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FUND PERFORMANCE MEASUREMENT WITHOUT BENCHMARK-A CASE OF SELECT INDIAN MUTUAL FUNDS

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ABSTRACT

This paper calculates the Performance Change measure (PCM) developed by Grinblatt & Titman(Journal of Business,1993,vol66,no-1)for a sample of 50 Indian mutual funds over a period of 26 months. PCM as a measure has some advantages compared to the traditional measures, the most important one being –it is free from using a benchmark portfolio and consequently the resulting biases arising out of usage of such a portfolio. So by using PCM as a measure, this paper, without using any benchmark, attempts to asses whether the selected mutual funds are able to provide above-normal return on average –using no more information than what is available to the common investor. PCM has been calculated for one month, one quarter and one year lag. And using PCM as a measure the study finds that though in the short term ,the mutual funds were unable to generate above-normal return but on the average the combined PCM of all the mutual funds is significantly different from zero, which are in agreement with the original findings of Grinblatt & Titman, in this Indian context.

SECTION I

1. Introduction

Measurement of portfolio performance and as a special case mutual fund performance is an area of interest for both academic as well as practice point of view since the development of portfolio measurement theory. Whatever measures have been developed and practiced are essentially comparisons of the concerned portfolio with the return earned by one (or more) other portfolio, often referred to as the benchmark portfolio. Depending upon whether the portfolios chosen are truly comparable[1] (i.e. they not only based on same assumptions of risk-return trade off but also bound by similar constraints),no measure till date suggested are free from biases, especially benchmark biases. In fact the most widely used measure in academic literature, the Jenson measure is subjected to the benchmark bias (Roll, 1978) . Grinblatt & Titman, observed that no measure has utilized the information about the composition of the portfolio – and they developed a measure utilizing the composition – the Portfolio Change Measure (henceforth called PCM), eliminating the need to compare the return to a bench mark portfolio and consequently with all its associated biases.

This paper is actually a replication of the study conducted by Grinblatt & Titman and calculates PCM for a sample of 50 Indian mutual funds over a period of 26 months, with a view of validating their study in the Indian context; whether or not the selected mutual funds (hence forth called funds) are able to outperform the market on the average over the studied time period.. In addition to that by examining the strength of interrelationships of values of PCMs for successive time periods , this paper also tries to infer about the extent to which the future values of fund performance are related to

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its past by using single index model with lag of 1-month,1-quarter, and 4-quarters.

The remainder of the paper is organized as follows; section II (literature review) provides a brief discussion of previous studies on fund performance and the related issues, mainly the biases associated with them. Section III describes the data, the methodology adopted for i) calculating the PCM & ii) drawing the inferences from the result obtained. Section IV presents the result and discusses it. It also concludes the paper.

SECTION II

2. Literature Survey

Market efficiency is the most intriguing and debated in the field of both applied and theoretical finance. Plethora of research papers are available in this arena suggesting theoretical measures and empirical testing of market efficiency . Obviously one of the ways of testing it indirectly is to test whether professional mutual fund managers are able to earn superior returns compared to unprofessional investors, when both are subject to non-asymmetry of information.. Numerous empirical studies have been made to test the hypothesis of market efficiency through testing of above-average return bearing capability of mutual funds. It has been done all over the world ,for various time periods with a varying degree of sample sizes. However with respect to methodology employed almost all of the studies employed a typical measure ,called the Jensen measure.

The Jensen measure (1968, 1969), which is the traditional measure (developed as a direct application of CAPM in the 1960's) used in most academic studies of fund performance management, actually is the intercept of a single variable linear regression of the time series of returns excess over a risk free rate (say 91 days T-Bill or 1 year RBI Bond) of the evaluated portfolio on the time series of excess return of the chosen benchmark portfolio. To put it symbolically, $E(R_p)- R_f = \alpha + \beta (E(R_b) - R_f)$, where α is the excess(differential) return earned by the mutual fund , and β is the systematic risk of the mutual fund portfolio. A positive (negative) α indicates that the portfolio has an above (below) average return over the benchmark rate and thus indicates about the efficiency of the fund manager. However this popular measure of evaluating fund performance has some serious drawbacks owing to its assumption of both the risk free rate and (more importantly) benchmark portfolio.

