

An Empirical Examination of Fama French Three-Factor Model in Indian ULIPS Market

¹, Chethan K.C., ², Dr. Mahesh. R

¹ResearchScholar, DOS in Business Administration, BIMS, UOM, Mysuru, India.

², Professor, DOS in Business Administration, BIMS, UOM, Mysuru, India.

Abstract: *The ULIPs satisfy the need of investment and the insurance coverage. Hence, there are large amount of funds have been invested in the ULIPs in India. Therefore, the investors are more interested on the performance of their funds and the factors those influence the returns of their portfolios. The portfolio returns are influenced by large number of factors. The Fama-French (1993) three factor model is one of the widely accepted models that states the portfolio excess returns are explained by market excess return, the size (SMB) and value (HML) factors. In the present study the explanatory power of the Fama-French three factor model has been tested in the Indian Insurance sector's equity-ULIPs market. It is found that, the market factor that significantly explain returns of portfolios in Indian Insurance sector's equity-ULIPs market.*

Keywords: *Insurance, Investment, Portfolio, Returns, Risk, Investor, Market, Size, Value*

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I. INTRODUCTION

A security or assets returns are influenced by many factors. The Fama French models (Fama and French, 1996, 1995, 1993) found that three important factors influence on the portfolio excess($r_p - r_f$) -returns: market excess- returns($R_m - R_f$), size factor(SMB), and value factor(HML). It indicates if assets are priced rationally the difference in mean returns are explained by the market, size and value factors. While this model has exceptionally better than the capital Asset Pricing Model (CAPM) and this model's performance against other general model is much better (Rahim and Nor, 2006). The Fama French model examines the basic CAPM for the American Stock Market; they examined the linear cross-section relationship between excess returns and the market factor.

Therefore, given the rational pricing, the market excess returns, size factor and value factor exposures should be a good proxy for the sensitivity to pervasive risk factors in returns(Connor and Sehgal, 2001). The Fama and French (1993) validate the portfolios constructed to replicate market risk factor, size and value all assist to explain the random returns to well-diversified stock portfolios.

Fama French in their model (1993) made an attempt to provide strong economic base for their three factor model by random return factors to earnings shocks. Further, they assert the behavior of stock returns in connection to market, size and value factors is consistent with the behavior of earnings(Connor and Sehgal, 2001). Finally they declare that the findings of their study are weak, especially relating to the value factor, but they attribute such results to the measurement error problems in earnings data.

The insurance sector is one of the major sectors that contribute to the growth of the Indian economy. As part of an invention in the field of the Insurance, Unit Linked Insurance Plans (ULIPs) have emerged. The ULIPs are significantly alike mutual funds, in ULIPs premium paid by the policy holder is invested in the tradable market securities and presented by the units, the NAVs of such investments are directly linked to the performances of such investments and regularly they declare the value of NAVs. A ULIP satisfies both investment and risk coverage objectives of an investor.

The present study empirically examines Fama-French three factor model (1993) in the Indian Insurance market's equity-ULIPs. In the study we analyzed the market, size and value factors are pervasive in the cross-section of random NAV returns. We investigate whether there are market, size and value factors in NAV earnings similar to those in returns, and whether the common risk factors in earnings translate into common risk factors in returns.

The study is organized as follows- the section one deals with the introduction, section two focuses on the review of literature, section three presents statement of the problem and the objectives, section four focused on the research methodology followed to empirically examination of the Fama-French model, section five presented empirically results and discussion, section six presents conclusion and scope for further research.

II. REVIEW OF LITERATURE

The fund performance measures focused on the initially start with the absolute returns, money weighted returns and time-weighted returns. Later, Sharpe (1964), Lintner (1965a&1965b), and Mossin (1966) have contributed to the development of CAPM. The CAPM model concentrating on mean risk and return. This model is mile stone in the area of corporate finance. After that Jensen (1967) had come up with a broad indicator of fund performance (known as Jensen's alpha), in his study Jensen concluded that the funds in his study were, on an average, not able to predict security prices well enough to outperform a buy-the market-and hold policy. Further Jensen concluded that there is very little evidence that any individual fund was able to do significantly better than that we expected from mere random chance. Later, E. Fama (1970) come up with a methodology to evaluate performance of managed portfolios by suggesting that the overall performance of managed portfolios can be divided into several. Further, Fama argued that the observed return of a fund could be due to 'selectivity ability', that is the fund managers ability to select the best securities at a given level of risk and 'timing ability' which means due to the prediction of general market price movement. After Fama(1970) model there are several researchers have provided both theoretical and empirical evidences that the, expected returns are explained by more than one factor. Fama and French(1993) provided a 3-factor model comprising, the return on the market portfolio, firm size and book-to-market ratio.

