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Study on Risk and Return Analysis of Prominent Stocks of FMCG, IT and Pharmaceutical Sectors in Pre-Covid and During Covid Period

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Abstract

There was a severe impact of outbreak of the pandemic of corona virus (COVID-19) on stock markets across the globe and Indian stock markets are no exception to this. With the outbreak of Covid, stock market indices fell sharply leading to drastic reduction in market capitalization of the listed companies. Though this trend has been reversed after rapid vaccination and some control over the pandemic. This study is an attempt to analyze the risk and return of prominent stocks in Pre-Covid and During Covid period. The researchers have analysed prominent stocks of FMCG, IT and Pharmaceutical sectors in India in terms of their risk and return on comparative basis in pre-covid and during covid time periods. The study reveals that FMCG sector offered the highest return in pre-Covid period and IT Sector offered highest return in during Covid period. In terms of risk, Pharma sector had highest risk in pre-covid, and IT sector had highest risk in during Covid period. The study also shows that there is a significant different in the return and risk of most of the stocks in pre-covid and during covid periods.

Key Words: *Risk, Return, Covid-19, Nifty50, Beta*

1. Introduction

There is a severe impact on the lives of people over the world with the outbreak of the pandemic of corona virus (COVID-19). Not only the lives of people were ruined but it had shaken the world economies as well as the environment too. With this outbreak of the pandemic, there might not be any sector of the country that had not been impacted. Its impact can be wondered with the slowdown of the activities, dropping of the GDP as well drastic fall in share markets with reduction of market capitalization of the listed companies.

In financial activities the basic idea that needs to be studied is risk/return relationship, whereas the COVID-19 has come as a big risk to the world. Although Covid-19 pandemic has posed a big challenge for various sectors, it has also presented an opportunity for certain sectors e.g. Pharmaceutical Sector and IT Sector etc. So, its impact on financial markets and various sectors needs to be analysed carefully. There are a number of factors on which the risk is based. These factors either can be common to all the number of listed shares or may be aligned to a specific number of selected shares. So, for an investor risk management is very important.

It is seen in the cycle of economics that it is not possible that all sectors perform in the same way in different periods of time. The recent volatility in the stock market by the pandemic of corona has changed the perspectives of the investors. That is why it has become necessary to analyse and understand sector wise as well stock specific return and risk before and during corona pandemic. A comparative examination of equities in terms of risk and return from three distinct sectors of the Indian economy is the subject of this research work.

2. Literature Review

The outbreak of the pandemic of COVID-19 has impacted both advanced economies as well as emerging economies and its impact on the stock market has given a lot of theoretical and empirical research for generalizing the security performances. Numerous advancements have happened in stock market theory and in how players now perceive investing theory. Before and during COVID-19, several researches have been conducted and the following are few important ones:

Adda (2016) studied the effect of the spread of infectious virus of a disease on the economic activity, such as those consequences that remain unintended with the spread of the virus of infection and how to efficiently use the resources in the meantime to curb the spread of the infection and used quasi- experimental variation in order to evaluate the policy importance. The outcomes of the study showed that economic condition was sensitive while the spreading of infection.

Lee and Bramasrene (2018) studied the relationship between stock prices and variables of microeconomics in the time frame of short run and long run and found the long term relationship between the variables of microeconomics like index, supply of money, inflation, interest rates, industrial production index as well as exchange rates and Korean stock market. The authors discovered that there is no convincing evidence that external shocks, such as the regional or worldwide financial crisis, have an effect on the stock price dynamics in the Korean securities market.

Ozili and Arun (2020) studied the impact the pandemic of Covid -19 on the global economy. The time period of studies starts from March 2020, the time when the COVID-19 had hit all the countries across the globe. According to the study, the growing number of lockdown days, monetary policy choices, and foreign travel restrictions had a significant negative impact on the level of economic activity and the security prices of key stock market indices during the COVID-19 pandemic. In contrast, increased fiscal policy expenditures and limitations on intra-country mobility had a beneficial influence on the level of economic activity, even if the increase in the number of confirmed corona virus cases did not have a statistically significant impact on the level of economic activity.

Ashraf (2020) studied the impact of the pandemic of Covid-19 on the stock market and it was found that the stock market reacted negatively with the number of the cases of people infected. The researcher also analyzed the death rate form 64 countries and their impact on stock market from the time period of 22nd January 2020 to 17th April 2020. The study shows that stock markets reacted very quickly to COVID-19 pandemic.

Hyun-Jung (2020) conducted research in the South Korean stock Market, which is a leading emerging economy. He study reveals that there was a significant decline in various economic indicators and stock prices after the outbreak of Covid-19 pandemic.

3. Objectives of study

- To analyse and compare the performance of stocks of FMCG, IT and Pharmaceutical sectors in terms of their returns before COVID-19 and during COVID-19 period
- To analyse and compare the performance of stocks of FMCG, IT and Pharmaceutical sectors in terms of their risk before COVID-19 and during COVID-19 period
- To compare the performance of these stocks across the sectors before COVID-19 and during COVID-19 period

4. Research Methodology

The study deals with analysing and comparing the performance of selected stocks of three important sectors of Indian economy i.e. FMCG Sector, IT Sector and Pharmaceutical Sector. NIFTY50 index has been used for the purpose of study.

Following is the list of stocks selected for the study:

Sl no.	FMCG sector	IT sector	Pharmaceutical Sector
1.	Hindustan Unilever Ltd	Tata Consultancy Services Ltd	Sun Pharmaceuticals Industries Ltd
2.	ITC Ltd	Infosys Ltd	Divi's Laboratories Ltd
3.	Nestle Ltd	HCL Technologies Ltd	Dr. Reddy's Laboratories Ltd
4.	Dabur India Ltd	Wipro Ltd	Cipla Ltd
5.	Britannia Ltd	Tech Mahindra Ltd	Biocon Ltd
6.	Godrej Consumer Products Ltd	Larsen & Toubro Infotech Ltd	Aurobindo Pharma Ltd
7.	Marico Ltd	Oracle Financial Services Software Ltd	Torrent Pharmaceuticals Ltd
8.	Colgate-Palmolive (India) Limited	Mphasis Ltd	Lupin Ltd
9.	Tata-Consumer Products Ltd	MindTree Ltd	Cadila Healthcare Ltd
10.	Proctor & Gamble Hygiene & Health Care Ltd	NIIT Technologies Ltd	Abbott India Ltd

4.1. ***Time Period of Study*** – Time period for the research is of 30 months. Time of 15 months is for pre covid period that ranges from 29th October 2018 to 29th January 2020, and an equal time period of 15 months has been taken during covid that ranges from 30th January 2020 to 30th April 2021.

