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A prediction modelling for stock returns: Analytical study with reference to automobile sector in India

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ABSTRACT

With about 3.99 million units sold in the categories of passenger and commercial cars, India became the fourth largest car market in 2019, displacing Germany. By 2021, India is projected to overtake Japan as the third largest market for cars. Thanks to a rising middle class and a young demographic, two-wheeler segment dominates the industry in terms of value. Furthermore, the rising curiosity of companies in exploring rural markets has further supported the growth of the business. India is also a leading vehicle exporter and has strong expectations for near future export growth. The investment made in any security contains a risk factor that can be very high or low. It is also good for investors to evaluate stock prices in terms of risk and return before taking any sound investment decision, which gives a clear understanding of the risk return characteristics of the stock price which is to be calculated. The aim of this study is to predict the future stock price of selected automobile companies listed on the Indian stock market by using a mathematical method to measure drift and volatility over the last 10 years using historical stock price data. The method used to forecast the future stock prices is Monte Carlo simulations using python by considering only historical prices of selected stocks..

KEYWORDS: Automobile sector, Prediction, Monte Carlo Simulation, Analytical study, Python.

1. INTRODUCTION

Investors have gained broad coverage from the stock market. How to grasp the evolving regularity of the stock market and predict the course of stock prices has always been a hot spot for investors and analysts. Many factors influence the rise and decline of stock markets, such as politics, finance, society and the economy. For equity investors, the stock market trend prediction is directly connected to the acquisition of earnings. The more detailed the prediction, the more risks can be avoided more effectively. In the case of the companies listed, the stock price reflects not just the operating conditions of the company and its

expectations for future growth, but also an important technological index for the valuation and research of the company. Stock price prediction forecasting also plays an important part in studying a country's economic development. The study of stock market prediction therefore has considerable theoretical significance and large application prospects.

The automotive sector has been largely affected by the Government of India 's announcement of the FAME (Faster Adoption and Development of Hybrid and Electric Vehicles in India) scheme. As the industry struggled with lower sales numbers so that the stock of BS4 could not be cleared and that became an unnecessary burden on the industry, COVID 19 added that the sales figures for March 2020 indicate that the situation is worse than everyone predicted. Thus, technical analysis is a trading method used by analysing statistics obtained from trading activity, such as price change and volume, to analyse securities and try to predict their future movement. Technical analysts rely on market movement charts and different analytical methods to determine the strength or weakness of a company and predict potential price adjustments. For stocks, commodities, currencies, and bonds, technical analysis may be used to forecast potential price changes. Using historical market evidence, mass investor psychology is analysed. The investment made in any security contains a risk factor that can be very high or low. But the essence of stock prices and the industry to which the business belongs depends on such a risk. It is also good for investors to evaluate stock prices in terms of risk and return before taking any sound investment decision, which gives a clear understanding of the risk return characteristics of the stock price which is to be calculated. The aim of this study is to predict the future stock price of selected automobile companies listed on the Indian stock market by using a mathematical method to measure drift and volatility over the last 10 years using historical stock price data.

2. LITERATURE REVIEW

Researchers used fundamental analysis to examine and evaluate securities of various companies in an attempt to evaluate the intrinsic value defined by economic, industry and market analysis known as the E-I-C framework by Nagpal, Chandok and Chabbra (2019). For Maruti Suzuki, Mahindra & Mahindra, Tata motors, Force engine and SML Isuzu, they measured earnings per share, price to earnings ratio, dividend pay-out ratio and book value and compared intrinsic value and market value for all businesses and decided whether the business is overvalued or undervalued.

Parmar, Agarwal, Saxen, Arora, Gupta, Dhiman, and Chouhan (2018) in this paper the future valuation of the capital stocks of a company has been calculated. A new development in stock market prediction technology by the use of machine learning, which makes forecasts based on the prices of current stock market indexes by studying their historical data. Machine learning itself utilises different models to make forecasting smoother and more authentic. The paper focused on the use of Regression and LSTM based machine learning to predict inventory values and the considered variables are open, near, low, high and volume.

Verma (2018) carried out a fundamental study of the automotive industry in relation to the selected firms. As part of the study, the global automotive sector was analysed with an emphasis on the European market and valuation was carried out for Volkswagen and BMW using relevant methods and models, resulting in the formulation of the investment recommendations. The first part of the thesis focuses on developing the requisite theoretical structure, the second part continues the study of the automotive industry and, finally, the assessment is carried out in the last part and an investment recommendation is formulated.

Arivalagan and Rajamohan (2018) this paper explores the volatility of Indian National Stock Exchange (NSE) stocks in the automotive market. Daily closing price of automotive sector spot and future stocks was used by the researcher of the period April 2010 to March 2017. Augmented Dicky Filler test is used to test the stationarity of the data set. GARCH model was used to find out the magnitude of the volatility of the spot and futures stocks. The findings indicate that the spot and future returns of Ashok Leyland Ltd, spot returns of Mahindra and Mahindra Ltd and spot returns of Tata Motors Ltd have high volatility.

