

Empirical Testing of Diversification of Securities in India



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Portfolio management theory is a true description of how rational investors should build efficient portfolios. Investors in the capital market prefer portfolio with least risk for a given level of expected return. We use sample data of daily share prices of Nifty companies data for 10 years. The empirical study shows that the portfolio returns are maximizing and portfolios risk is minimizing as we add more number of stocks into portfolios of the sample stocks. This shows that investors can scientifically diversify the securities and build the efficient portfolios in the Indian capital market.

Keywords: Portfolio Management, Maximizing Return, Minimizing Risk, Investment Mix, Asset Allocation.

1. Introduction

Markowitz (1952) developed a mathematical concept of diversification. Diversification is the act of holding many securities in order to reduce risk. He proved that if investors balanced their investment among several securities, it was possible to reduce risk. This is possible only when securities do not move in a single direction. The risk of a portfolio is diversified if securities added to portfolio do not co-vary too much in concordance with other securities in the portfolio. This helps investors constitute portfolios that attain the expected return for a given level of risk or the minimum risk for a given level of expected return. The portfolio theory is based on the assumption that investors care only about the mean and variance of return. Investors are mean-variance optimizers, and therefore, they seek and prefer portfolio with least return variance for a given level of mean (expected return). This suggests that variance-dispersion in possible return outcomes is an appropriate measure of risk. Portfolio theory is a true description of how rational investors should build efficient portfolios.

1.1 Empirical Studies of Portfolio Management in Developed Capital Markets

Researchers in securities market have attempted to understand the diversification of securities and the way portfolio risk is reduced in the efficient portfolios of the capital market. The studies conducted in developed capital markets in various form of portfolio analysis. Markowitz (1952; 1959) found that diversification reduces the portfolio risk in the U S capital markets, Similarly Lakonishok, Shlifer and Vishny (1994) found that diversification reduces the portfolio risk in Japanese capital market.

1.2 Empirical Studies of Portfolio Management in Indian Capital Markets

Though there are many studies in the developed capital markets on the portfolio analysis, there is no concrete studies except Obaidulla (1994) and Ansari (2000) conducted in Indian Capital markets in various form of portfolio analysis. This view motivates the present study. Hence, this paper proposes to study the diversification and risk reduction based on the NSE Nifty Companies. The paper is organized in four parts. Part 1 is the introduction; part 2 presents objectives, hypotheses, data and methodology; part 3 analyses the results; part 4 presents the summary and conclusions. References are given part 5.

1.3 Objectives

- To test risk return relations of individual securities in the Indian capital market
- To test whether diversification of securities reduces the risk in the Indian capital market.

1.4 Hypothesis

Based on the available evidence of Markowitz (1950; 1952); Obaidullah (1994) portfolio model
The following hypotheses are formulated:

- H_0 : Diversification of securities does not reduce the portfolio risk in Indian Context.
- H_1 : Diversification of securities does not reduce the portfolio risk in Indian Context.

1.5 Data and Sample

The study is based on NSE Nifty companies that are part of the NSE Nifty index. The final list of companies is selected based on two criteria: they should have been (a) the constituents of NSE and (b) traded for minimum six months in a year during the study period. The NSE Nifty companies represent almost 55 percent of the NSE's total market capitalization (<http://nseindia.com/mktlive/indiceshighlights.asp>. Last accessed on October 10, 2016) and our sample stocks come from 28 industry groups. These companies are heavily traded on the exchange and come from diverse industry groups. The daily adjusted share prices from January 1, 1997 to December 31, 2015 are used for the study. The method of computing these variables are explained in the methodology section. The data were collected from the capital line database, NSE and Indian

Infoline.com websites. Over the years, researchers have used quarterly, monthly and weekly data to study the empirical relationship of portfolio risk and return in the portfolio theory. Following Brown & Warner's (1995) suggestion that the daily prices are better as quarterly, monthly, and weekly data do not provide a very meaningful relationship between risk and return and hence, daily price data are used in this study. Only capital gains component has been used in estimating return as dividend information of companies is not available for all companies for all the years of the study period. Moreover, ignoring dividends would not pose a serious estimation bias in the light of the fact that the Indian companies exhibit very low dividends yield ratios over the sample period. Further, the BSE-100 index that is used as proxy in the study does not incorporate dividends. Hence, including dividends while estimating security return would have actually introduced a positive bias in the slope estimates of our time-series regression.