4.2. ***Data Collection*** – Secondary data have been used for the purpose of study. Official websites of National Stock Exchange and YahooFinance have been used for collecting the necessary data.

4.3. ***Data Analysis*** **-** The below mentioned tools have been used for the purpose of analysis of the collected data:

- ✓ Mean Return
- ✓ Standard Deviation
- ✓ Beta

4.5. ***Methodology for Calculation:***

1. Mean Return: For this study, daily returns have been calculated using adjusted close price of stocks. The formula for calculating Return:

$$\frac{(Adj\ close\ price\ of\ stock\ in\ current\ day - Adj\ close\ price\ of\ stock\ in\ previus\ day)}{Adj\ close\ price\ of\ stock\ in\ previous\ day} * 100$$

   Mean Return = Average (Returns for the considered period)

2. Standard Deviation: Standard deviation is the measure of volatility, measuring how much prices are deviated from the average price. Here Risk is measured in terms of Standard Deviation.

   The formula for standard deviation is

$$SD = \sqrt{\frac{\sum (r_i - r_{avg})^2}{n-1}}$$

   SD = Standard deviation, n = number of daily returns
   r_i = daily returns of the stock, r_{avg}= mean return of the stock

$$Varience = SD^2$$

3. Beta: Beta measures the responsiveness of a stock's price to changes in the overall stock market. For its calculation, following formula is used

$$Beta = \frac{Covarience(Stock's\ \%\ return, Index's\ \%\ return)}{Varience(Index's\ \%\ return)}$$

4.6. *Hypotheses:*

Hypothesis 1: Returns Performance

Null Hypothesis, H_0: There is no difference between stock returns before and during COVID-19
Alternate Hypothesis, H_1: There is significant difference between stock returns before and during COVID-19

Statistical Test Used: Paired sample t test is used to test the above hypothesis.

Hypothesis 2: Risk Performance

Null Hypothesis, H_0: There is no difference between variance of stocks before and during COVID-19
Alternate Hypothesis, H_1: There is significant difference between variance of stocks before and during COVID-19

Statistical Test Used: F-test has been used to test this hypothesis.

Hypothesis 3: Comparison between Sectors

Null Hypothesis, H_0: There is no difference between returns of stocks of different sectors before and during COVID-19
Alternate Hypothesis, H_1: There is significant difference between returns of stocks of different sectors before and during COVID-19

Statistical Test Used: Two-way ANOVA has been used to test this hypothesis.

5. Observation and Analysis

5.1 FMCG Sector

5.1.1. Pre-Covid:

Average annual Nifty return for pre-Covid period is 14.39%

Table 1 - Table Showing Performance of Stocks of FMCG Sector: Pre-Covid

Sl.no	Security Name	Mean Annual Return (%)	Annualized Standard Deviation	Beta
1	Hindustan Unilever Ltd	26.26	18.94	0.69
2	ITC Ltd	-13.48	20.05	0.77
3	Nestle Ltd	43.64	22.45	0.67
4	Dabur India Ltd	18.31	22.75	0.56
5	Britannia Ltd	17.09	24.57	0.79
6	Godrej Consumer Products	6.85	25.35	0.63
7	Marico Ltd	12.32	21.73	0.43
8	Colgate-Palmolive (India)	29.35	22.47	0.76
9	Tata-Consumer Products Ltd	51.59	32.46	0.82
10	P&G Ltd	19.70	20.51	0.53

Average Annual Return from this sector before covid = 21.16 %
Average Risk (Standard Deviation) from this sector before covid = 23.13

5.1.2. During Covid:

Average annual Nifty return for during Covid period is 22.07%

Table 2 - Table Showing Performance of Stocks of FMCG Sector: During Covid

Sl.no	Security Name	Mean Annual Return (%)	Annualized Standard Deviation	Beta
1	Hindustan Unilever Ltd	19.71	33.17	0.58
2	ITC Ltd	2.27	38.21	0.68
3	Nestle Ltd	11.98	3.59	0.54
4	Dabur India Ltd	14.92	29.01	0.58
5	Britannia Ltd	16.08	33.74	0.67
6	Godrej Consumer Products	8.90	35.72	0.63
7	Marico Ltd	22.80	29.06	0.47
8	Colgate-Palmolive (India)	12.00	27.97	0.42
9	Tata-Consumer Products Ltd	55.40	40.76	0.90
10	P&G Ltd	22.16	26.80	0.26

Average Annual Return from this sector during covid = 18.62 %
Average Risk (Standard Deviation) from this sector during covid = 29.80

