The Beta, Leverage and Returns Association

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Abstract: The aim of this research is to study the variables beta and leverage simultaneously to analyse its effect on the expected returns of the firms. In this direction, the study computes the beta over a five year period for a comprehensive sample of listed companies from the Bombay Stock Exchange using the CAPM model. Though both beta and leverage are known to be explanatory variables for the expected returns on equity their study at the same time has been limited. The beta is associated strongly with stock prices and returns. If the company had debt, the incremental risk arising from the leverage is added to the intrinsic systematic risk of the company's business, thus obtaining the levered beta signifying more risk and scope for returns. The results of the study confirm a positive relationship between beta and returns. The relationship between beta and returns are significant for both high and moderate beta companies. But the low beta companies are able to provide higher forecasted prices than the moderate beta companies. The combination of high beta and high leverage fails to provide significant returns to the shareholders. Hence the study brings to light the impact of beta and leverage on returns signifying that leverage indicating beyond a certain level debt adversely affects returns. The results of the study are important for investors in equity which would serve to channelize investments into stocks with a better understanding of these two parameters for potential higher returns in the future.

1. INTRODUCTION

The primary goal of investment is to earn returns higher than that made by the market. Measures of shareholder wealth creation have focussed on the firm's stock price performance and determine how much the shareholders have increased their wealth during different periods based on the dividends they receive and the appreciation in the firm's stock price. Hence the study focuses on the abnormal returns of the stocks to verify the variables that have an impact on returns.

2. REVIEW OF LITERATURE

Academic literature suggests that beta is useful for the estimating risk and for calculating abnormal returns for the firms. The following literature provides evidence of the relationship between the calculated beta of stocks and returns from the stock.

Nikolaos et al., (2004) studied the relationship between beta and returns in the Athens Stock Exchange and found that an unconditional relationship between beta and realized returns was not significant. However, when he used the CAPM model, beta and returns indicated a significant positive relationship in up market and a significant negative relationship in down market. Studies for France (Hawawini et al., 1983) and Japan (Hawawini, 1991; Chan et al., 1991) concluded a positive relationship between returns and beta, but the empirical findings in Canada (Calvet and Lefoll, 1989), Belgium (Hawawini et al., 1989), Finland and Sweden (Ostermark, 1991), the UK (Corhay et al., 1987; Chan and Chui, 1996), Singapore (Wong and Tan, 1991), Hong Kong (Cheung and Wong, 1992; Ho et al., 2000a; b), and Korea and Taiwan (Cheung et al., 1993) advocate either no relationship or an inconsistent relationship between returns and market risk. Karacabey (2001) also investigated the beta return relationship in the Istanbul stock exchange and reinforced that the conditional relationship holds true. Hence, beta is still a useful risk measure in this emerging market. Fama and French (1992) examined the relationship between beta and returns between 1963 and 1990 and have concluded that there was no relationship. These results were resisted on three fronts. First, Amihud, Christensen, and Mendelson (1992) used the same data, performed different statistical

tests and showed that differences in betas did in fact explain differences in returns during the time period. Second, Kothari and Shanken (1995) estimated betas using annual data instead of the shorter intervals used in many tests and concluded that betas explained a significant proportion of the differences in returns across investments. Third, Chan and Lakonishok (2001) looked at a much longer time series of returns from 1926 to 1991 and found that the positive relationship between betas and returns only in the period after 1982. They also found that betas were a useful guide to risk in extreme market conditions, with the riskiest firms (the 10 percent with highest betas) performing far worse than the market as a whole in the 10 worst months for the market between 1926 and 1991.

Masulis (1983) studied the relationship between the equity share return and the corporate leverage showed that highly levered companies had a greater impact on the expected returns. Bradley et al., (1984) found that 54% of the cross-sectional variance in firm leverage ratios was explained by industrial classification and suggested that industrial classification was a good proxy for business risk. Hou et al., (2006) examined the effect of industry concentration and average stock returns. After controlling for determinants such as size, book-to-market and momentum they found that firms in more competitive industries earn higher stock returns.

3. OBJECTIVE OF THE STUDY

The following are described as the objectives of the study:
1. To evaluate the beta value as a risk measure of the firm with variance statistics.
2. To study the impact of beta value, leverage and other variance statistics on the expected returns of shares of the selected companies.
3. To analyse the relationship between beta and prices at the end of year 1,2,3,4 and 5.

