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A STUDY ON PERFORMANCE ATTRIBUTION OF EQUITY MUTUAL FUNDS

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Abstract: *Most of the researches carried out in the domain of mutual fund is the evaluation of the performance of various mutual funds whether actively managed or passively managed using risk adjusted performance measures. The empirical and conceptual research has paid little attention to the concept of performance attribution."Performance attribution is a technique used to quantify the excess return of a portfolio against its benchmark into the active decisions of the investment decision process" (Bacon, 2008). Performance attribution analysis is a tool to understand the sources of return in a portfolio. This paper highlights the concept of performance attribution and discusses the different attribution models used in equity mutual funds. The performance return attribution results are useful to the portfolio manager as well other stakeholders in the asset management process. Performance attribution also provides individual investors with information necessary to guide their financial planning.*

Keywords: *Attribution, BHB, interaction, asset allocation, stock selection.*

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INTRODUCTION

Mutual funds have been subjected to extensive and exhaustive studies. Globally mutual fund researches have focused on wide spectrum of studies from the performance of mutual funds which includes persistency in the performance of across time, stock picking and market timing to relation between fund size and performance, fund manager ability and mutual fund performance. Most of the researches have been on the performance of individual and group of mutual funds with respect to their benchmark, peer mutual funds. Risk adjusted performance measures like Sharpe (1966), Treynor (1995), Jensen (1968), and Fama (1972) concluded that Mutual fund returns do not fare better than chance irrespective of whether the returns are considered gross or net. However, Ippolito (1989), Brow and Goetzmann (1995), Malkiel (1995), Gruber (1996) and Cahart (1997) confirm Jensen`s conclusion that mutual fund managers do not possess any superior investment skill.

Other researches focused on holding based measures to predict market timing ability. Studies by Daniel et al. (1997), Grinblatt and Titman (1989, 1993), Wermers (1999, 2000), Chen, Jegadeesh and Wermers (2000), Jiang et al.(2007) found evidence that fund managers have superior market timing ability. Kacperczyk (2011) studied the market timing with respect to different economical states and studied the different value adding features in their different states.

Most recent studies includes Cremers and Petajisto (2009) introduced a new method called the Active Share. The active Share describes the share of portfolio holdings that differ from the portfolio`s benchmark index. Their results showed that funds with highest active share significantly outperform their benchmark both before and after expenses. Also they found that tracking error volatility do not predict higher returns. Ferreira, et al.(2011), examines the performance across many countries including India. It is the only study so far which has included India in the study. They analyzed the performance of equity mutual funds with respect to fund characteristics and country characteristics around the world. The study revealed that open ended actively managed equity funds around the world underperform the market.

Empirical researches have been conducted between fund size and performance of mutual funds. Berk and Green (2004), study showed a negative correlation between fund size and performance of mutual funds and was due to the relative in elasticity of the skill of active

managers. Chen et al. (2004), found that smaller funds tend to outperform larger funds due to diseconomy of scale. This assumption is verified both before and after fees and is more evident on funds invested in small and illiquid stocks. On the other hand large mutual fund have cost advantages over small funds, given more favorable spreads given market positions and trading volumes.

PERFORMANCE ATTRIBUTION

The mutual fund performance measurement is an important integral part of the investment decision process. The process of adding value through benchmarking, asset allocation, security analysis, portfolio construction and executing transactions is collectively described as the Investment decision process. The mutual fund performance measurement is very important for different stakeholders like investors, asset managers, custodians, independent performance measurers. Portfolio performance measurement is the quality control of the investment decision process and provides the necessary information to investors and asset managers to assess how exactly the money has been invested. Portfolio measurement and evaluation tool is used to analyze the abilities of the fund managers. The fund manager's performance is evaluated on the basis of the difference between the portfolio returns and their respective benchmark. The difference between the two is called the active return. The focus is on the size of the excess return not on how the excess return is achieved. This source of excess return is broken down using performance attribution. The sources of active return may be through asset allocation or security selection. This also includes the interaction which captures the value added to portfolio that is not attributable due to asset allocation and security selection decision. According to Carl Bacon (2002), Performance is a technique used to quantify the excess return of a portfolio against its benchmark in to the active decision process of the portfolio manager. To effectively use the attribution analysis as a tool, it is necessary to have a good qualitative and quantitative understanding of the portfolio (Bacon 2008)

There are many methods and models of equity attribution used by various stakeholders. The main two types of attribution techniques are arithmetic models and geometric models. These two types of techniques can be used for single period analysis and multi period analysis. The main feature of arithmetic models is that they define the excess return as the arithmetic difference between the portfolio return and the benchmark return. It is simple

and intuitive in nature. It works best in single period attribution. Geometric technique explains the excess return using a geometric approach. Geometric method has the merit of theoretical and mathematical soundness (Bacon, 2002). A number of geometric excess return attribution models (geometric methods) have been developed over the years (Allen, 1991; Bain, 1996, Burnie et al., 1998; Bacon, 2002). The process of linking the single period attribution effect into multi period attribution is called linking. In arithmetic models the sum of single period effects will not add up to the excess return generated for the entire period. The excess return cannot be explained by the different attribution effects. Residuals effects occur and increases with the increase in the single period attribution in the chain. In geometric linking the excess returns linked for several periods, will not have residuals. Geometric models are not intuitive as arithmetic models. In multi period analysis smoothing is needed and there are many smoothing techniques known as smoothing algorithms have been developed by Carino (1999), Menchero (2000), GARP method (1997), Frongello (2002), Davies and Laker (2001).

