Risk and Return Analysis of Pharmaceutical Industry

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Rational Investor

Beta value

Ratio Analysis

Returns.

ABSTRACT

Purchase and sale of listed securities happen in the organized market called as stock exchange. Any investor, would analyze the risk associated with the stock which he is concerned about before investing his investible wealth. One of potential industry considered by the investors for investment in this decade is the Indian pharmaceuticals industry. This market is the third largest in terms of volume and thirteenth largest in terms of value, as per a report by Equity Master. Even in the global pharmaceuticals sector India enjoys an important position which is a major factor to be considered by the investors.

The objective of the study is to analyse the risk and returns of investment made in the Indian pharmaceutical industry. This study is done by selecting A group stock of the pharmaceutical sector listed in BSE. Beta, Alpha and Returns are calculated for every stock over a period of 5 years by taking the yearly opening price and closing price of these selected stocks.

Based on the analysis and interpretation derived from the calculations it can be concluded that the investors should analyse the market on a continuous basis which will help him to pick the right combination to construct the portfolio for investment. Higher the risk, higher the returns. Even though the pharmaceutical industry is doing well, it doesn't come up to the level of market returns.

1.0 Introduction:

Stock exchange is an organized market for purchase and sale of listed securities. Various services for stock brokers and traders in terms of trading of stocks, bonds and other securities are provided by the stock exchanges. These exchanges also provide other facilities for the issue and redemption of securities and other financial instruments. It also provides capital events including the payment of income and dividends.

Any investor, would analyse the risk associated with the avenue of their concern before investing his investible part of the wealth. The actual return which he receives from a stock may vary from his expected return and depends on the risk he is ready to bear. The risk is measured in terms of variability of return. There are several factors that cause risk. They are either common to all stocks or specific to a particular stock. Every investor would prefer to analyze the risk factors which would help him to plan his portfolio, so that he can minimize his risk and maximize his return by diversifying into right avenues.

The risk and return relationship is a concept applicable in real life situations as well as in terms of financial analysis. The amount of risk assumed should be proportionate to the expected returns. Managing risk is very important aspect for an investor.

The Indian pharmaceuticals market is the third largest in terms of volume and thirteenth largest in terms of value, as per a report by Equity Master. Branded drugs dominate the pharmaceuticals market, constituting nearly 70 to 80 per cent of the market. India is the largest provider of generic drugs globally with the Indian generics accounting for 20 per cent of global exports in terms of volume.

2.0 Purpose of the Research:

If a company which has a higher intrinsic value, it doesn't always mean that it is the best stock to buy. The prospects for growth of that company may be lower or it may be overpriced due to various other reasons affecting the market. Similarly, if a company performs well during any one year it need not be the best one to buy. A company which has been performing badly for some period of time might turn up to be the best company to buy. Even though the shares are underpriced it may have good prospects of growth. It all depends on the fundamentals of the company. Hence the analysis of risk and return would guide the investor in planning a proper profitable investment option and also to select the best portfolio as well.

Risk is measured in terms of variability of returns. There are two types of risk- systematic and unsystematic risk. Systematic risk is the one which affects the market as a whole. Example : interest rate, inflation. Unsystematic risk is unique to a particular industry or company. Here there are two types - business risk and financial risk. Business risk is the risk caused by the operating environment of the business. This intern is has two types- internal factors like sales and external factors like government policies. Financial risk is the one which emerges from the debt component of the capital structure.

The healthcare index is bullish. There is heavy buying of pharmaceutical companies listed in Bombay Stock

Exchange (BSE). This has led Healthcare index, to grow from 10,212 on 8 January 2014 to 15,014 on June 17, 2016.

BSE health care index is comprises of 56 Pharmaceutical companies, 5 Hospital and medical services and 2 miscellaneous companies.

An analyst Sriram Rathi from Anand Rathi Institutional Research said "Pharmaceutical stocks have been largely driven by companies' strong performance, increase in free cash flows, bright outlook, particularly in the US market, and valuation rerating,".

A global consultancy McKinsey & Co, has endorsed that the Indian pharmaceutical sector is on a strong footing. It also says that the sector could grow to $55 billion by 2020. The current market size of the pharmaceutical industry in India is US$ 20 billion. Domestic Pharmaceutical market grew at a CAGR (Compound Annual Growth Rate) of 12% year on year in February 2016 which is in line with average of 12.9% since April 2015.

Literature Review

Ramsey and Zhang (1995) and Ramsey and Lampart (1998) have used discrete wavelet decomposition to test the models in which there was variation in beta value and risk premium. Wavelets are those functions with properties used to decompose a time series of frequency and time. This gives scope to study the correlation of the markets

at different times. Therefore calculating and analyzing beta becomes more relevant. The decomposition of series of returns gives scope for a researcher to observe the risk and return ratio. This intern gives the solution to the question regarding the scale to be used to explain beta. It also analyses the risk – return relationship. It also explains if higher risk is accompanied by higher.

