*THINK INDIA JOURNAL*

ISSN: 0971-1260
Vol-22-Issue-10-November-2019

# Core and Satellite Investing – A strategy for Portfolio Management

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## Abstract

***It is well known fact that the objective of portfolio management is to maximize returns and minimize risk through distribution of allocated fund in different securities. Portfolio Managers adopt different strategies to achieve their desired level of return and generate return higher than market index return. In the recent era, the concept of core and satellite portfolio management has emerged under which a part of the fund remain invested in securities offering steady returns with low level of beta and remaining part is used for investment in sectoral index which remain in focus for a certain period of time. The present study aims to explain the concept of core and satellite portfolio management and statistically examines its significance in Indian stock market. Statistical test such as K-S test, Levene's statistic, t-test , etc have been employed using SPSS ( Statistical Package for Social Sciences) and appropriate conclusions have been drawn using the output of various tests.***

**Keywords:** *Portfolio Management, Core and satellite portfolio, K-S test, Levene's Statistic, ANOVA, Post hoc test, Multiple comparison , Nifty 50 , Nifty Auto Index, Nifty FMCG Index.*

## Introduction

The purpose of investment in equity and debt markets through creation of portfolio of securities is to diversify risk without compromising for reasonable level of return. Depending upon the risk appetite of investors, fund managers offer different kind of schemes constituting of fixed income securities and equity. The ability of fund managers is measured from the excess return over market index generated by the portfolio being managed by him. Therefore, most of the fund

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managers keeps on adopting different strategies to beat the market index through adjustment of weight of securities in their portfolios or replacement of securities. The process is referred as portfolio revision. Based on the same premise, the concept of core and satellite portfolio has developed. Core-satellite investing aim to create portfolios with the objective of minimizing risk and at the same time outperforming the broad market index. The core of the portfolio consists of passive investments which includes market index like Nifty 50 and additional positions, known as satellites, are added to the portfolio in the form of actively managed investments. The present study highlights the utility of this kind of investment strategy in Indian stock market.

***Review of existing Literature***

The literature on ESG portfolio is limited as the concept has evolved in the recent past. However, the contribution of some of the researchers is this area is very informative and provides good framework for further research. Donald J. Mulvihill (2005) in his study entitled, "Core and Satellite Portfolio Structure - Investment and Tax Considerations" observed that there are three primary sources of investment risk and return: interest rate risk, equity market risk, and active risk. Interest rate risk and equity market risk are associated with the variable returns to bond and stock markets. Active or manager risk includes the pursuit of additional returns from active portfolio management. The research also observed that the traditional approach to portfolio structure involves hiring active portfolio managers to implement allocations to stock or bond markets . Under this approach , active management is bundled with market exposure. In case of core and satellite approach, active management is separated from ownership of an asset class after examining the investment and tax considerations relevant to the choice of portfolio structure. N. Amenc, Philippe Malaise and Lionel Martellini (2004) in their study , "Revisting Core Satellite Investing" discussed a new methodology based on an optimal dynamic adjustment of the fractions invested in a passive core versus an active satellite portfolio allows investors to gain full access to good tracking error, while keeping bad tracking error below a given threshold.

***Objective of the study***

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The traditional style of portfolio management focuses on the specific sector whereas core and satellite investing allows allocation of funds from routine investment strategy towards an emerging investing alternative and thereby generating higher returns for the investors. The study has been conducted to examine the opportunity of generating excess return by the fund managers by allocating funds in different sectors from time to time. It has been observed that some of the sectoral index generate significantly different return in comparison to market index at the same point of time. Such opportunities can be used by investor and portfolio managers to adopt core satellite investing strategy for generating reasonably higher level of return.

