


**PERFORMANCE EVALUATION OF MUTUAL FUNDS USING RISK RETURN  
RELATIONSHIP MODELS - AN EMPIRICAL STUDY**

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ARTICLE INFO	ABSTRACT
<p><b>Article history:</b></p> <p>Received 03 March 2023</p> <p>Accepted 29 May 2023</p>	<p><b>Purpose:</b> The main purpose of this study is to analyse the performance of mutual funds using Risk- Return Relationship Models.</p>
<p><b>Keywords:</b></p> <p>Mutual Fund; Systematic Risk; Returns; GDP; NAV; Risk-Adjusted Measures; Benchmark.</p>	<p><b>Theoretical framework:</b> One of India's most important financial intermediaries, mutual funds can provide a wide range of financial services to small and large investors. They are also involved in the country's transformation, and their market participation has become more important. Evaluating a mutual fund's performance concerns investors, researchers, and fund managers. It should be conducted in a way that helps investors make informed decisions and maximize returns. A regular evaluation of a fund's performance is also essential for investors.</p>
	<p><b>Design/methodology/approach:</b> The performance of 12 growth-oriented mutual funds has been evaluated using three Risk Adjusted performance measures, namely the Treynor index, Sharpe index, and Jensen measure. Treynor Index, developed by Treynor and Mazuy (1966), defined the measure as the ratio of returns to systematic Risk (Beta). The higher the ratio better the performance. Sharpe Index, developed by Sharpe (1964) defined as the ratio of returns to the variability of returns. Jensen's measure (Jensen 1968) regresses excess fund return with the excess market return. Monthly data was used during the period from Jan 2015 to Dec 2019. Further monthly returns of 12 diversified Equity mutual funds were compared with the returns of the B.S.E.( Bombay Stock Exchange) national index during the same period.</p>
	<p><b>Findings:</b> It is identified from the results that the mutual funds have not performed better than their benchmark indicators except the ICICI Multi-asset fund and HDFC mid-cap opportunity fund in terms of a non-risk adjusted measure of the average returns as well as in terms of Risk-adjusted performance measures.</p>
	<p><b>Research, Practical &amp; Social implications:</b> Fund houses, Fund managers, researchers, and mutual fund investors can benefit more from a strong risk management foundation. It can help them make informed decisions and maximize their returns.</p>
	<p><b>Originality/value:</b> This study differs from past studies because it examined the risk-adjusted performance of a few mutual funds, which ultimately may use by investors and policymakers to enhance the returns in these funds.</p>
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## AVALIAÇÃO DE DESEMPENHO DE FUNDOS MÚTUOS USANDO MODELOS DE RELAÇÃO RISCO-RETORNO - UM ESTUDO EMPÍRICO

### RESUMO

**Objetivo:** O principal objetivo deste estudo é analisar o desempenho dos fundos mútuos usando modelos de relação risco-retorno.

**Estrutura teórica:** Um dos mais importantes intermediários financeiros da Índia, os fundos mútuos podem oferecer uma ampla gama de serviços financeiros a pequenos e grandes investidores. Eles também estão envolvidos na transformação do país, e sua participação no mercado se tornou mais importante. A avaliação do desempenho de um fundo mútuo diz respeito a investidores, pesquisadores e administradores de fundos. Ela deve ser conduzida de forma a ajudar os investidores a tomar decisões informadas e maximizar os retornos. Uma avaliação regular do desempenho de um fundo também é essencial para os investidores.

**Projeto/metodologia/abordagem:** O desempenho de 12 fundos mútuos voltados para o crescimento foi avaliado usando três medidas de desempenho ajustadas ao risco, a saber, o índice Treynor, o índice Sharpe e a medida Jensen. O Índice Treynor, desenvolvido por Treynor e Mazuy (1966), definiu a medida como a razão entre os retornos e o risco sistemático (Beta). Quanto maior a proporção, melhor o desempenho. Índice de Sharpe, desenvolvido por Sharpe (1964), definido como a razão entre os retornos e a variabilidade dos retornos. A medida de Jensen (Jensen 1968) regride o excesso de retorno do fundo com o excesso de retorno do mercado. Foram usados dados mensais durante o período de janeiro de 2015 a dezembro de 2019. Outros retornos mensais de 12 fundos mútuos de ações diversificados foram comparados com os retornos do índice nacional da B.S.E. (Bolsa de Valores de Bombaim) durante o mesmo período.

