"Education for Knowledge, Science and Culture"

-Shikhanmaharshi Dr. Bapuji Salunkhe

(स्वायत्त) कोल्हापूर

VIVEKANAND COLLEGE, KOLHAPUR (Autonomous)

DEPARTMENT OF STATISTICS

A PROJECT REPORT

on

Statistical Analysis on stock prices of Banking Sector For year 2018 to 2021

Submitted by

Mr. Patil Om Sanjay
Mr. Patil Swapnil Yuvraj
Mr. Jadhave Aniket Arun
Mr. Sangar Akash Anantrao
Ms. Kurade Saloni Sanjay

in partial fulfillment for the award of

the degree of

BACHELOR OF SCIENCE

in

STATISTICS

2022-23

"Education for Knowledge, Science and Culture"

-Shikhanmaharshi Dr. Bapuji Salunkhe

(स्वायत्त) कोल्हापूर

VIVEKANAND COLLEGE, KOLHAPUR(Autonomous)
DEAPRTMENT OF STATISTICS

Certificate

This is to Certify that,

Sr. No.	Name	Roll No.
1	Mr. Patil Om Sanjay	8347
2	Mr. Patil Swapnil Yuvraj	8351
3	Mr. Jadhave Aniket Arun	8340
4	Mr. Sangar Akash Anantrao	8353
5	Ms. Kurade Saloni Sanjay	8344

Have satisfactorily completed the project work on **"Statistical Analysis on stock prices of Banking Sector For year 2018 to 2021"** as a part of skill enhancement course for **B. Sc. III,** prescribed by the Department of Statistics, ***Vivekanand College, Kolhapur (Autonomous)*** in the academic year **2022-23**.

This project has been completed under our guidance and supervision. To the best of our knowledge and belief, the matter presented in this project report is original and has not been submitted elsewhere for any other purpose.

Project Guide

(Mr. Bhosale A. B.)

Examiner

Head

(Ms. Pawar V. V.)

HEAD
DEPARTMENT OF STATISTICS
VIVEKANAND COLLEGE, KOLHAPUR
(AUTONOMOUS)

VIVEKANAND COLLEGE ESTD JUNE 1964 KOLHAPUR - 416003

ACKNOWLEDGEMENT

Although the project is part of the syllabus, it allows us to apply the subject knowledge to real-life problems, which may be useful to us in the future.

Firstly, we are really thankful to Vivekanand College, Kolhapur. (Autonomous) for giving importance to the project in regularstudy. While doing this project we get innovative ideas in statistics and we also learn how to use statistics in real life.

We thank **Dr. R. R. KUMBHAR,** Principal of Vivekanand College, Kolhapur for giving permission for doing this project. We would like to thank Head of Department **Ms. V.V. Pawar** And project guide **Mr. A. B. Bhosale.** for their valuable guidance, suggestions and motivation for project work. He not only helps us with our project but also stood up for us every time. Last but not least we are thankful to our friends and parents who were always supported during project completion. We want to retain their debt.

INDEX

INTRODUCTION

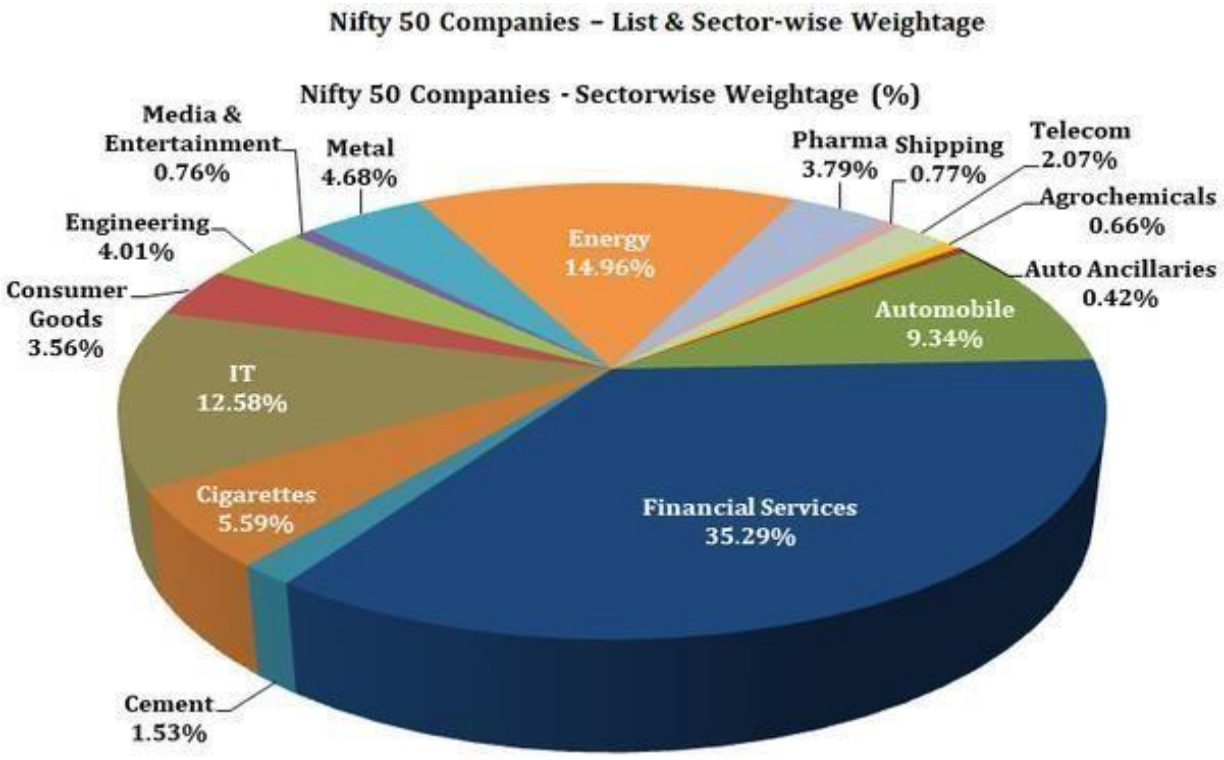
Stock market plays an important role in consolidation in national economy and also helps in the development in the industrial sector. It helps in mobilizing the saving and ensures safety. As India is a developing economy, the study of Indian stock market and its analysis find it prominence in national development.

In this chapter we discuss about basics of stock market, investment, various aspects of stock market, why people in India hesitate to investing stock market, basic terminologies used in the stock market, finance sector and Indian banking system.

Sector Indicators: There are number of sectors or industries which are listed on NSE and BSE. In addition to this, an individual sector comprises of number of companies. There are around 73 sectors listed on NSE and BSE separately.

Some of the important sectors present on both the exchanges are as follows:-

- Banking Sector
- Automobile Sector
- Information Technology Sector
- Fast Moving Consumer Goods(FMCG) Sector
- Media & Entertainment Sector
- Pharmaceuticals Sector
- Food Sector
- Public Sector Undertaking(PSU) Bank Sector
- Multi Nation Corporation (MNC) Sector



In the above Pie-chart, there is a list and sector-wise weightage of Nifty 50 Companies. We can see that, Financial Services sector have highest weightage than the other sectors, that is, 35.29% and Auto Ancillaries sector have the lowest weightage than the other sectors, that is, 0.42%.

- **<u>Basic Terminologies used in Stock market :</u>**

  1. Stocks/Shares: It is a security that represents the ownership of a fraction of a corporation. Units of stock are called "Shares".

  2. Investors: Investor is any persons or other entity who commits capital with the expectation of receiving financial returns.

  3. Open: It is the price at which the financial security opens in the market when trading begins.

High: High is the maximum value reached by the stock in period.

Low: Low is the minimum price of stock in a period.

Close: Close refers to the price of an individual stock when the stock exchange closed shop for the day.

4. Share Turnover: Share turnover is a measure of stock liquidity calculated by dividing the total number of shares traded over a period the average number of shares outstanding for the period.

5. Trade: The buying and selling of financial instruments.

6. Trading Volume: Trading volume is a measure of how much of a given financial asset has traded in a period of time.

7. Price-to-Earnings Ratio (P/E Ratio) : The price-to-earnings ratio is the ratio for valuing a company that measures its current share price relative to its per-share earnings ratio is also sometimes known as the price multiple or the earnings multiple

8. Stock Quote: A stock quote is the price of a stock as quoted on an exchange.

9. Sector: A sector is an area of the economy in which businesses

share the same or related product or services.

10. Business Day: Monday to Friday excluding public holidays.

11. Equity: Common and preferred stocks which represents

shares in ownership of a company.

12. Face Value: It is the cash denomination or the amount of **money** the holder of the individual security going to earn from the issuer of the security at the time of maturity. It is also known as per the value.

13. Mutual Fund: A pool of money managed by experts by investing in stocks, bonds and other securities with the objective of improving their savings.

14. Volatility: The price movements of a stock or the stock market as a whole. Highly volatile stocks are those with extreme daily up and down movements and wide intraday trading ranges.

15. Dematerialized account (Demit a/c): It is an account to hold and financial securities in electronic form. It allows investors to hold shares securities in electronic format, with an aim of facilitating safe, easy and convenient trade for users.

Aim and Objectives

- **Aim:**

To study the effect of COVID-19 on Bank nifty index & Predict the Future Stock Prices.

- **Objectives:**

1. To check the effect of COVID-19 on Bank nifty.
2. Predict the trend of bank nifty.

Source of data collection :

The pertained data on Open price and Closing prices at daily time step were collected from the secondary source viz. Yahoo finance official website (https://finance.yahoo.com/quote/%5ENSEI/history/).

The daily share prices of below mentioned banks were taken for a period between January 2018 to December 2021. For the study we have taken 6 banks on National Stock Exchange namely, HDFC bank, Axis bank, ICICI bank, Kotak Mahindra bank, INDUSIND bank. The six banks were selected on the basis of their performance in the NSE.

Data on Stock market

Now we present the sample data which we used for analysis purpose. The below table contains daily data of 'Open price' and 'close price' of 6 banks.