2. Methodology

The portfolio return and risk analysis has been analysed systematically by Markowitz (1952, 1959). The Methodology used in this study is more or less similar to that used by them. Obaidulla (1994) has used this methodology in the Indian capital market studies.

2.1 Calculations of percentage return

The daily returns are calculated using the following model

$$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it-1}} \times 100 \quad (1)$$

Mean return of security is given by

$$\bar{X} = \frac{\sum_{t=1}^N X}{N} \quad (2)$$

Where,

R_{it} = Return on security I during time period t; p_{it} = Adjusted closing price of security I for time t; P_{it-1} = Adjusted closing price of security I for t-1; N = Number of observations (return).

2.2 Portfolio returns with Equal Weights

Portfolio have been formed with equal weightage as suggested by Lakonishok, Shliefer and Vishny (1994). The portfolio return is given by the following formula

$$R_p = W_1 * R_1 + W_2 * R_2 \quad (3)$$

Where

R_p = Expected return on portfolio

W_1 = Percentage of funds invested in security 1

W_2 = percentage of funds invested in security 2

R_1 = expected return on security 1

R_2 = expected return on security 2

The portfolio risk is given by the following formula

$$a_p^2 = W_1^2 * a_1^2 + W_2^2 * a_2^2 + 2 * W_1 * W_2 * a_1 * a_2 \quad (4)$$

a_p^2 = Standard deviation of the portfolio

W_1 = percentage of funds invested in security 1

W_2 = Percentage of funds invested in security 2

a_1 = standard deviation of the security 1

a_2 = Standard deviation of the security 2

3. Results and Analysis

The present portfolio analysis study has been conducted by using a combination of securities as done in Markowitz (1952, 1959) as well as Obaidullah (1994) model to find out the extent of risk reduction by diversification. The portfolio analysis has two parts, first part of the study deals with individual securities daily return, securities daily standard deviation for the study period of 9 years. The methodology of forming portfolios; calculation of portfolio return and risk has been discussed in the first chapter. We calculated individual securities average returns and standard deviation for the study period based on the number of observation of security returns. The results of the all the securities return and standard deviation is table 1.

Second part of the study deals with portfolios return risk analysis. We calculated portfolio average returns and standard deviation for the study period. The results of the 119 portfolio average returns, standard deviation, variance is presented in Table 2 to 8.

First Part: Individual Security Risk-Return Analysis

Table 1 NSE Nifty Individual Securities Average Return, Standard Deviation & Variance

Sl no	Company Name	Average Return	Standard Deviation	Variance
1	ACC Ltd.	0.05	1.58	2.48
2	Adani Ports &Special Economic Zone Ltd.	0.13	2.47	6.09
3	Ambuja Cements Ltd.	0.04	1.83	3.37
4	Asian Paints Ltd.	0.13	1.76	3.10
5	Axis Bank Ltd.	0.13	1.96	3.85
6	Bajaj auto Ltd.	0.07	1.57	2.45
7	Bank Of Baroda.	0.07	2.52	6.34
8	Bharat Heavy Electricals Ltd.	0.02	2.47	6.10
9	Bharat Petroleum Corporation Ltd.	0.21	2.11	4.45
10	Bharati Airtel Ltd.	0.02	1.76	3.10
11	Bosch Ltd.	0.14	1.89	3.56
12	Cairn India Ltd.	-0.15	2.12	4.51
13	Cipla Ltd.	0.11	1.71	2.92
14	Coal India Ltd.	0.04	2.00	3.99
15	Dr. Reddy's Laboratories.	0.06	1.79	3.21
16	GAIL(India) Ltd.	0.04	2.02	4.09
17	Grasim Industries Ltd.	0.08	1.51	2.28
18	HCL Technologies Ltd.	0.08	1.93	3.74
19	HDFC Bank Ltd.	0.11	1.21	1.45
20	Hero MotoCorp Ltd.	0.06	1.55	2.39
21	Hindalco Industries Ltd.	-0.04	2.59	6.72
22	Hindustan Unilever Ltd.	0.09	1.49	2.21
23	Housing Development Finance corporation Ltd.	0.11	1.76	3.11
24	ICICI Bank Ltd.	0.05	1.87	3.48
25	Idea Cellular Ltd.	-0.01	2.23	4.96
26	Indulnd Bank Ltd.	0.18	1.66	2.76
27	Infosys ltd.	0.06	1.67	2.80
28	ITC Ltd.	0.02	1.54	2.36
29	Kotak Mahindra Bank Ltd.	0.15	1.70	2.89
30	Larsen & Toubro Ltd.	0.05	1.73	3.01
31	Lupin Ltd.	0.16	1.66	2.76
32	Mahindra & Mahindra Bank Ltd.	0.08	1.77	3.12
33	Maruti Suzuki India Ltd.	0.21	1.57	2.46
34	NTPC Ltd.	0.03	1.81	3.27
35	Oil & Gas Corporation Ltd.	-0.01	2.09	4.37
36	Power Grid Corporation of India Ltd.	0.08	1.40	1.96
37	Punjab National Bank.	0.01	2.31	5.33
38	Reliance Industries Ltd.	0.04	1.62	2.61
39	State Bank Of India.	0.07	1.95	3.79
40	Sun Pharmaceutical Industries Ltd.	0.09	2.00	4.00
41	Tata Consultancy Services Ltd.	0.04	1.48	2.18
42	Tata Motors Ltd.	0.03	2.10	4.40
43	Tata Power Company Ltd.	-0.03	2.08	4.34
44	Tata Steel Ltd.	-0.07	2.34	5.46
45	Tech Mahindra Ltd.	0.04	1.72	2.95
46	Ultratech Cement Ltd.	0.11	1.80	3.25
47	Vedanta Ltd.	-0.12	2.78	7.74
48	Wipro Ltd.	0.01	1.49	2.21
49	Yes Bank Ltd.	0.16	2.27	5.16
50	Zee Entertainment Enterprises Ltd.	0.11	1.86	3.46

