

## Optimal Portfolio Construction: An Empirical Study on Selected Mutual Funds

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### Abstract

Risk and return relationship is an important component of investment in decision making. Though studies have examined the nature of a risk and return relationship, the investor always like to invest in a combination of funds that provides the higher return and has lowest risk; and it is very necessary to create a portfolio which meet the investor's goals and objective. The investor tries to attain maximum return with minimum risk.

There are some investors who are active. They do their own research and understand the factors which may affect their investments in future. On the other hand there are some investors who are apprehensive and take action only when they see tangible merits on the change. As financial markets become more sophisticated and complex, investors need a financial intermediary which can provide the required knowledge and professional expertise for successful investing. The objective of an individual or organization is to meet the needs of the investors, thus maximize the returns and minimizing risk through effective diversification.

**Keywords:** Diversification; Investment; Risk; Return

### Introduction

#### Concept of mutual fund

A Mutual Fund is a trust that pools the savings of a number of investors who share a common financial goal. The money thus collected is invested by the fund manager in different types of securities depending upon the objective of the scheme. These could range from shares to debentures to money market instruments (Figure 1). The income earned through these investments and the capital appreciations realized by the scheme are shared by its unit holders in proportion to the number of units owned by them [1]. Mutual Fund companies are known as asset management companies. It is the most suitable investment for the common man as it offers an opportunity to invest in a diversified, professionally managed basket of securities at a relatively low cost.

#### Types of Mutual Funds Scheme

##### Based on their structure:

**Open-ended fund:** In Open Ended Funds, the fund issues/sells new units continuously for purchase by investors at any time during the life of a scheme. At the same time investors are free to redeem the units at prevailing NAV from the fund. Hence, number of unit outstanding in an open-ended fund can fluctuate on a daily basis.

**Close-ended fund:** In close-ended funds, the number of units

issued is fixed. After the initial issue/IPO, the units are traded on the exchange like any other stock. Units sold by one investor are purchased by another investor and not by the fund.

##### Based on their investment objective

**Equity fund:** These funds invest in equities and equity related instruments. With fluctuating share prices, such funds show volatile performance, even losses. However, short term fluctuations in the market, generally smoothens out in the long term, thereby offering higher returns at relatively lower volatility. At the same time, such funds can yield great capital appreciation as, historically, equities have outperformed all asset classes in the long term. Hence, investment in equity funds should be considered for a period of at least 3-5 years.

**Balanced fund:** These investment portfolios include both debt and equity. As a result, on the risk-return ladder, they fall between equity and debt funds. Balanced funds are the ideal mutual funds vehicle for investors who prefer spreading their risk across various instruments.

**Debt fund:** They invest only in debt instruments, and are a good option for investors averse to idea of taking risk associated with equities. Therefore, they invest exclusively in fixed-income instruments like bonds, debentures, Government of India securities; and money market instruments such as certificates of deposit (CD), commercial paper (CP) and call money.

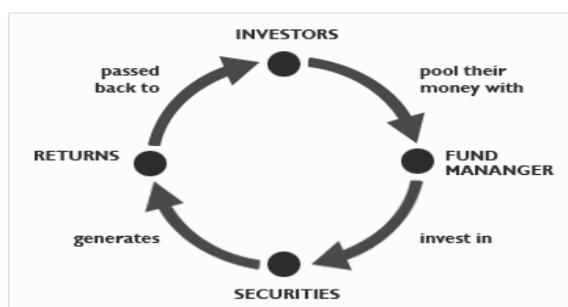


Figure 1: Concept of mutual fund,

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**Based on other schemes:**

**Tax saving schemes:** These schemes offer tax rebates under specific provisions of the Indian Income Tax laws as the Government offers tax incentives for investment in specified avenues. Investments made in Equity Linked Saving Schemes and Pension Schemes are allowed as deduction u/s 88 of the Income Tax Act, 1961.

**Industry specific schemes:** Industry Specific Schemes invest only in the industries specified in the offer document. The investment is limited to specific industries like InfoTech, FMCG, and Pharmaceuticals etc.

**Index schemes:** Index Funds attempt to replicate the performance of a particular index such as the BSE Sensex or the NSE 50 [2].

**Sector specific schemes:** Sectoral Funds are those, which invest exclusively in a specified industry or a group of industries or various segments such as 'A' Group shares or initial public offerings.

