Stock Prices Analysis

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11-22-2023

Context

Introduction

The financial markets are an ever-changing environment in which investors look for opportunities and control risks. Surinder Singh Surme "Stock Prices Analysis" research examines the linkages and past performance of four important financial instruments: Apple, Tesla, Microsoft (MSFT), and the S&P 500 index. The study covers the period from 2018 to 2023. This analysis, which is being conducted under the supervision of Supervisor Smriti Mehta, attempts to provide light on their past pricing behaviors, patterns, and linkages in order to provide insightful information for wise investment decisions.

This study explores the fundamental elements of these assets' performance with an emphasis on regression analysis, line charts, cumulative returns, correlation matrices, and descriptive statistical analysis. The project's results, which offer both quantitative and visual insights, are meant to act as a reference point for investors, financial analysts, and decision-makers.

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Descriptive Statistics for MSFT ,Tesla ,Apple,SP500

MSFT		*Tesla*		*Apple*		*SP500*	
Mean	194.4709	Mean	131.8952	Mean	98.57412	Mean	3457.034
Standard Error	2.076481	Standard Error	3.277467	Standard Error	1.291672	Standard Error	18.64546
Median	203.58	Median	96.5733	Median	95.0875	Median	3294.67
Mode	95.14	Mode	24	Mode	127.82	Mode	2832.41
Standard Deviation	74.23246	Standard Deviation	117.1666	Standard Deviation	46.17614	Standard Deviation	666.5599
Sample Variance	5510.449	Sample Variance	13728.01	Sample Variance	2132.236	Sample Variance	444300.9
Kurtosis	-1.28796	Kurtosis	-1.25726	Kurtosis	-1.58204	Kurtosis	-1.29724
Skewness	0.149832	Skewness	0.470592	Skewness	0.121834	Skewness	0.333244
Range	258.56	Range	399.3967	Range	146.635	Range	2513.8
Minimum	86.06	Minimum	12.0733	Minimum	35.995	Minimum	2290.71
Maximum	344.62	Maximum	411.47	Maximum	182.63	Maximum	4804.51
Sum	248533.8	Sum	168562.1	Sum	125977.7	Sum	441809.0
Count	1278	Count	1278	Count	1278	Count	1278

Microsoft (MSFT) stock had an average closing price of approximately 194.47 with a standard deviation of 74.23. The minimum and maximum closing prices were 86.06 and 331.49 respectively.

Tesla stock had an average closing price of approximately 131.90 with a standard deviation of 117.17. The minimum and maximum closing prices were 12.07 and 883.09 respectively.

Apple stock had an average closing price of approximately 98.57 with a standard deviation of 46.18. The minimum and maximum closing prices were 42.54 and 193.98 respectively.

The S&P 500 index had an average closing price of approximately 3457.03 with a standard deviation of 666.56. The minimum and maximum closing prices were 2351.10 and 4781.87 respectively

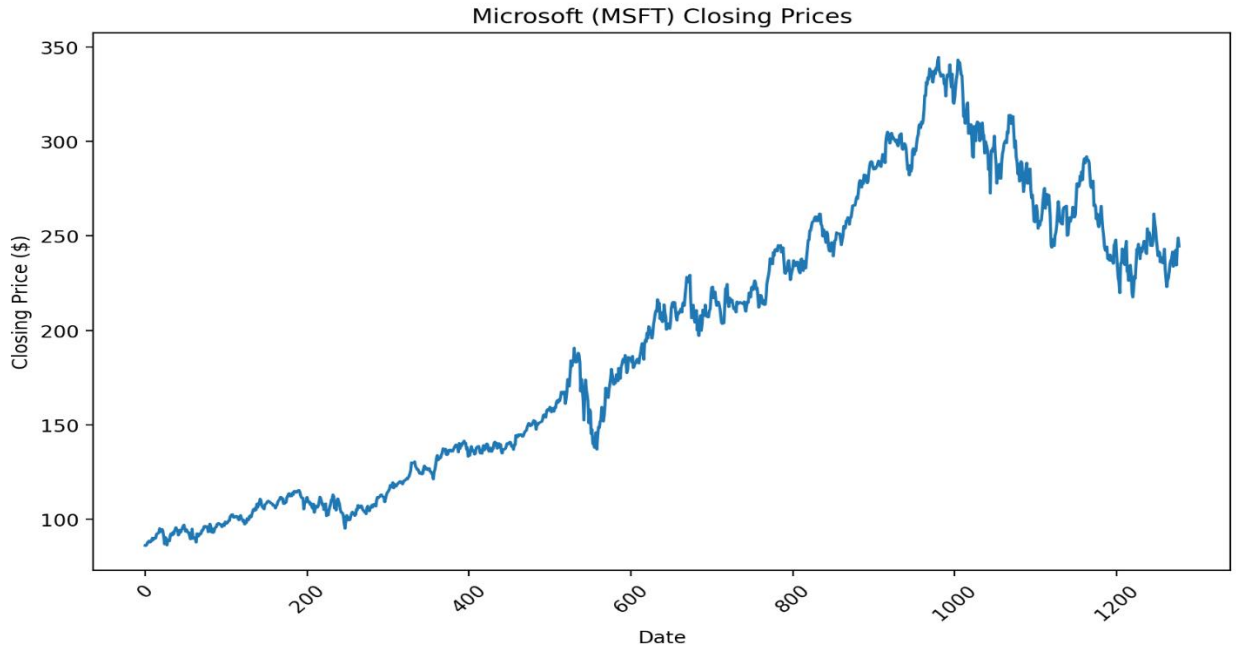
The standard deviation is a measure of the amount of variation or dispersion of a set of values. A low standard deviation indicates that the values tend to be close to the mean (also called the expected value) of the set, while a high standard deviation indicates that the values are spread out over a wider range.