4. RESEARCH METHODOLOGY

The methodology adopted for the study is as follows

4.1 POPULATION AND SAMPLE

This study has been done with selected seventeen companies listed on the Bombay Stock Exchange. The stocks were chosen ensuring continuous pricing data availability. Even though the number of companies chosen was only seventeen, seven of these are included within top fifty companies in terms of market capitalisation and another three within the top hundred. The sample includes listed and non financial companies as listing on exchange is a prerequisite with the stock price information needed for calculation abnormal returns. Also the study has an inclusive sample with companies from pertinent sectors of the economy such as Paints & Varnishes, Automobile, Fast Moving Consumer goods, Pharmaceuticals, Food & Beverage, Consumer Durables and electric generators. The industrial sectors chosen are those over which the betas vary widely.

The sample is classified into three groups. The companies with low betas (less than 0.50) comprising Berger, Amrutanjan Health Care, Dr. Reddy Laboratories, Novartis, Colgate Palmolive, Videocon Industries, moderate beta (between 0.5 to1.0) companies like Novartis, Godrej Consumer Products, Honda Siel Power Products, Mahindra and Mahindra, Nestle India and Maruti Suzuki and high beta companies (more than1.0) such as Asian Paints, Hindustan Unilever, Tata Motors, Whirlpool and IFB industries.

4.2 DATA COLLECTION

The stock prices have been taken from bseindia.com and dividend and Debt/Equity information of the companies are from moneycontrol.com. Beta has been estimated using closing monthly stock prices for 5 years i.e. 60 months from October 2012 till November 2017. As a long period of estimation improves the accuracy of the beta a period of five years has been chosen. The spreadsheet requires the use of the risk free rate which is the rate of interest payable on a long term bond issued by the Indian Government. The risk free rate for 2017 is 5.38% which has been arrived by deducting from the bond rate the default spread for India 2.60 % based on its local currency rate BAA3. The spreadsheet also uses India's Equity Risk Premium of 9.05 % (Aswath Damodaran, 2017) as the risk premium for stocks in the study.

4.3 FRAMEWORK FOR ANALYSIS

Beta has been computed using the spreadsheet risk.xls developed by Prof Aswath Damodaran Stern School of Business, New York. The abnormal returns are studied for its relationship with the beta of the company to evaluate the type of stock that provides better returns. The abnormal return for a stock is the excess returns made by each company's stock over the market index SENSEX.

The betas were classified into three categories: low betas less than 0.5, moderate betas 0.5 to 1.0 and high betas of more than 1.0. The three categories were studied for its relationship with expected returns, variance statistics and forecasted prices which are a result of the spreadsheet. The study also studies the impact of leverage on beta and returns. The results were analysed using Paired Sample t test with SPSS. The Paired Sample t test is used to determine if two sets of data are significantly different from each other. Thus this research would help the investors to select stocks which provide higher returns.

4.4 HYPOTHESIS FOR THE STUDY

The following are chosen as the hypothesis for the study

Ho1: There is no significant relationship between beta and the expected returns on the stock

Ho2: There is no significant relationship between leverage and the expected returns on the stock

Ho3: There is no significant relationship between forecasted prices and the expected returns on the stock

5. FINDINGS AND DISCUSSION

An Evaluation of Beta Values

The variance of the rate of return of a stock has two components systematic and unsystematic variances which together represent the total risk. The former is an uncontrollable risk, and the latter is a controllable risk. Beta is a measure of systematic risk. The unsystematic risk can be removed by judicious diversification. The impact of beta values and other variance statistics on the expected returns of shares of the selected companies shows the following results. Also the beta value has been studied as a risk measure of the firm with variance statistics.

