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A Study on Beta Analysis of Selected Stocks

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Abstract: The present study is an attempt to focus on the risk and returns associated with the selected stocks categorized under different companies listed in the National Stock Exchange. Risk and return generally moves with the market conditions as well as economic conditions prevailing in the market and their impact on individual stocks. Political conditions in any country also have the impact on stocks (systematic risk). These are the factors which investors can never avoid. Likewise; there are many factors which are held responsible for investment decisions in stocks. With the help of beta analysis selected stocks systematic risk can be measured and evaluated for the investment decisions. The crux behind the study is to examine the risk and return for selected company stocks. This study would help the investors to know about the risk and return associated with these selected stocks based on which investors can take their investment decisions.

Keywords: Beta, Systematic risk, Unsystematic risk.

I. INTRODUCTION

Risk is one of the important attributes of investment and every investor wants to invest after considering the risk factor. Returns are always evaluated in terms of risk. In general, investors perception towards risk is; high risk generates high returns, low risk –low returns and moderate risk with moderate returns. Therefore always there should be a trade-off between risk and return. Risk in general terms can be defined as variations in actual outcomes compared to the expected outcomes. Sometimes risk can be diversified and controlled but cannot be nullified as some factors are uncontrollable in nature which causes risk. Risks are basically of two types; systematic risk which is uncontrollable because of some external factors like inflation, interest rates fluctuations, GDP and National Income and unsystematic risk which is controllable as it is due to internal factors like management inefficiencies, fluctuations in profits, business policy. In general, beta measures the volatility of an asset or stock in relation to its benchmark. In stock market context, beta measures the systematic risk i.e., it measures the movements of the company stock against its benchmark i.e., Sensex and CNX Nifty.

Unsystematic risk is also known as "specific risk," "diversifiable risk" or "residual risk." It is a kind of uncertainty that comes with the company or industry one invests in. Unsystematic risk can be reduced through diversification. For instance, news that is specific to a small number of stocks, such as a sudden strike by the employees of a company who have shares in, can be considered as unsystematic risk. **Systematic risk**, on the other hand known as "market risk" or "un-diversifiable risk", is the uncertainty inherent to the entire market segment. It refers to the volatility of the stocks returns. Systematic risk consists of the day-to-day fluctuations in stock's price. Volatility is a measure of risk because it refers to the behaviour of investments rather than the reason for this behaviour. Market movements are the very reasons why investors make money from stocks, volatility is essential for returns, and the more unstable the investment, more chance there is that the stocks will experience a dramatic change in either direction. Interest rates, recession and wars all represent sources of systematic risk because they affect the entire market and cannot be avoided through diversification. Systematic risk underlies all other investment risks. If there is

inflation, one can invest in securities in inflation-resistant economic sectors. If interest rates are high, you can sell your efficacy stocks and move into newly issued bonds. On the other hand, if the entire economy underperforms, then the best is an attempt to find investments that will weather the storm better than the broader market like defensive industry stocks, or bearish options strategies.

Beta ('B')

Beta is a measure of the volatility, or systematic risk, of a security or a portfolio in comparison to the market as a whole. More so, it gives a sense of a stock's market risk compared to the greater market. It is used to compare a stock's market risk to that of other stocks. Investment analysts use the Greek letter 'B' to represent beta. Beta is calculated using regression analysis, beta implies as the tendency of a security's returns to respond to swings in the market.

Clauses of Stock Analysis

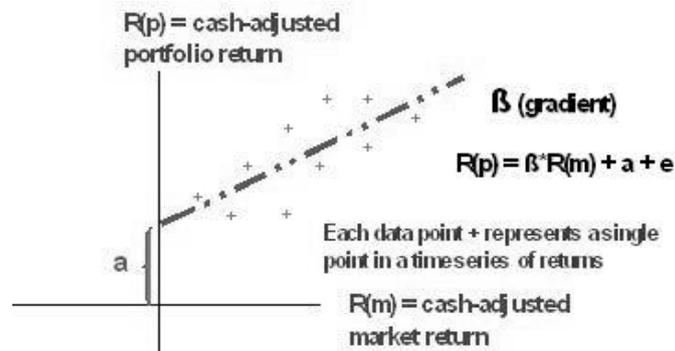
- A beta of 1 indicates that the security's price will move with the market.
- A beta of less than 1 means that the security will be less volatile than the market.
- A beta of greater than 1 indicates that the security's price will be more volatile than the market. Any stock whose beta is 1.2; it's theoretically 20% more volatile than the market.

