

Conditional selectivity performance of Indian mutual fund schemes: An empirical study

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ABSTRACT

The present study seeks to examine the stock-selection performance of the sample open-ended equity mutual fund schemes of Birla Sun Life Mutual Fund Company based on traditional and conditional performance measures. It is generally expected that inclusion of some relevant predetermined public information variables in the conditional CAPM provides better performance estimates as compared to the traditional measures. The study reports that after inclusion of conditioning public information variables, the selectivity performances of the schemes have dramatically improved relative to the traditional measure and also found that conditional measure is superior to traditional measure in statistical test.

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1. Introduction

Mutual fund plays a crucial role in mobilizing savings from the household sector to the capital market and it builds a link between the two markets. Commonly, it offers to the investors a rational return with a minimum degree of expected risk. Presently, performance evaluation of mutual fund is one of the significant and appealing topics to the academicians and professionals. The investment performance generally deals with three basic issues (1) successful prediction of security prices, (2) efficient prediction of market movement and (3) reduction of diversifiable risk through diversification (Jensen, 1968). These issues take a flight after the development of capital asset pricing model (CAPM) independently by Sharpe (1964), Linter (1965) and Mossin (1966). There are many studies examined portfolio performance by using relative measures and those measures basically concentrate on ranking of portfolios and does not give insight on risk control mechanism. Jensen (1968) proposed an absolute measure of portfolio performance to the existing literature. Although, the traditional measure of Jensen does not provide satisfactory result when risk and return are constant over time. Ferson and Schadt (1996) proposed a conditional investment performance measure, which estimates the risk, return and coefficients with more accuracy with the changes of time.

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The performance evaluation of mutual fund in Indian context is scanty and the earlier studies are based on traditional measures. The present study tries to examine the stock selection performance of the selected open-ended mutual fund schemes based on two measures (traditional & conditional) and possible explanations for the differences in results in Indian context.

The remaining of the study is designed as follows: Section 2 deals with the existing literature. Section 3 states with data and study period. Section 4 speaks about objective. Section 5 describes on methodology and hypothesis formulation. Section 6 summarizes the results and finally, the rest of the section contains concluding remarks.

2. Literature Review

The performance evaluation of investment receives serious attention after the establishment of portfolio selection measure by Markowitz (1952). His contribution has completely revolutionized in the way of thinking on that issue. Other prominent contributors include Sharpe (1964), Sharpe (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), etc. whose contributors in investment performance have still been considered path breaking. According to Markowitz, the process of portfolio selection can be made by (1) making probabilistic estimates of the future performances of securities, (2) analyzing those estimates to determine an efficient set of portfolios and (3) selecting from that set which are best suited to the investors' preferences. This issue gets considerable momentum after the development of CAPM independently by Sharpe (1964), Linter (1965) and Mossin (1966) who extended the work of Markowitz. They observed that the theory implies that the rate of return from efficient combinations of risky assets move together perfectly. This can result from their common dependence on general economic activity. If this is so, diversification among risky assets enables investors to escape from all risks except the risk resulting from changes in economic activity. Therefore, only the responsiveness of an asset's return to changes in economic activity is relevant in assessing its risk. Markowitz proposes that investors only need to be concerned with systematic risk (beta), not the total risk.

Before 1970, a number of economists develop normative approaches dealing with asset choice under conditions of risk (see Tobin, 1958; Hicks, 1972; Gordon & Gangolli, 1962). With regard to mutual fund performance, it is essential to describe one of the most well-known studies by Sharpe (1966). Within the past few years, remarkable developments have been made in three closely related areas of portfolios' performance namely (1) the theory of capital asset pricing under condition of risk, (2) theory of portfolio selection and (3) the general behavior of stock prices. Treynor (1965) proposed a new measure of investment performance. This measure is quite different from those used earlier by incorporating the volatility of a fund's return in a simple yet meaningful manner. Sharpe attempted to extend the Treynor's effort by subjecting his proposed measure to empirical test in order to evaluate its predictive ability. The measure is popularly known as R/V ratio or reward to variability ratio. He observes that the average value of the fund's ratio was significantly less than the same ratio as compared with the D-J industrial average over the period 1954-1963. Thus, he provides evidence that on an average the return earned by an investor by investing a given some of money in the mutual fund is distinctly inferior to a same amount of investment made in the D-J industrial average. However, Arditti (1971) showed that if another variable (i.e, sum of dividend, capital gains distribution, and change in net asset value, etc.) were introduced into the investors' decision making process then Sharpe's conclusion could be changed.

In order to make appropriate stock-selection, a more realistic measure is necessary. Generally, the concept behind evaluate of portfolio performance has two distinct dimensions. One is to increase returns of the portfolios through successful prediction of security prices and the other is to reduce the

degree of unsystematic risk through the activities of proper diversification. Jensen (1968) proposed an absolute measure of portfolio performance, which is able to evaluate the efficiency of the portfolio managers with respect to security selection and provide adequate control over the risk component. Jensen is interested in whether mutual fund managers add value over the long period or not. Whether or not they have through skill, privileged information or insight to outperform the market reasonably consistently year after year. The CAPM does not accommodate this possibility. Due to this problem, Jensen adds a new term in the CAPM model called alpha (α) in place of risk-free rate. This allows for a persistent positive contribution to a portfolio's expected return due to the manager's skill. Jensen does not say that some mutual fund managers do consistently outperform the market. The model simply allows for that possibility in order to test for it. He computed some mutual funds' alphas and observes if any are positive. Jensen's result depicts strong support of the efficient market hypothesis and suggested that no investment managers had had positive alphas.