Arthi and Saravanan (2018), this analysis aimed at comparing the Bombay stock exchange's major blue-chip shares to advise that the investor to buy, sell or keep the stock and also suggested the best investment option using the technical indicators RSI (Relative Strength Index), ROC (Rate of Change) and SMA (Simple Moving Average). The top 2 sectors in the automotive and information technology industries in 10 companies are taken for this study. Via technical analysis, their research methodology analysed securities for this purpose and projected their future movement by analysing statistics obtained from market activity, such as price movement and volume.

Atiq, Rafiq and Roohullah (2016), this paper analysed the internal factors of the business and the macro-economic variables influencing stock prices on the Pakistani Karachi Stock Exchange. Earnings per share and dividend per share are internal variables. The macroeconomic factors are defined by the supply of capital, the index of consumer prices, interest rates and the gross domestic product. There is a sample of 15 companies chosen from the KSE financial sector. In this analysis, which covers the period from 2001 to 2008, data for eight years is used. They use models of Random Effects and Set Effects. In addition, in order to remove the question of Autocorrelation, Weighted Least Squares (WLS) Regression is used for analysis.

Geetha and Swaminathan (2015), this paper attempted to examine the influencing factors that influence either the up or down trend of the stock price movement. The performance of stock price changes on the market has been compared by four company-specific variables, EPS, book value, P / E ratio and dividend yield. Selected as a sample for the five-year span of the automotive and IT industries. Techniques for financial reporting, such as Ratio Analysis.

Alrabadi and Aljarayesh (2015), their study investigated the cerdibility of the Monte Carlo simulation (MCs) at the Amman Stock Exchange (ASE) to forecast stock prices. With the Simple and Exponential Moving average techniques, they compared the in-sample forecasting capability of MCs. The study data is composed of ASE 's regular general float index over the duration (2003-2012). Four proxies test the precision of forecasting: Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), Mean Absolute Percentage Error (MAPE) and Coefficient of Theil Inequality (U).

Chauhan (2014). This report conducts a fundamental technique of research to find the value of the stock that takes into account the economy as a whole, then the market and then the performance of the business to find the value of the stock. It used a top to bottom approach to find the worth of the stock. In the fundamental study, numerous factors such as economic growth as a whole, business progress, previous company success, and the future prospectus of the company for finding the worth of the company's stock were considered. This paper examined the basic analysis of the Indian automotive industry in relation to the chosen companies.

Dhole (2013). A fundamental analysis of four companies was carried out in this paper for the purpose of data analysis, including economic analysis, market analysis and business analysis. Variables such as EPS, P/E, and Consistency of Earnings ratios are analysed for review of the results of the company's quarterly financial reports. Samples are selected from the automotive sector and from the BSE companies listed. Analysis which carried out in this paper is to analyse the connection between the price movements of the shares and the results of their respective businesses.

3. RESEARCH METHODOLOGY

Using historical data from the past 10 years (2010 to 2020), analytical research design is used to forecast the future stock prices in the automotive industry. For selected automotive firms, data analysis is conducted using methods used in technical analysis. Companies are selected based on the market capitalization are

1. Maruti Suzuki India Limited
2. Mahindra & Mahindra Limited

3. Tata Motors Limited.

Operational Definitions of Concept

Monte Carlo Simulation

The approach is generally used for risk management in the finance and business sectors. In order to assess potential future market scenarios, business risk analysts should take into account parameters such as revenue levels, interest rates and changing tax laws. Pricing options, a financial instrument with several sources of uncertainty, often use the process.
To model stochastic variables, there are many ways of using Monte Carlo simulations. This analysis will concentrate on one of the more fundamental variations and will only use the predicted return level and volatility as input parameters (calculated on the basis of historical data). Therefore, the modifications to enhance the simulation would primarily concentrate on measuring these parameters in a way that reflects the data better.

The Monte Carlo simulation, Monte Carlo methodology, and Monte Carlo experiment concepts apply to a wide variety of computational algorithms that somehow use randomness. Some problems involving a high degree of uncertainty (e.g., multiple stochastic factors or variables) may be difficult to solve correctly in an algebraic or numerical way, but it is possible to obtain a sufficient approximation by using randomness, or at least to model the probabilities of the outcomes of the problems. These steps are typically accompanied by a Monte Carlo simulation:

- Description of a domain of potential inputs
- Random values are generated from a distribution of probabilities (which depends on the domain of possible inputs)
- On the generated values, computation or analysis is performed
- It's important to draw a conclusion

