



Fama-French Three Factors Model in Indian Mutual Fund Market

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Abstract

Tax Saving Mutual Fund Schemes were established with the objective of inviting Indian Tax assesseees into the stock market-oriented investment. Tax saving mutual fund is an avenue which offers an investor the opportunity to avail tax exemption on investment along with diversified risk and market-related return. All Tax Saving Mutual Fund Schemes have same the objective but each scheme differs in returns produced and risks involved. The mutual fund performance is based on the performance of market and there is no assurance on return of mutual fund investments. As such, an analysis have been made in this paper to measure the performance of Indian Mutual funds market by using Fama French three factor model. In particular, 32 growth-oriented open-ended Tax Saving Mutual Fund Schemes have been taken for the study. The performance of the TSMF has been compared with the market benchmark S&P CNX Nifty. It is found that there is a difference between expected return and actual return of mutual funds. It is also found that there are certain mutual fund schemes have underperformed than the market benchmark. Not all the mutual fund schemes are safe and secured. It is the responsibility of the investors to find the better performing funds.

Keywords: Mutual Funds, Tax saving, growth oriented, open-ended, India, Fama French Three Factor Model.



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1. Introduction

Mutual funds are the best vehicle for investors, looking for ways to put their savings into stock market (Ajit Dayal, 2011). Tax Saving Mutual Fund Schemes were established with the objective of inviting Indian Tax assesseees into the stock market-oriented investment. All Tax Saving Mutual Fund Schemes have same the objective but each scheme differs in returns produced and risks involved. Tax saving mutual fund is one avenue which offers an investor the opportunity to avail tax exemption on investment along with market-related return with the diversified risks. As such, analyses have been made in this paper to measure the performance of Indian Mutual funds market by using Fama French three factor model. In particular 32 growth-oriented open-ended Tax Saving Mutual Fund Schemes have been analyzed in this paper.

Table 1 shows various growth-oriented open and closed-ended schemes. From the table, it is also noted that the number of schemes increased after the year 2005. SBI Magnum was the first Tax saving mutual fund scheme launched in the 1993.

Since, Union KBC Tax Saver Scheme was launched during November 2011, it has not been considered for the present study.

2. Studies Already Conducted

Fama and French (1993), identified five common risk factors in the returns on stock and bonds. Among the five, three factors are related to stock market namely, overall market, firm size and book-to-market equity. The other two factors related to bond-market are maturity and default risks. Stock returns are linked to both stock market factors and bond market returns.

Pablo Rogers and Jose Roberto Securoto (2007) have made an analysis on portfolios, in accordance with the Fama and French (1993). They applied two sub-samples of stocks with available data in the Sao Paulo Stock Exchange (BOVESPA). They concluded that the results support the Fama and French Three-Factor model to explain future returns.

Jan Bartholdy and Paula Peare (2002) compared the performance of stock returns using CAPM and Fama French Three Factor Model. They estimated individual stock returns based on CAPM using different time frames, data frequencies, and indexes. They obtained individual stock returns based on the Fama and French model using five years of monthly data.

Joseph Chen *et al.* (2004), analyzed U.S diversified mutual funds for the period of 37 years from 1962 to 1999 by using monthly returns. The author used Standard Deviation, Capital Asset Pricing Model of William F. Sharpe, Eugene F. Fama and Keneeth R. French three-factor model for the analysis. One month Treasury bill return was considered by the author for risk free rate of return. It has been found that these funds' family size does not significantly erode the performance of this fund.

Bhavna (2006) studied the Fama and French three-factor model of stock returns along with its variants, including Capital Asset Pricing Model for 79 stocks listed on the BSE-100 stock market index and found that factor portfolios that explain the returns are the market factor, size factor (SMB) and value factor (HML). The author concluded that the Fama and French fares better in explaining the cross-section of returns in the portfolios than its variants and the CAPM.

Yash Pal (2010) analyzed 187 companies by using CAPM and the Fama French for the period of five years from June 2004 to June 2009. The study concluded that efficiency of Fama French Model, for being a good predictor, cannot be ignored in India but either of the two factors (size and value) might improve the model.

Vanita Tripathi (2008) examined the relationship between four company fundamental variables (*viz.* market capitalization, book equity to market equity ratio, price earnings ratio and debt equity ratio) and equity returns in Indian stock market using monthly price data of a sample of 455 companies forming part of S&P CNX 500 Index over the period June 1997 to June 2007.

