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### MUTUAL FUND PERFORMANCE ANALYSIS IN INDIAN EQUITY MARKET

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#### ABSTRACT

Using various regression models, the present study aims at evaluating the performance of selected Open-ended Equity Diversified mutual funds schemes in the Indian equity market. The mutual funds such as HDFC Top 200 Fund(G), SBI Bluechip Fund (G), Birla Sun Life Frontline Equity Fund (G), ICICI Prudential Top 100 Fund (G) and DSP Blackrock Top 100 Equity Fund(G) have been studied for a period of over 50 months data (22nd September 2011 to 16th December 2015). The analysis has been done using the 3 models which are Capital Asset Pricing Model (CAPM), the Fama-French Three Factors Model and the Carhart Four Factors Model (momentum factors) to evaluate the performance of the funds. NIFTY 50 was selected as the benchmark Index.

**Keywords:-** *Mutual Fund, Equity Market.*

#### I. INTRODUCTION

A mutual fund is a type of investment scheme that allows a group of investors to pool in their money together with a predetermined investment objective. This gathered money is invested by the fund manager into specific securities such as stocks, bonds and short-term money market instruments with respect to the goal of investment. Since it pools money from many investors, a mutual fund is able to invest in diversified asset classes and securities within an asset class in a more optimised way than a single investment. Such diversification helps in mitigating risks making mutual funds one of the most attractive investment options available to small investors.

To ensure the right selection of mutual funds, an investor must know how to correctly evaluate the mutual fund market. This paper aims to evaluate few top performing equity mutual funds by three different models and analyse the results in details.

#### II. OBJECTIVES OF THE STUDY

1. To analyse the how the various factors affect the performance of mutual funds in India.
2. To evaluate the performance of selected equity diversified Mutual funds in India by applying different regression models.
3. To suggest strategies to invest in a profitable mutual fund.
4. To study the relative importance of the various models used.

#### III. LITERATURE REVIEW

Measuring and analyzing mutual fund performance is not a simple task. A lot of studies have discussed several issues about this subject. The review of existing literature gives clear evidence that historical performance is one of the major indicators of future performance of a fund.

Tom A. Fearnley (2002) presented empirical tests of an international Capital Asset Pricing Model (CAPM). He evaluated to what extent a chosen conditional multivariate international CAPM can explain stock and government bond returns in the US, Japan and Europe over the last 10 to 15 years, and whether the model can be usefully employed in global tactical asset allocation.

The paper by Dr. Rao (2002) on "PERFORMANCE EVALUATION OF INDIAN MUTUAL FUNDS" evaluated the performance of 269 Indian Mutual Fund Schemes in a bear market using relative performance index, risk-return analysis, Treynor's ratio, Sharpe's ratio, Jensen's measure, Fama's measure. The study finds that Medium Term Debt Funds were the best performing funds during the bear period of September 98-April 2002 and only 58 of 269 open ended mutual funds provided better returns than the overall market returns.



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The paper by Fama and French (2003) on “The CAPM: Theory and Evidence” studied that the version of the CAPM due to Sharpe (1964) and Lintner (1965) has never been an empirical success. From the first, empirical work on the model consistently finds that the relation between average return and market beta is flatter (the risk premium per unit of market beta is lower) than predicted by the model. And this problem is serious enough to invalidate most applications of the model.

Paper by Juan Carlos (2005) on “Portfolio performance: Factors or Benchmarks?” analyzed whether it was more appropriate to apply a factor-based or a characteristic-based model - both known as benchmarks in portfolio performance measurement using the Linear model, asset pricing model and Fama and French factors. The study showed that if information on returns was used and a linear model was proposed that adjusted return to a set of exogenous variables, then the right side of the equation reported the achieved performance and the passive benchmark that replicated the style or risk of the assessed portfolio.

The paper by N. S. Santhi and K. Balanaga Gurunathan (2014) on “Fama-French Three Factors Model in Indian Mutual Fund Market” analyzed the performance of Tax Saving Mutual Fund Schemes by using Fama French. The performance of the TSMF has been compared with the market benchmark S&P CNX Nifty. There will be a difference between expected return and actual return of mutual funds. The minimum difference between actual and expected return on funds show a stable performance in the market. There are certain funds where the minimum returns are expected by the investors but the funds might give a higher return and there are certain funds where the maximum returns are expected by the investors but those funds might give a lower return.

