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Conditional Selectivity Performance of Indian Mutual Fund Managers

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Abstract

In India, the performance evaluation of mutual fund based on the conditional model is scanty. This study focuses particularly on stock selection performance of the selected open-ended mutual fund schemes under the framework of conditional investment performance measure, over the period 2001 to 2019, by taking into consideration monthly closing NAV values. The study also considers 91-day Treasury bill rate as risk-free rate. Along with this, the study examines the difference in performances between the traditional model (unconditional) and the conditional model. The regression result is the absence of heteroscedasticity and multicollinearity problems. The time series data is also free from unit root. It is observed that the significant stock-selection performance is reduced after inclusion of public information in the conditional model, and the alpha values of the schemes are also reduced, compared to the unconditional model. The statistical test shows insignificant difference between the two measures.

Keywords: Conditional Model, Ferson, Mutual Fund, Performance Appraisal, Selectivity, Traditional Model

JEL Classification: G12, C13, C22

Introduction

Mutual fund is considered an attractive investment vehicle to the investors (Sadhak, 1997). It plays a vital role in mobilising savings from the household sector to the financial market. Therefore, it forms a link between the savings market and the capital market (Markowitz, 1952; Treynor, 1965; Sharpe, 1966; Jensen, 1968; Treynor & Mazuy, 1966; Sengupta, 1991; Sadhak, 1997; Rao & Ravindran, 2001; Narasimham & Vijaylakshmi, 2001; Ibrahim, 2004; K. Choudhary, 2007; Debasis, 2009; Afza & Rauf, 2009; Bhalla, 2005; Mansor & Bhatti, 2011; and so on). Generally, mutual fund provides the investors a reasonable return with a minimum degree of expected risk, and hence, it is a popular investment avenue for the investors at present. Therefore, performance measurement of mutual funds is an attractive topic for the researchers. Performance appraisal of a risky asset is a fundamental difficulty in finance. Generally, the portfolio performance is concerned with three dimensions, namely (i) successful prediction of security prices, (ii) efficient prediction of market movement, and (iii) minimisation of unsystematic risk through efficient diversification activities (Jensen, 1968). A considerable study on portfolio performance evaluation was made in the sixties, when relative measures were extensively used. Those studies basically focus on ranking. To solve this problem, Jensen (1968) contributed a new measure for portfolio performance. He disclosed about forecasting security prices that enhance returns and give adequate control over the riskiness of assets in the volatile market. However, most of the past studies indicate little evidence on superior stock-selection activities. Therefore, the traditional model of Jensen cannot predict the security prices correctly, and thus, the active fund managers tend to be replaced by passive fund managing activities. As a result, the growth and expansion of this industry is hampered.

Generally, the traditional measure of Jensen does not offer reasonable outcomes when risk and returns are considered constant. Due to this difficulty, a conditional measure proposed by Ferson and Schadt (1996) is used to examine the mutual fund performance that estimates risk and returns accurately. It is assumed that efficient prediction of beta directs efficient estimation of alpha. For the evaluation of portfolio performance by using conditional measure, the alpha value follows a conditional process that allows evaluating fund performance with change in time.

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This study shows the impact when conditional information is considered at the time of evaluating mutual fund performance, and possible explanations for the differences in results derived from both the measures. Most of the Indian studies apply traditional measures to assess mutual fund performance (Sharpe, 1966; Treynor, 1965; Jensen, 1968; Treynor & Mazuy; 1966; and Henrikson & Merton, 1981). Therefore, a better performance evaluation with respect to stock-selection is possible with the help of the conditional approach, than that of the traditional approaches.

The study is divided as follows: Literature review is presented in Section 2. Section 3 relates to the data and study period. Section 4 explains the objective of the study. Section 5 describes the methodology and hypothesis formulation. Results and analysis are presented in Section 6, and finally, the last section is the conclusion.

Literature Review

After the development of the portfolio selection model by Markowitz (1952), performance measurement of investment has gained immense importance. This development changes the thinking about investment performance. Thereafter, many contributors, like Sharpe (1964 & 1966), Linter (1965), Treynor (1965), Jensen (1968), Treynor and Mazuy (1966), Fama (1972), Henrikson and Merton (1981), Ferson and Schadt (1997), and Modigliani and Modigliani (1997) contributed to the advancement in this area. According to Markowitz, the procedure for selection of portfolio can be made by (i) considering probabilistic prediction of upcoming performances of the securities, (ii) analysing those portfolios to determine a competent set of portfolios, and (iii) selection of best portfolios which are assumed to be suited to the investors' preferences. However, performance evaluation of investment fund is a much-debated concern in finance, and it gets impetus by establishing CAPM independently by SLM (1964, 1965 & 1966), by extending the work of Markowitz. They argue that returns from efficient risky asset mixture go collectively absolutely. This can result from their common dependence on general economic activity. If it happens, then investors can diversify risk among the risky assets to make their portfolios efficient. Markowitz says that the investors give importance to beta risk and not the overall risk.

Here, financial economists establish various normative theories after due consideration of risk for asset selection. Tobin (1958) shows that under certain conditions the investment choice process can be divided into two parts, namely the selection of a exceptional best possible blend of risky assets, and a separate choice regarding the distribution of assets among such a combination and along with a solitary riskless asset. Hicks (1972) applies the Tobin's approach and concludes about the behaviour of the individual investor and also deals with the nature of the conditions under which the procedure of investment option can be dichotomised. Gordon and Gangolli (1962) present a smooth discussion about this procedure that includes a meticulous corroboration regarding choice among lotteries. However, most of the academicians exercise almost similar models regarding investor activities, but none of them try to extend to form a market equilibrium theory of asset prices under condition of risk.