**Objectives of Research**

- a. To select the fund for constructing portfolio.
- b. To find out the relationship of each fund with respect to benchmark.
- c. To compute systematic and unsystematic risk.
- d. To construct an optimum portfolio for investors.

**Procedure**

The following steps have been followed in this analysis.

**Step1:** Returns and risk of 8 randomly selected companies has been calculated for a period of 5 years,

**Step2:** For applying Sharpe's Single Index Model  $R_i, R_m, \sigma_{ei}, \sigma_p, R_f, \beta$  values are required.

So all these data are collected and calculated for further proceeding [3,4].

**Step3:** The cutoff point  $C^*$  is calculated using the formula

$$C_i = \frac{\sigma_m^2 \sum_{i=1}^n \frac{(R_i - R_f) \beta_{im}}{\sigma_{ei}^2}}{1 + \sigma_m^2 \sum_{i=1}^n \frac{\beta_{im}^2}{\sigma_{ei}^2}}$$

**Step4:** After computation of  $C_i$  for all the funds, the values got were put in a table.

**Step5:** The  $C_i$  values go on increasing up to a certain point and then start decreasing. The highest Point is called cut off point ( $C^*$ ). The funds which are above  $C^*$  point are chosen to the Portfolio.

**Step6:** Once the funds for portfolio are chosen, the proportion in which they should be invested is to be determined. This can be done using a formula where  $X_i$  denotes the proportion [5].

$$X_i = \frac{Z_i}{\sum Z_j}$$

Where

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

The following funds are taken from different Equity diversified funds of NSE NIFTY (Table 1).

**The Relationship Between Individual Fund and Market Return**

**Risk free rate of return**

Risk free rate has zero variance or standard deviation. The risk free rate has no risk of default. The government T-Bills or bonds are approximately examples of risk free rate as they have no risk default. The 181 days T-bills rate is around 8.3% (Tables 2 and 3) (Figure 2).

$$\bar{R}_m = \frac{\sum R_m}{N} = \frac{20.51}{5} = 4.10$$

$$\sigma_m^2 = \frac{\sum (R_m - \bar{R}_m)^2}{N-1} = \frac{296.16}{4} = 74.04$$

Sl. no.	Company
1	Birla sun life India Gen Next Fund
2	SBI Magnum Mid Cap Fund
3	Kotak Classic Equity
4	SBI Emerging Business Fund
5	Kotak 50
6	Axis Equity Fund
7	TATA Equity Management Fund
8	UTI India Lifestyle Fund

Table 1: List of the Equity Diversified funds chosen for the study.

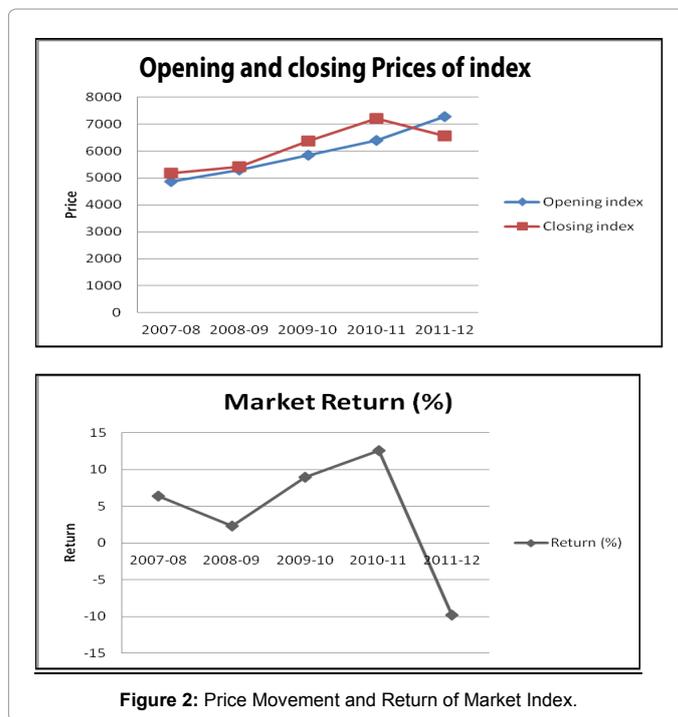


Figure 2: Price Movement and Return of Market Index.