Note: The above Table Second Column Shows names NSE Nifty Securities, Third Column Shows Average Return, Fourth Column Demonstrations Standard Deviation and Fifth Column Shows Variance of each Securities.

The Table 1 shows the shows the characteristics of the percentage return, standard deviation and variance of individual securities. We have found that ACC Ltd yielded returns of 0.05 percent; standard deviation of 1.58 percent; variance of 2.48 percent during the study period of 9 years, similar analysis holds for remaining securities. Further analysis shows that while Cairn India Ltd security has given lowest (-0.15 percent) average return; HDFC Bank Ltd security has lowest standard

deviation (1.21) and lowest variance (1.45). Maruti Suzuki India Ltd security given a highest percentage of average return 0.21; with the standard deviation of 1.57 and variance of 2.46.

Second Part: Portfolio Risk and Return Analysis Empirical Results

The individual security returns variation is too high and there is wide gap between the individual security risk and return. Hence the study further focuses on the portfolio way as suggested by Markowitz (1952; 1959), the following paragraphs deals about portfolio risk and return analysis.

Table 2 Category a Portfolios Average Return, Standard Deviation & Variance

SI No	Portfolios	Average Return	Standard Deviation	Variance
1	Portfolio-A1	40.34	19.49	379.87
2	Portfolio-A2	56.38	22.30	497.08
3	Portfolio-A3	41.76	28.72	824.98
4	Portfolio-A4	31.73	45.45	2065.99
5	Portfolio-A5	37.17	41.78	1745.88
6	Portfolio-A6	35.51	38.10	1451.43
7	Portfolio-A7	30.21	39.89	1591.10
8	Portfolio-A8	26.24	38.97	1518.86
9	Portfolio-A9	30.04	41.15	1693.61
10	Portfolio-A10	28.34	39.31	1544.99
11	Portfolio-A11	31.07	38.62	1491.14
12	Portfolio-A12	26.79	42.68	1821.95
13	Portfolio-A13	27.61	41.35	1710.00
14	Portfolio-A14	26.55	40.06	1604.52
15	Portfolio-A15	26.84	38.74	1500.57
16	Portfolio-A16	25.53	37.96	1440.69
17	Portfolio-A17	25.55	36.91	1362.31
18	Portfolio-A18	28.09	38.11	1452.65
19	Portfolio-A19	28.96	37.30	1391.29
20	Portfolio-A20	30.20	37.10	1376.15
21	Portfolio-A21	28.89	37.00	1368.93
22	Portfolio-A22	30.36	36.90	1361.95
23	Portfolio-A23	30.38	36.41	1325.61
24	Portfolio-A24	30.31	35.63	1269.62
25	Portfolio-A25	30.82	36.23	1312.66

Note:-Third Column Shows Average Return, Fourth Column Shows Standard Deviation and Fifth Column Shows Variance.