Many of the attribution models are based on arithmetic technique. The foundation of performance attribution analysis is in model called the **Brinson Model**. The Brinson Model is based on the articles of Brinson et al.(1986) and Brinson and Fachler (1985). Both the articles are based on the assumption that the total portfolio returns and benchmark returns can be disaggregated as follows:

$$Portfolio\ return \quad r = \sum_{i=1}^{i=n} w_i \times r_i$$

where w_i = weight of the portfolio in the ith asset class (note $\sum_{i=1}^{i=n} w_i = 1$)

r_i = return of the portfolio assets in the ith asset class:

$$Benchmark\ return \quad b = \sum_{i=1}^{i=n} W_i \times b_i$$

where W_i = weight of the benchmark in the ith asset class (note also $\sum_{i=1}^{i=n} w_i = 1$)

b_i = return of the benchmark in the ith asset class.

The focus of the single period attribution is to quantify portfolio managers active decisions that contribute to the difference between the portfolio return **r** and the benchmark return **b.**

Brinson, Hood and Beebover Model

Brinson, Hood and Beebover suggested a model which breaks the excess return which adds value through both asset allocation, security selection and interaction. In asset allocation the portfolio manager will try to add value by overweighting good performing assets or underweighting poor performing asset class in the portfolio in comparison with the benchmark. In security selection the portfolio manager will try add value by selecting individual securities within the asset classes. Interaction measures the combined impact of asset allocation and security selection effects. Table 1 shows the framework to analyze the portfolio returns.

Table 1. Brinson *et al.* framework to analyze portfolio returns. (Source: Brinson *et al., 1986*)

Timing	Selection: Actual	Selection: Passive
Actual	(IV) Actual Portfolio Return	(II) Policy and Timing Return
Passive	(III) Policy and Security Selection Return	(I) Policy Return (Passive Portfolio Benchmark)

Active Returns Due to:	
Timing	II - I
Selection	III - I
Other	IV - III - II + I
Total	IV - I

Table 3. *Brinson, Hood and Beebover attribution Model.* (Source: Brinson *et al., 1986*)

Selection $W_i \times (r_i - b_i)$	Interaction $(w_i - W_i) \times (r_i - b_i)$
Benchmark contribution $(W_i \times b_i)$	Allocation $(w_i - W_i) \times b_i$

where W_i = weight of the benchmark in the ith asset class (note also $\sum_{i=1}^{i=n} w_i = 1$)

b_i = return of the benchmark in the ith asset class.

w_i = weight of the portfolio in the ith asset class (note $\sum_{i=1}^{i=n} w_i = 1$)

r_i = return of the portfolio assets in the ith asset class:

The main aim of the model is to differentiate the effects of investment policy and investment strategy. Brinson *et al.*(1986) in study tested their framework with 91 pension funds from 1974-1983. The result of the study revealed that active management is important but the most part of the excess return is derived from investment policy.

Brinson and Fachler Model

In the Brinson *et al.(1986)* model the overweight positions in positive markets will generate positive attribution factors irrespective of the overall benchmark return while overweight positions in negative markets will generate negative attribution factors. There is a positive effect if the asset allocation is overweight in a negative market that has outperformed the benchmark.

Brinson and Fachler (1985) solve this problem by modifying the asset allocation factor to compare returns against the overall benchmark as follows:

$$A_i = (w_i - W_i) \times (b_i - b)$$

where A_i = the new asset allocation factor

w_i = weight of the portfolio in the ith asset class (note $\sum_{i=1}^{i=n} w_i = 1$)

W_i = weight of the benchmark in the ith asset class (note also $\sum_{i=1}^{i=n} w_i = 1$

b_i = return of the benchmark in the ith asset class.

b = return of the portfolio

There are three main types of attribution according to Bacon (2002).

Returns based attribution: It explains the total return difference between a portfolio and a benchmark in terms of the relative weightings among categories and the asset allocation within a category.

Holdings-based attribution*:* Attribution is calculated on a periodic basis and uses holdings data. It focuses on the portfolio beginning period holdings to extract the attribution effects.

A portfolio sub period is treated as a buy and hold basis and attribution effect is calculated on single period equations of the Brinson model. These attribution effects are then linked to multi period linking algorithm. This approach assumes that all transactions occur at the end of the day at the closing price.

Transaction-based attribution: This type of attribution focuses on the transactions like buy/sale, dividend, corporate actions, cash flows etc., It is difficult to implement and requires accurate and complete data.

The determinants of performance or performance attributes per se may present distorted picture (Ankrim 1992, Binay 2005) and the risk distortion could amount to 160 to 240 basis points in a year (Ankrim 1992) so it is usually advised that a simple risk adjustment procedure should be adopted by the manager while choosing the portfolios in which risk level varies with respect to their benchmarks so that it can compensate for the distortion of attributes. Brinson et al., in their follow up article suggested that systematic risk measures such as beta or duration could be used in conjunction with their standard model. This is only appropriate if the portfolio manager is using systematic risk in the investment decision process (Bacon 2002). According to Karnosky – Singer, the portfolio`s total value added in practice fails to completely attribute the residuals. Residuals arise when single period analysis is linked to multi period analysis.

CONCLUSION

Performance attribution analysis decomposes the fund manager's return versus the benchmark into pieces to explain the impact of decisions of an investment manager which helps the sponsor distinguish between luck and skill. Attribution is also one of the investment manager's tools for understanding and communicating the performance to investors and consultants. Attribution analysis has found application for self evaluation of wealth managers, portfolio management services, managed accounts and funds of funds. Performance attribution also provides individual investors with information necessary to guide their financial planning.

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