

# **What a Difference a Ph.D. Makes: More than Three Little Letters**

## **ABSTRACT**

Several hundred individuals who hold a Ph.D. in finance, economics, or a variety of others fields work for institutional money management companies. The gross performance of investment products managed by individuals with a Ph.D. (Ph.D. products) is superior to the performance of non-Ph.D. products matched by objective, size, and past performance for one-year returns, Sharpe Ratios, alphas, information ratios, and the manipulation-proof measure MPPM. Fees for Ph.D. products are lower than those for matched non-Ph.D. products. Investment flows to Ph.D. products substantially exceed the flows to the matched non-Ph.D. products. Ph.D.s' publications in leading finance and economics journals accentuate many of these differences.

In the context of money management, we evaluate whether a Ph.D. is a positive signal of managerial skill. The capability to identify money managers who will be successful is important in both academic and practical settings. We start from the premise that substantial effort and knowledge acquisition is necessary to complete the advanced coursework and unique research required to obtain a Ph.D. Thus, individuals holding these degrees will have unusual characteristics relative to the baseline population. We extend this logic to the production of papers published in leading economics and finance journals. Therefore, substantial academic publications in this arena could play an additional role beyond the simple possession of a Ph.D. degree. Of course, for individuals holding a Ph.D. to make a substantial difference in product performance, they must be placed in key roles within the management company.

It is possible that a Ph.D. program serves as a screening device for individuals with innate intelligence following Spence (1973). Alternatively, specialized human capital developed during a Ph.D. program might be particularly useful for various tasks related to money management as in Becker (1964, 1993). Nevertheless, it is also possible that these degrees are largely useless outside an academic environment. In spite of the latter possibility, hundreds of individuals holding this advanced degree are employed by institutional money management companies in our sample. Is this employment pattern driven by a random distribution of advanced degrees amongst money managers, or does it have an explanation rooted in some form of selection?

The possibility that education is linked to managerial talent in the context of money management has been explored by the existing literature. For instance,

Chevalier and Ellison (1999) finds that the educational characteristics of mutual fund managers are related to subsequent fund performance. In particular, fund managers graduating from undergraduate institutions with higher average SAT scores have higher returns. While part of this superior performance is explained by differences in the risk loadings and the level of fees, Chevalier and Ellison conclude that a significant fraction of the cross-sectional differences in performance is associated with the SAT scores even after controlling for other managerial characteristics such as age and educational attainment.

Chevalier and Ellison also investigate whether managers with an MBA outperform managers without it. While managers with an MBA do earn returns that are 63 basis points higher than other managers, this performance differential is explained by systematic risk. Rather than investigate the effect of masters degrees such as the MBA, we analyze whether the most advanced degree improves performance. Any potential benefits to a Ph.D. could stem from a variety of sources including innate ability, superior knowledge, and better soft skills.

We find that the gross performance of products managed by a Ph.D. (interchangeably called Ph.D. products) is better than the performance of non-Ph.D. products. In the context of this paper, a product is regarded to be managed by a Ph.D. if a key role in the firm is performed by a Ph.D. (Principal, CEO, Chief Investment Officer, Chief Investment Strategist, Senior Investment Officer, Partner, President, Portfolio Manager, Investment Manager, Chief Portfolio Manager, Senior Portfolio Manager, Lead Portfolio Manager, Advisor, Strategist, Chairman, Managing Director, and Director of

Research). To control for several product-specific differences, our analysis matches Ph.D. products to non-Ph.D. products by investment objective, product size, and previous performance, and then investigates subsequent performance differential according to several performance measures. We find statistically significant and economically meaningful differences according to objective- and size-adjusted annual returns (42.7 basis points per year), one-year monthly Sharpe ratios (0.847 percent), one-year monthly 4-factor alphas (3.31 basis points per month), one-year monthly information ratios (4.76 percent), and one-year monthly manipulation-free Goetzmann, Ingersoll, Spiegel, and Welch (2007) measure MPPM( $\rho = 3$ ) (0.516 percent).

It is conceivable that this superior performance in terms of gross returns could disappear (or even reverse) once fees are taken into account. To the contrary, if anything, Ph.D. products are associated with significantly lower fees compared to non-Ph.D. products. The economic magnitude of the difference in the baseline specification is approximately four basis points. Thus, the performance gap between Ph.D. products and non-Ph.D. products is preserved, and even ever so slightly enhanced, after fees (that is, in terms of net returns).

Perhaps nothing is more important from the perspective of an institutional money management company than the ability to attract money. After following the matching procedure using investment objective, product size, and past performance, it is quite remarkable that the average flow into Ph.D. products is 18.2 percent higher than the average flow into matched non-Ph.D. products (this differential is statistically significant at one-percent level). This gap is not uniformly distributed across quintiles of

past performance. It is as large as 40.4 percent for top-quintile performers, 18.6 percent for second highest performance quintile, 17 percent for the middle quintile, 10.3 percent for second lowest (all statistically significant at the 1% level), and only 4.3 percent (not statistically significant) for the bottom quintile. Because the work of Berk and Green (2004) indicates that observable ability will be eroded as money flows from products without skill to products with skill, this evidence clearly suggests that institutional investors think that money management firms employing Ph.D.s provide better performance. Indeed, in the absence of the strong relation between flows and the presence of a Ph.D., the performance gap between Ph.D. products and non-Ph.D. products would likely be substantially wider.

Finally, we recognize that not all Ph.D. managers in our sample are equal. Some have entered the money management industry early in their careers. Others have begun academic careers, and switched to money management soon thereafter. Still others have had distinguished academic career before they entered into money management. Accordingly, the Ph.D. managers in our samples have varying publication records in top outlets in economics and finance. The immediate question is whether the demonstrated success in generating and placing research in premier academic journals translates into investor acumen in the domain of institutional money management. In our final analyses, we show that Ph.D. product performance is positively related to the manager's publication record in leading journals in economics and finance.

The remainder of the paper is organized as follows. Section I describes the data sources and presents summary statistics. Section II uses a matching procedure to

analyze the performance and fees of Ph.D. products compared to non-Ph.D. products. Section III explores the extent to which Ph.D. products attract more money than non-Ph.D. products do even after controlling for observed performance. Section IV and investigates the relation between performance and record of leading publications among the products managed by Ph.D.s. Section V concludes.

## I. Data Sources and Sample Overview

We compile data from several sources. The key data are 59 quarterly releases of self-reported institutional money management data for the period from June 1993 to December 2007, obtained from leading data vendors: first from the Mobius Group and, from September 2006 onward, from Informa Investment Solutions (IIS) PSN Data Select.<sup>1</sup> Both data sources have been, and IIS PSN continues to be,<sup>2</sup> used by most large pension fund sponsors and endowment funds to identify money managers, study their track records, and consider a range of other variables relevant for the investment decision-making process. Also, IIS data have been used in extant academic research concerning institutional investment management (e.g., Busse, Goyal, and Wahal, 2010). Aside from monthly product returns (reported net of trading costs, but gross of investment management fees), the data contain a range of firm and product

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<sup>1</sup> Upon subsuming the Mobius Group and the subsequent expiration of one-year agreements with Mobius clients, Informa Investment Solutions began applying its own pricing model (data extractions charged by variable), making continued subscription to the data more challenging and prohibitively costly. Ultimately, December 2007 was the last installment IIS was willing to provide under the earlier pricing scheme.