Fernandez (2006) has analyzed Chile stock market with 24 stocks, about 85% of which were traded in Santiago stock exchange during January 1997 to September 2002. The researcher used the price index of selected stocks (IPSA), which is a proxy. The proxy for risk free investments is the rate of return on the deposits for 30 days. The average premium of the market was - 9.06% annually. When tested at 5% level of significance it shows that coefficients are not significant. This shows that there is no significant. This shows that there is no significant relation between risk and returns. It is concluded that capital asset pricing models predicts better when it comes to 4 to 8 days the estimated risk premium is almost similar to actual risk premium.

amaei (2012) analyzed the risk that is that systematic risk component of Iran stock market. The sample size was 15 companies listed in Tehran Stock exchange. These stocks were traded during June 2004 and

June 2009. Here the proxy used is the annual interest rate of the bonds issued by Central Bank. This study also proved that the market is more efficient at first to fourth scales.

Dimitrov and Jain (2005) measured the changes in leverage on the returns of the stock. The researcher also studied the earnings based performance. The study output showed that debt to equity ratio and risk adjusted stock returns are negatively correlated. The researchers also studied the negative correlated between changes in levels of debt and future adjusted returns. The researcher also studied the ability of the leverage to predict the stock returns by using ratios. The authors did not distinguish between the operating and investing activities of a firm.

Campbell, Lo and MacKinlay (1997), have analysed the factor models are based on Arbitrage Price Theory (APT) given by Ross in 1976. This model estimates the systematic risk by a single factor that is the market portfolio. The criticism of the Arbitrage Price Theory (APT) is that the number of factors is not known in advance. It must be determined using statistical tools.

Objectives of the study

- To analyze the risk and return of the A group shares of pharmaceutical industry listed in BSE.
- To calculate the returns of these companies for past 5 years (2011-2015).
- To calculate the Beta and Alpha of these companies for past 5 years (2011-2015).
- To guide the investors regarding various investment opportunities.
- To find if there is any relation between the beta and returns of the industry and the market.

4 .0 Methodology:

Sources of Data

The secondary data is collected from various sources like internet, journals and other publications. The opening and closing stock prices and market index values are obtained from the official websites www.bseindia.com and www.moneycontrol.com.

This study is undertaken to determine the risk and return prevailing in the stock market by analyzing the selected companies stocks. A group stock of the pharmaceutical sector listed in BSE are selected for the study. 21 stocks come under this group. Later Alpha beta and Returns involved in the stock are calculated using excel. Beta is calculated for every stock for five years. Returns are calculated for 5 years by taking

the yearly opening price and closing price of all the 21 stocks selected for the study.

A group shares are the most liquid shares among the whole lot of stocks listed in the BSE. These are companies which are rated excellent in all aspects. These are the safe options for an investor to consider in his portfolio. The fundamental information of these companies is extensively available.

The group A companies selected for the study are Cipla Ltd., Dr.Reddy's Laboratories Ltd., Lupin Ltd., Piramal Enterprises Ltd., Torrent Pharmaceutical Ltd., Glaxosmithkline Pharmaceuticals Ltd., Sanofi India Ltd., Pfizer Ltd., IPCA Laboratories., Sun Pharmaceutical Industries Ltd., Aurobindo Pharma Ltd., Natco Pharma Ltd., Jubilant Life Sciences Limited, Glenmark Pharmaceutical Ltd., Wochardt Ltd., Cadila Healcare Ltd., Ajanta Pharma Ltd., Divis Laboratories Ltd., Strides Shasun Ltd., Sun Pharma Advanced Research company Ltd. and Alembic Pharmaceutical Ltd.

Hypothesis 1: There is no significant difference between the calculated beta and market beta

Hypothesis 2: There is no significant difference between the average returns and market returns

Beta is calculated by the formula:

$$\beta = \frac{n \sum xy - \sum x . \sum y}{n \sum x2 - (\sum x)^2}$$

$$\beta = \frac{\sum (Ri - \bar{R}i)(Rm - \bar{R}m)}{\sum (Rm - \bar{R}m)^2}$$

Where n= no of years

x= independent factor (i.e. market)

y= dependent factor (i.e. individual firm)

R_i= individual return

$\bar{R}_i$= average individual return

R_m= mark5et return

$\bar{R}_m$= average market return

Alpha is calculated by the formula:

$\alpha = \hat{Y} - \beta \bar{X}$

Where $\hat{y} = \sum y/n$ and $\hat{x} = \sum x/n$

$\alpha = \hat{R}i - \beta \bar{R}m$

Returns are calculated using the formula

R= α+ β (R_m). t- test and Anova are the tools used to test the hypothesis

Analysis:

Table 1: Table showing Alpha, Beta and Returns of the companies considered for the study

