

# Risk And Return Relationship On Selected Income And Equity Mutual Fund Schemes

## 1. Dr. T. Hareesh Kumar,

M.Com, Ph.D, Assistant Professor, Department of Financial Administration, Central University of Punjab, Email : [hareeshsky@gmail.com](mailto:hareeshsky@gmail.com), Mobile:9885516493.

## 2. Dr. M.Madana Mohan,

M.Com, MBA, MPhil, PhD, Principal I/c Vishwa Vishwani School of Business, Thumkunta, Hyderabad-500078, Telangana State, Mobile: 8019764323, Email: [dr.madanamohan@gmail.com](mailto:dr.madanamohan@gmail.com)

### Abstract:

This paper is an attempt to inquire the relationship between mutual fund returns and historical measures of systematic and unsystematic risk over the ten years' time period from January 2016 to December 2021 in context of Indian financial market. Systematic risk is represented by beta and unsystematic risk measured by residual risk. A small variation of Fama and MacBeth methodology is used to show the relationship between historical systematic and unsystematic risk and present return of selected mutual funds. Empirical result found that significant relation exists among historical risk and current return.

**Keywords:** Mutual fund, Volatility, return, risk

### INTRODUCTION

This paper will look at how mutual fund returns have been linked to historical measures of both systematic and unsystematic risk in the Indian financial market. Beta is an indicator of systematic risk, and residual risk is an indicator of non-systematic risk. Use the same method that was used by Fama and Macbeth in 1973 to show how historical risk (systematic risk) and return (unsystematic risk) have changed over time for a group of mutual funds. Standard tests of the Capital Asset Pricing Model (CAPM) show how stock prices and model risk are linked. Fama MacBeth's model (1973) says that the portfolio return and beta are linked in a straight line, and residual risk isn't a big part of the portfolio return. Joel R. Barber (1994) points out that in Fama and MacBeth (1973), the t statistics on the coefficient are only 1.73 from 1956 to 1968, which isn't very high. Fama MacBeth's model was used in most of the work, which made some people question beta's ability to explain things. If you want to know how the US economy works, Tinic and West (1984) say that only in January does the relationship between beta and return hold true for the US economy. Nonlinear relationships are also found between beta and returns for the quadratic model. The residual risk also plays a role in how much money a fund makes. Return beta and residual risk are only related in the month of January in the case of the US economy. They were only related in that particular month. In contrast to the model presented above, Lakonishok and Shapiro (1987) discovered that neither beta nor residual risk can explain the differences in future returns over time in the same way. Corhay Haueawini and Michel (1987) found that for the New York, London, and Brussels exchanges, the average risk premium on beta is insignificantly different from zero. For the Paris exchange, the average risk premium on beta is negative.

### REVIEW OF LITERATURE

As Panigrahi (1996) says, mutual funds have become more popular in the last few years because of a number of reasons, including rapid growth and high performance. They also have well-trained staff and can reach a wider audience. Sathya Swaroop Debasish (2009) used the average return, beta ratio, Sharpe ratio, Treynor ratio, and Jensen ratio to look at 23 equity

mutual funds that were sold by six commercial and three public sector funds. They looked at 23 funds that were sold by 23 different funds. Sarika Keswani is an Indian woman who did a study in 2011 about open-ended balanced mutual funds. She looked at how well these funds did over time. Open plans were set up by mutual fund providers who didn't work for the government, Vikas Kumar said back in 2011. Sharpe, Treynor, Jensen, and Fama ratios are used to figure out how well individual stocks and debt-heavy mutual funds are doing in terms of money. During the last few years, mutual funds have become more and more popular because of their rapid growth and impressive performance as well as their skilled employees and wide range of portfolios. In this study, we looked at 23 stock mutual funds from six private and three public companies to see how well they did over time. It was important for us to look at things like the average return and the beta, as well as things like the Sharpe ratio, Treynor ratio, Jensen ratio, and Treynor ratio. India's balanced mutual funds have a lot to do with how well they do. The size of the fund has a big impact on how well it does. For his study, Vikas Kumar looked at twenty open plans from five mutual fund companies that were good at making money.

### Objective of Study

It was all done based on the current risk and return relationship. As a result, this study is different from the ones that came before it. It looks at the power of past or historical risk to explain current returns. The paper is good for investors who use historical beta estimates to decide whether or not to buy or sell something. We chose eight equity-oriented mutual funds and eight income-oriented mutual fund schemes for each of the companies in the sectors where they work. They were chosen because they had the best average return over the study period. To do this study, we look at data on the daily adjusted net asset value (NAV) of the 16 mutual fund schemes that we've chosen above. The time frame for the study is from 2016 to 2021. As a market index, the BSE sensex is used. The risk-free rate of return on a three-month Treasury bill is used. Capitaline is the source of the data.