### IV. RESEARCH METHODOLOGY

Secondary data is taken as a basis of analysis in this research. The 5 amongst the top few open ended equity diversified mutual funds schemes were selected. Daily data of the closing Net Asset Value of the selected schemes was collected from the website [www.amfiindia.com](http://www.amfiindia.com) and the Risk Free Return values of 10-yr bond in India from [in.investing.com](http://in.investing.com). Nifty 50 has been used as the benchmark index. The daily closing value of Nifty Fifty is collected from the website [www.nseindia.com](http://www.nseindia.com). The market premium, SMB, HML and WML values for the Fama-French Three Factors Model and the Four Factors Model (momentum factors) was taken from the source Sobhesh K. Agarwalla, Joshy Jacob & Jayanth R. Varma (2013) “Four factor model in Indian equities market”, W.P. No. 2013-09-05, Indian Institute of Management, Ahmedabad. The reference period for the data is taken from 22nd September 2011 to 16th December 2015. Microsoft Excel is used for all the calculations.

The selected schemes for the purpose of study are:

1. HDFC Top 200 Fund (g)
2. SBI Bluechip Fund (G)
3. Birla Sun Life Frontline Equity Fund (G)
4. ICICI Prudential Top 100 Fund (G) Prudential Top 100 Fund (G) Prudential Top 200(g)
5. DSP Blackrock Top 100 Equity Fund(G)

### Models Used:

#### 1. CAPM Model :

The concept of the Capital Asset Pricing Model (CAPM) was introduced by Sharpe (1964) and Lintner (1965) independently. According to this model, a fund can obtain higher return when it has higher market risk ( $\beta$ ). The model uses equation(1.1) to estimate alpha.

$$r(i,t) = \alpha(i) + \beta(i)*RMRF(t) + \varepsilon(i,t) \quad (1.1)$$



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Where  $r(i,t)$  is the return of fund  $i$  in month  $t$  in excess of risk-free rate,  
 $RMRF(t)$  is the return on the market index in excess of risk-free rate,  
 $\beta(i)$  is the systematic risk that fund  $i$  takes towards market risk ( $RMRF(t)$ ), and  
 $\varepsilon(i,t)$  is the residual return of fund  $i$  in month  $t$ .

Besides alpha, it is also common to use a Sharpe ratio that was first introduced by Sharpe (1966) as a performance measure relative to risk. It is calculated as the ratio between the portfolio return and its standard deviation. While the Sharpe ratio is appropriate to evaluate the risk-return trade off of an entire portfolio, alpha is more suited to identify the marginal contribution of a mutual fund when added to an existing diversified portfolio.

### 2. Fama-French Three Factor Model :

The Fama-French three factor model was developed by Eugene Fama and Kenneth French to describe stock returns. The traditional asset pricing model, Capital Asset Pricing Model (CAPM) uses only one coefficient, beta, to describe the returns of a portfolio or stock with the returns of the market as a whole. In contrast, the Fama-French model uses three coefficients. They found that the equity risks are multidimensional and the cross-section equity returns are better explained by adding two other proxies of risk factors (the return on the factor mimicking portfolio for size, and the return on the factor mimicking portfolio for the book-to-market ratio), in addition to the market factor. Fama and French started with the observation that two classes of stocks have tended to do better than the market as a whole:

- (i) small caps and
- (ii) stocks with a high book-to-market ratio

They then added two factors to CAPM to reflect a portfolio's exposure to these two classes:

$$r(i,t) = \alpha(i) + \beta(1,i)*RMRF(t) + \beta(2,i)*SMB(t) + \beta(3,i)*HML(t) + \varepsilon(i,t) \quad (1.2)$$

Here,  $SMB(t)$  is the return on the factor mimicking portfolio for size in excess of risk-free rate (Small Minus Big),  $HML(t)$  is the return on the factor mimicking portfolio for the book-to-market ratio (High Minus Low) in excess of risk-free rate, and  $\beta(i)$  is the systematic risk that fund  $i$  takes towards a risk factor ( $RMRF(t)$ ,  $SMB(t)$ , or  $HML(t)$ ).