Table 5.1 Variance statistics for low beta companies

Co No	Beta	Variance of the stock	Variance of the market	Systematic variance	Unsystematic variance	R squared	D/E	Expected return
1	0.04	0.01	0.001	0.0000	0.01	0.00	0.18	0.07
4	0.12	0.01	0.001	0.0000	0.01	0.00	0.04	0.08
5	0.12	0.01	0.001	0.0000	0.01	0.00	0.25	0.08
6	0.36	0.01	0.001	0.0002	0.01	0.02	0.03	0.10
7	0.07	0.01	0.001	0.0000	0.01	0.00	0.07	0.07
14	0.43	0.01	0.001	0.0003	0.01	0.02	2.06	0.11

Table 5.2. Variance statistics for moderate beta companies

Co No	Beta	Variance of the stock	Variance of the market	Systematic variance	Unsystematic variance	R squared	D/E	Expected return
2	0.80	0.02	0.001	0.001	0.023	0.04	0.03	0.14
8	0.72	0.00	0.001	0.001	0.003	0.18	0.02	0.13
9	0.72	0.00	0.001	0.001	0.003	0.18	0.32	0.13
11	0.83	0.00	0.001	0.001	0.003	0.22	0.15	0.14
12	0.80	0.01	0.001	0.001	0.006	0.14	0.03	0.14
17	0.95	0.00	0.001	0.001	0.002	0.34	0.22	0.15

Table 5.3 Variance statistics for high beta companies

Co No	Beta	Variance of the stock	Variance of the market	Systematic variance	Unsystematic variance	R squared	D/E	Expected return
3	1.30	0.02	0.001	0.002	0.02	0.12	0.01	0.18
10	1.65	0.02	0.001	0.004	0.01	0.24	0.02	0.21
13	1.59	0.01	0.001	0.004	0.01	0.34	0.88	0.21
15	1.48	0.01	0.001	0.003	0.01	0.27	0.10	0.20
16	1.87	0.02	0.001	0.005	0.02	0.20	0.07	0.23

The R-squared measure shows the extent to which change in the price of an asset is correlated with the benchmark, in other words, it is the total variance of the stock's return in relation to the total variance. The R-squared value also increases the reliability of the beta number. Beta and R-squared are different but related measures. But when analysed together, R-squared and Beta give investors a thorough picture of the performance of asset managers.

In the above table for low beta companies, Companies 6 and 14 have higher betas with R squared values and show higher expected returns than the other stocks. Company 14 has higher Debt/Equity which has further increased the beta value but it also produces higher expected returns. Hence the investors are compensated for assuming greater risk. If these stocks were added to the portfolios they would add more volatility but ensure superior returns especially in good market conditions. In the above table for moderate beta companies, Company 17 has a high Debt/Equity ratio in the category and this has further increased the beta value producing highest expected returns. For high beta companies, Company 13 has both a high Debt/Equity and beta which has further increased the R squared. It has produced the second highest expected returns in the category. Company 16 has higher beta value but it also produces higher expected returns. All stock indicates the relationship of higher returns with more risk. But the smart investor is one who can achieve higher returns for assuming comparatively less risk. For example, in low beta companies one can choose company number 4 instead of 5 as they both have the same beta but the latter one has higher D/E ratio with greater financial risk. Among the moderate beta companies one can choose company number 8 instead of 9 for the same reason as above.

Betas, Expected Returns and Forecasted Prices

To analyse the relationship between beta, expected returns, current price and forecasted prices at the end of year 1,2,3,4 and 5 a study of the descriptive statistics was done.

The results have been presented in the following tables.

Table 5.4 Descriptive Statistics for low beta companies

	beta	returns	Current price	Price 1 year later	Price 2 year later	Price 3 years later	Price 4 years later	Price 5 years later
Mean	0.19	.0842	1092.82	1171.1081	1255.0599	1345.0849	1441.6265	1545.1606
Std. Error of Mean	.06619	.00584	409.62	439.40591	471.38555	505.71885	542.58054	582.15843
Median	.1203	.0781	839.23	897.1259	959.1270	1025.5262	1096.6439	1172.8242
Mode	.04(a)	.07	2307.10	16.41(a)	18.14(a)	20.05(a)	22.17	24.50(a)
Std. Deviation	.16214	.01431	1003.35	1076.32028	1154.65408	1238.75313	1329.04546	1425.99111
Variance	.026	.000	1006718.15	1158465.339	1333226.040	1534509.315	1766361.845	2033450.657