Categorical differentiation of Betas'

- **Negative beta** - A beta less than 0 - indicates an inverse relation to the market - is possible but highly unlikely. Investors here believe that gold and gold stocks have negative betas because they tend to do better when the stock market declines, but this hasn't proved to be true over the long period.
- **Beta of 0** - Basically, ready money has a beta of 0. In other words, regardless of which way the market moves, the value of money remains unchanged assuming no inflation on a short run.
- **Beta between 0 and 1** - Companies with lower volatilities than the market have a beta of less than 1 but more than 0. There are many stocks which fall in this range.
- **Beta of 1** - A beta of 1 represents the volatility of the given index represents the overall market against which other stocks and their betas are measured. The S&P 500 is such an index. If a stock has a beta of 1, it will move the same amount and direction as the index. So, an index fund that mirrors the S&P 500 will have a beta close to 1.
- **Beta greater than 1** - This denotes a volatility that is greater than the broad-based index. Many technology companies on the NASDAQ have a beta higher than 1.
- **Beta greater than 100** - This is impossible as it essentially denotes a volatility that is 100 times greater than the market. If a stock had a beta of 100, it would be expected to go to 0 on any decline in the stock market. If you ever see a beta of over 100 on a research site, it is usually either the result of a statistical error or a sign that the given stock has experienced large swings due to low liquidity, such as an over-the-counter stock. For the most part, stocks of well-known companies rarely have a beta higher than 4.

Many efficient stocks have a beta of less than 1. Conversely, most high-tech NSE-based stocks have a beta greater than 1, offering the possibility of a higher rate of return, at the same time posing more risk.

Beta helps the investors to understand the concepts of inactive and active risk. The graph below is a projection of time series of returns (each data point labelled ("+")) for a particular portfolio R(p) versus the market return R(m). The returns are cash-adjusted, so the point at which the x and y axes intersect is the **cash-equivalent return**. Drawing a line of best fit through the data points allows us to quantify the beta and the active risk, which is referred as alpha.



(Source: <http://www.investopedia.com/>)

II. LITERATURE REVIEW

The Risk and Return are the two faces of the Investment coin. The ultimate goal of any investment is to maximize returns and minimize risk. The attitude of investors is they wanted to earn maximum return but they are not willing to take risk. But practically risk and return goes hand in hand. Higher the risk, higher the expected return and vice versa. Risk is inherent in every investment decision; even safe investments like treasury bills, government securities and post office deposits are not free from risk. The risk is more in certain investments like equity stock. What is Risk? It means earning less than what you expected from a given Investment or losing part of what you invested. In other words Risk means “variability of returns.” It is the probability of having adverse or low returns as compared to the expected returns (Sunil M Rashinkar, Divya U)

The capital asset pricing model (CAPM) of William Sharpe (1964) and John Lintner (1965) marks the birth of asset pricing theory (resulting in a Nobel Prize for Sharpe in 1990). Since its introduction in early 1960s, CAPM has been one of the most challenging topics in financial economics. Almost any manager who wants to undertake a project must justify his decision partly based on CAPM. The attraction of the CAPM is that it offers powerful and intuitively pleasing predictions about how to measure risk and the relation between expected return and risk (Ante Perković)

Beta is the statistical measure of a stock’s volatility compared with the overall market. Beta is also referred to as financial elasticity or correlated relative volatility, and can be referred to as a measure of the sensitivity of the asset’s returns to market returns, its non-diversifiable risk, its systematic risk or market risk. On an individual asset level, measuring beta can give clues to volatility and liquidity in the market place (G.B.Sabari Rajan, A.Saranya)

Assessment of justification of capital investment is important element of decision making process in any capital investment projects. The basic component of assessment of capital investments is risk assessment. If the investor does not have information about the level of risk of the project, he will not be able to determine and evaluate all its characteristics. When assessing the risk level, the key question is the size of minimum expected profit that investor expects to realize when it depends on the investment risk and investors preferences towards the risk (Domagoj Karačić Ph.D. Ivana Bestvina Bukvić Ph.D.2

Objectives of the study

- To understand the conception of systematic and unsystematic risk.
- To understand the measurability of risk and return
- To evaluate the Beta of the selected stocks
- To compare the Beta with the selected stocks
- To analyse the average returns of the selected stocks

- To determine the inferences drawn on the selected stocks and suggest the investors towards their decisions of investing in these stocks.