<sup>2</sup> Recent extant literature on institutional money managers uses either the same data source (Informa Investment Solutions; Bussee, Goyal, and Wahal (2010)) or a comparable data source from another vendor (Mercer's Manager Performance Analytics; Goyal and Wahal (2008)).

characteristics, including quarterly reports of products' firm affiliation and investment style, and annual reports of assets under managements, as well as firm personnel biographies.

The biographies include personnel names, titles, degrees in the period from 2000 to 2007, and the date as of which the listed personnel joined the firm. Out of 21,313 distinct individuals listed overall, we focus on the 531 individuals listed in the database as holding a Ph.D. degree and being affiliated with a firm that manages a domestic equity product (the database does not map personnel to specific products within firms). The indication of their Ph.D. degrees is sometimes accompanied by the field (finance, economics, management, accounting, physics, applied mathematics, and others) and the institution that awarded the degree, but that coverage is far from systematic. Henceforth, we refer to the individuals from our sample holding Ph.D. degrees as "Ph.D.s." Similarly, we refer to institutional money management firms with Ph.D. personnel as "Ph.D. firms," and to those without Ph.D. personnel as "non-Ph.D. firms."

Their titles and the related descriptions provide the role(s) they play in the firm. Titles are reported by the firms, and they are not standardized. Consequently, there is heterogeneity in the terminology the firms use to name the roles; faced with a plethora of distinct titles, we organized the roles that Ph.D.s play into 30 roles (a given Ph.D. could perform multiple roles, such as principal *and* senior portfolio manager).<sup>3</sup> We use

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<sup>3</sup> The complete list of roles is: advisor; analyst/researcher; associate; assistant/associate director; assistant vice president; CEO; chairman/chairman of the board; chief economist/senior economist; chief investment officer/chief investment strategist/senior investment officer; consultant; chief operating officer; chief portfolio manager/senior portfolio manager/lead portfolio manager; director/head/leader; director of research; economist; executive vice president; executive director; founder; general partner; information technology specialist/programmer; managing

these titles to define “Ph.D. products” (loosely speaking, products managed by Ph.D.s) as products managed by the firms in which a key role in the firm (Principal, CEO, Chief Investment Officer, Chief Investment Strategist, Senior Investment Officer, Partner, President, Portfolio Manager, Investment Manager, Chief Portfolio Manager, Senior Portfolio Manager, Lead Portfolio Manager, Advisor, Strategist, Chairman, Managing Director, and Director of Research) is performed by a Ph.D.

We augment this data with the publication records we compiled by searching for each Ph.D. in our sample for publications in leading outlets in finance and economics that are available through JSTOR. The list of journals is elite indeed (finance: Journal of Business, Journal of Finance, Review of Financial Studies; economics: American Economic Review, Econometrica, Journal of Political Economy, Quarterly Journal of Economics, and Review of Economic Studies). The one leading journal in finance not listed as part of this search is the Journal of Financial Economics. Although it unquestionably is a top outlet, it is not available through JSTOR, and, therefore, we did not include it. This omission creates some noise in the publication records we use in our analyses, but it should not have any discernible effects on the results, even if included (it is extremely unlikely that classifications would change dramatically for a significant number of Ph.D.s if the sample publication rankings included their JFE publications as well). Overall, 57 Ph.D.s from the sample have had at least one publication in these top

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director; managing partner; partner; portfolio manager/investment manager; president; principal; strategist; senior vice president/first vice president; vice chairman; vice president.

outlets. Twenty-eight of those individuals had three or more, of whom eleven have had more than ten top publications.<sup>4</sup>

Our analyses of product investment performance use standard investment style benchmarks (specifically, we use the four factors proposed by Carhart (1997), a standard performance evaluation tool of U.S.-based domestic equity mutual funds and other diversified investment vehicles). The data for the benchmarks come from the data library that Kenneth French maintains and makes widely available.<sup>5</sup> Many of our analyses will compare products pursuing the same investment style. We use the information regarding investment styles the products pursue to classify them into twelve styles: equity combined, equity growth, equity value, large cap, large growth, large value, mid cap, mid cap growth, mid cap value, small cap, small cap growth, and small cap value. Moreover, the analyses focus on actively managed products; accordingly, we exclude index products.

Finally, the data set also contains some coverage of the products' fee schedules. In this industry, fees do not need to be disclosed, and more than one-third of all the observations in the sample (36.7%) chose not to report them. Also, fees are paid on a per client basis; unlike mutual funds, institutional money management firms may charge different fees to different investors in the same product. The information provided in the data set is not sufficient to compute the fees charged for the product even when fee

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<sup>4</sup> For a list of Ph.D. holders from our sample of domestic equity products who have three or more JSTOR publications in top outlets in finance and economics, please see Appendix Table A.I.

<sup>5</sup> The data for the four benchmarks may be downloaded from Kenneth French's data library, available at [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

schedules are reported for two key reasons. First, fee schedules are listed for ranges of clients' assets under management; for a product with multiple investors, the fees the product charges cannot be computed because, except for products with one or two clients (by virtue of knowing the sizes of the largest and, if applicable, the smallest portfolios), the information regarding clients' assets under management in the product cannot be calculated. Second, anecdotally, fees may be discounted from the schedule, especially for clients with bargaining power. These *ad hoc* discounts are not observable in the data. These considerations preclude precise analyses of the fee structure in the present setting.

Nonetheless, with all these caveats in place, and in light of the important role that consideration of fees plays in the present context for investor welfare implications, we perform and report the analyses of the ways fees vary across Ph.D. firms and non-Ph.D. firms.

#### *A. Firm-Level Summary Statistics*

Table I presents the basic firm-level summary statistics of total firm assets under management at the end of 2003 (the statistics are qualitatively similar for other years during the period from 2000 to 2007). Panel A reports total assets under management for all asset classes, and Panel B reports total domestic equity assets under management. Both panels reveal that some firms do not report their biographies. Out of 961 firms that reported their assets under management, 30 firms (3.1%) did not report biographies. The non-reporting firms are fairly small, with but one exception—FIRSCo, which itself

accounts for nearly a trillion dollars under management (988 billion) at the end of 2003. The remaining 29 non-reporting firms together manage 68 billion dollars, a comparably small number, and are relatively small firms (as seen in the first row of Table I, Panel A).

Of those that did report biographies, 750 (80.6%) did not feature Ph.D.s, whereas 181 (19.4%) did. Looking into total assets managed by these firms, those not reporting biographies had 1.06 trillion dollars (or 5.4%) under management (most of which was FIRSCo), whereas those reporting biographies had a total of 18.67 trillion dollars under management, of which 6.46 trillion (or 34.6%) were managed by non-Ph.D. firms, and 12.2 trillion (or 65.4%) were managed by Ph.D. firms.