Years	Opening index	Closing index	Ri (cls-open)/op*100
2007-08	4865.90	5177.60	6.40
2008-09	5295.01	5420.20	2.36
2009-10	5846.48	6368.53	8.92
2010-11	6399.96	7206.96	12.60
2011-12	7282.15	6570.18	-9.77

Table 2: Calculation of Return on Market (Rm).

Years	Rm	(Rm- Rm̄)	(Rm- Rm̄) <sup>2</sup>
2007-08	6.40	2.3	5.29
2008-09	2.36	-1.74	3.02
2009-10	8.92	4.82	23.23
2010-11	12.60	8.50	72.25
2011-12	-9.77	-13.87	192.37
Total	20.51		296.16

Table 3: Calculation of variance of market index.

Year	NAV Beg	NAV End	Ri (End-Beg)/beg*100
2007-08	70.10	76.10	8.56
2008-09	76.98	88.39	14.82
2009-10	89.15	98.14	10.08
2010-11	99.95	116.84	16.89
2011-2012	117.12	127.94	9.23
Total	20.51		296.16

Table 4: NAV and fund return of Birla sun life India gennext.

Years	Ri	(Ri-Rī)	(Ri-Rī) <sup>2</sup>	(Rm-Rm̄)	(Rm-Rm̄) <sup>2</sup>	Σ(Ri-Rī) (Rm-Rm̄)
2007-08	8.56	-3.35	11.22	2.3	5.29	-7.7
2008-09	14.82	2.91	8.46	-1.74	3.02	-5.06
2009-10	10.08	-1.83	3.34	4.82	23.23	-8.82
2010-11	16.89	4.98	24.8	8.5	72.25	42.33
2011-12	9.23	-2.68	7.18	-13.87	192.37	37.17
Total	59.58		55		296.16	57.92

Table 5: Calculation of variance of Birla sun life India gennext.

## Computation of Risk and Returns of selected funds

### Birla sun life India Gen Next Fund

The below given Tables 4 and 5 shows the NAV and fund return and Calculation of variance of Birla sun life India gennext.

$$\bar{R}_i = \sum R_i / N$$

$$= 59.58 / 5$$

$$= 11.91$$

$$\sigma_i^2 = \sum (R_i - \bar{R}_i)^2 / N - 1$$

$$= 55 / 4$$

$$= 13.75$$

$$\text{Systematic Risk: } \beta_i = \sum (R_i - \bar{R}_i) (R_m - \bar{R}_m) / (R_m - \bar{R}_m)^2$$

$$= 57.92 / 296.16$$

$$= 0.1955$$

$$\text{Unsystematic Risk: } \sigma_{\bar{e}_i}^2 = \sigma_i^2 - \beta_i^2 \sigma_m^2$$

$$= 13.75 - (0.1955^2 * 74.04)$$

$$= 13.75 - 2.8298$$

$$= 10.92$$

**Interpretation:** From the above it is inferred that year 2008 was recorded as low return and high return is recorded in the year 2011. In general the overall returns are positive. The volatility of the fund is very low as compared to the market [6].

### SBI Magnum Midcap Fund

The below given Tables 6 and 7 shows the NAV and fund return

and Calculation of variance of SBI Magnum Midcap Fund.

$$\bar{R}_i = \sum R_i / N$$

$$= 27.25 / 5$$

$$= 5.45$$

$$\sigma_i^2 = \sum (R_i - \bar{R}_i)^2 / n - 1$$

$$= 569.03 / 4$$

$$= 142.25$$

$$\text{Systematic Risk: } \beta_i = \sum (R_i - \bar{R}_i) (R_m - \bar{R}_m) / (R_m - \bar{R}_m)^2$$

$$= 204.89 / 296.16$$

$$= 0.6918$$

$$\text{Unsystematic Risk: } \sigma_{\bar{e}_i}^2 = \sigma_i^2 - \beta_i^2 \sigma_m^2$$

$$= 142.25 - (0.6918^2 * 74.04)$$

$$= 142.25 - 35.4345$$

$$= 106.81$$

**Interpretation:** From the above it is inferred that year 2008 was recorded as low return and high return is recorded in the year 2010. In general the overall return is positive. The volatility of the fund is very low as compared to the market.