After the establishment of Jensen measure in the perspective of stock-selection, a large numbers of researchers empirically examined the stock-selection performances. The evidences of those studies in some cases are consistent with the view of Jensen and many of them are inconsistent with the Jensen's evidence. In some cases the managers have provided negative alphas, which indicate inefficiency in stock-selection (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) performance. However, there is lot of evidences of positive stock-selection performances by the managers (see Kon & Jen, 1978; Lee & Rahman, 1990; Coggin et al., 1993; Athanassakas et al., 2002; Moreno et al., 2003; Artikis, 2004; Kader & Kuang, 2007; Mansor & Bhatti, 2011; Koullis, 2011; Joydev, 1996; Gupta & Seghal, 1998; Chandra, 2005; Jain & Sandhi, 2006; Roy & Ghosh, 2011). It is generally expected that significant alpha provides abnormal return to the investors. The significant alpha value arises while the managers are efficient in stock-selection activities. Although, the earlier studies have provided very little evidences of significant stock-selection performances in developed as well as in developing countries (see Kon & Jen, 1978; Lee & Rahman, 1990; Graham & Harvey, 1996; Redman et al., 2000; Artikis 2004; Kososki & Timmerman, 2006; Joydev, 1996; Gupta & Seghal, 1998; Chandra, 2002; Roy & Ghosh, 2011).

Unlike Treynor measure, the Jensen measure is subject to same criticism: the result depends on the choice of market index. In addition, when the managers concerns with market-timing strategy, which involves varying the beta according to anticipated movements in the market, the Jensen alpha often becomes negative, and does not then reflect the real performance of the managers. Nevertheless, alpha is widely used to evaluate mutual fund and portfolio manager performances, often in conjunction with the Sharpe ratio and Treynor ratio. The efficiency of traditional mutual fund performance measures (Treynor 1965; Sharpe 1966; Jensen 1968) does not provide satisfactory results because criticisms are pointed out both at conceptual and econometric level. The main drawback of those measures is that the risk and return are constant overtime. But practically it is not so happen. In fact, these measures represent an unconditional approach in the sense that they do not consider publicly available information about the state of the economy in the estimation of expected returns and risk, assuming that these are constant over time (Silva et al., 2003). Practically, both expected return and risk are changed with the change of time. Under these state of affairs, traditional measures (Unconditional) cannot produce the correct performance estimates, since the earlier studies are run off speechless in the normal variation in risk and risk premiums with manager's performance. In piece of evidence, it is well known that the traditional measures are unbiased when portfolio managers exhibit macro-forecasting (market-timing) skills or pursue some vibrant investment strategies resulting in time-varying risk (see Jensen 1972, Grant 1977, Dybvig & Ross 1985, Grinblatt & Titman 1989).

Some studies point out that important public information like dividend yields of index or exchange rates or interest rates if include in the performance evaluation model then the stock and bond returns are improved (Fama & French, 1989; Ilmanen, 1995; Pesaran & Timmermann 1995, Silva et al. 2003).

The findings of those studies have led to significant improvement in the asset-pricing model as well as performance appraisal measures. These types of information are publicly available and allow for an assessment of the state of the economy. The investors can frequently use them and keep update about the expected returns. The conditional measure evaluates the managers' performance at the time of return creation process (Farnsworth, 1997). It is stated above that in conditional framework risk and return are time varying. It is observed from the empirical analysis (see Ferson & Schadt 1996, Ferson & Warther 1996; Chen & Knez 1996, Christopherson et al. 1998, Christopherson et al. 1999, Ferson & Qian 2004) that the conditional measure appears to provide better estimates as compared to the traditional measures. According to the arguments of some studies, it is expected that conditional model may produce better performance estimates and sometime allows the investors to scrutinize the dynamic behavior of the mutual fund managers (Otten & Bams 2004).

The performance evaluation of the mutual fund managers by using conditional measure is scanty in Indian context. A limited numbers of studies have examined mutual fund performances based on conditional model (see Roy & Sovan 2000, Shanmugham & Zabiulla 2011). The findings of those studies in relation to the majority of other empirical studies are in fact that conditional alphas are better than the unconditional alphas.

3. The proposed study

The study examines selectivity performance based on results of a sample of open-ended equity type of mutual fund schemes of Birla Sun life Mutual Fund Company. It uses monthly closing net asset values (NAV) of 32 open-ended equity schemes. The sample schemes are selected after the exclusion of schemes, which are below three years existence in mutual fund operation. It is also observed that some of the schemes have stopped their operations during the study period also taken into consideration. The information of NAV obtains from secondary sources like amfiindia.com, websites of respective mutual funds, mutualfundindia.com etc. The respective sources are crossed-checked with other sources that to ensure validity of the data and observed same. In order to evaluate the investment performance of sample schemes, they must be compared with the selected benchmark portfolio. Here, the schemes are greater equity exposure. Hence, BSE Sensex is used as a benchmark portfolio, which is considered an appropriate market proxy for investment performance comparison and evaluation. The monthly closing index value is obtained from the website of Bombay Stock Exchange (www.bseindia.org).

Generally, Treasury bills of different durations are considered as a surrogate for risk-free rate. Here, the monthly yield of 91-Day Treasury bill Rate of Government of India is used as a market proxy for risk-free rate of return. The monthly data is collected from RBI's annual reports and reports on Currency and Finance of Reserve Bank of India (RBI). The study uses a set of conditional public information variables like rupee-dollar exchange rate, monthly inflation rate and monthly yields of sensex (BSE) are used as public information, which are obtained from the websites of x-rates.com, rbi.org.com and from CSO (Centre for Statistical Organization). With a view to examine the conditional performance of the open-ended mutual fund schemes in India, a period of fourteen calendar years (1st January 2001 – December 2014) is taken into consideration, which is long enough to have seen a variety of ups and downs in the stock market and recent enough as well to reflect the complete picture about mutual fund performance.