The following methodology is used for the study.

### Return

The daily return has been computed for the above period by the following formula-

$$R_{pt} = \ln(NAV_t / NAV_{t-1}) \dots (1)$$

Here  $NAV_t$  and  $NAV_{t-1}$  are the net asset value for the time period  $t$  and  $t-1$  respectively. The average return of each mutual fund scheme ( $R_p^*$ ) over the study period is as follows

$$R_p^* = \frac{1}{n} \sum_{i=1}^n R_{pt} \dots (2)$$

Here  $R_{pt}$  is the return of mutual fund scheme at time  $t$  and  $n$  is the total number of year studied. **Three factor model**

The present risk and return relationship of the selected mutual fund schemes are measured by the following equations:

$$R_{it} = R_{ft} + \beta_{1t}(R_{1t} - R_{ft}) + \beta_{2t}(R_{2t} - R_{ft}) + \beta_{3t}(R_{3t} - R_{ft}) + e_{it} \dots (3)$$

$$R_{it} = R_{ft} + \beta_{1t}(R_{1t} - R_{ft}) + \beta_{2t}(R_{2t} - R_{ft}) + \beta_{3t}(R_{3t} - R_{ft}) + \beta_{4t}(R_{4t} - R_{ft}) + e_{it} \dots (4)$$

$$R_{it} = R_f + \beta_i R_{m,t} + S_{it} + e_{it} \dots (5)$$

$R_{it}$  = return of  $i^{th}$  fund at month  $t$ .

$R_f$  = risk free rate of return.

$\beta_i$  = systematic risk or beta of  $i^{th}$  fund.

$S_{it}$  = residual risk or unsystematic risk of  $i^{th}$  fund.

Each mutual fund scheme is judged on how well it did in the market at the time it was set up. They do this by looking at how the market has changed over the last 60 months or five years. This helps them figure out how each scheme's beta and risk have changed over time. When people want to figure out how much risk there was in the past, they often look at data from five years ago. It's called Beta, and it's the average least squares coefficient of a market index, which is called the Beta coefficient.

Each mutual fund scheme's extra return is regressed on the beta residual risk to see if it can explain why it did well, and if so, how it did well. In this case, E(1), E(2), and E(3) aren't the same as 0. This is looked at by comparing how much risk was measured in the past to how much money was made in the present. It can be set up in a number of ways, like this: - One factor, two factors, and three factor models are all ways to look at things, but they are all different ways to look at things.:-

$$R_{it} = R_f + \beta_{i,t-1} R_{m,t} + S_{it} + e_{it} \dots (6)$$

$$R_{it} = R_f + \beta_{i,t-1} R_{m,t} + \beta_{i,t-2} R_{m,t-1} + S_{it} + e_{it} \dots (7)$$

$$R_{it} = R_f + \beta_{i,t-1} R_{m,t} + \beta_{i,t-2} R_{m,t-1} + \beta_{i,t-3} R_{m,t-2} + S_{it} + e_{it} \dots (8)$$

$$0 \quad \beta_{i,t-1} \quad \beta_{i,t-2} \quad \beta_{i,t-3} \quad S_{it} \quad e_{it}$$

$$t \dots (6)$$

$$0 \quad 1 \quad 2 \quad 3 \quad S_{it} \quad e_{it}$$

$$t \quad t-1 \quad t-2 \quad t-3 \quad 1 \quad it$$

$$0 \quad 1 \quad 2 \quad 3 \quad it^2 \quad it^3$$

$$t \quad t-1 \quad t-2 \quad t-3 \quad 1 \quad it$$

$R_{it}$  = return of  $i^{th}$  fund at month  $t$ .

$R_f$  = risk free rate of return.

$\beta_{i,t-1}$  = historical systematic risk or beta of  $i^{th}$  fund.

$S_{i,t-1}$  = historical residual risk or unsystematic risk of  $i^{th}$  fund.

### Multicollinearity test

To detect multicollinearity in the three factor regression equations, Variance Inflation Factor (VIF) is used. Let the general multiple regression model be-

$$Y_i = \alpha_0 + \alpha_1 X_{1i} + \alpha_2 X_{2i} + \alpha_3 X_{3i} + e_i \dots (9)$$

In the presence of multicollinearity, the variance of the estimated coefficient of  $k^{th}$  explanatory variable is

$$Var(\hat{\alpha}_k) = \frac{\sigma^2}{z} \dots (10)$$

$$\frac{\text{Var}(\hat{\beta}_k)}{\text{Var}(\hat{\beta}_k) - R_k^2}$$

When multicollinearity is absent then  $R_k^2=0$  which is the squared multiple correlation between  $k^{\text{th}}$  explanatory variable and other explanatory variables of the model.