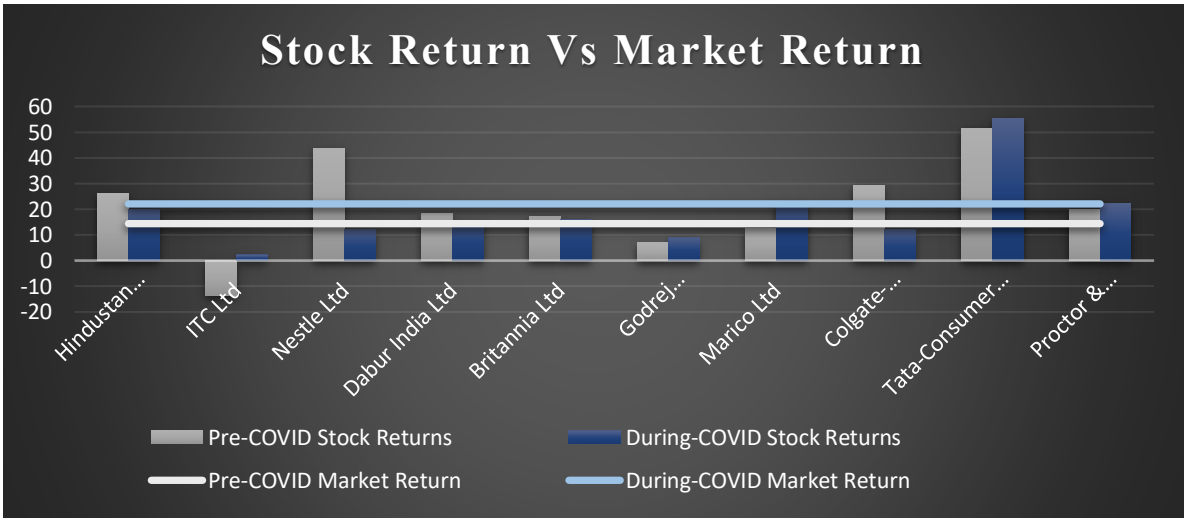

Chart 5.1 - Stock Vs Market Return (FMCG Sector): Pre-Covid Vs During Covid

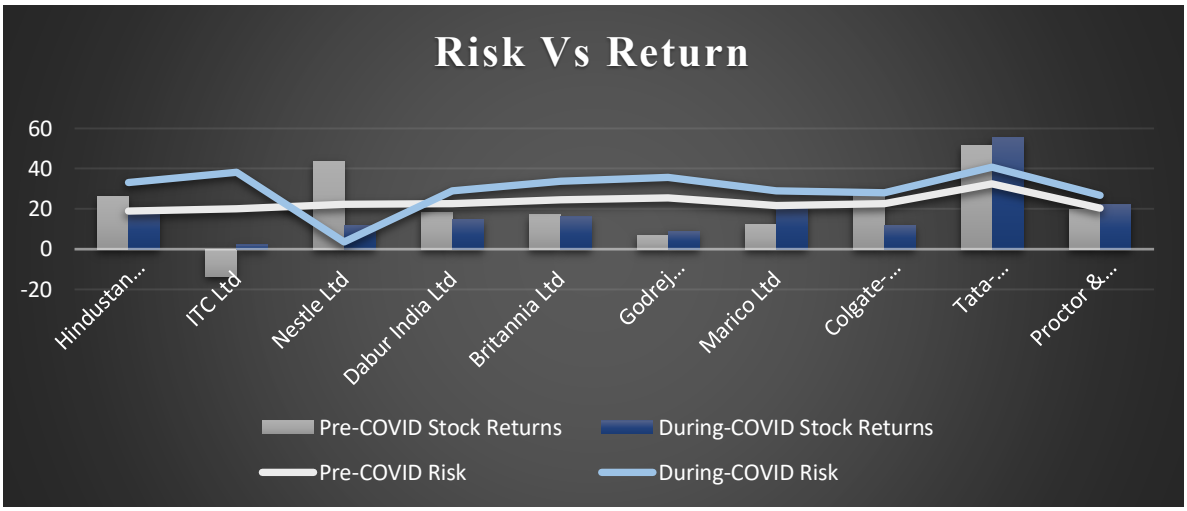

Chart 5.1 - Stock Risk and Return (FMCG Sector): Pre-Covid Vs During Covid

It is clear from Chart 5.1 that in pre covid period the lowest return in FMGC sector was given by ITC whereas highest return was given by the stock of Tata Consumer Products. When covid was going on, lowest return was given by ITC whereas the highest return was generated by Tata Consumer Products.

Chart 5.2 indicates that in the time when there was no covid, the stock with highest risk was Tata Consumer Products whereas lowest risk stock was HUL. During covid times, the highest risk was shown by the stock of Tata Consumer Products and lowest risk stock was Nestle.

Beta:

Pre-Covid:
Low Beta Stocks (Beta value < 1) - HUL, ITC, Nestle, Dabur, Britannia, Godrej Consumer Products, Marico, Colgate-Palmolive, Tata Consumer Products, and P&G
High Beta Stocks (Beta value > 1) - Nil

During Covid:
HUL, ITC, Nestle, Dabur, Britannia, Godrej Consumer Products, Marico, Colgate-Palmolive, Tata Consumer Products, and P&G
High Beta Stocks (Beta value > 1) - Nil

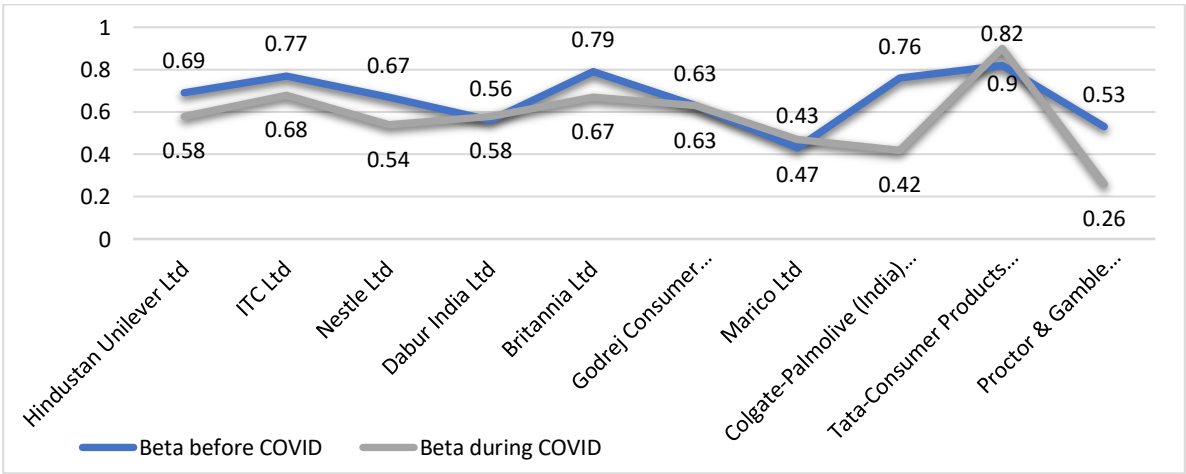

Chart 5.2 - Beta of FMCG Sector Stocks: Pre-Covid and During Covid

It is evident from chart 5.3 that in the pre covid period as well as during covid period highest beta was of the stock of Tata Consumer Products. The lowest beta in pre covid was of stock of Marico whereas during covid the lowest beta was of P&G Ltd.