Data Of Year 2018

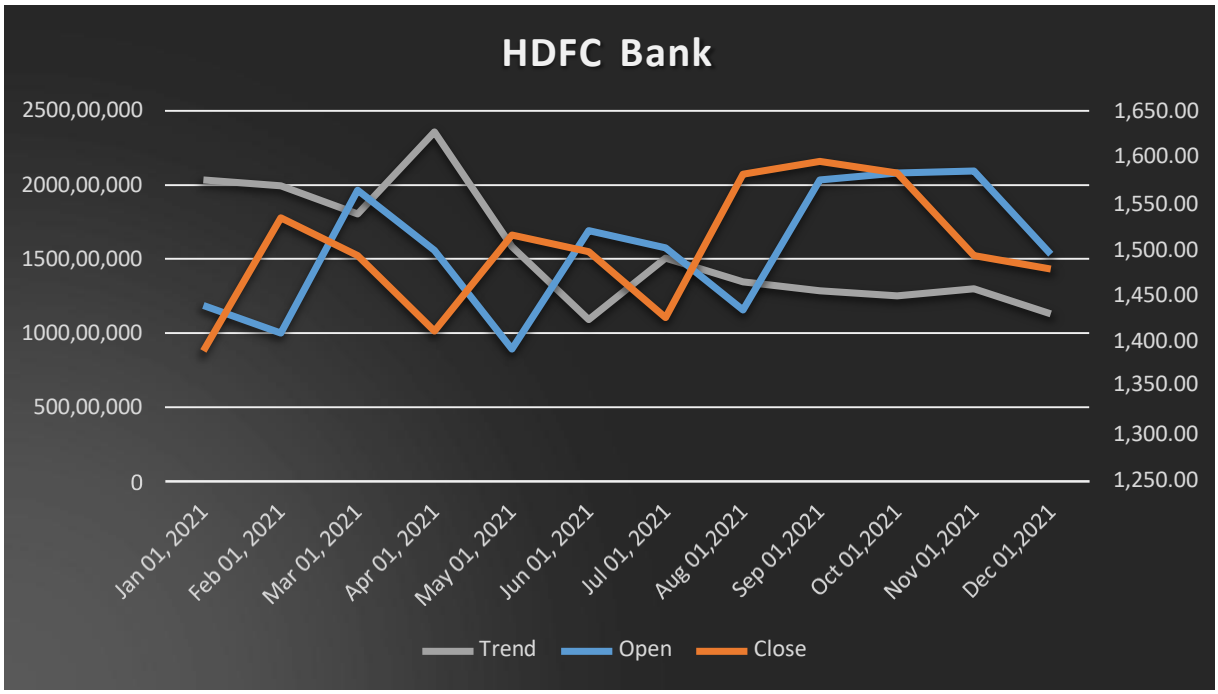
	HDFC Bank		AXIS Bank		ICICI Bank		SBI		KOTAK Mahindra Bank		INDUSIND Bank	
Date	Open	Close*	Open	Close*	Open	Close*	Open	Close*	Open	Close*	Open	Close*
Dec 28, 2018	1,058.68	1,061.45	623.9	625.05	358.3	360.75	293.6	294.8	1244.25	1241.35	1578.9	1583.25
Dec 27, 2018	1,066.50	1,052.53	623.55	617.55	359.5	355.65	296.7	292.15	1257.25	1240.25	1577	1564
Dec 26, 2018	1,038.50	1,061.18	611	619.5	350.65	355.85	292.85	294.15	1234.5	1248.15	1559.7	1556.45
Dec 24, 2018	1,052.00	1,040.32	626	615	353.4	352.75	293.5	293.05	1230	1238.5	1578	1562.35
Dec 21, 2018	1,067.00	1,055.57	633.3	620.85	361	354.2	293.65	291.9	1240	1227.2	1612.9	1575.65
Dec 20, 2018	1,056.28	1,068.72	636.95	632.95	363.05	362.15	298.35	294.05	1219.8	1236.3	1606.1	1612.85
Dec 19, 2018	1,066.55	1,061.72	624.25	641.65	363	366.5	294.7	300.7	1238.8	1225.65	1641	1612.65
Dec 18, 2018	1,062.00	1,067.72	617.65	619.4	356.75	362.25	287.85	292.75	1214.9	1237.1	1627.9	1639.55

Data Of Year 2021

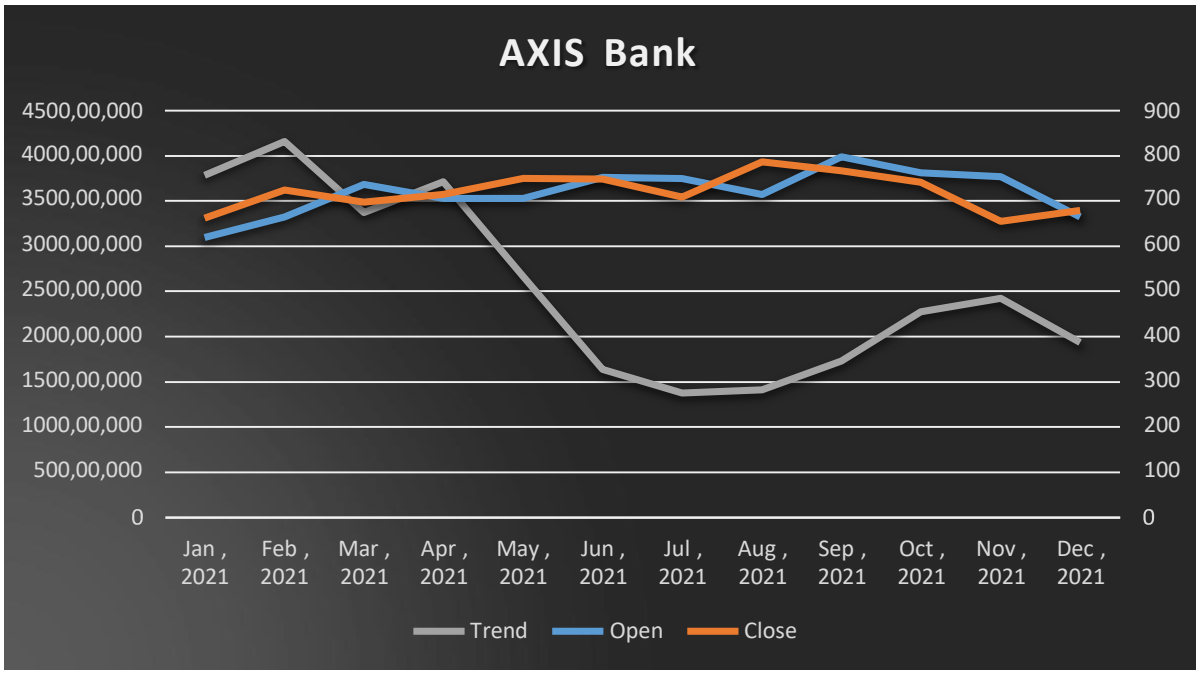
	HDFC Bank		AXIS Bank		ICICI Bank		SBI		Kotak Mahindra Bank		INDUSIND Bank	
Date	Open	Close*	Open	Close*	Open	Close*	Open	Close*	Open	Close*	Open	Close*
Dec 30, 2021	1,458.50	1,461.50	668	668.9	733.3	735.7	452.8	451.7	1,759.00	1,755.25	864	885.4
Dec 29, 2021	1,456.05	1,453.85	674.5	670.5	738	735.7	461	454.4	1,774.00	1,764.20	854.1	870
Dec 28, 2021	1,460.70	1,460.80	677.3	675.5	740.4	735.8	461.2	461.2	1,785.00	1,774.90	864	852.7
Dec 27, 2021	1,428.90	1,450.80	663.1	672.2	724	736	453.7	458.1	1,743.10	1,773.45	843	855.3
Dec 24, 2021	1,445.50	1,438.90	681.2	667.5	733.9	727.1	462.6	457	1,780.00	1,748.40	878	861.2
Dec 23, 2021	1,453.25	1,444.10	677	678.8	739.1	731.3	461	461.8	1,784.90	1,775.60	879.9	871.1
Dec 22, 2021	1,452.30	1,445.20	670	669.4	726.3	732.8	450	455.9	1,748.00	1,762.40	861.5	871.8
Dec 21, 2021	1,439.50	1,441.80	683	665.9	720	720.4	457.1	446	1,761.05	1,736.55	855.1	857.2
Dec 20, 2021	1,452.00	1,425.65	681	674.4	718.1	710	459	449.2	1,780.00	1,742.50	874	846.1
Dec 17, 2021	1,497.00	1,473.05	707.5	688.9	742	728.3	480.1	467.8	1,855.00	1,793.80	926	883
Dec 16, 2021	1,512.80	1,500.10	719	709.7	757.9	741.2	488.4	481.2	1,885.90	1,860.75	945	928.3

Data Representation

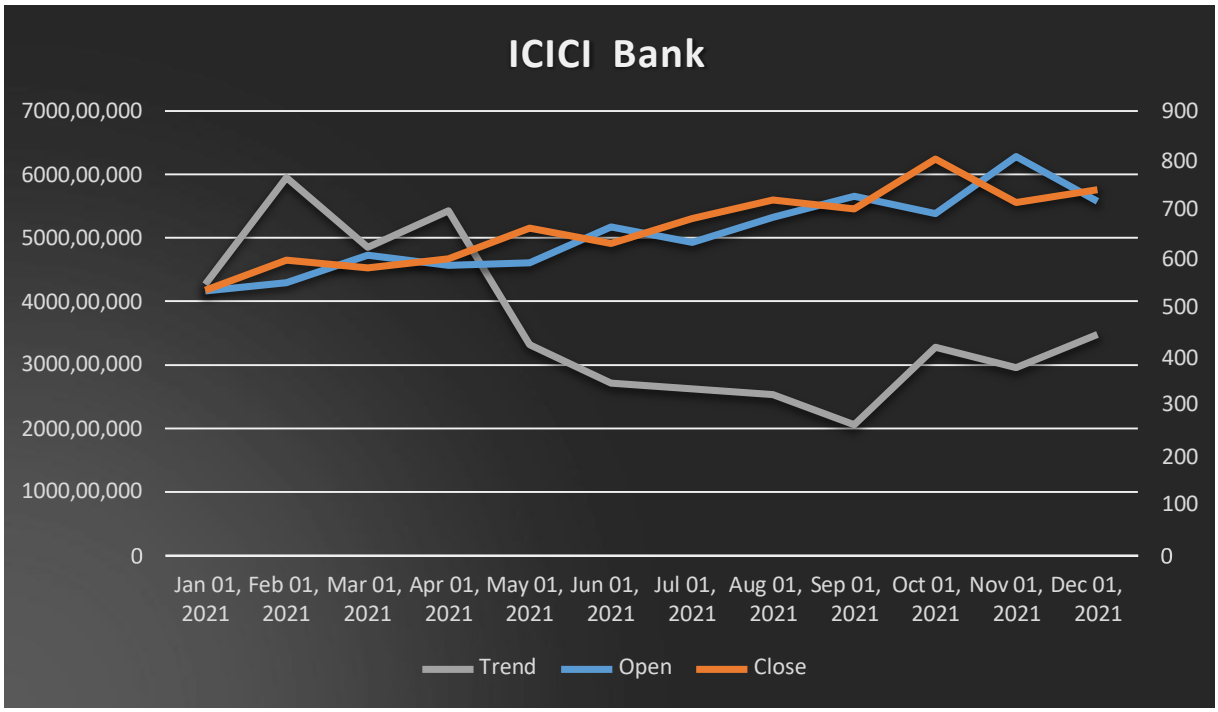
We use multiple bar graphs to present the data. we have taken 5 bank's data of one month. The bars in the data are representing open, high, low, close prices and the wave is representing number of trades of 5 banks.