III. RESEARCH METHODOLOGY

Beta has been calculated using regression analysis.

$$\beta = \frac{\{n \sum X Y - (\sum X \times \sum Y)\}}{\{n \sum (X^2) - (\sum X)^2\}}$$

$$\text{Return} = (P1 - P0)/P0$$

Where: *P1 = Closing price of the share,

* P0 = Opening price of the share

Where, X is independent variable which is index returns and Y is dependent variable which is stock returns

Data Collection

Period of Study

This study is conducted for entire one month, i.e., from March 1 to March 31, 2016. The stock prices were taken from the NSE. They have been used for calculating average returns and Beta. The objectives behind calculating the average returns and beta is to help the investors arrive at a decision to invest in the shares on the basis of the risk involved in it and also to gain knowledge of the stock market .

The findings and suggestion certainly would be of help to the investors.

Tools for evaluation:

Statistical tools for evaluations:

Beta

Average Return

Type of Company	Selected
INFRA	2
CEMENT	2
AUTOMOBILES	2

IV. DATA ANALYSIS

Infra Sector		
Company	Average Return	Beta
ABB	1.183	0.325
Siemens	0.378	1.026
Cements Sector		
Company	Average Return	Beta
Ultratech Cements	0.605	0.934
Ambuja Cements	1.073	0.758

Automobiles Sector		
Company	Average Return	Beta
Maruti Suzuki	0.337	0.624
Mahindra & Mahindra	-0.231	-0.242

Inferences:		
Company	Beta Value	Inference
ABB	0.325	A beta of less than 1 – indicates security will be less volatile than the market.
Siemens	1.026	A beta of greater than 1 indicates that the security's price is more volatile than the market.
Ultratech Cements	0.934	A beta of less than 1 – indicates security is less volatile than the market.
Ambuja Cements	0.758	A beta of less than 1 – indicates security is less volatile than the market.
Maruti Suzuki	0.624	A beta of less than 1 – indicates security is less volatile than the market.
Mahindra & Mahindra	-0.242	A beta less than 0 - indicates an inverse relation to the market

V. RESULTS

The beta values of most of the companies were less than one. It was found that M& M had a beta of negative analysis, which indicates that there is an inverse relationship with the stock movements in comparison to market moves. Only the beta value of Infra stock, i.e., Siemens is more than one. This indicates that this stock is more volatile. The one percent change in the price of the index has caused a change of 1.026 percent change in the price of the stock of Siemens. As the decrease in one percent of the index would cause a price change of less than one percent in case of other stocks under the study.

VI. CONCLUSION

Many efficient stocks have a beta of less than 1. Conversely, most high-tech NSE-based stocks have a beta greater than 1, offering the possibility of a higher rate of return, at the same time posing more risk. Beta helps the investors to understand the concepts of inactive and active risk. The graph below is a projection of time series of returns (each data point labelled (“+”) for a particular portfolio $R(p)$ versus the market return $R(m)$). The returns are cash-adjusted, so the point at which the x and y axes intersect is the cash-equivalent return. Drawing a line of best fit through the data points allows us to quantify the beta and the active risk, which is referred as alpha. The main measure of risk in terms of analysis was standard deviation of the return applied in the present study. The unexpected return appears because of the unanticipated event in the market. The risk from investing in stocks usually stalks from the possibility of an unprecedented event. The unsystematic risk can be eliminated through diversification. The systematic risk principle states that the reward for bearing risk depends on the level of systematic risk. The level of systematic risk of a particular asset, relative to the average returns is stated by the beta of the asset. The beta measures the relative systematic risk of a stock. Beta greater than one indicates more systematic risk than the benchmarked average, stocks with greater betas imply greater risk as well as greater expected return. On a concluding remark, the investors who are risk averse are advisable to invest in less risky stocks whose beta is between 0 to 1. And risk seekers can invest in stocks with highest beta and high returns.