5.1.3. Hypothesis Testing:

5.1.3.1. Comparison of returns of FMCG stocks before and during Covid using Paired Sample t test

H_0 = There is no difference between stock returns before and during COVID-19

H_1= There is significant difference between stock returns before and during COVID-19

Result

t-Test: Paired Two Sample for Means

	Before Covid	*During Covid*
Mean	0.08397925	0.07389267
Variance	0.00530804	0.00324326
Observations	10	10
Pearson Correlation	0.67695962	
Hypothesized Mean Difference	0	
df	9	
t Stat	0.58889246	
P(T<=t) one-tail	0.2852082	
t Critical one-tail	1.83311293	
P(T<=t) two-tail	0.57041641	
t Critical two-tail	2.26215716	

P value $\not<$ 0.05 (α) => Hence we accept the Null Hypothesis
i.e., There is no significant difference between stock returns before and during COVID-19

Hence, for FMCG sector it is found that there is no difference between stock returns before and during COVID-19**.**

5.1.3.2. Comparison of risks of FMCG stocks before and during Covid using F Test

H_0 = There is no difference between variance of stocks before and during COVID-19

H_1= There is difference between variance of stocks before and during COVID-19

F-Test Two-Sample for Variances

	During Covid	*Pre-Covid*
Mean	2.05384451	1.45695063
Variance	0.08416046	0.05775619
Observations	10	10
df	9	9
F	1.45716768	
P(F<=f) one-tail	0.29193555	
F Critical one-tail	3.1788931	

F value $\not>$ F Critical value: Therefore we accept the null hypothesis

i.e., There is no difference between variance of stocks before and during COVID-19

Hence, after studying it can be said that for this sector no difference was observed between stocks risk in pre covid period as well as when covid was going on.

5.2. *IT Sector*

5.2.1. Pre Covid:

Average annual Nifty return for Pre Covid period is 14.39%

Table 3 - Table Showing Performance of Stocks of IT Sector: Pre-Covid

Sl. no	Security Name	Mean Annual Return (%)	Annualized Standard Deviation	Beta
1	TCS Ltd	18.28	22.81	0.32
2	Infosys Ltd	22.93	27.32	0.40
3	HCL Technologies Ltd	20.32	23.45	0.37
4	Wipro Ltd	2.10	22.64	0.39
5	Tech Mahindra Ltd	19.62	24.71	0.40
6	L&T Infotech Ltd	17.56	28.30	0.25
7	Oracle Financial Services	-13.02	24.61	0.53
8	Mphasis Ltd	1.33	26.70	0.17
9	MindTree Ltd	18.69	27.71	0.44
10	NIIT Technologies Ltd	39.95	41.20	0.61

Average Annual Return from this sector before covid = 14.78%
Average Risk (Standard Deviation) of this sector before covid = 26.95

5.2.2. During Covid:

Average annual Nifty return for During Covid period is 22.07%

Table 4 -Table Showing Performance of Stocks of IT Sector: During Covid

Sl. no	Security Name	Mean Annual Return (%)	Annualized Standard Deviation	Beta
1	TCS Ltd	38.15	33.75	0.72
2	Infosys Ltd	54.43	37.65	0.84
3	HCL Technologies Ltd	42.71	38.93	0.78
4	Wipro Ltd	66.21	39.47	0.69
5	Tech Mahindra Ltd	29.07	40.64	0.84
6	L&T Infotech Ltd	10.79	39.88	0.99
7	Oracle Financial Services	29.21	38.56	0.58
8	Mphasis Limited	66.81	44.05	0.57
9	MindTree Ltd	82.83	46.65	0.80
10	NIIT Technologies Ltd	68.19	54.79	0.67

Average Annual Return from this sector during covid = 48.84%
Average Risk (Standard Deviation) from this sector during covid = 41.44