Table-1. Open-Ended Tax Saving Mutual Fund Schemes - Growth

S. No	Open-Ended Schemes (as on March 2011)	Date of Inception
1.	SBI Magnum Tax gain Scheme	24-February-1993
2.	CanaraRobeco Equity Tax saver	25- February -1993
3.	HDFC TaxSaver	18-December-1995
4.	LICMF Tax plan	11-January-1997
5.	Sahara Tax Gain	31- December -1997
6.	Franklin India Tax shield	10-April-1999
7.	ICICI Prudential Tax Plan	09-August-1999
8.	UTI - ETSP	15-November-1999
9.	Escorts Tax Plan	01- April -2000
10.	HDFC Long Term Advantage Fund	26- December -2000
11.	ING Tax Savings Fund	12- February -2004
12.	Sundaram Tax Saver OE	04-May-2005
13.	Reliance Tax Saver (ELSS) Fund	25-July-2005
14.	L&T Tax Saver Fund	27-September-2005
15.	Kotak Tax Saver-Scheme	29- September -2005
16.	BNP Paribas Tax Advantage Plan (ELSS)	07- November -2005
17.	Fidelity Tax Advantage Fund	05- January -2006
18.	DWS Tax Saving Fund	24- January -2006
19.	Birla Sun Life Tax Plan	03-October-2006
20.	HSBC Tax Saver Equity Fund	20- November -2006
21.	Religare Tax Plan	20- November -2006
22.	DSP Black Rock Tax Saver Fund	27- November -2006
23.	Taurus Tax Shield	05-March-2007
24.	JM Tax Gain Fund	24- December -2007
25.	Bharti AXA Tax Advantage Fund-ECO Plan	12- February -2008
26.	Bharti AXA Tax Advantage Fund-Regular Plan	12- February -2008
27.	Birla Sun Life Relief 96	03-June-2008
28.	IDFC Tax Advantage (ELSS) Fund	01- December -2008
29.	Quantum Tax Saving Fund	10- December -2008
30.	JPMorgan India Tax Advantage Fund	18- December -2008
31.	Edelweiss ELSS Fund	26- December -2008
32.	Axis Tax Saver Fund	17- December -2009

Source: (www.amfiindia.com)

3. Tools Applied to Measure Risk and Return

The aim of this study is to examine the performance of Tax Saving Mutual Fund Schemes. Daily NAV is used for computing annual returns of Tax Saving Mutual Fund Schemes (John Sorros, 2003). Mean returns are calculated by averaging the monthly returns over the relevant time period. Fama-French three factor model is used analysis the performance of TSMF.

Fama–French three-factor model is designed by Eugene Fama and Kenneth French to describe stock returns. This model uses three variables namely market, size and stocks with a high book-to-market ratio (BtM, customarily called value stocks, contrasted with growth stocks).

$$r = R_f + \beta_3 (K_m - R_f) + b_s \cdot \text{SMB} + b_v \cdot \text{HML} + \alpha$$

Where,

r = Portfolio's expected rate of return

R_f = Risk-free return rate

K_m = Return of the whole stock market

SMB = Small [market capitalization] Minus Big

HML = High [book-to-market ratio] Minus Low

4. Fama-French Three Factor Model

The traditional asset pricing model Capital Asset Pricing Model (CAPM) uses only Beta to describe the returns of a portfolio with market returns. Whereas, the Fama–French model uses three variables such as market, size of the portfolio and value of the portfolio. This model used SMB for “small (market capitalization) minus big” and HML for “high (book-to-market ratio) minus low”. It measures the excess returns of small caps over big caps and value stocks over growth stocks. The assets of all the 31 schemes as on March 2012 have been considered for the study.

SMB is the difference between the average return of smallest 30% of Tax Saving Mutual Fund Schemes and the average return of the largest 30% of the schemes assets (Kent Womack and Ying Zhang, 2003). A positive SMB indicates that small cap stocks outperformed large cap and a negative SMB indicates the large caps outperformed in a particular period. The five schemes with least assets are Bharti AXA Tax Advantage Fund-ECO Plan, Escorts Tax Plan, JPMorgan India Tax Advantage Fund, Quantum Tax Saving Fund and Edelweiss ELSS Fund which is having less than 10 crore assets. The schemes with greatest assets are ICICI Prudential Tax Plan, Sundaram Tax saver OE-App, Reliance Tax Saver (ELSS) Fund, HDFC TaxSaver and SBI Magnum Tax gain Scheme 1993 which is having more than 1000 crores. Table 2 shows the assets of the schemes.