### Kotak Classic Equity Fund

The below given Tables 8 and 9 shows the NAV and fund return and Calculation of Kotak Classic Equity Fund.  $\bar{R}_i = \sum R_i / N$

$$= 28.24 / 5$$

$$= 5.64$$

$$\sigma_i^2 = \sum (R_i - \bar{R}_i)^2 / n - 1$$

Year	NAV Beg	NAV End	Ri (end-beg)/beg*100
2007-08	74.82	68.48	-8.47
2008-09	69.87	79.77	14.16
2009-10	80.05	94.35	17.86
2010-11	94.91	104.01	9.58
2011-2012	103.74	97.64	-5.88

Table 6: NAV and fund return of SBI Magnum Midcap Fund.

Years	Ri	(Ri-Rī)	(Ri-Rī) <sup>2</sup>	(Rm-Rm̄)	(Rm-Rm̄) <sup>2</sup>	Σ(Ri-Rī) (Rm-Rm̄)
2007-08	-8.47	-13.92	193.76	2.3	5.29	-32.01
2008-09	14.16	8.71	75.86	-1.74	3.02	-15.15
2009-10	17.86	12.41	154.008	4.82	23.23	59.81
2010-11	9.58	4.13	17.05	8.5	72.25	35.1
2011-12	-5.88	-11.33	128.36	-13.87	192.37	157.14
Total	27.25		569.03		296.16	204.89

Table 7: Calculation of variance of SBI Magnum Midcap Fund.

Year	NAV Beg	NAV End	Ri (end-beg)/beg*100
2007-08	62.30	66.30	6.42
2008-09	66.95	72.58	8.40
2009-10	73.07	83.41	14.15
2010-11	142.10	141.20	-0.63
2011-2012	141.88	141.73	-0.10

Table 8: NAV and fund return of Kotak Classic Equity Fund.

Years	Ri	(Ri-Ri)	(Ri-Ri) <sup>2</sup>	(Rm-Rm)	(Rm-Rm) <sup>2</sup>	Σ(Ri-Ri) (Rm-Rm)
2007-08	6.42	0.78	0.608	2.3	5.29	1.79
2008-09	8.40	2.76	7.61	-1.74	3.02	-4.80
2009-10	14.15	8.51	72.42	4.82	23.23	41.01
2010-11	-0.63	-6.27	39.31	8.50	72.25	-53.29
2011-12	-0.10	-5.74	32.94	-13.87	192.37	79.61
Total	28.24		152.88		296.16	64.32

Table 9: Calculation of variance of Kotak Classic Equity Fund.

Year	NAV Beg	NAV End	Ri (end-beg)/beg*100
2007-08	86.10	91.10	5.80
2008-09	91.50	96.06	4.98
2009-10	96.88	110.64	14.20
2010-11	111.20	120.53	8.39
2011-2012	121.22	120.45	-0.63

Table 10: NAV and fund return of SBI Emerging Businesses Fund.

Years	Ri	(Ri-Ri)	(Ri-Ri) <sup>2</sup>	(Rm-Rm)	(Rm-Rm) <sup>2</sup>	Σ(Ri-Ri) (Rm-Rm)
2007-08	5.80	-0.74	0.547	2.3	5.29	-1.70
2008-09	4.98	-1.56	2.43	-1.74	3.02	2.71
2009-10	14.20	7.66	58.67	4.82	23.23	36.92
2010-11	8.39	1.85	3.42	8.50	72.25	15.72
2011-12	-0.63	-7.17	51.40	-13.87	192.37	99.44
Total	32.74		116.46		296.16	153.09

Table 11: Calculation of variance of SBI Emerging Businesses Fund.

$$= 152.88/4$$

$$= 38.22$$

$$\text{Systematic Risk: } \beta_i = \frac{\sum (Ri - \bar{Ri}) (Rm - \bar{Rm})}{(\sum (Rm - \bar{Rm})^2)}$$

$$= 64.32 / 296.16 = 0.2171$$

$$\text{Unsystematic Risk: } \sigma_{\bar{e}}^2 = \sigma_i^2 - \beta_i^2 \sigma_m^2$$

$$= 38.22 - (0.2171^2 * 74.04)$$

$$= 38.22 - 3.4896$$

$$= 34.73$$

**Interpretation:** From the above it is inferred that year 2011 has recorded as low return and high return is recorded in the year 2010. In general the overall returns are positive. The volatility of the fund is very low as compared to the market [7]

### SBI Emerging Businesses

The Tables 10 and 11 given below shows the NAV and fund return and Calculation of SBI Emerging Businesses Fund.