The VIF is the ratio of two variances with multicollinearity and without multicollinearity. Thus,

$$\text{VIF}_k = \frac{\text{Var}(\hat{\beta}_k)}{\text{Var}(\hat{\beta}_k) - R_k^2} = \frac{1}{1 - R_k^2} \quad (11)$$

For each estimated slope coefficient, the VIF values are computed. These values are used to identify the factors that cause multicollinearity. By using a rule of thumb, it is determined that severe multicollinearity occurs for the  $k^{\text{th}}$  explanatory variable when  $\text{VIF}_k > 10$ , that is,  $R_k^2 > 0.9$ . Klein (1962) established a rule of thumb that multicollinearity would be considered an issue if  $R_y^2 = R_k^2$ , where  $R_y^2$  is the squared multiple correlation coefficient between the dependent variable  $Y_i$  and the explanatory variables  $X_{1i}$ ,  $X_{2i}$ , and  $X_{ki}$ .  $R_k^2$  denotes the multiple correlation coefficient squared between the  $k^{\text{th}}$  explanatory variable and the other explanatory variables.

#### IV. ANALYSIS AND ESTIMATED RESULTS

The results of three factor models of equity oriented funds schemes are presented in the following tables.

**Table1: Values of Estimated Coefficients for Three Models of Equity oriented mutual funds January 2016 to December 2021**

HDFC Top 200 Fund (G)									
past risk					current risk				
Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$	Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$
Single Factor	-0.0942* (-307.84)	0.0011 (-1.12)			Single Factor	0.0929* (-114.7)	-0.0015** *		
Two Factor	-0.0939* (-274.23)	0.0034 (-1.80)	-0.0034*** (-1.80)		Two Factor	0.0929* (-85.75)	-0.0016 (-0.667)	0.000 (0.05)	
Three Factor	-0.0924* (-136.82)	0.0011 (-1.13)	-0.0016 (-0.83)	0.0318** * (-2.68)	Three Factor	0.0908* (-66.27)	-0.0034 (-1.32)	0.0006 (0.40)	-0.0349* (-2.40)

## HDFC Equity Fund - (G)

past risk					current risk				
Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$	Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$
Single Factor	-0.0943* (-305.41)	-0.0019** * (-1.82)			Single Factor	-0.0931* (-102.34)	-0.0013 (-1.39)		
Two Factor	-0.0939* (-260.49)	-0.0018** * (-1.72)	-0.0048* * (-1.99)		Two Factor	-0.0935* (-70.77)	8.06E-06 (-0.00)	-0.0008 (-0.49)	
Three Factor	-0.0917* (-135.40)	-0.0024* * (-2.37)	-0.0010 (-0.43)	-0.0467* * (-3.77)	Three Factor	-0.0906* (-58.47)	-0.0019 (-0.65)	-0.0003 (-0.17)	-0.0551* (-3.28)

Reliance Pharma  
Fund (G)

past risk					current risk				
Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$	Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$
Single Factor	-0.0942* (-313.74)	0.0012 (1.00)			Single Factor	-0.0938* (-200.31)	-0.0008 (-0.90)		
Two Factor	-0.0938* (-282.61)	0.0020** * (1.66)	-0.0062* * (-2.39)		Two Factor	-0.0939* (-201.94)	0.0013 (0.90)	-0.0030* * (-1.78)	
Three Factor	-0.0922* (-151.57)	0.0012 (1.04)	-0.0034 (-1.29)	-0.0383* * (-3.06)	Three Factor	-0.0924* (-132.59)	0.0008 (0.59)	-0.0024 (-1.44)	-0.0380* (-2.82)

Reliance Growth  
Fund (G)