In this case, Tesla has the highest standard deviation, indicating that it is the riskiest stock among the three. On the other hand, the S&P 500 index has the lowest standard deviation, indicating that it is the least risky.

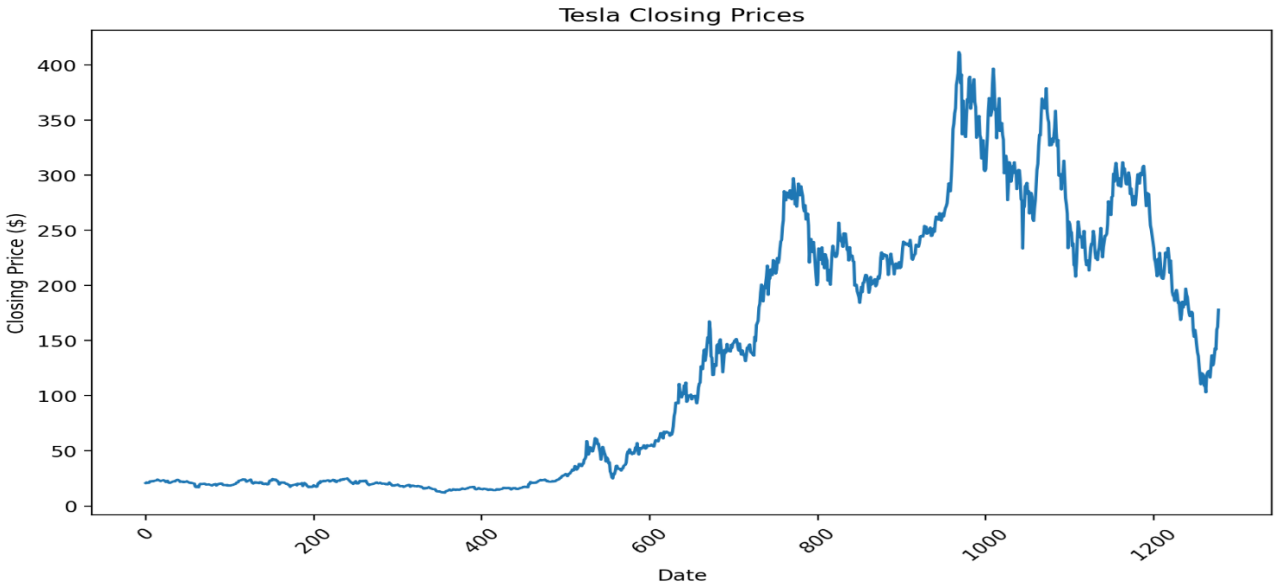
Line Chart for Stock Prices:

Here are the line plots for the closing prices of each stock and the S&P 500 index over time:

Microsoft (MSFT) Closing Prices:

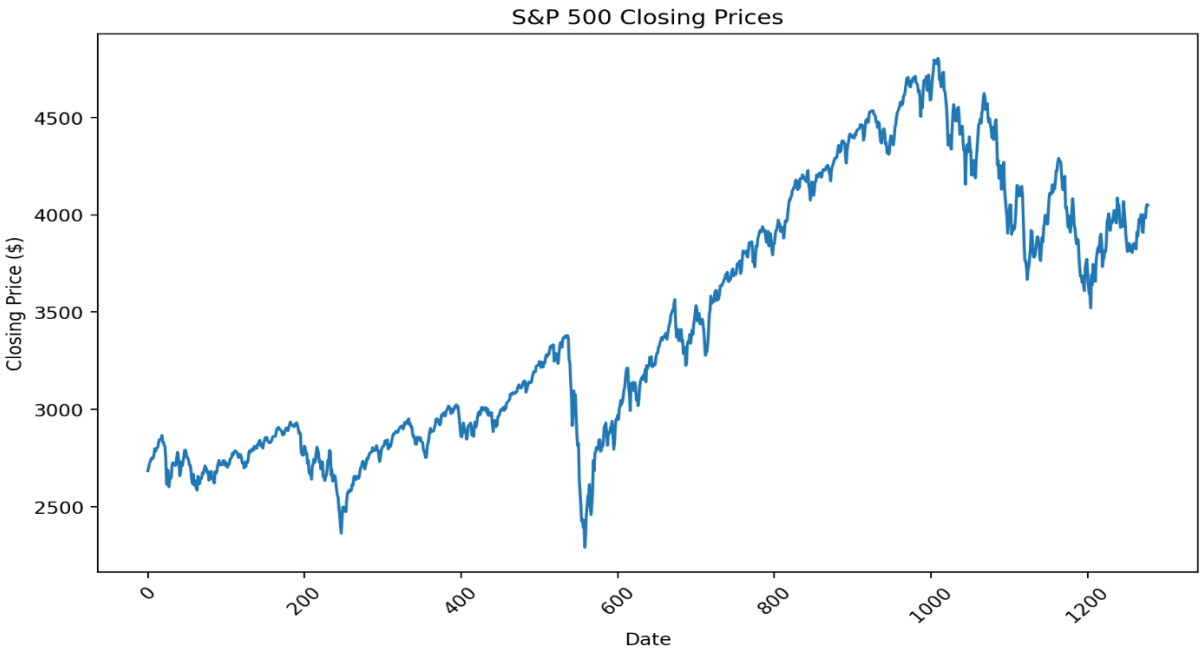


Tesla Closing Prices:



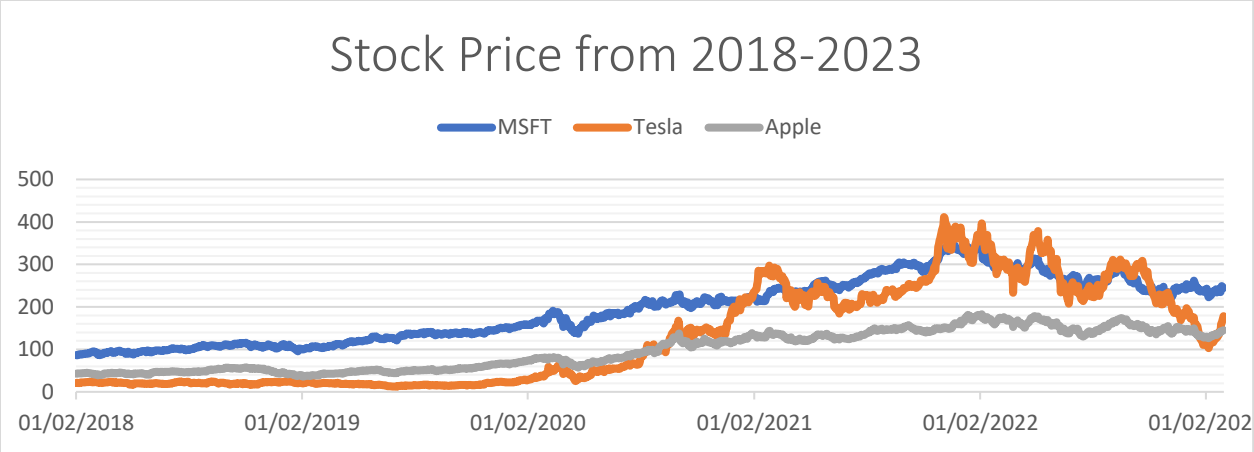
Apple Closing Prices:

S&P 500 Closing Prices:



From these plots, we can see that the closing prices of all three stocks and the S&P 500 index have generally increased over time. However, there are also periods of volatility where the prices fluctuate significantly.