Table 2 shows the Category a portfolios average returns, standard deviation and variance. The Portfolio A1 has been formed by choosing the first one and last one securities (securities 1 & 50); portfolio A2 is formed by 4 securities (securities 1, 2, 49 & 50); portfolio A3 is formed by 6 securities (securities 1, 2, 3, 48, 49 & 50) and so on. Similar process is done for subsequent test of the portfolios. Using this process, 25 portfolios have been formed with equal weightage of each security. The portfolio A1 has portfolios average return of 40.34 percent, standard deviation of 19.49 percent and portfolio variance of 379.87 percent. The portfolio A2 has portfolios return of 56.38 percent, standard deviation of 22.30 percent and portfolio variance of 497.08 percent. When we compare the portfolio A1 and portfolio A2 we found that the portfolio standard deviation is marginally increasing in the portfolio A2. The portfolio A3 has portfolios return of 41.76 percent, standard deviation of 28.72 percent and variance of 824.98 percent. When we compare the portfolio A2 and portfolio A3, it is found that the portfolio standard deviation is marginally increasing in the portfolio A3. The portfolio A4 has portfolios return of 31.73 percent, standard deviation of 45.45 percent and portfolio variance of 2065.99 percent. When we compare the portfolio A3 and portfolio A4, it is found that the portfolio standard deviation is marginally increasing in the portfolio A4. The result shows that when we add more securities to the portfolio (diversification of securities), the standard deviation is gradually increasing. The analysis of the results for portfolio A1 to portfolio A5 gradually increasing in the standard deviation and then portfolio A6 has lower standard deviation and the other portfolios standard deviation is varies widely. This table it indicates

that when we diversify it is not possible to reduce the risk. It is fail to fulfill the Markowitz model so we have to construct other portfolios.

Table 3 Category B Portfolios Average Return, Standard Deviation and Variance

SI no	Portfolios	Average Return	Standard Deviation	Variance
1	Portfolio B1	43.11	30.84	951.33
2	Portfolio B2	35.38	35.34	1249.25
3	Portfolio B3	34.67	34.41	1184.19
4	Portfolio B4	35.13	33.65	1132.62
5	Portfolio B5	30.82	36.23	1312.66

Table 3 shows the Category B portfolios average returns, standard deviation and variance. The Portfolio B1 has been formed by choosing the first Ten securities (securities 1, 2, 3, 4, 5, 6, 7, 8, 9 &10); portfolio B2 is formed by choosing 20 securities (securities1 to 20); portfolio B3 is formed 30 securities (securities 1 to 30); portfolio B4 is formed by choosing 40 securities (securities1to40); portfolio B5 is formed by choosing 50 securities (securities 1 to 50). Using this process, 5 portfolios have been formed with equal weightage of each security. The portfolio B1 has portfolios return of 43.11 percent, standard deviation of 30.84 percent and variance of 951.33 percent. The portfolio B2 has portfolios return of 35.38 percent, standard deviation of 35.34 percent and variance of 1249.25 percent. When we compare the portfolio B1 and portfolio B2, it is found that the portfolio standard deviation is marginally increasing in the portfolio B2. The portfolio B3 has portfolios return of 34.67 percent, standard deviation of 34.41 percent and variance of 1184.19 percent. When we compare the portfolio B2 and portfolio B3, it is found that the portfolio standard deviation is marginally decreasing in the portfolio B3. The portfolio B4 has portfolios return of 35.13 percent, standard deviation of 33.65 percent and variance of 1132.62 percent. When we compare the portfolio B3 and portfolio B4, it is found that the portfolio standard deviation is marginally decreasing in the portfolio B4. The portfolio B5 has portfolios return of 30.82 percent, standard deviation of 36.23 percent and variance of 1312.66 percent. When we compare the portfolio B4 and portfolio B5, it is found that the portfolio standard deviation is marginally increasing in the portfolio B5. The result shows that when we add more securities to the portfolio (diversification of securities) the standard deviation is gradually increasing in Portfolio B2 and Portfolio B5. The analysis of the results of other portfolios in category B portfolios shows similar results.