past risk					current risk				
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Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$	Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$
Single Factor	-0.0944* (-302.28)	-0.0014 (-1.27)			Single Factor	-0.0763* (-9.32)	-0.0201* (-1.95)		
Two Factor	-0.0940* (-266.81)	0.0011** (-1.01)	-0.0046* (-2.02)		Two Factor	0.0711* (-7.56)	-0.0479* (-1.77)	0.0225 (-1.11)	
Three Factor	-0.0914* (-140.29)	0.0024** (-2.25)	-0.0002 (-0.10)	-0.0583* (-4.68)	Three Factor	0.0567* (-4.47)	-0.0567* (-2.07)	0.0259 (-1.28)	-0.3024** (-1.67)
SBI Magnum Tax Gain Scheme (D)									
past risk					current risk				
Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$	Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$
Single Factor	-0.0935* (-132.05)	-0.0034 (-1.41)			Single Factor	0.0941* (-152.14)	-0.0002 (-0.31)		
Two Factor	-0.0931* (-118.65)	-0.0025 (-1.02)	-0.0059 (-1.37)		Two Factor	0.0939* (-127.18)	-0.0007 (-0.49)	0.0002 (-0.39)	
Three Factor	-0.0928* (-71.70)	-0.0028 (-1.05)	-0.0051 (-0.96)	-0.0070 (-0.29)	Three Factor	0.0917* (-90.46)	-0.004* (-2.32)	0.025* (2.56)	-0.039** (-3.13)
SBI Magnum Global Fund (D)									
past risk					current risk				
Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$	Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$
Single Factor	-0.0941* (-277.07)	-0.0048* (-3.78)			Single Factor	0.0934* (-154.62)	-0.0016** (-1.68)		
Two Factor	-0.0935* (-277.07)	0.0028** (-2.13)	0.0086* (-3.40)		Two Factor	0.0935* (-277.07)	-0.0018** (-1.68)	-0.0004 (-0.54)	

	257.33)					148.96)	*		
							(-1.76)		
Three Factor	-0.0933* (-183.33)	0.0029** (-2.16)	0.0081* (-3.02)	-0.0050 (-0.60)	Three Factor	0.0922* (-111.37)	-0.0034* (-2.81)	-0.0020** (-1.88)	-0.0286* (-2.37)
UTI- MNC Fund (D)									
past risk					current risk				
Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$	Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$
Single Factor	-0.0942* (-389.91)	-0.0009 (-0.84)			Single Factor	0.0932* (-171.39)	-0.0021* (-2.17)		
Two Factor	-0.0940* (-347.78)	0.0002 (0.22)	-0.0052** (-1.79)		Two Factor	0.0934* (-116.75)	-0.0010 (-0.36)	0.0009 (-0.42)	
Three Factor	-0.0920* (-196.46)	-0.0015 (-1.30)	0.0007 (0.27)	-0.0613* (-5.13)	Three Factor	0.0917* (-102.93)	-0.0011 (-0.43)	0.0005 (-0.25)	-0.0639* (-3.67)
UTI- Transportation & Logistics Fund (D)									
past risk					current risk				
Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$	Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$
Single Factor	-0.0942* (-314.31)	-0.0006 (-0.62)			Single Factor	0.0935* (-139.14)	-0.0010 (-1.14)		
Two Factor	-0.0942* (-289.26)	-0.0006 (-0.51)	0.0000 (0.04)		Two Factor	0.0933* (-96.75)	-0.0018 (-0.68)	0.0006 (0.32)	
Three Factor	-0.0919* (-130.50)	-0.0011 (-0.90)	0.0009 (0.50)	-0.0506* (-3.71)	Three Factor	0.0911* (-69.89)	-0.0031 (-1.15)	0.0013 (0.74)	-0.0502* (-2.40)

Source Capitaline database and authors' own

: calculations

\*1% level of significance

\*\*5% level of significance

\*\*\*10% level of significance

The results of three factor models of equity-focused mutual funds. The extra return of each mutual fund system is an investment that is regressed to historical beta, beta2, and residual risk, which is to say, the regression of past risk. It is compared to the results of regression equations (3), (4), and (5), in which the extra return of each mutual fund is regressed on the system in order to find out how the results of the past risk regression compare. Each of the coefficients in each model is statistically significant at a 1% level. There is no historical beta for the top 200 (G) HDFC fund in the one-factor model. The historical beta2 is negative but significant at the 10% level in the two-factor model. The past residual risk is also negative and significant at 10%. (3-factor model). Beta1 and Beta2 are positive, but Beta2 is zero and not statistically significant. The residual risk is there. Betas 1 and 2 are both negative, but Beta2 is zero. The statistical significance of (three-factor model).

That is, the top 200 HDFC funds have a lot of risk and a lot of extra money now. HDFC Equity Fund's past risk has a bigger effect on current excess returns than current risk because all of the regression coefficients of past risk, like beta in the one-way model, beta and beta2 in the two-factor model, and the rest of the risk in the three-factor model, were statistically significant. This means that past risk has a bigger effect on current excess returns than current risk. However, only residual risk has a big impact on the extra return of HDFC owner funds in the current regression model. Both past and current risk have the same effect on current extra returns. In the case of Reliance Pharma Fund (G), the past and present betas are not significant in the 1-factor model. The past and present beta2 coefficients are, however, significant in the model (two-factor model).