Comparing the distributions of assets under management reported by non-Ph.D. and Ph.D. firms (second and third rows of Table I, Panel A) reveals that, though substantially more numerous, non-Ph.D. firms are much smaller than Ph.D. firms, a tendency observable at every percentile documented in Panel A of Table I. For example, both median and average firm asset sizes of non-Ph.D. firms are about eight to nine times smaller than their Ph.D. counterparts (8.62 billion versus 67.43 billion dollars for means; 782 million versus 6.73 billion dollars for medians).

The figures reported in Panel A of Table I are very large, encompassing the firms' entire palette of assets under management from various asset classes and types of investment. Panel B focuses on U.S. domestic equity products, the centerpiece of our analyses. All the intuition from Panel A carries over, to the figures that are about three to five times smaller. Specifically, out of 949 firms that reported the assets under

management of their domestic equity products, 28 firms (3.0%) did not report biographies. The assets under management of U.S. domestic equity products from non-reporting firms are relatively small, around 92 billion dollars (around 2.0% of all U.S. domestic equity assets managed by all sample firms).

Of those that did report biographies, 739 (80.2%) did not feature Ph.D.s, whereas 181 (19.8%) did. The U.S. domestic equity products managed by firms that reported biographies had a total of 4.55 trillion dollars under management, of which 1.79 trillion (or 39.3%) were managed by non-Ph.D. firms, and 2.76 trillion (or 60.7%) were managed by Ph.D. firms. Once again, comparing the distributions of U.S. domestic equity assets under management reported by non-Ph.D. and Ph.D. firms (second and third rows of Table I, Panel B) reveals that, though substantially more numerous, non-Ph.D. firms are much smaller than Ph.D. firms, a tendency observable at every percentile documented in Panel B of Table I. For example, both median and average firm asset sizes of non-Ph.D. firms are about eight to nine times smaller than their Ph.D. counterparts (2.42 billion versus 15.17 billion dollars for means; 334 million versus 2.06 billion dollars for medians).

### *B. Product-Level Summary Statistics*

Panel A of Table II presents the basic product-level summary statistics of U.S. domestic equity product assets under management at the end of 2003 (the statistics are qualitatively similar for other years during the period from 2000 to 2007). Out of 3,174 products with available total assets under management, 48 products (1.5%) were

managed by firms that did not report biographies. Of the products whose firms did report biographies, 2,017 (64.5%) were managed by firms that did not feature Ph.D.s (henceforth “non-Ph.D. products”), whereas 1,109 (35.5%) were managed by firms that did (henceforth “Ph.D. products”).

Once again, this time at the product level, comparing the distributions of U.S. domestic equity assets under management reported by non-Ph.D. and Ph.D. products (second and third rows of Table II) reveals that, though nearly twice as numerous, non-Ph.D. products are much smaller than Ph.D. products. For example, both median and average firm asset sizes of non-Ph.D. products are about three times smaller than their Ph.D. counterparts (886 million versus 2.49 billion dollars for means; 166 million versus 480 million dollars for medians), with this ratio preserved across the documented percentiles.

With all the caveats regarding the fee data in our sample, we document their summary statistics. To maximize the number of observations, we compute “expense ratios” by dividing the fees the products state for 25-million dollar accounts by 25 million dollars.<sup>6</sup> Panel B of Table II provides summary statistics on the fees charged by Ph.D. products and the matched non-Ph.D. products. It turns out that, overall, the fees charged by Ph.D. products are a few basis points lower than those charge by their non-Ph.D. matched counterparts.

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<sup>6</sup> Results are very similar if we focus on 10-million dollar account or 50-million dollar accounts, but we lose more observations because of the increased propensity not to report in those ranges; moreover, 25-million dollars is close to 29 million dollars, the median account size in the sample.

## II. Performance and Fee Analyses

### A. The Empirical Setup

Panel A of Table II shows that non-Ph.D. products are much smaller—about three times smaller across the board. Extant mutual fund literature has established quite convincingly a negative relation between performance and size of mutual funds (e.g., Chen, Hong, Huang, and Kubik (2004), Pollet and Wilson (2008)), suggesting that a direct comparison of product performance across these two categories is challenging even in the presence of controls for size. To address the size-related *caveat*, and thereby perform a more meaningful and precise comparison, we contrast Ph.D. and non-Ph.D. products pursuing the same investment objective, with similar total assets under management, and similar past performance. We do so by developing a matching procedure that takes each Ph.D. product-year for which the product has all twelve monthly returns and identifies the corresponding non-Ph.D. product year such that the non-Ph.D. product pursues the same investment objective, is in the same size quintile in terms of its total assets under management, and is the closest in terms of past one-year performance (implicitly requiring that both products had all twelve monthly returns past year).

### B. Results

The dependent variables studied in this section are all computed for each of the 6,723 resulting observations on the basis of the two twelve-month time series of returns. In the first analysis, the dependent variable is the difference in annual returns between

the Ph.D. product and the matching non-Ph.D. product. The second analysis features the difference between their Sharpe ratios. The dependent variable in the third analysis is the difference between their alphas, calculated from regressions of the respective 12-month return series on the typical four factors (Carhart (1997)). The fourth analysis features the difference between their information ratios from these regressions. Lastly, the fifth analysis features the difference between their manipulation-free performance measures MPPM, with  $\rho = 3$ , as discussed in Goetzmann, Ingersoll, Spiegel, and Welch (2007). The results of all these analyses are reported in Panel A or Table III. Regressions reported in this section also control for total assets under management for both products (in logarithmic form), as well as their respective firm assets under management (given the close and careful matching design, their point estimates are practically zero, and we suppress them from the table for readability).<sup>7</sup> Lastly, in our estimations, we adjust standard errors by clustering that accounts for heteroskedasticity and dependence of observations across the firm to which the Ph.D. product belongs.

In short, we find statistically significant and economically meaningful differences according to objective- and size-adjusted annual returns (42.7 basis points per year), one-year monthly Sharpe ratios (0.847 percent), one-year monthly Carhart alphas (3.31 basis points per month), one-year monthly information ratios (4.76 percent), and one-year monthly manipulation-free Goetzmann, Ingersoll, Spiegel, and Welch (2007) measure MPPM( $\rho = 3$ ) (0.516 percent). Thus, there is overwhelming evidence that the

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<sup>7</sup> Including additional controls for squares of product and firm assets under management does not have any discernible effect on the results.

gross performance realized by Ph.D. products exceeds the performance realized by their matched non-Ph.D. products.

These gross performance results show convincingly that Ph.D. products outperform their matched non-Ph.D. counterparts along a range of performance measures. It is conceivable, however, that this performance differential in gross returns could disappear (or even reverse) once fees are taken into account.

It is conceivable that this superior performance in terms of gross returns could disappear (or even reverse) once fees are taken into account. To the contrary, Panel B of Table II suggests that, if anything, Ph.D. products are associated with lower fees compared to non-Ph.D. products. Moreover, Panel B of Table III features the results of a regression analysis in which we estimate the differential fees (the difference between the fees stated by the Ph.D. products and the fees stated by their matched non-Ph.D. products), in the presence of a rich set of covariates, to be around four basis points. Thus, the performance gap between Ph.D. products and non-Ph.D. products is preserved, and, if anything, even slightly enhanced after fees (that is, in terms of net returns).