Initial thinking may suggest that it is easy to set a benchmark. Yet, this is not the case. Benchmarks need to be based on an objective consideration of the needs of the fund manager, otherwise they are merely arbitrary indicators.[2]

Roll(1978) has clearly shown that the choice of benchmark can result in an upward bias in estimation of α's. Often referred to as benchmark bias, this bias is also the source of some serious criticism against Jensen measure in academic literature. Moreover it has also been found that Jensen measure is not free from the biased evaluation of market timers. [3] Also the Jensen model assumes that the portfolio is fully invested, ignoring the fact that fund managers often keep some cash in bank and invest some portion of the fund in short term money market instruments for meeting (contingent) liquidity requirements.

There are several research works suggesting about the appropriate benchmark. Guidance on the choice of benchmark and its construction has been given by and others. As an extension to the existing literature on the selection of benchmarks, Bailey (1992a) suggested a set of criteria. However it is a very rare occasion where a benchmark is readily found satisfying all the criteria. Academic studies[4] have computed benchmarks on the basis of risk-adjusted naive portfolios using an asset pricing model such as CAPM (which is much similar to Jensen's measure, except the risk adjusted benchmark).

The present study is motivated by the seminal work of Mark Grinblatt and Sheridan Titman,(Journal of Business,1993,vol66,no.1) who for the first time suggested an alternative measure of fund performance without using any benchmark portfolio. They pointed out that ,so far the traditional methods of evaluating portfolio performance did not utilize the information contained in the composition of the managed funds. The suggested measure ,called the 'Portfolio Changed Measure' (henceforth called PCM) incorporates the expected and the actual weights of an invested asset and the realized return over a single time period .Assumption behind motivating the PCM is that the uninformed investors perceive the vector of expected returns as constant, while

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informed investors can predict whether expected returns vary over time. "Informed investors can profit from changing expected returns by increasing (decreasing) their holdings of assets whose expected returns have increased (decreased). The holding of an asset that increases with an increase in its conditional expected rate of return will exhibit a positive unconditional covariance with the asset's returns." The PCM is constructed from an aggregation of these covariances.[5]

Most important feature of this measure is that it does away with the requirement of an appropriate benchmark and obviously from the biases arising out of the same. Grinblatt and Titman has shown that this new measure is "not subject to survivorship bias and has some computational advantages for statistical inferences". In fact , PCM has added a new dimension to performance measurement of funds and its evaluation techniques.

This is the reason the study has employed PCM to calculate the excess return of the selected sample and to test empirically the market efficiency w.r.t. the mutual fund return in the Indian context.

SECTION III

3. Data

The sample period examined is Dec'2001 to Feb'2004.The raw data were obtained from the NAVindia database of Capitalline, an independent research firm which monitors the mutual fund industry. The raw data consist of composition (i.e. the stocks that are included in the portfolio) percentage weights in various assets and the monthly returns of the each asset, as of the last working days of each month during our study period. From the raw data we have extracted the required information needed for our purpose i.e. name of the stocks under each portfolio of mutual fund, weights composition and monthly return. Both quarterly and yearly return have been compounded from the monthly return

4. Methodology

4.1. Rationale of PCM

If the market is efficient and consequently there are no information asymmetries in the market then the expected return-vector for an average (or uninformed) is constant over time. So his present portfolio holding (weights of fund allocation) cannot be highly correlated with future asset return. If it is observed that over time that again and again the fund manager has tilted his portfolio weights in such a manner so that the total return earned is above average, then definitely there is a presence of superior information. If the same phenomena repeat for majority of the funds, we may conclude that there is information asymmetry present in the market; this leads to a concept of measuring fund performance as a function of changing pattern of weights of asset holding over time.