There are a lot of things to think about, as well as any residual risks from the past and present. The model has three factors in it. A fund called the SBI Magnum Tax Gain Fund (D) has no historical risk regression coefficients. The current risk regression coefficients are very high. That is, the SBI magnum tax gain fund's beta, beta2, and residual risk all have a lot to do with the fund's current extra return (D). If you look at one, two, and three component models, systemic risk and beta2 have had a negative effect on the SBI Magnum Global Fund's current excess return over the past few years. For the UTI MNC fund, the historical beta coefficient is not significant. The historical beta2 coefficient is negative but significant at the 10% level, and the historical residual risk coefficient is also negative and significant at the 1% level (3 factor model). At the 10% level, the current beta coefficient is negative and significant, the current beta2 is zero, and the current residual risk is significant.

This is the case for both the 1 factor model and the 2 factor model (3 factor model). If you want to make money with the UTI transportation and logistics fund, history and residual risk have a big impact on how much money you make now, as well. A mutual fund's systematic risk, beta2, and residual risk all have an effect on how much extra money it makes now, no matter how much money it made in the past. This is their present or this is other words, for some equity-focused funds, risk and return don't always go hand in hand.

**Table2: Values of Estimated Coefficients for Three Models of Income Oriented mutual funds January 2016 to December 2021**

HDFC Income Fund (G)									
past risk					current risk				
Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$	Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$
Single	-0.0947*	0.0032			Single	-0.0947*	0.0013		



Factor	(-18833.5)	(1.50)			Factor	(1.10)	(-18540.0)		
Two Factor	-0.0947* (-17459.28)	0.0032 (1.50)	0.7809** (1.97)		Two Factor	-0.0947* (-18070.98)	0.0010 (0.64)	-0.0249 (-0.31)	
Three Factor	-0.0947* (-17113.68)	0.0030 (1.44)	0.7884** (1.99)	0.0017 (1.15)	Three Factor	-0.0948* (-10409.71)	0.0033* (2.91)	-0.3474* (-5.26)	0.1997* (10.56)

HDFC Monthly Income Plan - LTP  
(Div-Q)

past risk					current risk				
Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$	Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$
Single Factor	-0.0945* (-1031.31)	-0.0023** (-1.79)			Single Factor	0.0944* (-583.92)	-0.0003 (-0.39)		
Two Factor	-0.0944* (-868.74)	-0.0022** (-1.66)	-0.0154 (-1.25)		Two Factor	0.0944* (-549.08)	-0.0015 (-0.92)	0.0040 (0.84)	
Three Factor	-0.0941* (-461.01)	-0.0024* (-1.85)	-0.0060 (-0.47)	-0.0296* (-2.14)	Three Factor	0.0942* (-339.25)	-0.0019 (-1.08)	0.0046 (0.94)	-0.0105 (-0.66)

Reliance Income Fund -  
(Div-A)

past risk					current risk				
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Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$	Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$
Single Factor	-0.0945* (-1074.23)	-0.0013 (-0.98)			Single Factor	0.0938* (-245.29)	0.0042 (-1.50)		
Two	-0.0946*	-0.0020	0.0145		Two	-	-	-0.0034	

Factor	(-980.82)	(-1.41)	(1.45)		Factor	0.0938 (-242.27)	0.0035 (-0.59)	(-0.13)	
Three Factor	-0.0943* (-522.06)	-0.0022 (-1.60)	0.0194** (1.87)	- 0.0230*** (-1.69)	Three Factor	0.0939* (-147.81)	0.0033 (-0.53)	-0.0040 (-0.15)	0.0040 (0.09)
Relian Monthly Income Plan (G)									
past risk					current risk				
Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$	Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$
Single Factor	-0.0947* (-1739.77)	-0.0002 (-0.18)			Single Factor	-0.0946* (-1790.16)	-0.0017*** (-1.82)		
Two Factor	-0.094724* (-1730.90)	-0.0009 (-0.50)	-0.0025 (-0.48)		Two Factor	-0.0946* (-1746.07)	-0.0005 (-0.38)	-0.0099 (-1.07)	
Three Factor	-0.0946* (-1740.29)	0.0002 (0.11)	0.0124** (1.94)	-0.7035* (-3.76)	Three Factor	-0.0946* (-1435.32)	-0.0005 (-0.35)	-0.0152 (-1.44)	0.0082 (1.04)
SBI Magnum Income Fund - (D)									
past risk					current risk				
Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$	Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$
Single Factor	-0.0946* (-1790.16)	-0.0017** (-1.82)			Single Factor	-0.0946* (-1292.82)	-0.0002 (-0.15)		