Table 4 Category C Portfolios Average Return, Standard Deviation and Variance

SI No	Portfolios	Average Return	Standard Deviation	Variance
1	Portfolio C1	37.17	41.78	1745.88
2	Portfolio C2	19.50	36.64	1342.41
3	Portfolio C3	23.83	39.48	1558.50
4	Portfolio C4	40.31	31.25	976.78
5	Portfolio C5	33.26	34.28	1175.10

Table 4 deals with characteristics of the portfolios average returns, standard deviation and variance for category C. The portfolio C1 has been formed by choosing the first five securities and last five securities (securities 1, 2, 3, 4, 5, 46, 47, 48, 49 & 50); portfolio C2 is formed by choosing first 10 securities and last 10 securities (securities1to 10 and 41 to 50); portfolio C3 is formed by choosing first 15 securities and last 15 securities (securities1 to 15 and 36 to 50); portfolio C4 is formed by choosing first 20 securities and last 20 securities (securities1to 20 and 31 to 50) ; portfolio C5 is formed by choosing first 25 securities and last 25 securities. (Securities1to25 and 26 to 50). Using this process, 5 portfolios have been formed with equal weightage to each security. The portfolio C1 has portfolios return of 37.17 percent, standard deviation of 41.78 percent and portfolio variance of 1745.88 percent. The portfolio C2 has portfolios return of 19.50 percent, standard deviation of 36.64 percent and variance of 1342.41 percent. When we compare the portfolio C1 and portfolio C2, it is found that the portfolio standard deviation is marginally decreasing in the portfolio C2. The portfolio C3 has portfolios return of 23.83 percent, standard deviation of 39.48 percent and variance of 1558.50 percent. When we compare the portfolio C2 and portfolio C3, it is found that the portfolio standard deviation is marginally increasing in the portfolio C3. The portfolio C4 has portfolios return of 40.31 percent, standard deviation of 31.25 percent and portfolio variance of 976.78 percent. When we compare the portfolio C3 and portfolio C4, it is found that the portfolio standard deviation is marginally decreasing in the portfolio C4. The portfolio C5 has portfolios return of 33.46 percent, standard deviation of 34.28 percent and variance of 1175.10. When we compare the portfolio C4 and portfolio C5, it is found that the portfolio standard deviation is marginally increasing in the portfolio C5. The result shows that when we add more securities to the portfolio (diversification of securities), the standard deviation is varying in Portfolios C category. The analysis of the results for portfolio category C, portfolio C4 is best portfolios to invest.

Table 5 Category D Portfolios Average Return, Standard Deviation and Variance

SI No	Portfolios	Average Return	Standard Deviation	Variance
1	Portfolio D1	26.56	44.60	1988.78
2	Portfolio D2	53.34	29.93	895.80
3	Portfolio D3	39.86	31.39	985.62
4	Portfolio D4	47.47	30.20	912.28
5	Portfolio D5	46.96	28.25	798.00
6	Portfolio D6	48.31	27.30	745.25
7	Portfolio D7	46.40	25.59	654.88
8	Portfolio D8	47.71	29.28	857.60
9	Portfolio D9	48.99	31.85	1014.46
10	Portfolio D10	44.16	33.68	1134.20
11	Portfolio D11	45.18	32.56	1060.13
12	Portfolio D12	38.49	40.16	1612.81
13	Portfolio D13	38.41	38.85	1509.26
14	Portfolio D14	37.64	37.52	1407.97
15	Portfolio D15	37.39	36.36	1321.78
16	Portfolio D16	36.19	35.48	1258.58
17	Portfolio D17	35.65	34.56	1194.35
18	Portfolio D18	34.38	34.59	1196.54
19	Portfolio D19	33.00	35.67	1272.15
20	Portfolio D20	27.88	34.80	1210.79
21	Portfolio D21	31.89	35.05	1228.54
22	Portfolio D22	30.10	37.08	1375.02
23	Portfolio D23	30.12	36.59	1338.89
24	Portfolio D24	31.05	36.49	1331.86
25	Portfolio D25	30.82	36.23	1312.66

