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REVIEW OF LITERATURE

NEED/IMPORTANCE OF THE STUDY

STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESES

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

CONCLUSIONS

SCOPE FOR FURTHER RESEARCH

ACKNOWLEDGMENTS

REFERENCES

APPENDIX/ANNEXURE

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- Bowersox, Donald J., Closs, David J., (1996), "Logistical Management." Tata McGraw, Hill, New Delhi.
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- Always indicate the date that the source was accessed, as online resources are frequently updated or removed.

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- Garg, Bhavet (2011): Towards a New Natural Gas Policy, Political Weekly, Viewed on January 01, 2012 http://epw.in/user/viewabstract.jsp

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CONSTRUCTION OF OPTIMUM PORTFOLIO WITH SPECIAL REFERENCE TO BSE 30 COMPANIES IN INDIA

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ABSTRACT

Modern portfolio theory has one central theme: "In constructing their portfolios investors need to look at the expected return of each investment in relation to the impact that it has on the risk of the overall portfolio". Portfolio management concerns the constructions and maintenance of a collection of investment. It is investment of funds in different securities in which the total risk of the portfolio is minimized, while expecting maximum return from it. It primarily involves reducing risk rather than increasing return. Return is obviously important though, and the ultimate objective of portfolio manager is to achieve a chosen level of return by incurring the least possible risk.The paper aims at constructing an optimal portfolio by applying Sharpe's single Index model of capital asset pricing in different scenarios, this model helps an investor to select the best securities to be included in an optimal portfolio and the weights of investment in each security. The present study deals with construction of an optimal portfolio with stocks of BSE 30 Index stocks and for this purpose Sharpe's Single Index Model has been used. The main objective of the study is to construct an optimal portfolio of 30 Index Stocks of Bombay Stock Exchange. The entire study is based on secondary data extracted from websites like Bombay Stock Exchange (BSE), Reserve Bank of India (RBI), books and journals. The sample size 30 companies listed on BSE. The analysis is based on stock returns of 30 companies for five years from 31st March 2008 to 31st March 2012.

KEYWORDS

Sharpe's single index model, Sharpe ratio, optimal portfolio, cut-off rate Portfolio, optimal portfolio, market risk, unsystematic risk, variance.

INTRODUCTION

Portfolio is the collection of financial or real assets such as equity shares, debentures, bonds, treasury bills and property etc. portfolio is a combination of assets or it consists of collection of securities. These holdings are the result of individual preferences, decisions of the holders regarding risk, return and a host of other considerations. Portfolio management concerns the construction & maintenance of a collection of investment. It is investment of funds in different securities in which the total risk of the Portfolio is minimized while expecting maximum return from it. It primarily involves reducing risk rather than increasing return. Return is obviously important though, and the ultimate objective of portfolio manager is to achieve a chosen level of return by incurring the least possible risk. Appropriate selection of securities can assure good returns to investors and can also help to reduce the losses. This article attempts to construct an optimal portfolio by applying Sharpe's single index model of capital asset pricing. To illustrate the model, a real portfolio selection problem is presented. The study is carried out to fulfil the objectives like (i) to construct an optimal portfolio by implementing Sharpe's single index model. (ii) To know the proportion of each security in the optimal portfolio. This paper aims at developing an optimal portfolio with stocks of BSE 30 companies, through Sharpe's Single Index Model. For the study, stocks of BSE 30 companies were taken and the optimal portfolio was constructed with 4 companies.

OBJECTIVE OF THE STUDY

The main objective of the study is to construct an optimal portfolio of manufacturing companies listed on Bombay Stock Exchange. In order to achieve the main objective, the following subsidiary objectives have been drawn:
- To analyze the performance of sample manufacturing companies based on their return, systematic risk, unsystematic risk and total risk.
- To find out the excess return to beta ratio.
- To construct an optimal portfolio in different market scenarios.
- To test and analyse single index model by Sharpe – an intelligent tool to selectprofitable stock in different market scenario for investors.