Two Factor	-0.0946* (-1746.07)	-0.0005 (-0.38)	- 0.0099 (-1.07)		Two Factor	- 0.0946* (-1122.40)	-0.0003 (-0.20)	- 0.0130 (-0.66)	
Three Factor	-0.0946* (-1435.32)	-0.0005 (-0.35)	- 0.0152 (-1.44)	0.008 2 (1.04)	Three Factor	- 0.0949* (-922.27)	-0.0010 (-0.71)	- 0.0271 (-1.46)	0.0300* (4.29)
SBI Magnum Monthly Income Plan - (Div M)									
past risk					current risk				
Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$	Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$
Single Factor	-0.0946* (-1292.82)	-0.0002 (-0.15)			Single Factor	- 0.0949* (-1487.91)	0.0027* (12.57)		
Two Factor	-0.0946* (-1122.40)	-0.0003 (-0.20)	- 0.0130 (-0.66)		Two Factor	- 0.0946* (-962.59)	-0.0002 (-0.30)	0.0014* (3.60)	
Three Factor	-0.0949* (-922.27)	-0.0010 (-0.71)	- 0.0271 (-1.46)	0.030 0* (4.29)	Three Factor	- 0.0943* (-701.72)	-0.0007 (-0.88)	0.0024* (5.23)	- 0.0457* (-3.71)
UTI-Bond Fund (G)									
past risk					current risk				
Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$	Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$
Single Factor	-0.0946* (-1523.72)	0.0007 (0.35)			Single Factor	- 0.0946* (-1552.28)	- 0.0021*** (-1.75)		
Two Factor	#	- 0.9959* (468.61)	0.9966* (1523.72)		Two Factor	- 0.0945* (-1604.95)	0.0019 (1.17)	- 0.0354* (-3.57)	
Three Factor	#	- 0.9951* (-459.76)	0.9957* (1159.28)	- 0.013 1 (-1.54)	Three Factor	- 0.0947* (-1270.93)	0.0015 (0.98)	- 0.0502* (-4.58)	0.0336* (2.86)

UTI MIS Advantage Plan (G)									
past risk					current risk				
Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$	Model	$\alpha_{0t}$	$\alpha_{1t}$	$\alpha_{2t}$	$\alpha_{3t}$
Single Factor	-0.0945* (-1194.53)	-0.0013 (-0.89)			Single Factor	-0.0946* (-1208.40)	-0.0002 (-0.2795)		
Two Factor	-0.0946* (-1042.72)	-0.0017 (-1.00)	0.0092 (0.46)		Two Factor	-0.0945* (-1143.74)	0.0003 (0.31)	-0.0045 (-1.29)	
Three Factor	-0.0942* (-522.30)	-0.0014 (-0.85)	0.0129 (0.66)	-0.0270** (-2.04)	Three Factor	-0.0943* (-547.60)	0.0002 (0.26)	-0.0036 (-1.03)	-0.0202** (-1.63)

Source: Capitaline database and authors' own calculations

\*1% level of significance

\*\*5% level of significance

HDFC Top 200 Fund (G)					HDFC Equity Fund - (G)				
past risk			Current risk		past risk			Current risk	
Variable	Coefficient	Centered	Coefficient	Centered	Variable	Coefficient	Centered	Coefficient	Centered
	Variance	VIF	Variance	VIF		Variance	VIF	Variance	VIF
BETA	1.07E-06	1.027812	6.68E-06	9.142153	BETA	1.08E-06	1.027436	8.76E-06	9.463619
BETA <sup>2</sup>	4.02E-06	1.149701	2.38E-06	8.618017	BETA <sup>2</sup>	6.25E-06	1.188725	2.97E-06	9.183660
RESIDUAL RISK	0.000141	1.129287	0.000211	1.213455	RESIDUAL RISK	0.000153	1.202341	0.000282	1.114278
C	4.56E-07	NA	1.88E-06	NA	C	4.59E-07	NA	2.40E-06	NA