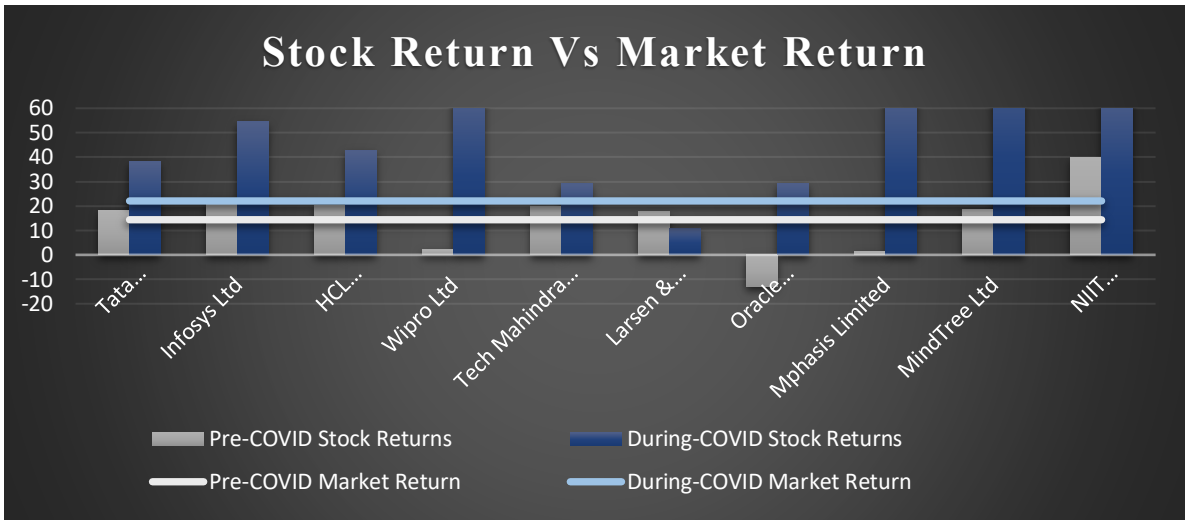

Chart 5.4 - Stock Vs Market Return (IT Sector): Pre-Covid Vs During Covid

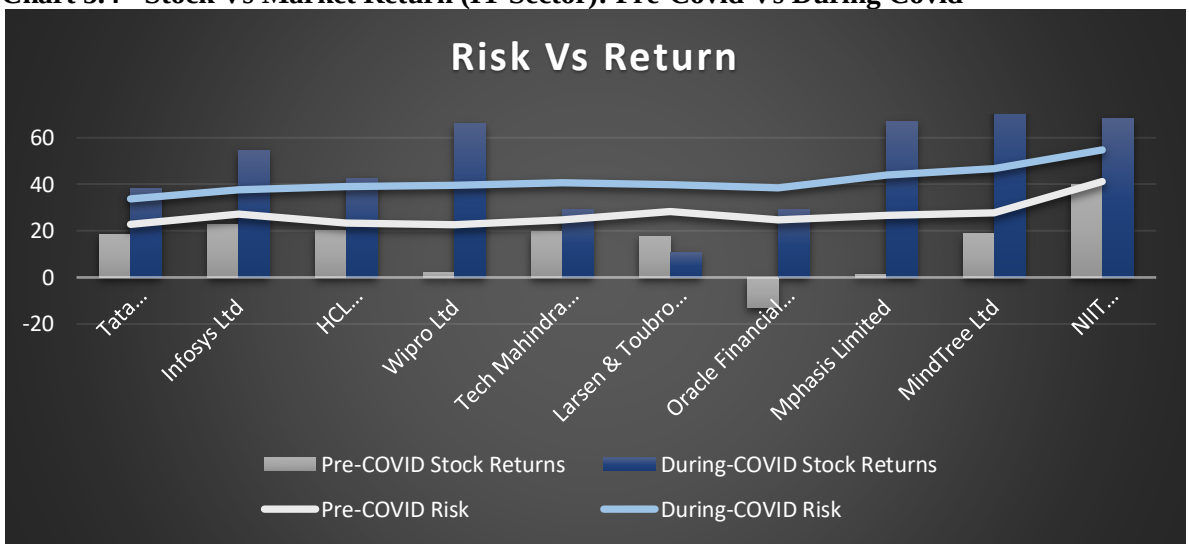

Chart 5.5 - Stock Risk and Return (IT Sector): Pre-Covid Vs During Covid

It is clear from Chart 5.4 that lowest return in IT sector was given by Oracle Financial Services Technologies Ltd. whereas highest return was given by the stock of NIIT Technologies Ltd. When Covid was going on, lowest return was given by L&T Infotech Ltd. whereas highest return in this sector was given by Mindtree Ltd.
Graph 5.5 indicates that before covid most risky share in IT sector was NIIT Technologies whereas least risky stock was Wipro Ltd., whereas in time when covid was going on highest risk was shown by the stock of NIIT Technologies and least risky stock was TCS.

Beta:

Pre-Covid:
Low Beta Stocks (Beta value < 1) – TCS, Infosys, HCL Technologies, Wipro, Tech Mahindra, L&T Infotech, Oracle Financial Services, Mphasis, MindTree, NIIT Technologies
High Beta Stocks (Beta value > 1)- Nil

During Covid:
Low Beta Stocks (Beta value < 1) – TCS, Infosys, HCL Technologies, Wipro, Tech Mahindra, L&T Infotech, Oracle Financial Services, Mphasis, MindTree, NIIT Technologies
High Beta Stocks (Beta value > 1)- Nil

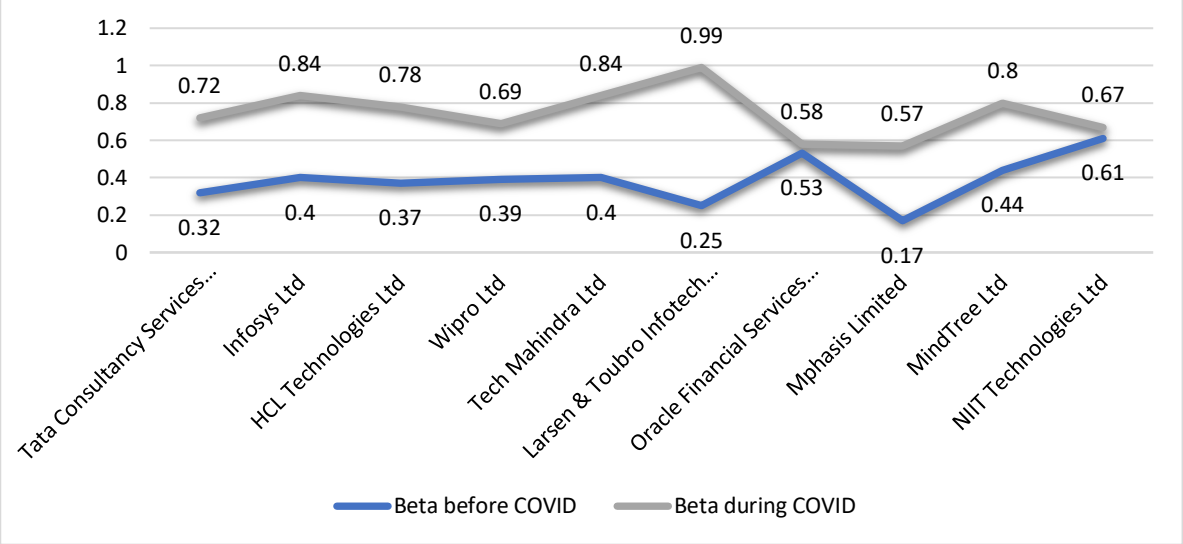

Chart 5.6 - Beta of IT Sector Stocks: Pre-Covid and During Covid

It is evident from the above chart that Mphasis was having lowest beta and NITT Technologies was having highest beta in pre covid period and in the time when covid was going on, Mphasis was having lowest beta and L&T Infotech was having highest beta.

5.2.3. Hypothesis Testing:

5.2.3.1. Comparison of returns of IT stocks before and during Covid using Paired Sample t test

H_0 = There is no difference between stock returns before and during COVID-19
H_1= There is significant difference between stock returns before and during COVID-19

t-Test: Paired Two Sample for Means

	Before Covid	*During Covid*
Mean	0.0586395	0.19381174
Variance	0.00333136	0.00798071
Observations	10	10
Pearson Correlation	0.16163028	
Hypothesized Mean Difference	0	
df	9	
t Stat	-4.3524167	
P(T<=t) one-tail	0.00092187	
t Critical one-tail	1.83311293	
P(T<=t) two-tail	0.00184374	
t Critical two-tail	2.26215716	

P value < 0.05 (α) => Hence we reject Null Hypothesis
i.e., There is difference between stock returns before and during COVID-19

Hence, for IT sector it is found that there is difference between stock returns before and during COVID-19.

5.2.3.2 Comparison of risks of FMCG stocks before and during Covid using F Test

H_0 = There is no difference between variance of stocks before and during COVID-19
H_1= There is significant difference between variances of stocks before and during COVID-19

F-Test Two-Sample for Variances

	During Covid	*Pre-Covid*
Mean	2.61029933	1.69734005
Variance	0.13549454	0.11643979
Observations	10	10
df	9	9
F	1.16364461	
P(F<=f) one-tail	0.41253946	
F Critical one-tail	3.1788931	

F value $\not>$ F Critical value : Therefore, null hypothesis is accepted.

i.e., There is no difference between variance of stocks before and during COVID-19

Hence, for this sector it is found that there is no difference between risk of stocks before and during COVID-19.