### **III. Flows**

Our next inquiry is whether investor flows have a differential response to Ph.D. and non-Ph.D. products. The dependent variable in these analyses is the difference between annual flows to Ph.D. products firm and the matched, non-Ph.D. product,

expressed in percentages. Similar to other analyses,<sup>8</sup> for each product managed by a Ph.D. firm for the year, the matching process identifies the product managed by a non-Ph.D. firm that belongs to the same style, and is the closest in terms of product assets under management and past one-year performance.

Controls, once again, are total assets under management for both products and for both firms (in logarithmic form). Given the close and careful matching design, their point estimates are practically zero, and we suppress them from the table for readability.<sup>9</sup> We adjust standard errors by clustering that accounts for heteroskedasticity and dependence of observations across the firm to which the Ph.D. product belongs.

Panel A of Table IV reports results of an estimation carried out across all observations. The extent to which the flow into Ph.D. products exceeds the flow into matched non-Ph.D. products is very large, estimated at 18.2 percent per year (and statistically significant at one-percent level). Panel B reports results estimated on five subsamples of the overall sample determined by the objective- and size-adjusted quintile product performance in year  $t$ . It reveals that the 18.2 percent per year gap from Panel A is not uniformly distributed across past performance. Indeed, the gap among the top-quintile Ph.D. and non-Ph.D. products is as large as 40.4% percent per year. As the past performance drops, so does the magnitude of the gap, from 18.6 percent for

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<sup>8</sup> The distribution of flows in this industry is highly leptokurtic (especially compared to the mutual fund industry). To minimize the influence of outliers, we have undertaken several standard steps. We exclude products managing fewer than five million dollars in total assets, and we winsorize flows at the 2.5<sup>th</sup> and 97.5<sup>th</sup> percentiles.

<sup>9</sup> Once again, including additional controls for squares of product and firm assets under management does not have any discernible effect on the results.

second highest performance quintile, 17 percent for the middle quintile, 10.3 percent for second lowest (all statistically significant at the 1% level), and only 4.3 percent (not statistically significant) for the bottom quintile.<sup>10</sup>

Because the work of Berk and Green (2004) indicates that observable ability will be eroded as money flows from products without skill to products with skill, this evidence suggests that institutional investors think that money management firms employing Ph.D.s provide better performance. Indeed, in the absence of the strong relation between differential flows and the presence of a Ph.D., the performance gap between Ph.D. products and non-Ph.D. products would likely be substantially wider.

#### **IV. The Role of Publication Records**

As discussed earlier, not all Ph.D. managers in our sample are equal. Some have entered the money management industry early in their careers. Others have begun academic careers, and switched to money management soon thereafter. Still others have had distinguished academic career before they entered into money management. Accordingly, the Ph.D. managers in our samples have varying publication records in top outlets in economics and finance. The immediate question is whether the demonstrated success in generating and placing research in premier academic journals translates into investor acumen in the domain of institutional money management.

As described in Section I, we compiled publication records for the Ph.D.s in our sample by searching through elite journals available through JSTOR (finance: Journal of

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<sup>10</sup> That the gap broadens in such nonlinear ways, leading to a 40.4% differential for past top quintile performers is remarkable. It is also supposed by our unreported persistence analyses, suggesting that the only nontrivial persistence in the course of which Ph.D. products dominate non-Ph.D. products is concentrated in the domain of past top quintile performers.

Business, Journal of Finance, Review of Financial Studies; economics: American Economic Review, Econometrica, Journal of Political Economy, Quarterly Journal of Economics, and Review of Economics and Statistics). Overall, 57 Ph.D.s from the sample have had at least one publication in these top outlets. Twenty-eight of those individuals had three or more, of whom eleven have had more than ten top publications.<sup>11</sup>

Table V offers further insight into the prevalence and depth of publication records across the institutional money management firms (those that provided biographical data). About 16% of the firm-year observations feature at least one publication, with the average of 2.39, and the average longest publication record in the firm is 1.66 papers. These statistics conceal the fact that publication records are skewed across firms. For example, at the 95<sup>th</sup> percentile of the publication distribution, firms have 7 publications, and the longest publication record is 5 papers.

Figure 1 offers a precursor to the results presented in this section. It plots the evolution of a hypothetical \$1 investment into five portfolios, made at the beginning of our sample period (end of September of 1993). For the next fourteen years, until the end of 2007, the hypothetical investments are buy-and-hold. The portfolios are formed at the end of each year in an equally-weighted fashion (we exclude miniscule products with less than one million dollars in total assets), and rebalanced annually. The performance of all the portfolios is based on gross returns, thus assuming that management fees have been waived. The five portfolios consist of non-Ph.D. products, Ph.D. products, Ph.D.

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<sup>11</sup> For a list of Ph.D.s who have had three or more JSTOR publications in top outlets in finance and economics, please see Appendix Table A.I.

products from publishing firms, Ph.D. products from firms whose Ph.D.s had published at least six JSTOR top-tier publications in finance and economics, and Ph.D. products from firms in which the top publication record exceeds ten JSTOR top-tier publications in finance and economics, respectively.

A comparison of the cumulative performance of the first two portfolios shows that the equally-weighted portfolio of Ph.D. products outperforms its counterpart composed of non-Ph.D. products. Over the fourteen-year period, the one-dollar hypothetical investment evolved to \$5.30 and \$5.17, respectively. The remaining three portfolios accentuate the central theme of our present analyses. Establishing increasingly more stringent publication threshold, thus interpreting publication in top-tier journals in economics and finance as a measure of skill potentially relevant for the investment performance, Figure 1 suggests that publication record in top JSTOR outlets in finance and economics appears to be positively related to performance. Requiring that a Ph.D. from the firm has published, that Ph.D.s had been (co)authors of a total of at least six papers, and that the top publication record in the firm is more than ten papers in top JSTOR outlets in economics and finance leads to increasingly better cumulative performance. The one-dollar hypothetical investment evolved to \$5.60, \$6.13, and \$6.66, respectively.

These cumulative performances constitute *prima facie* evidence that publication (a measure of skill relevant for investment performance) is related to performance. We next turn to more rigorous analyses to tease out whether Ph.D. product performance is positively related to the manager's publication record in leading journals in economics

and finance. Specifically, we relate the same five performance measures we utilized in Section II with three publication record measures.

All performance measures are adjusted by year, style, and size quintile. The independent variables, each associated with its respective column in the table, are measures of publication output by the firm. *Publications?* is set to one if any of the Ph.D.s from the firm had published a paper in a top JSTOR outlet in finance (Journal of Business, Journal of Finance, or Review of Financial Studies) or economics (American Economic Review, Econometrica, Journal of Political Economy, Quarterly Journal of Economics, Review of Economics Studies), and to zero otherwise. The variable *No.Pub.* is equal to the sum of the firms' Ph.D.s' number of publications in top outlets in finance and economics. The variable *Max.Pub.* is equal to the largest among the firms' Ph.D.s' number of publications in top outlets in finance and economics. Controls include product and matched product assets and their corresponding firm assets, as well as their squares. All specifications contain style and year effects. Standard errors are adjusted by clustering that accounts for heteroskedasticity and dependence of observations across the firm to which the Ph.D. product belongs.

