



A Study on Risk Return Relationship: Analysing the Relation Between Beta and Return of BSE 100 Index

KEYWORDS

Beta, Risk-Return relationship, and correlation coefficient – market returns, security returns.

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ABSTRACT

The main objective of the current study is the examination of the relationship between beta and returns of BSE 100 Index. The investigation period is from 2008 to 2013 and the focus on the risk-return trade-off by examining daily closing share prices of all the security. The study tries to verify whether beta is an important measure of risk and extent of correlation between security return and beta. It also investigates whether there is stocks with high beta values give high returns to investors. The result of the analysis using Karl Pearson's coefficient of correlation carried out showed that there is significant relationship between beta and return and the securities with high beta values give high returns to investors.

Everyone would like to earn a fortune out of their investments but it is impossible to do so without facing risk; risk of losing one's hard earned money. Investments are made to meet specific financial goals and one wrong step could take one's plan back over years.

Modern investment theory states that - 'High risk, High returns; Low risk, low returns'. This gives the possibility of high returns on high risk, not the guarantee of high returns as there are chances of high potential losses also. Hence, before investing a person needs have to be certain about his risk bearing capacity and various investment options to suit his financial condition, risk tolerance, life situation and financial goals.

The popular Capital Asset Pricing Model, CAPM (Black, 1972; Lintner, 1965; Sharpe, 1964) argues that beta, or the systematic risk is the only relevant risk measure for investment and a positive trade-off between beta and expected returns should exist. Because of its importance and relevance to all investors, it is one of the most extensively tested financial models in the literature. The CAPM postulates that the return on any asset is linearly related to its market beta.

Beta as the tendency of a security's returns to respond to swings in the market. A beta of 1 indicates that the security's price will move with the market. A beta of less than 1 means that the security will be less volatile than the market. A beta of greater than 1 indicates that the security's price will be more volatile than the market.

The aim of the current study is to determine whether beta has a role to play in calculating returns of the BSE 100 Index. The main purpose of this paper is to present evidence of the relationship between returns and beta in the Bombay Stock Exchange. It tries to verify whether stock with high beta gives high return. There will also be a try of observing a relation between return and beta in up and down markets.

Research Objectives:

The broader objectives of this paper are

1. To find out the Beta and expected return of individual securities with that of BSE 100 Index.
2. To analyze whether stocks with high beta values give high return to investors.
3. To find out the extent of correlation between security beta and return.
4. To understand concept of risk return relationship.

Size of the sample:

100 companies have been taken as a sample. These are the

companies which determine the BSE 100.

Methodology used:

Karl Pearson's coefficient of correlation has been used to test the hypothesis. The data set consists of daily closing prices of BSE-100 for the period 1/4/08 to 31/3/13. Various methodology used during the research are symbolically, stated below:

$$R_{it} = \frac{\text{Today's price of stock} - \text{Yesterday's price of stock} \times 100}{\text{Yesterday's price of stock}}$$

Where, R_{it} = Return on stock.

Same method has been used for calculating the return on market index (BSE 100). Symbolically, it can be written as:

$$X_t = \frac{\text{Today's price of index} - \text{Yesterday's price of index} \times 100}{\text{Yesterday's price of index}}$$

Where, x_t is return on index.

Symbolically expected return can be written as:

$$E(R_{it}) = a_i + b_i x_t + e_{it}$$

$E(R_{it})$ = Expected return on security

a_i = Alpha

b_i = Beta

x_t = Expected index return

e_{it} = error term representing unsystematic risk

Beta (β) can be estimated by regressing the daily return to the return of index. It is calculated as:

$$b_i = \frac{n \sum X R - \sum X \sum R}{n \sum X^2 - (\sum X)^2}$$

Alpha (α) is a constant intercept, indicating minimum level of return that is expected from security i , if market remains flat, is calculated as follow:

$$a_i = R - b_i x$$

Where,

a_i = constant intercept of security i

R = mean return of security i
 x = mean market return of index
 bi = slope of security i

For the simplification of formula market return is taken as X and security return as R and calculations done

The main objective of the study is to test the relationship between stock beta and return, accordingly, the hypothesis to be tested is:

Analysis:

Hypothesis

▪ Null Hypothesis:

There is no significant relationship between stock beta and return.

