

Performance Persistence of Indian Fund of Mutual Funds: With Special Reference to Bull and Bear Market Period

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Abstract: This paper examines the performance persistence of Indian Fund of Mutual Funds (FoFs) during the period from January 2nd 2007 to December 31st 2010. The entire study period classified into three sub-periods based on the movement of BSE 500 index closing value and they are named as First Bull Market Period, Bear Market Period and Second Bull Market Period. The performance of individual FoFs in each sub-period are assessed by employing the performance measures of average excess return, Sharpe ratio and Jensen's alpha. After testing the performance of the sample funds, contingency table is created by classifying the sample funds as winner or loser. Malkiel Z-test, Brown and Goetzmann Z-test and Khan and Rude Chi-square test is used to test the performance persistence of sample funds and found that the fund excel in the bull market do not expected to do well in the bear market. This study also concluded that the investors cannot earn above average risk adjusted return in the bull market period by hiring the above median performer of earlier bull market period.

Key words: Performance Persistence; Contingency table; Bull and Bear markets; Indian Fund of Mutual Funds.

JEL Classification: G01, G11, G14, G29.

1. Introduction

In finance, performance of mutual funds in one period will also continue in the next period is called as performance persistence. There are three types of performance persistence tendency in the mutual fund literature. Winning persistence is a specified tendency which occurs when a fund outperforms its competitors consecutively, i.e. winner becoming winner. Losing persistence is exists when the bad performing fund hits by further bad performance, i.e. loser becoming loser. Reversal pattern of persistence is occur when the performance distribution consist the funds being winner after losing or loser after winning.

Testing the persistence of mutual fund's performance turns out to be a center of attraction among the mutual fund investors since the past performance is a significant input into the investment decision. Thus, the performance persistence of mutual funds still stands as a controversial issue and attracts the academician and researcher towards it.

Fund of Mutual Funds (FoFs) are funds that are different from the traditional mutual funds by invest its resources in the units of other mutual funds rather than directly buying individual stocks, bonds or other securities. Hence, it offers diversification across various funds and involves additional layer of fees associated with underlying fund. It also enhanced performance persistence through management expertise and risk-return trade-off than the traditional mutual funds (Bertin and Prather, 2009). For this convenience investors prefer to pay additional cost associated with FoFs.

In India, FoFs are available to the mutual fund investors only from the end of 2003, after the amendment of Securities and Exchange Board of India (SEBI) Mutual Funds Regulations Act, 1996. As on December 31st 2010, there are 37 funds of mutual fund schemes available with the capitalization of ₹ 32.53

thousand millions. The phenomenal growth of asset under management of FoFs can be attributed to the increasing investor's interest in access the professional management for their investments.

However, the given fund may generate higher return due to higher exposure to risk on investments, or may be attributed to luck or general market boom, rather than pure skill. This aspect is particularly worrying in India because of the less matured capital market conditions, presence of high volatility in equity market, and lesser awareness among common investors. Moreover, whether the fund return is adhering to the level of risk associated with the fund may not be obvious to the investing public at large. On the other hand, the evidence of performance persistence also gives practical value to the investors, as it suggests that investors can realize abnormal returns by purchasing recently superior performing fund. Hence, examining the performance persistence of the fund is a perennial issue for potential and commitment investors.

2. Review of Literature

Several researches on mutual fund performance persistence have been done in the developed financial markets. However, emerging markets are away from the performance persistence test. In USA, Brown et al. (1992) employed the Chi-square test and cross-sectional regression approach to analyse the equity mutual fund performance persistence. They found statistically significant performance persistence for part of the study period only. Goetzmann and Ibbotson (1994) obtain the stronger result of persistence in performance with the sample of 728 mutual funds for the period 1976 – 1988. They employed both Chi-square test and cross-sectional regression to test the persistence of the funds. Khan and Rudd (1995) examined the performance persistence of U.S. equity mutual funds and fixed-income mutual funds using regression analysis and contingency tables. The evidence supported persistence only for fixed-income fund performance. Brown and Goetzmann (1995) found the clear evidence of relative performance persistence of equity mutual funds. Malkiel (1995) utilizes a unique data set, including returns from all equity mutual funds existing each year over the study period, to examine the performance persistence of equity funds. He adopts Z-test and found considerable performance persistence during 1970s, and no repeat winners existed during the 1980s.