Sl.No	Company	Beta	Alpha	Returns
1	Ajanta Pharma Ltd.	0.024684	1.151296	1.314671
2	Alembic Pharmaceutical Ltd.	0.031589	0.187449	0.396527
3	Aurobindo Pharma Ltd.	0.12315	-1.6E-05	0.815063
4	Cadila Healcare Ltd.	0.014886	0.111609	0.210133
5	Cipla Ltd.	0.010853	0.06937	0.141199
6	Divis Laboratories Ltd.	0.003456	0.268993	0.291865
7	Dr.Reddy's Laboratories Ltd.	0.006275	0.102593	0.144122
8	Glaxosmithkline Pharmaceuticals Ltd.	0.004449	0.052224	0.081668
9	Glenmark Pharmaceutical Ltd.	0.044861	-0.24743	0.247422
10	IPCA Laboratories.	0.011794	0.145252	0.223315
11	Jubilant Life Sciences Limited.	-0.00727	0.400466	0.352348
12	Lupin Ltd.	0.009707	0.260636	0.32488
13	Natco Pharma Ltd.	0.018584	0.523713	0.64671
14	Pfizer Ltd.	0.010303	0.122428	0.190623
15	Piramal Enterprises Ltd.	0.010781	0.112796	0.184152
16	Sanofi India Ltd.	-0.00059	0.179613	0.175713
17	Strides Shasun Ltd.	0.034084	0.366003	0.591592
18	Sun Pharma Advanced Research company Ltd.	-0.00799	0.409134	0.356243
19	Sun Pharmaceutical Industries Ltd.	0.009808	0.232633	0.297547
20	Torrent Pharmaceutical Ltd.	0.026331	0.061972	0.236248
21	Wochardt Ltd.	0.166022	1.02E-08	1.098835
	Market	1		6.6186

Chart1:Chart showing Beta of the companies considered for the study in relation to Market Beta
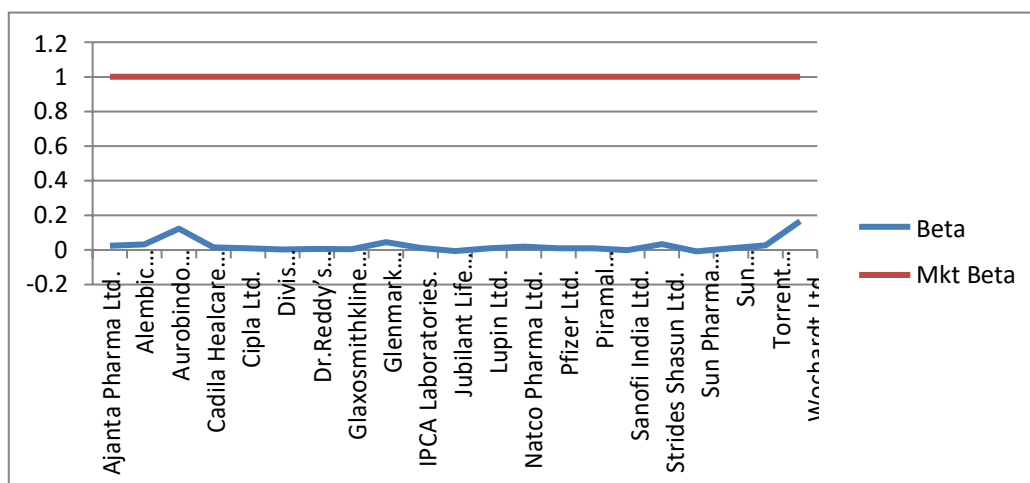
Table 2 : Table showing t-test: Paired Two Sample for Means of Beta.

	Variable 1	Variable 2
Mean	0.02598886	1
Variance	0.001772249	0
Observations	21	21
df	20	
t Stat	-106.0257096	
P(T<=t) one-tail	2.75217E-29	
t Critical one-tail	1.724718218	
P(T<=t) two-tail	5.50435E-29	
t Critical two-tail	2.085963441	

Table 3: Table showing Anova

Groups	Count	Sum	Average	Variance
Column 1	21	0.545766068	0.02598886	0.001772249
Column 2	21	21	1	0

ANOVA

Source of Variation	SS	df	MS	F	P-value
Between Groups	9.961325851	1	9.961325851	11241.4511	1.2383E-50
Within Groups	0.035444982	40	0.000886125		
Total	9.996770833	41			

Interpretation

If Beta is equal to 1, it means that one percent change in the market index causes one percent change in the stock return. It indicates that the particular stock moves along with the market.

If Beta is equal to 0.5, one percent change in market index return causes 0.5 percent change in market index returns. This means that the particular stock is less volatile compared to the market.

If Beta is equal to 2, one percent change in the market index return causes two percent change in stock returns. This means that the

stock returns are more volatile. The stocks with Beta value greater than one are considered to be risky.

Among the 21 stocks considered for the study there are no stocks with high beta value. These are stocks which are safe for an investor to plan his investments.

If Beta is negative, stock returns move in opposite direction of the market returns. Stock with negative beta resist the decline in the market return, but such stocks are very rare. Jubiliant Life Sciences Limited, Sanofi India Ltd. And Sun Pharma

Advanced Research Company Ltd are the companies in the study sample which have negative Beta values.

The average beta of the 21 companies considered for the study is 0.026 with almost zero variance. It means beta values for all companies in the sample is almost same.

Analysis of variance between the groups and within the groups is analysed and it is found that f value is 11241 and p value is Since the p value is much greater than 0.05, the null hypotheses is accepted.

