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Time-varying skills (versus luck) in U.S. active mutual funds and hedge funds

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ABSTRACT

In this paper, we develop a nonparametric methodology for estimating and testing time-varying fund alphas and betas as well as their long-run counterparts (i.e., their time-series averages). Traditional linear factor model arises as a special case without time variation in coefficients. Monte Carlo simulation evidence suggests that our methodology performs well in finite samples. Applying our methodology to U.S. mutual funds and hedge funds, we find most fund alphas decrease with time. Combining our methodology with the bootstrap method which controls for 'luck', positive long-run alphas of mutual funds but hedge funds disappear, while negative long-run alphas of both mutual and hedge funds remain. We further check the robustness of our results by altering benchmarks, fund skill indicators and samples.

1. Introduction

The Efficient Market Hypothesis (EMH) implies that funds should not have skills to persistently beat the market, which raises two classical questions regarding fund performance evaluation: (i) Do (a group of, or on average) funds have skills or not? (ii) If they have skills, are these skills persistent? Taking fund alphas as the fund skill indicator, the traditional linear factor models have been widely employed in the literature.[1] Unfortunately, the inherent assumption of constant alphas and factor loadings (betas), does not empirically holds at either the asset or portfolio level (see Ang and Kristensen (2012) and the references therein), and hence may distort the validity of the standard factor models with misleading inferences.

We suggest these two questions can, however, be answered simultaneously if the alphas (and betas) are viewed as time-varying coefficients at every time point, instead of period-specific constants. To this end, we propose a nonparametric methodology to estimate and test time-varying fund alphas and betas, which imposes no parametric assumptions on the time variation of alphas and betas.[2] Specifically, we first present an estimator for the time-varying fund alphas and betas, and then construct a Generalized Likelihood Ratio (GLR) statistic to test whether the estimated alphas are indeed time-varying or not. To evaluate the overall performance of funds, we also construct their long-run counterparts: the time-series averages of time-varying fund alphas and betas. To illustrate

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[1] Following the main literature, we use the net alphas (i.e., fund alpha net of all management expenses and 12b-fees) as fund skill indicator. Our main perspective is therefore in line with many other studies that are primarily concerned with the abnormal return that fund investors can earn by investing in mutual funds, see e.g., Fama and French (2010).

[2] The nonparametric method has been previously used in this area either via bootstrap methods (e.g., Kosowski et al. (2007) and Blake et al. (2014)), or to help construct approaches to detect false discoveries (e.g., Barras et al. (2010), Bajgrowicz and Scaillet (2012) and Bajgrowicz et al. (2015)).

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the flexibility of our methodology, we combine our methodology with the bootstrap approach to design three new fund bootstrap schemes to control for 'luck'. Thus, we are able to distinguish whether the superior fund performance is due to luck or to skill.

Our approach has several advantages. First, we have proposed a formal statistical approach to identify time-varying alphas and betas for an individual fund from a general perspective, which constitutes a methodological novelty and a unique contribution to fund performance evaluation. The time-series averages of the obtained time-varying alphas are a more accurate indicator of fund skills than OLS alphas, which can be further cross-sectionally refined using any approach applying to the OLS alphas.

Second, due to the nonparametric nature of our estimates, we do not need to assume any *ex ante* linear or nonlinear relationship between the fund returns and the factors. Instead, our methodology adopts a 'let-data-speak' approach to reveal the relationship between the fund returns and the factors, which means that our methodology does not only gauge the magnitude of alpha for an individual fund at each time point, but also uncover the plausible source of the alpha: stock-picking or market-timing (see, e.g., Kacperczyk et al. (2014)). The former is often represented by the unexplained alpha in a linear model of market-related factors, while the latter is captured by including an additional squared market returns (Treynor and Mazuy, 1966; Jiang et al., 2007; Chen et al., 2010; Blake et al., 2013).

Third, our estimates only require a series of kernel-weighted least squares regressions. If the genuine alphas and betas are indeed time-invariant rather than time-varying, our methodology degenerates to its special case: the standard linear factor models.