Simulations of a Stock

To calculate the probability that a stock increases or decreases in value, Monte Carlo simulations are used. By assuming that daily returns that follow a normal distribution are given by a stock price (a continuous probability distribution). Estimating the anticipated level of return and the volatility of the stock is the first thing that needs to be done. By measuring the average of the historical returns, the projected level of return can then be calculated. By measuring the standard deviation of historical returns, the variance can be calculated. Probability distribution has to be created that attempts to model the behaviour of the stock from the expected level of return and from the volatility of the stock. The simulation itself is the act of choosing random numbers from this distribution function of probability. We get a sense of how the stock might theoretically behave over the next ten days by sampling say 10 values from the distribution. However, only one simulation would not really an insight into the likelihood of potential returns for stocks. The stock probability is close to zero after only one single random simulation. When running thousands of simulations, real insight into the stock and the potential outcomes of the future is obtained by generating thousands of random price curves, all of which vary but share some of the main characteristics of historical price data at the same time. These are called random walks, so to speak. Stocks are assumed to follow a random walk, which means that it can function to simulate a stock using random variables.

Geometric Brownian Motion

A Geometric Brownian Motion (GBM), also known as exponential Brownian motion, is a stochastic process of constant time in which a Brownian motion (also called a Wiener process) with drift follows the logarithm of the randomly varying quantity. It is an important example of stochastic processes that satisfy a stochastic differential equation (SDE); it is used

to model market prices in mathematical finance, in particular, It is a concept that would allow to model randomness. The formula of Brownian motion is made of two components, they are

- Drift
- Volatility

Drift (μ)

The meaning of drift parameter is a trend or growth rate. If the drift is positive, trend is going up over time. If the drift is negative, the trend is going down. This shows the direction of rate of return using the past data. This can be called as expected daily return of the stock. The formula for drift is

$$\text{Drift} = \mu - 1 - \sigma 2$$

Where, μ = Average daily return

$\sigma 2$ = Variance

Volatility

It is given by historical volatility multiplied by z of a random number between 0 and 1, the random from 0 to 1 is a percentage

Random variable = $\sigma * z$

By assuming expected future returns are distributed normally z of the percentage between 0 to 1 would give us the number of standard deviations away from the mean, it has already been calculated by statisticians that the distance between the mean and events that have a probability of occurring between 0 and 1

For ex: If the distance between mean and events with probability of less than 99.7% is 3 SD, this is to determine the variable component of Brownian motion. Formula for Geometric Brownian Motion is

$$\text{Stock price today} = \mu - \sigma 2 + \sigma * z\ [\text{Rand}(0;1)] * \text{Stock price yesterday}$$

$$r = \text{drift} + \text{standard deviation} * er$$

Limitations of Research

The research restricted only to three automobile companies in India, but not entire automobile sector, the research considers only historical stock prices of the company but the future stock prices will be influenced by several other factors like company policies, government policies, market sentiments and fundamental factors etc.

4. DATA ANALYSIS

Forecasting stock prices of maruti suzuki india limited using monte carlo simulation using python

Group of libraries and modules are available that can be imported while performing this mission. Study requires "norm" from SciPy and some basic Matplotlib features in addition to the classic NumPy and Pandas

```
In [56]: import numpy as np
         import pandas as pd
         from pandas_datareader import data as wb
         import matplotlib.pyplot as plt
         from scipy.stats import norm
         %matplotlib inline
```

Numpy is a scientific computing tool and a third-party package allowing us to work with multidimensional arrays. Arrays represent a powerful way to organize and process data like matrices and multi-dimensional objects. Pandas is a high-performance data structure and data analysis tool; it allows us to organize data in a tabular form and to attach descriptive

labels to the rows and the columns of the table. Pandas is suitable for working with time series and huge databases. Matplotlib is a 2D plotting library specially designed for visualization of Numpy computations. Numpy, Pandas and Matplotlib are part of Scipy, it is a python scientific system containing lot of tools for calculation.

The companies using for research is Maruti Suzuki India Limited, Mahindra and Mahindra Limited and Tata Motors limited. The timeframe under review represents the past 10 years, beginning on 1 January 2010 and data source for research is Yahoo.

```
In [57]: ticker = 'MARUTI.NS'
         data = pd.DataFrame()
         data[ticker] = wb.DataReader(ticker, data_source='yahoo', start='2010-1-1')['Adj Close']
```

For Mahindra and Mahindra Limited and Tata Motors Limited only the ticker will change, for Mahindra & Mahindra Limited it is 'M&M.NS' and for Tata Motors Limited is 'TTM'. Estimating company's historical log returns is very important to predict company's future. stock price. The method used here is called "percent change," and to get the simple returns.