Chart 2: Chart Showing returns of individual companies with respect to Market returns
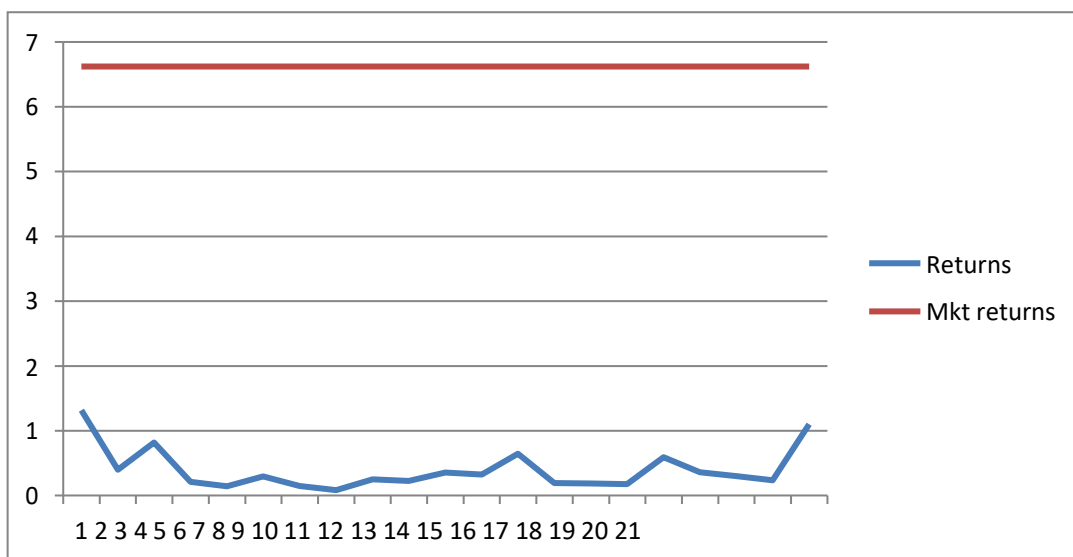
Table 4: Table showing t- test of returns

	Variable 1	*Variable 2*
Mean	0.396232232	6.6186
Variance	0.105922969	8.2830
Observations	21	21
Df	20	
t Stat	-87.61334277	
P(T<=t) one-tail	1.23901E-27	
t Critical one-tail	1.724718218	
P(T<=t) two-tail	2.47803E-27	
t Critical two-tail	2.085963441	

Table 5: Table showing output of Anova

Groups	Count	Sum	Average	Variance
Column 1	21	8.320876866	0.396232232	0.105923
Column 2	21	138.9906	6.6186	8.283E-31

ANOVA

Source of Variation	SS	df	MS	F	P-value
Between Groups	406.5375368	1	406.5375368	7676.0978	2.47E-47
Within Groups	2.118459382	40	0.052961485		
Total	408.6559961	41			

Interpretation

If Alpha is positive it is a positive sign. It yields profitable return. All the companies under study except Aurobindo Pharma Ltd., and Glenmark Pharmaceutical Ltd have positive Alpha.

The average return of the pharmaceutical industry is much less than market return. It means the market returns is not majorly determined on pharma stocks. The variance is almost 10%. It means the fluctuation is very less. It is almost constant for all the stocks in the given sample of 21 shares.

The t-test indicates whether the difference between two means are real difference or no. t=0 indicates sample results are equal to null hypothesis. This shows that the t-distribution has 20 degrees of freedom which corresponds to a sample of 21 shares. Here t value is positive. The Anova between the groups and within the groups is calculated and the f value is computed to be

7676. Since the p value is greater than 0.05, both the hypothesis are accepted.

Findings

In the present study Beta of Cipla Ltd., Dr.Reddy's Laboratories Ltd., Lupin Ltd., Piramal Enterprises Ltd., Torrent Pharmaceutical Ltd., Glaxosmithkline Pharmaceuticals Ltd., Pfizer Ltd., IPCA Laboratories., Sun Pharmaceutical Industries Ltd., Aurobindo Pharma Ltd., Natco Pharma Ltd., Glenmark Pharmaceutical Ltd., Wochardt Ltd., Cadila Healcare Ltd., Ajanta Pharma Ltd., Divis Laboratories Ltd., Strides Shasun Ltd., and Alembic Pharmaceutical Ltd. are positive but less than one. Therefore these stocks are said to be less volatile as compared to the market. It means these stocks have low systematic risk. An investor who is risk averse can consider these stock for investing his wealth.

Jubilant Life Sciences Ltd., Sanofi India Ltd., and Sun Pharma Advanced Research Company have negative Beta. It means that these stock move in the opposite direction of the market. These are stocks which cannot be analysed based on the market study. Strong fundamental analysis of these companies may be necessary to rely on this for investment since the behavior of these companies are difficult to predict based on just technical analysis.

All the companies considered for the study except Aurobindo Pharma Ltd., and Glenmark Pharmaceuticals are having positive Alpha which is a healthy sign. Returns of all the companies under study are positive but comparatively less than the market returns.

It can be concluded that there is no significant difference between the calculated beta of the companies under study and the market beta. Also there is no significant difference between the average returns of the pharmaceutical industry and the market returns hence accepting the hypotheses formulated to be tested.

Suggestions

Based on the calculations made it can be concluded that investors should analyse the market on a continuous basis in order to select the right companies to include in their portfolio. The returns and the Beta values will help the investors in analyzing his portfolio or avenue of investment. The t test and Anova performed to test the hypothesis has led to the conclusion that the market and the pharmaceutical industry in particular are moving in the same direction. The investors should always perform a thorough economic, fundamental and company analysis along with technical analysis in the right manner to arrive at that, important conclusion of investment decisions.

