Post-crises performance of Indian equity funds: A comparative analysis across different categories

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Post-crises performance of Indian equity funds: A comparative analysis across different categories[1]

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I. Introduction

This paper studies the performance of Indian equity funds in each of the following categories: Large cap, Large and Mid-cap, Mid and Small cap, Multi cap and International. It presents a comparative analysis of equity funds in different categories in the post-crises period, i.e. in the aftermath of the global economic crises. Given that different categories of equity funds chosen for the study here have different asset allocations and investment objectives, a comparative analysis of equity funds across these categories would help to give an indication regarding which of these sectors have done better in the post-crises scenario.

Risk-adjusted return measures are commonly used for the evaluation of mutual fund performance. For example, one of the most commonly used measures of risk-adjusted performance, Sharpe ratio measures the excess return generated over and above the risk-free return, per unit of risk (risk being quantified by standard deviation), while Treynor's ratio is another measures excess return generated per unit of the portfolio beta. For both the Sharpe ratio and Treynor's ratio, a higher value represents a better performance. Again, the annual expense ratio (calculated as the total operating expenses divided by total net assets) also helps compare fund performance, with a lower expense ratio suggesting a better fund performance. This paper uses parameters like mean returns, expense ratio to compare funds in different categories and

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also uses rankings based on Sharpe ratio and Treynor's ratio to compare the performance of equity funds in different categories from in the post-crisis period.

II. Mutual Funds: A brief overview of concept and industry

Mutual funds facilitate the pooling of resources form diverse investors and invest the amount generated in accordance to predefined objectives. SEBI defines Mutual Funds as "… a mechanism for pooling the resources by issuing units to the investors and investing funds in securities in accordance with objectives as disclosed in offer document[3]." The diverse investors in the mutual fund scheme are called the unit holders and the Asset management company (specifically the Fund Mangers of the scheme) invests the pooled resources on behalf on these unit holders. However, investment must be in accordance to the predefined objectives of the scheme as given in the offer document.

One of the greatest benefits offered by mutual funds is the diversification obtained from investment in various asset classes. Moreover, investing in mutual funds can help retail investors benefit form the professional management of such funds in lieu for a small fee, besides providing liquidity when needed and tax benefits. All these reasons have led to an increasing investment by retail investors in mutual funds. The Indian mutual fund industry had expanded hugely with Assets Under management (AUM) reaching Rs. 592250 crores in March, 2011[4]. Mutual funds are also the most preferred investment vehicles for financial planning and /or wealth management divisions of banks in India for investing client's resources.

A mutual fund is set up in the form of a trust, with sponsor, trustees, Asset Management Company (AMC) and custodian. The Sponsor (or sponsors) who establish the trust is like the

[3] SEBI (2012). SEBI investor education programme (investments in mutual funds). Retrieved form www.sebi.gov.in, accessed 12.7. 2012.

[4] AMFI (2012). Mutual fund: Industry. Retrieved form www.amfiindia.com, accessed 11/7/2012.

promoter(s) of a company. The trustees of the mutual fund hold its property for the benefit of the unit holders. The management of the fund is vested in Asset Management Company (AMC) approved by SEBI, while the Custodian, who is also to be registered with SEBI, holds the securities of various schemes of the fund in its custody. The general power of superintendence and direction over AMC are vested in the trustee. SEBI Regulations require that at least two thirds of the directors of trustee company or board of trustees must be independent i.e. they should not be associated with the sponsors. Also, fifty percent of the directors of AMC must be independent. All mutual funds are required to be registered with SEBI before they launch any scheme[5].

Tracing the history of mutual funds briefly, the first mutual funds, the Massachusetts Investors Trust and the State Street Investment trust were established in United States in 1942. Mutual fund industry in India started in 1963 with the formation of Unit Trust of India. Unit Trust of India (UTI) was established on 1963 by an Act of Parliament and set up by the Reserve Bank of India and functioned under the regulatory and administrative control of the Reserve Bank of India till 1978. Again 1987 marked the entry of non- UTI, public sector mutual funds set up by public sector banks and Life Insurance Corporation of India (LIC) and General Insurance Corporation of India (GIC). Another new era started in the Indian mutual fund industry with the coming of private sector funds in 1993, giving the Indian investors a wider choice of fund families. With the repeal of the Unit Trust of India Act 1963 in February 2003, and the bifurcation of UTI into two separate entities and mergers taking place among different private sector funds, the mutual fund industry has entered a phase of consolidation[6].

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[5] SEBI (2012), Ibid.

[6] Morbius, M. (2007). Mutual funds: An introduction to core concepts. USA: John Wiley & Sons, Inc.; Mutual Fund: Industry. Retrieved form www.amfiindia.com, accessed 11/7/2012.

Table 1: Funds mobilized and total Assets [Status of Mutual Funds for the period April 2012 to June 2012 (Figures in Rs. Crores)]

	Private Sector Mutual Funds	**Public Sector Mutual Funds**			**Grand Total**
	A	UTI (i)	Others (ii)	Sub-total B (i +ii)	A+B
Mobilization of Funds	957,459.18	91,340.31	105,781.30	197,121.61	1,154,580.79
Repurchase / Redemption Amt.	1,355,919.98	138,527.57	159,609.64	298,137.21	1,654,057.19
Net Inflow/ Outflow (-ve) of funds	(398,460.80)	(47,187.26)	(53,828.34)	(101,015.60)	(499,476.40)
Cumulative Position of net assets as on June 30, 2012	563,474.59	62,718.94	62,631.38	125,350.32	688,824.92
	81.80	9.11	9.00	18.20	100.00

Net Assets pertaining of Funds of Funds schemes is not included in the data
Source: SEBI Investment management department. Retrieved form www.sebi.gov.in, accessed 12.7.2012.