Droms and Walker (2001) observed the short-term performance persistence for international equity funds from 1977 to 1996; however, the results of the study do not support the longer term performance persistence. Jan and Hung (2004) employed the monthly returns for the period January 1961 to June 2000 to examine the performance persistence of 3316 U.S. equity funds. They concluded that investors can benefit from selecting mutual funds on the basis of both short- and long-run performance.

Bers and Madura (2000) examine the performance persistence of 384 domestic closed-end funds in the United States. The sample includes 115 taxable bond funds, 67 equity funds, and 202 municipal bond funds. They employed the regression test to assess the persistence of performance over the periods. They found net asset value based performance persistence and market price based performance persistence for each type of closed-end fund over 12-, 24-, and 36-month holding periods. The results differ slightly between fund groups and over different holding periods. Lin and Yung (2004) confirm the short-term persistence in performance of U.S. real estate mutual fund by using the autocorrelation analysis.

In Europe, Blake and Timmermann (1998) used a large sample containing the complete return histories of 2300 United Kingdom (UK) open-ended mutual funds over a 23-year period and found some evidence of underperformance on a risk-adjusted basis and persistence of performance. Allen and Tan (1999) analysed the performance persistence of UK mutual funds with the sample of funds which are survivors over the sample period from 1989-1995. They found the strong existence of persistence for long-term period and no evidence for short-term period. Cortez et al. (1999) found quarterly performance persistence of equity mutual funds in Portuguese. Otten and Bams (2002) studied the performance persistence of 506 funds of five European countries such as U.K., France, Germany, Italy, and Netherland. They found that most European funds provide only weak evidence of persistence in performance, except for U.K. funds. Vicente and Ferruz (2005) employed the parametric and non-parametric tests to examine the performance persistence of Spanish equity funds from July, 1994 to June, 2002. They illustrated that the performance persistence were depended on the time periods of the persistence study. Babalos et al. (2007) examines the performance persistence of domestic equity funds in Greece. They found evidence of persistence for specific periods and it was not significant for the overall sample period. Casarin et al. (2008) examine the efficiency and performance persistence of 56 Italian equity funds from March 1988 to August 1999 and found no persistence on the performance of yearly intervals.

Deaves (2004) studied the persistence in performance of Canadian equity mutual funds and found the short-term performance persistence. In New Zealand, Bauer et al. (2006) examined the performance persistence of 143 funds, consisting domestic equity funds (30), international equity funds (63) and multi-sector funds (50),

for the period of 1990-2003. They found that the funds that underperform (negative alpha) in one period are most likely to underperform in the next period. However, positively out performing funds do not exhibit the persistence. Filip (2011) concluded that the long-term persistence of Hungary equity fund depended on the applied measures of performance. However, this difference is not existed when the performance measurement interval is less than one year.

In India, the central issues of performance persistence of the mutual fund were not focused to a great extent in the academic literature. However, Bijan Roy and SaikatSovan Deb (2004) examine the evidence of performance persistence of 133 open-ended Indian mutual fund schemes, over the period from January, 1999 to July, 2003. Cross-sectional regression of future excess return on a measure of past fund performance were used to measure the performance persistence. They found unfavorable evidence to the Efficient Market Hypothesis by supporting the empirical evidence that the conditional measures of past fund performance predict the future fund returns significantly. Moreover, they also found that the time-varying conditional alpha was found to be a better measure in indicating persistence in performance of Indian mutual funds.

