Project proposal

Evaluating performance and strategy of mutual funds

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April 5, 2002

1 Introduction

Mutual funds have become one of the largest financial intermediaries in the leading world economies, currently controlling about 7 trillion dollars in assets in the US and over 3 trillion Euros in assets in Europe. In Russia, the mutual fund industry is relatively underdeveloped but has a huge potential for growth. One of the crucial factors ensuring efficient functioning of mutual funds is proper evaluation of their performance. This is important for investors who would like to make sure that their funds follow desirable strategies and earn positive risk-adjusted returns.

In general, there are two types of performance measures: *absolute* (based only on the performance record of a given fund) and *relative* (constructed with respect to some endogenous or exogenous benchmark). Absolute performance measures may be *raw*, such as fund total return, or *risk-adjusted*, such as the Sharpe ratio or Jensen's alpha. Relative performance measures can be *cardinal* (e.g., fund return adjusted by the category benchmark) or *ordinal* (e.g., fund performance rank within a given category).

Obviously, the use of a raw performance measure such as fund total return may be inappropriate, since it neglects the riskiness of fund investments. The most popular risk-adjusted measure in the literature is Jensen's alpha based on a factor model, e.g., a four-factor model of Carhart (1997):

$$R_{i,t} - R_t^f = \alpha + \beta_i^1 (R_t^m - R_t^f) + \beta_i^2 SMB_t + \beta_i^3 HML_t + \beta_i^4 MOM_t + \varepsilon_{i,t}, \qquad (1)$$

where $R_{i,t}$ is fund i's return, R_t^f is a risk-free rate, and $(R_{t-j}^m - R_{t-j}^f, SMB_{t-j}, HML_{t-j}, MOM_{t-j})$ represent the market, size, book-to-market, and one-year momentum factors in period t, respectively. Note that such a model allows us to estimate not only the risk-adjusted return of a given fund, but also its factor betas defining the fund's investment strategy or style.

The findings based on factor models suggest that mutual funds on average underperform the benchmark indices. For example, Gruber (1996) finds using a four-factor model that funds underperform by 65 basis points per year. Since the average expense ratio in his sample is about 113 basis points per year, this implies that mutual funds earn positive risk-adjusted returns, but charge the investors more than the value added. Many studies find evidence of persistence in mutual fund performance. In particular, Brown and Goetzmann (1995) find persistence in risk-adjusted returns based on one- and three-factor models, which is mostly due to funds with bad performance. However, Carhart (1997) demonstrates that most of performance persistence found in the previous studies can be attributed to the one-year momentum effect. The only significant persistence not explained by this factor is consistent underperformance by the worst-performing funds.

The evaluation of mutual fund performance and strategies remains a subject of many recent studies that extend the standard analysis based on factor models such as (1). Some of these extensions that can provide a starting point for our project are discussed below.

2 Bayesian approach to performance evaluation

Most of the existing studies find that mutual funds on average do not outperform their benchmarks. However, the exact magnitude of this underperformance is hard to determine, since it is very sensitive to the choice of the pricing model, time span, etc. Nevertheless, even small differences in the estimated performance may have large consequences for investors. Therefore, a Bayesian method of performance evaluation may be more suitable from investor's viewpoint. It combines prior investors' beliefs about the accuracy of the pricing model and managerial skill with the information in the data and produces posterior distribution of fund alphas. In that sense, the conclusions based on Bayesian approach may be more informative for investors than those based on the traditional statistical methods. Specifically, Baks et al. (2001) show that even some extremely skeptical priors about fund performance lead to significant allocations to active mutual funds.

Bayesian approach is especially convenient for incorporating the information about assets with long history into the performance evaluation of funds with short return history. This is

an important issue, since a median age of US diversified equity funds is about 4 years, as of January 2002. For the young funds, it might not be optimal to use only information on fund and factor returns over the life of the fund. Pastor and Stambaugh (2002) use long-horizon factor returns to provide more precise estimates of the moments of correlated short-horizon fund returns. Specifically, they combine short-horizon estimates of factor betas with long-horizon estimates of factor premiums.[1] They find that their estimates of performance measures are more precise than the usual estimates and that there are substantial differences between the two.