Types of mutual Fund Schemes[7]

A mutual fund scheme can be classified into open-ended scheme or close-ended scheme depending on its maturity period. Open-end funds are required to buy back shares, or units, from the shareholders at any time at a price based on the current value of fund's net assets. Mutual funds also offer new shares to the public on an ongoing basis. It is thus available for subscription and repurchase on a continuous basis and do not have a fixed maturity period. Investors can conveniently buy and sell units at Net Asset Value (NAV) related prices which are declared on a daily basis.

A close-ended fund or scheme has a stipulated maturity period and is open for subscription only during a specified period at the time of launch of the scheme. Investors can invest in the scheme

[7] The discussion is based on discussion in Morbius, M. (2007), Ibid; SEBI (2012), Ibid.

at the time of the initial public issue and thereafter they can buy or sell the units of the scheme on the stock exchanges where the units are listed. While shares of open-end mutual funds are redeemed and sold at the Net Asset Value (NAV) of those shares (i.e. market value of the fund's holdings), the price of closed-end funds depends on market forces. As a result, closed-end fund shares may sell at a premium or discount to their actual net asset value, depending on the supply and demand for those shares. These mutual funds schemes disclose NAV generally on weekly basis. Some close-ended funds give an option of selling back the units to the mutual fund through periodic repurchase at NAV related prices to provide an exit route to the investors. SEBI Regulations mandate that at least one of the two exit routes is provided to the investor.

Again, Exchange-traded funds, or ETFs, are designed to mirror the return of a particular market or sector index. The shares of ETFs are traded on stock exchanges at market-determined prices. Investors can buy or sell an ETF through a broker just like the shares of any other company.

A scheme can also be classified as growth scheme, income scheme, or balanced scheme considering its investment objective. Such schemes may be open-ended or close-ended schemes. The aim of growth funds is to provide capital appreciation over the medium to long- term and such schemes normally invest a major part of their corpus in equities. Income funds aim to provide regular and steady income to investors and such schemes generally invest in fixed income securities such as bonds, corporate debentures, Government securities and money market instruments. Income funds are less risky compared to growth schemes as these funds are not affected because of fluctuations in equity markets, though opportunities of capital appreciation are also limited in such funds. The NAVs of such funds are affected because of change in interest rates in the country.

The aim of balanced funds is to provide both growth in income and regular income as such schemes invest both in equities and fixed income securities in the proportion indicated in their offer documents and generally invest 40-60% in equity and debt instruments. The NAVs of such funds are likely to be less volatile compared to pure equity funds.

SEBI places a key role on the investment objectives of a mutual fund scheme which must be clearly spelled out in the offer document. In this context the offer document assumes a vital role as the most important source of information on the scheme, to help prospective investors evaluate the merits and demerits of investing in the scheme. Mutual Fund Offer Documents have two parts, i.e. the *Scheme Information Document (SID)* containing the details of the scheme and the *Statement of Additional Information (SAI)* which has statutory information about the mutual fund that is offering the scheme. SEBI mandates that both documents are prepared in the format prescribed by SEBI, and submitted to SEBI. SEBI does not approve or disapprove Offer Documents, but gives its observations, which the mutual fund needs to incorporate in the Offer Document that is offered in the market. Thus, Offer Documents in the market are "vetted" by SEBI. If the scheme's name implies that it will invest primarily in a particular type of security, or in a certain industry or industries, SEBI mandates that the scheme shall have an investment policy that requires that, under normal circumstances, at least 65 percent of the value of its total assets be invested in the indicated type of security or industry.

III. Brief Review of Literature

The first systematic study of mutual funds widely acknowledged by literature is by Friend *et al.* (1962), evaluating performance of 152 mutual funds with annual data from 1953 to 1958. They found that mutual funds earned an average annual return of 12.4%, 0.2 % below the benchmark of 12.6%. Treynor (1965) provided a measure of portfolio performance taking into account the

risk involved in the portfolio. He saw the appropriate measure of portfolio performance as risk premium per unit of ‘market risk’ generated by the portfolio and introduced the concept of 'beta" parameter, representing the degree of variation in the portfolio value compared to the market portfolio. A higher value of Treynor's index indicates better performance of portfolio and can be used as a relative measure to ranks mutual funds in terms (market risk) and return.

Sharpe (1966) extended Treynor’s work by subjecting his proposal to empirical testing to evaluate its predictive ability. He proposed another measure of portfolio performance evaluation by replacing ‘market risk’ (beta parameter) in Treynor's equation with the 'total risk'. Sharpe ratio can also be used as a relative measure to ranks mutual funds in terms (market risk) and return and a higher value of Sharpe's index indicates better performance of portfolio and vice versa.

Sharpe calculated the reward-to-volatility ratios for a sample of 34 mutual funds during the period 1944-53. Comparing with returns from Dow-Jones portfolio he found that results actually obtained by mutual funds (after costs associated with operation of the fund have been deducted) fell short of those from the Dow-Jones portfolio. Sharpe also found that better performing funds tend to be those with lower expenses.

Jensen (1968) carried out a well known research on mutual funds and derived a risk adjusted measure of portfolio performance that estimates how much a manager’s forecasting ability contributes to the Fund’s returns. He applied the measure to estimate the predictive ability of 115 mutual fund managers in the period 1945-1964—that is their ability to earn returns which are higher than those we would expect given the level of risk of each of the portfolios. The paper finds that not only these 115 mutual funds were *on average* not able to predict security prices well enough to outperform a buy-the-market and-hold policy, but also that there is very little

evidence that any *individual* fund was able to do significantly better than that expected from mere random chance.

Henriksson (1984) evaluated the market timing ability of 116 open ended mutual funds for the period 1968-80. He concluded that their empirical results do not support the hypothesis that mutual fund managers are able to follow an investment strategy that successfully times the return on the market portfolio. Ippolito (1989) tested investment performance in the mutual fund industry over a twenty year period. He concluded that risk-adjusted returns in the mutual fund industry, net of fees and expenses, are comparable to returns available in index funds; while portfolio turnover and management fees are unrelated to fund performance. Grinblatt and Titman (1989) analysed the extent to which mutual funds purchased stocks based on their past returns as well as their tendency to exhibit 'herding' behavior and found that 77% of mutual funds were "momentum investors", buying stocks that were past winners, and on an average, funds invested on momentum realized significantly better performance than other funds.