Fig a. Log returns of Maruti Suzuki India Limited

```
In [58]: log_returns = np.log(1 + data.pct_change())

In [59]: log_returns.tail()

Out[59]:
```

Date	MARUTI.NS
2021-01-06	-0.003513
2021-01-07	-0.008233
2021-01-08	0.057631
2021-01-11	0.026818
2021-01-12	-0.005444

From a given dataset and it has to be written as "pct change()". By using NumPy's log, construct the log returns formula and then type 1 + the simple returns extracted from the data and then output will be log returns of that company.

Fig b. Log returns of Mahindra & Mahindra Limited

```
In [58]: log_returns = np.log(1 + data.pct_change())

In [59]: log_returns.tail()

Out[59]:
```

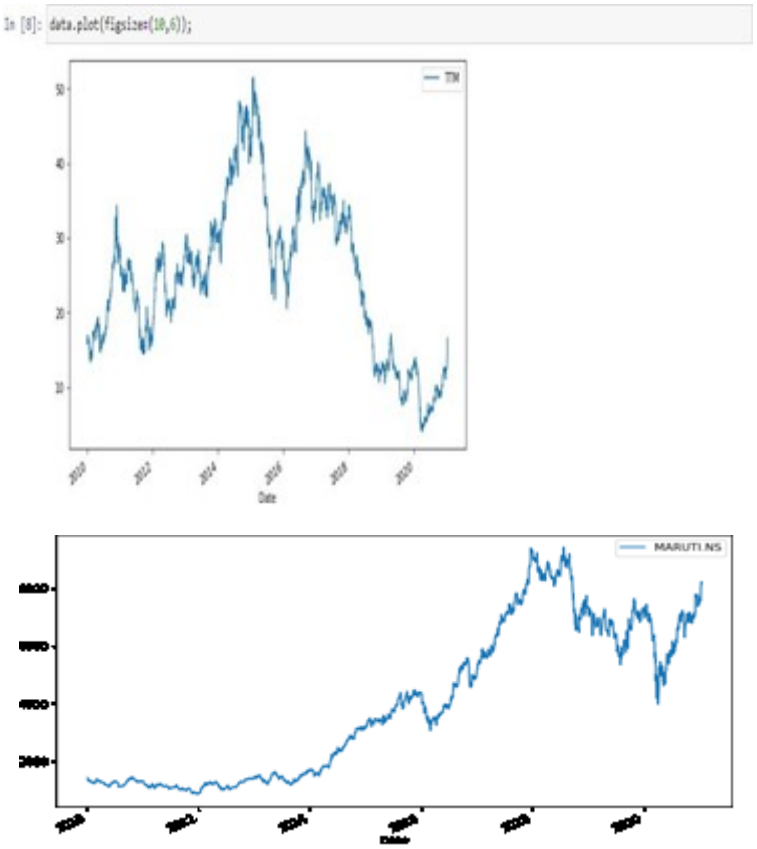
Date	MARUTI.NS
2021-01-06	-0.003513
2021-01-07	-0.008233
2021-01-08	0.057631
2021-01-11	0.026818
2021-01-12	-0.005444

Fig c. Log returns of Tata Motors Limited

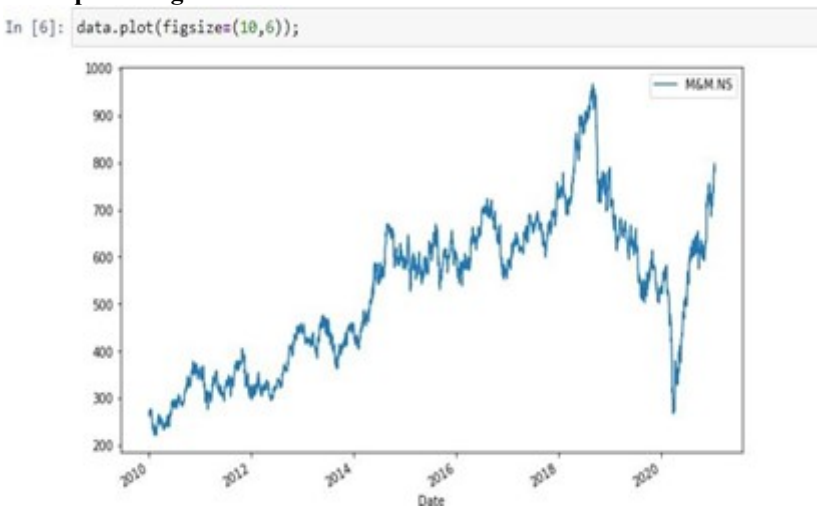
```
In [4]: log_returns = np.log(1 + data.pct_change())

In [5]: log_returns.tail()

Out[5]:
```

Date	TTM
2021-01-06	0.003003
2021-01-07	0.008212
2021-01-08	0.016225
2021-01-11	0.151115
2021-01-12	0.040067