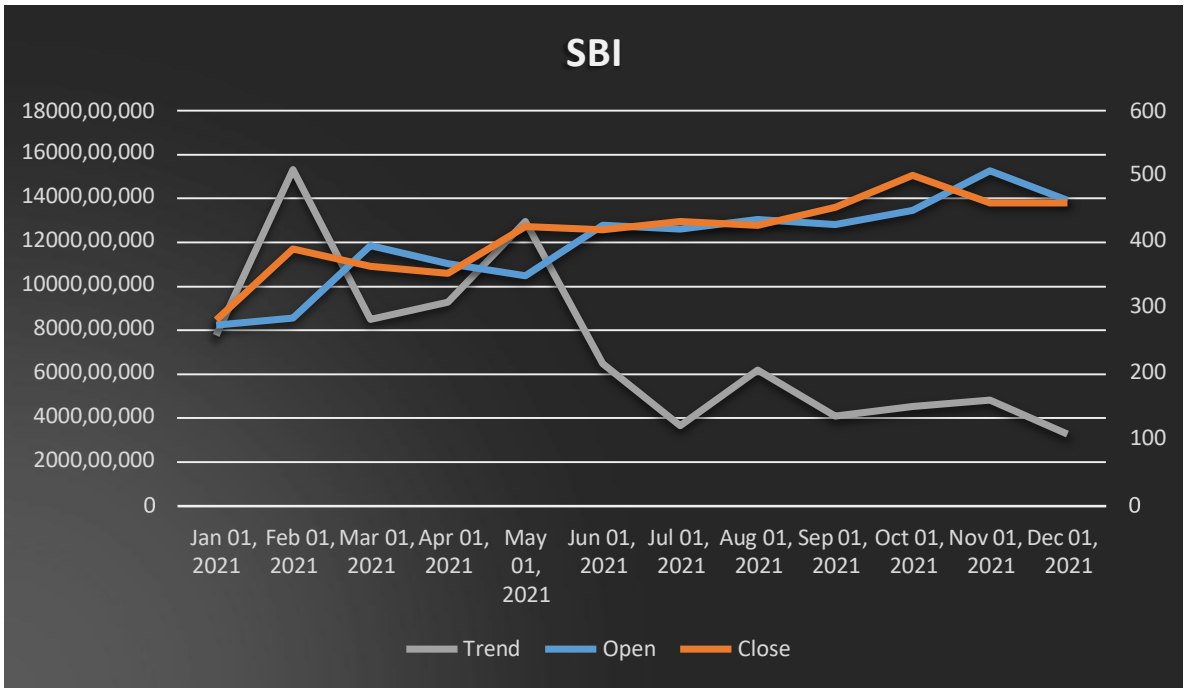
The above graph shows open, high, low, close prices and number of trades for one year i.e. year 2021 of HDFC bank.



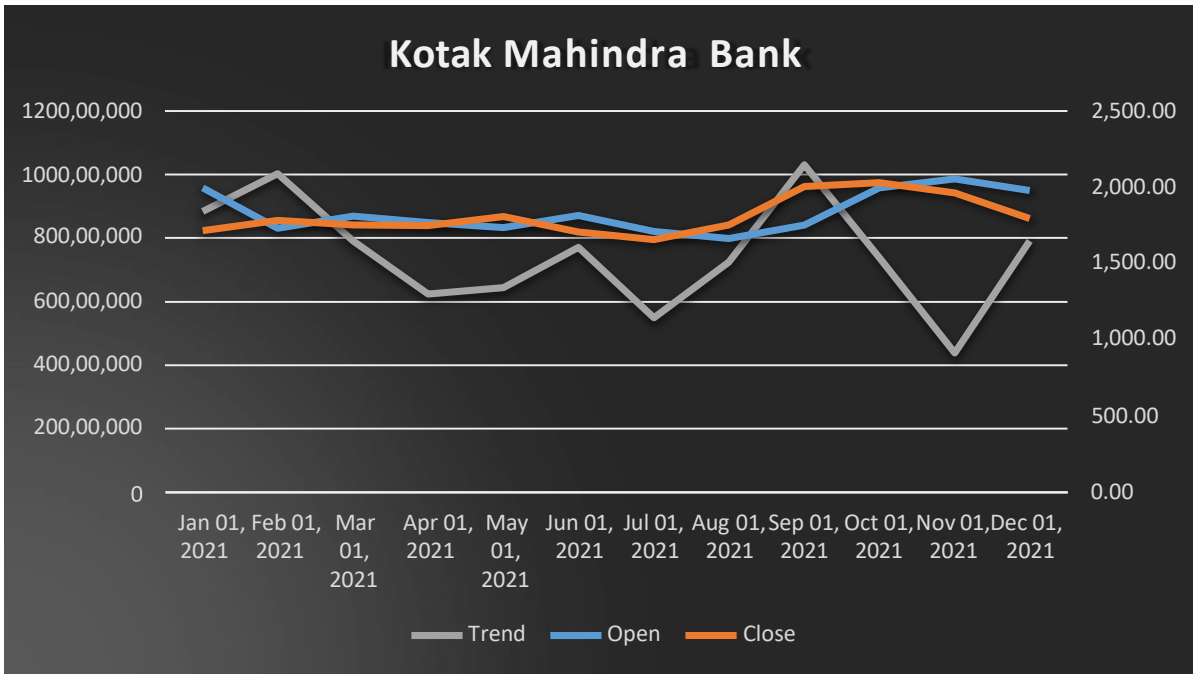
The above graph shows open, high, low, close prices and number of trades for one year i.e. year 2021 of AXIS bank.



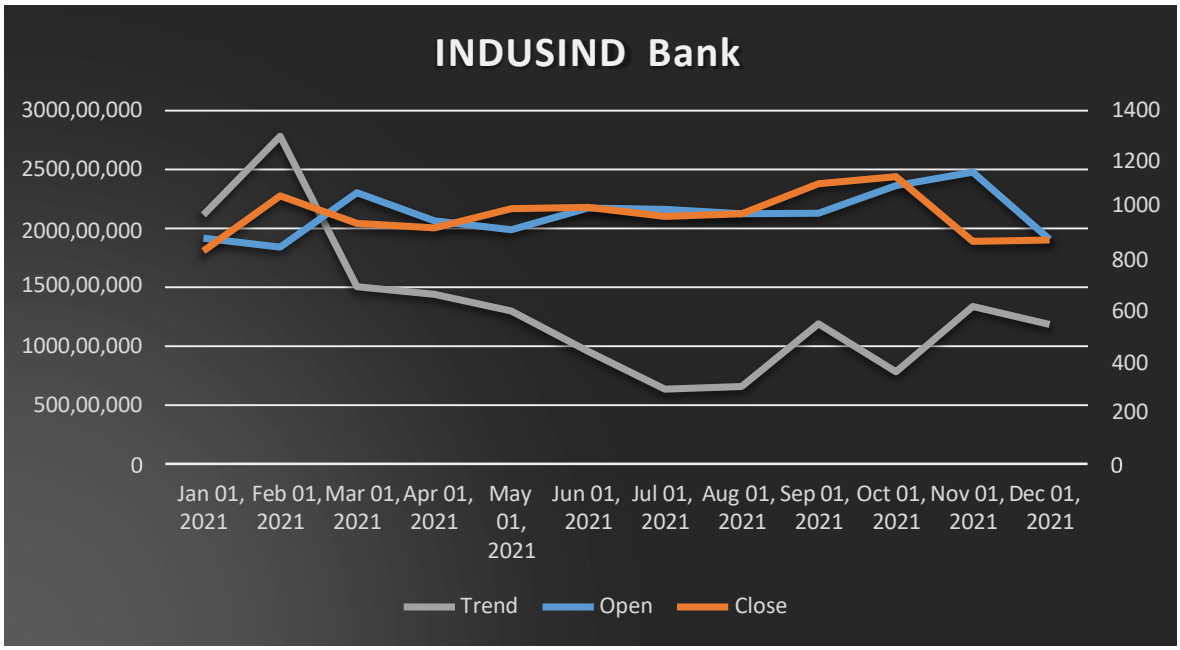
The above graph shows open, high, low, close prices and number of trades for one year i.e. year 2021 of ICICI bank.



The above graph shows open, high, low, close prices and number of trades for one year i.e. year 2021 of State Bank of India.



The above graph shows open, high, low, close prices and number of trades for one year i.e. year 2021 of KOTAK Mahindra Bank.



The above graph shows open, high, low, close prices and number of trades for one year i.e. year 2021 of INDUSIND Bank.

Statistical Analysis

we carryout statistical analysis to achieve the objectives. Here we are considering Three statistical tools and then with the help of these we record our conclusions.

- **The effect of COVID-19 on Stock market :**

Here we have taken stock returns of 6 banks before COVID-19, that is, from 2018 to 2019 and during COVID-19, that is, from 2020 to 2021 in order to find whether COVID-19 has affected the stock prices of selected banks or not, using **Paired t-test.**

- **Hypothesis :**

H_0: There is no effect of COVID-19 on Stock prices of banks.
i.e. $\mu_d \neq 0$

V/s

H_1: There is effect of COVID-19 on Stock prices of banks.
i.e. $\mu_d = 0$
Level of significance (α) = 0.05

- **The test statistic is:**

$$t = \frac{\bar{d} - \mu_d}{s_{d/\sqrt{n}}} \sim_{(n-1)d.f}$$

Where $\bar{d}$ is the mean difference. The standard error of $\bar{d}$ is $\frac{s_d}{\sqrt{n}}$ where s_d is the standard deviation of the differences.

Under the null hypothesis, this statistic follows a t-distribution with n − 1 degrees of freedom with α level of significance.

A} HDFC Bank

t-test: Paired Two Sample for Means

	Open Price(Before)	*Open Price(During)*
Mean	1082.039836	1316.723409
Variance	10850.46477	53536.64051
Observations	487	487
Pearson Correlation	0.663717924	
Hypothesized Mean Difference	0	
Df	486	
t Stat	-28.77519519	
P(T<=t) one-tail	2.4554E-107	
t Critical one-tail	1.647994976	
P(T<=t) two-tail	**4.9107E-107**	
t Critical two-tail	1.964857173	

	Close Price(Before)	*Close Price(During)*
Mean	1081.658357	1315.402977
Variance	10655.66773	53869.46252
Observations	487	487
Pearson Correlation	0.666509863	
Hypothesized Mean Difference	0	
df	486	
t Stat	-28.57448413	
P(T<=t) one-tail	2.0883E-106	
t Critical one-tail	1.647994976	
P(T<=t) two-tail	**4.1765E-106**	
t Critical two-tail	1.964857173	

Conclusion: From above both tables we can see that **p value < α (0.05).** Therefore we reject the null hypothesis & conclude that COVID-19 Affected significantly on Open & Close prices of HDFC bank.