The A group shares of pharmaceutical companies have yielded good returns in the past 5 years. These are shares which are strongly recommended for investment. The stock market is usually highly volatile. It depends upon the investors how to make use of the situation in order to reap the money back with good returns. An investor should be wise enough to analyze the various investment options available to him and thus minimize the risk and maximize the returns.

Conclusion

The Indian pharmaceutical industry, which is growing at a very fast rate is expected to grow over 15 per cent per annum between 2017 and 2020. It will outperform the global pharmaceutical industry, which is expected to grow at an annual rate of five per cent between the same period. The investible companies will have to face and overcome various challenges like competition, price wars and government

policies and interventions. Challenges will be tougher for companies whose focus is only on Indian market. Increasing competitiveness, patent issues and coping with the Drug Price Control Order (DPCO), which prescribes a cap on prices of several essential medicines, are some issues our pharmaceutical companies will have to face and survive.

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ANNEXURE

Table 1: Calculation of Beta of Cipla

Year	Open	Close	Return(R_i)	Return(R_m)	(R_i - $\tilde{R}i$)	(R_m -$\tilde{R}m$)	(R_i - $\tilde{R}i$) (R_m -$\tilde{R}m$)	(R_m-$\tilde{R}m$)^2
2011	369.50	319.55	-0.14	-25.06	-0.28	-31.67	8.75	1,003.22
2012	322.00	414.55	0.29	25.05	0.15	18.44	2.70	339.86
2013	415.00	400.55	-0.03	8.49	-0.18	1.87	-0.33	3.51
2014	403.00	625.80	0.55	29.58	0.41	22.96	9.45	527.18
2015	627.10	649.50	0.04	-4.98	-0.11	-11.60	1.22	134.48
			0.71	33.09			**21.79**	**2,008.26**
			0.14	**6.62**				

Beta = 0.0063, Alpha = 0.1026, Return = 0.1441

Beta = 0.0109, Alpha = 0.0694, Return = 0.1412

Table 2: Calculation of Beta of Dr.Reddy's Laboratories

Year	Open	Close	Return(R_i)	Return(R_m)	(R_i - $\tilde{R}i$)	(R_m -$\tilde{R}m$)	(R_i - $\tilde{R}i$) (R_m -$\tilde{R}m$)	(R_m-$\tilde{R}m$)^2
2011	1685	1575	-0.065282	-25.055	-0.2094	-31.6736	6.632575	1003.217
2012	1577.5	1828.35	0.1590174	25.054	0.014895	18.4354	0.274603	339.864
2013	1829.9	2533	0.3842286	8.493	0.240107	1.8744	0.450056	3.513375
2014	2534	3244.95	0.2805643	29.579	0.136442	22.9604	3.13277	527.18
2015	3244	3121	-0.037916	-4.978	-0.18204	-11.5966	2.111024	134.4811
			0.7206124	33.093			12.60103	2008.255
			0.1441225	6.6186				

Table 3: Calculation of Beta of Lupin

Year	Open	Close	Return(R_i)	Return(R_m)	(R_i - $\tilde{R}i$)	(R_m -$\tilde{R}m$)	(R_i - $\tilde{R}i$) (R_m -$\tilde{R}m$)	(R_m-$\tilde{R}m$)^2
2011	479.7	447.2	-0.067751	-25.055	-0.39263	-31.6736	12.43603	1003.217
2012	447.2	613.3	0.3714222	25.054	0.046542	18.4354	0.858024	339.864
2013	614.15	908.6	0.4794431	8.493	0.154563	1.8744	0.289713	3.513375
2014	915	1427.55	0.5601639	29.579	0.235284	22.9604	5.402213	527.18
2015	1433.9	1837	0.2811214	-4.978	-0.04376	-11.5966	0.507451	134.4811
			1.6244	33.093			19.49343	2008.255
			0.32488	6.6186				

Beta = 0.0097, Alpha = 0.2606, Return = 0.3248

Table 4: Calculation of Beta of Piramal

Year	Open	Close	Return(R_i)	Return(R_m)	(R_i - $\tilde{R}i$)	(R_m -$\tilde{R}m$)	(R_i - $\tilde{R}i$) (R_m -$\tilde{R}m$)	(R_m-$\tilde{R}m$)²
2011	467.75	379.55	-0.19	-25.06	-1.00	-31.67	31.76	1003.22
2012	385.00	520.60	0.35	25.06	-0.46	18.44	-8.52	339.87
2013	526.00	551.25	0.05	8.49	-0.77	1.87	-1.44	3.51
2014	554.00	831.65	0.50	29.58	-0.31	22.96	-7.17	527.18
2015	831.50	1004.40	0.21	-4.98	-0.61	-11.60	7.03	134.48
			0.92	33.09			21.65	2008.26
			0.18	6.619				

Beta = 0.0108, Alpha = 0.1128, Return = 0.1842

Table 5: Calculation of Beta of Torrent

Year	Open	Close	Return(R_i)	Return(R_m)	(R_i - $\tilde{R}i$)	(R_m -$\tilde{R}m$)	(R_i - $\tilde{R}i$) (R_m -$\tilde{R}m$)	(R_m-$\tilde{R}m$)²
2011	289.58	267.83	-0.08	-25.06	-0.31	-31.67	9.86	1003.22
2012	252.60	363.83	0.44	25.05	0.20	18.43	3.76	339.87
2013	363.00	474.05	0.31	8.49	0.07	1.87	0.13	3.51
2014	475.00	1131.00	1.381	29.58	1.14	22.96	26.29	527.18
2015	1127.85	145.53	-0.87	-4.98	-1.10	-11.60	12.84	134.48
			1.18	33.09			52.88	2008.26
			0.24	6.62				