3 Conditional performance evaluation

Traditional models use unconditional expected returns and are based on an assumption that factor loadings are constant. However, if expected returns and risks vary over time, such an unconditional approach may give biased results. Ferson and Schadt (1996) measure performance in a way consistent with the semi-strong form of market efficiency. In their one- and multi-factor models, factor betas are conditioned on the lagged public information variables such as the short-term interest rate, dividend yield, term spread and default spread. The derived conditional Jensen's alphas represent the average difference between fund's return and return to the dynamic strategies based on public information. They find that the distribution of the conditional Jensen's alphas of mutual funds is consistent with their neutral performance. This evidence is in contrast with the previous findings of average negative performance by mutual funds based on unconditional models.

An important extension of a standard model is used to measure the timing ability of mutual fund managers, i.e., the ability to increase (decrease) a fund's exposure to the market prior to its advances (declines). In the extended model, market beta is a linear function of the market return:

$$R_{i,t} - R_t^f = \alpha + \beta_{i,t}^1 (R_t^m - R_t^f) + \beta_i^2 SMB_t + \beta_i^3 HML_t + \beta_i^4 MOM_t + \varepsilon_{i,t}, \tag{2}$$

$$\text{where } \beta_{i,t}^1 = \beta_i^1 + \gamma R_t^m. \tag{3}$$

In this model, γ represents a Treynor-Mazuy type measure, which is positive for a manager who successfully times the market. Note, however, that the model (2) can produce spurious results if funds hold stocks with payoffs that are more or less option-like than the market proxy. Therefore,

[1]Note, however, that this approach relies on an assumption that factor betas stay constant over time.

Bollen and Busse (2001) compare funds' γ's to those of the synthetic portfolios constructed to match the actual funds' characteristics. Using daily data, they find evidence suggesting that about one third of funds have significantly negative timing ability and one third of funds have significantly positive timing ability. In a related study, Busse (1999) examines the conditional market volatility timing of mutual funds. He finds that funds reduce systematic risk when conditional market volatility is high, which leads to higher risk-adjusted returns.

4 Measuring dynamic strategies

A closely related literature examines the dynamic strategies of mutual fund managers. There, the focus is on the strategic changes of the factor loadings in response to the fund-specific characteristics such as its past performance. A number of studies examine the so-called tournament hypothesis, which states that funds performing badly during the first part of the year have an incentive to increase risk in the second part of the year in order to try to catch up with mid-year winners at the end of the year. Among others, Brown, Harlow, and Starks (1996) find evidence supporting the tournament hypothesis using a contingency table methodology applied to monthly data. However, Busse (2001) finds no such evidence using the contingency table methodology applied to daily data. He explains this divergence in the results by the presence of the auto- and cross-correlation in fund returns, which was not accounted for in the standard statistical tests used in the previous studies.

Several studies examine changes in fund styles measured as factor loadings from a multi-factor model. Chan, Chen, and Lakonishok (1999) find that fund styles tend to cluster around a broad market benchmark. When deviating, funds are more likely to favor growth stocks with good recent performance. There is some consistency in styles, although funds with poor past performance are more likely to change styles. Lynch and Musto (2000) investigate whether mutual funds change the strategy after the period of bad performance. Indeed, they find that the changes are larger for the funds in the bottom performance quartile than for the other funds. The change in strategy as well as managerial replacement among the poor performers seem to lead to the performance improvement.

Another strand of the literature tries to classify funds into categories on the basis of their observed investment behavior. This is important for investors who would like to know the strategy chosen by their funds and identify a relevant peer group for performance comparison. Brown and Goetzmann (1997) classify the US equity funds into 8 "actual" investment styles according to the algorithm based on funds' returns. In addition, they estimate the correlation

between the style returns and the previous period returns of the S&P 500, T-bills, and foreign equity indices. Some styles are found to exhibit positive correlation ("trend-chasing"), while the others indicate negative correlation (a "contrarian" approach). Teo and Woo (2001) examine persistence in fund performance relative to their peers in the Morningstar style categories. They argue that most funds with good returns are clustered into certain well-performing styles and that a large year-to-year variation in style returns may preclude finding persistence. Indeed, they find a strong evidence of persistence in style-adjusted performance measures based on several models including a four-factor model of Carhart (1997).

5 Proposed project topics

The goal of this project is to provide better insight into the evaluation of mutual fund performance and strategies. The empirical analysis can be applied both to the US and Russian mutual funds. The student theses may have the following titles: "Bayesian approach to estimating performance of mutual funds with short return history", "Conditional performance evaluation of mutual funds", "Examining timing ability of mutual funds", "Strategic changes in mutual fund styles", "Lead-lag structure of persistence in mutual fund performance"

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