VII. LIMITATIONS

1. The study is limited to only 3 selected sectors (Infra, Automobile, and Cement)
2. In calculating the return dividend has not been considered only the change in price of the stocks have been considered.
3. Stock market conditions are subjected to market risks, furthermore no mere assumptions were considered in the study.

4. The data representative was for very short period and studied on the basis of monthly analysis

APPENDIX

Date	CNX Nifty	Infra		Cement		Automobile	
		ABB	Siemens	Ultratech	Ambuja	Maruti Suzuki	Mahindra & Mahindra
1/3/2016	7222.3	1030	1025.55	2885.3	190.4	3494.4	1268.1
2/3/2016	7368.85	1028.05	1053.6	2973	195.65	3612.65	1199.15
3/3/2016	7475.6	1077.3	1049.35	2944.25	199.65	3608.65	1215.35
4/3/2016	7485.35	1142.45	1044.1	2906.9	202.4	3555.1	1216.35
8/3/2016	7485.3	1153.5	1046.7	2950	201.65	3462.65	1219.4
9/3/2016	7531.8	1176.55	1041.95	2991.6	204.35	3576.4	1235.55
10/3/2016	7486.15	1151.1	1035.4	2997.75	201.5	3627.2	1226.35
11/3/2016	7510.2	1143.45	1032.95	2994.45	200.7	3641.2	1220.5
14-03-2016	7538.75	1133.6	1034.6	3008.3	203.7	3648.15	1212.05
15-03-2016	7460.6	1140.7	1021.8	2989.6	204.9	3654.55	1205.05
16-03-2016	7498.75	1126.1	1004.6	2968.25	206.2	3667.35	1212.1
17-03-2016	7512.55	1148.35	1025.45	3029	218.15	3635.45	1198.45
18-03-2016	7604.35	1156.05	1052.45	3110.65	222.05	3621.4	1222.55
21-03-2016	7704.25	1177.6	1071.85	3229.5	231.95	3669.55	1227.95
22-03-2016	7714.9	1182.75	1072.55	3210.4	229.85	3699.55	1253.15
23-03-2016	7716.5	1206.45	1093.45	3198.45	228.25	3736	1249.35
28-03-2016	7615.1	1242.9	1072.45	3176.95	229.7	3638.95	1243.85
29-03-2016	7597	1209.05	1071.7	3136.25	230.9	3729.95	1232.25
30-03-2016	7735.2	1239.55	1096.25	3184.1	231.4	3727.45	1219.75
31-03-2016	7738.4	1282.15	1099.7	3228.75	232.55	3716.3	1210.7

ABB India				
Date	X	Y	X*Y	X2
1/3/2016	-	-	-	-
2/3/2016	2.029	-0.189	-0.3835	4.117
3/3/2016	1.449	4.791	6.9422	2.100

4/3/2016	0.130	6.048	0.7862	0.017
8/3/2016	-0.001	0.967	-0.0010	0.000
9/3/2016	0.621	1.998	1.2408	0.386
10/3/2016	-0.606	-2.163	1.3108	0.367
11/3/2016	0.321	-0.665	-0.2135	0.103
14-03-2016	0.380	-0.861	-0.3272	0.144
15-03-2016	-1.037	0.626	-0.6492	1.075
16-03-2016	0.511	-1.280	-0.6541	0.261
17-03-2016	0.184	1.976	0.3636	0.034
18-03-2016	1.222	0.671	0.8200	1.493
21-03-2016	1.314	1.864	2.4493	1.727
22-03-2016	0.138	0.437	0.0603	0.019
23-03-2016	0.021	2.004	0.0421	0.000
28-03-2016	-1.314	3.021	-3.9696	1.727
29-03-2016	-0.238	-2.723	0.6481	0.057
30-03-2016	1.819	2.523	4.5893	3.309
31-03-2016	0.041	3.437	0.1409	0.002
Total	6.984	22.482	13.196	16.937

$$\beta = \{n \Sigma X Y - (\Sigma X \times \Sigma Y)\} / \{n \Sigma (X^2) - (\Sigma X)^2\}$$