In 1966, Sharpe contributed a well-known study for mutual fund performance. In the area of investment performance, Treynor (1965) developed a risk-adjusted measure. This measure is different from others, because he includes the volatility term in a simple way. Sharpe (1964) expanded Treynor's effort by including the total risk in place of beta risk. The measure is popularly known as R/V ratio or reward to variability ratio. The study shows that the investors get less returns compared to the D-J industrial average. Although, Arditti, in 1971, argued that inclusion of a relevant factor in the decision-making process may lead to a change in Sharpe's conclusion.

There are two different aspects at the time of evaluating portfolio performance. One is to enhance returns through efficient estimation of security prices, and the other is to reduce the degree of unsystematic risk through the activities of proper diversification. Large numbers of studies have evaluated the performance of portfolios. Almost all of those studies have dealt with relative measures of performance, and are mainly confined to the ranking of portfolios. Hence, the past studies cannot quantify the element of risk and its control. In 1968, Jensen introduced a more efficient portfolio performance technique that helps to measure manager's efficiency with stock selection, and provides control over risk. Jensen is concerned about addition of value by the fund managers. The CAPM does not accommodate this possibility. Here, he adds alpha in the CAPM. The measure just allows for the opportunity, to test for it.

The stock selection performance gained momentum after the establishment of Jensen's measure. Although the evidence of some studies are consistent with Jensen, the results of many studies are different. In some cases, the managers have provided negative alphas, which indicate inefficiency in stock-selection performance (see Kon & Jen, 1978; Chang & Lewellen, 1984; Lee & Rahman, 1990; Drew et al., 2002; Iqbal & Qadeer, 2012; Joydev, 1996; Gupta & Seghal, 1998; Roy & Ghosh, 2011; and so on). Many studies have also provided favourable selectivity performances (Athanassakas et al., 2002; Moreno et al., 2003; Artikis, 2004; Kader & Kuang, 2007; Mansor & Bhatti, 2011; Koulis, 2011; M. Joydev, 1996; Gupta & Seghal, 1998; R. Chandra, 2005; Jain & Sandhi, 2006; Roy & Ghosh, 2011; and so on). The significant alpha depends on the efficiency of the managers, which generates higher returns. Although, many studies provide little evidence regarding selectivity (see Graham & Harvey, 1996; Redman et al., 2000; Artikis, 2004; Kososki & Timmerman, 2006; Chandra, 2002).

The Jensen measure faces similar criticism to Treynor's measure. It becomes negative during market timing and fails to offer real performances of the managers. Treynor and Mazuy (1966) developed a performance evaluation of the portfolio model, after taking into consideration the variation of beta, which is not explored here. Yet, alpha is still extensively used to assess mutual fund performance.

Due to the criticism at the theoretical and practical level, the traditional performance measurement provides disappointing results because of the assumption of constant risk and returns over time. However, practically, it is not so. In fact, those techniques characterise an unconditional approach because they do not consider the dynamic nature of the state of the economy at the time of estimation of expected returns and risk (Leite & Cortez). In reality, risk and returns change with the change in time. Therefore, conventional measures sometimes provide incorrect estimates due to constant risk and returns supposition.

Fama and French (1989), Ilmanen (1995), Pesaran and Timmermann (1995), and Silva, Cortez and Armada (2003) opine that inclusion of pertinent variables in the CAPM model may improve portfolio performance. This type of information is publicly available and permitted for the appraisal of the state of the economy; the investors can frequently utilise them and be informed about the anticipated returns. Farnsworth (1997) says that conditional method works when publicly available information is included in the CAPM model for returns generation, under the assumption of time varying risk and returns; it provides satisfactory returns than the traditional measure (see Ferson & Schadt, 1996; Ferson & Warther, 1996; Chen & Knez, 1996; Christopherson, Ferson & Glassman, 1998; Christopherson, Ferson & Turner, 1999; Ferson & Qian, 2004). According to Otten and Bams (2004), conditional measure produces satisfactory outcomes from the economic point of view and allows investors to evaluate the performance of the managers.

The USA has widely studied the fund managers' performances based on conditional measures. In India, the exploration of conditional investment performance remains scarce. There are very few studies that examine mutual fund performance by employing the conditional model (Roy & Sovan, 2000; Shanmugham & Zabiulla, 2011). The findings of those studies, in relation to the bulk of other experiential studies, is that conditional stock-selection performance is better than the unconditional performance.

Data and Study Period

The study examines mutual fund performance based on results of a sample of open-ended income type of mutual fund schemes of Unit Trust of India (UTI). The study uses closing monthly net asset value of sample mutual fund schemes. Initially, 38 open-ended income mutual fund schemes of UTI were considered, and finally, 21 were selected after the exclusion of schemes which have been in mutual fund operation for less than three years. It is observed that some of the schemes have stopped their operations during the study period taken into consideration. The data on net asset value (NAV) is used to examine the performance. The preference for use of such data over price data is guided by the consideration that these are not affected by the double incidence of market volatilities. The information of NAV is obtained from secondary sources like amfiindia.com, websites of respective mutual funds, mutualfundindia.com, and so on. The respective sources are crossed-checked with other sources for ensuring validity of the data. BSE Sensex is considered a benchmark for comparison of performances of the investments, and the monthly closing value is taken from its official website. The study considers 91-day Treasury bill rate as a proxy of risk-free rate; it is obtained from various RBI reports. The study also considers exchange rate of rupee-dollar, inflation rate, and yields of BSE Sensex as public information; these are obtained from the respective official websites. This public information is called a set of vector. Finally, the study period ranges between 1 January 2001 and 31 December 2019, which is 19 calendar years.

Objective of the Study

The study is designed to achieve the conditional stock-selection performance of the sample mutual fund schemes over a period of 19 years, and to compare the performance with the traditional measures and identify the best measure.