4.2. Formula of PCM and its estimating procedure.

Suppose there are N assets available for a fund manager to make investment for a given amount of fund .If the expected return on j-th asset is $E(R_j)$ and the expected holding of the same asset be denoted by $E(W_j)$ then the following sum can be thought of as the difference between the actual expected return of the portfolio managed by the fund manager and the expected return of the same portfolio had returns and weights of all the assets are not correlated.

$$SUM = \sum_j [\, E(W_j R_j) - E(W_j)\, E(R_j) \,]$$

The same SUM can be looked upon as a covariance between asset return and portfolio weights

$$COV = \sum_j [\, E(W_j - E(W_j))R_j \,]^6$$

This covariance is the foundation of PCM and hold at sample covariance level as well , since

$$Scov(w_j, R_j) = \sum_t (Wjt - \bar{W}_j)(Rjt - \bar{R}_j)/T$$

$$= \sum_t (Wjt - \bar{W}_j)\bar{R}_{jt}/T,$$

Where

Scov = sample covariance between weights and returns of asset j of period t

W_{jt} = the portfolio weight at the beginning of the portfolio t (with sample mean $\bar{W}_j$)

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R_{jt} = the portfolio return from date t to t+1 (with sample mean $\bar{R}_j$)
T = the number of discrete time intervals during the period t.

Here if it is assumed that period t+k return for each asset is used as a proxy for its expected return during the period t and its period t-k holding as a proxy for its expected holding during period t, then the PCM can be expressed as follows :

$$PCM = \sum_t \sum_j [\ R_{jt} \ (w_{jt} - \ w_{j\,t-k})] / T ,$$

Under the assumption of no superior information available to the fund manager, both the past and current weights are uncorrelated with current returns. So PCM should ideally be zero for large samples.
The inner summation actually an estimate of the covariance between returns and weights at a point in time. It can also be viewed as the return on zero-weight portfolio.
The PCM test itself is a *t*-test based on the time series of zero-weight portfolio returns, i.e., to put symbolically, $t = (PCM/S\,D)\ (T)^{1/2,}$ where SD is the Standard Deviation of the sample time-series of PCM obtained.

SECTION IV

5. Result

We find that the calculated grand average of PCM measures is not significantly different from zero when calculated for 1-month lag.(Table1) However the same average when calculated for 1-quarter lag (Table 2) and 4-quarter lag (Table3)are found to be significantly different from zero. We also found that the mean performances of all the mutual funds on an average are significantly different from zero as we increase the lag i.e. from 1 month to 1 quarter to 4 qtr. We started the discussion in the methodology section that the average of all PCM measures calculated for each fund has expected value zero and thus the grand mean of averages should have expected value zero. The underlying assumption in each case is the fund managers possess no amount of superior information. In other words this implies the mutual fund managers actually acts as an uninformed investor for whom the vector of expected asset return is constant over time. But in fact we notice that the result obtained is indicative of just the opposite especially in the long run. We understand that portfolios with dynamically changing weights might have returns that are not iid normal [7].That is why the PCM measures have been subjected to nonparametric Wilcoxon tests. The Wilcoxon test results , and binomial sign test results(not reported) are found consistent with the reported t-statistics.

6. Conclusion

The original work which is the motivation behind the present study in fact is much wider w.r.t. data and scope –which is not the case with the present study. However as known till date, the PCM measure is yet to be applied in any study in Indian context. By calculating PCM for the first time for the chosen sample of 50mutual funds , however the results obtained are , commensurate with the original findings of Grinblatt & Titman in case of mutual fund data of US. Thus we may conclude by saying that there are positive signals of information asymmetry in the market with mutual fund managers having superior information about the returns of stocks as a whole . PCM also indicates that on the average mutual funds provides excess (above-average) return, but only when unit of time period is longer (1 qtr or 4 qtr). Therefore we also may conclude that for assessing the true performance of a particular mutual fund, a longer time horizon is better. However future studies are required in this regard to come to a definite conclusion.

Table1. Performance Estimate/Measure (lagged 1 Month) for 50 Mutual Funds (in % Return per Month)

No. of Funds	Mean performance [a]	t-statistics	$t_{0.025,49}$	Wilcoxon statistic (W^-)	Wilcoxon Normal Approx [c]	$Z_{0.025}$
50	0.0467	0.7564	1.959	508	-1.25	-1.96

There fore we find that there is no reason to doubt the null hypothesis that the PCM s are having an expected value of ZERO on an average.