Beta = 0.0263, Alpha = 0.06197, Return = 0.2362

Table 6: Calculation of Beta of Glaxosmithkline

Year	Open	Close	Return(R_i)	Return(R_m)	(R_i - $\tilde{R}i$)	(R_m -$\tilde{R}m$)	(R_i - $\tilde{R}i$) (R_m -$\tilde{R}m$)	(R_m-$\tilde{R}m$)²
2011	2325	1936.50	-0.17	-25.06	-0.25	-31.67	7.88	1003.22
2012	1962	2165.70	0.10	25.05	0.02	18.44	0.41	339.87
2013	2185	2992.62	0.37	8.49	0.29	1.87	0.54	3.51
2014	3004	3196.75	0.06	29.58	-0.02	22.96	-0.40	527.18
2015	3200	3321.05	0.04	-4.98	-0.04	-11.60	0.51	134.48
			0.41	33.09			8.93	2008.26
			0.08	6.619				

Beta = 0.0044, Alpha = 0.0522, Return = 0.0817

Table 7: Calculation of Beta of Sanofi

Year	Open	Close	Return(R$_i$)	Return(R$_m$)	(R$_i$ - $\tilde{R}i$)	(R$_m$ -$\tilde{R}m$)	(R$_i$ - $\tilde{R}i$) (R$_m$ -$\tilde{R}m$)	(R$_m$-$\tilde{R}m$)^2
2011	1968.00	2320.00	0.18	-25.06	0.00	-31.67	-0.10	1003.22
2012	2320.00	2290.00	-0.02	25.05	-0.19	18.44	-3.48	339.87
2013	2300.00	2762.50	0.20	8.49	0.03	1.87	0.05	3.51
2014	2769.90	3593.53	0.30	29.58	0.12	22.96	2.79	527.18
2015	3589.00	4357.75	0.21	-4.98	0.04	-11.60	-0.45	134.48
			0.88	33.09			-1.18	2008.26
			0.18	6.62				

Beta = -0.0006, Alpha = 0.1796, Return = 0.1757

Table 8: Calculation of Beta of Pfizer

Year	Open	Close	Return(R$_i$)	Return(R$_m$)	(R$_i$ - $\tilde{R}i$)	(R$_m$ -$\tilde{R}m$)	(R$_i$ - $\tilde{R}i$) (R$_m$ -$\tilde{R}m$)	(R$_m$-$\tilde{R}m$)^2
2011	1133.35	1106.90	-0.02	-25.06	-0.21	-31.67	6.78	1003.22
2012	1106.90	1190.90	0.08	25.05	-0.11	18.44	-2.12	339.86
2013	1200.00	1151.50	-0.04	8.49	-0.23	1.87	-0.43	3.51
2014	1160.00	2151.65	0.85	29.58	0.66	22.96	15.25	527.18
2015	2167.60	2354.25	0.09	-4.98	-0.10	-11.60	1.21	134.48
			0.95	33.09			20.69	2008.26
			0.19	6.619				

Beta = 0.0103, Alpha = 0.1224, Return = 0.1906

Table 9: Calculation of Beta of IPCA

Year	Open	Close	Return(R$_i$)	Return(R$_m$)	(R$_i$ - $\tilde{R}i$)	(R$_m$ -$\tilde{R}m$)	(R$_i$ - $\tilde{R}i$) (R$_m$ -$\tilde{R}m$)	(R$_m$-$\tilde{R}m$)^2
2011	339.00	274.70	-0.19	-25.06	-0.41	-31.67	13.08	1003.22
2012	274.70	519.19	0.89	25.05	0.67	18.44	12.29	339.86
2013	522.90	721.00	0.38	8.49	0.16	1.87	0.29	3.51
2014	711.05	731.50	0.03	29.58	-0.19	22.96	-4.47	527.18
2015	737.00	743.35	0.01	-4.98	-0.21	-11.60	2.49	134.48
			1.12	33.09			23.69	2008.26
			0.22	6.62				

Beta = 0.0118, Alpha = 0.1453, Return = 0.2233

Table 10: Calculation of Beta of Sun Pharmaceuticals

Year	Open	Close	Return(R_i)	Return(R_m)	(R_i - $\tilde{R}i$)	(R_m -$\tilde{R}m$)	(R_i - $\tilde{R}i$) (R_m -$\tilde{R}m$)	(R_m-$\tilde{R}m$)²
2011	243.5	248.43	0.02	-25.06	-0.28	-31.67	8.78	1003.22
2012	248.43	367.75	0.48	25.05	0.18	18.44	3.37	339.86
2013	369.53	567.75	0.54	8.49	0.24	1.87	0.45	3.51
2014	568	826.15	0.45	29.58	0.16	22.96	3.60	527.18
2015	823	819.95	-0.00	-4.98	-0.30	-11.60	3.49	134.48
			1.49	33.09			19.70	2008.26
			0.30	6.62				