Methodology

Method is a technique for solving a difficulty that creates knowledge. It can be divided into two forms: (i) quantitative and (ii) qualitative, by which information is treated accordingly (Holme & Solvang, 1997). This study is quantitative in nature. A large number of data are obtained and analysed to find out a relationship.

The performance evaluation of a risky investment is the central problem in finance. The evaluation of investment performance is mainly concerned with (i) security prices prediction and returns maximisation, (ii) minimisation of risk through proper diversification, and (iii) optimum returns through market movement prediction. In the literature of finance, many studies have dealt with the issue of investment performance, but encountered the problems of nature and measurement of risk. The past evidence suggests predominance of risks in the capital market and the investors perceive that higher returns of investments are caused by higher risks. In 1968, M.C. Jensen contributed a new measure of investment performance by specifying the problems of evaluating the predictive abilities of the portfolio managers with regard to efficient selection of security prices from the volatile market, which ultimately provides higher returns at a minimum expected risk.

It is well known that the Jensen measure is based on CAPM. Jensen opines that security price can be predicted accurately through alpha. Jensen alpha is the differential return between the return of the portfolio in excess of the RFR (risk-free rate) and the return of the benchmark index (market portfolio); it is stated as follows:

$$E(R_i) - RFR = \alpha_i + \beta_i(E(R_m)) - RFR \qquad (1)$$

The linear regression equation is estimated with the help of SPSS (Statistical packages of Social Sciences). Here, a disturbance term is included in equation 1 and then estimated as follows:

$$R_{it} - RFR_t = \alpha_{it} + \beta_i(R_{mt} - RFR_t) + \varepsilon_{it} \qquad (2)$$

Where, R_{it} denotes return of i^{th} mutual fund scheme at time t.

R_{mt} indicates return of the market at time t, and RFR_t is the risk-free rate of return at time t.

α_i is the intercept term, popularly known as Jensen alpha, and β_i (Beta) is the beta coefficient or measure of systematic risk of i^{th} mutual fund scheme to be estimated.

ε_{it} is the error term with zero mean and constant standard deviation, with the following properties: $E(\varepsilon_{it}) = 0$, $Var(\varepsilon_{it}) = \sigma^2 \varepsilon_{it}$, and $Cov(\varepsilon_{it,} \varepsilon_{ij}) = 0$.

The average value of return and beta is computed during the evaluation period unconditionally, without considering the dynamic nature of the financial market. On the other hand, conditional measure considers the above situation and estimates risk and returns with better accuracy, by considering important variables.

However, this approach is based on the conditional version of CAPM that supports a semi-strong form of market efficiency, where influence of valuable information is present in a small way; this was described by Fama in 1970.

According to the conditional version of the CAPM, the returns of a mutual fund scheme can be defined as follows:

$$R_{i,t+1} = \beta_{im}(N_t)R_{m,t+1} + \varepsilon_{i,t+1} \qquad (3)$$

With: $E(\varepsilon_{i,t+1} / N_t) = 0$ and $E(\varepsilon_{i,t+1,} R_{m,t+1} / N_t) = 0 \qquad (4)$

N_t denotes the vector that represents a set of public information at time t.

Here, $\beta_{im}(N_t)$ in equation 4 is conditional beta, which depends on N_t. Therefore, beta varies over time, due to certain factors. Regression equation 4 does not consider the alpha term due to the use of information variables. The disturbance term is independent and this leads to efficient market hypothesis (EMH).

The recognition of portfolio returns is identified by asset returns relationship under the postulation of the use of public information by the investors, and thus, beta (β_{im}) depends on N_t. Here, a linear equation is set for approximation of beta, as follows:

$$\beta_{im}(N_t) = b_{0i} + B_i n_t \qquad (5)$$

Where, b_{0i} denotes average beta that relates to the unconditional mean of the conditional beta, as follows:

$$b_{0i} = E(\beta_{im}(N_t)) \qquad (6)$$

B_i is the response coefficient of the conditional beta, with extent to N_t. Where, n_t represents the vector of the differentials of N_t compared to its mean, as follows:

$$n_t = N_t - E(N) \qquad (7)$$

Now, it is possible to formulate a conditional measure of portfolio performance, by taking into consideration the above equations, as follows:

$$R_{i,t+1} = b_{0i}R_{m,t+1} + B_i n_t R_{m,t+1} + \varepsilon_{i,t+1} \qquad (8)$$

With the properties of $E(\varepsilon_{i,t+1} / N_t) = 0$ and $E(\varepsilon_{i,t+1}R_{m,t+1} / N_t) = 0$

The stochastic factor of the above measure is a linear function of the market returns in excess of the RFR or minimum acceptable rate (or R_f), where the coefficients of the above model depend on public information N_t.

The above measure is proposed by Ferson & Schadt (1996) and thus, developed with the help of the traditional performance measure that came from CAPM, to be applied by incorporating a time component. The risk and returns of a portfolio can be predicted more correctly by using the CAPM version of conditional performance evaluation measure.

The traditional measure (or unconditional measure) of Jensen cannot offer satisfactory outcomes when risk and returns are assumed to be constant. Keeping this in mind, the conditional model of Ferson and Schadt (1996) may be able to solve this difficulty, and thus, for mutual fund performance evaluation, α_{ci} is included in the equation, as follows:

$$R_{i,t+1} = \alpha_{ci} + b_{0i}R_{m,t+1} + B_i n_t R_{m,t+1} + \varepsilon_{i,t+1} \qquad (9)$$

Here, α_{ci} denotes mean return difference between the surplus returns of the mutual fund scheme and the excess returns from the reference strategy. Hence, the above equation estimates alpha in a better way, and thus, the investment manager generates satisfactory returns with a significant alpha.