$$\bar{Ri} = \sum Ri / N$$

$$= 32.74 / 5$$

$$= 6.54$$

$$\sigma_i^2 = \frac{\sum (Ri - \bar{Ri})^2}{n-1}$$

$$= 116.46 / 4$$

$$= 29.115$$

$$\text{Systematic Risk: } \beta_i = \frac{\sum (Ri - \bar{Ri}) (Rm - \bar{Rm})}{(\sum (Rm - \bar{Rm})^2)}$$

$$= 153.09 / 296.16$$

$$= 0.5169$$

$$\text{Unsystematic Risk: } \sigma_{\bar{e}}^2 = \sigma_i^2 - \beta_i^2 \sigma_m^2$$

$$= 29.115 - (0.5169^2 * 74.04)$$

$$= 29.115 - 19.782$$

$$= 9.332$$

**Interpretation:** From the above it is inferred that year 2012 has recorded as low return and high return is recorded in the year 2010. In general the overall returns are positive. The volatility of the fund is very low as compared to the market.

### Kotak 50 Fund

The below given Tables 12 and 13 shows the NAV and fund return and Calculation of Kotak 50  $\bar{Ri} = \sum Ri / N$

$$= 40.49 / 5$$

$$= 8.09$$

$$\sigma_i^2 = \frac{\sum (Ri - \bar{Ri})^2}{n-1}$$

$$= 945.37 / 4$$

$$= 236.34$$

$$\text{Systematic Risk: } \beta_i = \frac{\sum (Ri - \bar{Ri}) (Rm - \bar{Rm})}{(\sum (Rm - \bar{Rm})^2)}$$

$$= 417.89 / 296.16$$

$$= 1.411$$

$$\text{Unsystematic Risk: } \sigma_{\bar{e}}^2 = \sigma_i^2 - \beta_i^2 \sigma_m^2$$

$$= 236.34 - (1.411^2 * 74.04)$$

$$= 236.34 - 147.4077$$

$$= 88.9323$$

**Interpretation:** From the above it is inferred that year 2012 has recorded as low return and high return is recorded in the year 2010. In general the overall returns are positive. The volatility of the fund is very high as compared to the market.

### Axis Equity fund

The below given Tables 14 and 15 shows the NAV and fund return and Calculation of Axis Equity Fund.

Year	NAV Beg	NAV End	Ri (end-beg)/beg*100
2007-08	34.80	33.80	-2.87
2008-09	36.30	40.30	11.01
2009-10	40.88	50.88	25.92
2010-11	51.71	61.15	18.25
2011-2012	61.95	54.64	-11.80

Table 12: NAV and fund return of Kotak 50 Fund.

Years	Ri	(Ri-Ri)	(Ri-Ri) <sup>2</sup>	(Rm-Rm)	(Rm-Rm) <sup>2</sup>	Σ(Ri-Ri) (Rm-Rm)
2007-08	-2.87	-10.96	120.12	2.3	5.29	-25.20
2008-09	11.01	2.92	8.52	-1.74	3.02	-5.08
2009-10	25.92	17.83	317.90	4.82	23.23	85.94
2010-11	18.25	10.16	103.22	8.50	72.25	86.36
2011-12	-11.80	-19.89	395.61	-13.87	192.37	275.87
Total	40.49		945.37		296.16	417.89

Table 13: Calculation of variance of Kotak 50 Fund.

Year	NAV Beg	NAV End	Ri (end-beg)/beg*100
2007-08	81.70	85.70	4.89
2008-09	86.19	93.19	8.12
2009-10	93.65	116.7	24.61
2010-11	117.25	104.69	-10.71
2011-2012	105.10	89.82	-14.53

Table 14: NAV and fund return of Axis Equity Fund.

Years	Ri	(Ri-Ri)	(Ri-Ri) <sup>2</sup>	(Rm-Rm)	(Rm-Rm) <sup>2</sup>	Σ(Ri-Ri) (Rm-Rm)
2007-08	4.89	2.42	5.85	2.3	5.29	5.56
2008-09	8.12	5.65	31.92	-1.74	3.02	-9.83
2009-10	24.61	22.14	490.17	4.82	23.23	106.71
2010-11	-10.71	-13.18	173.71	8.50	72.25	-112.03
2011-12	-14.53	-17.00	289.00	-13.87	192.37	235.79
Total	12.38		990.65		296.16	226.20

Table 15: Calculation of variance of Axis Equity Fund.