The objective of this study is to examine the conditional stock-selection performance of the open-ended sample mutual fund schemes in India over a period of fourteen calendar years. Moreover, the study compares selectivity performance based on traditional and conditional measures and finally, put emphasis on the best measure (whether traditional or conditional) based on statistical test. The Jensen measure is based on the capital asset pricing model (CAPM). He argues that alpha is able to guess the security prices with more accuracy. Jensen alpha is defined as the differential between the return on the

portfolio in excess of risk-free rate (R_f) and the return explained by the benchmark index (Market portfolio (R_m)) can be expressed as follows:

$$E(R_i) - R_f = \alpha_i + \beta_i(E(R_m) - R_f) + \varepsilon \quad (1)$$

The coefficients, α_i and β_i , of Eq. (1) are estimated through regression equation. The basic problems of any time series regression are normality of error term, unit root problem and auto correlation etc. This study takes due care with these problems. Here, the above regression equation is modified by inserting an error term in the equation as under:

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

Where, R_{it} is the return of i^{th} mutual fund scheme at time t , R_{ft} is the risk-free rate of return at time t , α_i (Jensen Alpha) is the intercept term of i^{th} mutual scheme at time t or additional return of i^{th} mutual fund scheme due to the managers' choice of security prices. Moreover, β_i (Beta) is the beta coefficient or measure of systematic risk of i^{th} mutual fund scheme, R_{mt} is the return of the benchmark index at time t and ε_{it} is the error term with zero mean and constant standard deviation with the following properties: $E(\varepsilon_{it}) = 0$, $\text{Var}(\varepsilon_{it}) = \sigma^2\varepsilon_{it}$ and $\text{Cov}(\varepsilon_{it}, \varepsilon_{ij}) = 0$.

The statistical significance of alpha can be judged by computing the t-statistic of the regression equation, which is equal to the estimated value of the alpha divided by its variances. This value is derived from the regression equation. If the values of alpha are assumed to be normally distributed then the t-statistic, greater than two implies that the probability of having obtained the result through luck, and not through expertise, is strictly less than at 5% level. In this respect, the average value of alpha is significantly different from zero. In this unconditional model, both the alpha and beta are constant. The Jensen measure also contains benchmark index like Sharpe and Treynor measures. In Jensen measure, only systematic risk is taken into consideration like Treynor measure. Unlike the Sharpe and Treynor measures, the Jensen measure does not permit portfolios with different level of risk to be compared. Here, the value of alpha is actually proportional to the level of risk taken, which is measured by the beta. However, the traditional Jensen measure is subject to same criticisms like the Treynor measure in respect of choice of reference benchmark. Even if, at the time of market timing activity that involves changing of beta as per anticipated movements in the stock market, the value of Jensen alpha often becomes negative and that time the Jensen alpha does not reveal the real efficiency of the portfolio managers.

According to the traditional Jensen measure, the portfolio has the equal market exposure (or beta). In Jensen model, the return and beta risk both is measured as averages over the evaluation period and the averages are considered unconditionally or without regard to the variations in the state of financial markets. The unconditional measure cannot control the changes in the state of the economy. On the other hand, the conditional performance evaluation measure estimates the risk exposures and the market incentives that changes overtime with the changes of the state of the economy with more accuracy. In this approach, the changing culture of the state of the economy is quantified by using the public information variables. However, this approach is based on the conditional version of the capital asset pricing model (CAPM) that is consistent with the semi-strong form of market efficiency where influence of valuable information is present a little, which is interpreted by Fama (1970). According to the conditional version of the CAPM, the return of a mutual fund scheme can be written as follows:

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

With

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

Where, R_{it} is the excess return of i^{th} mutual fund scheme at time t over the R_f , R_{mt} is the excess return of the benchmark index over the R_f and N_t denotes the vector that represents the public information at time t . The beta of the regression equation $\beta_{im}(N_t)$ is a conditional beta that depends on the information vector N_t . Therefore, beta varies overtime due to certain factors. In the regression, the alpha term does not appear because of using only information variables N_t when the latter is null. The error term in the regression is independent from the information variables, which is translated by the relationship as per equation four. This leads to efficient market hypothesis (EMH). The portfolio return relationship can be recognized by using the asset return relationship with the assumption that the investors use only public information. Therefore, it may be said that investor's portfolio beta β_{im} depends only on public information (N_t). Then, beta can be approximated through a linear function as follows:

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

where, b_{0i} can be treated as mean beta. It corresponds to the unconditional mean of the conditional beta as follows:

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

The elements of vector B_i are the response coefficients of the conditional beta with respect to the information variables N_t . In addition, n_t represents the vector of the differentials of N_t compared to its mean as under:

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

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

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

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 return in excess of R_f . Here, the coefficients of the above model depend on public information N_t . The traditional measure (or unconditional measure) of Jensen cannot provide satisfactory outcomes when risk and return components are not constant overtime. On the other hand, conditional model of Ferson and Schadt (1996) can solve the above problems. Therefore, to evaluate mutual fund performance the empirically developed model incorporates the term α_{ci} and the measure would be as under:

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

where, α_{ci} implies the average differentials between the excess return of i^{th} mutual fund scheme and the excess return of a vibrant reference strategy. Hence, it may be assumed that the above measure will offer a better forecast of alpha (or stock selection performance). Therefore, it may be assumed that a mutual fund manager with a positive conditional alpha achieves higher return than the average return from the active reference strategy. Now, at the beginning it is important to determine the type of information to be used. This is almost same as using explanatory variables. Ferson and Schadt (1996) proposed to link with the portfolio risk to market indicators such as the dividend yield of market index (DY_t) and the return on 91-day T-Bills (TB_t), lagged by one period compared to the estimation period. In addition to these, the monthly inflation rate (FL_t) and monthly rupee-dollar exchange rates (EX_t) are used to make the study more meaningful and hence, the study will produce a meaningful conditional alpha. Now, the dy_t , tb_t , fl_t and ex_t variables represent the differentials compared to the average of the variables DY_t , TB_t , FL_t and EX_t that can be shown as follows:

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

Then, the relationship can be written as follows:

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

Now, the conditional beta would be as follows:

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

Hence, the conditional measure of Jensen model will be as follows:

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

where, represents the conditional stock selection measure, b_{0i} denotes the conditional beta, b_{1i} , b_{2i} , b_{3i} and b_{4i} represent the variations in conditional beta compared to the dividend yield, the return on the T-Bills, the inflation rate and rupee-dollar exchange rates. It is well known that better estimation of the beta allows to better estimation of the alpha. Therefore, for the evaluation of stock selection performance, the value of alpha also follows conditional process. Thus, the relationship depicted by the conditional alpha can be written as follows:

$$\alpha_{ci} = \varphi_i(n_t) = \varphi_{0i} + \psi_i n_t \quad (14)$$

Now, the regression equation that allows the Jensen alpha can be written as follows:

$$R_{i,t+1} = \varphi_{0i} + \psi_i n_t + b_{0i}R_{m,t+1} + B_i n_t R_{m,t+1} + \varepsilon_{i,t+1} \quad (15)$$

Then again, the alpha coefficient can be written by taking into consideration the information variables, which is made up by four components as under:

$$\alpha_{ci} = \varphi_{0i} + \varphi_{1i} dy_t + \varphi_{2i} tb_t + \varphi_{3i} fl_t + \varphi_{4i} ex_t \text{ with } \varphi_i = [\varphi_{1i}, \varphi_{2i}, \varphi_{3i}, \varphi_{4i}]^T \quad (16)$$

Finally, the conditional measure of stock-selection performance can be written as under:

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

where φ_{1i} , φ_{2i} , φ_{3i} and φ_{4i} measure the variations in conditional alpha compared to the dividend yield, the return on the T-bills, change in rupee-dollar exchange rate and change in inflation rates. The coefficients of the model are estimated through regression equation from the time series data. The traditional Jensen measure cannot estimate the alpha properly at the time when risk and return are not constant over time. Whereas, the conditional Jensen measure may help to solve the problem. Hence, it is necessary to test whether the conditional Jensen alpha is better than the traditional alpha or not. Therefore, the following hypothesis is tested as under:

H₀: Traditional alpha (α_i) = Conditional alpha (α_{ci})

H_a: Conditional alpha (α_{ci}) is better than traditional alpha (α_i)

To observe the pattern of the time series data Jarque-Bera (JB) test of normality is applied. Therefore, skewness and kurtosis are measured by taking into consideration of the OLS residuals. A test of stationarity (or non-stationarity) that has become widely popular over the past several years is the unit root test that has been tested by DF test. The Autocorrelation problem is common in any regression-based model. In this study Durbin-Watson (d) test is applied to correct the above problem. An important assumption of regression-based model is that the disturbances are homoscedastic that means they all have the same variances. Inversely, the disturbances in the regression model do not have the same variances that imply the disturbances are heteroscedasticity. The problem of heteroscedasticity can be tested by applying White's (1980) general heteroscedasticity test. The term multicollinearity is due to

Ragnar Frisch¹. Generally it means the existence of a perfect or exact, linear relationship among some or all independent variables of a regression model². In this study the problem of multicollinearity has been tested through correlation matrix, R^2 , TOL and VIF techniques. The monthly rate of return of the individual mutual fund schemes and the market (BSE Sensex) are computed as follows:

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

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

where, R_{it} is the logarithm return of the i^{th} mutual fund scheme at the end of the time (month) t . $NAV_{i,t}$ is the net asset value of the i^{th} scheme at time (month) t and $NAV_{i,t-1}$ is the net asset value of the i^{th} scheme at the end of the previous time (month) period 't-1'. Similarly, R_{mt} is the logarithm return of the market.

4. Result and Analysis

Table 1 reports the descriptive statistics of monthly return series of the individual schemes.