Barua and Verma (1991) had provided empirical evidence of equity mutual fund performance in India by studying the performance of India's first 7-year close-end equity mutual fund, Mastershare. They concluded that the performance of the fund was satisfactory for large investors in terms of rate of return. Gupta and Sehgal (1997) evaluated mutual fund performance over a four-year period from 1992-96, using a sample of 80 mutual- fund schemes. They concluded that mutual fund industry faired reasonably well during the period of study.

Chakraborty *et al.* (2008) attempted to evaluate the performance of mutual funds on the basis of rate of return as well as risk-adjusted methods. The performance of the mutual funds were compared with the risk-free returns as well as the benchmark index (BSE 100), which is taken as a proxy for market returns. The paper suggested that that majority of the equity mutual funds

(included in the sample) have outperformed the benchmark. However, when the mean return of the entire sample was considered, it did not show significantly different return from that of the benchmark BSE 100 index. An analysis based on risk-adjusted performance, however, shows most of the funds (around 70%) in the sample have posted positive and better Sharpe as well as Treynor's ratio compared to the benchmark BSE 100 index.

Bhatt and Bandopadhyay (2011) compared the performance of equity large cap Indian mutual fund schemes along with International mutual fund schemes, using three performance evaluation indicators (expense ratio, Jenson's alpha and Sharpe ratio) and found that the performance of both classes of schemes of funds is the same. The study further shows that the rankings of mutual fund schemes based on Expense ratio, Jenson's alpha and Sharpe's ratio are highly correlated. However, rankings based on Expense ratio are not correlated with the ranking with either Jenson's alpha or Sharpe's ratio.

IV. Objectives of the study and methodology

This paper studies the performance of Indian equity funds in each of the following categories: Large cap, Large and Mid-cap, Mid and small cap, Multi cap and International. Equity Funds are defined as those funds which have at least 65% of their Average Weekly Net Assets invested in Equities. Equity Funds can be classified on the basis of market capitalisation of the stocks they invest in – namely Large Cap Funds, Mid Cap Funds or Small Cap Funds. The data on Mutual funds is obtained form Value research. For each of the categories, random samples are chosen from the population of all funds in that category by random sampling techniques. For each

category data three yearly returns, expense ratio, and beta values are obtained from Value Research[8].

A comparison of mean three yearly, expense ratios, Sharpe ratio and Treynor ratio is made across the following groups:

I. Large Cap (L) and Large & Mid Cap (LM) Fund.

II. Multi-cap (MC) and International (I) funds.

III. Large & mid-cap (LM) and Mid & Small cap (MS) Funds.

Large-cap funds are those that restrict their stock selection to the large cap stocks – typically the top 100 or 200 stocks with highest market capitalization and liquidity. Large cap equity funds primarily seek to generate long term capital appreciation by investing in large blue-chip companies. After Large-cap funds comes the **Midcap funds**, which invest in stocks belonging to the mid cap segment of the market. Many of these midcaps are said to be the 'emerging blue-chips' or 'tomorrow's large-caps'. There can be actively managed or passively managed mid cap funds. Value Research Online defines large-caps as the smallest number of stocks that can together equal 70 per cent of the total market capitalisation of the BSE. Mid-caps are the smallest number of stocks that can equal the next 20 per cent of market capitalisation and small-caps are the remaining companies, whose market capitalisation will add up to almost 10 per cent of the market's total value.

Multi-cap funds can, theoretically, have a small-cap portfolio today and a large-cap portfolio tomorrow and invest in any stock from any sector. **International Funds** invests in stocks of companies outside India, a fund which directly or indirectly invests in overseas equities.

[8] Value research: The complete guide to Mutual funds. Retrieved from www.valueresearchonline.com, accessed 12/6/2012.

For Large cap, Large and mid-cap and Multi cap Mutual Funds, random sampling technique is used to select a sample of twenty funds from the population of funds. Funds launched on or before 2005 are included in the sample as the objective of the paper are to compare performance of funds in the post-crises period. While the global economic crisis began to be felt from 2008 onwards with banking and liquidity crises, the collapse of the US Housing Bubble in 2007 may be taken as the prelude to the crises. For funds launched after 2006 a comparison of post crises performance would not be very meaningful, as the performance would be affected to a large extent by global economic conditions. For Mid and Small Cap (MS) funds, the total population of funds launched on or before 2005 (i.e. twenty-four) are selected given the smaller number of total funds. For International funds, the total population of funds launched on or before 2008 (i.e. seventeen) is selected as consideration of funds launched on or before 2005 would yield a very small sample.

Three yearly returns data is taken to provide an understanding of how performances of funds across categories have been in the post crises scenario. More specifically it would help to know which of these categories have done better in the post crisis period. For each of these groups [i.e. G.I) Large Cap and Large & Mid Cap Fund; G.II) Multi-cap and International funds and G.III) Large & Mid-cap and Mid & Small cap Funds], comparison of mean returns, mean expense ratio and rankings based on Sharpe and Treynor ratio is performed.

For testing of hypothesis comparing means and expense ratio of two groups, the t test is used as the sample sizes are small. Assuming unequal variances[9], the relevant t-test statistic (t) is calculated as below[10]:

[9] Given independent samples coming form two different populations.

$$t = \frac{\bar{x}_1 - \bar{x}_2 - \Delta}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \quad \text{.....(1),}$$

Where, $\bar{x}_1$ = Mean obtained from sample 1, $\bar{x}_2$ = Mean obtained from sample 2,

Δ = Difference between population means, s_1 = Standard deviation obtained from sample 1,

s_2= Standard deviation obtained from sample2, n_1= Size of sample 1, n_2= Size of sample 2.

and the degree of freedom is given by,

$$\text{degrees of freedom (df)} = \frac{\left[\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right]^2}{\frac{\left(\frac{s_1^2}{n_1}\right)^2}{n_1 - 1} + \frac{\left(\frac{s_2^2}{n_2}\right)^2}{n_2 - 1}} \quad \text{.....(2),}$$

Where, s_1 = Standard deviation obtained from sample 1, s_2= Standard deviation obtained from sample2, n_1= Size of sample 1, n_2= Size of sample 2.