Year	NAV Beg	NAV End	Ri (end-beg)/beg*100
2007-08	93.8	97.8	4.26
2008-09	98.12	116.01	18.23
2009-10	116.90	128.33	9.77
2010-11	128.88	147.21	14.22
2011-2012	147.60	138.23	-6.34

Table 16: NAV and fund return of TATA Equity Management Fund.

$$\bar{R}_i = \sum R_i / N$$

$$= 12.38 / 5$$

$$= 2.47$$

$$\sigma_i^2 = \sum (R_i - \bar{R}_i)^2 / n - 1$$

$$= 990.65 / 4$$

$$= 247.66$$

$$\text{Systematic Risk: } \beta_i = \sum (R_i - \bar{R}_i) (R_m - \bar{R}_m) / (\sum (R_m - \bar{R}_m)^2)$$

$$= 226.20 / 296.16$$

$$= 0.7637$$

$$\text{Unsystematic Risk: } \sigma_{\epsilon_i}^2 = \sigma_i^2 - \beta_i^2 \sigma_m^2$$

$$= 247.66 - (0.7637^2 * 74.04)$$

$$= 247.66 - 43.1829$$

$$= 204.47$$

**Interpretation:** From the above it is inferred that year 2012 has recorded as low return and high return is recorded in the year 2010. In general the overall returns are positive. The volatility of the fund is low as compared to the market.

### Tata Equity Management Fund

The below given Tables 16 and 17 shows the NAV and fund return and Calculation of TATA Equity Management Fund.

$$\bar{R}_i = \sum R_i / N$$

$$= 40.14 / 5$$

$$= 8.02$$

$$\sigma_i^2 = \sum (R_i - \bar{R}_i)^2 / n - 1$$

$$= 366.07 / 4$$

$$= 91.51$$

$$\text{Systematic Risk: } \beta_i = \sum (R_i - \bar{R}_i) (R_m - \bar{R}_m) / (\sum (R_m - \bar{R}_m)^2)$$

$$= 233.90 / 296.16$$

$$= 0.7897$$

$$\text{Unsystematic Risk: } \sigma_{\epsilon_i}^2 = \sigma_i^2 - \beta_i^2 \sigma_m^2$$

$$= 91.51 - (0.7897^2 * 74.04)$$

$$= 91.51 - 46.17$$

$$= 45.34$$

**Interpretation:** From the above it is inferred that year 2012 has recorded as low return and high return is recorded in the year 2009. In general the overall returns are positive. The volatility of the fund is low as compared to the market.

### UTI India Lifestyle Fund

The below given Tables 18 and 19 shows the NAV and fund return and Calculation of UTI India Lifestyle Fund.

$$\bar{R}_i = \sum R_i / N$$

$$= 53.95 / 5$$

$$= 10.79$$

$$\sigma_i^2 = \sum (R_i - \bar{R}_i)^2 / n - 1$$

$$= 128.85 / 4$$

$$= 32.21$$

Years	Ri	(Ri-Ri)	(Ri-Ri) <sup>2</sup>	(Rm-Rm)	(Rm-Rm) <sup>2</sup>	Σ(Ri-Ri) (Rm-Rm)
2007-08	4.26	-3.74	14.13	2.3	5.29	-8.64
2008-09	18.23	10.21	104.24	-1.74	3.02	-17.76
2009-10	9.77	1.75	3.06	4.82	23.23	8.43
2010-11	14.22	6.20	38.44	8.50	72.25	52.7
2011-12	-6.34	-14.36	206.20	-13.87	192.37	199.17
Total	40.14		366.07		296.16	233.90

Table 17: Calculation of variance of TATA Equity Management Fund.

Year	NAV Beg	NAV End	Ri (end-beg)/beg*100
2007-08	95.23	101.02	6.08
2008-09	101.80	112.75	10.75
2009-10	113.05	135.95	20.25
2010-11	136.15	150.02	10.18
2011-2012	150.95	161.05	6.69

Table 18: NAV and fund return of UTI India Lifestyle Fund.