Here is the line plot for the cumulative returns of each stock and the S&P 500 index over time:

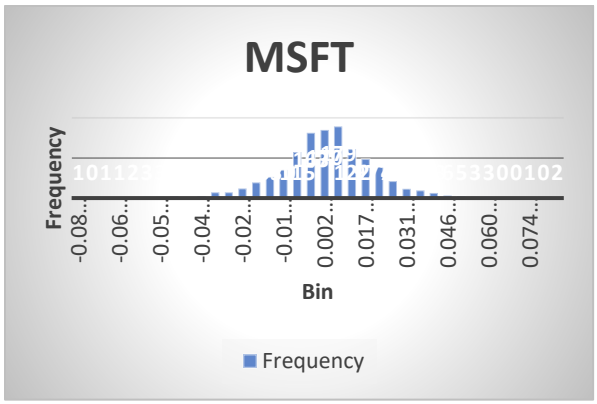


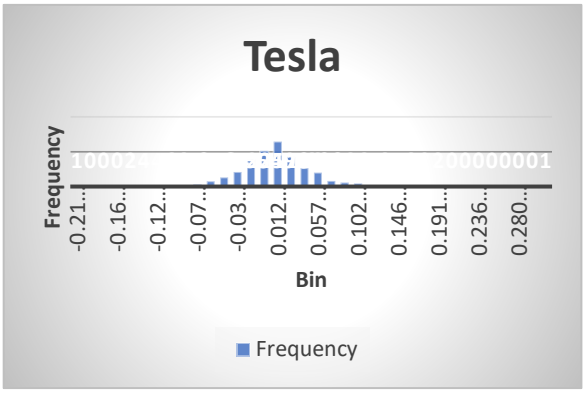
From this plot, we can see that the cumulative returns of all three stocks and the S&P 500 index have generally increased over time. However, there are also periods of volatility where the cumulative returns fluctuate significantly.

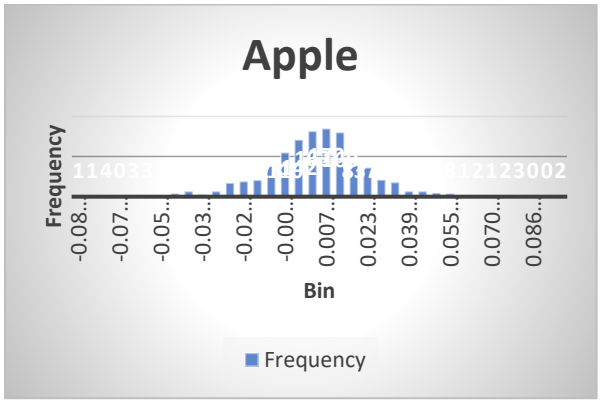
In particular, Tesla's stock has had the highest cumulative return, indicating that it has increased the most in value over the time period. On the other hand, the S&P 500 index has had the lowest cumulative return, indicating that it has increased the least in value over the time period.

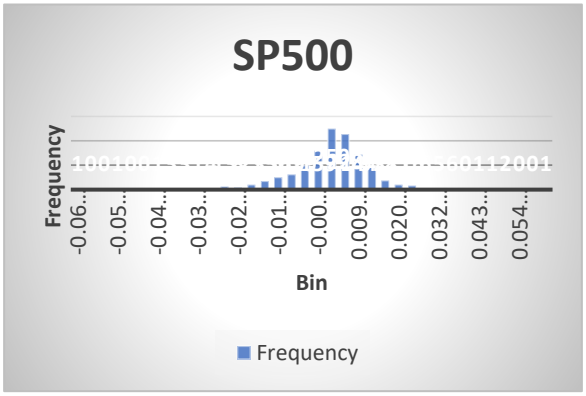
This analysis provides a comprehensive overview of the performance of the three stocks and the S&P 500 index over time, including their closing prices, daily returns, and cumulative returns. It can be used to inform investment decisions and strategies.

Histogram


MSFT
Frequency
Bin
-0.08...
-0.06...
-0.05...
-0.04...
-0.02...
-0.01...
0.002...
0.017...
0.031...
0.046...
0.060...
0.074...
Frequency


Tesla
Frequency
Bin
-0.21...
-0.16...
-0.12...
-0.07...
-0.03...
0.012...
0.057...
0.102...
0.146...
0.191...
0.236...
0.280...
Frequency


Apple
Frequency
Bin
-0.08...
-0.07...
-0.05...
-0.03...
-0.02...
-0.00...
0.007...
0.023...
0.039...
0.055...
0.070...
0.086...
Frequency