**Conclusões:** Os resultados indicam que os fundos mútuos não tiveram um desempenho melhor do que seus indicadores de referência, exceto o fundo ICICI Multi-asset e o HDFC mid-cap opportunity fund em termos de uma medida não ajustada ao risco dos retornos médios, bem como em termos de medidas de desempenho ajustadas ao risco.

**Implicações sociais, práticas e de pesquisa:** As casas de fundos, os administradores de fundos, os pesquisadores e os investidores em fundos mútuos podem se beneficiar mais de uma base sólida de gerenciamento de risco. Isso pode ajudá-los a tomar decisões informadas e maximizar seus retornos.

**Originalidade/valor:** Este estudo difere de estudos anteriores porque examinou o desempenho ajustado ao risco de alguns fundos mútuos, o que, em última análise, pode ser usado por investidores e formuladores de políticas para aumentar os retornos desses fundos.

**Palavras-chave:** Fundo Mútuo, Risco Sistemático, Retornos, GDP, NAV, Medidas Ajustadas ao Risco, Benchmark.

## EVALUACIÓN DEL RENDIMIENTO DE LOS FONDOS DE INVERSIÓN MEDIANTE MODELOS DE RELACIÓN RIESGO-RENTABILIDAD - UN ESTUDIO EMPÍRICO

### RESUMEN

**Objetivo:** El principal objetivo de este estudio es analizar el rendimiento de los fondos de inversión utilizando modelos de relación riesgo-rentabilidad.

**Marco teórico:** Los fondos de inversión, uno de los intermediarios financieros más importantes de la India, pueden ofrecer una amplia gama de servicios financieros a pequeños y grandes inversores. Su participación en el mercado es cada vez más importante. La evaluación del rendimiento de un fondo de inversión concierne a inversores, investigadores y gestores de fondos. Debe realizarse de manera que ayude a los inversores a tomar decisiones con conocimiento de causa y a maximizar los rendimientos. La evaluación periódica del rendimiento de un fondo también es esencial para los inversores.

**Diseño/metodología/enfoque:** El rendimiento de 12 fondos de inversión orientados al crecimiento se evaluó utilizando tres medidas de rendimiento ajustadas al riesgo, a saber, el índice de Treynor, el índice de Sharpe y la medida de Jensen. El índice de Treynor, desarrollado por Treynor y Mazuy (1966), definió la medida como la relación entre los rendimientos y el riesgo sistemático (Beta). Cuanto mayor sea la relación, mejor será el rendimiento. Índice de Sharpe, desarrollado por Sharpe (1964), definido como la relación entre los rendimientos y la variabilidad de los rendimientos. La medida de Jensen (Jensen 1968) relaciona el exceso de rentabilidad del fondo con el exceso de rentabilidad del mercado. Se utilizaron datos mensuales durante el periodo comprendido entre enero de 2015 y diciembre de 2019. Se compararon otros rendimientos mensuales de 12 fondos de inversión de renta variable diversificada con los rendimientos del índice nacional B.S.E. (Bombay Stock Exchange) durante el mismo periodo.

**Conclusiones:** los resultados indican que los fondos de inversión no obtuvieron mejores resultados que sus índices de referencia, excepto el fondo ICICI Multi-asset y el fondo HDFC mid-cap opportunity en términos de una medida no ajustada al riesgo de rendimientos medios, así como en términos de medidas de rendimiento ajustadas al riesgo.

**Implicaciones sociales, prácticas y de investigación:** Las sociedades de fondos, los gestores de fondos, los investigadores y los inversores en fondos de inversión pueden beneficiarse más de una base sólida de gestión del riesgo. Esto puede ayudarles a tomar decisiones con conocimiento de causa y a maximizar sus rendimientos.