Years	Ri	(Ri-Ri)	(Ri-Ri) <sup>2</sup>	(Rm-Rm)	(Rm-Rm) <sup>2</sup>	Σ(Ri-Ri) (Rm-Rm)
2007-08	6.08	-4.71	22.18	2.3	5.29	-10.83
2008-09	10.75	-0.04	0.0016	-1.74	3.02	0.069
2009-10	20.25	9.46	89.49	4.82	23.23	45.59
2010-11	10.18	-0.61	0.372	8.50	72.25	-5.18
2011-12	6.69	-4.1	16.81	-13.87	192.37	56.86
Total	53.95		128.85		296.16	86.509

Table 19: Calculation of variance of UTI India Lifestyle Fund.

$$\begin{aligned} \text{Systematic Risk: } \beta_i &= \frac{\sum (R_i - R_f)(R_m - R_f)}{\sum (R_m - R_f)^2} \\ &= 85.509/296.16 \\ &= 0.2921 \end{aligned}$$

$$\begin{aligned} \text{Unsystematic Risk: } \sigma_{ei}^2 &= \sigma_i^2 - \beta_i^2 \sigma_m^2 \\ &= 85.509 - (0.2921^2 * 74.04) \\ &= 85.509 - 6.3172 \\ &= 25.89 \end{aligned}$$

**Interpretation:** From the above it is inferred that year 2008 has recorded as low return and high return is recorded in the year 2010. In general the overall returns are positive. The volatility of the fund is very low as compared to the market.

### Construction of Optimum Portfolio

#### Determination of cutoff point

**Step 1:** In order to determine the cutoff point (Table 20), first let us rank the companies based on the decreasing value of the decreasing order of  $(R_i - R_f)/\beta_i$

$$\text{Risk free rate of return (Rf)} = 8.30$$

**Step 2:** The companies are rearranged according to their ranks with decreasing excess return to beta ratios (Table 21).

**Step 3:** C value for each fund is calculated using the formula below:

Calculation of Ci

$$c_i = \frac{\sigma_m^2 \sum_{i=1}^n \frac{(R_i - R_f) \beta_{im}}{\sigma_{ei}^2}}{1 + \sigma_m^2 \sum_{i=1}^n \frac{\beta_{im}^2}{\sigma_{ei}^2}}$$

Table 22 represents calculation of Ci

Sol.no	Company	$\beta_i$	Ri	$(R_i - R_f)/\beta_i$	Rank
1	Birla sun life India gennext	0.1955	11.91	18.465	1
2	SBI Magnum Midcap	0.6918	5.45	-4.119	6
3	Kotak Classic Equity	0.2171	5.64	-12.252	8
4	SBI Emerging Businesses	0.5169	6.54	-3.404	5
5	Kotak 50	1.411	8.09	-0.148	3
6	Axis Equity	0.7637	2.47	-7.633	7
7	TATA Equity Management	0.7897	8.02	-0.354	4
8	UTI India Lifestyle	0.2921	10.79	8.524	2

Table 20: Determination of cutoff point.

Sol.no	Company	$\beta_i$	Ri	$\sigma_{ei}^2$	$(R_i - R_f)/\beta_i$
1	Birla sun life India gennext	0.1955	11.91	10.92	18.465
2	UTI India Lifestyle	0.2921	10.79	25.89	8.524
3	Kotak 50	1.411	8.09	88.93	-0.148
4	TATA Equity Management	0.7897	8.02	45.34	-0.354
5	SBI Emerging Businesses	0.5169	6.54	9.33	-0.3404
6	SBI Magnum Midcap	0.6918	5.45	106.81	-4.119
7	Axis Equity	0.7637	2.47	204.47	-7.633
8	Kotak Classic Equity	0.2171	5.64	34.73	-12.252

Table 21: Rearrangement of companies as per decreasing order of their beta ratios.

Fund	$(R_i - R_f)/\sigma_{ei}^2$	$\sum((R_i - R_f)\beta_i/\sigma_{ei}^2)$	$\beta_i^2/\sigma_{ei}^2$	$\sum\beta_i^2/\sigma_{ei}^2$	Ci
Birla sun life India gennext	0.0646	0.0646	0.0035	0.0035	3.7986
UTI India Lifestyle	0.0280	0.0926	0.0032	0.0067	4.5827
Kotak 50	-0.0033	0.0893	0.0223	0.0290	2.1008
TATA Equity Management	-0.0048	0.0845	0.0137	0.0427	1.5033
SBI Emerging Businesses	-0.0975	-0.0130	0.0286	0.0713	-0.1532
SBI Magnum Midcap	-0.0184	-0.0314	0.0044	0.0757	-0.3519
Axis Equity	-0.0217	-0.0531	0.0028	0.0785	-0.5771
Kotak Classic Equity	-0.0166	-0.0697	0.0013	0.0798	-0.7470

Table 22: Calculation of Ci.