Reliance Pharma Fund (G)					Reliance Growth Fund – (G)				
past risk			Current risk		past risk			Current risk	
Variable	Coefficient	Centered	Coefficient	Centered	Variable	Coefficient	Centered	Coefficient	Centered
	Variance	VIF	Variance	VIF		Variance	VIF	Variance	VIF
BETA	1.50E-06	1.138548	2.14E-06	2.895233	BETA	1.20E-06	1.089746	0.000747	7.150341
BETA <sup>2</sup>	7.23E-06	1.227971	2.76E-06	2.908793	BETA <sup>2</sup>	5.45E-06	1.217418	0.000409	6.955377
RESIDUAL RISK	0.000157	1.141858	0.000182	1.018211	RESIDUAL RISK	0.000155	1.238124	0.032762	1.082343
C	3.71E-07	NA	4.86E-07	NA	C	4.25E-07	NA	0.000161	NA
SBI Magnum Tax Gain Scheme (D)					SBI Magnum Global Fund (D)				
past risk			Current risk		past risk			Current risk	
Variable	Coefficient	Centered	Coefficient	Centered	Variable	Coefficient	Centered	Coefficient	Centered
	Variance	VIF	Variance	VIF		Variance	VIF	Variance	VIF
BETA	7.34E-06	1.219610	3.04E-06	5.517746	BETA	1.85E-06	1.224407	1.49E-06	1.675541
BETA <sup>2</sup>	2.79E-05	1.552087	9.67E-07	7.419476	BETA <sup>2</sup>	7.22E-06	1.354449	1.23E-06	1.826672
RESIDUAL RISK	0.000571	1.498275	0.000156	2.212451	RESIDUAL RISK	6.91E-05	1.117867	0.000146	1.775025
C	1.68E-06	NA	1.03E-06	NA	C	2.59E-07	NA	6.85E-07	NA
UTI-MNC Fund (D)					UTI-Transportation & Logistics Fund (D)				
past risk			Current risk		past risk			Current risk	
Variable	Coefficient	Centered	Coefficient	Centered	Variable	Coefficient	Centered	Coefficient	Centered
	Variance	VIF	Variance	VIF		Variance	VIF	Variance	VIF
BETA	1.46E-	1.5233	7.12E-	8.1398	BETA	1.62E-	1.6505	7.44E-	9.6946

	06	20	06	84		06	09	06	80
BETA <sup>2</sup>	8.36E-06	1.657483	5.05E-06	8.159813	BETA <sup>2</sup>	3.48E-06	1.659240	3.44E-06	9.611979
RESIDUAL					RESIDUAL				
RISK	0.000142	1.203847	0.000303	1.011221	RISK	0.000186	1.016305	0.000436	1.041731
C	2.19E-07	NA	7.95E-07	NA	C	4.96E-07	NA	1.70E-06	NA

\*\*\*10% level of significance

Equations (7) and (8) produce a singular matrix for this specific fund scheme when the coefficient term is constant. The findings of three factor models of income-oriented mutual fund schemes are shown in Table 2. At the 1% level, the coefficient of all intercept terms in one factor, two factor, and three-factor models is statistically significant. In two-factor and three-factor regression models, the present excess return of HDFC Income Fund (G) is favourably impacted by historical beta2, but adversely affected by current beta2 in the three-component regression model. This indicates that lower historical beta2 results in a lower present excess return and greater current beta2 results in a higher current excess return. Only historical beta and residual risk have an effect on HDFC Monthly Income Plan - LTP's current excess return (Div-Q). The coefficients of historical beta and historical beta2 for Reliance Income Fund (Div-A) are negligible for the 1 factor model and the 2 factor model, respectively. On the other hand, the historical beta2 and residual risk, on the other hand, are considerable (3 factor model). The historical residual risk of this strategy is inversely connected to its present excess return. Historical beta2, residual risk (3 factor model), and present systematic risk have a substantial impact on the excess return in the case of the Reliance Monthly Income Plan (G). The present excess return of the Reliance Monthly Income Plan (G) scheme is influenced adversely by past residual risk and favourably by historical beta2. Only the coefficient of prior beta (1 factor model) and present residual risk (3 factor model) are significant for SBI Magnum Income Fund (D). Present risk has a greater effect on the current excess return of the SBI Magnum Monthly Income Plan than historical risk (Div-M). Historical and present risk have almost the same influence on the excess return for the UTI bond fund (G). Only historical and present residual risks have had a major impact on the UTI-MIS Advantage Plan's excess return (G).

### Table3: Variance Inflation Factors of Equity Oriented Mutual Funds

Source: Capitaline database and authors' own calculations

VIP: Variance Inflation Factor.

The Variance Inflation factor for chosen equity-oriented mutual fund schemes is shown in Table3. The VIF is determined using equation 6.11. The centred VIF is the ratio of the estimated coefficient's variance in the original when just that explanatory variable is used and the constant are included. The VIFs of all computed coefficients in equity-oriented risk regression are less than ten. Thus, the quadratic regression model does not exhibit multi collinearity.