**Originalidad/valor:** Este estudio difiere de otros anteriores porque examina el rendimiento ajustado al riesgo de algunos fondos de inversión, lo que en última instancia puede ser utilizado por los inversores y los responsables políticos para mejorar los rendimientos de estos fondos.

**Palabras clave:** Fondo de Inversión, Riesgo Sistemático, Rendimientos, GDP, NAV, Valor Liquidativo, Medidas Ajustadas al Riesgo, Referencia.

## INTRODUCTION

The mutual fund industry in India has been growing at a rapid pace since its inception. Various factors, such as establishing an all-inclusive legal framework, raising household savings, and introducing new products and educational campaigns, have contributed to the industry's success.

The Indian fund market has started to evolve from its traditional debt and equity funds offerings to various products geared toward capital protection. This has resulted in the emergence of new fund categories, such as gold funds and exchange-traded funds. Despite the industry's various achievements, the fund sector's potential remains untapped.

According to estimates, the assets under management of the fund industry in India are around 5% to 6% of the country's G.D.P. This is lower than the figures of other emerging economies such as South Africa and Brazil, which have around 40% and 33 percent of their economies' G.D.P., respectively. Also, the industry has yet to reach out to the country's other regions. As of September 2013, over 74 percent of the fund assets under management are in Tier-I cities.

In addition, various behavioral and cultural factors prevent people from efficiently transferring their savings into a mutual fund. This is why the industry must be addressed appropriately to ensure that the fund industry can achieve newer heights.

## REVIEW OF LITERATURE

Evaluating a mutual fund's performance concerns investors, researchers, and fund managers. It should be conducted in a way that helps investors make informed decisions and maximize returns. Due to the increasing competition in the market, fund managers are under increasing pressure to justify the expenses associated with research and management.

A regular evaluation of a fund's performance is also essential for investors. It can help them make informed decisions and maximize their returns. A method has been developed to measure a fund's monthly returns against that of a benchmark. Various experts such as Sharpe, Jensen, and Treynor suggested the use of risk-adjusted measures.

In 1968, a study was conducted on the evaluation of the performance of a fund by developing a new predictive model that considers the various factors that affect a portfolio's returns. The new model aims to enhance the ability of a portfolio manager to increase returns and minimize risk.

In 1980, a framework was developed by Nicholas Greses, Tom, and WMiller to deal with the non-stationarity in the relationship between a fund's returns and the risk-return curve. In 1996, a study by Panigrahi examined the changes that occurred during the past few years in the capital market. The increasing emphasis on institutional investors and the continued liberalization of the economy has led to the growth of the investible resources of funds.

### **The Objective of the Study**

- 1) To Analyse the performance of mutual funds using Risk- Return relationship Models.

### **METHODOLOGY**

The sample comprises the top 12 growth-oriented equity mutual funds with over 10,000 crores of assets under management. They were selected using stratified random sampling and proportional representation methods. The benchmark market index for the designated funds was the B.S.E National Index. The schemes were evaluated using this index to see if they could beat the market.

Portfolio returns ( $R_{it}$ ) are the difference between NAVs for two consecutive months divided by the NAV for the proceeding month.

$$R_{it} = \frac{NAV(t) - NAV(t-1)}{NAV(t-1)}$$

Market Returns ( $R_{mt}$ ) is the difference between the market indices of two consecutive months divided by the market index for the proceeding month.

$$R_{mt} = \frac{\text{Market Index}(t) - \text{Market Index}(t-1)}{\text{Market Index}(t-1)}$$

Risk-free Return (Rf) The concept of risk-free return refers to the minimum returns that investors can expect from their investments. For the study, this was taken as a 1% monthly rate.

The concept of risk refers to the variability of returns. Usually, it is categorized into two categories: systematic and unsystematic. The former refers to the various factors that affect the market's returns. The latter is the type of risk that investors should consider when planning their investments.

Following are the Risk-adjusted performance measures used to evaluate mutual Funds.