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Table2. Performance Estimate/Measure (lagged 1Qtr) for 50 Mutual Funds (in % Return per Quarter)

No. of Funds	Mean performance [a]	t-statistics	$t_{0.025,49}$	Wilcoxon statistic (W^-)	Wilcoxon Normal Approx [c]	$Z_{0.025}$
50	8.73	47.22	1.9599	367	-2.611	-1.96

There fore we find that there is sufficient evidence to doubt the null hypothesis that the PCM s are having an expected value of ZERO on the average in case of qrtly returns. Tests have found the difference between the observed expected values and zero is significant at both 5% and 1% significance level.

Table3. Performance Estimate/Measure (lagged 4Qtr) for 50 Mutual Funds (in % Return per 4- Quarter)

No. of Funds	Mean performance [a]	t-statistics	$t_{0.025,49}$	Wilcoxon statistic (W^-)	Wilcoxon Normal Approx [c]	$Z_{0.025}$
50	1.0556	6.7447	1.9559	124	-4.98	1.95

Therefore we find that there is sufficient evidence to doubt the null hypothesis that the PCM s is having an expected value of ZERO on the average in case of yearly returns. Tests have found the difference between the observed expected values and zero is significant at both 5% and 1% significance level.

[a] (Sum of all PCMs) /50
[b] Mean Performance Divided by Standard Error of the Mean Performance
[c] If the number of observations is such that n(n+1)/2 is large enough (> 20), a normal approximation can be used with μ_W =n(n + 1)/4 =637.5,σ = [n(n + 1)(2n + 1)/24]$^{1/2}$ = 103.59.

Appendix A

Biases in Jensen Measure Arising out of choice of Benchmark.[8]

Let the problem be the performance-evaluation of a portfolio with excess return r_{pt}. Let this portfolio consist of N assets with excess returns r_{jt},(j=1,2,…,N). Let r_{et} , be the excess return on another portfolio, which from the viewpoint of an uninformed investor , is mean-variance efficient within this set of *N* assets and whose orthogonal portfolio is used to compute excess returns. Here the underlying assumption is that risk free lending and borrowing is permitted.[9]

We also assume that the uninformed investors' expected return on this mean-variance efficient portfolio is μ_e and its variance is σ^2_e. Also suppose that the expected return on asset *j* is that μ_j . And that the covariance matrix of the return vector r = ($r_1,r_2, \ldots r_j,\ldots,r_N,r_e)^{/}$ is constant given the information available to the uninformed investor.

Against this setup , it follows from Roll (1978) that,

$$r_{jt} = \beta_j\ r_{et} + \varepsilon_{jt} \quad \text{and} \quad \beta_j = \mathrm{Cov}(r_{jt},\ r_{et}) / \sigma^2_e \quad (1)$$

Here, for an uninformed investor , β_j is constant over time and $E(\varepsilon_{jt}) = 0$. If portfolio manager is assumed to possess different (superior) information set that will lead to time-varying expected returns. As a result, not only the portfolio weights will vary over time, but also the uninformed investors' expected value of r_p,. Since the portfolio weights change over time, β_p, the portfolio beta, will also be *time* varying. Returns on the managed portfolio can be written as

$$r_{pt} = \beta_{pt}\ r_{et} + \varepsilon_{pt} \quad (2)$$

The manager of the fund can possesses two types of superior information. If F_t denote the information set that the manager is endowed with at time t, then he is said to have timing information if $E(r_{et} \mid F_t)$ is not equal to $E(r_{et})$ (= μ_e) . When $E(\varepsilon_{jt} \mid F_t)$ is not equal to $E(\varepsilon_{jt})$ (= 0) he is said to be having selectivity information.

The most popular measure of the performance of a managed fund is the Jensen (1968, 1969) measure, which is the intercept, α_p, of a least squares regression of r_{pt} on r_{et}. It has been shown by Admati and Ross (1985) that when a manager has superior timing information, the Jensen measure, α_p, can be negative.