Sanjay Sehgal and ManojJhanwar (2008) examine the short-term persistence of 59 mutual funds in Indian context by employing daily and monthly returns. They used one factor Risk Adjusted Return (RAR) based on CAPM, three factors Fama-Frence model and Carhart four-factor model to assess the performance of mutual fund schemes. They adopt zero-outlay strategies, by assuming that the investors short sells the past losers and buy the past winners with the sale proceeds, to assess the short-term persistence of the mutual fund performance. They find no evidence that confirms persistence using monthly data, based on all the performance models. But, in contradict, the performance persistence were exists in daily data based on four-factor model. However, they also concluded that the economic feasibility of the trading strategies seems doubtful due to high transaction cost.

Nevertheless, the significant lack of empirical conclusion on performance persistence of the Indian mutual fund literature is existed. Moreover, published literatures were contradicted regarding the performance persistence of mutual funds in different market under different circumstance. Hence, it is concluded that the open issues of performance persistence of Indian mutual funds may generate different results. On the other hand, the preponderance of mutual fund performance persistence studies was mainly focused on the persistence of traditional mutual funds. Despite the fact that the study of performance persistence of FoFs remains spares, largely because of limited history of FoFs returns and limited sample size. Hence, to address this imbalance, this study intends to focuses the central issue of performance persistence of Indian FoFs.

3. Data and Methodology

This empirical study covers the period from January 2nd 2007 to December 31st2010. To assess the performance persistence in the bull and bear market horizons, the total study period has been divided into three sub-periods based on the movement of BSE 500 index closing value, which is shown in Chart 1. The sub-periods are: First Bull Market Period: from 2nd January 2007 to 14th January 2008; Bear Market Period: from 15th January 2008 to 9th March 2009 and Second Bull Market Period: from 12th March 2009 to 31st December 2010.

The data set used in this study is primarily obtained from the Association of Mutual Funds in India (AMFI). To calculate the daily fund return the daily Net Asset Value (NAV) of the fund is obtained from January 2nd 2007 to December 31st2010. There are 37 open-ended FoFs schemes in operation as on December 31st2010. However, the schemes which are having track record for two sub periods were only considered for the study. This is primarily because the funds need to have returns for two periods before they can be included in the sample for the preparation of contingency table. Hence, the sample confined to 25 schemes to test whether the performance in first bull market period will persistence during the bear market and second bull market period. Similarly, whether the performance in bear market period will continue in second bull market is examined with the sample of 30 schemes. This is primarily because of 25 funds were only exist during the first bull market period to compare with the bear market and second bull market period performance. But, the available FoFs in the market increased to 30 during the bear market period hence the sample includes the all funds which are exists during the bear market. However during the study period no funds were closed.

The study uses the percentage changes of daily NAVs as a daily return (R_{it}) of FoFs which is calculated as per equation (1). However, similar to Allen and Tan (1999), and Vijayakumar et al. (2012), NAVs are adjusted by assuming dividends and other capital gains are reinvested to purchase additional units of the funds at the NAV of the ex-dividend date.

$$R_{it} = \frac{NAV_t - NAV_{t-1}}{NAV_{t-1}} \times 100 \quad (1)$$

Where,

R_{it} is the daily return of the fund i for the day t .

NAV_i is the net asset value of the fund i for the day t .

NAV_{t-1} is the net asset value of the fund i for the day $t-1$.

This paper employed the BSE 500 index as the benchmark index. The daily data related to closing value of BSE 500 Index is obtained from BSE website. The daily return of the index is calculated as the percentage of change of daily closing value of the index which is expressed in Eq.2.

$$R_{mt} = \frac{\text{Index}_{mt} - \text{Index}_{mt-1}}{\text{Index}_{mt-1}} \times 100 \quad (2)$$

Where,

R_{mt} is the return of market index for the day t .

Index_{mt} is the closing value of the BSE 500 index for the day t .

Index_{mt-1} is the closing value of the BSE 500 index for the day $t-1$.