Treynor Index: Developed by Jack Treynor, defined this measure is the ratio of returns to systematic Risk (Beta). The higher the ratio better the performance.

$$TI = (R_i - R_f) / B_i$$

Where

R<sub>i</sub> = Fund return  
R<sub>f</sub> = Risk-free return  
B<sub>i</sub> = Systematic Risk

Sharpe Index: Developed by W.F. Sharpe, defined as the ratio of returns to The variability of returns.

$$SI = (R_i - R_f) / S.D.$$

Where

SD = Standard deviation of the fund scheme.

Jensen measure Jensen regresses excess fund return with excess market return as shown below:

$$R_{it} - R_{ft} = \alpha + \beta (R_{mt} - R_{ft}) + e_i$$

Where

Rit = monthly return on the scheme (i) in a month (t)

$\alpha$  = The Intercept

$\beta$  = Systematic Risk

The intercept of the equation provides a Jensen measure of performance. The higher the intercept, the better the performance.

The results and findings of the analysis are given in Table 1.

Systematic risk ( $\beta$ ): The first column of this study analyzed the 12 growth-oriented funds. It revealed that the average value was only 0.597. The funds tend to have low-risk strategies and typically hold less risky portfolios. The maximum and minimum values of the funds analyzed were 0.825 and 0.245, respectively.

It was also observed that the three funds that were evaluated for this study, namely, the S.B.I Bluechip fund, the HDFC Midcap Opportunity fund, and the multi-asset fund of the company, were riskier than their market counterparts.

Coeff. of Determination ( $R^2$ ): Table 1 shows that the coefficient of determination ( $R^2$ ) was at 0.54. This means that, in general, the data for most funds is reasonably accurate. For instance, the maximum and minimum values of the HDFC equity focus fund and the mid-cap opportunity fund are respectively 0.82 and 0.35.

The low  $R^2$  of the HDFC Focus fund implies that the portfolio is not as diversified as it should be. On the other hand, the high  $R^2$  of the HDFC MidCap opportunity fund (0.82) shows that the portfolio is very diversified. It means that the fund's diversification gives it an advantage over the HDFC focus fund (0.164), which has a high total risk.

Thus, it can be concluded that the various funds that have used the diversification technique to reduce their total risk are the ones that have the advantage over the other funds in this analysis. For instance, the multi-asset and discovery fund of the ICICI, the Birla Sun Life Equity fund, the HDFC mid-cap opportunity fund, and the S.B.I blue chip fund have a low total risk.

## DATA ANALYSIS AND DISCUSSION

Table 1. Different risk-adjusted performance measures, along with other parameters for 12 mutual funds

Name of scheme	Systematic Risk( $\beta$ )	Total	ARit	SI	TI	JM( $\alpha$ )	$R^2$
Market Index	1	0.080	0.0029	- 0.0925	-0.0071	-----	----

Axis Bluechip Fund	0.461	0.150	-0.0038	-0.0901	-0.0302	-0.0101	0.54
Mirae Large cap fund	0.348	0.097	-0.0036	-0.0148	-0.0410	-0.0130	0.39
ICICI multi asset fund	0.825	0.081	0.0128	0.0307	0.0026	0.0056	0.74
HDFC Mid-cap opportunity	0.720	0.076	0.0160	0.0818	0.0087	0.0080	0.82
Kotak Multicap fund	0.245	0.080	-0.0060	-0.1998	-0.0661	-0.0013	0.36
SBI magnum Multicap fund	0.480	0.104	0.0013	-0.0830	-0.0180	-0.0062	0.44
SBI Bluechip fund	0.681	0.090	-0.0029	-0.1474	-0.0187	-0.0012	0.60
Birla sun life equity fund	0.815	0.082	-0.0004	-0.1252	-0.0124	-0.0016	0.77
Birla sun life Frontline Equity fund	0.480	0.110	-0.0015	-0.1090	-0.0580	-0.0013	0.39
Nippon India large-cap fund	0.520	0.081	-0.0018	-0.3470	-0.0535	-0.0022	0.62
ICICI value discovery fund	0.496	0.108	-0.0200	-0.2731	-0.0601	-0.0018	0.44
HDFC Equity fund	0.545	0.164	-0.0153	-0.1532	-0.0455	-0.0021	0.35
Average Value	0.597		-0.0071	-0.1379	-0.0345	-0.0045	0.54

Source: Prepared by Authors from secondary data

The four measures are then analyzed separately. The mean returns are a non-risk-based measure of performance that is used to compare the returns of various asset classes over a period of time. For instance, the market return from Jan 2015 to December 2019 was 0.0029. On the other hand, the average monthly returns for the sample scheme were -0.0071.