2.1- Review of Empirical Literature

There are large number of empirical researches have been conducted to examine fund performances of portfolios. It is considered that, if any fund that outperformed the bench mark its after-cost basis is treated as the value addition. The portfolio managers generally believe that they can be estimate a securities risk and return, able to identify the miss priced securities and to time the market. Thus, able to generate excess returns and add value to the investors. Rahim and Nor (2006) compared the Fama-French model and Liquidity based three factors model, they documented that' the preliminary results clearly shows that three-factor models outperform the CAPM'. Soumaré et al.,(2013) compared the CAPM and the Fama-French models, in their study it is found that-all the three factors significantly explains the excess returns of portfolios. Gharghori et al. (2007) found that, the Fama-French model do not explain the default risk, their analysis revealed the Fama-French factors capture some form of priced risk. Connor and Sehgal, (2001) in their study found- the size and the value factors explain the equity return. In their study Trimech et al. (2009) found- the explanatory power of the multi -factor model stronger in explaining the relationship between the portfolio returns and the risk factors (i.e. the market, size and value factors), further, they state- such explanatory power depends significantly upon the considered time-horizon. Taneja, (2010) in their study tested the efficiency of Fama French Model, he stated that- for being a good predictor, this model cannot be ignored in India but either of the two factors (size and value) might improve their results. Manjunatha and Mallikarjunappa, (2018) in their study showed-portfolio returns are explained by all three factors. Their results also show that, market has the highest explanatory power followed by size and value. Connor and Sehgal, (2001) in their study find evidence for pervasive market, size, and book-to-market factors in Indian stock returns. Further, they find that cross-sectional mean returns are explained by exposures to these three factors, and not by the market factor alone. Cakici, (2015) conducted the study on the international sample of 23 developed countries; the results of the study suggest that regional models perform much better than global models. This may imply that markets are still not fully integrated.

The literature review shows- the Fama-French (1993) three factor model has better explanatory power in explaining the mean excess returns of a portfolio. Further in the literature review it also revealed that robust evidence on size and value premiums are required for the emerging Indian market.

III. STATEMENT OF PROBLEM AND OBJECTIVES:

Globalization brought unprecedented growth in many sectors of the Indian economy, which also resulted in the growth of household income. At the same time, the traditional investment avenues like bank FDs have lost their attractiveness due to decline in their interest rates. Further, the Indian stock markets have reached all time highs. Hence, the common investor has been in search of alternative investment avenues. Unit Linked Insurance Plans (ULIPs) which are similar like mutual funds and managed by professional managers who invest the collected premium in stocks, bonds and other securities. These investments are represented by units whose value has been linked to the performances of those investments and the NAVs of such units are regularly updated. Hence, ULIPs have both risk coverage and investment options, and they satisfy the multiple objectives of a investor.

The Fama-Frech (1993) model is one of the best models that explains the return of a portfolio. The model states- market, value and size factors significantly explain the portfolio returns. An investor who has invested his hard earned money in ULIPs generally interested to examine the performance of their portfolios and determinants of their portfolio performances. Hence, examination of Fama French(1993) three factors help the

investors to make correct decision, that in turns channelizes the house-hold savings to the appropriate direction and helps economic growth of the country.

There is a dearth of applicability of the Fama-French model in Indian insurance market's equity-ULIPs. The previous researches have been conducted on the stocks and researchers constructed portfolios. But, none of them have made an attempt to the conduct their research on the performance of ULIPs using the Fama-French model (1993). The present research fills this research gap.

The present study has the following specific objective:

To assess the performance of the Equity-ULIPs using the Fama-French three factor model.

IV. RESEARCH DESIGN

4.1- Data and sample:

The data for the study consists of dividend adjusted Net Asset Values (NAVs) for 35 Unit-Linked Insurance Plans (ULIPs) from April-2009 to 31March, 2019. The sample ULIPs are equity based plans with higher growth expectation, the detailed profile of the Equity-ULIP funds have been presented in the annexure-I. The NAVs of ULIPs are used to estimate the percent of daily and monthly returns for the sample ULIPs. We have chosen the year 2010 for the starting point of our research, because we intend to examine the performance of the ULIPs using post global recession data. The data for the study is collected from the respective Insurance company websites, National Stock Exchange website and other sources. The sample schemes are less due to the fact that non-availability of daily NAV information both at cross –sectional level and for longer period of time.