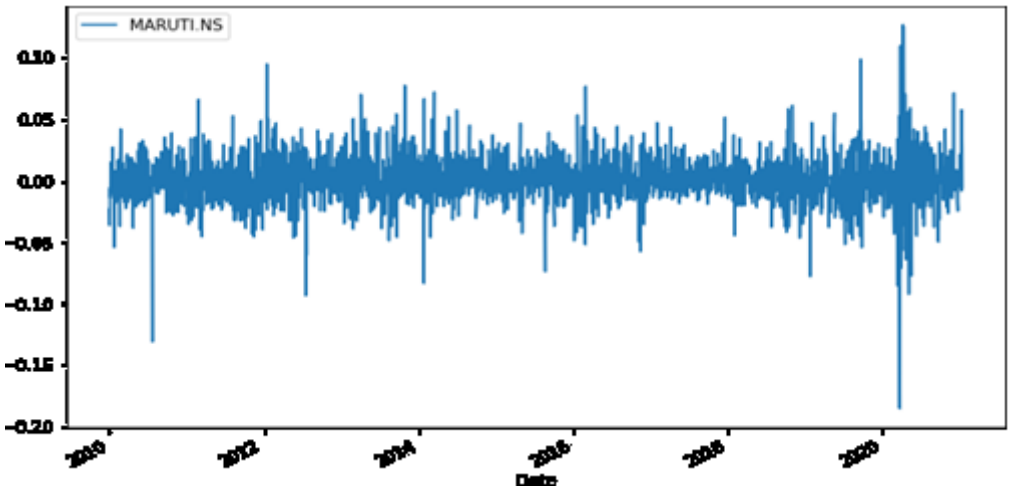
Graph 1: The trend of yearly stock price of Maruti Suzuki Private Limited from 2010 to 2020



Graph 2: Log returns of Maruti Suzuki India Limited 2010 to 2020



Graph 3: Trend of yearly stock price of Maruti Suzuki Private Limited from 2010 to 2020



The log returns of the Maruti Suzuki India Limited is plotted but not the price here, the image shows us that the returns are normally distributed and have a stable mean and which is same for Mahindra & Mahindra Limited and Tata Motors Limited.

Calculation of mean and variance is very important because both are important factors to calculate Geometric Brownian motion, after coding, the output will be obtained.

c. Mean and Variance of Maruti Suzuki India Limited

```
In [10]: u = log_returns.mean()
         u

Out[10]: TTM    0.000017
         dtype: float64

In [11]: var = log_returns.var()
         var

Out[11]: TTM    0.00075
         dtype: float64
```

d. Mean and Variance of Tata Motors Limited

After calculation of mean and variance, computation of drift is important, it provides approximate future rate of return of company. Formula used here is drift is equal to the average log return minus half of its variance that is

$$\text{Drift} = \mu - 1\ \sigma 2$$

Drift Value of Maruti Suzuki India Limited

```
In [64]: drift = u - (0.5*var)
         drift

Out[64]: MARUTI.NS    0.000471
         dtype: float64
```

Drift Value of Mahindra & Mahindra Limited

```
In [10]: drift = u - (0.5*var)
         drift

Out[10]: M&M.NS    0.000223
         dtype: float64
```

Drift Value of Tata Motors Limited

```
In [12]: drift = u - (0.5*var)
         drift

Out[12]: TTM   -0.000358
         dtype: float64
```

Standard Deviation of Maruti Suzuki India Limited

Construction of a variable called 'stdev' which means standard deviation and assign it with standard deviations of log returns. As Geometric Brownian motion contains the sum of the drift and a variance modified by "E" to the power of "R", this is the second part of the GBM formula, Formula is

```
In [65]: stdev = log_returns.std()
         stdev

Out[65]: MARUTI.NS    0.018683
         dtype: float64
```

Standard Deviation of Mahindra & Mahindra Limited

```
In [11]: stdev = log_returns.std()
         stdev

Out[11]: M&M.NS    0.019301
         dtype: float64
```

Standard Deviation of Tata Motors Limited

```
In [13]: stdev= log_returns.std()
         stdev

Out[13]: TTM    0.027388
         dtype: float64
```

After calculating the drift, variance and standard deviation, by using all this data daily returns of stock are calculated. The "type" function allows to check the type and to check whether it is in pandas series or not.

```
In [15]: type(drift)

Out[15]: pandas.core.series.Series

In [16]: type(stdev)

Out[16]: pandas.core.series.Series
```

For Maruti Suzuki India Limited

Conversion of Drift values to Numpy arrays is important because Numpy is a scientific computing tool and a third-party package allows to work with multidimensional arrays. Arrays represent a powerful way to organize and process data like matrices and multi-dimensional objects, after typing "dot values" after a Pandas object, it can be a date frame or series it can convert the object into a Numpy array.

```
In [68]: np.array(drift)
Out[68]: array([0.00047103])

In [69]: drift.values
Out[69]: array([0.00047103])
```