***Research Methodology***

The returns ( in percentage) on daily basis generated by the Nifty Auto Index and Nifty FMCG have been calculated and compared against the return generated by the Nifty 50 index for the period 1st February, 2019 to 15th October,2019 . The days when the significant difference occurred among the return on daily basis in these three indices were noticed and shortlisted for the study, as shown in the table 1 below:

| S.No. | Trading Date | Return on Nifty Index | Return on Auto Index | Return on FMCG Index | Diff b/w Nifty and Auto index | Diff b/w Nifty and FMCG index | Diff b/w Auto and FMCG index |
|---|---|---|---|---|---|---|---|
| 1 | 1-Feb-19 | 0.578897 | 2.711598 | 1.340076 | 2.132701 | 0.761179 | 1.371522 |
| 2 | 11-Mar-19 | 1.202041 | 2.331461 | 1.037376 | 1.12942 | -0.16467 | 1.294085 |
| 3 | 24-Apr-19 | 1.297518 | -0.4244 | 0.44663 | -1.72192 | -0.85089 | -0.87103 |
| 4 | 17-May-19 | 1.332937 | 2.456316 | 2.509349 | 1.123379 | 1.176412 | -0.05303 |
| 5 | 20-May- | 3.69154 | 4.159787 | 1.954132 | 0.468243 | -1.73741 | 2.205655 |

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|---|---|---|---|---|---|---|---|
| | 19 | 4 | | | | | |
| 6 | 21-May-19 | -1.00733 | -2.5249 | -0.03192 | -1.51757 | 0.97541 | -2.49298 |
| 7 | 22-May-19 | 0.245963 | 0.451918 | -0.95046 | 0.205955 | -1.19642 | 1.402378 |
| 8 | 24-May-19 | 1.604608 | 2.961579 | 0.812817 | 1.356971 | -0.79179 | 2.148762 |
| 9 | 29-May-19 | -0.56712 | -1.38482 | -0.18208 | -0.8177 | 0.38504 | -1.20274 |
| 10 | 30-May-19 | 0.714942 | -0.55784 | -0.03931 | -1.27278 | -0.75425 | -0.51853 |
| 11 | 8-Jul-19 | -2.13823 | -3.25897 | -1.26313 | -1.12074 | 0.8751 | -1.99584 |
| 12 | 11-Jul-19 | 0.730505 | 1.861233 | 0.478836 | 1.130728 | -0.25167 | 1.382397 |
| 13 | 17-Jul-19 | 0.213503 | -1.02173 | 0.843305 | -1.23523 | 0.629802 | -1.86504 |
| 14 | 18-Jul-19 | -0.77519 | -2.73857 | -0.20379 | -1.96338 | 0.5714 | -2.53478 |
| 15 | 19-Jul-19 | -1.53187 | -3.30636 | -1.78098 | -1.77449 | -0.24911 | -1.52538 |
| 16 | 22-Jul-19 | -0.63971 | 0.382329 | -1.07691 | 1.022039 | -0.4372 | 1.459239 |
| 17 | 24-Jul-19 | -0.52731 | -1.95007 | 0.005519 | -1.42276 | 0.532829 | -1.95559 |
| 18 | 26-Jul-19 | 0.285723 | 2.153183 | 0.547724 | 1.86746 | 0.262001 | 1.605459 |
| 19 | 29-Jul-19 | -0.84276 | -3.57188 | -0.57425 | -2.72912 | 0.26851 | -2.99763 |
| 20 | 30-Jul-19 | -0.92768 | -2.05555 | -0.38085 | -1.12787 | 0.54683 | -1.6747 |
| 21 | 31-Jul-19 | 0.294081 | 1.299575 | 0.697567 | 1.005494 | 0.403486 | 0.602008 |
| 22 | 1-Aug-19 | -1.24123 | 0.064948 | -0.48373 | 1.306178 | 0.7575 | 0.548678 |
| 23 | 7-Aug-19 | -0.84717 | -2.15846 | -0.1137 | -1.31129 | 0.73347 | -2.04476 |
| 24 | 8-Aug-19 | 1.63004 | 3.030504 | 1.101006 | 1.400455 | -0.52904 | 1.929498 |