The results of this study indicate that mutual funds provide lower average monthly returns than the market index, which represents the share market. For instance, the two funds with the highest average monthly returns are the HDFC Mid Cap Opportunity Fund and the multi-asset fund, which is more than the market index.

Out of the 12 mutual funds analyzed, about 16.67 percent had higher mean returns than the market. However, most of these funds exhibited negative returns, possibly because of the stock market's poor performance during this period. A simple average return doesn't highlight the fund's risk-mitigation strategy.

Sharpe Index: The reward for the variability of mutual funds is shown in the fourth column in Table 1. The average value of these 12 funds during the study is -0.137, while the market index is -0.0925. This suggests that the funds have not performed well when it comes to return on investment.

Around 33 percent of the 12 funds that were analyzed had a value of more than the market's ratio of -0.0925. Some of these include the HDFC Mid-cap opportunity fund (0.0816), the Axis blue chip fund (-0.0901), and the S.B.I. Magnum Multicap fund (-0.0830), and the ICICI multi-asset fund (0.0307).

The results of the study revealed that out of the 12 funds analyzed, the S. B.I. and the ICICI funds were the top performers. This is because the funds earned higher returns per unit of risk during a falling market. This suggests that they were well-positioned to provide reasonable returns to small investors who are looking for a diversified portfolio. The fund managers of these funds have also done an excellent job of providing these investors with high returns.

**Treynor Index:** The Treynor Index is a measure of risk that investors should consider when it comes to holding fund shares. The table shows that the average value that the funds under consideration concerning this ratio was -0.0345. It is -0.0071 for the Market index.

Although most of the mutual funds have a lower Treynor Index than the market, some of these funds, such as HDFC Midcap Opportunity Fund (0.0087) and ICICI Multi-asset Fund (0.0028), have managed to provide better returns than the market. A lower Treynor index may indicate that investors with a well-defined strategy but still do not get adequate returns from their investments may need to rethink their approach.

**Jensen's Index:** The last measure used in the analysis is the Jensen Measure, which is the alpha derived from equation 7. According to this, the funds earned around 0.4 percent less than they should have due to their systematic risk level. The result indicates that the alpha value of the ICICI multi-asset fund (0.0056) and HDFC mid-cap opportunity fund (0.0080) is positive, indicating the superior performance of these funds than the market. In contrast, the remaining funds of S.B.I., Birla sun life, and Nippon mutual funds have a negative value of  $\alpha$ , which indicates the inferior performance of these funds compared to the market. This shows that the distribution is skewed to the low side, with ten funds having  $\alpha < 0$  and only two funds with  $\alpha > 0$ . Thus, it appears from the preponderance of negative  $\alpha$ 's that the funds are not able to forecast future security prices enough to recover their research expenses, management fees, and commission expenses, i.e., There is no fund except ICICI Muti asset fund, HDFC Mid-cap opportunity fund where the managers have been able to add value to the portfolio over the returns of any random selection of securities.

## **FINDINGS & CONCLUSION**



According to the above analysis, most growth-oriented funds have not performed well relative to their benchmark indicators. The exception is the HDFC Midcap Opportunity and the multi-asset fund of ICICI. Growth-oriented funds are expected to provide the advantage of market timing, selectivity, and diversification.

The sample under study shows that the multi-asset and the HDFC Midcap Opportunity funds are very diversified. This has reduced the total risk of the portfolio. While this is good news for the investors, it does not mean these funds will perform better. The main limitation of the present study is the sample size, as only the top 12 funds with more than 10,000 crores of AUM (Asset Under Management) have been considered with a single benchmark index. Future studies can be conducted by taking larger samples from different categories of mutual funds, so a risk-return model may also be developed to study the risk-returns relationship.

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