So, determination of information is an important task in conditional measure. The study uses macroeconomic indicators like dividend yield of the market index (DY_t), 91-day T-Bill rate (TB_t), inflation rate (FL_t), and rupee-dollar exchange rates (EX_t). Here, dy_t, tb_t, fl_t and ex_t denote mean difference of actual value from the expected, and can be shown as follows:

$$dy_t = DY_t - E(DY),\ tb_t = TB_t - E(TB),\ fl_t = FL_t - E(FL) \text{ and } ex_t = EX_t - E(EX) \qquad (10)$$

Now, the association can be shown as follows:

$$n_t = \begin{bmatrix} dy_t \\ tb_t \\ fl_t \\ ex_t \end{bmatrix} \text{ and } B_i = \begin{bmatrix} b_{1i} \\ b_{2i} \\ b_{3i} \\ b_{4i} \end{bmatrix} \qquad (11)$$

The equation of conditional beta is:

$$b_i = b_o + b_1 dy_t + b_2 tb_t + b_3 fl_t + b_4 ex_t \qquad (12)$$

Consequently, the Jensen measure in conditional framework can be shown as follows:

$$R_{i,t+1} = \alpha_{ci} + b_{0i}R_{m,t+1} + b_{1i}dy_t R_{m,t+1} + b_{2i}tb_t R_{m,t+1} + b_{3i}fl_t R_{m,t+1} + b_{4i}ex_t R_{m,t+1} + \varepsilon_{i,t+1} \qquad (13)$$

Where, α_{ci} measures conditional selectivity performance, b_{oi} denotes conditional beta coefficient, and b_{1i}, b_{2i}, b_{3i}, and b_{4i} are the variations in conditional beta coefficient to be estimated. So, estimation of the beta efficiently allows one to efficiently estimate the alpha, which follows conditional procedure, and hence, the association shown by the conditional alpha is as follows:

$$\alpha_{ci} = V_i(n_t) = V_{i0i} + \gamma_i n_t \qquad (14)$$

So, the equation that permits Jensen alpha is:

$$R_{i,t+1} = V_{i0i} + \gamma_i n_t + b_{0i}R_{m,t+1} + B_i n_t R_{m,t+1} + \varepsilon_{i,t+1} \qquad (15)$$

Again, after consideration of the information variables, the alpha coefficient can be written as:

$$\alpha_{ci} = \nu_{0i} + \gamma_{1i}dy_t + \nu_{2i}tb_t + \nu_{3i}fl_t + \nu_{4i}ex_t,$$

$$\text{with } \nu_i = \begin{bmatrix} \nu_{1i} \\ \nu_{2i} \\ \nu_{3i} \\ \nu_{4i} \end{bmatrix} \qquad (16)$$

Now, selectivity performance in conditional framework can be shown as:

$$R_{i,t+1} = V_{0i} + V_{1i}dy_t + V_{2i}tb_t + V_{3i}fl_t + V_{4i}ex_t + b_{0i}R_{m,t+1} + b_{1i}dy_tR_{m,t+1} + b_{2i}tb_tR_{m,t+1} + b_{3i}fl_tR_{m,t+1} + b_{4i}ex_tR_{m,t+1} + \varepsilon_{i,t+1} \quad (17)$$

Here, V_{1i}, V_{2i}, V_{3i}, and V_{4i} are the coefficients to be estimated.

The conventional Jensen's measure may not be able to estimate the alpha properly; however, the conditional measure helps eliminate the above issue. Thus, it the superiority of Jensen alpha may be tested based on the two measures, and thus, the hypothesis is formulated for testing.

H_0: No difference between conventional and conditional alphas.

H_a: There is a difference.

Thus, z-statistic is used for testing.

$$z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{\sigma^2 s_1}{n_1}} + \sqrt{\frac{\sigma^2 s_2}{n_2}}}$$

Where, $\bar{x}_1$ is the average selectivity performance based on the conditional model, $\bar{x}_2$ is the average selectivity performance based on the unconditional model, $\sigma^2 s_1$ is the standard deviation of selectivity performance of sample one (conditional model), $\sigma^2 s_2$ is the standard deviation of selectivity performance of sample one (unconditional model), n_1 is the number of observations in sample one, and n_2 is the number of observations in sample two.

The study uses Jarque-Bera test statistic for testing normality, and thus, skewness and kurtosis are computed. Skewness measures the symmetry of the distribution, whereas kurtosis implies the peakedness of the distribution. The J-B statistic is computed as follows:

$$JB = n\left[\frac{S^2}{6} + \frac{(K-3)^2}{24}\right] \quad (18)$$

Where, n = number of observations, S = skewness of the residuals, K = kurtosis of the residuals.

The unit root test is conducted with this regression equation:

$$\Delta R_{i(t)} = \delta R_{i(t-1)} + \mu_t \quad (19)$$

Where, $\delta = (\rho-1)$ and Δ, as usual, is the first-difference operator. In practice, it is tested that the (null) hypothesis $\delta = 0$. If $\delta = 0$, then $\rho = 1$, that is a unit root, meaning the time series under consideration is non-stationary. Now, let us turn to the estimation of the above regression equation. First difference is taken of $R_{i(t)}$ and then regress on $R_{i(t-1)}$; it is checked if the estimated slope coefficient in this regression ($= \hat{\delta}$) is 0 or not. If it is zero, it may be concluded that $R_{i(t)}$ is non-stationary. However, if it is negative, then $R_{i(t)}$ is stationary. Dickey and Fuller show that under the null hypothesis, δ = zero (0) and the estimated 't' value of the coefficient of $R_{i(t-1)}$ in the above regression equation follows the ĭ (tau) statistic. The critical value of tau statistic is computed based on Monte Carlo simulations. In the literature, the tau statistic is known as Dickey-Fuller (DF) test. The actual procedure of implementing the DF test involves several decisions. Here, random walk model with drift is considered, as follows:

$R_{i(t)}$ is a random walk with drift: $\Delta R_{i(t)} = \alpha_i + \delta R_{i(t-1)} + \mu_t$ (20)

Where, t is the time or trend variable. $\delta = 0$ is the null hypothesis (presence of unit root or non-stationary). The alternative hypothesis is that δ is less than 0 (time series is stationary). If the null hypothesis is rejected, it means $R_{i(t)}$ is stationary with a non-zero mean [$= \beta_i / (1-\rho)$]. It is extremely important to note that the critical value of the tau test to test the hypothesis that $\delta = 0$, is different for the above specification of the DF test. The actual estimation procedure is as follows: estimate the above equation (with drift) by OLS; divide the estimated coefficient of $R_{i(t-1)}$ by its standard error to compute the tau statistic, and refer to the table value of DF. The null hypothesis is rejected if the computed tau statistic (|ĭ|) exceeds the DF, and vice-versa.

The autocorrelation problem is corrected by applying the Durbin-Watson (d) test statistic, which is:

$$d = \frac{\sum_{t=2}^{t=n}\left(\hat{\mu}_t - \hat{\mu}_{t-1}\right)^2}{\sum_{t=1}^{t=n}\hat{\mu}_t^2} \quad (21)$$

It is assumed that disturbances in the regression equation follow homoscedasticity, meaning that they have equal variances; however, in reality, it does not happen, due to the heteroscedasticity issue. The problem of heteroscedasticity can be tested by applying different models. The study uses White's (1980) general heteroscedasticity test, and thus, residuals are estimated from the original regression model. The squared residuals are then regressed on the original independent variables, their squared values, and the cross product(s) of the regressors. R^2 value is computed from the auxiliary regression equation, which follows χ^2 distribution:

$$n.R^2 \sim \chi^2 df$$

If the value of chi-square goes above the critical chi-square value at the chosen level of significance, then heteroscedasticity exists; if the opposite happens, then there is no heteroscedasticity. This may be shown as $\alpha^2 = \alpha^2 = \alpha^2 = \alpha^2 \ldots\ldots\ldots. = 0$ (see footnote[1]).

The term multicollinearity is due to Ragnar Frisch[2], which implies the presence of an exact linear relationship among the variables in a regression model[3]. In this study, the problem of multicollinearity has been tested to observe the individual effect of independent variables on stock-selection performance. In the present study, R^2, VIF, and TOL are used to check for the multicollinearity problem.

The returns of the mutual fund schemes and the market is obtained using the below formulas:

$$R_{i,t} = \log \frac{NAV_{i,t}}{NAV_{i,t-1}}$$

$$R_{m,t} = \log \frac{Market\ Index_t}{Market\ Index_{t-1}}$$

Where, R_{it} is the logarithm return of the i^{th} mutual fund scheme at the end of month t. $NAV_{i,t}$ is the net asset value of i^{th} scheme at month t, and $NAV_{i,t-1}$ is the net asset value of the i^{th} scheme at the end of the previous month t-1. R_{mt} is the logarithm return of the market.

Result and Analysis

Table 1 reports the descriptive statistics of monthly returns series of the individual schemes. The returns of the schemes during the study period vary between −50.3553 and 58.967. The mean returns of the schemes are different from zero. The skewness of the return distribution of the schemes is also different from zero, and somewhere, they indicate long left and right tails compared to the right one. The value of kurtosis of the individual schemes is greater than three, which indicates a heavy tail and the distribution of the schemes' returns series are leptokurtic; the computed J-B statistic of the individual returns series of the schemes are far different from zero (J-B > 0), which confirms rejection of null hypothesis, which means non-normality of returns distribution.

Table 1: Descriptive Statistics

Dependent Variable	*OB*	*Mean*	*Median*	*Max*	*Min*	*St. Dev.*	*Skewness*	*Kurtosis*	*JB*
UTI-Bond Fund-Growth	216	0.6436	0.5438	4.0789	−1.7166	0.7203	1.112	4.862	50.4793
UTI-Bond Fund-Income	145	−0.0492	0.1523	8.3964	−21.243	2.2663	−6.071	57.076	6527.23
UTI-Senior citizen unit plan	216	0.8245	0.6826	8.8316	−6.5522	2.3187	0.550	3.910	12.2286
UTI-Retirement benefit pension fund	216	0.1176	0.1831	6.5300	−16.804	2.7492	−2.851	16.041	1215.48
UTI-Mahila unit scheme	155	1.9278	0.9139	58.967	−36.8138	8.9807	2.897	31.327	2264.13
UTI-CRTS 81-Dividend option	220	0.3503	0.3092	5.0499	−4.8539	1.4572	−0.403	3.319	4.0388

[1] Implied in this procedure is the assumption that the error variance of μ_i, σ^2_i, is functionally related to the regressors, their squares, and their cross products. If all the partial slope coefficients in this regression are simultaneously equal to zero, then the error variance is the homoscedastic constant, equal to α_1.

[2] Ragnar Frisch, Statistical Confluence Analysis by means of Complete Regression Systems, Institute of Economics, Oslo University, Publ. no. 5, 1934.

[3] Multicollinearity refers to the existence of more than one exact linear relationship and collinearity refers to the existence of a single linear relationship. However, this distinction is rarely maintained in practice, and multicollinearity refers to both cases.