Specifically then, for first group, G. I, mean three yearly returns of Large cap funds and Large & Mid-cap funds is compared statistically testing the following hypothesis.

Ho: Three yearly mean return of fund category L and LM are equal.

H1: Three yearly mean return of fund category L are less than that of fund category LM.

Again for comparing mean expense ratio the following hypothesis is made.

Ho: Mean expense ratio of fund category L and LM are equal.

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[10] Black, K. (2010). Business statistics: For contemporary decision making [7th edition]. USA: John Wiley & Sons; Bowerman, B.L.; O'Connell, R.T. & Murphree, E. S. (2010). Business statistics in practice. New York: McGraw-Hill.

H1: Mean expense ratio of fund category L and LM are unequal. For the other groups, G II and GIII, a similar comparison of mean and expense ratio is made.

For Sharpe ratio and Treynor ratio, the risk-free rate is the taken as the average of Commercial Bank Deposit Rates (1-3years) from 2005 to 2012 and Interest on Central Government securities from 2005 to 2012[11].

For comparing the rankings obtained by Sharpe ratio and Treynor ratio, the Wilcoxon rank sum test was used[12]. When the individual sample sizes are more than ten, the z-test approximation to the Wilcoxon rank sum test can be used[13], where the test statistic (z) is obtained as

$$z = \frac{w - \frac{n_1(n+1)}{2}}{\sqrt{\frac{n_1 n_2 (n+1)}{12}}},$$

Where, n_1= Size of sample 1, n_2= Size of sample 2, $n = n_1 + n_2$, W= Rank sum of first sample, 1.

For first group, G. I, the following hypotheses are tested

Ho: Median ranking given by Sharpe Ratio for fund categories L and LM are equal

H1: Median ranking given by Sharpe Ratio of fund category L is more than that of fund category LM

And,

Ho: Median ranking given by Treynor Ratio for fund categories L and LM are equal

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[11] Calculated from Table 119: Interest Rates On Central And State Government Dated Securities Table 74: Structure Of Interest Rates. Reserve Bank of India Database. Retrieved from www.rbi.org.in

[12] For joint ranks, the methodology used for Wilcoxon rank sun test requires that each joint rank holder is assigned the number obtained by dividing the rank by the number of joint holders. So if both Scheme A & B have tied at rank 12, each would get 6.

[13] Weiers, R.M. (2010). Introduction to Business statistics.USA: S. W. Cengage learning.

H1: Median ranking given by Treynor Ratio for fund category L is more than that of fund category LM.

It may be noted here that for both Sharpe and Treynor ratios, higher risk adjusted returns mean a better performance and for the Wilcoxon test the values of both ratios are ranked in descending order, so that a smaller rank means a better performance. Thus, a lower median ranking for a group would mean a better performance. For the other groups, G II and GIII, a similar comparison of Sharpe and Treynor ratios are made.

V. Findings of the study

A. G I results: For Group I consisting of Large Cap Funds (L) and Large & Mid Cap Funds (LM), a random sample of twenty for each group is taken. The mean and standard deviation for both three yearly returns and expense ratio is given below:

	Three yearly returns		Expense ratio	
	L	LM	L	LM
Mean	5.93	9.61	1.76	2.05
Standard Deviation	1.97	3.95	0.63	0.43

We test the hypothesis:

Three yearly returns

H0: Three yearly mean return of fund category L and LM are equal

H1: Three yearly mean return of fund category L are less than that of fund category LM

We obtain, $t = -3.63$

The p-value (for degrees of freedom 28) = 0.00043 < 0.01 [$t_{0.01}$= 2.467 for degrees of freedom=28][14].

We therefore reject the null hypothesis at 1% ($\alpha_{0.01}$) level of significance (28 degrees of freedom) and accept the alternate hypothesis that mean three yearly returns of Large Cap Funds are less than that of Large & Mid Cap Funds.

Expense ratio

Ho: Mean expense ratio of fund category L and LM are equal.

H1: Mean expense ratio of fund category L and LM are unequal.

We obtain, t = -1.69,

The p-value (for degrees of freedom 34) = 0.049 > 0.01,

We therefore accept the null hypothesis at 1% ($\alpha_{0.01}$) level of significance (34 degrees of freedom). In other words, there the difference in mean expense ratio of Large Cap Funds and Large & Mid Cap Funds is not significant.

Sharpe ratio

The Sharpe ratios for the random sample chosen for each category are given in Appendix 1(A).

The following hypothesis is tested:

Ho: Median ranking given by Sharpe Ratio for fund categories L and LM are equal

H1: Median ranking given by Sharpe Ratio of fund category L is more than that of fund category LM

[14] Refer to Equation (1) and (2).

We obtain,

$z_{computed} = 1.136$. For one tail test, the critical values at 1% level of significance are $z = \pm 2.33$, so we accept null hypothesis that the difference in median ranking (obtained from Sharpe ratios) of the Large Cap and Large & Mid cap Funds is not significant.

Treynor ratio

The Treynor ratios for the random samples chosen for each category are given in Appendix 1(B).

The following hypothesis is tested:

Ho: Median ranking given by Treynor Ratio for fund categories L and LM are equal

H1: Median ranking given by Treynor Ratio for fund category L is more than that of fund category LM.

We obtain,

$z_{computed} = 1.704$. For one tail test, the critical values at 1% level of significance are $z = \pm 2.33$, so we accept null hypothesis that the difference in median ranking (obtained from Treynor ratios) of the Large Cap and Large & Mid cap Funds is not significant.

