

ORIGINAL ARTICLE

A MUTUAL FUND INDEX APPROACH TO TESTING MARKET EFFICIENCY: A CASE OF NIFTY INDEX

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Abstract

Over the past two decades mutual funds have emerged as one of the key participant in Indian equity markets. Apart from attracting retail investors and supplying liquidity in the markets, mutual funds have also provided illustrations for theoretical experiments. One such theoretical experiment is testing of capital market efficiency using mutual fund portfolio performance. Market efficiency as a concept proposed by Eugene Fama in 1970 and went onto prove to be one of the pivotal contribution in asset pricing model developments, proven rightfully with earning a Nobel award to Fama. This study uses the approach to testing efficiency of Indian Capital Markets by developing a mutual fund index, developed on the basis of NAV changes of 20 selected funds, existing in the last 11 years. Such an index's performance is then compared with the performance of CNX NIFTY index using statistical tools like descriptive statistics and a student's t-test. It has been concluded based on above analysis that the outperformance of mutual funds over market are statistically insignificant and the Indian equity market is found to be efficient and does not provide a consistent abnormal return earning opportunity to any market participant.

KEYWORDS:

Testing Market Efficiency , theoretical experiments , Indian equity market , investment theory .

INTRODUCTION

Over the past two decades mutual funds have emerged as one of the key participant in Indian equity markets. Apart from attracting retail investors and supplying liquidity in the markets, mutual funds have also provided illustrations for theoretical experiments. One such theoretical experiment is testing of capital market efficiency using mutual fund portfolio performance. Market efficiency as a concept proposed by Eugene Fama in 1970 and went onto prove to be one of the pivotal contribution in asset pricing model developments, proven rightfully with earning a Nobel award to Fama.

Efficient Market Hypothesis or EMH is an investment theory that states it is impossible to *beat the market* because stock market efficiency causes existing share prices to always incorporate and reflect all relevant information. According to the EMH, stocks always trade at their fair value on stock exchanges, making it impossible for investors to either purchase undervalued stocks or sell stocks for inflated prices. As such, *it should be impossible to outperform the overall market through expert stock selection or market timing*, and that the only way an investor can possibly obtain higher returns is by purchasing riskier investments. The classic statements of the Efficient

Markets Hypothesis are to be found in Roberts (1967) and Fama (1970). An 'efficient' market is defined as a market where there are large numbers of rational, 'profitmaximizers' actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants. In an efficient market, competition among the many intelligent participants leads to a situation where, at any point in time, actual prices of individual securities already reflect the effects of information based both on events that have already occurred and on events which, as of now, the market expects to take place in the future. In other words, in an efficient market at any point in time the actual price of a security will be a good estimate of its intrinsic value. Fama identified three distinct levels (or 'strengths') at which a market might actually be efficient – weak, semi-strong and strong form of efficiencies.

Mutual funds provide an excellent proxy for varied set of portfolios of market participants. The research question – “are there any market participant earning that excess return through a specific stock selection strategy or market timing?” – can be tested using a set of mutual funds as those portfolios who utilise expert stock selection, access to speedier and accurate information, strategic and consistent methods of stock pick, use of advanced tools and even the market timing.

LITERATURE REVIEW

Various studies have been conducted by scholars across the globe to test the efficiency of market in different time periods of different markets and continue to be conducted. This will be an ongoing study, as the experiments are being conducted to ensure that hypothesis (which is assumed) is indeed true and investor act accordingly. There have been conclusions drawn favouring both the sides of arguments. But most studies are skewed towards proving the random walk theory to be true and thus markets being efficient.

The theory of random walk was first formulated and discussed by **Bachelier (1900)** but with the assumptions that new information analysis and evaluation would occur in independent manner. Later **Fama (1965-1992)** has defined market efficiency and identified a market as a place where there is large number of rational investors competing actively, each investor acting with homogeneous objectives and information relating to stocks are freely available to all participants of the market. Fama went on to test the three levels of market efficiency based on amount of information the market is expected to absorb during the price determination process. **Lo and Mckinlay (1981)** have proposed variance ratio tests in order to answer the question of whether the asset prices or returns are predictable or not.