Funds	Return	Weights	Expected return	Deviation d=R-E(R)	D <sup>2</sup>	D <sup>2</sup> *weights
Birla sun life India gennext	11.91	0.85	10.123	0.169	0.028	0.0238
UTI India lifestyle fund	10.79	0.15	1.618	-0.951	0.904	0.135
			11.741			0.1588

Table 23: Computation of portfolio return and risk.

The optimal portfolio will consist of funds

Birla sun life India gennext

Uti India lifestyle

#### Calculation of Weights/Proportions in the Portfolio

$$X_i = \frac{Z_i}{\sum Z_j}$$

Now, Zi, is calculated as,

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

For Birla sun life India gennext

$$\begin{aligned} Z_{\text{birla}} &= 0.01790[18.465 - 3.7986] \\ &= 0.2625 \end{aligned}$$

For Uti India lifestyle

$$\begin{aligned} Z_{\text{uti}} &= 0.01128[8.524 - 4.5827] \\ &= 0.0444 \end{aligned}$$

$$\Sigma (Z_{\text{birla}} + Z_{\text{uti}}) = 0.2625 + 0.0444 = 0.3069$$

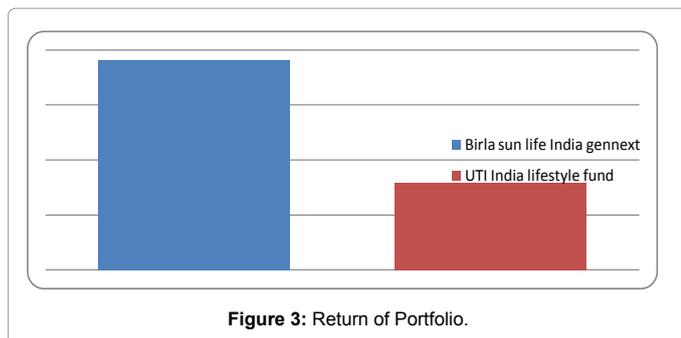
Weights are calculated as:

$$\begin{aligned} W_{\text{birla}} &= 0.2625/0.3069 \\ &= 0.8553 = 85.5\% \end{aligned}$$

$$\begin{aligned} W_{\text{uti}} &= 0.0444/0.3069 \\ &= 0.1446 = 14.46\% \end{aligned}$$

The total computation of Portfolio return and risk is shown in Table 23

$$\text{Standard deviation} = \sqrt{0.1588}$$



= 0.39

Portfolio return = 11.74%

Portfolio risk = 0.39%

1. The Birla Sun Life India Gennext has the highest return of 18.465% and the Kotak Classic Equity has the lowest return of -12.25%. If the investor wants to earn a maximum return without considering the risk aspect then investment can be made on those securities which yield high returns (Figure 3). Even though the return is high, the risk involved in the stock return should be considered while taking investment decisions.

2. The risk can be reduced if the portfolio is diversified. The point of diversity is to achieve a given level of expected return while bearing the least possible risk.

## Conclusion

Mutual fund is booming sector now a days and it has lot of scope to generate income and providing return to the investor, the mutual fund is one of the way to development of country and helps to mobilizing dead money in the economy which helps to develop the economic conditions of the country and people. Mutual fund helps to analyze the market conditions, it providing lot of opportunities to the people for research work and helps the people to know the new things going on

around the world. It gave the more knowledge to the person, because it diversifies the risk by investing in different securities [8].

Mutual fund has become one of the important sources for investing. It is quite likely that a more efficient portfolio can be constructed directly from funds. Thus, the two-step process of choosing an asset allocation based on the information about benchmark indexes and then choosing funds in each category may be one of the best realistically attainable approaches. To use this approach to portfolio selection effectively, investors would benefit from estimates of future asset returns, risks and correlations, as well as from fund management's disclosure of future asset exposures and appropriate benchmarks [9].

The investor should invest in a fund which has good net asset value and good performance history with respect to NAV. The outcome of the fund is derived by studying the periodical movements of fund's net asset value and by comparing the fund's performance over their respective benchmarks for the specified period. It was traced that the funds, which embarked lower risk, did not always validate lower returns or vice versa. This states that the risks and return need not always be in a beeline or point-blank relationship.

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