The results are presented in Table VI. To conserve space, only the key coefficients associated with publication records are displayed.<sup>12</sup> The first column features a simple measure of publication record, the indicator variable *Publications?* For each of the five performance metrics, the presence of a publication record is associated with a statistically significant and economically large performance differential: objective- and

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<sup>12</sup> The number of observations in each specification presented in the table is 6,723, and values of R-squared range from 0.001 to 0.004.

size- adjusted returns are larger by 1.14 percent per year, the Sharpe ratio is larger by 1.59%, alpha is larger by 3.5 basis points per month, information ratio is larger by 5 percent, and the MPPM measure is larger by 0.68 percent.

The second column and the third columns feature the remaining two measures of publication output, capturing overall publication output for the firm and the output of its most prolific Ph.D. A one-standard deviation move for the variable  $\ln(1+\text{No. Pub.})$  ( $\ln(1+\text{Max. Pub.})$ ), equal to 0.834 (0.744), translates loosely into doubling the publication output. Focusing, for example, on objective- and size- adjusted annual returns, roughly doubling these publication output measures translates into an increase in the performance differential of  $0.834 * 0.385 = 32$  basis points per year ( $0.744 * 0.447 = 33$  basis points per year). Other performance measures yield similar conclusions.

There is an absence of statistical significance for alpha in the last two columns (and for Sharpe ratio in the second column). The point estimates are in the correct direction, and are of plausible magnitudes, but the standard errors are high. The latter findings are not surprising because the estimations are based on only twelve data points and, more generally, alphas are notoriously difficult to estimate with precision. To discern whether the lack of significance related to alpha comes from a lack of power (the annual estimates of alpha may be noisy), we perform our final portfolio analysis, and report the results in Table VII.

Table VII presents results of Carhart (1997) performance evaluation of zero-cost portfolio strategies formed on the basis of the publication records associated with products managed by Ph.D.s. Each of the three zero-cost portfolios corresponds to a

measure of publication output, and is presented in the respective column. Across all three columns, there is a statistically significant alpha. Resorting to back-of-the-envelope calculations, its annualized magnitude is 44 basis points per year ( $=3.688*12$ ), 92 basis points per year ( $=7.635*12$ ), and 104 basis points per year ( $=8.665*12$ ), respectively. Moreover, factor loadings on the SMB and, especially, on the HML also suggest that those with publication records loaded more heavily on those factors (especially true of the most discerning classification of publication records from the last column of Table VII).

## V. Conclusion

In this paper, we analyze whether the possession of a Ph.D. provides a positive signal regarding managerial skill. We find that the performance of investment products managed by Ph.D.s is superior to the performance of non-Ph.D. products along several metrics. This performance differential in gross returns is preserved, even slightly enhanced, once fees are taken into account (fees for Ph.D. products tend to be slightly lower than fees for non-Ph.D. products).

Hiring employees to maximize assets under management is of first order importance for management companies. We find that net flows to Ph.D. products substantially exceed net flows to the non-Ph.D. products matched by style, assets under management, and recent performance. This difference is particularly accentuate in the top quintile of past performance. While the underlying cause of the relation between

flows and educational attainment may ultimately stem from ability, knowledge, or soft skills, this finding provides a clear economic justification for the aggressive recruitment individuals holding a Ph.D., especially those with strong publication records, to serve in key positions in money management companies.

Our final analyses serve to confirm that, within the group of product managers holding a Ph.D. degree, performance is strongly related to the publication record in the top outlets in economics and finance, accentuating the above point still further.

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**Table I**  
**Sample Summary Statistics: Money Management Firms**

This table provides summary statistics of the institutional money management firms from the data set. The information is compiled from 59 quarterly releases of data concerning institutional money managers, obtained from the Mobius Group and, from September 2006 onward, Informa Investment Solutions (IIS) PSN Data Select for the period from June 1993 to December 2007. The table reports the 2003 year-end summary.

<b>Panel A: Total Firm Assets (All Asset Classes)</b>								
	No. of Firms	Average Firm Assets (\$Million)	St. Dev. of Firm Assets (\$Million)	5th	25th	Median (50th)	75th	95th
Firms not Reporting Biographies	30	35,218	180,173	45	131	338	1,564	26,949
Firms Reporting Biographies, no Ph.D.s	750	8,619	48,482	27	202	782	2,923	30,617
Firms Reporting Biographies, with Ph.D.s	181	67,434	148,408	85	1,000	6,725	46,125	393,992
<b>Panel B: Total Firm Assets in Domestic Equity</b>								
	No. of Firms	Average Firm Assets (\$Million)	St. Dev. of Firm Assets (\$Million)	5th	25th	Median (50th)	75th	95th
Firms not Reporting Biographies	28	3,292	12,990	4	60	140	247	10,909
Firms Reporting Biographies, no Ph.D.s	739	2,417	10,154	4	71	334	1,451	9,407
Firms Reporting Biographies, with Ph.D.s	182	15,166	40,820	37	256	2,064	12,900	61,120

**Table II**  
**Sample Summary Statistics: Products**

This table provides summary statistics for the assets under management and fees of the products managed by the institutional money management firms from the data set. The information is compiled from 59 quarterly releases of data concerning institutional money managers, obtained from the Mobius Group and, from September 2006 onward, Informa Investment Solutions (IIS) PSN Data Select for the period from June 1993 to December 2007. The table reports the 2003 year-end summary. Panel A focuses on assets under management. Panel B focuses on fees. The tabulated fees, expressed in basis points, are the “expense ratios” obtained by dividing the fees the products state for 25-million dollar accounts by 25 million dollars.

<b>Panel A: Assets</b>								
	No. of Products	Average Product Assets (\$Million)	St. Dev. of Product Assets (\$Million)	5th	25th	Median (50th)	75th	95th
Firms not Reporting Biographies	48	1,921	9,804	3	16	88	487	3,762
Firms Reporting Biographies, no Ph.D.s	2,017	886	3,473	1	28	166	672	3,250
Firms Reporting Biographies, with Ph.D.s	1,109	2,489	7,549	7	105	480	1,801	10,395
<b>Panel B: Fees</b>								
		Average Fees (bp)	St. Dev. of Fees (bp)	5th	25th	Median (50th)	75th	95th
	Ph.D. Products' Fees	70.18	22.92	35	55	66	85	100
	Non-Ph.D. Products' Fees	73.82	21.22	41	60	72	90	100