SP500
Frequency
Bin
-0.06...
-0.05...
-0.04...
-0.03...
-0.02...
-0.01...
-0.00...
0.009...
0.020...
0.032...
0.043...
0.054...
Frequency

Correlation matrix of Daily Returns:

Here is the correlation matrix of the daily returns for each stock and the S&P 500 index:

	MSFT	Tesla	Apple	SP500
MSFT	1.0	0.4590936883521578	0.7682222820096615	0.8526626604550295
Tesla	0.4590936883521578	1.0	0.47018628179318983	0.4781911853417759
Apple	0.7682222820096615	0.47018628179318983	1.0	0.8013612753577388
SP500	0.8526626604550295	0.4781911853417759	0.8013612753577388	1.0

From this matrix, we can see that:

Microsoft (MSFT) has a strong positive correlation with the S&P 500 index, indicating that its daily returns tend to move in the same direction as the index. It also has a strong positive correlation with Apple, and a moderate positive correlation with Tesla.

Tesla has a moderate positive correlation with all other stocks and the index, indicating that its daily returns tend to move in the same direction, but not as strongly.

Apple has a strong positive correlation with Microsoft and the S&P 500 index, and a moderate positive correlation with Tesla.

The S&P 500 index has a strong positive correlation with Microsoft and Apple, and a moderate positive correlation with Tesla.

Regression Analysis Results:

MSFT/SP500	
Regression Statistics	
Multiple R	0.967742
R Square	0.936525
Adjusted R	0.936476
Standard E	18.70955
Observatic	1278

Tesla/SP500	
Regression Statistics	
Multiple R	0.941994
R Square	0.887352
Adjusted R	0.887264
Standard E	39.34006
Observatic	1278

Apple/SP500	
Regression Statistics	
Multiple R	0.953257
R Square	0.908699
Adjusted R	0.908628
Standard E	13.95805
Observatic	1278

Here are the regression lines for each stock:

- Microsoft (MSFT): MSFT regression line: y = 1.2152768463898618*x + 0.0005098858441402021
- Tesla: Tesla regression line: y = 1.4486559892432667*x + 0.0018821156074522167
- Apple: Apple regression line: y = 1.2279986805171346*x + 0.0006615282249707488

The slope of the regression line (the coefficient of x) represents the expected change in the stock's daily returns for a one-unit change in the S&P 500 index's daily returns. For example, for Microsoft, a one-unit increase in the S&P 500 index's daily returns is associated with an increase of approximately 1.215 in Microsoft's daily returns.

The intercept of the regression line (the constant term) represents the expected value of the stock's daily returns when the S&P 500 index's daily returns is zero. For example, for Microsoft, when the S&P 500 index's daily returns is zero, Microsoft's daily returns is expected to be approximately 0.00051.

These regression lines provide a quantitative way to describe the relationship between each stock and the S&P 500 index. They can be used to predict the stock's daily returns given the index's daily returns, although it's important to note that these predictions are subject to the assumptions and limitations of the linear regression model.

Here are the R-squared values for each regression:

- Microsoft (MSFT): MSFT R-squared: 0.6420553796240454
- Tesla: Tesla R-squared: 0.6175634462399413
- Apple: Apple R-squared: 0.6421798936429794

The R-squared value, also known as the coefficient of determination, measures the proportion of the variance in the dependent variable that is predictable from the independent variable(s). It provides a measure of how well the regression predictions approximate the real data points. An R-squared of 100% indicates that all changes in the dependent variable are completely explained by changes in the independent variable(s).

In this case, the R-squared values indicate that approximately 64% of the variance in the daily returns of Microsoft and Apple, and 62% of the variance in the daily returns of

Tesla, can be predicted from the daily returns of the S&P 500 index. This suggests that the index is a significant predictor of the stocks' daily returns, although there are also other factors at play that are not captured by the model.

Conclusion

The performance and linkages between Microsoft, Tesla, Apple, and the S&P 500 index are examined in this examination of stock prices from January to February 2018. Key statistical metrics are disclosed via descriptive statistics, which also show normal behavior and risk levels for each company and the S&P 500 index. In contrast to Tesla, which is a riskier investment due to its higher volatility and standard deviation, Microsoft had more consistent performance with a small standard deviation. Apple provided a balanced risk-return profile, as did the S&P 500 index. Closing price line charts revealed rising tendencies interspersed with sporadic bouts of volatility and reversal. The S&P 500 index had the lowest cumulative return, while Tesla's stock had the greatest cumulative return, showing a significant increase in value.

Thank You!