For both Sharpe and Treynor ratios, higher risk adjusted returns mean a better performance and for the Wilcoxon test, the values of both ratios are ranked in descending order, so that a smaller rank means a better performance. Thus, it suggests that risk-adjusted performance of Large Cap Funds is not significantly different from that of Large &Mid Cap Funds.

B. G II results: For Group II consisting of Multi Cap Funds (MC) and International Funds (I), a random sample of twenty for Multi-cap funds and a sample of seventeen for International funds is taken[15].

The mean and standard deviation for both three yearly returns and expense ratio is given below:

	Three yearly returns		Expense ratio	
	MC	I	MC	I
Mean	10.75	11.15	2.10	2.04
Standard Deviation	2.97	3.56	0.55	0.59

We test the hypothesis:

Three yearly returns

H0: Three yearly mean return of fund category MC and I are equal

H1: Three yearly mean return of fund category MC are less than that of fund category I.

We obtain, $t = -0.3701$, p-value (for degrees of freedom 31) = $0.36 > 0.01$[16].

We therefore accept the null hypothesis at 1% ($\alpha_{0.01}$) level of significance (31 degrees of freedom) that the difference between mean three yearly returns of Multi Cap Funds and International Funds is not significant.

Expense ratio

Ho: Mean expense ratio of fund category MC and I are equal.

H1: Mean expense ratio of fund category MC and I are unequal.

[15] For International funds, the total population of funds launched on or before 2008 is selected.
[16] Refer to Equation (1) and (2).

We obtain, t = 0. 340, p-value (for degrees of freedom 33) = 0.37 > 0.01.

We therefore accept the null hypothesis at 1% ($\alpha_{0.01}$) level of significance (33 degrees of freedom). In other words, difference between mean expense ratios for the two funds categories is not statistically significant at 1% level of significance.

Sharpe ratio

The Sharpe ratios for the random sample chosen for each category are given in Appendix 2(A).

The following hypothesis is tested:

Ho: Median ranking given by Sharpe Ratio for fund categories L and LM are equal

H1: Median ranking given by Sharpe Ratio of fund category L is more than that of fund category LM

We obtain,

$z_{computed}$ = -0.185. For one tail test, the critical values at 1% level of significance are z = ±2.33, so we accept null hypothesis that the difference in median ranking of the Multi Cap and International Funds is not significant at 1% level of significance.

Treynor ratio

The Treynor ratios for the random samples chosen for each category are given in Appendix 2(B).

The following hypothesis is tested:

Ho: Median ranking given by Treynor Ratio for fund categories MC and I are equal

H1: Median ranking given by Treynor Ratio for fund category MC is more than that of fund category I.

We obtain,

$z_{computed} = 0.7104$. For one tail test, the critical values at 1% level of significance are $z = \pm 2.33$, so we accept null hypothesis that the difference in median ranking of the Multi Cap funds and International Funds is not significant.

C. G III results: For Group II consisting of Large & Mid Cap Funds (LM) and Mid &Small Cap (MS), a random sample of twenty for Large & Mid Cap Funds (LM) and twenty-four for Mid & Small Cap (MS) is taken[17]. The mean and standard deviation for both three yearly returns and expense ratio is given below:

	Three yearly returns		Expense ratio	
	LM	MS	LM	MS
Mean	9.61	17.04	2.05	2.23
Standard Deviation	3.95	5.07	0.43	0.27

Three yearly returns

We test the hypothesis:

H0: Three yearly mean return of fund category LM and MS are equal

H1: Three yearly mean return of fund category LM are less than that of fund category MS

We obtain, $t = -5.466$, p-value (for degrees of freedom 42) $= 1.16E\text{-}06 < 0.01$[18].

[17] For Mid and Small Cap (MS) funds, the total population of funds launched on or before 2005 is selected.

[18] Refer to Equation (1) and (2).

We therefore reject the null hypothesis at 1% ($\alpha_{0.01}$) level of significance (42 degrees of freedom) and accept the alternate hypothesis that mean three yearly returns of Large & Mid Cap Funds are less than that of Mid &Small Cap Funds.

Expense ratio

Ho: Mean expense ratio of fund category LM and MS are equal.

H1: Mean expense ratio of fund category LM and MS are unequal.

We obtain, $t = -1.598$, p-value (for degrees of freedom 31) = $0.060 > 0.01$.

We therefore accept the null hypothesis at 1% ($\alpha_{0.01}$) level of significance (31 degrees of freedom). In other words, the difference in mean expense ratio of Large & Mid Cap Funds and Mid & Small Cap Funds is not significant.

Sharpe ratio

The Sharpe ratios for the random sample chosen for each category are given in Appendix 3(A).

The following hypothesis is tested:

Ho: Median ranking given by Sharpe Ratio for fund categories LM and MS are equal

H1: Median ranking given by Sharpe Ratio of fund category LM is more than that of fund category MS.

We obtain,

$z_{computed} = 3.724$. For one tail test, the critical values at 1% level of significance are $z = \pm 2.33$, so we reject null hypothesis and accept the alternate hypothesis that median ranking given by

Sharpe Ratio of fund category LM is more than that of fund category MS. This implies a better risk-adjusted performance (Sharpe ratio) ranking of fund category Mid & Small Cap.

Treynor ratio

The Treynor ratios for the random samples chosen for each category are given in Appendix 3(B).

The following hypothesis is tested:

Ho: Median ranking given by Treynor Ratio for fund categories LM and MS are equal

H1: Median ranking given by Treynor Ratio for fund category LM is more than that of fund category MS.

We obtain,

$z_{computed} = 2.62$. For one tail test, the critical values at 1% level of significance are $z = \pm 2.33$, so we reject null hypothesis and accept the alternate hypothesis that median ranking given by Treynor Ratio of fund category LM is more than that for fund category MS. This implies a better risk-adjusted performance (Treynor ratio) ranking of fund category Mid &Small Cap.