In the earlier mutual fund literature, the t-bill rates were applied as risk-free rate of return. However, t-bill rate information is not available on daily basis. Since, the daily returns are used for empirical analysis in this study, Mumbai Inter Bank Offer Rate (MIBOR), which is available on daily basis in debt segment of NSE website, used as a proxy for risk-free rate.

3.1 Mutual fund performance models

This study employs three performance measures viz. average excess return, Sharpe ratio and Jensen's alpha and are discussed as follows:

3.1.1. Average Excess Return

The study used the percentage of changes in fund's NAV to estimate the average excess return. The average excess return of the funds is calculated as the sum of daily returns is divided by the number of observation in the particular time period, which is expressed in Eq. (3).

$$AR_{it} = \frac{\sum(R_{it} - R_{ft})}{n} \quad (3)$$

Where,

AR_i is the average excess return of the fund i for the period t .

R_{it} is the daily return of the fund i for the day t .

R_{ft} is the risk free rate i.e. MIBOR

n is the number of observation during the period.

3.1.2 Sharpe Ratio

Sharpe (1966) examined the performance of the mutual fund by ranking the funds based on the excess returns adjusted to the total risk, where the total risk is measured by standard deviation of raw returns of the fund. Thus, the risk-adjusted performance of a fund by using the Sharpe measure is calculated as

$$S_{it} = \frac{\bar{R}_{it} - \bar{R}_{ft}}{SED_{it}} \quad (4)$$

Where,

S_{it} is the Sharpe ratio of a fund i for the period t .

\bar{R}_{it} is the average return of a fund i for the period t .

\bar{R}_{ft} is the average risk-free rate of return for the period t (i.e. MIBOR).

SED_p is the standard deviation of the raw return of the fund for the period t .

3.1.3. Jensen Alpha

Jensen (1968) employs the single index CAPM to estimate the intercept (i.e. α) of the model which explains the performance of the fund that is independent of the market's performance. This model is employed in this study and expressed as:

$$R_{it} - R_{ft} = \alpha_i + \beta_i (R_{mt} - R_{ft}) + \hat{\epsilon}_{it} \quad (5)$$

Where,

α_i is the component of the fund i 's return that is independent of the market return (i.e. benchmark return).

β_i is the systematic risk which measures the expected change in the return of fund i for the given change in benchmark index return.

R_{it} is the return of the fund i for the day t .

R_{mt} is the return of the benchmark index for the day t .

R_{ft} is the risk free rate i.e. MIBOR.

$\hat{\epsilon}_{it}$ is the error term of the model which represents the residual return of the fund i for the study period.

3.2 Mutual fund Performance Persistence Models

The performance measures discussed in the previous section will be employed to estimate the performance of sample funds in all the three sub-periods. Further, they are classified as Winners (W) and Losers (L) based on their performance. Winners are the sample funds which are higher than or equal to the median performance and Losers are lower performers with respect to the median performance in each sub-period. After this classification, the two-way contingency matrix is created as "WW" (winner in successive period), "LL" (loser in successive period), "WL" (winner in first period and loser in the second period) and "LW" (loser in first period and winner in second period) which is shown below in table form:

Table 5.1 Contingency Table

Period t	Period $t+1$	
	Winner	Loser
Winner	WW	WL
Loser	LW	LL

Once the contingency table is created, Malkiel's Z-test (1995) for repeated winners, Brown and Goetzmann (B&G) (1995) Z-test for Cross Product Ratio (CPR) and Chi Square test of Kahn and Rudd (1995) are used to examine the performance persistence of the sample funds. The null hypotheses of these tests are that there is no performance persistence, i.e., there is no relationship between fund performance in one period and performance in the subsequent period.