For Mahindra & Mahindra Limited

```
In [14]: np.array(drift)
Out[14]: array([0.00022265])

In [15]: drift.values
Out[15]: array([0.00022265])
```

For Tata Motors Limited

```
In [17]: np.array(drift)
Out[17]: array([-0.00035847])

In [18]: drift.values
Out[18]: array([-0.00035847])
```

Random variable Z is the second component of the Brownian motion, it corresponds to the distance between the mean and the events, expressed as the standard deviations, for this research assuming that based on the historical data the future stock returns has 95% chance of occurring in the same direction, then the distance between the event and the mean will be approximately 1.65 standard deviation.

```
In [71]: norm.ppf(0.95)
Out[71]: 1.6448536269514722
```

The Numpy “rand” function is used here to randomize, this is for second component of Brownian function, to randomize, create a multi-dimensional array by inserting two arguments, for research 10, 2 has taken for rows and columns respectively for all the three companies.Random element should be included within the PPF distribution to obtain the distance from the mean corresponding to each of these randomly generated probabilities. The first number from the 1st column and row corresponds to the first probability from the first column and row of x and it repeats same for all values. The newly created array used the probabilities provided by the function 'rand' and transformed them, as determined by the number of standard deviations, into distances from the mean 0. As specified in our formula, this expression will generate the value of Z. After building the necessary tools and after calculating variables, daily returns of the stock have to be calculated. The time interval for forecasting the daily stock returns will be using here is 365 days of 2021 and iterations chosen here is 1 that means producing one series of future stock price prediction of all companies.

```
In [109]: t_intervals = 365
          iterations = 1
```

The "daily returns" variable will show us what is going to equate "E" to the power of "R". We need the "EXP" function of NumPy, which implies that we measure the number "E" of Euler raised to the power of the expression written between the parentheses. The value of the drift and the product of the standard deviation and the random part in the parentheses, generated using the "norm" module. Its percentage value was created using the "rand" feature of NumPy, using "time intervals" and "iterations" to determine the array measurements filled with values from 0 to 1.

```
In [110]: daily_returns = np.exp(drift.values + stdev.values * norm.ppf(np.random.rand(t_intervals, iterations)))
```

The formula used, provided with 365 by 1 array with daily return values with 1 set of 365 random future daily returns of all the three companies. Create a price list and that price must be equal to the product of the price observed the previous day and the simulated daily return. Therefore, after getting the price in day T, one can estimate the expected stock price on day T plus 1. This process will be repeated for 365 times, then prediction of a company's stock price for next 365 days will be obtained from the day when we run the code

$S(t) = S0 * daily\ return(t)$
$S(t+1) = S(t) * daily\ return(t+1)$
$S(t+999) = S(t+998) * daily\ return(t+999)$

The first stock price on the list must be the last one in the data set to make credible predictions about the future. That is the current stock price of Maruti on 12-01-2021. Current market price is named as S0, as today it includes the stock price (at the starting point, time 0). With the support of the 'i-loc' method and the index operator, by typing minus 1 in the brackets, we can show that we need the last value from the table.

This will be the first stock price of the Maruti Suzuki India Limited, as the code was run on 13-01-2021, hence the future stock prices will start from this date.

```
In [112]: S0 = data.iloc[-1]
          S0

Out[112]: MARUTI.NS    8188.049805
          Name: 2021-01-12 00:00:00, dtype: float64
```

```
In [25]: S0 = data.iloc[-1]
         S0

Out[25]: M&M.NS    797.299988
         Name: 2021-01-13 00:00:00, dtype: float64
```

This will be the first stock price of the Mahindra & Mahindra Limited, as the code was run on 13-01-2021, hence the future stock prices will start from this date.

```
In [25]: S0 = data.iloc[-1]
         S0

Out[25]: M&M.NS    797.299988
         Name: 2021-01-13 00:00:00, dtype: float64
```

This will be the first stock price of the Tata Motors Limited, as the code was run on 13-01-2021, hence the future stock prices will start from this date.

```
In [32]: S0 = data.iloc[-1]
         S0

Out[32]: TTM    16.549999
         Name: 2021-01-12 00:00:00, dtype: float64
```

NumPy has a method which is already defined that construct an array of the same dimensions as an array that exists. This technique is called "zeros like". For argument, insert an array of daily returns, then the array of 365 elements is obtained, same as the dimension of daily return, and then it will be filled with zeros. Reason to create zero-like array is to replace these zeros with the future stock prices of three companies using a loop.