**Table III**

**Performance and Fee Differentials Between Ph.D.-Managed and Non-Ph.D. Managed Products**

The dependent variables in Panel A of this table are differences between performance measures of products managed by Ph.D.s and their respective matched products managed by non-Ph.D.s. A product is regarded to be managed by a Ph.D. if a key role in the firm (Principal, CEO, Chief Investment Officer, Chief Investment Strategist, Senior Investment Officer, Partner, President, Portfolio Manager, Investment Manager, Chief Portfolio Manager, Senior Portfolio Manager, Lead Portfolio Manager, Advisor, Strategist, Chairman, Managing Director, and Director of Research) is performed by a Ph.D. The first performance measure is the difference between annual returns of products managed by Ph.D.s and their respective matched products managed by non-Ph.D.s, expressed in percentages per year. The second performance measure is the difference between one-year monthly Sharpe ratios of products managed by Ph.D.s and their respective matched product managed by non-Ph.D.s (expressed in percentages). The third performance measure is the difference between one-year monthly Carhart alphas of products managed by Ph.D.s and their respective matched product managed by non-Ph.D.s (expressed in basis points per month). The fourth performance measure is the difference between one-year monthly information ratios (based on Carhart alphas and idiosyncratic standard deviation) of products managed by Ph.D.s and their respective matched product managed by non-Ph.D.s. The fifth performance measure is the difference between one-year monthly manipulation-free measures MPPM( $\rho = 3$ ) of products managed by Ph.D.s and their respective matched product managed by non-Ph.D.s. The dependent variable in Panel B of this table is the difference between fees charged by products managed by Ph.D.s and their respective matched products managed by non-Ph.D.s. These fees, expressed in basis points, are the “expense ratios” obtained by dividing the fees the products state for 25-million dollar accounts by 25 million dollars. For each product managed by a Ph.D. for the year, the matching process identifies the product managed by a non-Ph.D. that belongs to the same style, is in the same size quintile, and is the closest in terms of past one-year performance. Controls include product and matched product assets and their corresponding firm assets, as well as their squares. Standard errors are adjusted by clustering that accounts for heteroskedasticity and dependence of observations across the firm to which the Ph.D. product belongs. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

**Table III (Continued)**  
**Performance and Fee Differentials Between Ph.D.-Managed and Non-Ph.D. Managed Products**

	Differential (Intercept)	Controls	R Squared	Number of Obs.
Panel A: Performance				
Objective- and Size- Adjusted Annual Return	0.427** (0.209)	Yes	0.00	6,723
Objective- and Size- Adjusted Sharpe Ratio	0.847** (0.434)	Yes	0.00	6,723
Objective- and Size- Adjusted Alpha	3.306* (1.810)	Yes	0.00	6,723
Objective- and Size- Adjusted Information Ratio	4.755*** (1.082)	Yes	0.00	6,723
Objective- and Size- Adjusted MPPM (Rho = 3)	0.516** (0.211)	Yes	0.00	6,723
Panel B: Fees				
Product Fees	-4.352*** (1.654)	Yes	0.00	3,541

**Table IV****Net Flow Differentials Between Ph.D.-Managed and Non-Ph.D. Managed Products**

The dependent variable is the difference between annual flows to products managed by Ph.D.s and their respective matched products managed by non-Ph.D.s, expressed in percentages. A product is regarded to be managed by a Ph.D. if a key role in the firm (Principal, CEO, Chief Investment Officer, Chief Investment Strategist, Senior Investment Officer, Partner, President, Portfolio Manager, Investment Manager, Chief Portfolio Manager, Senior Portfolio Manager, Lead Portfolio Manager, Advisor, Strategist, Chairman, Managing Director, and Director of Research) is performed by a Ph.D. For each product managed by a Ph.D. for the year, the matching process identifies the product managed by a non-Ph.D. that belongs to the same style, is in the same size quintile, and is the closest in terms of past one-year performance. Controls include product and matched product assets and their corresponding firm assets, as well as their squares. Panel A reports results estimated over all product-year observations in the sample. Panel B reports results estimated on five subsamples of the overall sample determined by the objective- and size-adjusted quintile product performance in year  $t$ . Standard errors are adjusted by clustering that accounts for heteroskedasticity and dependence of observations across the firm to which the Ph.D. product belongs. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	Differential (Intercept)	Controls	R Squared	Number of Obs.
<b>Panel A: All Products</b>				
All Products	18.231*** (1.784)	Yes	0.01	6,723
<b>Panel B: Products by Objective- and Size- Adjusted Performance Quintile in year <math>t</math></b>				
Product Performance in Top Quintile	40.380*** (5.266)	Yes	0.01	1,312
Product Performance in Quintile 4	18.658*** (4.067)	Yes	0.01	1,374
Product Performance in Quintile 3	16.971*** (3.848)	Yes	0.01	1,384
Product Performance in Quintile 2	10.346*** (3.491)	Yes	0.01	1,369
Product Performance in Bottom Quintile	4.340 (2.961)	Yes	0.01	1,284

**Table V**  
**Publication Records in the Sample**

This table provides summary statistics of the publications produced by the institutional money management firms from the data set. The indicator variable *Publications?* is set to one if any of the Ph.D.s from the firm had published a paper in a top JSTOR outlet in finance (Journal of Business, Journal of Finance, or Review of Financial Studies) or economics (American Economic Review, Econometrica, Journal of Political Economy, Quarterly Journal of Economics, Review of Economics Studies), and to zero otherwise. The variable No.Pub. is equal to the sum of the firms' Ph.D.s' number of publications in top outlets in finance and economics. The variable Max.Pub. is equal to the largest among the firms' Ph.D.s' number of publications in top outlets in finance and economics.

	Mean	St. Dev.	5th	25th	Median (50th)	75th	95th
<i>Publications?</i>	0.161	0.368	0	0	0	0	1
No.Pub.	2.39	12.17	0	0	0	0	7
$\ln(1+\text{No.Pub.})$	0.293	0.834	0	0	0	0	2.09
Max.Pub.	1.66	8.09	0	0	0	0	5
$\ln(1+\text{Max.Pub.})$	0.262	0.744	0	0	0	0	1.79

**Table VI**  
**Performance Differentials Among Ph.D.-Managed Products by Publication**

The dependent variables in this table are performance measures of products managed by Ph.D.s. A product is regarded to be managed by a Ph.D. if a key role in the firm (Principal, CEO, Chief Investment Officer, Chief Investment Strategist, Senior Investment Officer, Partner, President, Portfolio Manager, Investment Manager, Chief Portfolio Manager, Senior Portfolio Manager, Lead Portfolio Manager, Advisor, Strategist, Chairman, Managing Director, and Director of Research) is performed by a Ph.D. The first performance measure is the objective- and size-adjusted annual returns of products managed by Ph.D.s, expressed in percentages per year. The second performance measure is the objective- and size-adjusted one-year monthly Sharpe ratios of products managed by Ph.D.s (expressed in percentages). The third performance measure is the objective- and size-adjusted one-year monthly Carhart alphas of products managed by Ph.D.s (expressed in basis points per month). The fourth performance measure is the objective- and size-adjusted one-year monthly information ratios (based on Carhart alphas and idiosyncratic standard deviation) of products managed by Ph.D.s. The fifth performance measure is the objective- and size-adjusted one-year monthly manipulation-free measures MPPM( $\rho = 3$ ) of products managed by Ph.D.s. The independent variables, each associated with its respective column in the table, are measures of publication output by the firm. *Publications?* is set to one if any of the Ph.D.s from the firm had published a paper in a top JSTOR outlet in finance (Journal of Business, Journal of Finance, or Review of Financial Studies) or economics (American Economic Review, Econometrica, Journal of Political Economy, Quarterly Journal of Economics, Review of Economics Studies), and to zero otherwise. The variable No.Pub. is equal to the sum of the firms' Ph.D.s' number of publications in top outlets in finance and economics. The variable Max.Pub. is equal to the largest among the firms' Ph.D.s' number of publications in top outlets in finance and economics. Controls include product and matched product assets and their corresponding firm assets, as well as their squares. All specifications contain style and year effects. The number of observations in each specification presented in the table is 6,723, and values of R-squared range from 0.001 to 0.004. Standard errors are adjusted by clustering that accounts for heteroskedasticity and dependence of observations across the firm to which the Ph.D. product belongs. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