B} AXIS Bank

t-test: Paired Two Sample for Means

	Open Price(Before)	*Open Price(During)*
Mean	645.5798768	622.9658111
Variance	8397.084121	20883.12383
Observations	487	487
Pearson Correlation	0.714323976	
Hypothesized Mean Difference	0	
Df	486	
t Stat	4.902616473	
P(T<=t) one-tail	**6.4564E-07**	
t Critical one-tail	1.647994976	
P(T<=t) two-tail	**1.29128E-06**	
t Critical two-tail	1.964857173	

	Close Price(Before)	*Close Price(During)*
Mean	645.1275	621.845
Variance	8314.113	20919.52
Observations	487	487
Pearson Correlation	0.716243	
Hypothesized Mean Difference	0	
Df	486	
t Stat	5.05239	
P(T<=t) one-tail	**3.09E-07**	
t Critical one-tail	1.647995	
P(T<=t) two-tail	**6.19E-07**	
t Critical two-tail	1.964857	

Conclusion: From above both tables we can see that **p value < α (0.05)**. Therefore we reject the null hypothesis & conclude that COVID-19 Affected significantly on Open & Close prices of AXIS bank.

C} ICICI Bank

t-test: Paired Two Sample for Means

	Open Price(Before)	*Open Price(During)*
Mean	366.536345	536.9125257
Variance	4507.595477	21502.55128
Observations	487	487
Pearson Correlation	0.854261575	
Hypothesized Mean Difference	0	
Df	486	
t Stat	-39.22143038	
P(T<=t) one-tail	**5.5392E-153**	
t Critical one-tail	1.647994976	
P(T<=t) two-tail	**1.1078E-152**	
t Critical two-tail	1.964857173	

	Close Price(Before)	*Close Price(During)*
Mean	366.7468172	536.5197125
Variance	4529.353606	21534.17886
Observations	487	487
Pearson Correlation	0.853011156	
Hypothesized Mean Difference	0	
Df	486	
t Stat	-39.02919961	
P(T<=t) one-tail	3.3969E-152	
t Critical one-tail	1.647994976	
P(T<=t) two-tail	6.7938E-152	
t Critical two-tail	1.964857173	

Conclusion: From above both tables we can see that **p value < α (0.05).**Therefore we reject the null hypothesis & conclude that COVID-19 Affected significantly on Open & Close prices of ICICI bank.

D} State Bank Of India

	Open Price(Before)	*Open Price(During)*
Mean	292.4093429	319.5041068
Variance	975.4641872	12573.45951
Observations	487	487
Pearson Correlation	0.573735732	
Hypothesized Mean Difference	0	
Df	486	
t Stat	-6.124858525	
P(T<=t) one-tail	**9.37439E-10**	
t Critical one-tail	1.647994976	
P(T<=t) two-tail	**1.87488E-09**	
t Critical two-tail	1.964857173	

	Close Price(Before)	*Close Price(During)*
Mean	291.9955852	318.973614
Variance	971.3795535	12549.64705
Observations	487	487
Pearson Correlation	0.573032211	
Hypothesized Mean Difference	0	
Df	486	
t Stat	-6.10191664	
P(T<=t) one-tail	**1.07137E-09**	
t Critical one-tail	1.647994976	
P(T<=t) two-tail	**2.14275E-09**	
t Critical two-tail	1.964857173	

Conclusion: From above both tables we can see that **p value < α (0.05).**Therefore we reject the null hypothesis & conclude that COVID-19 Affected significantly on Open & Close prices of HDFC bank.

E} KOTAK Mahindra Bank

	Open Price(Before)	*Open Price(During)*
Mean	1323.3423	1654.960062
Variance	33007.91232	71778.12221
Observations	487	487
Pearson Correlation	0.474545889	
Hypothesized Mean Difference	0	
Df	486	
t Stat	-30.23388115	
P(T<=t) one-tail	**4.8571E-114**	
t Critical one-tail	1.647994976	
P(T<=t) two-tail	**9.7143E-114**	
t Critical two-tail	1.964857173	

	Close Price(Before)	*Close Price(During)*
Mean	1324.12115	1653.034292
Variance	32831.59391	71777.7983
Observations	487	487
Pearson Correlation	0.472994592	
Hypothesized Mean Difference	0	
Df	486	
t Stat	-29.96234602	
P(T<=t) one-tail	**8.4537E-113**	
t Critical one-tail	1.647994976	
P(T<=t) two-tail	**1.6907E-112**	
t Critical two-tail	1.964857173	

Conclusion: From above both tables we can see that **p value < α (0.05)**. Therefore we reject the null hypothesis & conclude that COVID-19 Affected significantly on Open & Close prices of State Bank Of India.

F} INDUSIND Bank

t-test: Paired Two Sample for Means

	Open Price(Before)	*Open Price(During)*
Mean	1629.999795	858.3654004
Variance	40668.03119	78569.15535
Observations	487	487
Pearson Correlation	-0.68025781	
Hypothesized Mean Difference	0	
Df	486	
t Stat	38.44945989	
P(T<=t) one-tail	**8.2915E-150**	
t Critical one-tail	1.647994976	
P(T<=t) two-tail	**1.6583E-149**	
t Critical two-tail	1.964857173	

	Close Price(Before)	*Close Price(During)*
Mean	1628.149897	855.3007187
Variance	40876.58968	77848.06008
Observations	487	487
Pearson Correlation	-0.682516667	
Hypothesized Mean Difference	0	
Df	486	
t Stat	38.55083258	
P(T<=t) one-tail	**3.161E-150**	
t Critical one-tail	1.647994976	
P(T<=t) two-tail	**6.3221E-150**	
t Critical two-tail	1.964857173	

Conclusion: From above both tables we can see that **p value < α (0.05)**. Therefore we reject the null hypothesis & conclude that COVID-19 Affected significantly on Open & Close prices of HDFC bank.

- **ANOVA for Open Price**:

Ho (Open Price): There is no significant difference between open prices of banks in all three Phases.

V/S

H_1 (Open Price): There is significant difference between open prices of banks in all three phases.

- **ANOVA for Close Price**:

Ho (Close Price): There is no significant difference between close prices of banks in all three Phases.

V/S

H_1 (Close Price): There is significant difference between close prices of banks in all three phases.

A} HDFC Bank: Open Price

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Phase 1	211	229681.75	1088.5391	20580.12433
Phase 2	69	102346.8	1483.286957	4665.979386
Phase 3	62	97416.65	1571.23629	4131.138047

ANOVA

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	15642750.81	2	7821375.407	542.0947615	**0.0000**	3.022362118
Within Groups	4891112.129	339	14428.05938			
Total	20533862.94	341				

Close Price

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Phase 1	211	229360.85	1087.018246	21146.16896
Phase 2	69	102145.4	1480.368116	4022.574336
Phase 3	62	97565.15	1573.631452	3605.513462

ANOVA

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	15753090.77	2	7876545.386	541.1549635	**0.0000**	3.022362118
Within Groups	4934166.858	339	14555.06448			
Total	20687257.63	341				

Conclusion: From above both tables we can see that **p value < α (0.05).** Therefore we reject the null hypothesis. we can see that There is significant difference between in all three phases of Open & Close prices of HDFC Bank.

B} AXIS Bank : Open Price

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Phase 1	211	103118	488.7109005	12826.31776
Phase 2	69	49438.1	716.4942029	1148.187245
Phase 3	62	48410.6	780.816129	797.513834

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	5524339.899	2	2762169.95	332.0184427	0.0000	3.022362118
Within Groups	2820251.806	339	8319.326863			
Total	8344591.706	341				

Close Price

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
601.6	210	102266.9	486.9852381	12939.53497
750.7	68	48580.35	714.4169118	1006.547284
742	61	47610.6	780.5016393	676.6884139

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	5487775.92	2	2743887.96	327.8144797	0.0000	3.022601302
Within Groups	2812402.782	336	8370.246375			
Total	8300178.702	338				

Conclusion: From above both tables we can see that **p value < α (0.05).** Therefore we reject the null hypothesis. we can see that There is significant difference between three phases of Open & Close pricesof AXIS Bank.

C} ICICI Bank:

Open Price

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Phase 1	211	83141.05	394.0334123	4729.354343
Phase 2	69	41716	604.5797101	835.8416411
Phase 3	62	44600.8	719.3677419	1148.898451

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	6100571.729	2	3050285.865	923.1865589	0.0000	3.022362118
Within Groups	1120084.449	339	3304.08392			
Total	7220656.178	341				

Close Price

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Phase 1	211	82973.35	393.2386256	4750.215251
Phase 2	69	41701.95	604.376087	828.0904859
Phase 3	62	44614.4	719.5870968	1228.792536

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	6137681.044	2	3068840.522	921.6213268	0.0000	3.022362118
Within Groups	1128811.7	339	3329.828025			
Total	7266492.745	341				

Conclusion: From above both tables we can see **p value < α (0.05).** Therefore we reject the null hypothesis. we can see that There is significant difference between three phases of Open & Close prices of ICICI Bank.

D} State Bank Of India:

Open Price

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Phase 1	211	44561.6	211.1924171	2068.729109
Phase 2	69	25880	375.0724638	692.01401
Phase 3	62	27911.7	450.1887097	856.4029852

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	3398767.241	2	1699383.62	1079.366624	0.0000	3.022362118
Within Groups	533730.6476	339	1574.426689			
Total	3932497.888	341				

Close Price:

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Phase 1	211	44404.6	210.4483412	2040.669962
Phase 2	69	25815.6	374.1391304	640.5607257
Phase 3	62	27913.45	450.2169355	867.955979

ANOVA

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	3412090.156	2	1706045.078	1101.525075	0.0000	3.022362118
Within Groups	525044.136	339	1548.802761			
Total	3937134.292	341				

Conclusion: From above both tables we can see that **p value < α (0.05).** Therefore we reject the null hypothesis. we can see that There is significant difference between three phases of Open & Close pricesof State Bank Of India.

E} KOTAK Mahindra Bank:

Open Price

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Phase 1	211	296696.3	1406.143602	35524.96742
Phase 2	69	125303.55	1815.993478	6729.610067
Phase 3	62	117466.2	1894.616129	22092.70129

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	16355136	2	8177568.002	299.1950931	0.0000	3.022362118
Within Groups	9265511.422	339	27331.8921			
Total	25620647.43	341				

Close Price

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Phase 1	211	296692.7	1406.126303	36815.65984
Phase 2	69	124970.7	1811.168841	6379.661625
Phase 3	62	117682.9	1898.110484	21995.98895

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	16337298.26	2	8168649.129	291.2814323	0.0000	3.022362118
Within Groups	9506860.883	339	28043.83741			
Total	25844159.14	341				

Conclusion: From above both tables we can see that **p value < α (0.05).** Therefore we reject the null hypothesis. we can see that There is significant difference between three phases of Open & Close pricesof KOTAK Mahindra Bank.