VI. Conclusions

The paper compares performance of mutual funds in different categories in the post-crisis scenario. Given the consideration of post-crisis scenario, only funds launched on or before 2006 are taken. Funds in categories Large Cap, Large and Mid Cap and Multi-Cap are chosen on the basis of random sampling technique. For International and Multi-Cap Funds the entire population of funds launched on or before 2008 and 2006 respectively are taken given the smaller number of funds in these categories.

For comparison, funds are divided into three Groups:

G.I) Large Cap and Large & Mid Cap Fund

G.II) Multi-cap and International funds and

G.III) Large & Mid-cap and Mid & Small cap Funds.

For each group, the mean three yearly returns and expense ratio of the two samples are compared using the t-test for unequal variances. The funds in each category are also ranked on the basis of their Shape ratios and Treynor ratios, two most commonly used risk-adjusted measures. The funds in each category are then compared on the basis of the rankings obtained from Shape ratios and Treynor ratios, using the standard normal (z) approximation of the Wilcoxon Rank Sum test.

Group I comparisons show that mean three yearly returns of Large Cap funds are lower than that of Large & Mid Cap funds at 1% level of significance, while the difference between mean expense ratios for the two funds categories is not statistically significant at 1% level of significance. The standard normal (z) approximation of the Wilcoxon Rank Sum test shows that the difference in median ranking of the Large Cap and Large & Mid cap Funds is not significant at 1% level of significance, using either rankings obtained from Sharpe ratio or Treynor ratio.

For GII ,the results indicate that the difference between the mean three yearly returns of Multi Cap funds and International Funds Cap funds is not significant (at 1% level of significance). Further, the difference between mean expense ratios for the two funds categories is also not statistically significant (at 1% level of significance). The standard normal (z) approximation of the Wilcoxon Rank Sum test shows that the difference in median ranking of the Multi Cap and International Funds is not significant (at 1% level of significance), using either rankings obtained from Sharpe ratio or Treynor ratio.

GIII comparisons show that mean three yearly returns of Large & Mid Cap funds are less than that of Mid & Small Cap funds (at 1% level of significance), while the difference between mean expense ratios for the two funds categories is not statistically significant (at 1% level of significance).

The standard normal (z) approximation of the Wilcoxon Rank Sum test shows that the difference in median ranking of the Large Cap and Large & Mid cap Funds is significant (at 1% level of significance), using rankings obtained from both Sharpe ratio and Treynor ratio. The median ranking of fund category Large & Mid Cap Funds is more than that of fund category Mid & Small cap (at 1% level of significance) for rankings obtained from both Sharpe ratio and Treynor ratio. For both Sharpe and Treynor ratios, higher risk adjusted returns mean a better performance and for the Wilcoxon test the values of both ratios are ranked in descending order, so that a smaller rank means a better performance. So, a higher median ranking of fund category Large & Mid Cap Funds than that of fund category Mid & Small cap implies a better risk-adjusted performance ranking of fund category Mid & Small Cap.

The paper shows that in the post crises framework there is no significant difference in the mean expense ratios of different fund categories. Large& Mid cap funds have performed better than Large Cap funds if mean three yearly returns are considered but there is no evidence of better performance of Large& Mid cap funds over Large Cap funds if risk adjusted return rankings are used. There is no significant difference in performance of Multi cap funds and International Funds in the post crises scenario. However, Mid & Small cap have outperformed Large and Mid Cap funds in the post crises scenario taking into account both mean three yearly returns and risk adjusted return rankings.

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Appendices

Appendix 1 (A)

Rankings of random sample of Large Cap and Large & Mid cap Funds on the basis of Sharpe ratios

Name of the Fund	Fund category	Sharpe Ratio	Rank Assigned
UTI Equity	L	1.78	1
UTI Dividend Yield	L	1.69	2
Canara Robeco Equity Diversified	L	1.67	3
UTI Opportunities	L	1.59	4
HDFC Growth	L	1.36	5
Fidelity Equity	L	1.18	6
Franklin India Prima Plus	L	1.05	7
HDFC Top 200	L	0.83	8
ICICI Prudential Advisor-Very Aggressive	L	0.79	9
Principal Large Cap	L	0.78	10
Franklin India Flexi Cap	L	0.67	11
DWS Alpha Equity Regular	LM	0.61	6
DSPBR Top 100 Equity Reg	LM	0.61	6
HDFC Index Sensex Plus	LM	0.60	13
ING Core Equity	L	0.48	14
BNP Paribas Equity	LM	0.30	15
DSPBR Opportunities	L	0.23	16
HSBC India Opportunities	L	0.18	17
Sundaram India Leadership Reg	LM	-0.18	18
Sundaram Growth Reg	L	-0.27	19
Kotak 50	LM	-0.45	20
ING Large Cap Equity	LM	-0.74	21
ICICI Prudential SPIcE	LM	-0.75	22
IDFC Classic Equity Plan A	L	-0.77	23
DWS Investment Opportunity Regular	L	-0.91	24
ICICI Prudential Index Retail	LM	-0.92	25
Goldman Sachs Nifty ETS	LM	-0.94	26
Birla Sun Life Advantage	L	-0.96	13.5
IDFC Equity	LM	-0.96	13.5
SBI Magnum Contra	L	-1.02	28
Tata Index Nifty A	LM	-1.07	29
Taurus Bonanza	L	-1.17	30

Birla Sun Life Index	LM	-1.43	31
IDFC Imperial Equity	LM	-1.49	32
LIC Nomura MF Index Sensex	LM	-1.51	16.5
HDFC Index Nifty	LM	-1.51	16.5
Tata Index Sensex A	LM	-1.59	34
LIC Nomura MF Growth	LM	-2.19	35
LIC Nomura MF Equity	LM	-2.66	36
Baroda Pioneer Growth	LM	-2.73	37

Appendix 1 (B)