Table 1
Descriptive Statistics of the return series

D.Var	OB	Mean	Median	Max	Min	St.Dev	Skewness	Kurtosis	JB
1	156	0.6346	0.4520	5.0144	-1.6212	1.7045	2.123	4.525	132.302
2	156	0.2432	0.1258	6.4125	-11.243	2.1447	-4.122	12.126	983.108
3	156	0.7523	0.5478	5.4152	-7.3321	2.4231	0.550	10.430	366.697
4	156	0.3212	0.1045	4.1201	-14.1254	2.6012	-2.415	16.213	1286.430
5	90	1.1285	0.7458	14.1254	-30.124	6.1234	2.101	25.327	1935.569
6	140	0.5420	0.3124	5.0499	-4.1012	2.8457	0.785	6.319	78.637
7	130	0.3478	0.3545	9.1210	-16.1254	2.6542	-1.854	22.646	2165.121
8	130	0.1245	0.4745	6.1232	-10.1284	2.4578	2.123	11.934	529.993
9	128	1.7124	0.7480	10.1235	-31.2874	10.1481	-2.125	5.963	143.157
10	128	0.2145	0.1745	5.1123	-20.9541	1.4412	1.549	5.852	94.568
11	112	0.4712	0.3541	9.1245	-7.8845	2.1365	2.568	8.741	276.909
12	112	0.5565	0.4045	7.1245	-10.1254	2.7397	1.852	12.123	452.427
13	110	0.4457	0.5124	4.1785	-11.1254	1.7244	3.109	13.456	678.294
14	110	0.4242	0.3212	9.1235	-15.7895	12.3212	0.744	5.789	45.800
15	110	0.4578	0.4141	5.1235	-10.3687	1.2354	1.945	8.245	195.443
16	110	0.4785	0.2874	6.1245	-12.1978	0.3625	2.102	14.401	676.759
17	110	0.4321	0.4125	1.5623	-1.3012	0.5012	0.074	4.213	6.844
18	110	0.8523	0.5012	3.3212	-1.7845	0.7451	0.345	3.183	2.336
19	110	0.6123	0.3125	3.1245	-6.5542	0.8564	0.412	4.811	18.144
20	110	0.3125	0.1784	4.5231	-2.8234	1.1245	-0.125	0.523	28.408
21	110	0.8524	0.5123	7.9176	-7.7412	0.9745	0.512	2.971	4.810
22	128	0.8542	0.5412	10.1235	-12.1234	0.4512	0.451	3.125	4.423
23	125	0.4562	0.3215	6.1234	-9.5412	0.9654	0.965	4.845	37.130
24	136	0.2475	0.4512	5.1248	-10.7481	0.4562	-0.451	0.984	27.641
25	140	1.1235	0.7452	11.1245	-8.9547	0.8452	0.652	0.754	39.345
26	140	0.7415	0.3652	7.5423	-14.4512	0.6521	0.784	4.123	21.699
27	88	0.9542	0.4521	6.2354	-12.6547	0.7412	-0.754	12.451	335.850
28	88	1.4587	0.4221	5.4521	-13.8475	0.5641	-0.214	15.325	557.659
29	100	0.2256	0.3215	10.1235	-8.24587	0.8451	0.321	14.745	576.488
30	100	0.4512	0.7001	9.4567	-9.4781	0.6541	0.123	9.452	173.703
31	100	0.5541	0.5123	17.1236	-21.4562	0.7845	0.452	8.654	136.604
32	102	0.6542	0.4875	12.4562	-15.8745	0.6584	0.362	0.987	19.449

* D.Var means dependent variable

The returns of all the schemes during the study period vary between -31.2874 and 17.1236. The mean returns of all the schemes are different from zero and the skewness of the distribution is also different

¹ Ragnar Frish, Statistical Confluene Analysis by means of Complete Regression Systems, Institute of Economics, Oslo University, Publ. no. 5, 1934.

² Multicollinearity refers to the existence of more than one exact linear relationship and collinearity refers to the existence of a single linear relationship. But this distinction is rarely maintained in practice and multicollinearity refers to both cases.

from zero and somewhere they indicate long left and right tails compared to the right one. On the other hand, the values of kurtosis exhibit greater than three in all respect that indicates heavy tail and the distributions of the schemes' return series are leptokurtic. Finally, the computed J-B statistic of the individual return series of the schemes are far different from zero ($J-B > 0$), which confirms rejection of null hypothesis that the return series are not normally distributed. Similarly, the distribution of the time series data of the independent variables is reported in Table 2. It is observed that the value of J-B statistic of the independent variables are far different from zero ($J-B > 0$) that concludes rejection of null hypothesis under the assumption that the residuals are normally distributed.

Table 2
Summary statistics of the independent Variables

I. Var	OB	Mean	Median	Max	Min	St.Dev	Skewness	Kurtosis	JB
Dy	168	1.6859	1.5641	3.1452	-8.123	0.5123	0.4125	7.123	123.758
Tb	168	0.4123	0.6654	48.1425	-28.654	6.2147	0.3214	12.125	585.751
Fl	168	2.4451	2.6412	6.1245	-21.145	3.4256	-0.7542	10.337	392.747
Ex	168	0.2324	0.6125	9.4587	-8.884	2.1478	0.6458	8.451	219.671
Rm	168	1.4745	0.9741	41.1256	-34.247	8.4712	0.5128	8.125	191.222

* I.Var means independent variable

The empirical work based on time series data assumes that the underlying time series is stationary. It is very much important that the time series data will be stationary. In short, if a time series is stationary, its mean, variance, and auto-covariance (at various lags) remain the same that means they are time invariant (Gujrati, 2007). Here, Dickey-Fuller³ (DF) test is used to measure stationarity of the time series return data.