### 3. Carhart Four Factor Model (Momentum Factors) :

Carhart extended the Fama-French Three Factor model by including a fourth momentum factor, to offer investors the possibility of capturing additional returns (asset's returns). Momentum in a stock is described as the tendency for the stock price to continue rising if it is going up and to continue declining if it is going down. This factor can be calculated by subtracting the equal weighted average of the highest performing firms from the equal weighted average of the lowest performing firms, lagged one month (Carhart, 1997). The model is based on the equation (1.3).

$$r(i,t) = \alpha(i) + \beta(1,i)*RMRF(t) + \beta(2,i)*SMB(t) + \beta(3,i)*HML(t) + \beta(3,i)*UMD(t) + \varepsilon(i,t) \quad --(1.3)$$

Here, UMD is the monthly premium on winners minus losers



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## V. DATA ANALYSIS

## Model 1 : Capital Asset Pricing Model (CAPM)

<i>CAPM Model</i>	<i>HDFC Top 200 (Growth)</i>	<i>SBI Bluechip Fund (G)</i>	<i>Birla Sun Life Frontline Equity Fund (G)</i>	<i>ICICI Prudential Top 100 Fund (G)</i>	<i>DSP Blackrock Top 100 Equity Fund(G)</i>
<b>Multiple R</b>	<b>0.9589</b>	<b>0.9717</b>	<b>0.9775</b>	<b>0.9807</b>	<b>0.9617</b>
<b>R Square</b>	<b>0.9195</b>	<b>0.9443</b>	<b>0.9555</b>	<b>0.9617</b>	<b>0.9249</b>
<b>Adjusted R Square</b>	<b>0.9194</b>	<b>0.9442</b>	<b>0.9554</b>	<b>0.9617</b>	<b>0.9248</b>
<b>Standard Error</b>	<b>0.4098</b>	<b>0.2945</b>	<b>0.2781</b>	<b>0.2509</b>	<b>0.3806</b>
<b>Alpha(Jensen's Index)</b>	<b>0.0172</b>	<b>0.0392</b>	<b>0.0292</b>	<b>0.0232</b>	<b>0.0090</b>
<b>Beta</b>	<b>1.0176</b>	<b>0.8943</b>	<b>0.9507</b>	<b>0.9282</b>	<b>0.9857</b>

## INFERENCE:

1. The Jensen's Performance Index (Alpha) calculated on the basis of above CAPM model measures the performance due to stock selection. It reflects the difference between the return actually earned on a portfolio and the return of the fund was expected to earn, given its beta. A positive alpha is the extra return awarded for taking a risk, instead of accepting the market return. Therefore, it is a measure of Fund Manager's contribution.

Here, the highest alpha for the chosen period is for SBI Bluechip Fund (G) (0.0392), followed by Birla Sun Life Frontline Equity Fund (G) (0.0292) and then ICICI Prudential Top 100 Fund (G) (0.0232).

2. The Beta measures the volatility of a security relative to the chosen benchmark index Nifty Fifty. A beta greater than one means the fund or stock is more volatile than the benchmark index, while a beta of less than one means the security is less volatile than the index.

According to this measure, HDFC Top 200 (Growth) Fund is the only fund that is more volatile than the market. All other selected funds show beta value of less than 1 which means that the funds will be less volatile than the market.

3. The systematic risk rate is lowest for SBI Bluechip Fund (G) (0.8943) and the investors with low appetite for risks should invest here. Also, this fund has the highest alpha (0.0392).

## Model 2 : Fama French 3 Factor Model



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<b>Fama French 3 Factor Model</b>	<b>HDFC Top 200 (G)</b>	<b>SBI Bluechip Fund (G)</b>	<b>Birla Sun Life Frontline Equity Fund (G)</b>	<b>ICICI Prudential Top 100 Fund (G)</b>	<b>DSP Blackrock Top 100 Equity Fund(G)</b>
<b>Multiple R</b>	0.9672	0.9749	0.9819	0.9818	0.9652
<b>R Square</b>	0.9355	0.9503	0.9641	0.9639	0.9316
<b>Adjusted R Square</b>	0.9353	0.9502	0.9640	0.9638	0.9314
<b>Standard Error</b>	0.3661	0.2782	0.2501	0.2440	0.3637
<b>Intercept</b>	0.0165	0.0362	0.0281	0.0219	0.0090
<b>Coefficient of Index Refined Rate</b>	0.9985	0.9088	0.9454	0.9325	0.9733
<b>Coefficient of SMB</b>	0.0862	0.1251	0.0885	0.0645	0.0537
<b>Coefficient of BML</b>	0.1882	0.0606	0.1174	0.0467	0.1156