In the study we have used individual security data to construct size and value factors daily as well as monthly. Such stock data consists of Nifty-50 stocks this index accounts 13 sectors of the economy. The Index accounts 66.8 percent of the free float market capitalization of stocks listed on NSE as on March 29, 2019. This clearly shows the relevance and the scope of the Nifty-50 index. Thus, our sample represents market performance as whole. The share price data has been collected from NSE website.

The NSE's Nifty-50 index has been used as surrogate for aggregate economic wealth. The 365 days T-bill rates are used as proxy for the risk –free rate, such data is obtained from RBI –website.

Further, the annual data of market capitalization and market value and book value are obtained on March-end of the year.

4.2- Estimation procedure:

It is very crucial for an investor to examine the performance of a manager. In the present section we examined whether the fund managers exhibits persistently superior stock selection skills. The daily percentages of returns from the NAVs are estimated to examine the performance of managers.

At the end of the year t (2010) we have ranked the sample funds on the basis of their daily mean returns for the calendar year t. such ranked funds are classified into five portfolios, hence the P1 consists of top 20 percent of the sample funds, P5 consists of bottom 20 percent of the fund schemes. Then, we estimate the equally weighted-daily returns of the sample funds on the basis of their average daily returns on the sample portfolio for the year t+1. The portfolios are re-formed at the end of the year t+1 based on their new ranking which is based on the daily returns for that particular year. This process has been repeated till we reach end of our study period.

To estimate the three factors of Fama-French model, in addition to the CAPM's market risk factors two other important risk factors need to be considered which is as follows.

As on the end of the July every year we rank the Nifty-50 stock based on their market capitalization (size): hence we formed two groups-Small(S) and Big(B), small represents the stocks whose market capitalization is below the median and the Big represents the stocks above the median. Then we have ranked the sample firms as on the March end of the year t-1 based on their book to market equity(BE/ME) and we form three groups L (bottom 30 percent), M (middle-40 percent) and H (top -30 percent).

The annual BE/ME ratios have been taken at the march-end of the year. From the interaction of two-size and three BE/ME groups, we construct six portfolios –S/L,S/M,S/H,B/L,B/M and B/H. while the S/L is a portfolio small and low BE/ME stocks, B/H is a portfolio of big and high BE/ME stocks. Further, the equally-weighted daily returns for the six portfolios in year t has been formed. The portfolios are rebalanced at the end of the year t and this process is repeated for entire study period. The six-double sorted portfolios are then used construct the size and the value factors in the stock returns.

The size factor(SMB) is calculated as the difference between the mean returns on all small-stock portfolios and the mean returns on all big stocks on all big stock portfolios, i.e.,

$$SMB=(S/L+S/M+S/H)/3 - (B/L+B/M+B/H)/3$$

The size factor is constructed such a way that it is neutral of BE/ME effect.

The value factor (i.e BE/ME) is constructed as the mean returns on the high BE/ME portfolios minus the mean return on the low BE/ME portfolios.,

$$HML=(SH+BH)/2 -(S/L+B/L)/2$$

This value factor is neutral of size effect by construction

4.3- Empirical model:

The multiple regression on Market factor (Rm-Rf), Size-factor (SMB) and Value factor (HML) for excess returns of portfolios of P1, P2, P3, P4 and P5 based on BE/ME ratio

$$R_p - R_f = a + b (R_m - R_f) + s (SMB) + h (HML) + \epsilon$$

The a,b,s and h; the t-value; and the adjusted R2 value; F-value and p values are examined to see if the factors together capture the cross-sectional variation in portfolio-excess returns. The purpose is to see if the returns of the portfolios formed on BE/ME ratio criteria alone are explained by the three factors of Fama and French(1993).

V. EMPIRICAL RESULTS AND DISCUSSION

The current study has been conducted to examine the whether Fama-French three factors –market excess returns, size and value factors explain the portfolio excess returns in Indian Insurance equity-ULIPs market. In the study the intercept and the slope co-efficient values are tested using the F-test at 5% level of significance. The intercept and coefficient estimates of the market return, size factor and the value factor are treated as significant if their corresponding p-values are lesser than the level of significance. The detailed empirical results and the explanatory power of the each of the three factors have been presented in the below tables.

Table-1: Descriptive Statistics for Sample ULIPs and the Market Index

Portfolio	Mean	Standard Deviation	Kurtosis	Skewness
Daily				
ULIPs	0.000590	1.014752	182.5841	4.857182
Daily Nifty 50	0.00058	1.09906	20.64496	1.20785

The above table-1 shows the descriptive statistics for the sample ULIP funds and the market index. It can be found in the above table-1 the mean daily returns of the ULIPs is 0.00059(annualized returns is 14.75 percent¹). The ULIPs have a standard deviation of 1.015. The daily mean market returns is 0.00058(annualized returns is 14.5 percent) and the standard deviation of the daily return is 1.099. Thus, it reveals the ULIPs are performing better as compared to the market.