Grinblatt and Titman (1989) examine a class of performance measures that includes the Jensen measure and show that certain members of the class

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do not suffer from the problems that arise with the Jensen measure. The class of measures, called period weighting measures, is defined for a sample of T observations by

$\alpha = \sum \omega_t r_{pt}, \quad \sum \omega_t = 1, \ \sum \omega_t r_{et} = 0.$ (3)

where the weights, ω_t, are functions of the return on the benchmark portfolio.[10] They have shown that Jensen measure is obtained by setting

$\omega_t = [V_e - (r_{et} - \bar{r}_e)\ \bar{r}_e] T^{-1} V_e^{-1}$

where $\bar{r}_e$ and V_e are the sample mean and sample variance of the benchmark return . We then have

$\alpha_p = \sum \omega_t r_{pt} = \bar{r}_p - b_p \bar{r}_e.$ (4)

where b_p is the estimated least squares slope coefficient from a regression of r_{pt}, on r_{et} The problem that arises with the Jensen measure is when, whether the manager has timing information or not, can be seen by examining his weights, ω_t For large values of r_{et} , $\omega_t < 0$. When the investor has timing ability, r_{pt}, will, on average, be large when $E(r_{et} | F_t)$ is large . Therefore it will also be large, on average, when r_{et} is large . These large returns will then receive negative weights, making it possible that $\alpha_p < 0$ when the investor has timing information.

If the benchmark return is measured with mean zero error, Jensen measure will be biased upwards. The bias arises because measurement error will bias the slope parameter, α_p, in (4) toward zero. As a result, when $\beta_p > 0$, plim[11] $\alpha_p > 0$ even if the manager does not possess superior information.

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[1] As an extension to the existing literature on the selection of benchmarks, Bailey (1992a) suggested a set of criteria. However it is a very rare occasion where a benchmark is readily found satisfying all the criteria. In addition to that it is still an ambiguous term in the arena of Fund management.

[2] Does benchmarking help? J. Ansella, P. Molesa, A. Smartb , Intl. Trans. in Op. Res. 10 (2003) 339–350

[3] Refer to Appendix A for a discussion on Jenson measure and its sensitivity to Benchmark chosen and to timing ability.

[4] Grinblatt and Titman, 1989, 1994; Grinblatt, Titman and Wermers, 1995

[5] Refer to Methodology under Section III for formula for computation .

[6] It can also be expressed as, COV = $\sum_j$ [E(Rjt – E(Rjt)] Wj, which is the starting point of Event Study Mechanism.. The event study measure is also build on the idea that during a period (event period) the scripts held by a portfolio manager who has superior information , will have a higher return (with a high degree of probability) compared to the later period(comparison period) when those scripts were not included. The measure based on event-study method actually calculates the difference between the return during the event period than during the comparison period. The rationale behind choosing later period as a comparison period is that the tendency of choosing scripts based on earlier return does not result in biases. However by doing so they tend to incorporate another type of bias called survivorship bias.

[7] If portfolio (abnormal) returns are serially independent, normally distributed, and homoscedastic , then t –statistic derived from a time series portfolio gives valid inferences about the means of average(abnormal) returns.However if securities returns are serially uncorrelated then the C.L.T. can be applied and asymptotic z-tests are valid for non-normal portfolio returns. Given the length of our original time series ,the asymptotic z-test statistics are virtually identical to the t-test statistics and the difference in significance level can be taken as negligible. For further details see Grinblatt & Titman(1988,1989).

[8] Please refer to Cumby, R. E, et al, "Evaluating the Performance of International Mutual Funds" , Journal of Finance, June,1990, for further details. This section has been adopted from the same after modification.

[9] This assumption is required to perform testing of hypotheses.

[10] Their main result is that, if $\omega_t > 0$ for all *t*, the performance measure, denoted by *a** when *w*, > 0, converges in probability to zero for an uninformed investor and to a positive number for an investor with selectivity information and no timing information or selectivity information and independently distributed timing information .

[11] limit in probability

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