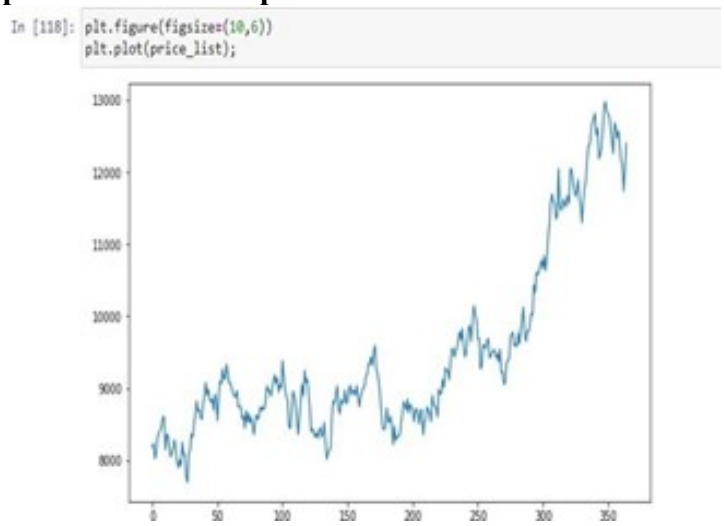
The first value of the list is created that is S0 which is current market price of three companies will appear at first row of single column, "S zero" for 1 iteration that is using for research it will be the initial price after that array follows as same

The expected stock prices of three companies will be generated for this loop will be obtained that begins from day 1 (S0) and ends on day 365, for this formula used is

$$S(t) = S(t-1) * \text{daily returns}(t)$$

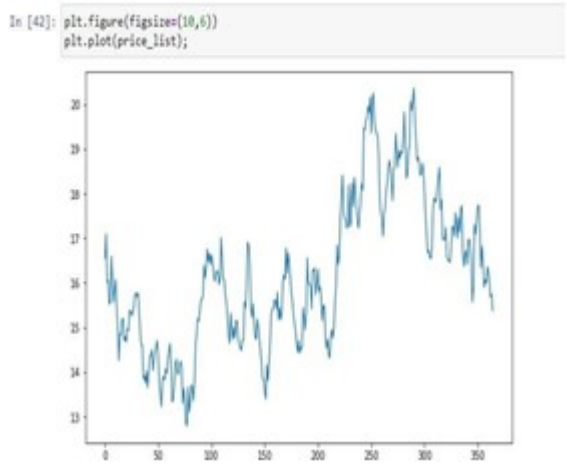
Matplotlib syntax is used to plot a graph for the obtained future stock prices of all three companies with size 10,6., after executing we got one possible path because the number of iterations chosen is 1, if it is 10 then there will be 10 possible paths of the future stock prices of all three companies from date of execution. In this research, computer will iterate the provided formula for once, iteration chosen here is 1, the graph shows the path or trend for the simulated values.

Graph 4. Future stock prices of Maruti Suzuki India Limited



Graph 5. Future stock prices of Mahindra & Mahindra Limited

Graph 6. Future Stock Prices of Tata Motors Limited



6. FINDINGS

The drift is positive for the Maruti Suzuki India Limited i.e., 0.000471, hence in the graph the trend is going up (positive) for Maruti, so from the analysis the obtained expected daily returns of the stocks are positive. From the data analysis, the obtained Variance is 0.000349 and obtained mean is 0.000646, the difference between mean and variance is 0.000297, the difference is not very high, hence it shows that stock is not very risky.

From the analysis, obtained standard deviation is 0.018683, it is used to measure the volatility of returns, and obtained mean is 0.000646 and the difference between standard deviation and mean is 0.018037, as the value is less, hence the stock is not more volatile.

From the analysis, Daily returns of the stock of the Maruti is obtained from 12-01-2021 to 24- 06-2022. The drift is positive for the Mahindra & Mahindra Limited i.e., 0.000223, hence in the graph the trend is going up (positive) for Mahindra, so from the analysis the obtained expected daily returns of the stocks are positive.

From the data analysis, the obtained Variance is 0.000373 and obtained mean is 0.000409, the difference between mean and variance is 0.000036, the difference is not high, hence it shows that stock is not risky. From the analysis, obtained standard deviation is 0.019301, it is used to measure the volatility of returns, and obtained mean is 0.000409 and the difference between standard deviation and mean is 0.018892, as the value is less, hence the stock is not more volatile. From the analysis, Daily returns of the stock of the Maruti is obtained from 13-01-2021 to 25- 06-2022.

The drift is positive for the Tata Motors Limited i.e., -0.000358, hence in the graph the trend is going down (negative) for Tata Motors, so from the analysis the obtained expected daily returns of the stocks are negative. From the data analysis, the obtained Variance is 0.00075 and obtained mean is 0.000017, the difference between mean and variance is 0.000733, the difference is little high, hence it shows that stock is little risky.

From the analysis, obtained standard deviation is 0.02738, it is used to measure the volatility of returns, and obtained mean is 0.000017 and the difference between standard deviation and mean is 0.027363, as the value is little high, hence the stock is little volatile. From the analysis, Daily returns of the stock of Tata Motors is obtained from 13-01-2021 to 25-06-2022. From the analysis, Future stock price of Tata Motors is obtained from 13-01-2021 to 25-06-2022.

