Mutual Fund Performance

When measured before expenses passive investors who simply hold the market portfolio must earn zero abnormal returns. This means that active investors as a group must also earn zero abnormal returns before expenses and negative abnormal returns after expenses. Since active trading incurs more costs than passive investment, active investors as a whole must earn lower returns after expenses than passive investors. However, this does not mean that *all* active investors fare poorly. For example certain groups of professional investors may be able to earn superior returns on a consistent basis. Since data on mutual funds are readily available, most studies of professional investors have focused on their performance. Before looking at what they found, we first look at the principal methods for measuring performance.

Single Index Measures of Performance

Early studies of mutual fund performance used a single-index model as a benchmark. There are three common single-index models:

The Sharpe Measure [1] If investors can borrow and lend risklessly, the optimum portfolio is the one that offers the highest return in excess of the risk-free rate as a proportion of the standard deviation. Thus the Sharpe measure is defined as $(r_p - r_f)/\sigma_p$, where r_p is the average portfolio return over the measurement period, r_f is the risk-free rate and σ_p is the standard deviation of the portfolio returns. A mutual fund is a superior investment to the market portfolio if it offers a higher Sharpe ratio.

Jensen's Measure [2] The Sharpe ratio focuses on total portfolio risk. A fund with the highest Sharpe ratio is the optimal holding if it constitutes the entire set of risky assets for an investor. A fund with a higher Sharpe ratio than the market earns a sufficiently high return to offset the cost of being less than fully diversified. A somewhat separate question is to ask whether a portfolio manager is able to pick stocks that provide a superior return. The portfolio in this case should form *part* of an optimal set of assets even though it may not be an optimal holding on its own.

Assume that expected returns are given by the capital asset pricing model. Then, the excess return on the portfolio is measured as $r_p - [r_f + \beta_p(r_m - r_f)]$, where β_p is the beta of the portfolio and r_m is the average return on the market. This excess return is often known as *Jensen's alpha* (or, more simply, *alpha*). The portfolio's alpha (α_p) is estimated from past returns by the following regression:

$$r_p - r_f = \alpha_p + \beta_p(r_m - r_f)$$

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[1] W.Sharpe, "Mutual Fund Performance," *Journal of Business* 39 (1966), pp. 119-138.

[2] M.C. Jensen, "The Performance of Mutual funds in the Period 1945-1964," *Journal of Finance* 23 (1968), pp. 389-416.

Treynor's Measure [3] The third, less commonly used, measure also focuses on the ability of the fund manager to pick stocks. It is measured either as the ratio $(r_p - r_f)/\beta_p$ or as an excess return, α_p/β_p.[4] The Treynor measure recognizes that a fund manager who can offer the same excess return (alpha) with a lower beta provides a higher ratio of reward to risk. If an investor in the fund borrows or lends so that his portfolio has a beta of 1.0, then α_p/β_p is the extra return that he would receive over and above the return on the market portfolio. The difference between the Jensen and Treynor measures is shown graphically below.

Multi-Factor Measures of Performance

Fama-French 3-factor model

Chapter 8 showed that stock returns are influenced by a strong size factor. Small-cap stocks not only behave differently from large-cap stocks, but over the long-run have provided higher returns. We would not judge a manager to have exhibited superior selection skills just because his remit was to invest in better-performing, small-cap stocks. Therefore, when measuring fund performance, it makes sense to control for common factors in stock returns.

One approach is to use the Fama-French 3-factor model which controls for the market factor, a size factor, and a value factor. In this case the performance benchmark is

$$r_f + \beta_p(r_m - r_f) + \beta_{SMB}(r_{SMB}) + \beta_{vHML}(r_{HML})$$

where

r_{SMB} is the difference between the returns on small-and large-cap stocks (the size factor)

r_{HML} is the difference between the returns on stocks with high book-to-market ratios and those with low ratios (the value factor)

β_{SMB} and β_{vHML} measure the sensitivity of portfolio returns to the size and value factors

Portfolio performance (alpha) is then measured as the difference between the average fund return and the benchmark return:

$$\alpha_p = r_p - [r_f + \beta_p(r_m - r_f) + \beta_{SMB}(r_{SMB}) + \beta_{HML}(r_{HML})]$$

Carhart Model

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[3] J. Treynor, "How to Rate Management of Investment Funds," *Harvard Business Review* 43 (1965), pp. 63-75.

[4] The difference between the Treynor ratio for the fund and the market is $(r_p - r_f)/\beta_p - (r_m - r_f)/\beta_m$. Since the beta of the market is 1.0, we can rearrange this expression to give $((r_p - r_f) - \beta_p(r_m - r_f))/\beta_p = \alpha_p/\beta_p$.