$$\{(19 \times 13.196) - (6.984 \times 22.482)\} / \{(19 \times 16.937) - 48.776\}$$

$$\beta = 0.325$$

Siemens	Variables			
Date	X	Y	X*Y	X ²
1/3/2016	-	-	-	-
2/3/2016	2.029	2.735	5.549	4.117
3/3/2016	1.449	-0.403	-0.584	2.100
4/3/2016	0.130	-0.500	-0.065	0.017
8/3/2016	-0.001	0.249	0.000	0.000
9/3/2016	0.621	-0.454	-0.282	0.386
10/3/2016	-0.606	-0.629	0.381	0.367
11/3/2016	0.321	-0.237	-0.076	0.103
14-03-2016	0.380	0.160	0.061	0.144
15-03-2016	-1.037	-1.237	1.283	1.075

16-03-2016	0.511	-1.683	-0.860	0.261
17-03-2016	0.184	2.075	0.382	0.034
18-03-2016	1.222	2.633	3.218	1.493
21-03-2016	1.314	1.843	2.422	1.727
22-03-2016	0.138	0.065	0.009	0.019
23-03-2016	0.021	1.949	0.041	0.000
28-03-2016	-1.314	-1.921	2.524	1.727
29-03-2016	-0.238	-0.070	0.017	0.057
30-03-2016	1.819	2.291	4.167	3.309
31-03-2016	0.041	0.315	0.013	0.002
Total	6.984	7.181	18.199	16.937

$$\beta = \frac{\{n \sum X Y - (\sum X \times \sum Y)\}}{\{n \sum (X^2) - (\sum X)^2\}}$$

$$\frac{\{(19 \times 18.199) - (6.984 \times 7.181)\}}{\{(19 \times 16.937) - 48.776\}}$$

$$\beta = 1.026$$

Ultratech	Variables			
Date	X	Y	X*Y	X ²
1/3/2016	-	-	-	-
2/3/2016	2.029	3.040	6.168	4.117
3/3/2016	1.449	-0.967	-1.401	2.100
4/3/2016	0.130	-1.269	-0.165	0.017
8/3/2016	-0.001	1.483	-0.001	0.000
9/3/2016	0.621	1.410	0.876	0.386
10/3/2016	-0.606	0.206	-0.125	0.367
11/3/2016	0.321	-0.110	-0.035	0.103
14-03-2016	0.380	0.463	0.176	0.144
15-03-2016	-1.037	-0.622	0.645	1.075
16-03-2016	0.511	-0.714	-0.365	0.261
17-03-2016	0.184	2.047	0.377	0.034
18-03-2016	1.222	2.696	3.295	1.493
21-03-2016	1.314	3.821	5.021	1.727
22-03-2016	0.138	-0.591	-0.082	0.019
23-03-2016	0.021	-0.372	-0.008	0.000
28-03-2016	-1.314	-0.672	0.883	1.727

29-03-2016	-0.238	-1.281	0.305	0.057
30-03-2016	1.819	1.526	2.776	3.309
31-03-2016	0.041	1.402	0.057	0.002
Total	6.984	11.496	18.396	16.937

$$\beta = \{n \sum X Y - (\sum X \times \sum Y)\} / \{n \sum (X^2) - (\sum X)^2\}$$

$$\{(19 \times 18.396) - (6.984 \times 11.496)\} / \{(19 \times 16.937) - 48.776\}$$

$$\beta = 0.934$$

Ambuja	Variables			
Date	X	Y	X*Y	X ²
1/3/2016	-	-	-	-
2/3/2016	2.029	2.757	5.594	4.117
3/3/2016	1.449	2.044	2.962	2.100
4/3/2016	0.130	1.377	0.179	0.017
8/3/2016	-0.001	-0.371	0.000	0.000
9/3/2016	0.621	1.339	0.832	0.386
10/3/2016	-0.606	-1.395	0.845	0.367
11/3/2016	0.321	-0.397	-0.127	0.103
14-03-2016	0.380	1.495	0.568	0.144
15-03-2016	-1.037	0.589	-0.611	1.075
16-03-2016	0.511	0.634	0.324	0.261
17-03-2016	0.184	5.795	1.066	0.034
18-03-2016	1.222	1.788	2.185	1.493
21-03-2016	1.314	4.458	5.858	1.727
22-03-2016	0.138	-0.905	-0.125	0.019
23-03-2016	0.021	-0.696	-0.015	0.000
28-03-2016	-1.314	0.635	-0.834	1.727
29-03-2016	-0.238	0.522	-0.124	0.057
30-03-2016	1.819	0.217	0.395	3.309
31-03-2016	0.041	0.497	0.020	0.002
Total	6.984	20.383	18.992	16.937