Table 5.5 Descriptive Statistics for moderate beta companies

	beta	returns	Current price	Price1 year later	Price 2 year later	Price 3 years later	Price 4 years later	Price 5years later
Mean	.8027	.1383	3370.5417	3817.9506	4324.9836	4899.6169	5550.8981	6289.0896
Std. Error of Mean	.03443	.00304	1437.40330	1633.97197	1857.59484	2112.01780	2401.50821	2730.92788
Median	.7996	.1380	1339.7750	1507.4682	1696.2196	1908.6819	2147.8435	2417.0703
Mode	.72(a)	.13(a)	1264.80	555.45(a)	628.75(a)	711.72(a)	805.64(a)	911.95(a)
Std. Deviation	.08434	.00745	3520.90465	4002.39759	4550.15952	5173.36594	5882.46974	6689.37983
Variance	.007	.000	12396769.52	16019186.5	20703951.63	26763715.13	34603450.20	44747802.51

Table 5. 6 Descriptive Statistics for high beta companies

	beta	returns	Current price	Price1 year later	Price 2 year later	Price 3 years later	Price 4 years later	Price 5years later
Mean	1.5789	.2067	1080.10	1298.5334	1561.6157	1878.5674	2260.5322	2720.9816
Std. Error of Mean	.09568	.00844	171.13	205.68555	248.10225	300.30928	364.72251	444.35978
Median	1.5891	.2077	1179.60	1454.2314	1792.8018	2210.1972	2705.9275	3235.7615
Mode	1.30	.18(a)	408.60	493.25(a)	595.43(a)	718.79(a)	867.70(a)	1047.46(a)
Std. Deviation	.21394	.01887	382.65	459.92687	554.77349	671.51197	815.54432	993.61868
Variance	.046	.000	146421.91	211532.721	307773.629	450928.329	665112.535	987278.085

The above tables show that the low beta companies produce the least mean returns and the expected returns rise with moderate beta and are the highest for the high beta category. But standard deviation is the lowest for the moderate beta companies. The results were analysed using Paired Sample t test with SPSS and the results are presented below.

Leverage and Expected Returns

To further analyse the relationship between D/E representing leverage, beta and expected returns a Paired Sample t test was conducted and the results were tested at 5% level of significance.

Table 5.7 Paired Samples Test for low beta companies

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	beta - Debt equity	.18333	.15319	.06254	.02257	.34409	2.932	5	.033
Pair 2	Beta and R squared	.18000	.16322	.06663	.00871	.35129	2.701	5	.043
Pair 3	Debt equity - Expected returns	-.07833	.00753	.00307	-.08623	-.07043	-25.489	5	.000

The above table shows a significant relationship beta - Debt equity, beta and R squared and D/E and expected returns at 5% level of significance.

Table 5. 8 Paired Samples Test for moderate beta companies

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	beta - Debt equity	.79833	.08565	.03497	.70844	.88822	22.830	5	.000
Pair 2	Beta and R squared	.62000	.082704	.033764	.533207	.706793	18.363	5	.000
Pair 3	Debt equity - Expected returns	-.13333	.01033	.00422	-.14417	-.12249	-31.623	5	.000

The above table shows a significant relationship between beta - Debt equity, beta and R squared and D/E and expected returns at 5% level of significance. The study reinforces the relationship for moderate beta companies.

Table 5.9 Paired Samples Test for high beta companies

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	beta - Debt equity	1.36200	.41662	.18632	.84470	1.87930	7.310	4	.002
Pair 2	Beta and R squared	1.344000	.202682	.090642	1.092337	1.595663	14.828	4	.000
Pair 3	Debt equity - Expected returns	.00925	.37238	.16653	-.45311	.47162	.056	4	.958

The above table shows a significant relationship between beta - Debt equity and beta and R squared but not for debt equity and expected returns indicating beyond a certain level debt adversely affects returns.

Betas and Forecasted Prices

To analyse the relationship between beta and prices at the end of year 1,2,3,4 and 5 a Paired t test was performed and results were presented in the following tables.

Table 5.10 Paired Samples Test for low beta companies

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	beta - returns	.10586	.14782	.06035	-.04927	.26099	1.754	5	.140
Pair 2	Price1 year later - Current price	78.29143	73.37670	29.95591	1.28730	155.29556	2.614	5	.047
Pair 3	Price1 year later - Price 2 year later	-83.95178	78.77003	32.15773	-166.61585	-1.28771	-2.611	5	.048
Pair 4	Price 2 year later - Price 3 years later	-90.02504	84.56335	34.52284	-178.76883	-1.28124	-2.608	5	.048
Pair 5	Price 3 years later - Price 4 years later	-96.54159	90.78656	37.06346	-191.81624	-1.26694	-2.605	5	.048
Pair 6	Price 4 years later - Price 5years later	-103.53407	97.47176	39.79268	-205.82441	-1.24373	-2.602	5	.048

The results indicate that there is a significant improvement in the prices a year later. Hence companies with low betas are companies are able to give reasonable returns but these are not significant at 5% level. Some of the companies in this category include MNCs which are well funded by parent organisations like Colgate Palmolive and Novartis. Their betas are low on account of lower leverage.