Table-2. Assets of the Tax Saving Mutual Fund Schemes

S. No	Tax Saving Mutual Fund Schemes	Asset (cr)
1.	Bharti AXA Tax Advantage Fund-ECO Plan	3.1
2.	Escorts Tax Plan	3.8
3.	JPMorgan India Tax Advantage Fund	4.2
4.	Quantum Tax Saving Fund	5.5
5.	EDELWEISS ELSS FUND	5.9
6.	SaharaTax Gain	11.1
7.	L&T Tax Saver Fund	27.8
8.	ING Tax Savings Fund	29.5
9.	Bharti AXA Tax Advantage Fund	32.5
10.	LIC MF Tax plan	34.2
11.	JM Tax Gain Fund	40.8
12.	Birla Sun Life Tax Plan	45.2
13.	DWS Tax Saving Fund	58.7
14.	Taurus Tax Shield	72.8
15.	Religare Tax Plan	111.5
16.	BNP Paribas Tax Advantage Plan	118.6
17.	IDFC Tax Advantage (ELSS) Fund	134.9
18.	HSBC Tax Saver Equity Fund	196.2
19.	CanaraRobeco Equity Tax saver	362.4
20.	Kotak Tax Saver-Scheme	433.1
21.	UTI – ETSP	461.6
22.	DSP Black Rock Tax Saver Fund	724.4
23.	Birla Sun Life Relief 96	765.9
24.	Franklin India Tax shield	812.4
25.	HDFC Long Term Advantage Fund	840.5
26.	Fidelity Tax Advantage Fund	1,167.10
27.	ICICI Prudential Tax Plan	1,278.40
28.	Sundaram Tax saver OE- App	1,391.30
29.	Reliance Tax Saver (ELSS) Fund	1,972.80
30.	HDFC TaxSaver	3,114.10
31.	SBI Magnum Tax gain Scheme 1993	4,778.50

Source: Secondary Data

HML has been constructed to measure value premium with high book to market values. HML is the difference between the average return of the 50% of the schemes with the highest book to equity and the 50% of the schemes with the lowest book to equity of the schemes (Kent Womack and Ying Zhang, 2003). A positive HML indicated value scheme outperformed in a particular period and a negative HML indicates growth schemes outperformed in a month. Table 3 shows the book to market ratio of the Tax Saving Mutual Fund Schemes. The five schemes with least Book to Market Ratio are SBI Magnum Tax gain Scheme 1993, HDFC Long Term Advantage Fund, ICICI Prudential Tax Plan, Franklin India Tax shield and HDFC TaxSaver. The schemes with high book to market ratio are

JM Tax Gain Fund, Birla Sun Life Relief 96, DWS Tax Saving Fund, Birla Sun Life Tax Plan and HSBC Tax Saver Equity Fund.

Table-3. Book to Market of Tax Saving Mutual Fund Schemes

Tax saving mutual fund schemes	Book to Market
JM Tax Gain Fund	1.5916
Birla Sun Life Relief 96	0.9930
DWS Tax Saving Fund	0.8390
Birla Sun Life Tax Plan	0.7669
HSBC Tax Saver Equity Fund	0.7170
L&T Tax Saver Fund	0.7072
BNP Paribas Tax Advantage	0.6926
DSP Black Rock Tax Saver Fund	0.6324
Religare Tax Plan	0.5794
Kotak Tax Saver-Scheme	0.5775
JPMorgan India Tax Advantage fund	0.5724
IDFC Tax Advantage (ELSS) Fund	0.5353
Edelweiss ELSS Fund	0.5227
Bharti AXA Tax Advantage Fund	0.4812
Bharti AXA Tax Advantage Fund-ECO Plan	0.4778
Fidelity Tax Advantage Fund	0.4747
Reliance Tax Saver (ELSS) Fund	0.4695
Quantum Tax Saving Fund	0.4538
CanaraRobeco Equity Tax saver	0.3852
LIC MF Tax plan	0.3702
ING Tax Savings Fund	0.3627
Taurus Tax Shield	0.3058
Sahara Tax Gain	0.2743
UTI – ETSP	0.2661
Escorts Tax Plan	0.2642
Sundaram Tax saver OE- App	0.2384
SBI Magnum Tax gain Scheme 1993	0.1714
HDFC Long Term Advantage Fund	0.0747
ICICI Prudential Tax Plan	0.0736
Franklin India Tax shield	0.0468
HDFC TaxSaver	0.0448

Source: Secondary Data

Table 4 summarizes the results of Fama French three factor analysis. The tables shows the coefficients of $R_m - R_f$, SMB and HML that is obtained by regressing $R_i - R_f$ with $R_m - R_f$, SMB and HML. These coefficients are substituted in Fama French three factor model to obtain the Expected Rate of Return. Additionally, Actual Rate of Return of these schemes have been calculated by using the historical values of past three years from 2009-10 to 2011-12. Table 4 shows that Reliance Tax Saver (ELSS) Fund, CanaraRobeco Equity Tax saver, Religare Invesco Tax Plan, SaharaTax Gain and Bharti AXA Tax Advantage Fund-ECO Plan performed well with high difference in expectation and actual return. Sundaram Tax saver OE- App, Kotak Tax Saver-Scheme, DWS Tax Saving Fund, Franklin India Tax shield and L&T Tax Saver Fund-Cumulative were not performed well. The actual return of these schemes was lower than the expected return.