Beta = 0.0098, Alpha = 0.2975, Return = 0.2975

Table 11: Calculation of Beta of Aurobindo Pharma

Year	Open	Close	Return(R_i)	Return(R_m)	(R_i - $\tilde{R}i$)	(R_m -$\tilde{R}m$)	(R_i - $\tilde{R}i$) (R_m -$\tilde{R}m$)	(R_m-$\tilde{R}m$)²
2011	131.74	42.58	-0.68	-25.06	-1.49	-31.67	47.25	1003.22
2012	42.58	94.65	1.22	25.05	0.41	18.44	7.52	339.86
2013	95.38	196.95	1.06	8.49	0.25	1.87	0.47	3.51
2014	196.33	568.20	1.89	29.58	1.08	22.96	24.78	527.18
2015	557.50	875.40	0.57	-4.98	-0.24	-11.60	2.84	134.48
			4.08	33.09	3.26	26.47	86.31	700.89
			0.82	6.62			169.17	2709.15

Beta = 0.1232, Alpha = -1.6000, Return = 0.8151

Table 12: Calculation of Beta of Natco

Year	Open	Close	Return(R_i)	Return(R_m)	(R_i - $\tilde{R}i$)	(R_m -$\tilde{R}m$)	(R_i - $\tilde{R}i$) (R_m -$\tilde{R}m$)	(R_m-$\tilde{R}m$)²
2011	61.83	46.50	-0.25	-25.06	-0.89	-31.67	28.34	1003.21
2012	46.50	92.20	0.98	25.05	0.34	18.44	6.20	339.86
2013	93.38	161.35	0.73	8.49	0.08	1.87	0.15	3.513
2014	162.56	306.13	0.88	29.58	0.24	22.96	5.43	527.18
2015	307.00	579.50	0.89	-4.98	0.24	-11.560	-2.79	134.48
			3.23	33.09			37.32	2008.26
			0.65	6.62				

Beta = 0.0186, Alpha = 0.5237, Return = 0.6467

Table 13: Calculation of Beta of Jubiliant

Year	Open	Close	Return(R_i)	Return(R_m)	($R_i - \tilde{R}i$)	($R_m - \tilde{R}m$)	($R_i - \tilde{R}i$) ($R_m - \tilde{R}m$)	($R_m - \tilde{R}m$)^2
2011	285.75	180.20	-0.37	-25.06	-0.72	-31.67	22.86	1003.20
2012	180.2	223.95	0.24	25.05	-0.11	18.44	-2.02	339.88
2013	226.5	135.30	-0.40	8.49	-0.75	1.87	-1.42	3.51
2014	134.60	121.15	-0.10	29.58	-0.45	22.96	-10.38	527.19
2015	121.00	410.30	2.39	-4.98	2.04	-11.60	-23.64	134.47
			1.76	33.09			-14.60	2008.26
			0.35	6.62				

Beta = -0.0072, Alpha = 0.4005, Return = 0.3523

Table 14: Calculation of Beta of Glenmark

Year	Open	Close	Return(R_i)	Return(R_m)	($R_i - \tilde{R}i$)	($R_m - \tilde{R}m$)	($R_i - \tilde{R}i$) ($R_m - \tilde{R}m$)	($R_m - \tilde{R}m$)^2
2011	362.70	290.80	-0.20	-25.06	-0.45	-36.08	16.08	1302.20
2012	290.80	527.80	0.81	25.05	0.57	14.02	7.96	196.64
2013	530.80	533.35	0.00	8.49	-0.24	-2.54	0.62	6.44
2014	533.00	770.35	0.45	29.58	0.20	18.55	3.67	344.03
2015	788.00	922.15	0.17	-4.97	-0.08	-16.01	1.24	256.29
			1.24	33.09	0.99	22.06	21.84	486.73
			0.25	11.03			51.40	2592.33

Beta = 0.0449, Alpha = -0.2474, Return = 0.2474

Table 15: Calculation of Beta of Wochardt

Year	Open	Close	Return(R_i)	Return(R_m)	($R_i - \tilde{R}i$)	($R_m - \tilde{R}m$)	($R_i - \tilde{R}i$) ($R_m - \tilde{R}m$)	($R_m - \tilde{R}m$)^2
2011	364.70	276.05	-0.24	-25.06	-1.34	-31.67	42.50	1003.22
2012	276.05	1572.10	4.69	25.05	3.60	18.44	66.30	339.87
2013	1568.80	452.35	-0.71	8.49	-1.81	1.87	-3.40	3.51
2014	453.00	1009.75	1.23	29.58	0.13	22.96	2.99	527.18
2015	1004.00	1531.00	0.52	-4.98	-0.57	-11.60	6.66	134.48
			5.49	33.09	4.40	26.47	116.36	700.89
			1.10	6.62			231.42	2709.15