Table 3
Unit Root test of return series of individual schemes

Sl.No	Scheme Name	Estimated coefficient	Standard Error	Tau (τ) Statistic	DF Statistic
1	Birla India Opportunities fund-plan A (D)	0.457	0.280	4.388	-2.89
2	Birla India Opportunities fund-plan B (G)	0.142	0.173	0.421	-2.89
3	Birla MNC fund-plan A (Dividend)	0.476	0.362	1.824	-2.93
4	Birla MNC fund-plan B (Growth)	-0.235	0.526	-0.453	-2.89
5	Birla Advantage fund-plan A (Dividend)	1.329	0.359	0.311	-2.93
6	Birla Advantage fund-plan B (Growth)	0.409	0.424	0.326	-2.89
7	Birla India fund-plan A (Dividend)	0.232	0.425	1.114	-2.89
8	Birla India fund-plan B (Growth)	0.243	0.261	0.372	-2.89
9	Birla Midcap fund-plan A (Dividend)	1.739	0.572	1.606	-2.89
10	Birla Midcap fund-plan B (Growth)	0.205	0.065	1.545	-2.89
11	Birla Dividend Yield Plus-Plan A (Div)	0.710	0.393	2.564	-2.89
12	Birla Dividend Yield Plus-Plan B (Growth)	0.351	0.523	0.541	-2.89
13	Birla Balance-Plan A (Dividend)	0.539	0.187	3.216	-2.89
14	Birla Balance-Plan B (Growth)	0.401	0.518	0.514	-2.89
15	Birla India Gennext Fund-Dividend option	0.345	0.241	4.527	-2.89
16	Birla India Gennext Fund-Growth option	0.423	0.184	4.423	-2.89
17	Birla Sunlife Buy India Fund-Plan A (D)	0.451	0.235	0.875	-2.89
18	Birla Sunlife Buy India Fund-Plan B (G)	0.612	0.134	4.436	-2.89
19	Birla Sunlife Basic Ind India Fund-PI A(D)	0.521	0.134	3.671	-2.89
20	Birla Sunlife Basic Ind India Fund-PI B(G)	0.323	0.114	2.345	-2.89
21	Birla Sunlife equity fund-Plan A (Dividend)	0.604	0.138	4.201	-2.89
22	Birla Sunlife equity fund-Plan B (Growth)	0.125	0.362	1.256	-2.89
23	Birla Sunlife Frontline equity fund-PI A (D)	0.654	0.425	3.548	-2.89
24	Birla Sunlife Frontline equity fund-PI B (G)	0.701	0.120	2.123	-2.89
25	Birla Sunlife New Millenium fund-PI A (D)	0.562	0.321	0.452	-2.89
26	Birla Sunlife New Millenium fund-PI B (G)	0.456	0.145	0.652	-2.89
27	Birla Top 100-Dividend Option	0.741	0.233	-0.213	-2.89
28	Birla Top 100-Growth Option	-0.123	0.102	0.236	-2.89
29	Birla Sunlife Intl equ fund Plan A D-Dir PI	0.652	0.365	0.415	-2.89
30	Birla Sunlife Intl equ fund Plan A G-Dir PI	0.452	0.526	0.854	-2.89
31	Birla Sunlife long term advantage-G-Dir PI	0.632	0.421	2.412	-2.89
32	Birla Sunlife long term advantage-D-Dir PI	0.256	0.123	6.878	-2.89

³ Dickey, D.A. & Fuller, W.A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74, 427-431.

Table 3 reports the test statistic of the of the time series data. It is observed that the computed absolute values of the tau statistic (τ) of eight (8) individual time series return data exceed the DF critical absolute tau values at 5% significance level. This means those time series data are free from unit root problem. On the other hand, in case of the remaining individual time series return data the computed absolute tau statistic are lower than the DF critical absolute tau statistics at 5% significance level, which implies the acceptance of null hypothesis. Hence, in this case, the return data are found to be non-stationary. Another problem of regression based model is heteroscedasticity. In this study, White's heteroscedasticity test is applied. Tab. 4 presents the individual regression based test statistic of heteroscedasticity. Here, the computed chi-square values of the individual regression models are lower than the critical chi-square value at 5% level of significance and hence, it may be argued that there is absence of heteroscedasticity in the regression models.

Table 4
Test of Heteroscedasticity

Sl.No	Scheme's Name	R ²	Computed χ^2	Table value (5% sig. level)
1	Birla India Opportunities fund-plan A (D)	0.065	3.445	19.6751
2	Birla India Opportunities fund-plan B (G)	0.054	2.862	19.6751
3	Birla MNC fund-plan A (Dividend)	0.049	3.773	19.6751
4	Birla MNC fund-plan B (Growth)	0.168	10.752	19.6751
5	Birla Advantage fund-plan A (Dividend)	0.028	1.792	19.6751
6	Birla Advantage fund-plan B (Growth)	0.159	10.176	19.6751
7	Birla India fund-plan A (Dividend)	0.084	5.376	19.6751
8	Birla India fund-plan B (Growth)	0.094	6.016	19.6751
9	Birla Midcap fund-plan A (Dividend)	0.094	6.016	19.6751
10	Birla Midcap fund-plan B (Growth)	0.159	13.992	19.6751
11	Birla Dividend Yield Plus-Plan A (Div)	0.186	16.368	19.6751
12	Birla Dividend Yield Plus-Plan B (Growth)	0.105	9.240	19.6751
13	Birla Balance-Plan A (Dividend)	0.105	9.240	19.6751
14	Birla Balance-Plan B (Growth)	0.105	9.240	19.6751
15	Birla India Gennext Fund-Dividend option	0.094	8.272	19.6751
16	Birla India Gennext Fund-Growth option	0.083	7.304	19.6751
17	Birla Sunlife Buy India Fund-Plan A (D)	0.059	5.192	19.6751
18	Birla Sunlife Buy India Fund-Plan B (G)	0.253	22.264	19.6751
19	Birla Sunlife Basic Ind India Fund-Pl A(D)	0.159	13.992	19.6751
20	Birla Sunlife Basic Ind India Fund-Pl B(G)	0.084	7.392	19.6751
21	Birla Sunlife equity fund-Plan A (Dividend)	0.062	5.456	19.6751
22	Birla Sunlife equity fund-Plan B (Growth)	0.062	5.456	19.6751
23	Birla Sunlife Frontline equity fund-Pl A (D)	0.205	18.04	19.6751
24	Birla Sunlife Frontline equity fund-Pl B (G)	0.205	18.04	19.6751
25	Birla Sunlife New Millenium fund-Pl A (D)	0.159	13.992	19.6751
26	Birla Sunlife New Millenium fund-Pl B (G)	0.094	8.272	19.6751
27	Birla Top 100-Dividend Option	0.056	4.928	19.6751
28	Birla Top 100-Growth Option	0.179	15.752	19.6751
29	Birla Sunlife Intl equity fund Plan A D-Dir Pl	0.084	7.392	19.6751
30	Birla Sunlife Intl equity fund Plan A G-Dir Pl	0.094	8.272	19.6751
31	Birla Sunlife long term advantage-G-Dir Pl	0.065	3.445	19.6751
32	Birla Sunlife long term advantage-D-Dir Pl	0.074	5.123	19.6751