▪ Alternative Hypothesis:

There is significant relationship between stock beta and return

For the purpose of the study, to establish the risk and return relationship between stock, all the securities are arranged in ascending order on the basis of their beta values.

Analysis of Relationship between beta and expected return

Table - 1

SR. NO.	NAME	BETA	EXP.RET.
1	NESTLE INDIA LTD.	0.1828	1.3777
2	GODREJ CONSUMER PRODUCTS LTD.	0.2552	1.9505
3	ASIAN PAINTS (INDIA) LTD.,	0.2879	2.1350
4	COLGATE-PALMOLIVE (INDIA) LTD.,	0.2952	2.1654
5	SUN PHARMACEUTICAL INDUSTRIES LTD.	0.3844	2.7290
6	DABUR INDIA LTD.	0.3898	2.7665
7	SHRIRAM TRANSPORT FINANCE CO. LTD.,	0.4095	2.9392
8	HINDUSTAN UNILEVER LTD.,	0.4126	2.9482
9	DR. REDDY'S LABORATORIES LTD.,	0.4143	2.9946
10	INDIAN OIL CORPORATION LTD.	0.4343	3.0268
11	HERO MOTOCORP LIMITED	0.4724	3.3786
12	LUPIN LTD	0.4784	3.4403
13	CIPLA LTD.,	0.4919	3.4896
14	HINDUSTAN PETROLEUM CORPORATION LTD	0.5122	3.6090
15	BHARAT PETROLEUM CORPN. LTD.,	0.5168	3.6394
16	CUMMINS INDIA LTD.,	0.5292	3.7508
17	ITC LTD	0.5407	3.8335
18	TATA GLOBAL BEVERAGES LIMITED	0.5489	3.8095
19	EXIDE INDUSTRIES LTD.,	0.5864	4.1689
20	COAL INDIA LIMITED	0.5943	-1.9537
21	ULTRATECH CEMENT LTD	0.6026	4.2929
22	ACC LTD	0.6107	4.3063
23	UNITED BREWERIES LTD.	0.6525	4.7181
24	DIVI'S LABORATORIES LTD.	0.6709	4.6949
25	NHPC LIMITED	0.6812	4.2433

26	BAJAJ AUTO LIMITED	0.6964	5.0386
27	NTPC LIMITED	0.6973	4.8501
28	GRASIM INDUSTRIES LTD.,	0.7012	4.9175
29	GLENMARK PHARMACEUTICALS LTD	0.7023	4.9400
30	INFOSYS LTD	0.7141	5.0555
31	TITAN INDUSTRIES LTD	0.7285	5.1561
32	MARUTI SUZUKI INDIA LTD.	0.7362	5.1922
33	RANBAXY LABORATORIES LTD.,	0.7410	5.2026
34	POWER GRID CORPORATION OF INDIA LIMITED	0.7472	5.2332
35	GAIL (INDIA) LTD.	0.7707	5.3769
36	ZEE ENTERTAINMENT ENTERPRISES LTD.	0.7913	5.5573
37	OIL AND NATURAL GAS CORPORATION LTD	0.8026	5.5780
38	FEDERAL BANK LTD.	0.8036	5.6924
39	AMBUJA CEMENTS LTD.	0.8166	5.7504
40	BHARTI AIRTEL LTD.	0.8276	5.7278
41	TATA CONSULTANCY SERVICES LTD.	0.8304	5.8845
42	ABB LTD.	0.8452	5.8473
43	UNION BANK OF INDIA	0.8506	5.9967
44	ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD	0.8647	6.0169
45	WIPRO LTD.,	0.8654	6.0695
46	UNITED PHOSPHORUS LTD.	0.8799	6.1241
47	HINDUSTAN ZINC LTD.,	0.8867	6.2111
48	TATA CHEMICALS LTD	0.9048	6.3484
49	ASHOK LEYLAND LTD.,	0.9094	6.3508
50	BANK OF BARODA	0.9106	6.4467
51	NMDC LTD	0.9183	6.2374
52	CAIRN INDIA LIMITED	0.9186	6.4518
53	CANARA BANK	0.9240	6.5172
54	POWER FINANCE CORPORATION LTD	0.9403	6.5993
55	TATA POWER CO. LTD	0.9447	6.5239
56	HDFC BANK LTD.	0.9577	6.7019
57	IDEA CELLULAR LTD	0.9647	6.7708
58	UNITED SPIRITS LIMITED	0.9652	6.8096
59	BHARAT FORGE LTD	0.9661	6.7494
60	PUNJAB NATIONAL BANK	0.9667	6.7937
61	SATYAM COMPUTER SERVICES LTD	0.9865	6.9237
62	RURAL ELECTRIFICATION CORPORATION LIMITED	0.9880	6.9787
63	ADANI ENTERPRISES LTD.	1.0095	7.0116
64	HCL TECHNOLOGIES LTD	1.0109	7.1784
65	SIEMENS LTD.,	1.0131	7.0855
66	CROMPTON GREAVES LTD.,	1.0263	7.1220
67	MAHINDRA & MAHINDRA LTD.	1.0289	7.2398
68	ADANI POWER LIMITED	1.0416	6.2015