Beta = 0.1660, Alpha = 1.0200, Return = 1.0988

Table 16: Calculation of Beta of Cadila

Year	Open	Close	Return(R_i)	Return(R_m)	($R_i - \tilde{R}i$)	($R_m - \tilde{R}m$)	($R_i - \tilde{R}i$) ($R_m - \tilde{R}m$)	($R_m - \tilde{R}m$)^2
2011	155.67	140.00	-0.10	-25.06	-0.31	-31.67	9.84	1003.22
2012	140.93	180.14	0.28	25.05	0.07	18.44	1.26	339.86
2013	180.00	161.62	-0.10	8.49	-0.31	1.87	-0.59	3.51
2014	163.33	319.67	0.96	29.58	0.75	22.96	17.15	527.18
2015	322.00	327.80	0.02	-4.98	-0.19	-11.60	2.23	134.48
			1.05	33.09			29.89	2008.26
			0.21	6.62				

Beta = 0.0149, Alpha = 0.1116, Return = 0.2101

Table 17: Calculation of Beta of Ajanta

Year	Open	Close	Return(R_i)	Return(R_m)	($R_i - \tilde{R}i$)	($R_m - \tilde{R}m$)	($R_i - \tilde{R}i$) ($R_m - \tilde{R}m$)	($R_m - \tilde{R}m$)^2
2011	28.28	39.69	0.40	-25.06	-0.91	-31.67	28.86	1003.21
2012	39.69	101.84	1.57	25.05	0.25	18.44	4.63	339.86
2013	101.94	378.28	2.71	8.49	1.40	1.87	2.62	3.51
2014	379.20	931.78	1.46	29.58	0.14	22.96	3.27	527.18
2015	930.80	1336.60	0.44	-4.98	-0.88	-11.60	10.19	134.48
			6.57	33.09			49.57	2008.26
			1.31	6.62				

Beta = 0.0247, Alpha = 1.1513, Return = 1.3147

Table 18: Calculation of Beta of Divis

Year	Open	Close	Return(R_i)	Return(R_m)	($R_i - \tilde{R}i$)	($R_m - \tilde{R}m$)	($R_i - \tilde{R}i$) ($R_m - \tilde{R}m$)	($R_m - \tilde{R}m$)^2
2011	322.85	387.68	0.20	-25.06	-0.09	-31.67	2.88	1003.22
2012	387.68	551.95	0.42	25.05	0.13	18.44	2.43	339.87
2013	555.53	610.90	0.10	8.49	-0.19	1.87	-0.36	3.51
2014	613.70	859.25	0.40	29.58	0.11	22.96	2.49	527.18
2015	865.35	1155.25	0.34	-4.98	0.04	-11.60	-0.50	134.48
			1.46	33.09			6.94	2008.26
			0.29	6.62				

Beta = 0.0035, Alpha = 0.2690, Return = 0.2919

Table 19: Calculation of Beta of Strides Shasun

Year	Open	Close	Return(R_i)	Return(R_m)	(R_i - $\tilde{R}i$)	(R_m -$\tilde{R}m$)	(R_i - $\tilde{R}i$) (R_m -$\tilde{R}m$)	(R_m-$\tilde{R}m$)²
2011	448.95	401.00	-0.11	-25.06	-0.70	-31.67	22.12	1003.22
2012	401.00	1096.25	1.73	25.05	1.14	18.44	21.06	339.86
2013	1102.00	359.95	-0.67	8.49	-1.26	1.87	-2.37	3.51
2014	360.00	960.15	1.67	29.58	1.08	22.96	24.69	527.18
2015	963.95	1289.05	0.34	-4.98	-0.25	-11.60	2.95	134.48
			2.96	33.09			68.45	2008.26
			0.59	6.62				

Beta = 0.0341, Alpha = 0.3660, Return = 0.5916

Table 20: Calculation of Beta of Sun Advanced Research

Year	Open	Close	Return(R_i)	Return(R_m)	(R_i - $\tilde{R}i$)	(R_m -$\tilde{R}m$)	(R_i - $\tilde{R}i$) (R_m -$\tilde{R}m$)	(R_m-$\tilde{R}m$)²
2011	91.73	73.22	-0.20	-25.06	-0.56	31.67	-17.67	1003.22
2012	73.22	134.18	0.83	25.05	0.48	-18.44	-8.78	339.86
2013	135.67	159.86	0.18	8.49	-0.18	-1.87	0.33	3.51
2014	161.20	185.68	0.15	29.58	-0.20	-22.96	4.69	527.18
2015	185.68	337.99	0.82	-4.98	0.46	11.60	5.38	134.48
			1.78	33.09			-16.05	2008.26
			0.36	6.62				

Beta = -0.0080, Alpha = 0.4091, Return = 0.3562

Table 21: Calculation of Beta of Alembi

Year	Open	Close	Return(R_i)	Return(R_m)	(R_i - $\tilde{R}i$)	(R_m -$\tilde{R}m$)	(R_i - $\tilde{R}i$) (R_m -$\tilde{R}m$)	(R_m-$\tilde{R}m$)²
2011	33.83	7.00	-0.79	-25.06	-1.19	-31.67	37.68	1003.22
2012	7.00	8.45	0.21	25.05	-0.19	18.44	-3.49	339.86
2013	8.50	14.81	0.74	8.49	0.35	1.87	0.65	3.51
2014	15.15	38.95	1.57	29.58	1.17	22.96	26.97	527.18
2015	38.00	47.70	0.26	-4.98	-0.14	-11.60	1.64	134.49
			1.98	33.09			63.44	2008.26
			0.40	6.62				

Beta = 0.0316, Alpha = 0.1874, Return = 0.3965