Table 4 reports Pearson Correlation Matrix, it is found that the highest simple correlation coefficient between independent variables (EX and FL) is 0.2145. According to Gujrati (2004), if the simple correlation doesn't exceed 0.90 between the independent variables should not be considered harmful. The R² value higher than 0.800 is considered to be harmful because of the presence of multicollinearity problem. Here, the computed R² values of the individual schemes' are lower than the cut-off point (0.800), which necessarily proves that the explanatory variables in the regression model is free from the problem of multicollinearity. VIF is another popular measure of multicollinearity. It is generally held that the value of VIF higher than ten (10) is likely to cause a multicollinearity problem. In the present study the values range between 1.0651 and 2.8125 (i.e. less than 10) that means absence of multicollinearity problem. Tolerance (TOL) may also be used as a measure to examine multicollinearity problem. The tolerance value more than 0.20 may be used as a criterion for the absence of

multicollinearity problem. Here, the computed tolerance value ranges between 0.302 and 0.745 which clearly indicates that the individual regression models are free from the problem of multicollinearity. Here, the results of R^2 , VIF and TOL are discussed but the values are not presented here.

Table 4

Test of Multicollinearity (Pearson Correlation matrix)

Variable	Rm	DY	TB	FL	EX
Rm	1.000				
DY	0.1235	1.000			
TB	-0.0546	-0.1425	1.000		
FL	-0.2014	-0.2054	0.1845	1.000	
EX	-0.2541	-0.0674	0.0541	0.2145	1.000

If we look back in Table 1, we observe that the average monthly return performance of the schemes is positive. Generally, the return performance is influenced by two reasons one is managers' abilities to select the under priced securities (stock-selection) and the other is to predict the market movement correctly (market-timing). Although, the prediction of security prices is not an easy task that requires efficiency of the fund managers to analysis of under-valued and over-valued security prices judiciously that ensure higher return. It is generally expected that positive alpha value (a measure of stock-selection) represents manger's ability to select right stocks that finally add value to the mutual fund portfolios. Similarly, significant positive alpha indicates managers are superior to select under priced securities, which finally add extra value to the mutual fund portfolios. If we look back to the past studies on selectivity performance of the managers we can see a mix results like positive, negative and superior performances.

Table 6

Estimation of selectivity performance based on unconditional measure

Sl.No	Scheme's Name	Alpha	t-value	D-W
1	Birla India Opportunities fund-plan A (D)	0.530	3.542*	1.632
2	Birla India Opportunities fund-plan B (G)	0.458	0.269	1.543
3	Birla MNC fund-plan A (Dividend)	0.754	2.254*	1.815
4	Birla MNC fund-plan B (Growth)	0.574	0.761	2.004
5	Birla Advantage fund-plan A (Dividend)	1.412	3.129*	1.546
6	Birla Advantage fund-plan B (Growth)	0.402	2.132*	1.795
7	Birla India fund-plan A (Dividend)	0.345	0.593	1.946
8	Birla India fund-plan B (Growth)	-0.074	-0.149	1.451
9	Birla Midcap fund-plan A (Dividend)	2.123	1.993*	2.104
10	Birla Midcap fund-plan B (Growth)	0.089	1.012	1.802
11	Birla Dividend Yield Plus-Plan A (Div)	0.510	0.817	1.854
12	Birla Dividend Yield Plus-Plan B (Growth)	0.475	0.942	1.740
13	Birla Balance-Plan A (Dividend)	0.514	2.203*	1.541
14	Birla Balance-Plan B (Growth)	-0.042	-0.512	2.120
15	Birla India Gennext Fund-Dividend option	0.602	0.201	1.562
16	Birla India Gennext Fund-Growth option	0.415	1.574	1.841
17	Birla Sunlife Buy India Fund-Plan A (D)	0.462	2.323*	1.754
18	Birla Sunlife Buy India Fund-Plan B (G)	0.612	0.226	1.603
19	Birla Sunlife Basic Industries India Fund-Pl A(D)	0.665	3.126*	1.704
20	Birla Sunlife Basic Industries India Fund-Pl B(G)	-0.302	-0.541	1.565
21	Birla Sunlife Equity fund-Plan A (Dividend)	0.701	0.283	1.901
22	Birla Sunlife Equity fund-Plan B (Growth)	0.512	0.812	1.412
23	Birla Sunlife Frontline equity fund-Pl A (D)	0.624	1.978*	1.621
24	Birla Sunlife Frontline equity fund-Pl B (G)	-0.012	-0.602	1.874
25	Birla Sunlife New Millenium fund-Pl A (D)	1.502	2.201*	1.624
26	Birla Sunlife New Millenium fund-Pl B (G)	1.355	1.213	1.804
27	Birla Top 100-Dividend Option	0.328	2.102*	1.975
28	Birla Top 100-Growth Option	-0.102	-0.325	2.010
29	Birla Sunlife Intl equity fund Plan A D-Dir Plan	0.648	2.025*	1.754
30	Birla Sunlife Intl equity fund Plan A G-Dir Plan	0.503	0.723	1.665
31	Birla Sunlife long term advantage-G-Dir Plan	1.244	1.932	1.998
32	Birla Sunlife long term advantage-D-Dir Plan	0.012	0.557	2.321