Table-2: Empirical results of Fama-French Three factor model

Rank Portfolio	Regrn. Output	Intercept	Mkt.	SMB	HML	AdjR2	F-stat and (p-values)	
		a	B	S	H			
P1	Coeffts.	16.594	104.126	-13.028	2.2920	0.678	7.311	0.02
	p values	0.0156	0.0157	0.05	0.6536			
P2	Coeffts.	5.1950	81.489	1.2233	-0.4855	0.802	13.195	0.00
	p values	0.1056	0.0031	0.7042	0.8615			
P3	Coeffts.	-1.483	59.198	-1.936	-2.8402	0.494	3.934	0.07
	p values	0.6309	0.0184	0.5788	0.3601			
P4	Coeffts.	-6.080	44.828	-2.979	-3.65	0.394	2.951	0.12
	p values	0.051	0.0293	0.3310	0.1865			
P5	Coeffts.	-12.737	21.185	-1.806	-0.8511	0.010	1.032	0.44
	p values	0.0010	0.1682	0.483	0.6993			
Number of portfolios with p-values <0.05			4	0	0			
Percentage of Portfolios with p-values<0.05			80	0	0			

¹ We followed Sehgal and Jhanwar (2008), daily data were annualized assuming 250 working days in a year.

In the portfolio -1(P1) and Portfolio-2 (P2) collectively the three factors significantly explain the excess –returns of the portfolios. Thus we conclude that, all the three factors- market, size and value of Fama –French model explain the portfolio returns of top two best portfolios of the equity-ULIPs in India. Further, it can be found that, in the Portfolio-1(P1) the market and size factors explain the excess returns of the portfolios. In the Portfolio-2 (P2) only market returns explain the portfolio excess returns.

Further, it is also found that, in the portfolio-3(P3) and Portfolio-4(P4) the market significantly influence on the portfolio returns but collectively all the three factor do not significantly influence on the portfolio excess returns. Whereas, in Portfolio-5(P5) none of the factor explain the portfolio returns.

VI. SUMMARY OF FINDING AND CONCLUSION:

The portfolio returns are determined by large number of factors. The present study made an attempt to examine the validity of the Fama- French(1995) three factor model in the Indian equity-ULIPs market. It is found that when the entire three factors are considered in five portfolios the market has the high explanatory power followed by the size (significant in P1). The market is only a factor that explains the returns in portfolio-2(P2) and that variable significantly influence on the excess returns in portfolio-3 and portfolio-4(P4) also. Hence, the market has the higher explanatory power in large part of the portfolio of equity-ULIPs in India. The result of the present study helps the portfolio manager of the equity-ULIPs and the investor to take right decision. Further, research can be conducted with large sample of BSE and NSE market to test the applicability of the model in the Indian context. Further research can also be conducted to examine whether three-factor model performs better or five-factor model performs better in Indian context.

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ANNEXURE-I

Detailed profile of the Sample ULIPs

Slo No.	ULIPS
1	Tata Equity Fund

2	Tata Whole Life Midcap Equity Fund
3	Tata Largecap Equity
4	Tata Future Equity Pension
5	Tata Select Equity Fund
6	Tata Future Select Equity
7	Tata Top 50
8	Tata Top 200
9	Tata Infrastructure Fund
10	Tata Super Select Equity Fund
11	Tata Super Select Equity Pension Fun
12	Tata Indian Consumption Fund
13	Tata Multicap Fund
14	PNB Flexi Cap Fund
15	PNB Multiplier II
16	PNB Multiplier III
17	PNB Multiplier I
18	PNB Virtual Fund II
19	AB Multiplier
20	AB Maximiser
21	AB Magnifier
22	AB Maximiser Guaranteed Fund
23	AB Capped & Nifty index fund
24	AB Value & Momentum fund
25	AB Super 20
26	AB Pure equity fund
27	Kotak Classic Opportunities Fund
28	Kotak Front line equity fund
29	Kotak opportunity fund
30	Kotak aggressive growth fund
31	Kotak dynamic growth fund
32	Kotak dynamic balanced fund
33	Kotak guaranteed growth fund
34	Kotak Pension classic opportunity fun
35	kotak pension opportunities fnd
36	Pension frontline equity fund
37	Kotak pension growth fund

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