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Scale and skill in active management ☆

Ľuboš Pástor [a,c,d], Robert F. Stambaugh [b,c], Lucian A. Taylor [b,*]

[a] University of Chicago, 5807 S. Woodlawn Ave., Chicago, IL 60637, USA
[b] University of Pennsylvania, 3620 Locust Walk, Philadelphia, PA 19104, USA
[c] NBER, USA
[d] CEPR, United Kingdom

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ABSTRACT

We empirically analyze the nature of returns to scale in active mutual fund management. We find strong evidence of decreasing returns at the industry level. As the size of the active mutual fund industry increases, a fund's ability to outperform passive benchmarks declines. At the fund level, all methods considered indicate decreasing returns, though estimates that avoid econometric biases are insignificant. We also find that the active management industry has become more skilled over time. This upward trend in skill coincides with industry growth, which precludes the skill improvement from boosting fund performance. Finally, we find that performance deteriorates over a typical fund's lifetime. This result can also be explained by industry-level decreasing returns to scale.

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* Corresponding author.
E-mail address: luket@wharton.upenn.edu (L.A. Taylor).

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1. Introduction

The performance of active mutual funds has been of long-standing interest to financial economists.[1] The extent to which an active fund can outperform its passive benchmark depends not only on the fund's raw skill in identifying investment opportunities but also on various constraints faced by the fund. One constraint discussed prominently in recent literature is decreasing returns to scale. If scale impacts performance, skill and scale interact. For example, a more skilled large fund can underperform a less skilled small fund. Therefore, to learn about skill, we must understand the effects of scale.

What is the nature of returns to scale in active management? The literature has advanced two hypotheses. The first one is fund-level decreasing returns to scale: as the size of an active fund increases, the fund's ability to outperform its benchmark declines (e.g., Perold and Salomon, 1991; Berk and Green, 2004). The second hypothesis is industry-level decreasing returns to scale: as the size of the active mutual fund industry increases, the ability of any given fund to outperform declines (Pástor and Stambaugh, 2012). Both hypotheses have been motivated by liquidity constraints. At the fund level, a larger fund's trades have a larger impact on asset prices, eroding the fund's performance. At the industry level, as more money chases opportunities to outperform, prices move, making such opportunities more elusive. Consistent with such liquidity constraints, evidence is mounting that trading by mutual funds is capable of exerting meaningful price pressure in equity markets.[2]

Both hypotheses are plausible alternatives to a null hypothesis of constant returns to scale, due to imperfect liquidity of financial markets. Moreover, these alternative hypotheses are not mutually exclusive. A fund's performance could depend on both the size of the fund and the size of the fund's competition, as proxied by industry size. If funds were to follow exactly the same investment strategy, their performance would likely depend more on their combined size than on their individual sizes, whereas the opposite would be true if the funds' strategies were completely unrelated. The reality is between the two extremes, and the relative merits of the two hypotheses must be evaluated empirically. The fund-level hypothesis has been tested in a number of recent studies, with mixed results.[3] We provide the first evidence regarding the industry-level hypothesis, to our knowledge. We also reexamine the fund-level hypothesis by using cleaner data and econometric techniques that avoid inherent biases.

One of the challenges in estimating the effect of fund size on performance is the endogeneity of fund size. If size were randomly assigned to funds, one could simply run a panel regression of funds' benchmark-adjusted returns on lagged fund size, and the ordinary least squares (OLS) slope estimate would correctly measure the effect of size on performance. Alas, size is unlikely to be randomly paired with funds. For example, larger funds could be run by managers with higher skill (e.g., Berk and Green, 2004). Skill could be correlated with both size and performance, yet we cannot control for skill as it is unobservable. As a result, the simple OLS estimate of the size-performance relation is likely to suffer from an omitted-variable bias.

The omitted-variable bias can be eliminated by including fund fixed effects in the regression model. These fixed effects absorb the cross-sectional variation in performance that is due to differences in skill across funds. This fixed effect approach cleanly identifies the effect of fund size on performance in the setting of Berk and Green (2004), but it applies more generally as long as fund skill is time-invariant. Unfortunately, while adding fund fixed effects removes one bias, it introduces another. This second bias results from the positive contemporaneous correlation between changes in fund size and unexpected fund returns. In general, a nonzero correlation between a regressor's innovations and the regression disturbances introduces a finite-sample bias in OLS estimates (Stambaugh, 1999), and this bias extends to the fixed effects setting (Hjalmarsson, 2010).

To address the second bias, we develop a recursive demeaning procedure that closely builds on the methods of Moon and Phillips (2000) and Hjalmarsson (2010). This procedure runs a panel regression of forward-demeaned returns on forward-demeaned fund size, while instrumenting for the latter quantity by its backward-demeaned counterpart. The resulting estimator eliminates the bias, as proved by Hjalmarsson and confirmed in our simulation analysis. Our simulations also highlight the bias in both OLS estimators, with and without fund fixed effects. In addition to being biased, the OLS estimators heavily over-reject the null hypothesis of no returns to scale even when this hypothesis is true.

Our empirical analysis relies on a cross-validated dataset of actively managed US equity mutual funds. We reconcile the key data items in the Center for Research in Security Prices (CRSP) and Morningstar databases, building on the work of Berk and van Binsbergen (2014). Our dataset covers 3,126 funds from 1979 through 2011, a period during which the mutual fund industry grew dramatically.

We begin our analysis by using panel data to estimate the slope coefficient of fund performance regressed on lagged fund size. OLS regressions both with and without fund fixed effects deliver negative estimates that are statistically significant but relatively small in magnitude. Moreover, both estimates are likely to be biased, as noted earlier. To avoid the biases in OLS, we apply the recursive demeaning procedure. The estimates of fund-level returns to scale are again negative, but they become statistically

[1] See, for example, Jensen (1968), Ferson and Schadt (1996), Carhart (1997), Daniel, Grinblatt, Titman, and Wermers (1997), Wermers (2000), Pástor and Stambaugh (2002), Cohen, Coval, and Pástor (2005), Kacperczyk, Sialm, and Zheng (2005, 2008), Kosowski, Timmermann, Wermers, and White (2006), Barras, Scaillet, and Wermers (2010), Fama and French (2010), etc.

[2] For example, Edelen and Warner (2001) find that aggregate flow into equity mutual funds has an aggregate impact on market returns. Wermers (2003), Coval and Stafford (2007), Khan, Kogan, and Serafeim (2012), and Lou (2012) also find significant price impact associated with mutual fund trading. Edelen, Evans, and Kadlec (2007) report that trading costs are a major source of diseconomies of scale for mutual funds.

[3] See, for example, Chen, Hong, Huang, and Kubik (2004), Pollet and Wilson (2008), Yan (2008), Ferreira, Keswani, Miguel, and Ramos (2013a, 2013b), and Reuter and Zitzewitz (2013).