**Table VI (Continued)**  
**Performance Differentials Among Ph.D.-Managed Products by Publication**

	Publications?	log(1+No. Pubs.)	log(1+Max. No. Pubs.)
Objective- and Size- Adjusted Annual Return	1.141*** (0.301)	0.385*** (0.106)	0.447*** (0.124)
Objective- and Size- Adjusted Sharpe Ratio	1.591*** (0.596)	0.332 (0.227)	0.387* (0.234)
Objective- and Size- Adjusted Alpha	3.490** (1.643)	0.468 (0.713)	0.651 (0.801)
Objective- and Size- Adjusted Information Ratio	4.992*** (1.435)	1.958*** (0.698)	2.404*** (0.752)
Objective- and Size- Adjusted MPPM (Rho = 3)	0.681** (0.344)	0.215** (0.102)	0.253** (0.115)

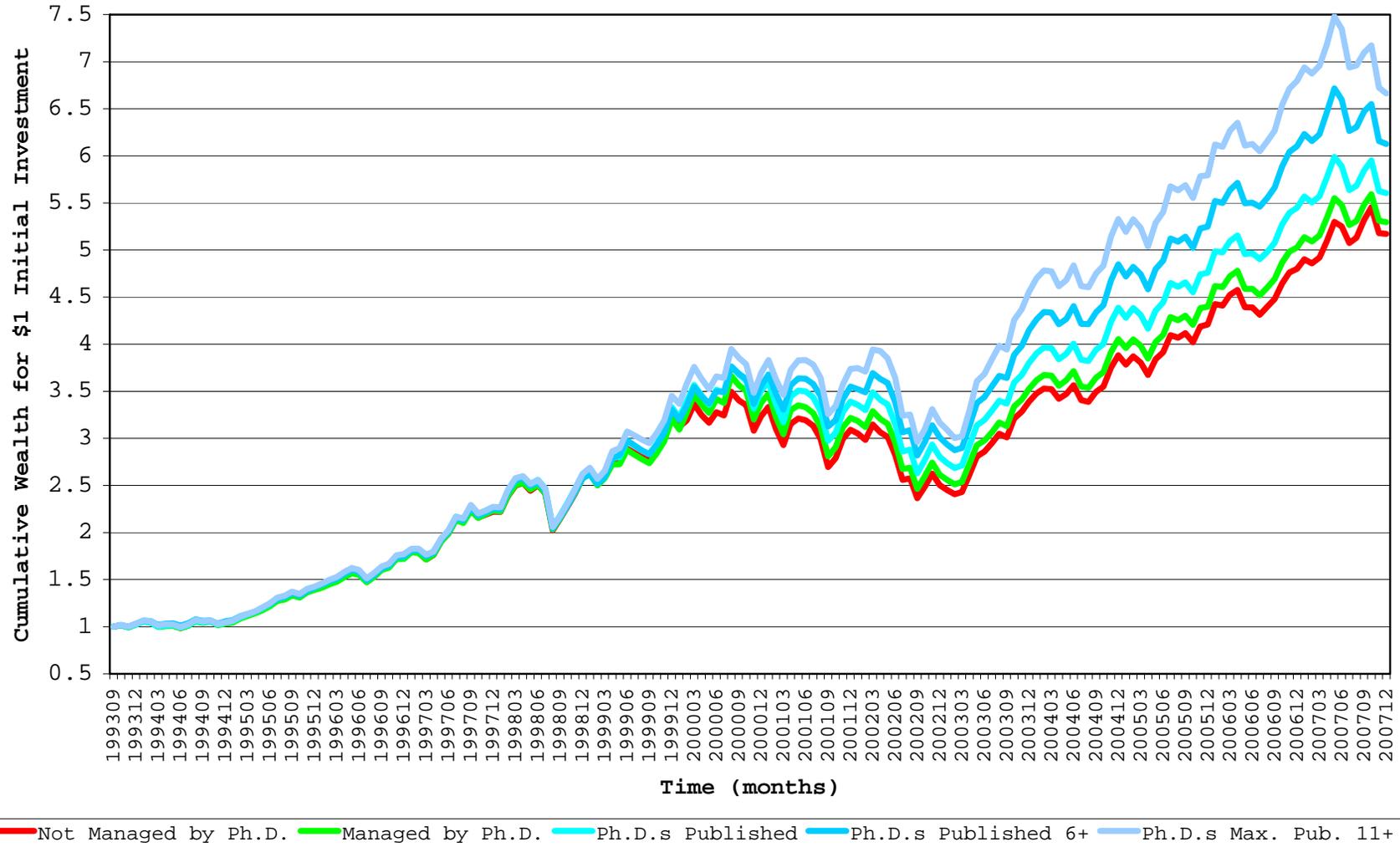
**Table VII**

**Portfolio Performance Differentials Among Ph.D.-Managed Products by Publication**

This table presents results of Carhart (1997) performance evaluation of zero-cost portfolio strategies formed on the basis of the publication records associated with products managed by Ph.D.s A product is regarded to be managed by a Ph.D. if a key role in the firm (Principal, CEO, Chief Investment Officer, Chief Investment Strategist, Senior Investment Officer, Partner, President, Portfolio Manager, Investment Manager, Chief Portfolio Manager, Senior Portfolio Manager, Lead Portfolio Manager, Advisor, Strategist, Chairman, Managing Director, and Director of Research) is performed by a Ph.D. We use three measures of publication output by the firm. *Publications?* is set to one if any of the Ph.D.s from the firm had published a paper in a top JSTOR outlet in finance (Journal of Business, Journal of Finance, or Review of Financial Studies) or economics (American Economic Review, Econometrica, Journal of Political Economy, Quarterly Journal of Economics, Review of Economics Studies), and to zero otherwise. The variable No.Pub. is equal to the sum of the firms' Ph.D.s' number of publications in top outlets in finance and economics. The variable Max.Pub. is equal to the largest among the firms' Ph.D.s' number of publications in top outlets in finance and economics. Standard errors are adjusted by clustering that accounts for heteroskedasticity and dependence of observations across the firm to which the Ph.D. product belongs. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	Ph.D. Products with Publications	Ph.D. Products with 6+ Publications	Ph.D. Products with 11+ Max. Pub.
<b>Long:</b>			
<b>Short:</b>	Ph.D. Products without Publications	Ph.D. Products without Publications	Ph.D. Products without Publications
Alpha (bp/month)	3.688* (2.180)	7.635** (3.367)	8.665** (3.773)
RMRF	0.006 (0.006)	0.004 (0.009)	0.042*** (0.011)
SMB	0.013 (0.006)	0.042*** (0.010)	0.120*** (0.011)
HML	0.029*** (0.008)	0.104*** (0.012)	0.142*** (0.014)
UMD	0.002 (0.004)	-0.016** (0.007)	-0.011 (0.008)
R squared	0.08	0.38	0.50
No. of Months	168	168	168

## Growth of \$1 Investment into EW Portfolios



**Figure 1:** Growth of hypothetical investment of \$1 into equally-weighted portfolios of non-Ph.D. products, Ph.D. products, Ph.D. products from firms whose Ph.D.s had published a JSTOR top-tier paper, Ph.D. products from firms whose Ph.D.s had published at least six JSTOR top-tier papers, and Ph.D. products from firms in which the top publication record exceeds ten JSTOR top-tier papers.

