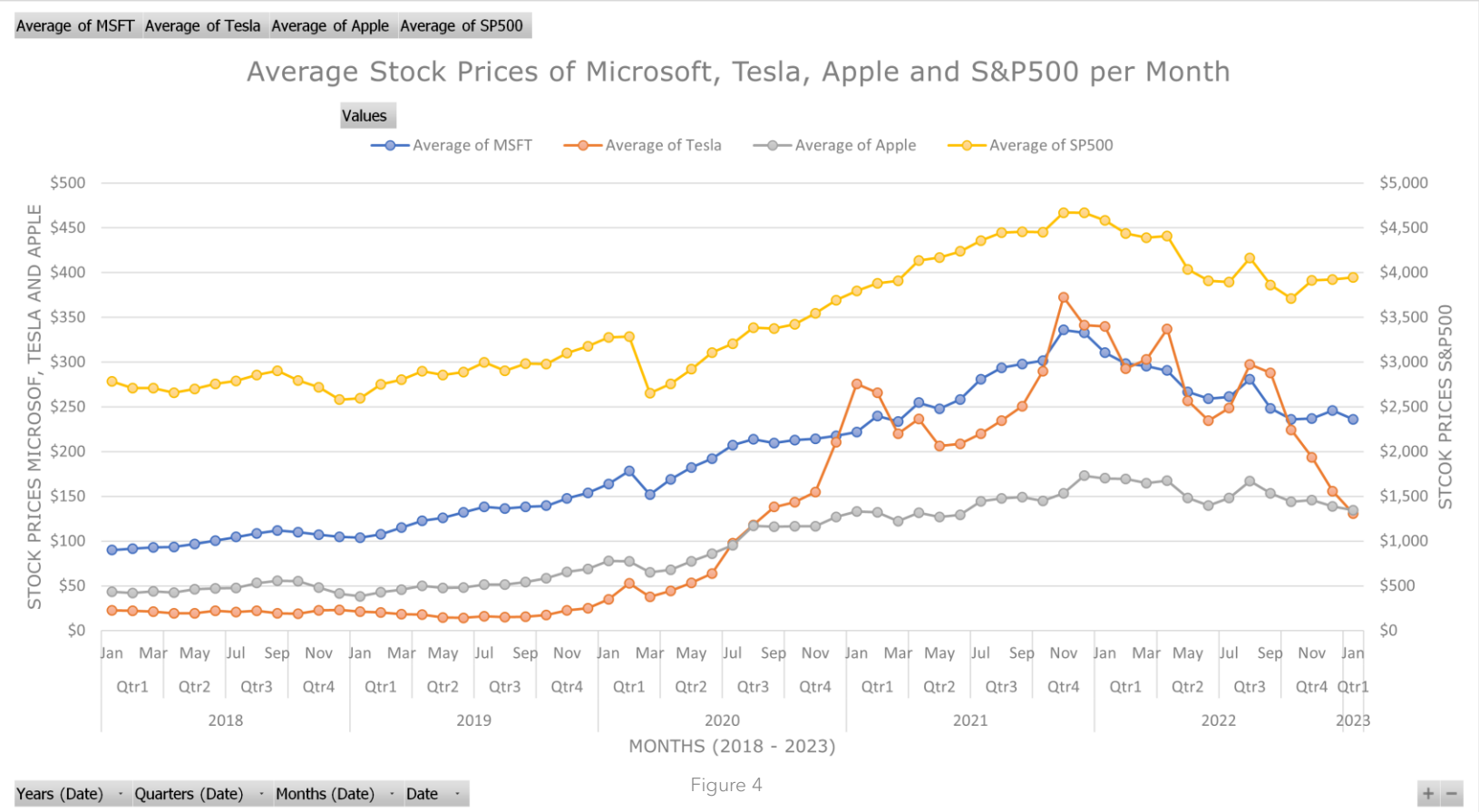

Figure 4

Overview: From 2020 to 2022, Microsoft, Tesla, and Apple exhibited substantial growth, peaking in late 2022 before gradually declining. A brief dip occurred in early 2020 during the pandemic's onset, followed by rapid recovery and substantial growth.

Microsoft: Steady growth since 2018, with an acceleration in early 2020, reaching a peak near $300 in late 2021.

Apple: Modest growth, starting at half the price of Microsoft in 2018. Since late 2020, Apple's growth stabilised, demonstrating resistance to sharp fluctuations.

Tesla: Experienced significant growth from 2020, particularly during the pandemic, jumping from $40 (Q1 2020) to $400 (late 2021), but with higher volatility.