69	BHARAT HEAVY ELECTRICALS LTD.,	1.0687	7.3454
70	BANK OF INDIA	1.0811	7.5890
71	SESA GOA LTD.	1.1277	7.8259
72	INDUSIND BANK LTD.	1.1392	8.1165
73	LIC HOUSING FINANCE LTD.	1.1397	8.0353
74	HOUSING DEVELOPMENT FINANCE CORP.LT	1.1453	7.9918
75	RELIANCE POWER LIMITED	1.1807	8.1450
76	STATE BANK OF INDIA,	1.1819	8.2912
77	RELIANCE INDUSTRIES LTD	1.1872	8.2331
78	LARSEN & TOUBRO LIMITED	1.1925	8.2937
79	IDBI BANK LTD	1.2287	8.5935
80	JINDAL STEEL & POWER LTD	1.2297	8.5454
81	GMR INFRASTRUCTURE LIMITED	1.2635	8.7192
82	STEEL AUTHORITY OF INDIA LTD.,	1.2811	8.8844
83	KOTAK MAHINDRA BANK LTD.	1.3040	9.1480
84	TATA MOTORS LTD.	1.3238	9.2784
85	HINDALCO INDUSTRIES LTD.	1.3265	9.2467
86	YES BANK LTD.	1.3490	9.5277
87	STERLITE INDUSTRIES (INDIA) LTD	1.3607	9.4180
88	AXIS BANK LTD.	1.3906	9.7774
89	TATA STEEL LIMITED	1.4361	9.9942
90	JSW STEEL LIMITED	1.4467	10.1331
91	IDFC LIMITED	1.4869	10.4138
92	RELIANCE COMMUNICATIONS LIMITED	1.5112	10.4174

93	ICICI BANK LTD.	1.5823	11.1008
94	SUZLON ENERGY LTD.	1.5945	10.9663
95	DLF LIMITED	1.6070	11.1842
96	RELIANCE CAPITAL LIMITED	1.6450	11.4173
97	RELIANCE INFRASTRUCTURE LTD	1.6494	11.4501
98	UNITECH LTD.,	1.7677	12.2273
99	JAIPRAKASH ASSOCIATES LIMITED	1.8349	12.7693
100	HOUSING DEVELOPMENT & INFRASTRUCTURE LTD	1.9113	13.2096

Interpretations.

Table 1 presents the statistical summary of all the stocks. The table indicates the value of Beta, and expected return on all stocks. The securities with less beta value can be termed as less volatile. They remain less responsive to the market upswings and downswings. Securities with high beta values exhibit high degree of market sensitivity.

Conclusion:

In order to test the hypothesis Pearson's correlation coefficient is used where $r = 0.97$ which suggests positive relationship between stock beta and return (where $n = 100$) at 5% level of significance. By referring the row in the table for $n = 100$ and the column at significance level of 0.05 it is found that the critical values for r is 0.195. As per our calculation, $r = 0.97$ here calculated value is more than tabulated value. So, the null hypothesis is rejected and alternate hypothesis is accepted. Alternate hypothesis state that there is significant relationship between stock beta and return. Also it is evident from the above calculations that stocks with high beta values give high return to investors.

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