5. Conclusion

Performance of Tax Saving Mutual Fund Schemes were analyzed 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. It is found that there are certain schemes which have been underperformed than the market benchmark. There are certain funds that outperform the market benchmark. It is found that, Reliance Tax Saver (ELSS) Fund, Canara Robeco Equity Tax saver, Religare Invesco Tax Plan, Sahara Tax Gain and Bharti AXA Tax Advantage Fund-ECO Plan have performed well with high difference in expectation and actual return. From the analysis, it can be concluded that there has to be some other factors other than the factors considered by Fama French model that would explain the performance of variation among the Indian tax saving mutual fund market.

Table-4. Coefficients, Expected Return and Actual Rate of Return of the Tax Saving Mutual Fund Schemes

S. No	Tax Saving Mutual Fund Schemes	Coefficient			Expected Return	Actual Return	Difference
		RM-RF	SMB	HML			
1	Reliance Tax Saver (ELSS) Fund	0.7517	-0.4336	1.2158	0.1342	1.9581	1.8240

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2	CanaraRobeco Equity Tax saver	0.8306	-0.2054	0.3408	0.3615	1.3303	0.9688
3	Religare Tax Plan	0.6067	-0.3036	0.8697	0.1476	1.1113	0.9637
4	Sahara Tax Gain-Growth	0.8473	-0.0524	0.9628	0.1849	1.1274	0.9425
5	Bharti AXA Tax Advantage Fund-ECO Plan	0.9886	0.2817	1.4450	0.0695	0.9150	0.8456
6	Bharti AXA Tax Advantage Fund	0.9914	0.2838	1.4270	0.0749	0.9028	0.8279
7	Quantum Tax Saving Fund	0.7430	0.4863	-0.0847	0.3398	1.1484	0.8086
8	Birla Sun Life Relief 96	0.9323	-0.3519	0.8731	0.2845	1.0911	0.8066
9	ING Tax Savings Fund	0.8720	0.1051	0.4753	0.2996	1.0819	0.7823
10	HDFC TaxSaver	0.8094	-0.2273	-0.1059	0.4722	1.2322	0.7600
11	Fidelity Tax Advantage Fund	0.7594	0.0826	0.1812	0.3339	1.0646	0.7307
12	SBI Magnum Tax gain Scheme 1993	0.8256	-1.0357	0.8475	0.3442	1.0743	0.7301
13	BNP Paribas Tax Advantage Plan	0.6877	-0.3951	0.9244	0.1788	0.8860	0.7072
14	Taurus Tax Shield	0.9297	0.5048	0.8527	0.1685	0.8719	0.7034
15	HDFC Long Term Advantage Fund	0.8248	0.0310	-0.3155	0.4966	1.1849	0.6883
16	IDFC Tax Advantage (ELSS) Fund	0.7319	-0.1575	1.2269	0.0845	0.7571	0.6726
17	Edelweiss ELSS Fund	0.6976	-0.4201	1.3587	0.0733	0.7367	0.6634
18	Birla Sun Life Tax Plan	0.7991	-0.4789	1.2689	0.1458	0.7698	0.6240
19	HSBC Tax Saver Equity Fund	0.7725	-0.1209	0.7870	0.2102	0.8338	0.6236
20	DSP Black Rock Tax Saver Fund	0.8269	-0.0431	0.2150	0.3699	0.9531	0.5831
21	JM Tax Gain Fund	0.8106	-0.1832	1.6051	0.0214	0.5077	0.4863
22	JPMorgan India Tax Advantage Fund	0.7487	1.1519	0.0204	0.2213	0.7066	0.4854
23	UTI – ETSP	0.7642	0.0118	0.4400	0.2784	0.7116	0.4331
24	LIC MF Tax plan	0.8821	-0.1357	0.6201	0.2997	0.5659	0.2661
25	Escorts Tax Plan	0.9388	1.3115	0.4344	0.1677	0.4120	0.2443
26	ICICI Prudential Tax Plan	0.8569	0.0149	0.1210	0.3983	0.4720	0.0738
27	Sundaram Tax saver OE- App	0.8731	-0.5069	1.0954	0.2246	0.2360	0.0113
28	Kotak Tax Saver-Scheme	0.8961	0.1592	0.7727	0.2243	0.0463	-0.1780
29	DWS Tax Saving Fund	0.7232	-0.2497	1.1125	0.1237	-0.1377	-0.2615
30	Franklin India Tax shield	0.7210	-0.1676	0.0995	0.3748	0.1093	-0.2655
31	L&T Tax Saver Fund	0.9494	-0.2921	0.5659	0.3629	-0.0883	-0.4512

Source: Secondary Data

Note: Fama French model was employed with 31 open ended schemes for the three years (2009-11 to 2011-12) as the required data is available only for that period.

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