Table 5 deals with the characteristics of the portfolios return, standard deviation and variance for portfolios D category. The portfolio D1 (security 1 & 25) has portfolio return of 26.56 percent, standard deviation of 44.60 percent and variance of 1988.78 percent. The portfolio D2 (securities 1, 2, 26 & 27) has portfolio return of 53.34 percent, standard deviation of 29.93 percent and variance of 895.80 percent. When we compare the portfolio D1 and portfolio D2, it is found that the portfolio standard deviation is gradually decreasing in the portfolio D2. The portfolio D3 has portfolio return of 39.86 percent, standard deviation of 31.39 percent and portfolio variance of 985.62 percent. When we compare the portfolio D2 and portfolio D3, it is found that the portfolio standard deviation is marginally increasing in the portfolio D3. The portfolio D4 has portfolio return of 47.47 percent, standard deviation of 30.20 percent and variance of 912.28 percent. When we compare the portfolio D3 and portfolio D4, it is found that the portfolio standard deviation is marginally decreasing in the portfolio D4. The portfolio D5 has portfolio return of 46.96 percent, standard deviation of 28.25 percent and variance of 789 percent. When we compare the portfolio D4 and portfolio D5, it is found that the portfolio standard deviation is marginally decreasing in the portfolio D5. The result shows that when we add more securities to the portfolio (diversification of securities), the standard deviation is gradually varying. The analysis of the results for portfolio D category, portfolio D1 has lower average return (26.56); portfolio D2 has higher average return (53.34); portfolio D7 has lower standard deviation with 25.59.

Table 6 Category E Portfolios Average Return, Standard Deviation and Variance

SI No	Portfolios	Average Return	Standard Deviation	Variance
1	Portfolio E1	48.03	23.58	555.82
2	Portfolios E2	43.11	30.84	951.33
3	Portfolio E3	35.14	40.65	1652.46
4	Portfolio E4	35.38	35.34	1249.25
5	Portfolio E5	32.43	34.54	1193.35
6	Portfolio E6	34.67	34.41	1184.19
7	Portfolio E7	36.08	35.47	1258.03
8	Portfolio E8	35.13	33.65	1132.62
9	Portfolio E9	31.32	34.34	1179.50
10	Portfolio E10	30.82	36.23	1312.66

The Table 6 deals with the characteristics of the portfolios return, standard deviation and variance for portfolios E category. The portfolio E1 has 5 securities (security 1 to 5) with portfolio return of 48.03 percent, standard deviation of 23.58 percent and variance of 555.82 percent. The portfolio E2 has 10 securities (securities 1 to 10) has portfolio return of 43.11 percent, standard deviation of 30.84 percent and portfolio variance of 951.33 percent. When we compare the portfolio E1 and portfolio E2 it is found that the portfolio standard deviation is gradually increasing in the portfolio E2. The portfolio E3 (securities 1 to 15) has portfolio return of 35.14 percent, standard deviation of 40.65 percent and variance of 1652.46 percent. When we compare the portfolio E2 and portfolio E3 it is found that the portfolio standard deviation is marginally increasing in the portfolio E3. The portfolio E4 (securities 1 to 20) has portfolio return of 35.38 percent, standard deviation of 35.38 percent and portfolio variance of 1249.25 percent. When we compare the portfolio E3 and portfolio E4 it is found that the portfolio standard deviation is marginally decreasing in the portfolio E4. The portfolio E5 (securities 1 to 25) has portfolio return of 32.43 percent, portfolio standard deviation of 34.54 percent and variance of 1193.35 percent. When we compare the portfolio E4 and portfolio E5 it is found that the portfolio standard deviation is marginally decreasing in the portfolio E5. The result shows that when we add more securities to the portfolio (diversification of securities), the standard deviation is gradually varying. The analysis of the results for portfolio E category, portfolio E1 has higher average return (23.58) with lower standard deviation.

Table 7 Category F Portfolios Average Return, Standard Deviation and Variance

SI No	Portfolios	Average Return	Standard Deviation	Variance
1	Portfolio F1	46.30	27.92	779.62
2	Portfolio F2	36.96	25.53	651.57
3	Portfolio F3	43.86	25.00	625.18
4	Portfolio F4	48.03	23.58	555.82
5	Portfolio F5	45.66	21.87	478.34
6	Portfolio F6	43.83	20.55	422.21
7	Portfolio F7	39.75	22.24	494.83
8	Portfolio F8	46.97	30.04	902.47
9	Portfolio F9	43.11	30.84	951.33
10	Portfolio F10	45.64	30.44	926.54
11	Portfolio F11	35.68	45.10	2033.83
12	Portfolio F12	37.19	43.52	1893.90
13	Portfolio F13	36.09	42.01	1765.02
14	Portfolio F14	35.14	40.65	1447.69
15	Portfolio F15	34.12	39.48	1558.91
16	Portfolio F16	34.35	38.24	1462.35
17	Portfolio F17	34.66	37.12	1378.05
18	portfolio F18	35.58	36.30	1317.75
19	Portfolio F19	35.38	35.34	1249.25
20	Portfolio F20	22.06	36.49	1331.87
21	Portfolio F21	33.37	35.73	1276.98
22	Portfolio F22	34.27	35.18	1237.69
23	Portfolio F23	33.93	34.45	1186.77
24	portfolio F24	32.43	34.54	1193.35
25	Portfolio F25	34.63	35.66	1271.42
26	Portfolio F26	34.50	34.97	1222.97
27	Portfolio F27	33.54	34.69	1203.72
28	Portfolio F28	35.00	34.97	1223.08
29	Portfolio F29	34.67	34.41	1184.19
30	Portfolio F30	36.02	34.65	1200.81
31	Portfolio F31	36.05	34.09	1162.11
32	Portfolio F32	38.06	35.49	1259.34
33	Portfolio F33	37.34	35.19	1238.64