Pharmaceutical Sector

5.3.1. Pre-Covid:

Average annual Nifty return for pre-Covid period is 14.39%

Table 5 - Table Showing Performance of Stocks of Pharmaceutical Sector: Pre-Covid

Sl.no	Security Name	Mean Annual Return (%)	Annualized Standard Deviation	Beta
1	Sun Pharmaceuticals Ltd	-13.29	33.75	0.57
2	Divi's Laboratories Ltd	29.29	26.03	0.56
3	Dr. Reddy’s Laboratories Ltd	22.54	23.66	0.24
4	Cipla Ltd	-22.53	23.96	0.58
5	Biocon Ltd	-1.76	29.30	0.64
6	Aurobindo Pharma Ltd	-28.25	35.83	0.82
7	Torrent Pharmaceuticals Ltd	15.89	26.13	0.37
8	Lupin Ltd	-10.67	24.92	0.52
9	Cadila Healthcare Ltd	-14.03	28.09	0.78
10	Abbott India Ltd	50.98	24.11	0.70

Average Annual Return from this sector before covid = 2.82%
Average Risk (Standard Deviation) from this sector before covid = 27.58

5.3.2. During-Covid:

Average annual Nifty return for during-Covid period is 22.07%

Table 6 - Table Showing Performance of Stocks of Pharmaceutical Sector: During Covid

Sl.no	Security name	Mean Annual Return (%)	Annualized Standard Deviation	Beta
1	Sun Pharmaceuticals Ltd	39.23	36.96	0.65
2	Divi's Laboratories Ltd	63.78	35.75	0.58
3	Dr. Reddy’s Laboratories Ltd	46.01	34.97	0.45
4	Cipla Ltd	64.69	38.06	0.43
5	Biocon Ltd	30.89	38.11	0.61

6	Aurobindo Pharma Ltd	74.41	57.21	0.91
7	Torrent Pharmaceuticals Ltd	28.97	36.79	0.37
8	Lupin Ltd	38.40	38.78	0.33
9	Cadila Healthcare Ltd	69.91	41.13	0.44
10	Abbott India Ltd	21.36	32.17	0.41

Average Annual Return from this sector during covid = 47.77
Average Risk (Standard Deviation) from this sector during covid = 38.99

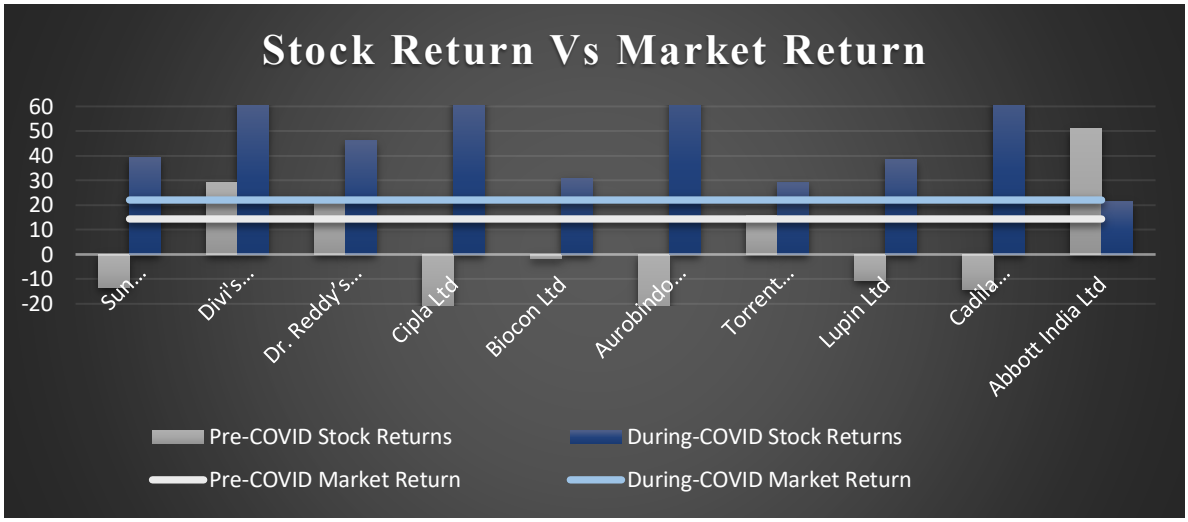

Chart 5.7 - Stock Vs Market Return (Pharmaceutical Sector): Pre-Covid Vs During Covid

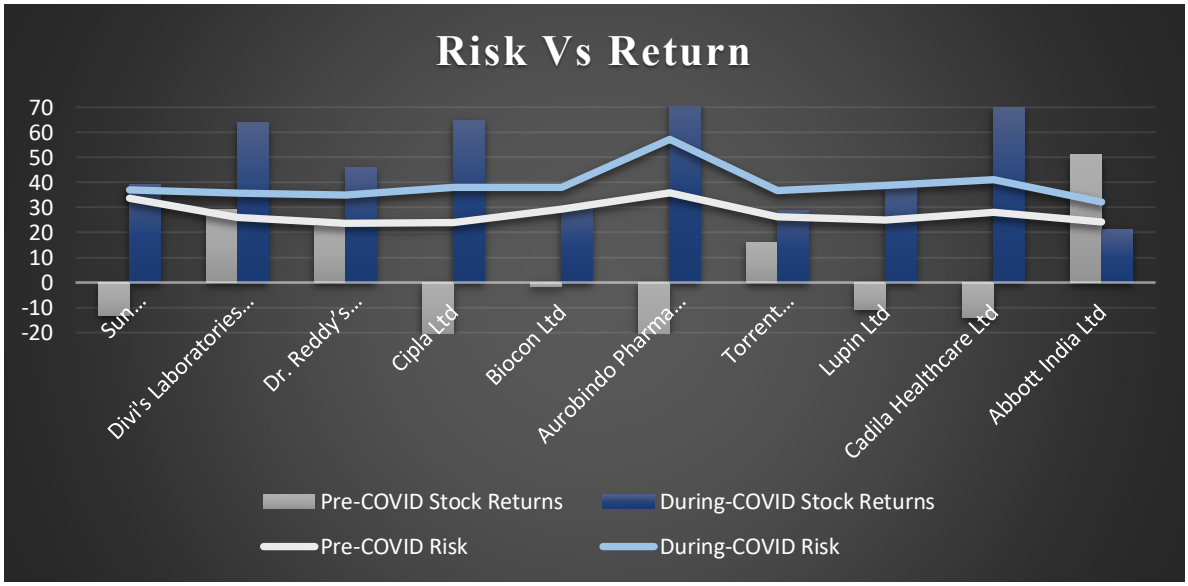

Chart 5.8 - Stock Risk and Return (Pharmaceutical Sector): Pre-Covid Vs During Covid

It is evident from Chart 5.7 that in Pharma sector, during pre-Covid times, Abbott India Ltd. gave the highest return and Aurobindo Pharma Ltd gave the lowest return. Whereas during Covid period, Aurobindo Pharma Ltd gave the highest return and Abbott India Ltd has the lowest return.
Similarly, Chart 5.8 shows that in pre-Covid times, Dr. Reddy's Laboratories has lowest risk and Sun Pharmaceuticals Industry has highest risk. In during Covid times, Abbott India has lowest risk and Aurobindo Pharma has highest risk.