Dependent Variable	OB	Mean	Median	Max	Min	St. Dev.	Skewness	Kurtosis	JB
UTI-Unit linked Insurance plan	220	0.2568	0.2303	7.6970	−12.2165	2.7117	−1.171	4.646	43.7028
UTI-CC balanced fund	220	0.0850	0.4234	5.2021	−8.6808	2.8922	−1.217	1.934	37.6571
UTI-MIS-Growth	210	2.7124	7.7480	15.166	−50.3553	17.0781	−2.628	5.509	171.016
UTI-MIS-Income	210	0.1117	0.1802	3.5700	−2.0888	0.6949	0.549	5.387	34.8045
UTI-CCP-Bond-Growth	198	0.5591	0.3453	8.0831	−9.4119	1.8888	3.568	10.258	466.204
UTI-CCP-Bond-Income	198	0.5565	0.4176	8.0871	−9.4119	1.7397	−0.852	12.891	453.309
UTI-Bond Advantage Institutional-Bonus	190	0.5716	0.4199	4.3186	−0.4094	0.7244	3.069	13.217	597.844
UTI-Bond Advantage-UBA-Annual Div	190	0.4193	0.2835	6.1781	−4.0503	1.4402	0.960	5.051	33.2164
UTI-Bond Advantage-UBA-Bonus	190	0.5459	0.4041	2.7649	−0.3687	0.4749	1.848	4.922	73.0335
UTI-Bond Advantage-UBA-Growth	190	0.5467	0.3967	4.1252	−0.1978	0.5832	3.128	14.552	726.300
UTI-Bond Advantage-UBA-Quarterly Div	190	0.3302	0.3173	1.6943	−1.4427	0.4270	0.081	4.120	5.3894
UTI-MIS-Advantage-Flexi Dividend	190	0.8262	0.5793	3.7634	−1.8576	0.9618	0.384	1.083	17.9473
UTI-MIS-Advantage-Growth	190	0.8261	0.6273	3.3828	−1.8556	0.9627	0.357	0.811	22.3106
UTI-MIS-Advantage-Monthly Dividend	190	0.2762	0.1850	2.5231	−2.3876	1.0151	−0.006	0.523	25.8210
UTI-MIS-Advantage-Monthly payment	190	0.8265	0.6485	3.9176	−1.8566	0.9685	0.628	0.971	23.9638

Similarly, the distribution of the time series data of the independent variables is reported in Table 2; there is non-normal distribution.

Table 2: Summary Statistics of the Independent Variables

Variable	OB	Mean	Median	Max	Min	St. Dev.	Skewness	Kurtosis	JB
Dy	216	1.5794	1.5266	2.52	0.85	0.417	0.329	−0.963	96.83
Tb	216	0.3739	0.6024	59.19	−39.65	9.1724	0.531	15.644	965.995
Fl	216	2.4207	2.5333	5.60	−2.1	1.3529	−0.716	1.337	28.8972
Ex	216	0.2019	0.5393	7.16	−6.8	2.2252	0.545	2.291	10.1447
Rm	216	1.4496	0.9457	49.94	−30.24	9.0680	0.578	6.366	75.9978

The empirical work based on the time series data assumes that the underlying time series is stationary. The outcome is reported in Table 3. It is found that tau statistic (|τ|) of ten schemes are higher than the DF value at 95% confidence interval, meaning there is an absence of unit root problem.

Table 3: Stationarity Test

Sr. No.	Scheme Name	Estimated Coefficient	Standard Error	Tau (τ) Statistic	DF Statistic
1	UTI-Bond Fund-Growth	0.547	0.080	6.838	−2.89
2	UTI-Bond Fund-Income	−0.042	0.190	−0.211	−2.89
3	UTI-Senior citizen unit plan	0.676	0.346	1.954	−2.93
4	UTI-Retirement benefit pension fund	−0.599	0.746	−0.803	−2.89

Sr. No.	Scheme Name	Estimated Coefficient	Standard Error	Tau (τ) Statistic	DF Statistic
5	UTI-Mahila unit scheme	1.129	0.341	3.311	−2.93
6	UTI-CRTS 81-Dividend option	0.309	0.134	2.306	−2.89
7	UTI-Unit linked Insurance plan	0.246	0.245	1.004	−2.89
8	UTI-CC balanced fund	0.043	0.250	0.172	−2.89
9	UTI-MIS-Growth	2.839	1.572	1.806	−2.89
10	UTI-MIS-Income	0.105	0.065	1.615	−2.89
11	UTI-CCP-Bond-Growth	0.520	0.193	2.694	−2.89
12	UTI-CCP-Bond-Income	0.471	0.177	2.661	−2.89
13	UTI-Bond Advantage Institutional-Bonus	0.359	0.087	4.126	−2.89
14	UTI-Bond Advantage-UBA-Annual Div	0.520	0.148	3.514	−2.89
15	UTI-Bond Advantage-UBA-Bonus	0.368	0.070	5.257	−2.89
16	UTI-Bond Advantage-UBA-Growth	0.534	0.081	6.593	−2.89
17	UTI-Bond Advantage-UBA-Quarterly Div	0.254	0.052	4.885	−2.89
18	UTI-MIS-Advantage-Flexi Dividend	0.717	0.127	5.646	−2.89
19	UTI-MIS-Advantage-Growth	0.728	0.128	5.688	−2.89
20	UTI-MIS-Advantage-Monthly Dividend	0.222	0.104	2.135	−2.89
21	UTI-MIS-Advantage-Monthly payment	0.804	0.129	6.233	−2.89

The problem of heteroscedasticity is recognised in the regression equation, and thus, White's heteroscedasticity test is applied and the results are depicted in Table 4. According to the White test, if the Chi-square value obtained from auxiliary regression equation exceeds the critical Chi-square value at the chosen level of significance, then there is a presence of heteroscedasticity. The table reports an absence of the heteroscedasticity problem.