Rankings of random sample of Large Cap and Large & Mid cap Funds on the basis of Treynor ratios

Name of the Fund	Fund category	Treynor Ratio	Rank assigned
HDFC Growth	L	10.33	1
Fidelity Equity	L	9.73	2
Canara Robeco Equity Diversified	L	9.03	3
Franklin India Prima Plus	L	8.98	4
UTI Dividend Yield	L	8.34	5
UTI Opportunities	L	8.26	3
UTI Equity	L	8.26	3
HDFC Top 200	L	8.15	7
Franklin India Flexi Cap	L	7.57	8
ICICI Prudential Advisor-Very Aggressive	L	6.64	9
Principal Large Cap	L	3.55	10
HSBC India Opportunities	L	2.50	11
ING Core Equity	L	2.07	12
DWS Alpha Equity Regular	LM	1.48	13
DSPBR Top 100 Equity Reg	LM	1.44	14

HDFC Index Sensex Plus	LM	1.34	15
DSPBR Opportunities	L	1.10	16
BNP Paribas Equity	LM	0.72	17
Goldman Sachs Nifty ETS	LM	0.00	18
Sundaram India Leadership Reg	LM	-0.37	19
Sundaram Growth Reg	L	-1.14	10
Kotak 50	LM	-1.14	10
ING Large Cap Equity	LM	-1.54	21
ICICI Prudential SPIcE	LM	-1.56	22
ICICI Prudential Index Retail	LM	-1.86	23
IDFC Equity	LM	-1.98	24
Tata Index Nifty A	LM	-2.10	25
Birla Sun Life Index	LM	-2.78	26
HDFC Index Nifty	LM	-3.01	27
LIC Nomura MF Index Sensex	LM	-3.06	28
Tata Index Sensex A	LM	-3.23	29
IDFC Imperial Equity	LM	-3.77	30
Birla Sun Life Advantage	L	-4.15	31
SBI Magnum Contra	L	-4.49	32
LIC Nomura MF Growth	LM	-4.69	33
Baroda Pioneer Growth	LM	-5.60	34
Taurus Bonanza	L	-5.63	35
LIC Nomura MF Equity	LM	-5.70	36
IDFC Classic Equity Plan A	L	-33.78	37
DWS Investment Opportunity Regular	L	-51.15	38

Appendix 2 (A)

Rankings of random sample of Multi Cap and International Funds on the basis of Sharpe ratios

Name of the Fund	Fund category	Sharpe Ratio	Rank assigned
ING Global Real Estate Retail	I	3.54	1
HDFC Capital Builder	MC	2.36	2
Tata Ethical	MC	2.23	3
Tata Contra	MC	2.12	4
Principal Global Opportunities	I	2.01	5
Fidelity India Special Situations	MC	1.85	6
Birla Sun Life International Equity Plan A	I	1.82	7
Sundaram Global Advantage	I	1.71	8
Principal Dividend Yield	MC	1.70	9
AIG World Gold	I	1.66	5
HDFC Long-term Equity	MC	1.66	5
Tata Equity PE	MC	1.64	11
HDFC Core & Satellite	MC	1.62	12
Kotak Global Emerging Market	I	1.33	13
HDFC Premier Multi-Cap	MC	1.27	14
DSPBR Equity	MC	1.18	7.5
Tata Equity Opportunities	MC	1.18	7.5
DSPBR World Gold Reg	I	1.07	16
AIG India Equity Reg	MC	1.01	17
Kotak Contra	MC	0.88	18
DWS Global Thematic Offshore	I	0.81	19
ING Latin America Equity	I	0.75	20
Franklin Asian Equity	I	0.63	21
Birla Sun Life Asset Allocation Aggressive	MC	0.61	22
ING OptiMix Global Commodities	I	0.57	23
SBI Magnum Multiplier Plus	MC	0.52	24
Birla Sun Life Commodity Equities - Global Agri Ret	I	0.35	25
Mirae Asset Global Commodity Stocks	I	0.33	26
Tata Growing Economies Infrastructure Plan A	I	0.21	27
Kotak Opportunities	MC	0.18	28

Birla Sun Life Commodity Equities - Global Multi Commodity Ret	I	-0.01	29
HSBC Unique Opportunities	MC	-0.03	30
Taurus Starshare	MC	-0.05	31
HSBC Emerging Markets	I	-0.16	32
Birla Sun Life Equity	MC	-0.58	33
Birla Sun Life Commodity Equities - Global Precious Metals Ret	I	-0.60	34
Birla Sun Life Special Situations	MC	-1.48	35

Appendix 2 (B)			
Rankings of random sample of Multi Cap and International Funds on the basis of Treynor ratios			
Name of the Fund	Fund category	Treynor Ratio	Rank assigned
ING Global Real Estate Retail	I	46.70	1
Birla Sun Life International Equity Plan A	I	25.88	2
AIG World Gold	I	13.72	3
Sundaram Global Advantage	I	13.51	4
Principal Global Opportunities	I	12.79	5
DSPBR World Gold Reg	I	10.30	6
DWS Global Thematic Offshore	I	9.90	7
Kotak Global Emerging Market	I	9.08	8
Tata Ethical	MC	8.96	9
HDFC Capital Builder	MC	8.64	10
Tata Contra	MC	7.50	11
Fidelity India Special Situations	MC	6.77	12
Principal Dividend Yield	MC	6.10	13
HDFC Core & Satellite	MC	5.87	14
HDFC Long-term Equity	MC	5.79	15
Tata Equity PE	MC	5.53	16
Franklin Asian Equity	I	4.74	17
HDFC Premier Multi-Cap	MC	4.72	18
ING Latin America Equity	I	4.19	19
DSPBR Equity	MC	4.12	20
Tata Equity Opportunities	MC	4.11	21
AIG India Equity Reg	MC	4.00	22
ING OptiMix Global Commodities	I	3.58	23