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|---|---|---|---|---|---|---|---|
| | | 9 | | | | | |
| 25 | 9-Aug-19 | 0.699754 | 1.98544 | 0.584928 | 1.285686 | -0.11483 | 1.400512 |
| 26 | 13-Aug-19 | -1.65442 | -3.94611 | -1.95787 | -2.29169 | -0.30345 | -1.98824 |
| 27 | 20-Aug-19 | -0.33382 | 1.168965 | -0.58136 | 1.502785 | -0.24754 | 1.750325 |
| 28 | 26-Aug-19 | 2.110007 | 0.492248 | 1.594997 | -1.61776 | -0.51501 | -1.10275 |
| 29 | 27-Aug-19 | 0.429559 | 1.853975 | 0.764426 | 1.424416 | 0.334867 | 1.089549 |
| 30 | 28-Aug-19 | -0.53353 | -1.87895 | -0.38804 | -1.34542 | 0.14549 | -1.49091 |
| 31 | 4-Sep-19 | 0.432955 | -1.67736 | -0.14339 | -2.11032 | -0.57635 | -1.53397 |
| 32 | 5-Sep-19 | 0.029969 | 2.059849 | -0.05448 | 2.02988 | -0.08445 | 2.114329 |
| 33 | 6-Sep-19 | 0.906166 | 2.610611 | -0.20986 | 1.704445 | -1.11603 | 2.820471 |
| 34 | 11-Sep-19 | 0.296736 | 3.604151 | -0.29918 | 3.307415 | -0.59592 | 3.903331 |
| 35 | 12-Sep-19 | -0.47935 | -1.88049 | -0.64031 | -1.40114 | -0.16096 | -1.24018 |
| 36 | 17-Sep-19 | -1.68946 | -3.83391 | -0.2659 | -2.14445 | 1.42356 | -3.56801 |
| 37 | 20-Sep-19 | 5.319109 | 9.901598 | 4.408481 | 4.582489 | -0.91063 | 5.493117 |
| 38 | 25-Sep-19 | -1.27716 | -3.89541 | -1.23418 | -2.61825 | 0.04298 | -2.66123 |

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|---|---|---|---|---|---|---|---|
| 39 | 26-Sep-19 | 1.145085 | 2.533984 | 0.329012 | 1.388899 | -0.81607 | 2.204972 |
| 40 | 15-Oct-19 | 0.768441 | 2.232609 | 1.101304 | 1.464168 | 0.332863 | 1.131305 |

***Table 1: Return on daily basis generated by Nifty , Nifty Auto and Nifty FMCG Index***

It can be observed from the above table that significant difference occurred in the returns offered by these three indices on the same trading day. In order to examine , if these differences , are statistically significant or not, ANOVA test was used. Therefore, the study test the null hypothesis that there is no significant difference among the returns generated by these indices.

**i.e.** $H_0$ **: Mean** $_{\text{Return on Nifty}}$ **= Mean** $_{\text{Return on Nifty Auto}}$ **= Mean** $_{\text{Return on Nifty FMCG}}$ **( Null Hypothesis)**

$H_a$**: Mean** $_{\text{Return on stocks}}$ $\neq$ **Mean** $_{\text{Return on NIFTY 500}}$ $\neq$**Mean** $_{\text{Return on Nifty FMCG}}$ **(Alternative Hypothesis)**

The statistical test , One way Anova , has been employed for the study using SPSS after ensuring compliance of necessary conditions required for the same. It has been ensured that the samples are independent of each other because majority of the stocks of these indices are not existing simultaneously in all the three indices. The conditions with regard to independence of the samples under the study has been met. The other conditions such as normality of the data and homogeneity of variance have been examined using Kolmogorov Smirnov test and Levene's test respectively. Finally, Anova test and multiple comparison test has been conducted on the sample and meaningful interpretations were made.

***Analysis and Interpretation of Data under study***

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All the test have been conducted using 5% level of significance. For the purpose of inferring on the basis of ANOVA, the assumption of normality of data and homogeneity of variances has been assessed using K-S test and Levene's test respectively. Finally, Post - hoc analysis using multiple comparison has been used to find the areas in which differences are significant.