F} INDUSIND Bank:

Open Price

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Phase 1	211	133857.25	634.3945498	66955.85882
Phase 2	69	67228.9	974.3318841	5226.767498
Phase 3	62	67202.2	1083.906452	6543.605122

ANOVA

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	12798612.81	2	6399306.404	146.42723	0.0000	3.022362118
Within Groups	14815310.45	339	43702.98069			
Total	27613923.26	341				

Close Price

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Phase 1	211	133184.2	631.2047393	65854.85776
Phase 2	69	67080.4	972.1797101	4964.504435
Phase 3	62	67188.5	1083.685484	6243.267655

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	12936463.56	2	6468231.782	150.7244123	0.0000	3.022362118
Within Groups	14547945.76	339	42914.29427			
Total	27484409.32	341				

Conclusion: From above both tables we can see that **p value < α (0.05).** Therefore we reject the null hypothesis. we can see that There is significant difference between three phases of Open & Close pricesof State Bank Of India.

Exponential Smoothing

Stock Prices data is highly depending on time period. So, we have implemented time series analysis for the given data set, mainly we have tried single exponential smoothing method for the analysis and prediction purpose. we have taken average Open & Close price of every month as a data for the forecasting purpose. We have taken data from January 2018 to December 2021.

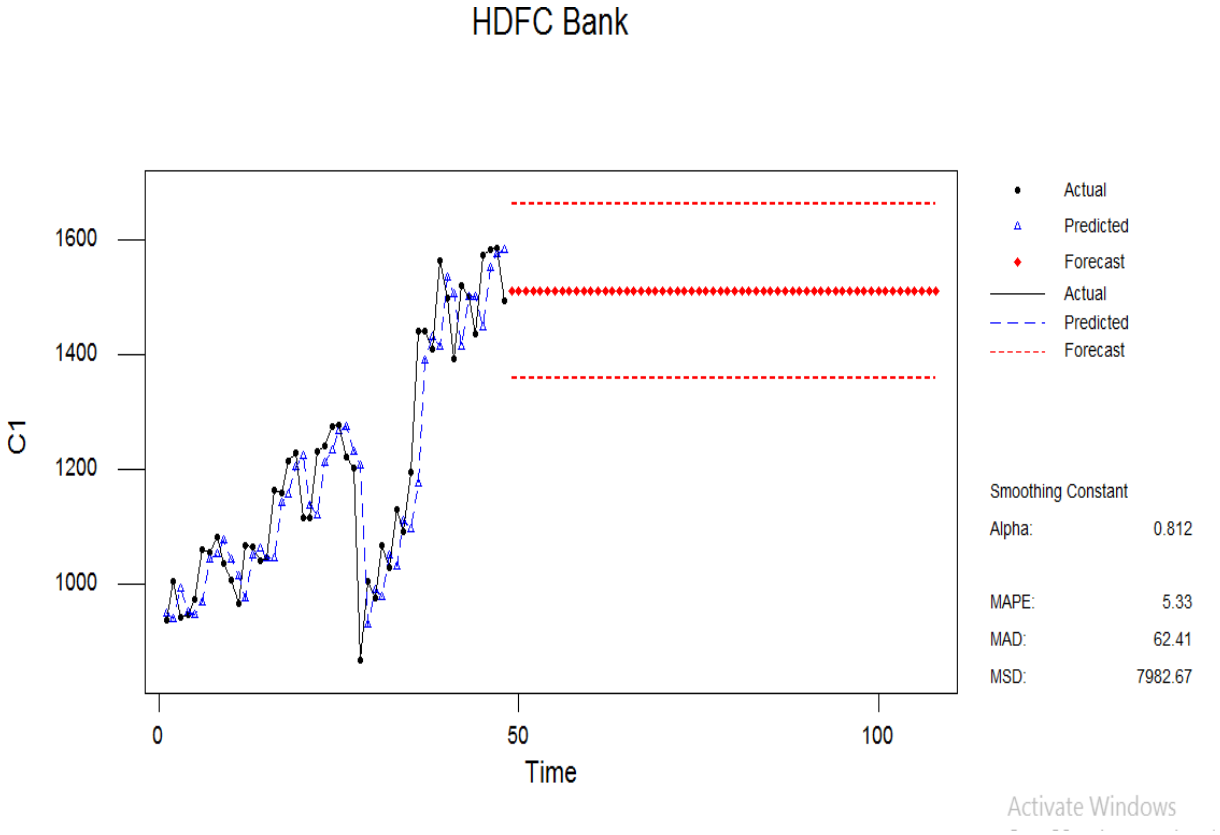
Single Exponential Smoothing

Single exponential smoothing is a time series forecasting method for univariate data without a trend or seasonality.

Banks	Forecasted Data[Using single exponential smoothing]					
	Open Price			Close Price		
	Forecasted	Lower Price	Upper Price	Forecasted	Lower Price	Upper Price
HDFC Bank	1511.63	1358.73	1664.53	1483.55	1331.53	1635.56
AXIS Bank	674.102	561.968	786.236	677.367	566.009	788.725
ICICI Bank	728.344	643.33	813.358	738.168	656.321	820.015
SBI	466.117	400.551	531.684	460.452	397.23	523.674
KOTAK M. Bank	1973.96	1746.69	2201.24	1785.35	1557.22	2013.48
INSIND Bank	898.983	614.674	1183.29	888.138	610.924	1165.35

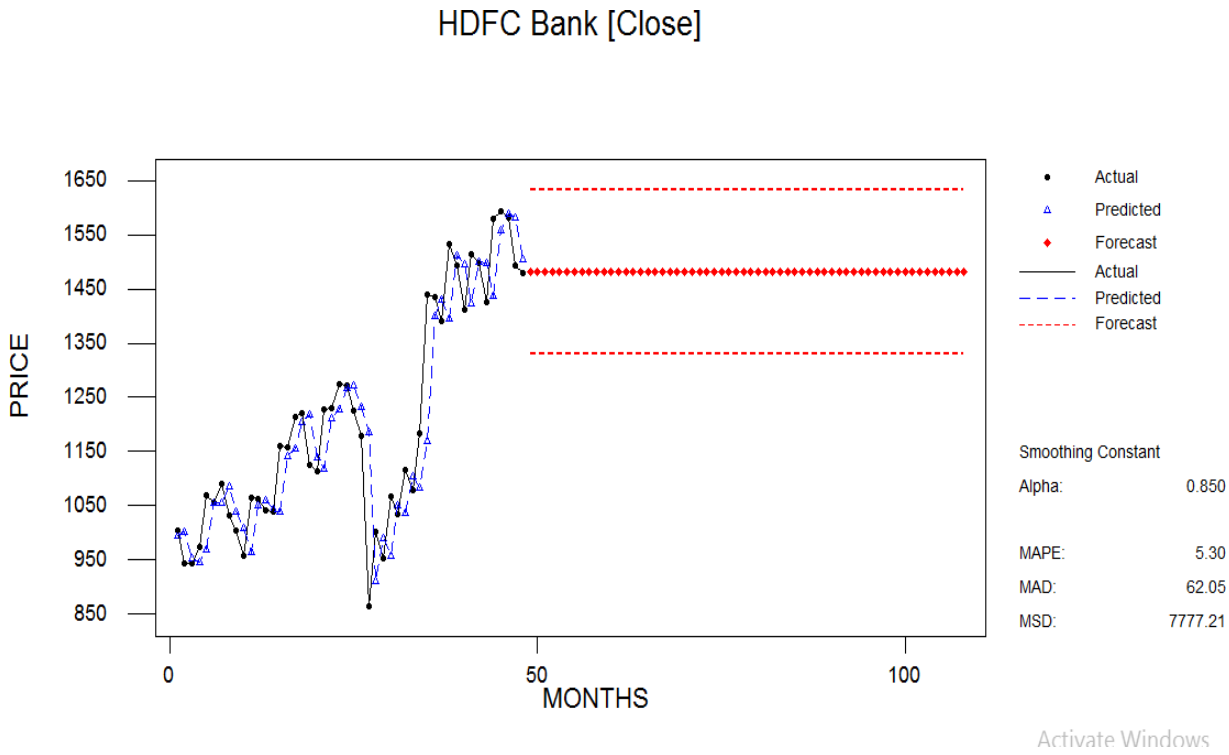
Following are time series graphs using Single Exponential method for the data of Stock Price [Open & Close Price] under study.

Time Series Analysis of HDFC BANK Data Using single Exponential Smoothing technique



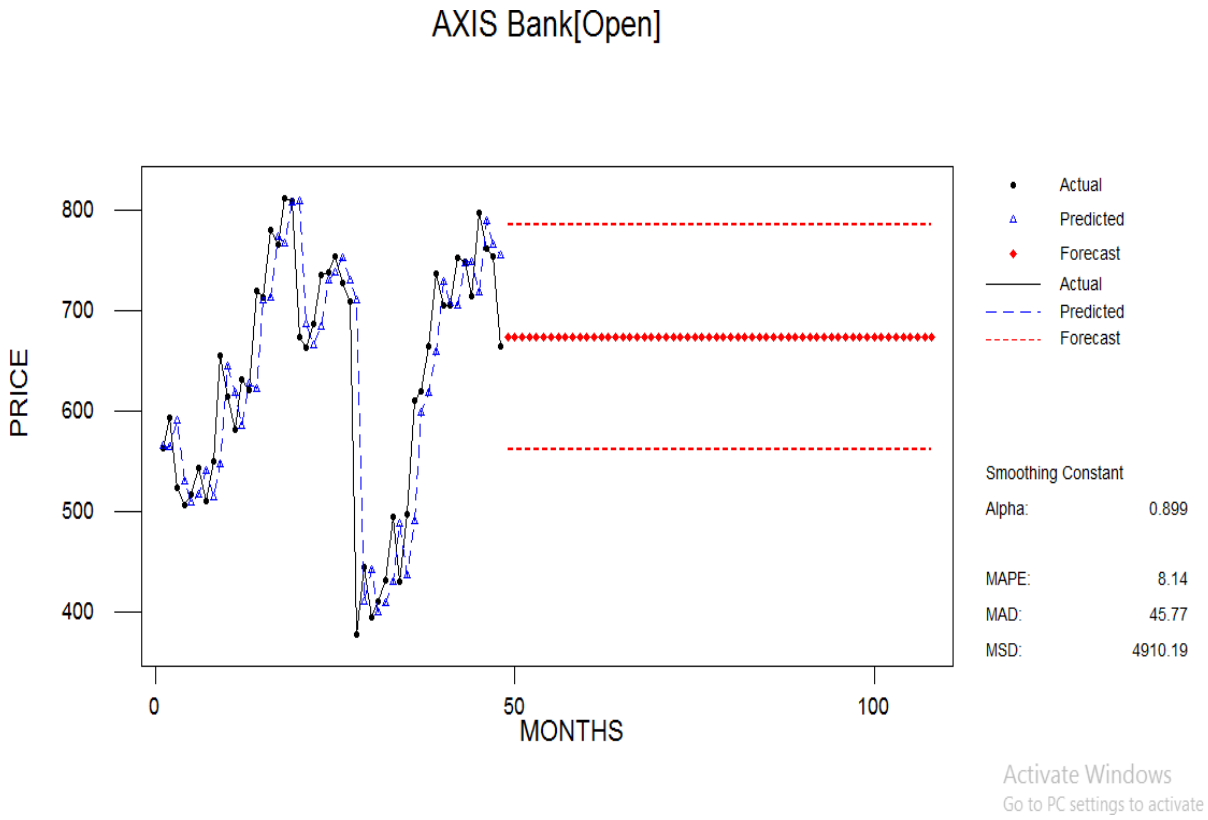
Conclusion: Single exponential smoothing is good fit for the data of HDFC Bank. We can expect Open Price will lie between 1358.73 to 1664.53 approximately for next 5 Years at 95% of Confidence Coefficient.