7. CONCLUSION

From the analysis, the drift values for all the three companies are obtained, by comparing the values of companies, we can say that Maruti's drift value is higher compared to M&M Limited and Tata Motors, Hence the excepted rate of return will be higher and trend will go up for Maruti Suzuki private limited and 2nd position will be given for M&M Limited, but the Tata Motors trend is in negative

From the analysis, the spread between mean and standard deviation is almost same for Maruti Suzuki Private Limited and M&M Limited, and it is high for Tata Motors limited, from this we can say that Tata Motor's stock is riskier and more volatile compared to other two stocks. From the graph of future stock price, the trend of Maruti is going up when compared to other two companies, whereas M&M stock prices would decrease from mid of march and again stock price of Mahindra gains its potential at year end and again it will start to decrease from end of May.

Whereas, in Tata Motors Limited, the stock price will start to fall from march and stock price will increase from year end and again decrease at end of the march and decrease from April, hence from this analysis, Tata Motors Limited stock prices will be riskier and more volatile and prices would go down in future. Expected returns from Maruti Suzuki India Limited is higher and M&M Limited will increase at mid and fall at end, but stock price will be higher compared to initial stock price. Tata motors stock price will go on decreasing only for times it will increase but gradually it will fall lesser than initial price

8. REFERENCES

- (N.d.-a). Retrieved July 5, 2021, from Owler.com website: https://www.owler.com/company/marutisuzuki
- (N.d.-b). Retrieved July 5, 2021, from Capitalmarket.com website: https://www.capitalmarket.com/Company-Information/Information/About-%20Company/Mahindra-and-Mahindra-Ltd/365
- Alrabadi, Aljarayesh, Forecasting Stock Market Returns Via Monte Carlo Simulation: The Case of Amman Stock Exchange, Jordan Journal of Business Administration, Volume 11, No. 3, Febrauary 16, 2015
- Arivalagan, Rajamohan, Volatility modelling for Automobile sectors stocks in National stock exchange, International Journal of Advanced Research in Management and Social Sciences, Volume 7, No. 4, April 2018
- Arthi, Saravanan, A study on the performance of equity shares of automobile industry and information technology industry in BSE, International Journal of Advanced Research and Development, Volume 3, Issue 1, January 2018
- Atiq, Rafiq, Roohullah, Factors affecting stock prices: A case study of Karachi stock exchange (KSE), Volume 2, No. 1, September 27, 2016
- Chauhan A, A Study on Fundamental Analysis of Indian Automobile Industry with Reference to the Selected Companies, International Journal of scientific research, Volume 3, April, 2014
- Dhole, Analytical study of four automobile sector companies in price movement of shares, International Journal of Application or Innovation in Engineering & Management, Volume 2, June 6, 2013
- Geetha, Swaminathan, A study on the factors influencing stock price: A Comparative study of Automobile and Information Technology Industries stocks in India, International journal of current research and academic review, Volume 3, No. 3, March, 2015
- https://en.wikipedia.org/wiki/Maruti_Suzuki
- Johnson, E. (2021, July 5). What is MARUTI SUZUKI number of employees? MARUTI.NS. Retrieved July 5, 2021, from Macroaxis.com website: https://www.macroaxis.com/invest/ratio/MARUTI.NS--Number-of-Employees
- Nagpal, Chandok, Chabbra, A Research on Fundamental Access of Selected Automobile Companies in India, International Journal of Innovative Technology and Exploring Engineering (IJITEE), Volume 8, Issue-11S, September 2019
- Parmar, Agarwal, Saxen, Arora, Gupta, Dhiman, and Chouhan (2018), Stock Market Prediction Using Machine Learning, December, 2018

- Tata Motors: Number of employees 2006-2021. (n.d.). Retrieved July 5, 2021, from Macrotrends.net website: https://www.macrotrends.net/stocks/charts/TTM/tata-motors/number-of-employees
- Verma, The Fundamental Analysis of Automobile Industry with Reference to the Selected Companies, May 10, 2018
- Wikipedia contributors. (2021a, June 30). Tata Motors. Retrieved July 5, 2021, from Wikipedia, The Free Encyclopedia website: https://en.wikipedia.org/w/index.php?title=Tata_Motors&oldid=1031238100
- Wikipedia contributors. (2021b, July 1). Mahindra & Mahindra. Retrieved July 5, 2021, from Wikipedia, The Free Encyclopedia website: https://en.wikipedia.org/w/index.php?title=Mahindra_%26_Mahindra&oldid=1031324603
- Wikipedia, S. (2011). Mahindra Group: Mahindra & Mahindra Limited, Ssangyong Motor Company, Mahindra Navistar, Reva, Gippsland Aeronautics, Anand Mahindra. Books LLC, Wiki Series.