The assumption of normality of data has been examined using one sample Kolmogorov-Smirnov test (K-S test ) using SPSS. The result of the output are summarized below in **table 2.**

| **One-Sample Kolmogorov-Smirnov Test** | | |
|---|---|---|
| | | Return on indices |
| N | | 120 |
| Normal Parameters[a,b] | Mean | .2240887 |
| | Std. Deviation | 1.96292659 |
| Most Extreme Differences | Absolute | .077 |
| | Positive | .077 |
| | Negative | -.055 |
| Kolmogorov-Smirnov Z | | .838 |
| Asymp. Sig. (2-tailed) | | .484 |
| a. Test distribution is Normal. | | |
| b. Calculated from data. | | |

***Table 2: SPSS output of One sample Kolmogorov – Smirnov Test***

As can be observed from above calculation , p-value (Asymp. Sig) is greater than .05 , therefore, we can concluded that our data complies with the condition of normality . In order to test the

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homogeneity of variances among return , Levene statistic has been calculated using SPSS , as shown below in table 3:

| Test of Homogeneity of Variances | | | |
|---|---|---|---|
| Return on Indices | | | |
| Levene Statistic | df1 | df2 | Sig. |
| 18.433 | 2 | 117 | .062 |

***Table 3: SPSS output of Levene statistic test***

The Levene statistic has been used to test the null hypothesis if there is significant difference among variance of the variables namely Return on the three indices under study. As the p-value of Levene's test is greater than significance level of 0.05, the differences in sample variances are likely to have occurred based on random sampling from a population with equal variances. Thus, the null hypothesis of equal variances is not rejected and it is concluded that there is no difference between the variances in the population.

The compliance of test of normality and homogeneity validates the use of ANOVA test to find out if the returns are significantly different or not. The output of ANOVA test obtained by using SPSS on the data given in table 1 is summarized in table 4

| ANOVA | | | | | |
|---|---|---|---|---|---|
| Return | | | | | |
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | .081 | 2 | .040 | .010 | .990 |
| Within Groups | 458.436 | 117 | 3.918 | | |
| Total | 458.517 | 119 | | | |

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***Table 4: SPSS output of ANOVA test***

As the Significance value happens to be more than 0.05 , we can conclude that that there is no statistically significant difference among three variables under study. In order to further ensure that there is no difference among the variables under study , post hoc test was conducted

**Post Hoc Test and Analysis**

It can be observed from **table 5** that no significant difference have been observed among variables under study .

| **Multiple Comparisons** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dependent Variable: Return on Indices | | | | | | | |
| | (I) | (J) | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
| | | | | | | Lower Bound | Upper Bound |
| LSD | Nifty | Nifty Auto Index | -.03238322 | .44262038 | .942 | -.9089697 | .8442032 |
| | | Nifty FMCG Index | .03112368 | .44262038 | .944 | -.8454628 | .9077101 |
| | Nifty Auto Index | Nifty | .03238322 | .44262038 | .942 | -.8442032 | .9089697 |
| | | Nifty FMCG Index | .06350690 | .44262038 | .886 | -.8130796 | .9400934 |
| | Nifty FMCG | Nifty | -.03112368 | .44262038 | .944 | -.9077101 | .8454628 |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Index | Nifty Auto Index | -.06350690 | .44262038 | .886 | -.9400934 | .8130796 |

***Table 5 : SPSS output of Multiple comparison test***

***Conclusion of the Study***

Significant difference were observed among the daily returns offered by the three indices on certain days during the period Feb01,2019 to October 15, 2019 which implies that opportunities for making excess returns over market return is available to the fund managers provided the sectoral indices likely to outperform the broader market index could be predicted precisely. The return among the indices were not found to be statistically significant different. This could have been due to the shorter time horizon of the study. The study therefore concludes that portfolio managers can adopt core satellite investing strategy for the long period of time and it will enable them to generate significant excess return over the market index return. This strategy is more suitable during the period when the broader market index is in consolidation phase and moves in a narrow range.

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