3.2.1 Malkiel's Z – test (1995)

This test assumes that the 'p' is the probability of a winning fund and it is continued to be a winning fund in the next period. Hence, the expected value of 'p' would be equal to 1/2 if there is no persistence. Hence, the assumption of $p = 1/2$ may not be rejected when there is evidence of persistency in winning. The random variable Y is the number of persistently winning funds in a binomial distribution, where the binomial test is used to examine the probability of consistent winning, i.e. 'p', is greater than 1/2. Thus, the Z-test for repeat winner is calculated as follows.

$$Z = \frac{(y - np)}{\sqrt{np(1-p)}} \quad (6)$$

Where,

Z is the normal distribution with zero mean and standard deviation of one.

y is the number of the winner funds in two consecutive periods.

n is the sum of WW + WL.

p is the probability that a winner continues to be a winner in the next period i.e. $p = 1/2$.

On the other hand, Malkiel's Z-test may be re-written as:

$$\text{Malkiel Z-test} = \frac{WW - (0.5 \times (WW + WL))}{\sqrt{(WW + WL) \times 0.5 \times 0.5}} \quad (7)$$

It is argued when the percentage of repeat winner is higher than 50 percent and a Z value above zero, the winner funds in one period will also continue to be winners in the next period.

3.2.2. Brown and Goetzmann's (1995) Cross Product Ratio (B&G CPR)

The Brown and Goetzmann's (1995) proposed the model to assess the persistence of performance using the Cross Product Ratio (CPR) which is the product of principal diagonal cell counts to the product of the off-diagonal counts. It is computed as:

$$CPR = \frac{WW \times LL}{WL \times LW} \quad (8)$$

For the strong argument, the hypothesis of no-persistence of performance is tested using the Z-test for the CPR value suggested by Brown and Goetzmann (1995) (B&G Z-stat) which is calculated as:

$$Z = \frac{\log(CPR)}{\sigma_{\log(CPR)}} \quad (9)$$

Where,

Z-statistics has a mean of zero and standard error of one.

$\log(CPR)$ is the log value of CPR.

$$\sigma_{\log(CPR)} = \sqrt{\frac{1}{WW} + \frac{1}{WL} + \frac{1}{LW} + \frac{1}{LL}}$$

The value of CPR more than one with positive Z-statistics indicates that the winner (loser) in one period will also continue to be a winner (loser) in the next period. However, the negative persistence (i.e. winner in first period and loser in the next period and vice versa) will observe when CPR is less than one.

3.2.3. Kahn and Rudd's Chi-square (χ^2) test (1995)

In each period, fifty percent of the funds are winners and remaining funds are loser, which is because the funds are classified based on median performance of the sample funds. Hence, higher observation in the diagonal cells (top left and bottom right) in the contingency table evidenced that the winner (loser) in one period will also continue to be a winner (loser) in the next period. In this connection, to analyze the statistical significance of the persistence Chi-Square test is employed and calculated as:

$$\chi^2 = \sum_{i,j=1}^n \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \quad (10)$$

Where, O_{ij} is the actual frequency of the i^{th} row and j^{th} column in the contingency table. E_{ij} is the expected frequency for the i^{th} row and j^{th} column in the contingency table. The expected frequency is calculated by using the equivalent calculation method, hence Chi-square will be calculated as:

$$\chi^2 = \frac{(WW - \frac{N}{4})^2 + (LW - \frac{N}{4})^2 + (WL - \frac{N}{4})^2 + (LL - \frac{N}{4})^2}{N/4} \quad (11)$$

Where, N is calculated as the sum of contingency table i.e. $N = WW + LW + WL + LL$.

On the other hand, Gupta (2011) stated that the Chi-square test is appropriate for the reasonably large sample. Moreover, it is essentially a continuous distribution, though it can be applied for discrete random variables whose frequencies can be counted and tabulated with or without grouping. In this regard, Cortez et al. (1999) suggest 'Yates correction for continuity' for both the continuity approximation problem and for the small sample issue. The equation for the Yates' continuity correction is:

$$\chi^2 = \frac{(ABS(WW - D_1) - 0.5)^2}{D_1} + \frac{(ABS(LW - D_1) - 0.5)^2}{D_2} + \frac{(ABS(WL - D_1) - 0.5)^2}{D_3} + \frac{(ABS(LL - D_1) - 0.5)^2}{D_4} \quad (12)$$

Where,

ABS is the absolute value of a number, i.e. a number without considering its sign.