Table 4: Test of Heteroscedasticity

Sr. No.	Scheme's Name	R^2	Computed $\chi 2$	Table Value (5% Sig. Level)
1	UTI-Bond Fund-Growth	0.062	8.928	19.6751
2	UTI-Bond Fund-Income	0.052	2.652	19.6751
3	UTI-Senior citizen unit plan	0.167	18.256	19.6751
4	UTI-Retirement benefit pension fund	0.028	4.032	19.6751
5	UTI-Mahila unit scheme	0.159	10.335	19.6751
6	UTI-CRTS 81-Dividend option	0.083	10.707	19.6751
7	UTI-Unit linked Insurance plan	0.083	12.032	19.6751
8	UTI-CC balanced fund	0.083	12.032	19.6751
9	UTI-MIS-Growth	0.094	19.360	19.6751
10	UTI-MIS-Income	0.094	19.280	19.6751
11	UTI-CCP-Bond-Growth	0.160	11.340	19.6751
12	UTI-CCP-Bond-Income	0.205	11.340	19.6751
13	UTI-Bond Advantage Institutional-Bonus	0.105	10.605	19.6751
14	UTI-Bond Advantage-UBA-Annual Dividend	0.105	10.605	19.6751
15	UTI-Bond Advantage-UBA-Bonus	0.105	10.605	19.6751
16	UTI-Bond Advantage-UBA-Growth	0.105	10.605	19.6751
17	UTI-Bond Advantage-UBA-Quarterly Dividend	0.105	10.605	19.6751
18	UTI-MIS-Advantage-Flexi Dividend	0.105	10.605	19.6751
19	UTI-MIS-Advantage-Growth	0.105	10.605	19.6751
20	UTI-MIS-Advantage-Monthly Dividend	0.105	10.605	19.6751
21	UTI-MIS-Advantage-Monthly payment	0.105	10.605	19.6751

The result of multicollinearity is presented in Table 5. It is observed that the R^2 values of the schemes are lower than the standard (0.800, see Gujrati, 2004); this means an absence of the multicollinearity problem. The study also uses VIF technique to test multicollinearity. It was found that the range of VIF is between 1 and 1.0471 (i.e., less than 10), which means collinearity is not a problem for the individual schemes. Tolerance is also used to examine the problem of multicollinearity. It was observed that TOL ranges between 0.717 and 1, which is higher than the standard TOL value (0.20); this means an absence of such a problem. Hence, this test clearly demonstrates the fact that the regression models used in the present study are free from the problem of multicollinearity.

Table 5: Test of Multicollinearity

Sr. No.	*Scheme's Name*	R^2	*TOL*	*VIF*
1	UTI-Bond Fund-Growth	0.021	0.979	1.0214
2	UTI Bond Fund-Income	0.000	1	1
3	UTI-Senior citizen unit plan	0.283	0.717	1.3947
4	UTI-Retirement benefit pension fund	0.000	1	1
5	UTI-Mahila unit scheme	0.008	0.992	1.0081
6	UTI-CRTS 81-Dividend option	0.020	0.980	1.0204
7	UTI-Unit linked Insurance plan	0.043	0.957	1.0449
8	UTI-CC balanced fund	0.045	0.955	1.0471
9	UTI-MIS-Growth	0.001	0.999	1.001
10	UTI-MIS-Income	0.028	0.972	1.0288
11	UTI-CCP-Bond-Growth	0.016	0.984	1.0162
12	UTI-CCP-Bond-Income	0.033	0.967	1.0341
13	UTI-Bond Advantage Institutional-Bonus	0.035	0.965	1.0362
14	UTI-Bond Advantage-UBA-Annual Dividend	0.001	0.999	1.001
15	UTI-Bond Advantage-UBA-Bonus	0.029	0.971	1.0298
16	UTI-Bond Advantage-UBA-Growth	0.022	0.978	1.0225
17	UTI-Bond Advantage-UBA-Quarterly Dividend	0.001	0.999	1.001
18	UTI-MIS-Advantage-Flexi Dividend	0.026	0.974	1.0266
19	UTI-MIS-Advantage-Growth	0.016	0.984	1.0162
20	UTI-MIS-Advantage-Monthly Dividend	0.005	0.995	1.005
21	UTI-MIS-Advantage-Monthly payment	0.002	0.998	1.002

Table 6 presents the selectivity performance of the sample open-ended mutual fund schemes based on traditional and conditional measures; it is observed that managers of the 18 schemes have provided positive stock-selection performances and the managers of the remaining schemes have offered negative performances, because the managers cannot correctly identify the under-priced securities. Thus, the outcome regarding negative stock-selection performances of the managers is consistent with the earlier studies of Joydev (1996), Gupta and Seghal (1998), Chandra (2005), Shanmugham and Zabiulla (2011), and Roy and Ghosh (2012). The negative stock selection performances of the investment managers are also reported by many international authors, like Jensen (1968), Kon and Jen (1978), Chang and Lewellen (1984), Lee and Rahman (1990), Naim Sipra (2002), Drew et al. (2005), and Iqbal and Qadeer (2012). Hence, the evidence of negative stock-selection performances are not unique to India.

The managers of the 18 schemes provide positive stock-selection performances, meaning that the mangers are efficiently able to predict the security prices. The findings of the present study are similar to the studies conducted by Joydev (1996), Gupta and Seghal (1998), Chandra (2005), Jain and Sandhi (2006), Shanmugham and Zabiulla (2011), and Roy and Ghosh (2012). The picture is not different in the case of other developed and emerging economics. Kon and Jen (1978), Lee and Rahman (1990), Coggin et al. (1993), Athanassakas et al. (2002), Moreno et al. (2003), Artikis (2004), Kader and Kuang (2007), Koulis (2011), and Mansor and Bhatti (2011) opine that the investment managers are able to generate positive alpha.

The table also provides significant stock selection performances of 15 schemes, meaning that the managers are efficiently able to select the under-priced securities, and able to provide abnormal returns to the investors. The result is very satisfactory, because 71% of the managers of the sample schemes are superior stock pickers and able to add extra value to the mutual fund portfolios.