**INFERENCE:**

1. The excess returns calculated from this model show a similar picture as CAPM model with SBI Bluechip Fund (G) Mutual Fund on top with alpha having a value of 0.0362 followed by Birla Sun Life Frontline Equity Fund (G)(0.0281) and ICICI Prudential Top 100 Fund (G) (0.0219).
2. The volatility of the Funds relative to the chosen benchmark index Nifty Fifty is maximum for HDFC Top 200 (Growth) Fund (0.9985) and is lowest for SBI Bluechip Fund (G) (0.9088). All the selected funds show a value of less than 1 which means that all these funds will be less volatile than the market.
3. The SBI Bluechip Fund (G) Fund seems to be the safest option according to this model as well.

**MODEL 3 : Carhart 4 Factor Model**

<b>Carhart 4 Factor Model</b>	<b>HDFC Top 200 (G)</b>	<b>SBI Bluechip Fund (G)</b>	<b>Birla Sun Life Frontline Equity Fund (G)</b>	<b>ICICI Prudential Top 100 Fund (G)</b>	<b>DSP Blackrock Top 100 Equity Fund(G)</b>
<b>Multiple R</b>	0.9677	0.9762	0.9819	0.9780	0.9656
<b>R Square</b>	0.9365	0.9530	0.9641	0.9564	0.9324
<b>Adjusted R Square</b>	0.9362	0.9528	0.9639	0.9563	0.9321
<b>Standard Error</b>	0.3636	0.2708	0.2502	0.2680	0.3617



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<b>Intercept</b>	<b>0.0199</b>	<b>0.0311</b>	<b>0.0283</b>	<b>0.0228</b>	<b>0.0058</b>
<b>Coefficient of Index Refined Rate</b>	<b>0.9924</b>	<b>0.9177</b>	<b>0.9451</b>	<b>0.9307</b>	<b>0.9789</b>
<b>Coefficient of SMB</b>	<b>0.0918</b>	<b>0.1169</b>	<b>0.0888</b>	<b>0.0637</b>	<b>0.0486</b>
<b>Coefficient of BML</b>	<b>0.1769</b>	<b>0.0771</b>	<b>0.1169</b>	<b>0.0545</b>	<b>0.1259</b>
<b>Coefficient of WML</b>	<b>-0.0514</b>	<b>0.0749</b>	<b>-0.0024</b>	<b>0.0434</b>	<b>0.0467</b>

### INFERENCE:

1. The excess returns are highest for SBI Bluechip Fund (G) Mutual Fund with alpha having a value of 0.0311 followed by Birla Sun Life Frontline Equity Fund (G) Sun Life (0.0283) and ICICI Prudential Top 100 Fund (G)(0.0228). Here, the results show the same pattern for all the models but a careful observation reveals that the values of alpha have increased for all except for SBI Bluechip Fund (G) mutual fund which shows a decrease in value. It is important to note that the model could have shown different results than those observed in earlier models for a different set of data.
2. The volatility of the Funds relative to the chosen benchmark index Nifty Fifty is again maximum for HDFC Top 200 (Growth) Fund (0.9924) and is lowest for SBI Bluechip Fund (G) (0.9177). All the selected funds show a value of less than 1 which means that all these funds will be less volatile than the market.
3. The SBI Bluechip Fund (G) Fund seems to be the safest option (least risky) according to this model as well.

### VI. CONCLUSION

The toughest part in making an investment is the selection of the right Mutual Fund. And our study concludes that the more the number of factors of the market are considered, the better will be the assessment (shown by higher R squared value). Also, the different parameters measuring the performance may hold different weights for different individuals. In general, human psychology aims to minimise the risk instead of maximising the returns. For such risk aversion, SBI Bluechip Fund (G) equity Fund seems to be the best option after studying the data for the period 2011-2015. Considering the ranking given by CRISIL which is a global analytical company providing ratings, research and risk and policy advisory services ranks the above mutual funds in consistency with the results obtained from our data.

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