Time Series Analysis of HDFC BANK Data Using single Exponential Smoothing technique



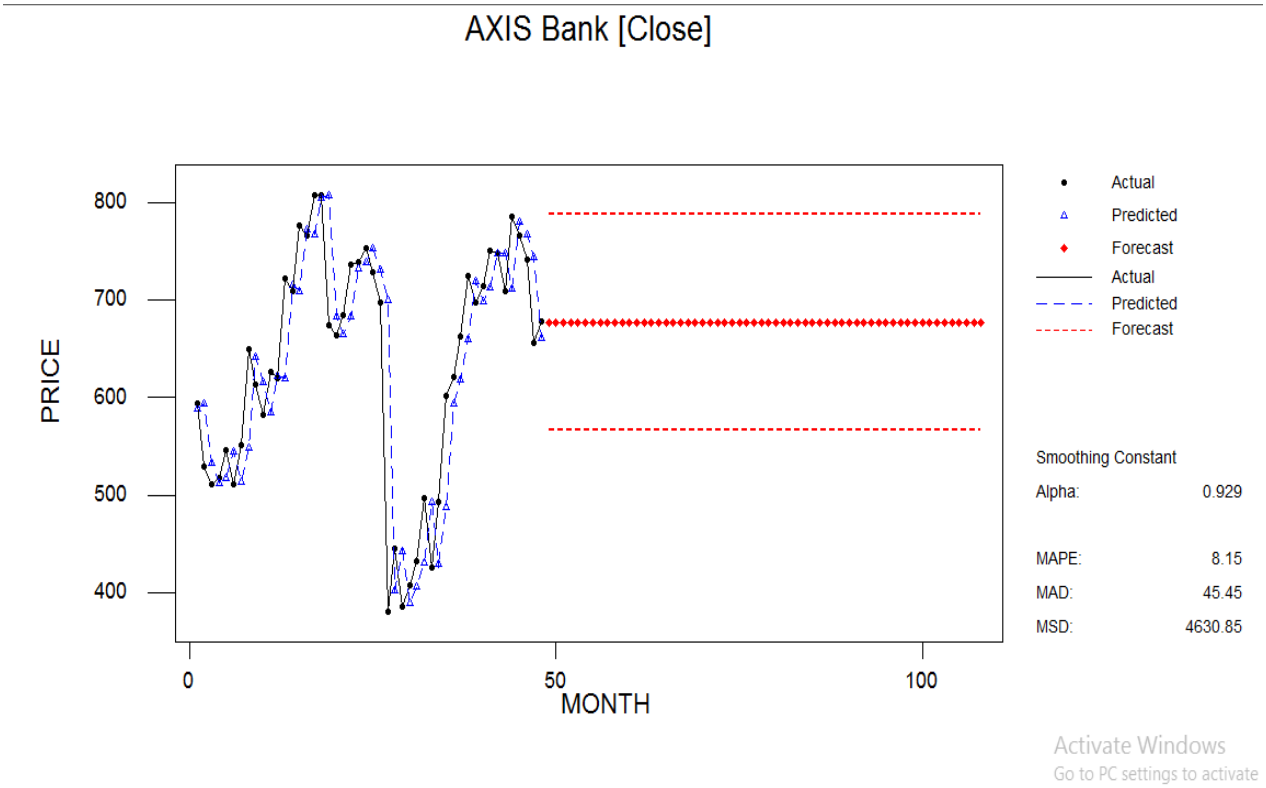
Conclusion: Single exponential smoothing is good fit for the data of HDFC Bank. We can expect Close Price will lie between 1331.54 to 1635.56 approximately for next 5 Years at 95% of Confidence Coefficient.

Time Series Analysis of INDUSIND BANK Data Using single Exponential Smoothing technique



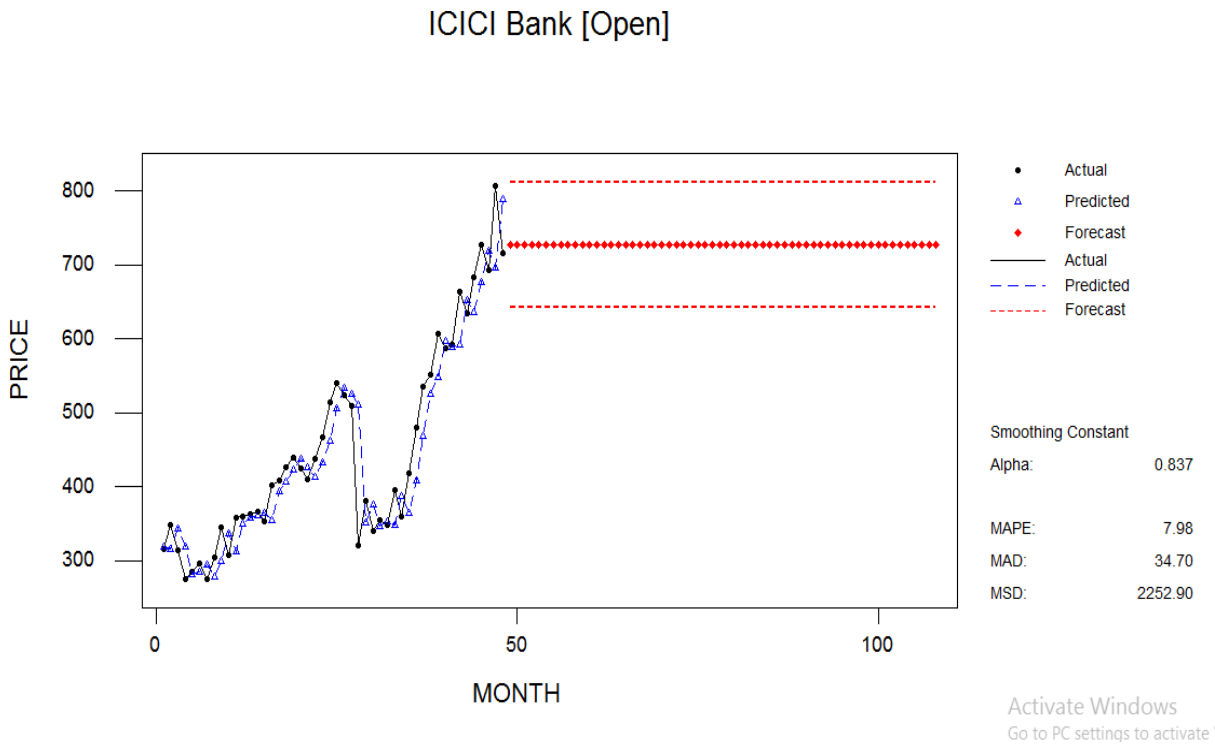
Conclusion: Single exponential smoothing is good fit for the data of AXIS Bank. We can expect Open Price will lie between 561.96 to 786.23 approximately for next 5 Years at 95% of Confidence Coefficient.

Time Series Analysis of AXIS BANK Data Using single Exponential Smoothing technique



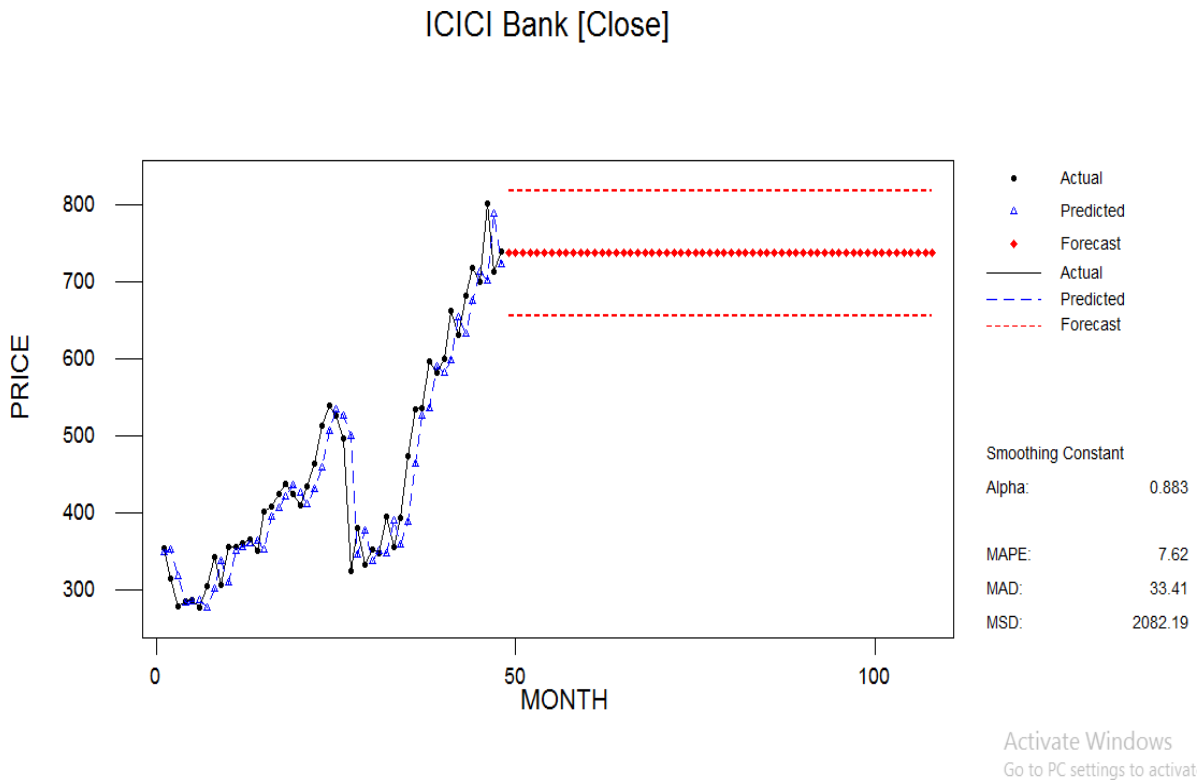
Conclusion: Single exponential smoothing is good fit for the data of AXIS Bank. We can expect Close Price will lie between 566.009 to 788.72 approximately for next 5 Years at 95% of Confidence Coefficient.