Testing of Strong form of market efficiency is generally found to be about testing the performance of evaluating the institutional investors' performance, as they are expected to have access to privileged private information over the non-institutional investors. Before which it was Markowitz's CAPM return was the benchmark against which the stock returns were compared and such a test was only resulting in diagnosis of semi-strong form of market efficiency. It was **Jensen (1969)** who published the result of evaluation of 115 investment funds between 1945 and 1964 and concluded that investment funds achieve above-normal returns, but the fees and expenses paid will eat into such benefits. **Jaffe (1974)**'s studies on insider trading contradicted Jensen's conclusions and evidenced the strong form of market efficiency. Such studies continued throughout the next 3 decades. **Elton and Gruber (1998)** questioned such studies and added the validity of data being considered. **Brown et al (2003)** tested the strong form of market efficiency of Canadian stock exchange.

OBJECTIVES OF THE RESEARCH

- To develop and test a mutual fund index and compare the same with CNX NIFTY index to track performance
- To test the efficiency of Equity Mutual Funds as an asset class
- To test whether Indian capital market is efficient as per EMH theory

DATA

Data has been collected on convenience sampling testing. As the objective of this study is to test if the Indian capital market is efficient in its semi-strong form, secondary data has been collected from the reliable sources like AMFI India website for collecting NAVs of top twenty mutual funds of seven different fund houses and NSE website for collecting CNX NIFTY historical data for 11 years on quarterly basis.

These data are been used to analyse through statistical tools and develop a Mutual Fund (MF) Index for tracking the performance by comparing Mutual Fund returns with that of CNX NIFTY returns.

RESEARCH METHODOLOGY

Preparation of Data

Various Mutual Fund historical NAVs have been arranged chronologically and average NAV of all the twenty funds for each quarter ending date has been computed. Using this average NAV data, a Mutual Fund Index has been developed keeping base as 1000 in the base year starting from 1st Jan 2013.

The index has been developed using the below formula,

$$I_t = N_t / N_b \times I_b$$

Where,

I_t = Mutual Fund Index at time t

I_b = Mutual Fund Index at base year (i.e, 1000)

N_t = Average NAV at day t

N_b = Average NAV at base year

Once the mutual fund index has been prepared for the purpose of comparing the performance of these mutual fund with that of overall market (as represented by CNX NIFTY).The quarterly returns of mutual fund returns and CNX NIFTY have been computed through following formula:

$$\text{Returns} = \frac{P_1 - P_0}{P_0} \times 100$$

Using the two identified time series variables, which are CNX NIFTY returns and MF Index returns below statistical analysis have been conducted.

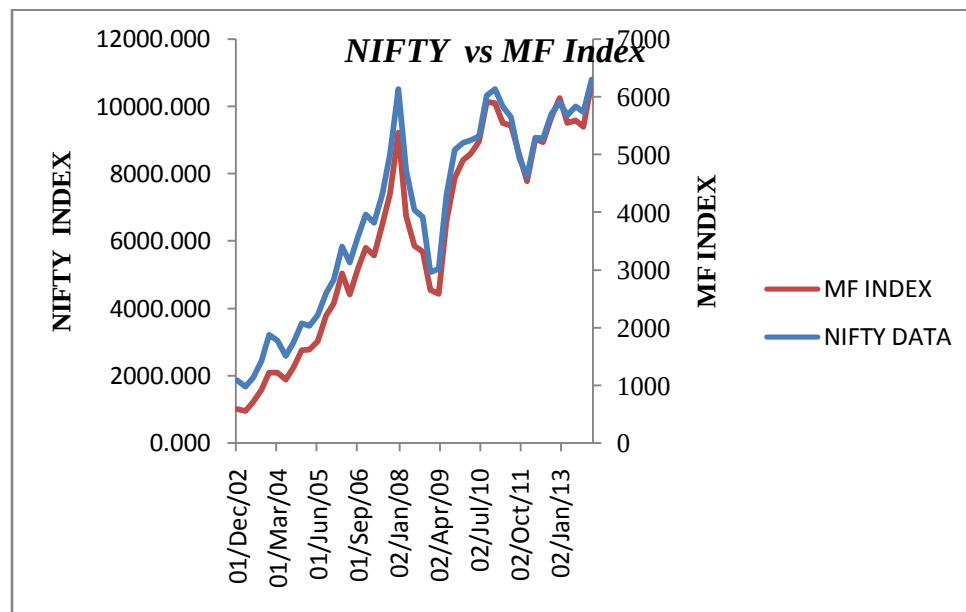
t Test: A t test is conducted to compare the means of Mutual fund index and CNX Nifty. This is conducted with an objective to determine whether there is a difference in the means of populations of both these variables.