34	Portfolio F34	36.08	35.47	1258.03
35	Portfolio F35	36.18	34.96	1222.47
36	Portfolio F36	35.31	34.89	1216.98
37	Portfolio F37	34.89	34.50	1190.54
38	Portfolio F38	34.85	34.05	1159.28
39	Portfolio F39	35.13	33.65	1132.62
40	Portfolio F40	34.71	33.34	1111.69
41	Portfolio F41	34.26	33.06	1092.82
42	Portfolio F42	33.13	33.49	1121.88
43	Portfolio F43	31.56	34.70	1204.20
44	Portfolio F44	31.32	34.34	1179.50
45	Portfolio F45	31.79	34.11	1163.66
46	Portfolio F46	29.81	36.37	1322.75
47	Portfolio F47	29.33	36.13	1305.70
48	Portfolio F48	30.34	36.45	1328.47
49	Portfolio F49	30.82	36.23	1312.66

The Table 7 deals with the characteristics of the portfolios return, standard deviation and variance for category F portfolios. The portfolio F1 (security 1&2) has portfolio return of 46.30 percent, standard deviation of 27.92 percent. The portfolio F2 (security 1, 2 &3) has portfolio return of 36.96 percent and standard deviation of 25.53 percent. When we compare the portfolio F1 and F2 it is found that the portfolio standard deviation is marginally decreasing in portfolio F2. The portfolio F3 (security 1, 2, 3 & 4) has portfolio return of 43.86 percent and standard deviation of 25.00 percent. When we compare the portfolio F2 and F3, it is found that the portfolio standard deviation is marginally decreasing in the portfolio F3. The portfolio F4 (security 1, 2, 3, 4 & 5) has portfolio return of 48.08 percent and portfolio standard deviation of 23.58 percent. When we compare the portfolio F3 and F4, it is found that the portfolio standard deviation is marginally decreasing in the portfolio F4. The portfolio F5 (security 1,2,3,4&5) has portfolio return of 45.66 and portfolio standard deviation of 21.87. When we compare The portfolio F4 and F5 it is found that the portfolio standard deviation is marginally decreasing in the portfolio F5. The portfolio F6 (security 1,2,3,4&5) has portfolio return of 43.83 and portfolio standard deviation of 20.55. When we compare The portfolio F5 and F6, it is found that the portfolio standard deviation is marginally decreasing in the portfolio F6. The same explanation holds for remaining portfolios. The analysis of the results for portfolio F8 to portfolio F14 shows that portfolio risk is increasing from 30.04 (portfolio F7) to 40.65 (portfolio F14). It indicates that when we diversify it is not possible to reduce the risk.

Table 8 Best Portfolios Average Return, Standard Deviation and Variance

Sl no	Portfolios	average Return	Standard Deviation	Variance
1	Portfolio B1	43.11	30.84	951.33
2	Portfolio B2	35.38	35.34	1249.25
3	Portfolio B3	34.67	34.41	1184.19
4	Portfolio B4	35.13	33.65	1132.62
5	Portfolio B5	30.82	36.23	1312.66

In the above portfolio B category Table will be best portfolio which is having a low risk compared to other portfolio categories. Portfolio B1, portfolio B2, portfolio B3 and portfolio B4 is recorded a maximum return with minimum risk; portfolio B5 is yielded as a minimum return with little higher risk.

4. Summary and Conclusions

Based on the objectives we have tried to analyse the Markowitz diversification model which reduces the portfolio risk and maximize the portfolio return. Based on the tables we have found that following major observation, we offer suggestion to investors. Major findings are.