Time Series Analysis of ICICI BANK Data Using single Exponential Smoothing technique



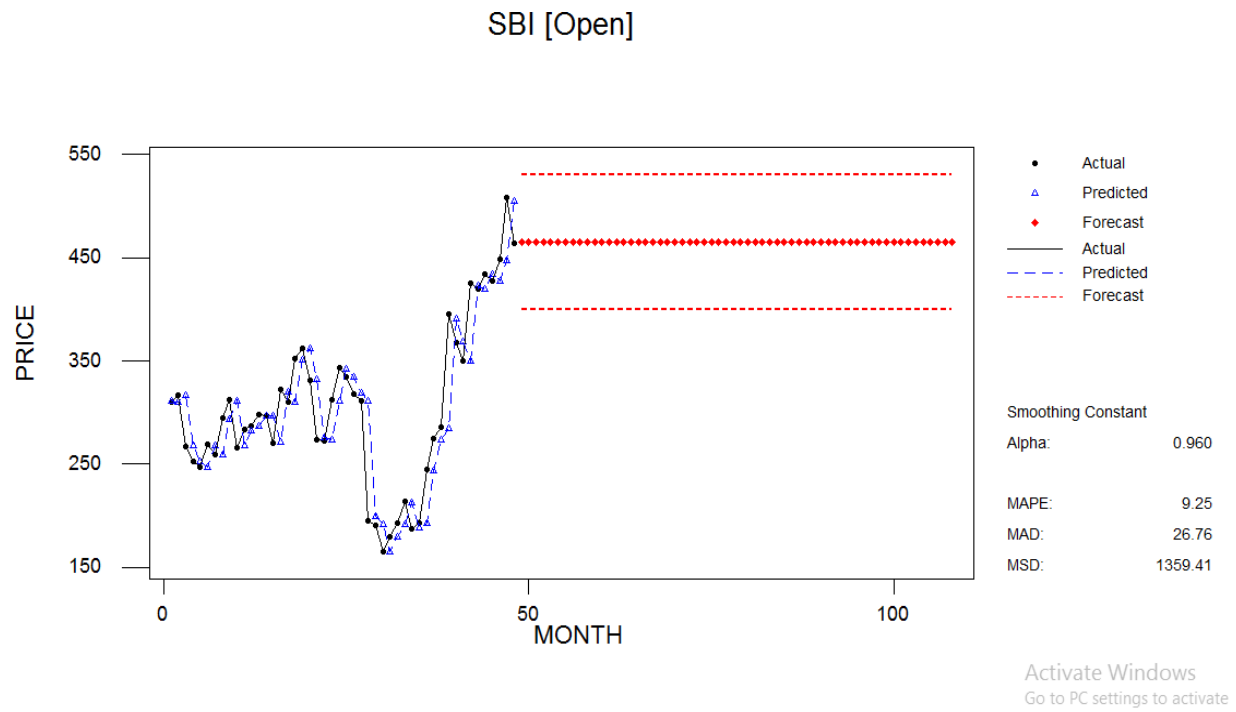
Conclusion: Single exponential smoothing is good fit for the data of ICICI Bank. We can expect Open Price will lie between 643.33 to 813.35 approximately for next 5 Years at 95% of Confidence Coefficient.

Time Series Analysis of ICICI BANK Data Using single Exponential Smoothing technique



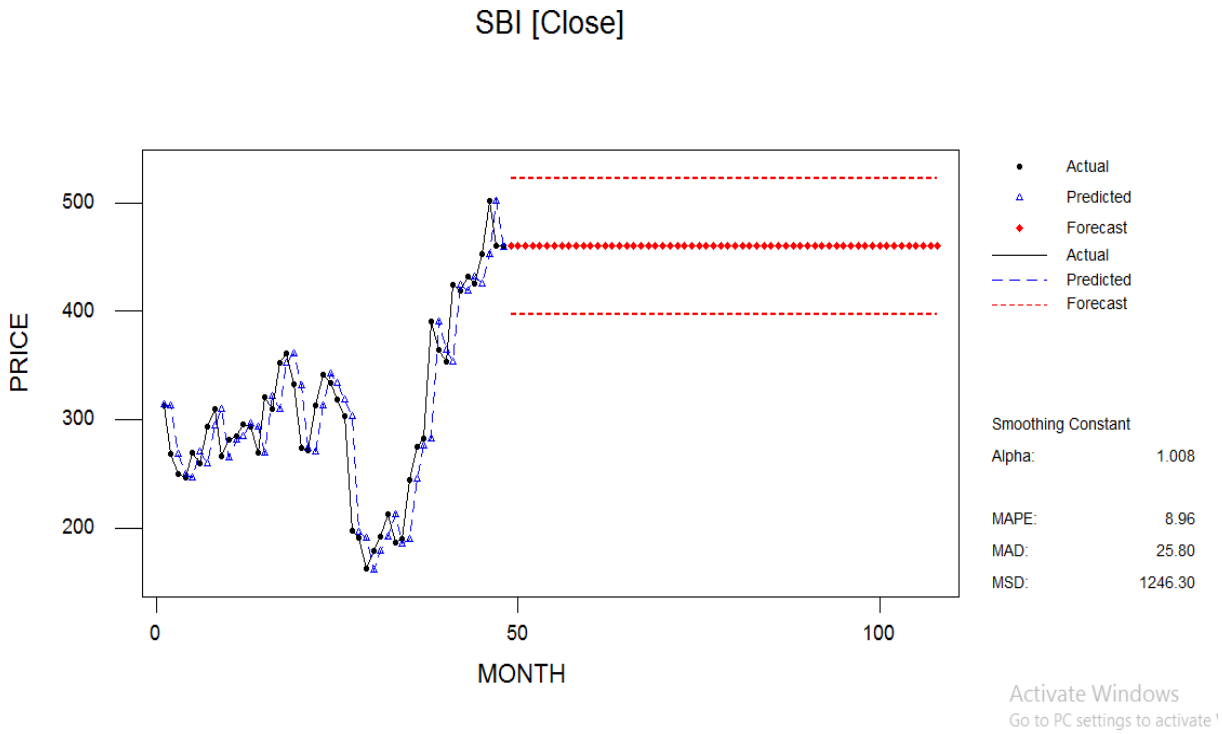
Conclusion: Single exponential smoothing is good fit for the data of ICICI Bank. We can expect Close Price will lie between 656.32 to 820.015 approximately for next 5 Years at 95% of Confidence Coefficient.

Time Series Analysis of State Bank Of India Data Using single Exponential Smoothing technique



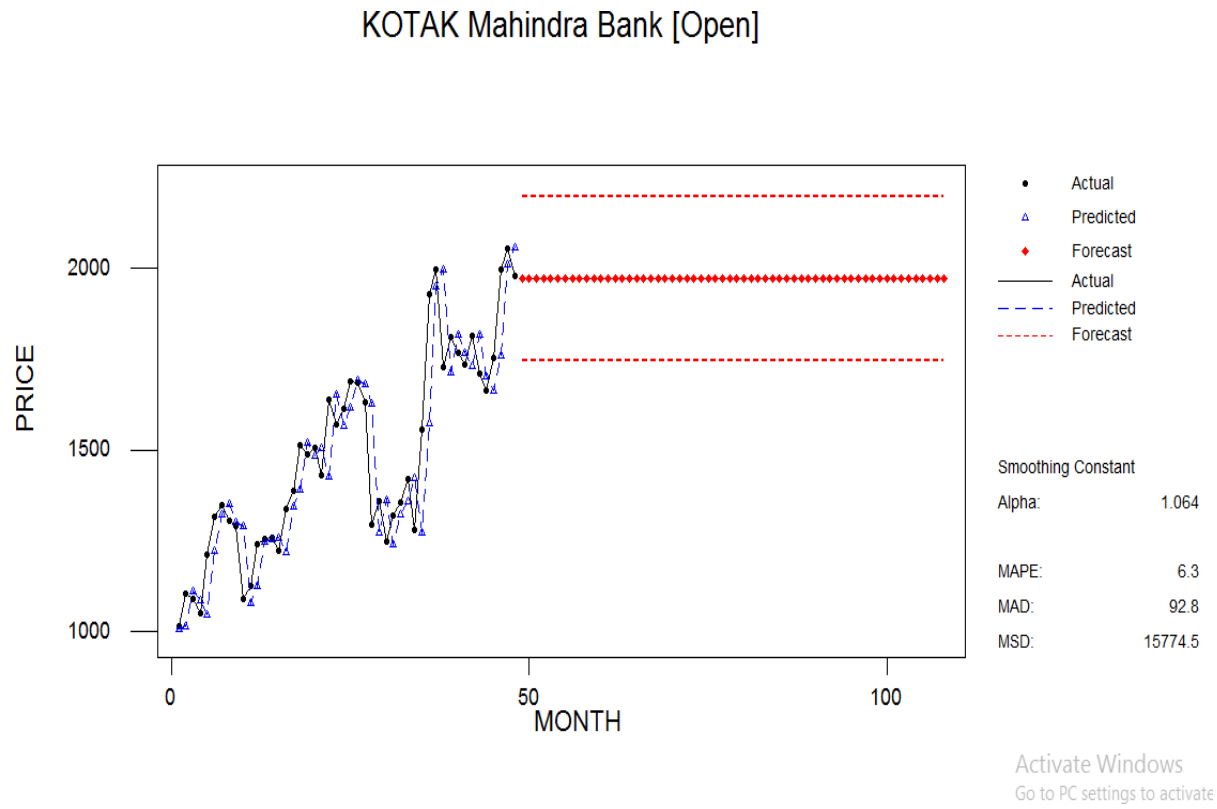
Conclusion: Single exponential smoothing is good fit for the data of State Bank Of India. We can expect Open Price will lie between 400.55 to 531.68 approximately for next 5 Years at 95% of Confidence Coefficient.