$D_1 = (WW + LW) * (WW + WL) / N$,

$$D_2 = (WW+LW)*(LW+LL)/N,$$

$$D_3 = (WW+WL)*(WL+LL)/N \text{ and}$$

$$D_4 = (LW+LL)*(WL+LL)/N.$$

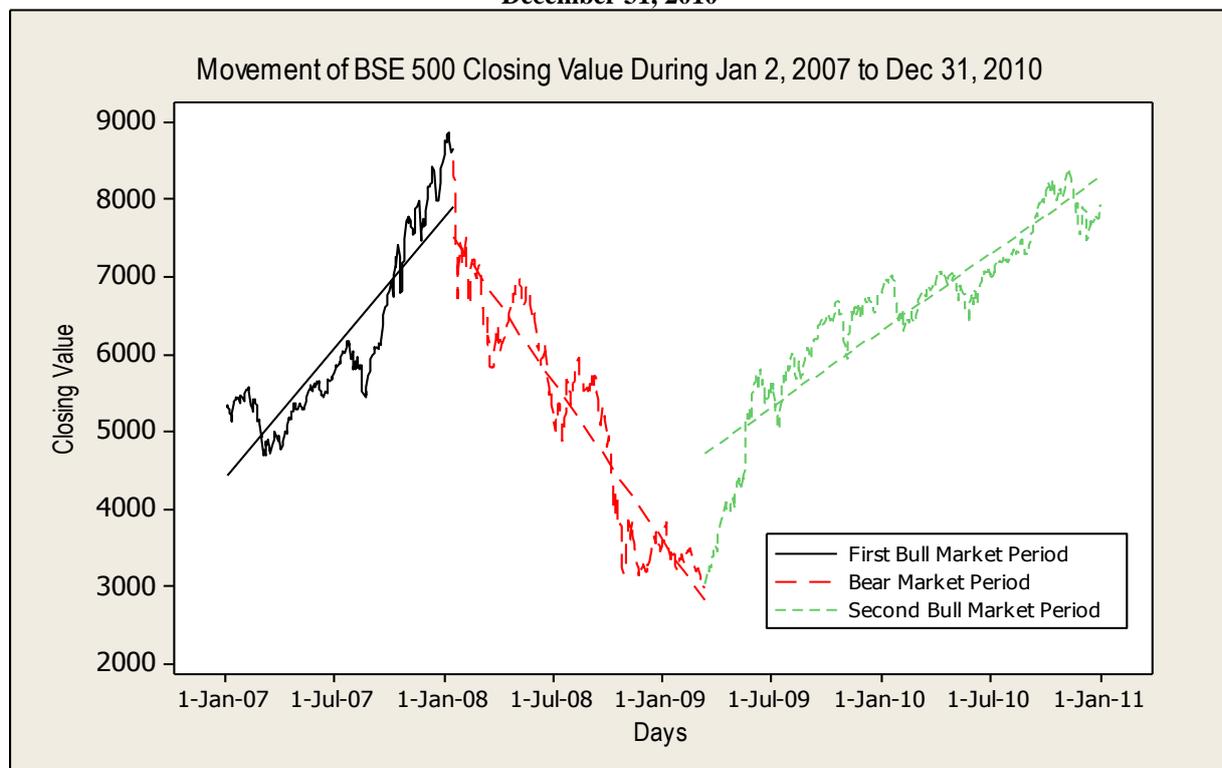
The null hypothesis of no relationship between performance in one period and performance in the next period is tested by using the above discussed models at some pre-determined confidence level.

4. Empirical Results

The movement of BSE 500 index closing value for the entire study period is presented in Chart 1. It shows the increasing trend of the index value from 2nd January 2007 to 14th January 2008. This period is known as first bull market period of the study. However, from 15th January 2008 to 9th March 2009, the index value shows decreasing trend, hence this period termed as bear market period. Again the market gets retrieval and shows increasing trend from 12th March 2009 to 31st December 2010. Hence, this period termed as second bull market period.