There is evidence that stocks are also influenced by a momentum factor. Stocks that have performed well over the past year behave differently from those that have performed poorly, and in the past have provided higher returns. Therefore, in a study of fund performance Mark Carhart extended the 3-factor model to include a momentum factor, r_{MOM}. The Carhart performance measure is

$$\alpha_p = r_p - [r_f + \beta_p(r_m - r_f) + \beta_{SMB}(r_{SMB}) + \beta_{HML}(r_{HML}) + \beta_{MOM}(r_{MOM})]$$

Other factor models

Other studies have introduced other factors such as the return on bonds or on overseas stocks in regressions that otherwise look similar to the Fama-French and Carhart regressions.

Empirical Evidence

The following table summarizes the evidence on the average performance of U.S. mutual funds. The studies differ in terms of sample, benchmark used, and estimation method. However, there is considerable unanimity that after expenses the funds on average have offered slightly inferior performance.

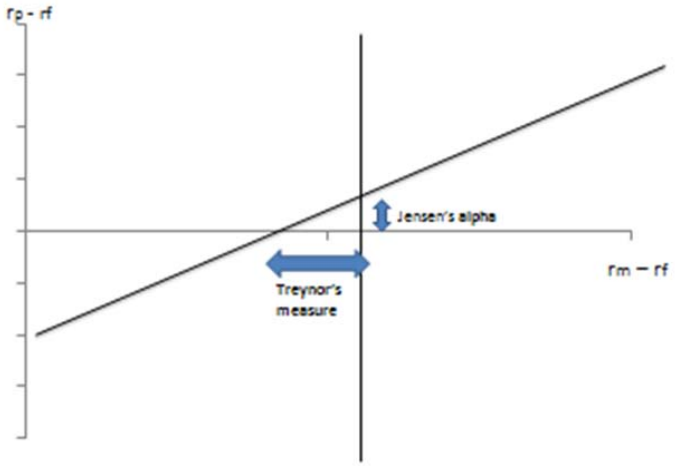
Mutual Fund Performance (post expenses)		
Author(s)	**Methodology**	**Average excess return annualized**
Sharpe (1966)	Sharpe ratio	Negative
Jensen (1968)	Single-index model (CAPM)	-1.1%
Lehman & Modest (1987)	CAPM & multi-factor models	Negative
Elton, Gruber, Das, & Hlavka (1993)	Multi-factor model	-1.59%
Malkiel (1995)	Single-index model (CAPM)	-.24%
Gruber (1996)	CAPM & multi-factor factor models	-.65%
Elton, Gruber, & Blake (1996)	Multi-factor model	-.91%
Ferson & Schadt (1996)	Single-index model (CAPM)	-.37 to +.26%
Carhart (1997)	4-factor model	-1.98%
Pastor & Stambaugh (2002)	Multi-factor model	-.86 to -1.25%
Elton, Gruber, & Blake (2003)	Multi-factor model	-.91%
Kosowski, Timmerman, Werners, & White	Carhart 4-factor model	-.5%
Fama & French (2010)	Fama-French 3-factor & Carhart 4-factor models	-.81 to -1.00%
Elton, Gruber, & Blake (2011)	Fama-French 3-factor & Carhart 4-factor models	Negative

Adapted from Elton & Gruber (2012)		

Of course, this does not mean that there are no superior managers. One could for example point to the occasional manager who has turned in 10 years or more of successive superior returns. Surely that cannot be coincidence. It is true that for any one manager the probability of beating the market for 10 years in succession simply by luck is less than .1%. But the probability that you will find at least one in 8,000 funds that just by luck has had 10 successive years of superior performance is over 99.9%. The question that we need to ask is whether there is a greater spread in fund returns than one would expect simply from good and bad luck. In other words, we need to measure the spread of true alphas that abstracts from the fact that every fund will have lucky and unlucky periods.

A number of papers have looked at this question. For example, the 2010 paper by Gene Fama and Ken French studied the performance of a large sample of active stock funds between 1984 and 2006 and compared the spread in actual abnormal returns with simulations of the spread of α's if there was no abnormal performance in fund returns. They concluded that when returns are measured before expenses, there is evidence of manager skill, negative as well as positive. The true three-factor or four-factor α was symmetric about zero with a cross-section standard deviation of about 1.25% per year (about ten basis points per month). This implies that about 16% of funds have a true α greater than 1.25% per year and about 2.3% have α greater than 2.50% per year before expenses. The problem for the investor is to identify these funds ahead of time.

The sloping line shows the relationship between the reward for risk on a hypothetical portfolio and the market. The slope of the line (beta) is .5. Jensen's alpha measures the vertical distance from the intercept to the line. Treynor's measure is the horizontal distance.



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