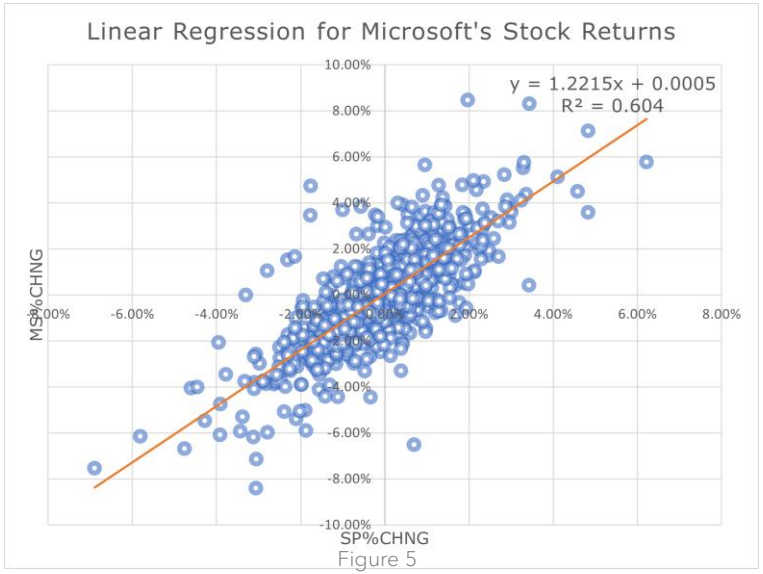

Figure 5

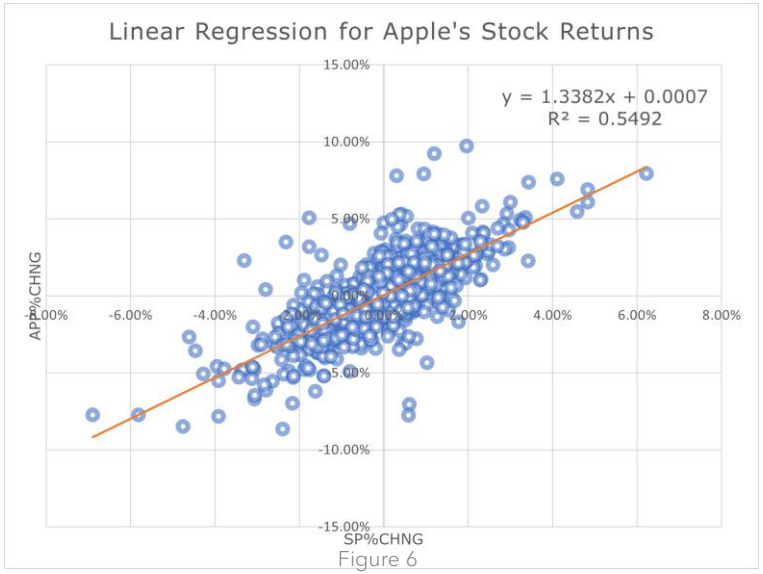

Figure 6

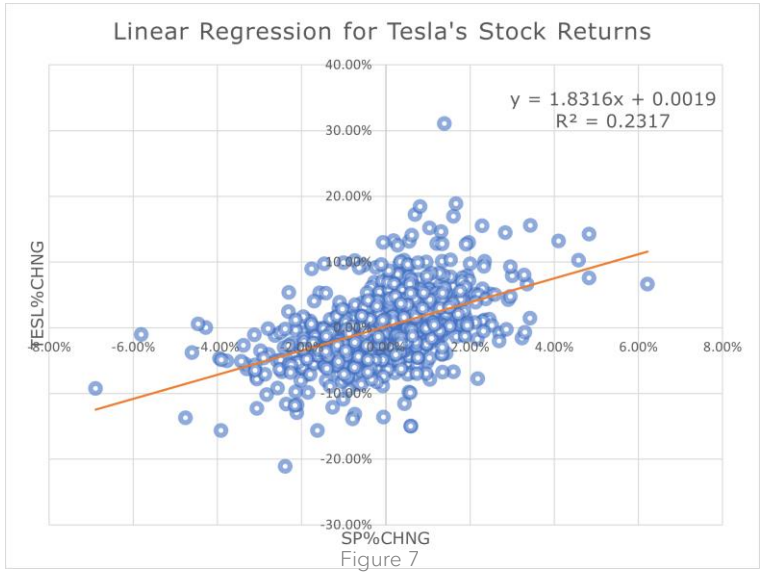

Figure 7

Relative Risk Stock

Linear Regression Analysis:

Stock's returns against Index's return

Microsoft:
- R-squared: 0.60, indicating that 60% of the asset's performance can be explained by the Benchmark Index's performance.
- Beta: 1.22, slightly deviating from the market (beta of 1), offering attractive returns during bullish periods.

Apple
- R-squared: 0.54, indicating a weaker but still significant relationship with the Index.
- Beta: 1.33, slightly riskier than Microsoft during bull markets.

Tesla
- R-squared: 0.23, demonstrating a lower relationship with the Index's performance.
- Beta: 1.83, indicating higher risk but offering higher potential returns during bullish periods.

Summary

Apple: Stable price range mainly around $150 and lowest standard deviation, signifying stability and lower volatility. Suitable for investors with low-risk tolerance.

Microsoft: Broader price range with frequent prices around $150 and higher standard deviation, indicating greater price volatility and associated risk. Suitable for investors with low to medium-risk tolerance.

Tesla: Widest price range with frequent prices at $50, indicating significant price volatility and highest standard deviation, signifying the highest stock price volatility. Suitable for investors with high-risk tolerance.

List of figures and tables

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