Beta:

Pre-Covid:
Low Beta Stocks (Beta value < 1) - Sun Pharma, Divi's Laboratories, Dr. Reddy's Laboratories, Cipla, Biocon, Aurobindo Pharma, Torrent Pharma, Lupin, Cadila Healthcare, and Abbott India
High Beta Stocks (Beta value > 1) - Nil

During Covid:

Low Beta Stocks (Beta value < 1) – Sun Pharma, Divi's Laboratories, Dr. Reddy's Laboratories, Cipla, Biocon, Aurobindo Pharma, Torrent Pharma, Lupin, Cadila Healthcare, and Abbott India
High Beta Stocks (Beta value > 1)- Nil

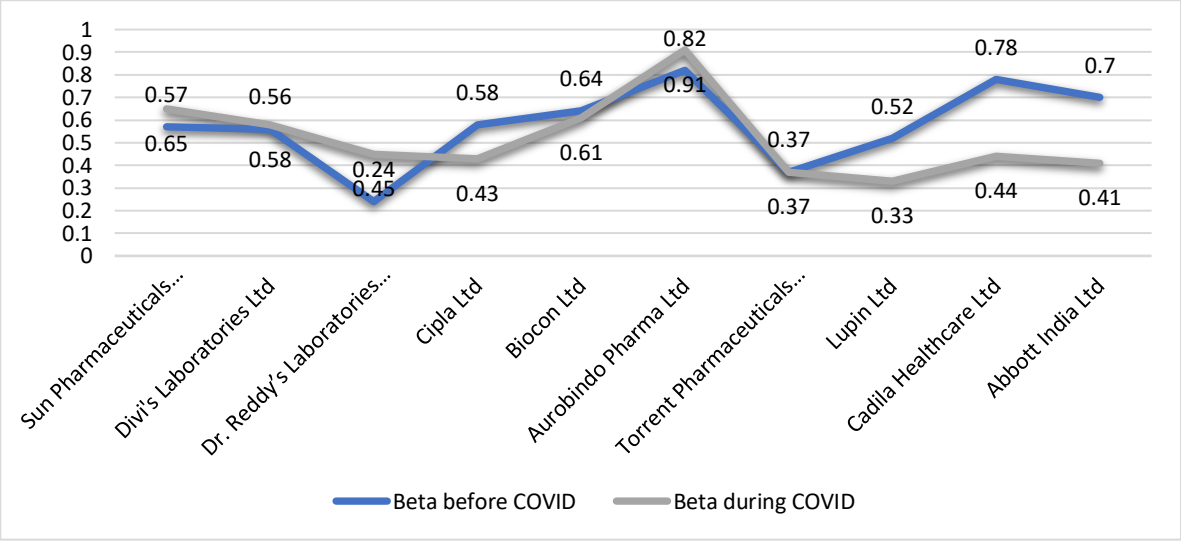

Chart 5.9 - Beta of Pharma Sector Stocks: Pre-Covid and During Covid

Chart 5.9 clearly indicates that Aurobindo Pharma has highest beta before Covid period and also in during Covid period. Dr. Reddy's Laboratories Ltd has lowest beta in pre-Covid period and Lupin Ltd has the lowest beta in during Covid period.

5.3.3. Hypothesis Testing

5.3.3.1. Comparison of returns of Pharmaceutical stocks before and during Covid using Paired Sample t test

H_0 = There is no difference between stock returns before and during COVID-19
H_1= There is significant difference between stock returns before and during COVID-19

t-Test: Paired Two Sample for Means

	Before Covid	*During Covid*
Mean	0.0111741	0.18954327
Variance	0.01038408	0.0056714
Observations	10	10
Pearson Correlation	-0.5509818	
Hypothesized Mean Difference	0	
df	9	
t Stat	-3.6027129	
P(T<=t) one-tail	0.00286201	
t Critical one-tail	1.83311293	

P(T<=t) two-tail	0.00572402
t Critical two-tail	2.26215716

P value < 0.05 (α) => Hence the Null Hypothesis is rejected.
i.e., There is significant difference between stock returns before and during COVID-19

Hence, for Pharma sector it is found that there is difference between stock returns before and during COVID-19**.**

5.3.3.2. Comparison of risks of Pharma stocks before and during Covid using F Test

H_0 = There is no difference between variance of stocks before and during COVID-19
H_1= There is significant difference between variances of stocks before and during COVID-19

F-Test Two-Sample for Variances

	During Covid	*Pre-Covid*
Mean	2.45642264	1.73730816
Variance	0.18531628	0.07120046
Observations	10	10
df	9	9
F	2.60274004	
P(F<=f) one-tail	0.08518206	
F Critical one-tail	3.1788931	

F value ⊁ F Critical value : Therefore null hypothesis is accepted.
i.e., There is no difference between variance of stocks before and during COVID-19

Hence, for Pharma sector it is found that there is no difference between stock risks before and during COVID-19.