Fourth, we extend the traditional bootstrap methods for fund performance evaluation (e.g., Kosowski et al. (2006) and Fama and French (2010)) by capturing the time variations. Kosowski et al. (2006) and Fama and French (2010) distinguish alphas from luck and skills by comparing the estimates from bootstrap simulations of the cross-section of funds with zero alphas to the actual cross-section of fund alphas. The idea is that the returns of the funds in a simulation run have the properties of actual fund returns, except they set true alpha to zero in the return population from which simulation samples are drawn. The simulations thus describe the distribution of alpha estimates when there is no abnormal performance in fund returns. Comparing the distribution of alpha estimates from the simulations to the cross-section of alpha estimates for actual fund returns allows them to draw inferences about the existence of skilled managers. However, as noted in the literature (Fama and French, 2010, page 1925), one major caveat of this method is that *'Because we randomly sample months, we also lose any effects of variation through time in the regression slopes in* (1)*. (The issues posed by time-varying slopes are discussed by* Ferson and Schadt (1996)*.) Capturing time variation in the regression slopes poses thorny problems, and we leave this potentially important issue for future research'*. Adapted from Kosowski et al. (2006) and Fama and French (2010), we compare estimates of long-run alphas from bootstrap simulations of the cross-section of funds with zero alphas across time periods to the actual cross-section of fund long-run alphas. Our method thus provides a remedy for the drawback of the existing literature.

Even in simulated funds with only 200 time-series observations, our methodology performs well in different cases, including (i) constant α and constant β; (ii) constant α but time-varying β, (iii) time-varying α but constant β, and (iv) time-varying α and time-varying β.

Applying our methodology to the legendary Fidelity Magellan fund, we find a positive and significant long-run alpha using the time-varying Fama–French–Carhart 4-factor model. Furthermore, the alpha is time-varying and decreases from positive before the 1980s to insignificant and further to negative in the 2000s. We conclude that though it was once a star fund, it definitely is not any longer.

Applying our methodology to the whole mutual and hedge funds industry, we find that most net fund alphas are time-varying and in general, with a decreasing trend. Only 1% (19%) of mutual (hedge) funds have positive and significant long-run net alphas, while 9% (9%) have negative and significant long-run net alphas. Combining our methodology with the bootstrap approach to control for 'luck', positive long-run alphas of mutual funds but hedge funds disappear, while negative long-run alphas of both funds remain.[3]

Our results are robust in altering the number of factors in our benchmark fund performance evaluation model, adding back fees and expenses to fund returns, as well as sub-sample analysis. They are not robust when using the value-added measure from Berk and Van Binsbergen (2015) instead of fund alphas, or using the Vanguard index fund as the passive benchmark portfolio alternative to the traditional Fama–French factors.[4] This is not surprising as this is also the case in existing performance evaluation studies (e.g., Kosowski et al. (2006), Barras et al. (2010), Fama and French (2010) and Berk and Van Binsbergen (2015)).

Our idea of time-varying alphas can be traced back to the earlier conditional beta model (e.g., Ferson and Schadt (1996)) and the conditional alpha and beta model (e.g., Christopherson et al. (1998)), which add a factor conditional on the state of the economy to the original unconditional model of Jensen (1968).[5] Perhaps due to its simplicity, this setup has been used with few doubts (for recent examples, see, Fung et al. (2008), Ferson and Lin (2014) and Kacperczyk et al. (2014)). Using kernel-based method, our methodology uses all the data in an efficient way to estimate time-varying alphas and betas, and hence nests almost all extant conditional beta models and conditional alpha and beta models as special cases.

Our work complements (Mamaysky et al., 2008), which justifies the existence of time-varying alphas and betas for mutual funds. Unlike their Kalman filter approach, which is specifically developed for identifying the market-timing abilities, our methodology aims to identify the overall time-varying skills of funds. While their model hinges on the assumption that assets under management within a fund are reallocated on the basis of some unobserved factor (market-timing), we follow the mainstream literature and build up our model on the observable factors.

[3] We use "*fund alpha*" and "*alpha*" interchangeably in this paper. We focus on the fund skills in this paper, but our results hold when we limit our sample to the periods after the current portfolio manager taking control. Put differently, we focus on fund skills in general instead of specific manager skills.

[4] Benchmark means the next best investment opportunity available to investors rather than the fund at the same time. For fund performance evaluation, we must compare the fund performance with the performance of its benchmark (Berk and Van Binsbergen, 2015).

[5] Typically, this strand of literature assumes a different but constant beta (and/or an alpha) according to whether the returns of the market factor is below or above the risk-free rate.