Data Analysis and Results:

Descriptive Statistics

	<i>Mean</i>	<i>Standard Deviation</i>
<i>CNX NIFTY</i>	0.0497	0.13929
<i>MF Index</i>	0.0658	0.15159

As can be seen from the above table the mean return of NIFTY is 4.97% with standard deviation of 13.93% as compared to MF Index average return of 6.58% with a standard deviation of 15.16%. At the outset one can simply say that Mutual Funds have outperformed the CNX NIFTY based on mean returns but the other argument can be that CNX NIFTY was a less risky portfolio compared to Mutual Fund Index as evident from their respective standard deviation.



After observation of two way line graph we can see that both the indices moved almost in the same direction except minute variation in the pattern.

t-Test

The hypothesis has been formulated as below:

$$H_0: \mu_m - \mu_n = 0$$

$$H_1: \mu_m - \mu_n \neq 0$$

The observed value of “t” is found out using the below formula.

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2} \left[\frac{n_1+n_2}{n_1n_2} \right]}}$$

Where: $\bar{X}_1$ is the mean for Group 1; $\bar{X}_2$ is the mean for Group 2; n_1 is the number of people in Group 1; n_2 is the number of people in Group 2; s_1^2 is the variance for Group 1; s_2^2 is the variance for Group 2; $df = n_1 + n_2 - 2$.

The value of Alpha is taken as 0.05 (at 95% confidence level). A two tailed t test is conducted with degrees of freedom of $44+44-2 = 86$. Because it is a two tailed test Alpha is considered to be 0.025. Hence the table t value is 1.9879. The null hypothesis will be rejected if the observed t value is less than -1.9879 or greater than +1.9879.

The observed “t” value on the sample data is presented below

<i>t-Test: Two-Sample Assuming Equal Variances</i>		
	<i>Nifty</i>	<i>MF Index</i>
Mean	0.049690375	0.06583577
Variance	0.019401054	0.022980831
Observations	44	44
Hypothesized Mean Difference	0	

Df	86	
t Stat	-0.520217419	
P(T<=t) one-tail	0.302124343	
t Critical one-tail	1.66276545	
P(T<=t) two-tail	0.604248686	
t Critical two-tail	1.987934166	

Because the observed value, $t=0.6042$ is neither less than the table value -1.9879 nor greater than table value $+1.9879$, the observed value of t is in the acceptance region. The null hypothesis is accepted. That is there is no significant difference in the mean returns of the MF Index and CNX Nifty.

From the above t-test we found that Mutual Funds have outperformed the markets in terms of average return during the study period. Mutual Funds have exhibited a higher volatility than the CNX Nifty. Mutual Funds have delivered a better risk adjusted performance over the overall market. Mutual Funds have moved in tandem with the market and at the same time have outperformed. The pattern of return generation from the Mutual Funds are almost similar even though the returns of Mutual Fund are higher than Nifty. The average returns of the MF Index and CNX Nifty when tested for statistical significance the result concluded that they are statistically insignificant. Based on this finding we can conclude that the Indian capital markets do not provide an opportunity for a mutual fund manager to earn excess return consistently. Thus, the Indian equity markets can be called efficient. The distribution of returns of Mutual Funds and CNX Nifty are considerably different.

CONCLUSION

The study focused on developing a broad based Mutual Fund Index and testing the EMH theory based on the various findings and suggestions outlined in the previous sections. We conclude that Indian capital markets are efficient. Even though during the period of sample, that is 2002 to 2013 capital market have provided an opportunity for Mutual Fund Managers to choose and select undervalued stocks in their portfolio and also opportunity to time the market, the same cannot be held significant for the infinite population of such returns and hence, Indian equity markets can be called efficient.

Overall it can be concluded that market being inefficient would be a boon for Mutual Fund Managers and Indian Stock Market by being efficient does not provide the opportunity for earning excess returns consistently.

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