Birla Sun Life Commodity Equities - Global Agri Ret	I	3.54	24
Kotak Contra	MC	3.09	25
Birla Sun Life Asset Allocation Aggressive	MC	3.05	26
SBI Magnum Multiplier Plus	MC	1.97	27
Mirae Asset Global Commodity Stocks	I	1.48	28
Tata Growing Economies Infrastructure Plan A	I	1.46	29
Kotak Opportunities	MC	0.63	30
HSBC Unique Opportunities	MC	-0.12	31
Birla Sun Life Commodity Equities - Global Multi Commodity Ret	I	-0.14	32
Taurus Starshare	MC	-0.18	33
HSBC Emerging Markets	I	-0.82	34
Birla Sun Life Equity	MC	-1.92	35
Birla Sun Life Commodity Equities - Global Precious Metals Ret	I	-4.95	36
Birla Sun Life Special Situations	MC	-5.23	37

Appendix 3 (A)			
Rankings of random sample of Large & Mid Cap and Mid & Small Funds on the basis of Sharpe ratios			
Name of the Fund	Fund category	Sharpe Ratio	Rank assigned
SBI Magnum Emerging Businesses	MS	3.66	1
Reliance Equity Opportunities	MS	3.45	2
HSBC Midcap Equity	MS	3.16	3
ICICI Prudential Discovery	MS	3.06	4
Canara Robeco Emerging Equities	MS	2.64	5
UTI Master Value	MS	2.50	6
IDFC Premier Equity	MS	2.49	7
Tata Dividend Yield	MS	2.38	8
UTI Mid Cap	MS	2.27	9
Birla Sun Life Dividend Yield Plus	MS	2.17	10
SBI Magnum Global	MS	2.07	11
Kotak Mid-Cap	MS	1.91	12
UTI Equity	LM	1.78	13
Franklin India Prima	MS	1.77	14
Sundaram Select Midcap Reg	MS	1.71	15
UTI Dividend Yield	LM	1.69	16
Canara Robeco Equity Diversified	LM	1.67	17
UTI Opportunities	LM	1.59	18

Franklin India Smaller Companies	MS	1.47	19
HDFC Growth	LM	1.36	20
L&T Midcap	MS	1.23	21
Fidelity Equity	LM	1.18	22
Franklin India Prima Plus	LM	1.05	23
Sahara Mid-Cap Fund	MS	1.04	24
Birla Sun Life Mid Cap	MS	0.97	25
ING Midcap	MS	0.96	26
Tata Growth	MS	0.93	27
HDFC Top 200	LM	0.83	28
Sahara Wealth Plus Variable Pricing	MS	0.81	29
ICICI Prudential Advisor-Very Aggressive	LM	0.79	30
Principal Large Cap	LM	0.78	31
Sundaram S.M.I.L.E. Reg	MS	0.70	32
Franklin India Flexi Cap	LM	0.67	33
Sahara Wealth Plus Fixed Pricing	MS	0.63	34
ING Core Equity	LM	0.48	35
DSPBR Opportunities	LM	0.23	36
HSBC India Opportunities	LM	0.18	37
Escorts Growth	MS	-0.24	38
Sundaram Growth Reg	LM	-0.27	39
IDFC Classic Equity Plan A	LM	-0.77	40
DWS Investment Opportunity Regular	LM	-0.91	41
Birla Sun Life Advantage	LM	-0.96	42
SBI Magnum Contra	LM	-1.02	43
Taurus Bonanza	LM	-1.17	44

Appendix 3 (B)			
Rankings of random sample of Large & Mid Cap and Mid & Small Funds on the basis of Treynor ratios			
Name of the Fund	Fund category	Treynor Ratio	Rank assigned
SBI Magnum Emerging Businesses	MS	26.54	1
ICICI Prudential Discovery	MS	18.90	2
Reliance Equity Opportunities	MS	18.40	3
IDFC Premier Equity	MS	18.26	4
Canara Robeco Emerging Equities	MS	17.42	5
Tata Dividend Yield	MS	16.12	6
SBI Magnum Global	MS	15.40	7
Birla Sun Life Dividend Yield Plus	MS	14.84	8
UTI Master Value	MS	14.43	9
UTI Mid Cap	MS	14.05	10
HSBC Midcap Equity	MS	13.93	11
Franklin India Prima	MS	11.83	12
Kotak Mid-Cap	MS	11.11	13
Sundaram Select Midcap Reg	MS	10.42	14

HDFC Growth	LM	10.33	15
Fidelity Equity	LM	9.73	16
Franklin India Smaller Companies	MS	9.32	17
Canara Robeco Equity Diversified	LM	9.03	18
Franklin India Prima Plus	LM	8.98	19
UTI Dividend Yield	LM	8.34	20
UTI Opportunities	LM	8.26	21
UTI Equity	LM	8.26	22
HDFC Top 200	LM	8.15	23
L&T Midcap	MS	7.97	24
Franklin India Flexi Cap	LM	7.57	25
Tata Growth	MS	6.77	26
ICICI Prudential Advisor-Very Aggressive	LM	6.64	27
Sahara Mid-Cap Fund	MS	6.48	28
Birla Sun Life Mid Cap	MS	6.05	29
ING Midcap	MS	5.91	30
Sahara Wealth Plus Variable Pricing	MS	5.74	31
Sahara Wealth Plus Fixed Pricing	MS	4.44	32
Sundaram S.M.I.L.E. Reg	MS	3.96	33
Principal Large Cap	LM	3.55	34
HSBC India Opportunities	LM	2.50	35
ING Core Equity	LM	2.07	36
DSPBR Opportunities	LM	1.10	37
Sundaram Growth Reg	LM	-1.14	38
Escorts Growth	MS	-1.31	39
Birla Sun Life Advantage	LM	-4.15	40
SBI Magnum Contra	LM	-4.49	41
Taurus Bonanza	LM	-5.63	42
IDFC Classic Equity Plan A	LM	-33.78	43
DWS Investment Opportunity Regular	LM	-51.15	44