METHODOLOGY

The entire study is based on secondary data extracted from websites like Bombay Stock Exchange (BSE), Reserve Bank of India (RBI), books and journals. The sample size is 30 companies listed on BSE SENSEX. The analysis is based on stock returns of 30 companies for five years from 31st March 2008 to 31st March 2012.

SCOPE OF THE STUDY

The study is all about construction of an optimal portfolio with stocks of BSE 30 companies. Thirty companies have been selected for the purpose construction of an optimal portfolio. The study covers a period of five years from March 31st 2008 to March 2012.

LIMITATIONS

Since the optimal portfolio constructed in this study is based on Sharpe's Single Index Model, it is not free from market risk. The study is limited to closing prices of the stocks for five years.

TOOLS USED FOR ANALYSIS

Return of the stock is being calculated by using the following formula.

$$Return = \frac{ClosingPrice - OpeningPrice}{OpeningPrice} * 100$$

Beta Coefficient is given by;

$$\beta = CorrelationCoefficient * \frac{\sigma\,(Y)}{\sigma\,(X)}$$

$Where, \; \sigma(Y) = $ Standard deviation of individual stock
$\sigma(X) = St$andard deviation of market

Risk free return is the average risk free return of five years from March 2008 – March 2012.

Excess Return-beta ratio is given by $\frac{R_i - R_f}{\beta_i}$

$Where, R_i = Expected\,return\,on\,stock$

$R_f = Expected\,return\,a\,riskless\,asset$

$\beta_i = Beta\,coeffient\,of\,the\,security$

Systematic Risk: $\sigma_m^2 * \beta_i^2$

$Where, \sigma_m^2 = Variance\ of\ the\ market\ return$

Unsystematic Risk: $\sigma_i^2 - \sigma_m^2 * \beta_i^2$

$Where, \sigma_i^2 = Variance\ of\ the\ stock\ return$

Cut-off point C*: $C_i = \dfrac{\sigma_m^2 \sum_{i=1}^{N} \frac{(R_i - R_f)\,\beta_i}{\sigma_{ei}^2}}{1 + \sigma_m^2 \sum_{i=1}^{N} \frac{\beta_i^2}{\sigma_{ei}^2}}$

$Where, \sigma_m^2 = Variance\,of\,the\,market\,return$

$\sigma_{ei}^2 = Unsystematic\,risk\,of\,the\,stock$

Weights of investment in each security: $W_i = \frac{Z_i}{\sum_{i=1}^{N} Z_i}$

$Where, \qquad W_i = Proportion\,of\,investment\,in\,each\,security$

$Z_i = \frac{\beta_i}{\sigma_{ei}^2} \left(\frac{R_i - R_f}{\beta_i} - C^* \right)$

$Where, C^* = The\,cut-off\,point$

DATA ANALYSIS AND INTERPRETATION

It is clear from Table 1 that among the stocks under study, Jindal Steel & Power ranked first in terms of annual returns with 36.6638067% return and Reliance Communications obtained the least rank, i.e., 30th rank, with -7.762140811% return . In terms of systematic risk, HUL has the lowest risk and Tata Motors has the highest risk compared to other stocks under study. HDFC Bank has the lowest unsystematic risk and Jindal Steel & Power has the highest unsystematic risk compared to other stocks under study. HUL has the lowest total risk and Tata Motors has the highest total risk compared to other stocks under study.

As per Table 2 it is crystal clear that Hero Motor Corp stock has the highest (21.52597) excess return-beta ratio and Cipla has the lowest (-19.1308) excess return-beta ratio. The excess return to beta ratio was calculated using 6.48% as risk free rate of return which is the average of all risk free rates from March, 2008 – March, 2012. It is also shown in the table that the cut-off point is 12.56409606 and it is obtained for the fourth stock, which is ranked in terms of excess return to beta ratio. As per the rule, the stocks above C* can be included in the portfolio.