* Significance at 5% level

The stock-selection performance based on unconditional model is given in Table 6. It is observed that the alpha values of 27 schemes are positive and the remaining is negative. Here, the probable reason for obtaining negative alpha may be caused for the inability of the managers' to select the under-priced securities correctly. The positive performance may be considered due to the managers' ability to predict the security prices correctly. Moreover, fund managers produce significant alpha by applying their skills on stock-selection activities from the volatile market. It is observed from the table that the alpha values of twelve (12) schemes are statistically significant at 5% level. In that case, only 37.5% managers of the sample schemes are superior stock pickers who correctly selected the under-priced securities and finally add additional returns to the portfolios. Although, the selectivity performance is not satisfactory. Table 6 also presents the test statistic of autocorrelation. Here, Durbin-Watson (1951) test is applied. Accordingly, if the value of 'd' is two, one may assume that there is no first-order autocorrelation in the regression model. The observed 'd' values of majority of the schemes are far less than 2 and hence, the return data are free from first order autocorrelation. Finally, the stock-selection performance based on conditional measure is presented in Table 7. It is observed that the estimated conditional alpha values (a measure of conditional selectivity performance) of two schemes are negative and the remaining schemes have positive. The observed positive selectivity performances of the two measures are quite same and the difference observed is negligible. It is also found that twenty (20) schemes have provided significant stock-selection performances out of thirty two (32) schemes. If we compare the significant stock-selection performance based on two measures we find that conditional model is better. According to the unconditional model, the number of significant stock-selection performers is twelve (12) where as in conditional model the number is twenty (20) or in percentages the former is 37.5% and the latter is 62.5%. Therefore, we can conclude that inclusion of public information variables in the conditional model generate better performance estimates in Indian context based on sample schemes. Here, the computed test statistic is 2.012, which is higher than the table value of z at 5% level (1.96) of significance. This prompts us to reject the null hypothesis and concluded conditional stock selection performance is superior to traditional performance measure.

Table 7**Estimation of selectivity performance by conditional measure of Jensen**

Sl.No	Scheme's Name	Alpha	t-value	D-W
1	Birla India Opportunities fund-plan A (D)	0.527	3.124*	1.732
2	Birla India Opportunities fund-plan B (G)	0.235	0.845	1.847
3	Birla MNC fund-plan A (Dividend)	0.674	1.987*	2.018
4	Birla MNC fund-plan B (Growth)	0.013	0.578	2.001
5	Birla Advantage fund-plan A (Dividend)	1.302	2.125*	1.411
6	Birla Advantage fund-plan B (Growth)	0.514	1.971*	1.811
7	Birla India fund-plan A (Dividend)	0.156	0.548	1.908
8	Birla India fund-plan B (Growth)	-0.452	-0.621	1.368
9	Birla Midcap fund-plan A (Dividend)	2.412	1.994*	2.195
10	Birla Midcap fund-plan B (Growth)	0.874	2.012*	1.856
11	Birla Dividend Yield Plus-Plan A (Dividend)	0.612	3.015*	1.842
12	Birla Dividend Yield Plus-Plan B (Growth)	0.421	0.190	1.679
13	Birla Balance-Plan A (Dividend)	0.502	4.121*	1.290
14	Birla Balance-Plan B (Growth)	0.501	3.164*	1.270
15	Birla India Gennext Fund-Dividend option	0.612	2.015*	2.377
16	Birla India Gennext Fund-Growth option	1.542	4.124*	1.866
17	Birla Sunlife Buy India Fund-Plan A (D)	1.302	0.596	1.480
18	Birla Sunlife Buy India Fund-Plan B (G)	0.865	0.174	1.774
19	Birla Sunlife Basic Industries India Fund-PI A(D)	0.812	3.124*	1.767
20	Birla Sunlife Basic Industries India Fund-PI B(G)	0.625	2.015*	1.443
21	Birla Sunlife equity fund-Plan A (Dividend)	0.745	5.123*	1.940
22	Birla Sunlife equity fund-Plan B (Growth)	0.156	0.745	2.012
23	Birla Sunlife Frontline equity fund-Plan A (D)	-0.123	-0.512	1.578
24	Birla Sunlife Frontline equity fund-Plan B (G)	1.987	2.951*	2.014
25	Birla Sunlife New Millenium fund-Plan A (D)	0.615	2.008*	1.947
26	Birla Sunlife New Millenium fund-Plan B (G)	0.502	0.451	1.901
27	Birla Top 100-Dividend Option	1.402	3.045*	1.778
28	Birla Top 100-Growth Option	1.302	1.941	1.652
29	Birla Sunlife Intel equity fund Plan A D-Direct PI	0.612	2.130*	1.745
30	Birla Sunlife Intel equity fund Plan A G-Direct PI	1.230	5.021*	2.012
31	Birla Sunlife long term advantage-G-Direct Plan	1.621	6.125*	1.956
32	Birla Sunlife long term advantage-D-Direct Plan	0.945	1.902	1.984

*Significance at 5% level

7. Conclusion

Before the development of the conditional model traditional measures are extensively used in investment performances. With the growing popularity of conditional measure, a new age is opened in the investment performance. In the present study, it is observed that the superior selectivity performance of the sample schemes based on traditional measure is not satisfactory. But, incorporation of available public information variables in the traditional measure the significant stock-selection performances of the managers have been radically changed. In this model the statistically significant stock-selection performance is increased to twenty (20) from twelve (12). Our evidences agree with the earlier views that after inclusion of public information variables in the conditional model, the stock-selection performance confirms better. The statistical test also reveals that the conditional stock-selection performance of the sample schemes of Birla Sun Life Mutual Fund Company is better than traditional measure. In addition to this, the uses of multi-index multi-factor conditional measures and along with this sustainable investment performance are the natural extension of this paper particularly in Indian context.

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