5.4. Sector wise Analysis

5.4.1. Comparison of Sectors in Pre-Covid and During Covid Period:

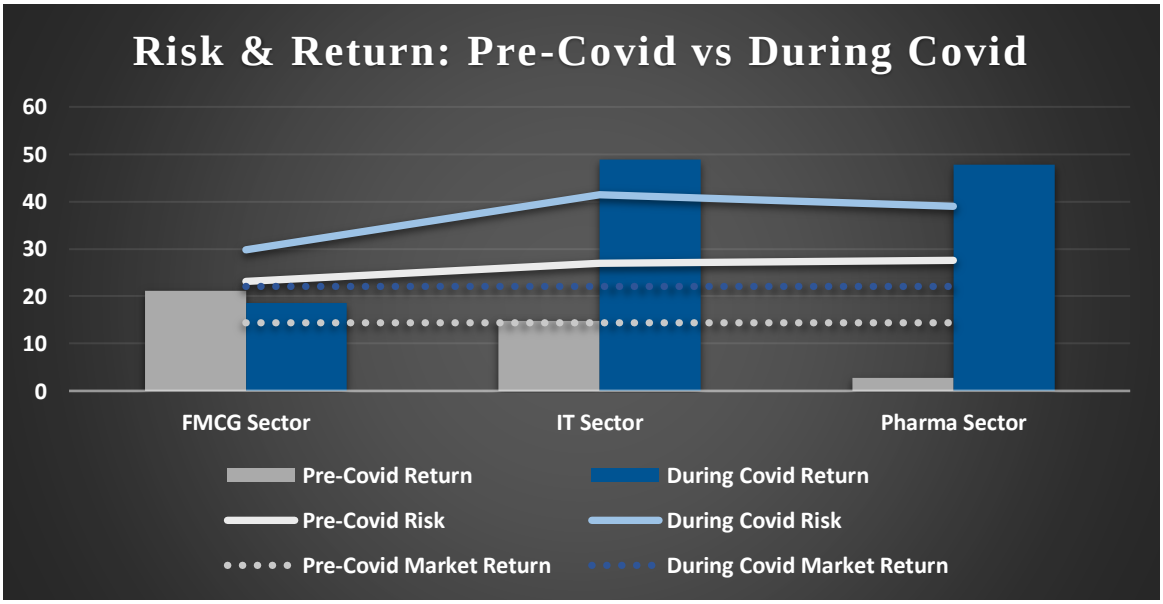

Chart 5.10 - Risk and Return of Sectors: Pre-Covid Vs During Covid

It is clear from Chart 5.10 that in pre-covid period FMCG sector generated highest return followed by IT sector and then Pharma sector. On the other hand, during covid period, IT sector generated maximum return followed by Pharma and then FMCG.
In terms of risk, FMCG had lowest risk in both the periods while Pharma had highest risk in pre covid time and IT had highest risk in during covid time.

5.4.2. Hypothesis Testing

5.4.2.1. Comparison of returns of stocks across all sectors before and during covid using Two Factor ANOVA with Replication

H_0 = There is no difference between returns of stocks of the three selected sectors before and during COVID-19
H_1= There is significant difference between variances of the three selected sectors before and during COVID-19

Anova: Two-Factor With Replication

SUMMARY	**Pre-Covid**	**During Covid**	**Total**
FMCG Sector			
Count	10	10	20
Sum	0.83979252	0.73892668	1.5787192
Average	0.08397925	0.07389267	0.07893596
Variance	0.00530804	0.00324326	0.00407739
IT Sector			
Count	10	10	20
Sum	0.58639498	1.93811738	2.52451236
Average	0.0586395	0.19381174	0.12622562
Variance	0.00333136	0.00798071	0.01016665
Pharma Sector			
Count	10	10	20
Sum	0.11174104	1.89543268	2.00717373
Average	0.0111741	0.18954327	0.10035869
Variance	0.01038408	0.0056714	0.01597774
Total			
Count	30	30	
Sum	1.53792854	4.57247674	
Average	0.05126428	0.15241589	
Variance	0.00684587	0.00843579	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F cri*

Sample	0.02242895	2	0.01121448	1.873	0.163
Columns	0.15347471	1	0.15347471	25.637	0.000
Interaction	0.09746945	2	0.04873472	8.141	0.001
Within	0.32326962	54	0.00598647		
Total	0.59664274	59			

For samples i.e. between sectors, P value >0.05: Therefore there is no significant difference between returns on stocks of different sectors.

For columns, i.e., between pre-covid and during covid period, P value <0.05: Therefore there is significant difference between pre-covid and during covid period.

For interaction, P value <0.05: Therefore we can conclude that there is significant difference in interaction between different sectors and different time period.

Hence, between all the sectors it is found that there is significant difference between stock returns before and during COVID-19.

6. Findings

The study has many surprising outcomes. Here are the major findings of the study:

1) It is observed that, in sector wise comparison, FMCG sector offered the highest return in pre-Covid period and IT Sector offered highest return in during Covid period. Pharma sector had highest risk in pre-covid and IT sector had highest risk in during Covid period.
In sector wise comparison it is also found that there is significant difference between returns of stock of these three sectors before and during COVID-19.

2) In FMGC sector, lowest return was given by the share of ITC whereas highest return was given by the stock of Tata Consumer Products during pre covid period. When covid was going on, lowest return was given by ITC whereas the highest return was generated by Tata Consumer Products. In the time when there was no covid, the stock with highest risk was Tata Consumer Products whereas lowest risk stock was HUL. During covid times, the highest risk was shown by the stock of Tata Consumer Products and lowest risk stock was Nestle. For FMCG sector, no difference was observed between returns as well as risks of stocks in pre covid period and during covid period.

3) In IT sector, lowest return was given by the share of Oracle Financial Services whereas highest return was given by the stock of NIIT Technologies before covid. When Covid was going on, lowest return was given by L&T Infotech whereas highest return in this sector was given by Mindtree. Before covid most risky share was NIIT Technologies whereas least risky stock was Wipro Ltd., whereas in the time when covid was going on, highest risk was shown by the stock of NIIT Technologies and least risky stock was TCS. For IT sector it is found that there is significant difference between stock returns before and during covid but there is no difference between stock risks before and during covid periods.

4) In Pharmaceutical sector, during pre-Covid times, stock of Abbott India gave the highest return and share of Aurobindo Pharma gave the lowest return. Whereas, during Covid period, Aurobindo Pharma gave the highest return and Abbott India had the lowest return. In pre-Covid times, Dr. Reddy's Laboratories had lowest risk and Sun Pharmaceuticals had highest risk. In during Covid times, Abbott India had lowest risk and Aurobindo Pharma had highest risk. For Pharma sector, it is found that there is significant difference between stock returns before and during covid but that there is no difference between stock risks before and during covid.

5) It can also be seen that all the stocks in these sectors have beta less than one and can be termed as defensive securities. Investors who are risk averse may prefer to invest in such type of securities.

7. Conclusion

Covid 19 pandemic had a significant impact on Indian economy and Indian stock market. As Covid 19 pandemic started in India, there were two lower circuits within 10 days in India stock markets but once the condition became slightly stable, the stock prices bounced back again. The study reveals that the impact of Covid was different on stocks of different sectors. The returns of stocks of IT and Pharma sectors in during covid period were significantly higher than that of pre covid period but it was not the case with the stocks of FMCG sector. The FMCG sector provided the best return in the pre-covid period, while the IT sector provided the highest return during the Covid period. Pharma sector posed highest risk in pre-covid period and on the other hand, IT sector posed the highest risk in during the covid period.

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