Table 4 shows the proportion of investment to be made in each stock. It is clear from the table that highest proportion of investment is to be made (i.e., 61.5282%) in ITC stock and lowest investment is to be made (i.e., 5.642103%) in HUL stock.

Table 5 shows the fact that annual returns of the stocks is highly correlated with systematic risk, unsystematic risk and total risk and it is highest (0.71) with unsystematic risk. Systematic risk is highly correlated with total risk and unsystematic risk and it is highest (0.99) with total risk. Unsystematic risk is highly correlated with total risk (0.72).

FINDINGS OF THE STUDY

- It is found in the study that among the stocks under study, Jindal Steel & Power has highest annual return and Reliance communications has the lowest annual return. Therefore the comparatively the most profitable stock is Jindal Steel and power.
- It is clear from the study that HUL stock has the lowest systematic risk and Tata Motors stock has the highest systematic risk compared to other stocks under study.
- It is revealed in the study that HDFC Bank has the lowest unsystematic risk and Jindal Steel and Power has the highest unsystematic risk compared to other stocks under study.
- In terms of total risk, it is found in the study that HUL has the lowest total risk and Tata Motors has the highest total risk compared to other stocks under study.
- As per study it is crystal clear that Hero Motor Corp stock has the highest (21.526) excess return-beta ratio and Cipla has the lowest (-19.1308) excess return-beta ratio.
- It is found in the study that the cut-off point is 12.56409606 and it is obtained for the sixth ranked stock
- The study shows the fact that highest proportion of investment is to be made (i.e 61.5282%) in ITC stock and lowest investment is to be made (i.e., 5.6421%) in HUL stock to construct the optimal portfolio.
- It is evident from the study that annual returns of the stocks is highly correlated with systematic risk, unsystematic risk and total risk, Systematic risk is highly correlated with total risk and unsystematic risk and it is equal in both the cases, Unsystematic risk is perfectly correlated with total risk.

CONCLUSION

Sharpe's model is a scientific technique which can be used to construct the optimal portfolio. In this study out of thirty stocks selected for the study, only four stocks are suitable to construct the optimal portfolio. The stocks supposed to be included for the construction of optimal portfolio are; Hero Motor Corp, ITC, HUL, Jindal Steel and power. The investor has to decide about the proportion of investment in each security as found in the study so as to make the investment more scientific. Finally, it can be concluded that present study will help the investors to create optimal portfolio and also help the investors as a guiding record in future.

TABLES

TABLE 1: RANKING OF THE STOCKS OF SAMPLE MANUFACTURING COMPANIES BASED ON RETURNS, SYSTEMATIC RISK, UNSYSTEMATIC RISK AND TOTAL RISK