The individual securities result shows that variation of securities return is too high and there is wide gap between the individual security risk and return. Hence we have to focus on the portfolio construction. In the category a portfolios we found that portfolio A1 has a least risk i.e. 19.49 with the average return. Whereas portfolio A4 has a highest risk i.e. 45.45 with the average return of 31.73. Portfolio A category is having a 12 percent of the portfolio decreases risk (standard deviation) and 88 percent of the portfolio increases the risk; it will clearly state that this portfolio is highly sensitive and

riskier. In the category B portfolio we analyse that portfolio B1 has a least risk i.e. 30.84 with the average return of 43.11. Whereas portfolio B5 has a highest risk i.e. 63.23 with the average returns of 30.82. There for it is evident that portfolio B category is having 80 percent of the portfolio decreases the risk and remaining 20 percent of the portfolio increases the risk: it is clearly state that this portfolio is low sensitive and low riskier. Category C portfolios, we analyse that portfolio C4 has a least risk i.e. 31.28 with the average return of 40.31. Whereas portfolio C1 has a highest risk i.e. 41.78 with the average returns of 37.17. As far our study we find out that portfolio C category is having 20 percent of the portfolio reduce risk and remaining 80 percent of the portfolio increases the risk : it is clearly state that this portfolio is higher sensitive and higher riskier. In the category D portfolio we analyse that portfolio D7 has a least risk i.e. 25.59 with the average return. Whereas portfolio D4 has a highest risk i.e. 44.60 with the average return of 26.56. It is clearly evident that portfolio D category is having 52 percent of the portfolios reduces risk and remaining 80 percent of the portfolio increases the risk: it is clearly state that this portfolio is higher sensitive and higher riskier. In the category E portfolio we analyse that portfolio E1 has a least risk i.e. 23.58 with the average return of 48.03. Whereas portfolio E3 has a highest risk i.e. 40.65 with the average return of 35.14. As far our study we find out that portfolio E category is having 60 percent of the portfolios reduces risk and remaining 40 percent of the portfolio increases the risk: it is clearly state that this portfolio is less sensitive and less risky. In the category F portfolio we analyse that portfolio F6 has a least risk i.e. 20.55 with the average return of 39.75. Whereas portfolio F11 has a highest risk i.e. 45.10 with the average returns of 35.68. It is clearly evident that portfolio F category is having 49 percent of the portfolios reduces risk and remaining 51 percent of the portfolio increases the risk: it is clearly state that this portfolio is higher sensitive and higher risky. The overall result shows that 65 percent of the portfolios reduce the standard deviation (risk) when compared to other portfolio. The remaining 35 percent of the portfolios increases the standard deviation (risk) when compared to other category portfolios. Based on the objectives we would like to suggest to the investors instead of investing in single security we have to invest in the portfolio it will reduces the portfolio risk and maximize the portfolio return. Based on the table we would like to suggest portfolio B, portfolio D and portfolio E will gives the low risk with the high returns. This shows that investors can scientifically diversify the securities and build the efficient portfolios in the Indian capital market.

5. References

Journals

1. Brown, Stephen J, and Warner (1985) Using Daily Stock Returns, The case of event Studies, Journal of Financial Economics 14(2), 3-3.
2. Fama, Eugene F, and French Kenneth R, 1992, The Cross-section of Expected Stock Returns, Journal of Financial, Vol, 47 No. 2, PP427-465.
3. Lakonishok, Josef, Andrei Shleifer, and Robert Vishny W, (1994), Contrarian Investment Extrapolation and Risk journal of Finance 49(5), 541-1578
4. Markowitz, Harry M, (1952) portfolio selection Journal of Finance 7(1), 77-91
5. Markowitz, Harry M (1952), Portfolio Selection, Efficient Diversification of investments (New York: John Wiley and Sons Inc)
6. Obaidullah, M, (1991), The Distribution of stock Returns, Chartered Financial Analyst.
7. Obaidullah, M, (1994), Indian stock market: Theories and Evidence Hyderabad, ICFAI,

Websites

8. <http://nseindia.com/ISLIndices/CNXNIFTY>. Last accessed on 10.10.2016.
9. <http://cdbmsi.reservebank.org.in/cdbmsi/servlet/login/statistics/SourcesofmoneyStock>. Last accessed on 10.10.2016.
10. <http://nseindia.com/mktlive/indiceshighlights.asp>. Last accessed on 10.10.2016.