Table 6 presents the Durbin-Watson test statistic of autocorrelation; it is observed that there is an absence of autocorrelation problem.

Table 6: Unconditional Measure and Stock-Selection Performance

Sr. No.	Scheme's Name	Alpha	t-Value	D-W
1	UTI-Bond Fund-Growth	0.661	10.906*	1.685
2	UTI-Bond Fund-Income	−0.052	−0.269	1.783
3	UTI-Senior citizen unit plan	0.636	2.241*	1.803
4	UTI-Retirement benefit pension fund	−0.570	−0.761	2.018
5	UTI-Mahila unit scheme	1.572	5.459*	1.461
6	UTI-CRTS 81-Dividend option	0.309	2.354*	1.749
7	UTI-Unit linked Insurance plan	0.144	0.597	1.938
8	UTI-CC balanced fund	−0.038	−0.149	1.360
9	UTI-MIS-Growth	2.530	1.603	2.189
10	UTI-MIS-Income	0.088	1.379	1.799
11	UTI-CCP-Bond-Growth	0.520	2.817*	1.834
12	UTI-CCP-Bond-Income	0.504	2.993*	1.680
13	UTI-Bond Advantage Institutional-Bonus	0.597	8.203*	1.298
14	UTI-Bond Advantage-UBA-Annual Dividend	0.428	2.912*	2.365
15	UTI-Bond Advantage-UBA-Bonus	0.561	11.727*	1.360
16	UTI-Bond Advantage-UBA-Growth	0.563	9.544*	1.995
17	UTI-Bond Advantage-UBA-Quarterly Dividend	0.328	7.523*	1.475
18	UTI-MIS-Advantage-Flexi Dividend	0.798	8.226*	1.686
19	UTI-MIS-Advantage-Growth	0.798	8.126*	1.712
20	UTI-MIS-Advantage-Monthly Dividend	0.263	2.541*	1.550
21	UTI-MIS-Advantage-Monthly payment	0.819	8.283*	1.936

*Significant at 5% level.

The outcome of the conditional selectivity performance is given in Table 7. It is found that the managers of 18 schemes have provided positive performances. It is also noticed that the schemes which provide negative alpha based on the unconditional measure also provided the same performances under the conditional framework. Thus, it may be said that the managers cannot provide positive alpha after the inclusion of public information for those schemes. According to the conditional model, the managers of the 18 schemes have added little value to the mutual fund portfolios and the variation of alpha based on the two measures is insignificant.

Generally, it is expected that conditional selectivity performance measure is superior to the unconditional selectivity measure, as suggested by Ferson & Schadt (1996). However, the present study provides a different view. Empirical results show that the managers of 13 schemes out of 21 have provided significant stock-selection performances. Although, it is observed that the managers of 15 schemes have provided significant stock selection performances based on traditional measure compared to the conditional measure. Here, the stock picking efficiency of the managers based on conditional measure is slightly decreased.

Table 7: Outcome of Conditional Stock Selection Performance

Sr. No.	Scheme's Name	Alpha	T-Value
1	UTI-Bond Fund-Growth	0.657	10.967*
2	UTI-Bond Fund-Income	−0.055	−0.279
3	UTI-Senior citizen unit plan	0.488	1.874
4	UTI-Retirement benefit pension fund	−0.526	−0.690
5	UTI-Mahila unit scheme	1.667	5.624*
6	UTI-CRTS 81-Dividend option	0.225	1.733
7	UTI-Unit linked Insurance plan	0.020	0.081
8	UTI-CC balanced fund	−0.120	−0.453
9	UTI-MIS-Growth	2.596	1.582
10	UTI-MIS-Income	0.076	1.134
11	UTI-CCP-Bond-Growth	0.569	3.131*
12	UTI-CCP-Bond-Income	0.529	3.190*
13	UTI-Bond Advantage Institutional-Bonus	0.592	8.346*
14	UTI-Bond Advantage-UBA-Annual Dividend	0.449	11.177*
15	UTI-Bond Advantage-UBA-Bonus	0.558	2.934*
16	UTI-Bond Advantage-UBA-Growth	0.542	8.585*
17	UTI-Bond Advantage-UBA-Quarterly Dividend	0.346	7.596*
18	UTI-MIS-Advantage-Flexi Dividend	0.823	8.140*

19	UTI-MIS-Advantage-Growth	0.809	7.992*
20	UTI-MIS-Advantage-Monthly Dividend	0.270	2.537*
21	UTI-MIS-Advantage-Monthly payment	0.808	7.763*

*Significant at 5% level.

Finally, it is seen from the above analysis that the stock-selection performances based on the unconditional model are better than the conditional model, and thus, z-test is applied. It is found that the computed value of z statistic (−0.02349) is lower than the table value, at 95% confidence interval, which indicates an acceptance of the null hypothesis, or in other words, there is no difference between the two measures.

Conclusion

In the present study, it is found that the stock-selection performances of the selected open-ended mutual fund (income type) schemes, based on Jensen measure, is satisfactory, because 15 schemes out of 21 have offered statistically significant selectivity performances. In the conditional model, the statistically significant stock-selection performances are reduced from 15 to 13. After inclusion of available public information in the conditional model, the significant stock-selection performances of the managers have been declined; however, the performances of the remaining schemes are not changed. It may be concluded from the above evidence that with the inclusion of information variables in the conditional model the selectivity performance is found to be same as before (traditional model). In fact, most of the studies have opined that the inclusion of conditioning public information makes the performance of the funds satisfactory, but it requires a superior set of information to achieve better performance. The statistical test also reveals that the stock-selection performances of the open-ended income schemes of UTI are equal, based on two measures. Finally, it may be recommended that further research is needed to prove that conditional model is superior compared to the traditional model, after consideration of other types of mutual fund schemes in India, and to determine which set of information variables are relevant in estimating the stock-selection performances.

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