Sl. No.	Stocks	Annual Return (%)	Rank	Systematic Risk	Rank	Unsystematic risk	Rank	Total risk	Rank
1	Hero Motor Corp	13.20113601	10	86.82687906	3	331.118608	17	417.9454866	6
2	ITC	12.42027323	12	96.15493166	4	90.3015848	2	186.4565164	2
3	HUL	7.843597869	20	6.531898729	1	156.980349	7	163.5122475	1
4	Jindal Steel & Power	36.6638067	1	3890.24054	28	1736.69908	30	5626.939622	29
5	HDFC Bank	13.63432273	9	763.4090953	12	69.9075176	1	833.3166129	10
6	Tata Motors	25.2338084	2	5484.338371	30	1212.21451	28	6696.552879	30
7	SBI	16.81233617	4	2162.573845	21	397.311631	20	2559.885475	20
8	HDFC FIN	13.78300078	8	1505.319745	18	101.372088	4	1606.691833	14
9	Reliance Infrastructure	17.72614775	3	3866.584978	27	1223.46557	29	5090.050546	27
10	Tata Power Company	11.60985076	14	851.3005716	13	401.771303	21	1253.071875	12
11	Tata Consultancy Services	12.78651544	11	1428.237179	16	642.503091	24	2070.740269	18
12	Larsen &Tourbo ltd	14.88895036	6	3120.897509	23	168.448061	8	3289.34557	23
13	ACC	9.66003371	19	453.7136841	8	360.274193	19	813.9878775	9
14	Mahindra &mahindra	12.0691338	13	1492.183837	17	566.576946	23	2058.760783	17
15	Jaiprakash Associates	15.57482362	5	4442.12492	29	659.518377	26	5101.643296	28
16	Tata Steel	14.13003289	7	3563.595683	25	199.234372	9	3762.830055	25
17	Maruti Suzuki India	10.28872282	16	1313.207364	14	423.214989	22	1736.422353	16
18	Hindlco Industries Ltd	11.13608867	15	2815.616322	22	334.272728	18	3149.88905	22
19	Wipro	10.2113685	18	1906.893014	19	718.579052	27	2625.472067	21
20	ICICI Bank	10.28165836	17	3389.677969	24	280.117732	14	3669.795701	24
21	SterlightInd Ltd	7.149708581	21	1964.111258	20	329.971608	16	2294.082866	19
22	Infosys	6.380697008	22	527.2259629	9	241.182682	11	768.4086448	8
23	Bharat Electricals	6.10333091	23	627.5350132	11	644.234441	25	1271.769454	13
24	DLF	1.99663977	27	3624.316141	26	264.95315	12	3889.269291	26
25	Reliance Industries	4.051663541	24	551.0021762	10	313.038423	15	864.0405988	11
26	ONGC	3.892597269	25	339.6792661	7	134.430285	5	474.1095511	7
27	Reliance Communications	-7.762140811	30	1411.687346	15	267.285863	13	1678.973209	15
28	BharatiAirtel	0.396697692	29	228.2959367	6	146.737921	6	375.033858	5
29	NTPC	1.627622983	28	96.57847146	5	92.5420588	3	189.1205303	3
30	Cipla	3.683598632	26	18.99900802	2	227.120826	10	246.1198338	4

TABLE 2: EXCESS RETURN TO BETA RATIO AND CUT-OFF POINT CALCULATIONS FOR MANUFACTURING COMPANIES UNDER STUDY

Sl. No.	Stocks	$(R_i - R_f)/B_i$	Rank
1	Hero Motor Corp	21.52597141	1
2	ITC	18.07928438	2
3	HUL	15.93730416	3
4	Jindal Steel & Power	14.43954654	4
5	HDFC Bank	7.72735472	5
6	Tata Motors	7.556296465	**6**
7	SBI	6.630167918	7
8	HDFC FIN	5.617279078	8
9	Reliance Infrastructure	5.396921226	9
10	Tata Power Company	5.24737522	10
11	Tata Consultancy Services	4.980158694	11
12	Larsen &Tourbo ltd	4.491885792	12
13	ACC	4.456579637	13
14	Mahindra &Mahindra	4.318184526	14
15	Jaiprakash Associates	4.072109154	15
16	Tata Steel	3.82431678	16
17	Maruti Suzuki India	3.137169438	17
18	Hindlco Industries Ltd	2.618948583	18
19	Wipro	2.550550786	19
20	ICICI Bank	1.949034216	20
21	SterlightInd Ltd	0.451930748	21
22	Infosys	-0.126981054	22
23	Bharat Electricals	-0.446744602	23
24	DLF	-2.221173314	24
25	Reliance Industries	-3.084568235	25
26	ONGC	-4.186095051	26
27	Reliance Communications	-11.30844332	27
28	BharatiAirtel	-12.00943146	28
29	NTPC	-14.72712159	29
30	Cipla	-19.13081449	30