Table 1 discloses the descriptive statistics of the daily return of BSE 500 index and average return of selected fund of mutual funds for each sub-period. It clearly evidenced that the selected FoFs do not outperform the market index during the bull market horizons. It is also observed that both market index and FoFs gives negative return during the bear market period. Moreover, the total risk measured by standard deviation of return evidenced that the market index is associated with higher risk than the FoFs. In addition, the total risk (SD) is higher during the bear market period than the bull market period. It clearly indicates that the return of BSE 500 index is more volatile than the return of FoFs.

Chart 1: Movement of BSE 500 Index closing value during the study period from January 2, 2007 to December 31, 2010



Note: First Bull Market Period: 2nd January 2007 to 14th January 2008; Bear Market Period: from 15th January 2008 to 9th March 2009 and Second Bull Market Period: from 12th March 2009 to 31st December 2010.

Table 1: Summary Statistics for BSE 500 Index Return and Fund of Mutual Funds Returns

	Average	SD	Min	Max	Count
Panel A: First Bull Market Period 2nd January 2007 to 14th January 2008					
BSE 500 Index	0.2121	1.5368	-6.5752	5.1432	240
FoFs [#]	0.1132	0.0984	-0.0430	0.3932	
Panel B: Bear Market Period from 15th January 2008 to 9th March 2009					
BSE 500 Index	-0.3644	2.6979	-10.5105	6.9090	271
FoFs [#]	-0.1413	0.1016	-0.3004	0.0359	
Panel C: Second Bull Market Period from 12th March 2009 to 31st December 2010					
BSE 500 Index	0.2336	1.6134	-5.5903	17.0676	432
FoFs [#]	0.1242	0.0607	-0.0115	0.2141	

Note: # average of total fund of mutual funds existed during the respective periods.

Table 2 exhibits the contingency table of winner and loser successions from second column to the fifth column. The sixth column of the table shows the percentage repeat winner. From seventh column to sixteenth column demonstrates the results of Malkiel Z-test, B&G Z-test and Chi-square test with their corresponding p-values. The results are used to test the null hypothesis that the performance of one period is not related to the performance of subsequent period. The performance persistence of the sample fund is measured as per average excess return, Sharpe ratio and Jensen's alpha and shown respectively in Panel-A, Panel-B and Panel-C of the Table 2.

As per Malkiel Z-test and B&G Z-test, average excess return and Sharpe ratio exhibits negatively significant performance persistence when the bear market performance rankings are used to predict the second bull market performance rankings. It indicates the existence of reversal pattern of performance persistence i.e. the fund which outperform its peer group during the bear market period (from 15th January 2008 to 9th March 2009) become the worst performer during the second bull market period (from 12th March 2009 to 31st December 2010). However, after adjusted for systematic risk as per Jensen alpha it shows the reversal pattern of persistence but statistically not significant. It may indicate that the funds which are having great exposure to the fixed income securities during the bear market period may outperform the funds which are having high equity exposure. But it just reverses when market gets revive, i.e. high equity exposure funds outperform the funds which are having great exposure to the fixed income securities during the bull market. However, after adjusting to the systematic risk this pattern were absent.

On the other hand, when the first bull market performance is used to predict the bear market performance, the B&G Z-test and Chi-square test exhibits the significant reversal pattern of performance persistence as per average excess return. However, after adjusting the risk, the significant reversal pattern of persistence is not exists as per Sharpe ratio and Jensen alpha.

The losing persistence (high number of fund in LL column), as per average excess return, indicates that the funds which underperform during the first bull market become the loser again in second bull market also. However, there is no such kind of tendency as per Sharpe ratio and Jensen alpha.