## APPENDIX

Table A.I

Ph.D.s With At Least Three Publications in Top JSTOR Outlets in  
Finance (JB, JF, RFS) and Economics (AER, Econometrica, JPE, QJE, RES)

Firm Name	Number of Publications
Shleifer, Andrei	61
Fama, Eugene	54
Ross, Stephen	52
Thaler, Richard	32
Lakonishok, Josef	30
Vishny, Robert	24
Roll, Richard	23
Madhavan, Ananth	13
Lee, Charles	12
Lerner, Eugene	12
Schlarbaum, Gary	11
Dunn, Kenneth	7
Kon, Stanley	7
Rosen, Kenneth	7
Scott, James	7
Tuttle, Donald	7
Knez, Peter	6
Laffer, Arthur	5
Meese, Richard	5
Rosenberg, Barr	5
Breeden, Douglas	4
Garvey, Gerald	4
Lieberman, Charles	4
Rudd, Andrew	4
Carhart, Mark	3
Maloney, Kevin	3
Richard, Scott	3
Sorensen, Eric	3

**Table A.II**  
**Firms That Managed More Than \$100 billion Across All Asset Classes in 2003**

Firm Name	Assets (\$Million)
<b>Firms not Reporting Biographies</b>	
Fidelity Inst'l Retirement Svcs Co (FIRSCo)	988,300
<b>Firms Reporting Biographies, no Ph.D.s</b>	
State Street Global Advisors	1,106,384
AIG Global Investment Group	395,495
Northern Trust Global Investment Services	285,539
Dumont & Blake Investment Adv. LLC	197,748
Federated Investors	193,998
INVESCO	186,006
G E Asset Management	180,223
Western Asset Management	148,333
Principal Life Insurance Company	140,500
Janus Capital Group, Inc.	128,655
U.S. Bancorp Asset Management, Inc.	123,732
Principal Global Investors	117,895
Dodge and Cox	107,993
Delaware Investment Advisers	102,876

**Table A.II (Continued)**  
**Firms That Managed More Than \$100 billion Across All Asset Classes in 2003**

Firm Name	Assets (\$Million)
<b>Firms Reporting Biographies, with Ph.D.s</b>	
Barclays Global Investors	1,070,224
Vanguard Group, Inc. (The)	721,839
JPMorgan Fleming Asset Management	558,998
Capital Research & Management Company	532,434
Citigroup Asset Management	521,488
Merrill Lynch Investment Managers	499,677
AllianceBernstein Institutional Investment Mgmt	474,747
UBS Global Asset Management	462,960
Morgan Stanley Investment Management Inc.	418,695
Wellington Management Company, LLP	393,992
Pacific Investment Management Company	373,772
Goldman Sachs Asset Management	347,724
Fiduciary/Franklin Templeton Institutional	336,721
Credit Suisse Asset Management	317,994
TIAA-CREF	311,716
Deutsche Asset Management	305,778
Evergreen Investments	247,340
Putnam Investments, LLC	239,648
Prudential Investment Management, Inc.	218,874
BNP Paribas Asset Management, Inc.	211,322
Banc of America Capital Management, LLC	201,539
T. Rowe Price	189,960
Aeltus Investment Management, Inc.	164,768
Columbia Management Group, Inc.	160,309
Banc One Investment Advisors Corporation	150,512
Franklin/FranklinTempleton Institutional	146,321
Capital Guardian Trust Company	146,147
MFS Institutional Advisors, Inc.	140,317
Charles Schwab Investment Management, Inc.	138,566
Wells Capital Management	124,072
New York Life Investment Management, LLC	119,430

**Table A.III**  
**Firms That Managed More Than \$20 billion of Domestic Equity Products in 2003**

Firm Name	Domestic Equity Assets (\$Million)
<b>Firms not Reporting Biographies</b>	
Fidelity Inst'l Retirement Svcs Co (FIRSCO)	67,995
<b>Firms Reporting Biographies, no Ph.D.s</b>	
State Street Global Advisors	219,979
Northern Trust Global Investment Services	89,426
Neuberger & Berman, LLC	35,037
G E Asset Management	33,381
INVESCO	32,300
Legg Mason Capital Management, Inc.	31,574
Barrow, Hanley, Mewhinney & Strauss, Inc.	29,476
Harris Associates L.P.	23,408
Delaware Investment Advisers	23,226
Private Capital Management, L.P.	21,309

**Table A.III (Continued)**  
**Firms That Managed More Than \$20 billion of Domestic Equity Products in 2003**

Firm Name	Domestic Equity Assets (\$Million)
<b>Firms Reporting Biographies, with Ph.D.s</b>	
Barclays Global Investors	363,898
Capital Research & Management Company	313,825
AllianceBernstein Institutional Investment Mgmt	159,998
Wellington Management Company, LLP	114,018
Citigroup Asset Management	106,237
Lord, Abbett & Co.	82,684
T. Rowe Price	81,414
Grantham Mayo Van Otterloo & Company, LLC	64,072
MFS Asset Management, Inc.	62,130
Banc of America Capital Management, LLC	61,193
Morgan Stanley Investment Management Inc.	59,742
Putnam Investments, LLC	58,921
JPMorgan Fleming Asset Management	53,583
Mellon Capital Management Corp.	50,713
Goldman Sachs Asset Management	48,199
Merrill Lynch Investment Managers	46,606
Davis Selected Advisers, L.P.	42,971
Trust Company of the West	40,385
BlackRock, Inc.	37,625
Capital Guardian Trust Company	32,803
Jennison Associates Capital Corp.	32,554
Fayez Sarofim & Co.	28,280
Dimensional Fund Advisors, Inc.	27,965
American Express Management Group, Inc.	26,883
Quantitative Management Associates LLC	25,974
Prudential Investment Management, Inc.	25,768
AXA Rosenberg Investment Management	25,325
Fidelity Management Trust Company	25,127
Pacific Investment Management Company	24,156
Fiduciary/Franklin Templeton Institutional	23,984
Franklin/FranklinTempleton Institutional	23,766
AETNA Capital Management, Inc.	23,258
RCM Capital Management, LLC	23,059
Ariel Capital Management, Inc.	20,761