TABLE 3: C_i CALCULATIONS FOR SAMPLE STOCKS

Sl. No.	Stocks	$\dfrac{(R_i - R_f)\beta_i}{\sigma_{ei}^2}$	$\sigma_m^2 \sum\limits_{I=1}^{N} \dfrac{(R_i - R_f)\beta_i}{\sigma_{ei}^2}$	$\dfrac{\beta_i^2}{\sigma_{ei}^2}$	$1 + \sigma_m^2 \sum\limits_{i=1}^{N} \dfrac{\beta_i^2}{\sigma_{ei}^2}$	C_I
1	Hero Motor Corp	0.006340789	0.006340789	0.000294565	0.000295	4.471953822
2	ITC	0.021625561	0.02796635	0.001196151	0.001491	10.69846457
3	HUL	0.000744936	0.028711286	4.67417E-05	0.001537	10.79049424
4	Jindal Steel & Power	0.036334182	0.065045468	0.002516297	0.004054	12.56409606**c***
5	HDFC Bank	0.094792559	0.159838027	0.012267142	0.016321	9.162800438
6	Tata Motors	0.038402872	0.198240899	0.005082235	0.021403	8.800354347
7	SBI	0.040539104	0.238780004	0.00611434	0.027517	8.337055317
8	HDFC FIN	0.093701452	0.332481455	0.016680932	0.044198	7.336025732
9	Reliance Infrastructure	0.019159838	0.351641294	0.003550142	0.047749	7.195165661
10	Tata Power Company	0.012489817	0.364131111	0.002380203	0.050129	7.104708146
11	Tata Consultancy Services	0.012435929	0.37656704	0.002497095	0.052626	7.006005213
12	Larsen &Tourbo ltd	0.093487199	0.470054239	0.020812461	0.073438	6.304236694
13	ACC	0.006304641	0.47635888	0.001414682	0.074853	6.269833262
14	Mahindra &mahindra	0.012775402	0.489134282	0.002958512	0.077811	6.19668461
15	Jaiprakash Associates	0.030810109	0.519944391	0.00756613	0.085378	6.010850676
16	Tata Steel	0.076840108	0.596784499	0.020092506	0.10547	5.59869649
17	Maruti Suzuki India	0.010935035	0.607719535	0.003485638	0.108956	5.520752628
18	Hindlco Industries Ltd	0.024780465	0.6325	0.00946199	0.118418	5.291067267
19	Wipro	0.007603188	0.640103187	0.002980998	0.121399	5.224389704
20	ICICI Bank	0.026493983	0.66659717	0.01359339	0.134992	4.897291102
21	SterlightInd Ltd	0.003021839	0.669619009	0.006686509	0.141679	4.689143146
22	Infosys	-0.000311817	0.669307193	0.002455617	0.144134	4.607725341
23	Bharat Electricals	-0.000488836	0.668818356	0.001094218	0.145228	4.569934946
24	DLF	-0.034131029	0.634687327	0.015366216	0.160595	3.924653619
25	Reliance Industries	-0.006099019	0.628588308	0.001977268	0.162572	3.839989544
26	ONGC	-0.011882039	0.616706269	0.002838454	0.16541	3.70319043
27	Reliance Communications	-0.067092706	0.549613563	0.005932975	0.171343	3.186779918
28	BharatiAirtel	-0.020988829	0.528624734	0.001747696	0.173091	3.034333599
29	NTPC	-0.017265096	0.511359638	0.001172333	0.174263	2.915611156
30	Cipla	-0.001797701	0.509561937	9.39689E-05	0.174357	2.903805432

TABLE 4: PROPORTION OF INVESTMENT IN EACH STOCK

Sl. No.	Stocks	Proportion of Investment
1	Hero Motor Corp	25.90991
2	ITC	61.5282
3	HUL	5.642103
4	Jindal Steel & Power	6.919787

TABLE 5: CORRELATIONS BETWEEN ANNUAL RETURN, SYSTEMATIC RISK, UNSYSTEMATIC RISK AND TOTAL RISK

Variable	Annual Return	Systematic Risk	Unsystematic risk	Total Risk
Annual Return	1			
Systematic Risk	0.570896	1		
Unsystematic Risk	0.710898	0.593110953	1	
Total Risk	0.641343	0.985373645	0.721635	1

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