$$\beta = \{n \sum X Y - (\sum X \times \sum Y)\} / \{n \sum (X^2) - (\sum X)^2\}$$

$$\{(19 \times 18.992) - (6.984 \times 20.383)\} / \{(19 \times 16.937) - 48.776\}$$

$$\beta = 0.758$$

Maruti Suzuki	Variables			
Date	X	Y	X*Y	X²
1/3/2016	-	-	-	-
2/3/2016	2.029	3.384	6.866	4.117
3/3/2016	1.449	-0.111	-0.161	2.100
4/3/2016	0.130	-1.484	-0.193	0.017
8/3/2016	-0.001	-2.600	0.003	0.000
9/3/2016	0.621	3.285	2.040	0.386
10/3/2016	-0.606	1.420	-0.861	0.367
11/3/2016	0.321	0.386	0.124	0.103
14-03-2016	0.380	0.191	0.073	0.144
15-03-2016	-1.037	0.175	-0.181	1.075
16-03-2016	0.511	0.350	0.179	0.261
17-03-2016	0.184	-0.870	-0.160	0.034
18-03-2016	1.222	-0.386	-0.472	1.493
21-03-2016	1.314	1.330	1.748	1.727
22-03-2016	0.138	0.818	0.113	0.019
23-03-2016	0.021	0.985	0.021	0.000
28-03-2016	-1.314	-2.598	3.414	1.727
29-03-2016	-0.238	2.501	-0.595	0.057
30-03-2016	1.819	-0.067	-0.122	3.309
31-03-2016	0.041	-0.299	-0.012	0.002
Total	6.984	6.410	11.822	16.937

$$\beta = \{n \sum X Y - (\sum X \times \sum Y)\} / \{n \sum (X^2) - (\sum X)^2\}$$

$$\{(19 \times 11.822) - (6.984 \times 6.410)\} / \{(19 \times 16.937) - 48.776\}$$

$$\beta = 0.624$$

Mahindra & Mahindra	Variables			
Date	X	Y	X*Y	X²
1/3/2016	-	-	-	-
2/3/2016	2.029	-5.347	-10.849	4.117
3/3/2016	1.449	1.351	1.958	2.100
4/3/2016	0.130	0.082	0.011	0.017

8/3/2016	-0.001	0.251	0.000	0.000
9/3/2016	0.621	1.324	0.822	0.386
10/3/2016	-0.606	-0.745	0.451	0.367
11/3/2016	0.321	-0.477	-0.153	0.103
14-03-2016	0.380	-0.692	-0.263	0.144
15-03-2016	-1.037	-0.578	0.599	1.075
16-03-2016	0.511	0.585	0.299	0.261
17-03-2016	0.184	-1.126	-0.207	0.034
18-03-2016	1.222	2.011	2.457	1.493
21-03-2016	1.314	0.442	0.581	1.727
22-03-2016	0.138	2.052	0.283	0.019
23-03-2016	0.021	-0.303	-0.006	0.000
28-03-2016	-1.314	-0.440	0.578	1.727
29-03-2016	-0.238	-0.933	0.222	0.057
30-03-2016	1.819	-1.014	-1.844	3.309
31-03-2016	0.041	-0.742	-0.030	0.002
Total	6.984	-4.299	-5.092	16.937

$$\beta = \{n \Sigma X Y - (\Sigma X \times \Sigma Y)\} / \{n \Sigma(X^2) - (\Sigma X)^2\}$$

$$\{(19 \times -5.092) - (6.984 \times -4.299)\} / \{(19 \times 16.937) - 48.776\}$$

$$\beta = -0.242$$

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