### Table4: Variance Inflation Factors of Income Oriented Mutual Funds

HDFC Income Fund (G)	HDFC Monthly Income Plan - LTP (Div-Q)
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past risk			Current risk		past risk			Current risk	
Variable	Coefficient	Centered	Coefficient	Centered	Variable	Coefficient	Centered	Coefficient	Centered
	Variance	VIF	Variance	VIF		Variance	VIF	Variance	VIF
beta	4.51E-06	1.003189	1.34E-06	1.762646	beta	1.72E-06	1.018040	3.21E-06	4.483047
beta2	0.155644	1.000297	0.004356	2.158594	beta2	0.000168	1.140917	2.45E-05	4.185613
residual risk	2.28E-06	1.003429	0.000358	1.752099	residual risk	0.000191	1.130338	0.000251	1.147993
c	3.07E-11	NA	8.30E-11	NA	c	4.17E-08	NA	7.73E-08	NA
Reliance Income Fund - (Div-A)					Reliance Monthly Income Plan (G)				
past risk			Current risk		past risk			Current risk	
Variable	Coefficient	Centered	Coefficient	Centered	Variable	Coefficient	Centered	Coefficient	Centered
	Variance	VIF	Variance	VIF		Variance	VIF	Variance	VIF
beta	3.01E-06	1.140322	2.80E-06	1.879448	beta	2.06E-06	1.134201	3.87E-05	4.866703
beta2	0.000486	1.412218	0.000154	2.194399	beta2	0.000107	1.215580	0.000701	4.640554
residual risk	9.16E-05	1.291159	0.000185	1.311834	residual risk	0.000186	1.085452	0.001768	1.118337
c	7.34E-09	NA	9.55E-09	NA	c	3.27E-08	NA	4.04E-07	NA
SBI Magnum Income Fund - (D)					SBI Magnum Monthly Income Plan - (Div-M)				
past risk			Current risk		past risk			Current risk	
Variable	Coefficient	Centered	Coefficient	Centered	Variable	Coefficient	Centered	Coefficient	Centered
	Variance	VIF	Variance	VIF		Variance	VIF	Variance	VIF
beta	3.60E-06	3.183266	2.14E-06	2.309736	beta	2.28E-06	1.020792	6.79E-07	17.37127
beta2	4.09E-05	5.042607	0.000110	2.993136	beta2	0.000344	1.039804	2.11E-07	25.61224
residual					residual				

l	0.03483	2.34759	6.14E-	1.6222	l	4.88E-	1.0429	0.00015	6.3970
risk	4	5	05	04	risk	05	64	2	00

c	2.96E-	NA	4.35E-09	NA	c	1.06E-08	NA	1.81E-	NA
	09					08		08	
UTI Bond Fund					UTI-MIS Advantage Plan (G)				
past risk			Current risk		past risk			Current risk	
Variable	Coefficient	Uncentered	Coefficient	Centered	Variable	Coefficient	Centered	Coefficient	Centered
	Variance	VIF	Variance	VIF		Variance	VIF	Variance	VIF
beta	4.69E-06	1.180411	2.51E-06	1.9567	beta	2.92E-06	1.2193	9.18E-	1.23390
				25			85	07	1
beta2	7.38E-07	1.962365	0.00012	2.4976	beta2	0.00038	1.2221	1.21E-	1.26420
			0	81		2	64	05	8
residual					residual				
risk	7.27E-05	1.748044	0.00013	1.6773	risk	0.00017	1.0254	0.00015	1.02747
			8	46		5	79	2	5
c	#	#	5.55E-09	NA	c	3.26E-08	NA	2.97E-	NA
						08		08	

Source: Capitaline database and authors' own calculations

VIP: Variance Inflation Factor.

#: with constant coefficient term, equation (7) and (8) becomes a singular matrix for this particular fund scheme, hence centered VIF is not observed for this fund.

Table4 reflects the Variance Inflation factor of selected income oriented mutual fund schemes. VIFs of all the estimated coefficient of past and present risk regression of income oriented schemes are less than 10. So here too the multicollinearity is absent for the quadratic regression model.

## V. CONCLUSION

The article investigates the relationship between mutual fund scheme returns and historical systematic and unsystematic risk, which is computed by regressing mutual fund current returns on the market index return for the prior 60 months. This connection is diametrically opposed to the conventional risk-reward relationship. According to empirical evidence, the current or current month returns of chosen mutual fund schemes in the Indian mutual fund sector are impacted not only by current month systematic and unsystematic risk, but also by five-year historical risk. For some fund schemes, such as the HDFC equity fund, the HDFC monthly income fund, and the Reliance income fund, only past risk has an effect on current month's performance. All calculated historical and present-day risk regression coefficients for equity and income-oriented schemes have VIFs of less than ten.



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