Time Series Analysis of State Bank Of India Data Using single Exponential Smoothing technique



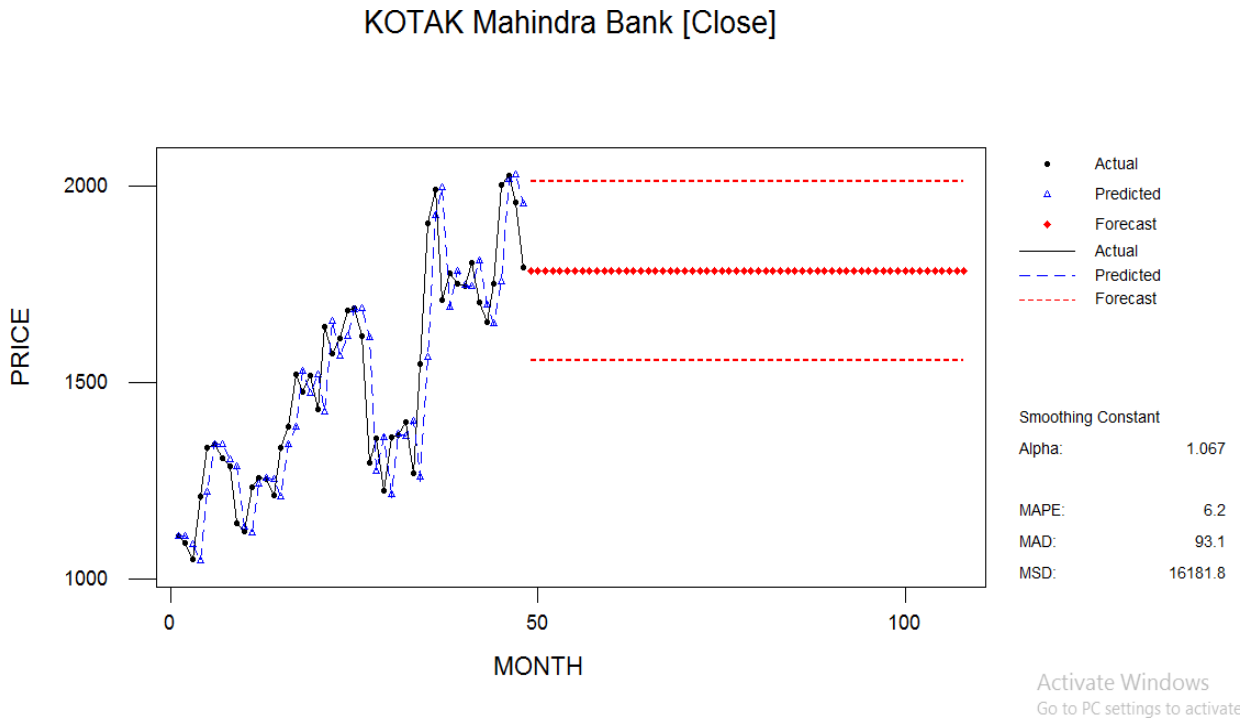
Conclusion: Single exponential smoothing is good fit for the data of State Bank Of India. We can expect Close Price will lie between 397.23 to 523.674 approximately for next 5 Years at 95% of Confidence Coefficient.

Time Series Analysis of KOTAK Mahindra BANK Data Using single Exponential Smoothing technique



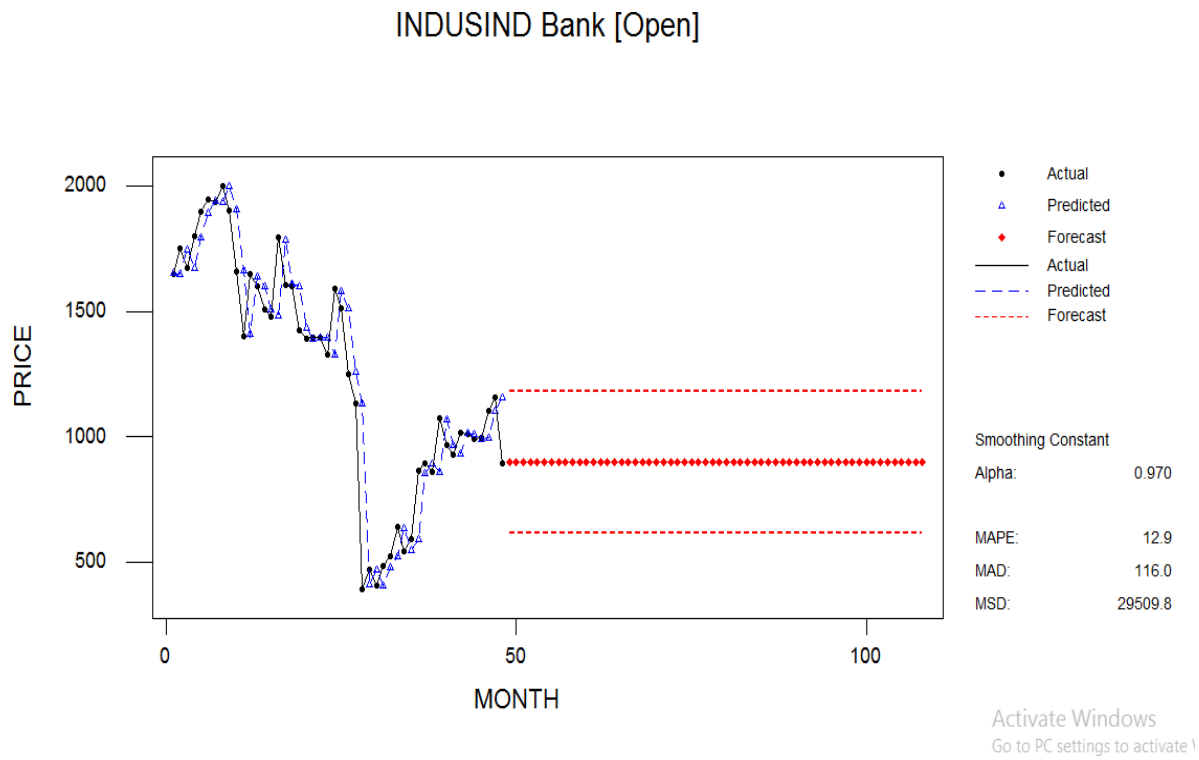
Conclusion: Single exponential smoothing is good fit for the data of KOTAK Mahindra Bank. We can expect Open Price will lie between 1746.69 to 2201.24 approximately for next 5 Years at 95% of Confidence Coefficient.

Time Series Analysis of KOTAK Mahindra BANK Data Using single Exponential Smoothing technique



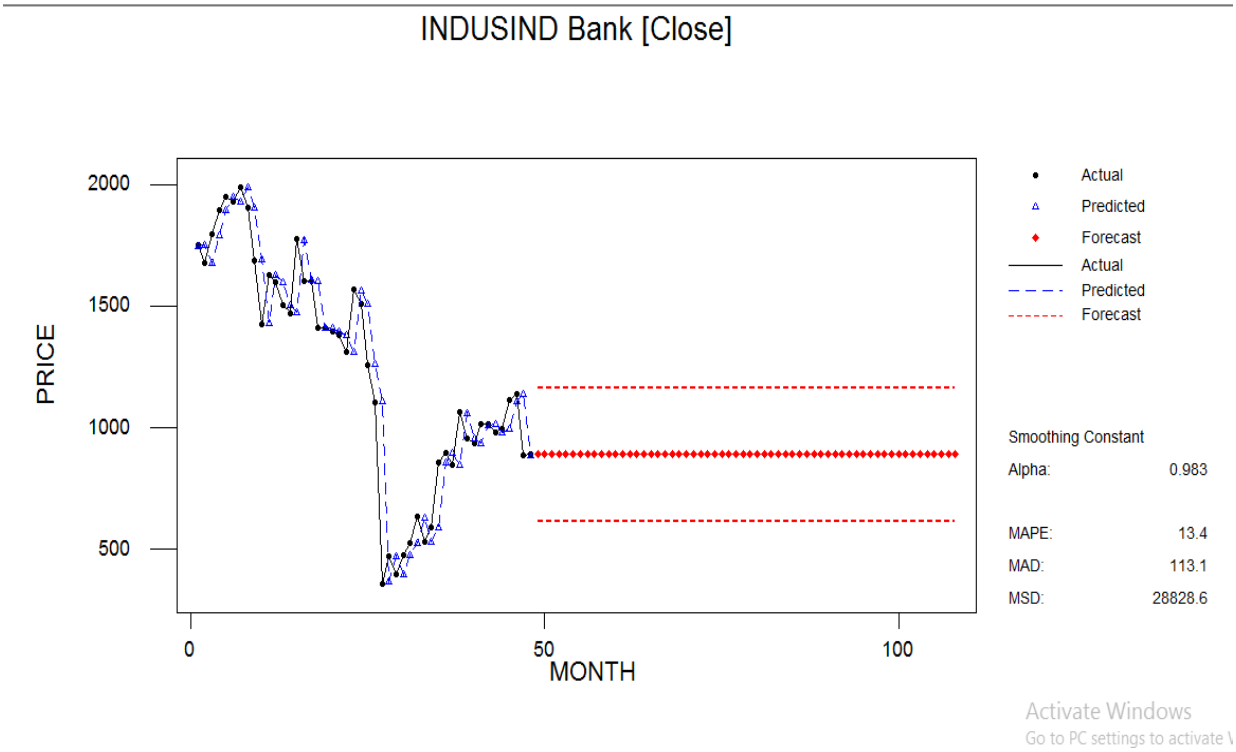
Conclusion: Single exponential smoothing is good fit for the data of KOTAK Mahindra Bank. We can expect Close Price will lie between 1557.22 to 2013.48 approximately for next 5 Years at 95% of Confidence Coefficient.

Time Series Analysis of INDUSIND BANK Data Using single Exponential Smoothing technique



Conclusion: Single exponential smoothing is good fit for the data of INDUSIND Bank. We can expect Open Price will lie between 614.74 to 1183.29 approximately for next 5 Years at 95% of Confidence Coefficient.

Time Series Analysis of INDUSIND BANK Data Using single Exponential Smoothing technique



Conclusion: Single exponential smoothing is good fit for the data of INDUSIND Bank. We can expect Close Price will lie between 610.924 to 1165.35 approximately for next 5 Years at 95% of Confidence Coefficient.

Overall Conclusion

Following are the conclusions based on analysis carried out in this project.

- We have seen that, for all the 6 banks considered namely HDFC Bank, AXIS bank, ICICI Bank, State Bank Of India, KOTAK Mahindra Bank and INDUSIND Bank, COVID-19 has significantly affected to the stock prices (Open and Close Prices).
- **Also we can say reason behind rise in stock prices during COVID-19 pandemic lockdown is most of the people choose the way of stock marketing as their income source.**
- From the ANOVA table, we conclude that there is significant difference between the Open price and close price of all 6 banks in all 3 phases.
- On smoothing plots, the fits closely follow the data. Forecasted prices lie near to actual stock prices of each bank at 95% of Confidence Coefficient approximately.

References

- We collected the required data for this from the official website of yahoo finance .

  https://finance.yahoo.com/quote/%5ENSEI/history/

- Dr. Kore B.G. and Dr.Dixit P.G. : “Statistical Methods-II”, Nirali Prakashan,Pune.

Software used

- **MS-Excel.**
- **Minitab.**
- **MS-Word.**