Table 2: Contingency Table for Performance Persistence in the Bull and Bear Market Horizons

Period	WW	LW	WL	LL	Percentage repeat winner	Malkiel Z-Test	p-Value	CPR	B & G Z-Stat	χ^2 (Log)	p-Value	Chi-Sq	p-Value	Yates's Cont. Cor.	p-Value
Panel A: Average Excess Return															
1 st Bull Vs Bear	4	10	8	3	0.33	-1.15	0.248	0.15	-2.11*	0.90	0.035	4.812*	0.028	3.20	0.07
Bear Vs 2 nd Bull	2	13	13	2	0.13	-2.84*	0.005	0.02	-3.49*	1.07	0.000	16.133*	0.000	13.33*	0.003
1 st Bull Vs 2 nd Bull	8	2	4	11	0.67	1.15	0.248	11.00	2.44*	0.98	0.015	6.838*	0.009	4.86*	0.03
Panel B: Sharpe Ratio															
1 st Bull Vs Bear	5	6	7	7	0.42	-0.58	0.564	0.83	-0.23	0.81	0.821	0.051	0.821	0.03	0.84
Bear Vs 2 nd Bull	3	12	12	3	0.20	-2.32*	0.020	0.06	-3.04*	0.91	0.002	10.80*	0.001	8.53*	0.003
1 st Bull Vs 2 nd Bull	7	8	5	5	0.58	0.58	0.564	0.88	-0.16	0.82	0.870	0.027	0.870	0.06	0.81
Panel C: Jensen's Alpha															
1 st Bull Vs Bear	9	4	3	9	0.75	1.73	0.083	6.75	2.13*	0.90	0.033	4.891*	0.027	3.27	0.07
Bear Vs 2 nd Bull	6	8	9	7	0.40	-0.77	0.439	0.58	-0.73	0.74	0.466	0.536	0.464	0.13	0.71
1 st Bull Vs 2 nd Bull	2	7	10	6	0.17	-2.31*	0.021	0.17	-1.85	0.95	0.064	3.744	0.053	2.30	0.13

Note: "WW" indicates the number of funds with excess return over and above to the median return in two sub-periods. "LL" indicates the number of funds with excess return below to the median return in two sub-periods. "LW" ("WL") indicates the number of funds with excess return below (above) to the median return in first sub-period and above (below) to the median return in the second sub-period. Percentage repeat winner = $WW/(WW+WL)$. Malkiel Z-test is calculated by application of Eq. 7. Cross Product Ratio (CPR) and Brown & Goetzmann (B&G) Z-test are calculated as per Eq. 8 and Eq. 9 respectively. Chi-square and Yates's continuity correction are calculated as per Eq. 11 and Eq. 12 respectively. * denote significant at 5 per cent level.

Conclusion

This paper examines the performance persistence of Indian fund of mutual funds during the bull and bear market by covering the period from January 2nd 2007 to December 31st 2010. The entire study period has been classified into three sub-periods based on the movement of closing value of BSE 500 index. The sub-periods are termed as First Bull Market Period: from 2nd January 2007 to 14th January 2008; Bear Market Period: from 15th January 2008 to 9th March 2009 and Second Bull Market Period: from 12th March 2009 to 31st December 2010. The performance of the sample fund in each sub-period is measured with the performance measures of average excess return, Sharpe ratio and Jensen's alpha. Then, the funds are classified as winner and loser based on the median performance to create the 2×2 contingency table. After creating the contingency table, Malkiel (1995) Z-test, Brown and Goetzmann (1995) z-test and Chi-square test of Kahn and Rudd (1995) are employed to assess the persistence of funds.

The average excess return and Sharpe ratio exhibits the significant reversal pattern of performance persistence, when bear market performance is used to predict the second bull market performance. However, when the first bull market performance is used as a base, to predict the bear market and second bull market performance, no performance measures shows the significant persistence except average excess return. Moreover, average excess return also exhibits the losing pattern of persistence, i.e. loser becoming loser than the winner becoming the winner. This result clearly indicates that the capital market is efficient to the information. Hence, investors cannot expect above average risk adjusted return in bear market period and in the bull market period by hiring the above median performer of earlier bull market period.

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