Table 5. 11 Paired Samples Test for moderate beta companies

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	beta - returns	.66444	.07689	.03139	.58376	.74513	21.168	5	.000
Pair 2	Price1 year later - Current price	447.40891	482.61012	197.02476	-59.05935	953.87716	2.271	5	.072
Pair 3	Price1 year later - Price 2 year later	-937246.46	2094926.65	936879.68	-3538441.46	1663948.5	-1.000	4	.374
Pair 4	Price 2 year later - Price 3 years later	-574.63338	624.62733	255.00304	-1230.13956	80.87281	-2.253	5	.074
Pair 5	Price 3 years later - Price 4 years later	-651.28113	710.70585	290.14445	-1397.12118	94.55891	-2.245	5	.075
Pair 6	Price 4 years later - Price 5years later	-738.19157	808.71605	330.15695	-1586.88702	110.50387	-2.236	5	.076

The results show that there is no significant improvement in the prices a year later. But companies with moderate betas provide returns but they are significant at 5% level. This indicates that even though these companies are able to provide the immediate benefits in terms of significant returns, the capital appreciation has not been adequate with prices in later years.

Table 5.12 Paired Samples Test for high beta companies

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	beta - returns	1.37211	.19508	.08724	1.12989	1.61433	15.728	4	.000
Pair 2	Price1 year later - Current price	218.43342	80.94058	36.19773	117.93241	318.93442	6.034	4	.004
Pair 3	Price1 year later - Price 2 year later	-263.08223	99.14583	44.33936	-386.18804	-139.97643	-5.933	4	.004
Pair 4	Price 2 year later - Price 3 years later	-316.95172	121.74047	54.44399	-468.11248	-165.79097	-5.822	4	.004
Pair 5	Price 3 years later - Price 4 years later	-381.96485	149.80728	66.99585	-567.97516	-195.95455	-5.701	4	.005
Pair 6	Price 4 years later - Price 5years later	-460.44939	184.69459	82.59793	-689.77801	-231.12077	-5.575	4	.005

The Paired sample t test indicates that there is a significant improvement in the prices a year later. The relationship between beta and returns are also significant. Hence companies with high betas are companies are able to give high returns which are also significant at 5% level.

6. LIMITATION OF THE STUDY

Due to time and financial constraints, the study is restricted to a sample size of seventeen companies. This study is limited to selected companies which are listed in the Bombay Stock Exchange.

7. SCOPE FOR FURTHER STUDIES

The implication of beta and leverage with the changing market conditions could be studied for further analysis.

8. IMPLICATIONS OF THE STUDY

Risk averse investors prefer a low beta as they have lower operating risk with risk diversified internally. From the study a positive relationship can be concluded between beta and returns. The companies having low betas in the sample include MNCs (as they do not have leverage) which have a good funding from the parent company. Hence even the low beta a reasonable expected returns have been achieved. Hence if the investor is a first time investor in stocks, he can choose the low beta companies to stay safe and at the same time earn reasonable returns. The moderate beta companies have the least variance in returns as they indicate the lowest standard deviation. The high beta companies show the highest returns .Consequently selection of investments in this category alongside with lower debt considerations would help investors assimilate higher returns when the market conditions are satisfactory.

Leverage has the effect of increasing beta values as levered betas are higher than the unlevered betas. D/E ratios are lower for some companies such as established domestic companies and MNCs which employ lower financial leverage. These reputable companies are also able to provide higher returns. There is a positive relationship between D/E and returns are for low and moderate beta companies. But for high beta companies the relationship is not significant.

The study confirms that the high beta firms have a greater tendency for higher abnormal returns. The investors could earn abnormal returns by trading on these signals to obtain better returns. Therefore, following the market on these lines would mean potentially higher returns but one should also be wary of very high leverage.

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