Outsourcing Mutual Fund Management: Firm Boundaries, Incentives and Performance

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Abstract:

We investigate the effects of firm boundaries on incentives and performance in the mutual fund industry. Fund families often farm out the management of their funds to advisory firms. We hypothesize that a key factor behind this make-or-buy decision is client demand for and the fixed cost of offering styles outside of family expertise. Indeed, we find that the incidence of outsourcing is non-linear in a family's assets under management---significantly higher for medium sized families than for either small or large ones. Moreover, small funds whose style differs from the family's modal style are more likely to be outsourced. We then argue that it is more difficult to extract performance from an outsourced fund than an in-house one. Consistent with this hypothesis, we find that funds managed externally are more likely to be closed down for poor past performance, take less risk and perform less well than comparable funds ran internally. We rule out alternative explanations such as outsourcing being a signal of a lack of family commitment to that fund's style.

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I. Introduction

Over the past two decades, mutual funds have been one of the fastest growing institutions in this country. At the end of 1980, they managed less than 150 billion dollars, but this figure had grown to over 4 trillion dollars by the end of 1997---a number that exceeds aggregate bank deposits (Pozen (1998)). Indeed, mutual funds were the default destination for much of the new money that flowed into the market in the 1990s. From 1988 to 2000, the percentage of American households owning mutual funds rose from 24 percent to 49 percent (Investment Company Institute (2000)). While the flow of new money has leveled off recently in the face of market declines, the mutual fund industry remains among the most important in the economy.[1]

The economics literature on mutual funds has largely focused on two issues. The first, which dates back to Jensen (1968), is whether managers are able to beat the market. The consensus is that a typical manager is not able to earn enough returns to justify her fee, i.e. funds under-perform the market by about 1% annually (see, e.g., Malkiel (1995), Gruber (1996)). The second is the agency problem arising out of delegated portfolio management. An important message of this literature is that incentives influence the risk-taking behavior of managers (see, e.g., Brown, Harlow and Starks (1996), Chevalier and Ellison (1997, 1999)).

Largely ignored is the role of organizations in shaping the incentives and performance of mutual funds. There are two main types of firms in this industry. The first is mutual fund companies (i.e. families or complexes) that market and distribute thousands of funds to retail investors. Examples are well-known brand names like

[1] In 2003, the number of households with mutual funds actually fell to 53.3 million from 54.2 million, but the percentage of U.S. households with mutual funds is still near an all time high of 47.9 percent (Investment Company Institute (2004)).

Fidelity and Vanguard. The second is investment advisors such as Wellington Capital who manage the portfolios of these funds and typically has little role in marketing. In the verbiage of industrial organization, fund companies are downstream firms and investment advisors are upstream firms.

A little recognized fact is that mutual fund companies often outsource the management of their funds to sub-advisory firms. One of the largest mutual fund companies in the world is Fidelity. Fidelity is vertically integrated in that they both market the funds and all their portfolio managers are Fidelity employees, i.e. all their funds are managed in-house. However, Fidelity is the exception rather than the rule. Many other families outsource to some degree. For example, Vanguard markets both index funds and actively-managed funds. While their index funds are managed in-house, Vanguard's actively-managed funds are run by investment advisory firms. Importantly, mutual fund investors are typically not aware if the managements of their funds are outsourced.

In this paper, we explore the determinants of this make-or-buy decision and consider the effects of firm boundaries on the incentives and performance of mutual funds. Such a study will help to illustrate the importance of organizational form in this industry. At the same time, it will further our insights into central questions of organizational economics. In his seminal article "The Nature of the Firm", Ronald Coase (1937) raised two fundamental questions that have spawned a large body of research: the first is do firm boundaries affect the allocation of resources? In other words, do firm boundaries matter and how? The second is what determines firm boundaries? As Scharfstein and Mullainathan (2001) point out, we know much more empirically about

the second question than the first. We have little to say about the second question but hope to better our understanding of the first in this paper.

We put together a unique database from 1994 to 2003 that tracks for each year whether a fund is outsourced or ran internally. We take the CRSP Mutual Fund Database, which has information on fund families and their funds and merge it with the CDA Spectrum Database, which has information on the names of the investment advisory companies that manage these funds. We are able to identify each fund as being outsourced or not by seeing if the names of the investment advisory companies from Spectrum match the name of the mutual fund complex marketing the fund. It turns out that a sizeable fraction of mutual fund companies outsource to some degree. Roughly 45.9% of these companies outsource about 32.5% of their funds in a typical year.

We then ask what drives this make-or-buy decision. In the analysis below, we take as given that the production of mutual funds is not done under one roof, i.e. we do not attempt to explain why Vanguard and Wellington are not integrated into one firm. Implicitly, we are appealing to theories of the firm such as the transactions cost economics model of Williamson (1975, 1985) and Klein, Crawford and Alchian (1978) and the related though not identical property rights model of Grossman and Hart (1986). These papers along with recent papers by Aghion and Tirole (1997) and Stein (2002) argue that there are various costs of having a boss which keep Wellington and Vanguard from being integrated.

Taking firm boundaries as given, we argue that this make-or-buy decision is driven by client demand for styles outside of family expertise and the fixed cost of offering them. We develop this hypothesis by using an analogy to the hiring of visitors

by academic departments to staff courses. This analogy not only makes clear our hypothesis but also illustrates the relevance of our results for other interesting contexts.

Consider Princeton University's department of economics, which offers an undergraduate certificate in finance. The department has full-time faculty members who teach financial economics. However, it also has to offer one basic accounting class as part of its curriculum. It could hire a visitor to teach the class or it could hire a tenured or tenure-track faculty in accounting. While economists may not be able to judge the quality of accounting professors, they can rely on screening done by business schools in their hiring decisions, e.g. hire an accounting professor from Wharton. The decision to make or buy is driven in part by whether there is enough demand for accounting classes to justify a full-time accounting professor. If the curriculum only demands one accounting course, then the cost-effective strategy is simply to staff it with a visitor.

This analogy applies equally well to mutual fund families. Most families begin with a few managers who specialize in a particular style (e.g. investing in small market capitalization growth companies). However, for transactions cost reasons, clients often want a mutual fund company to offer one-stop shopping. So this means that families have to offer other funds---a bond fund, a balanced fund or an international fund---so that their clients can invest in them for diversification reasons. Families with more assets under management face a greater demand for other styles beyond their expertise.

However, if the clients' demand for say an international fund is small, then there may not be enough assets under management to cover the fixed cost of hiring a full-time manager. The standard management fee in the industry for equity funds is around one percent of assets under management. So a fund with 25 million dollars of assets

generates only 250 thousand dollars in fees annually, which is not enough to cover a host of basic expenses including salaries for the portfolio manager and his analysts. Fortunately, there is a large pool of investment sub-advisors to choose from and mutual fund companies can easily fire one advisor and give the assets to another manager. In this case, it is cost efficient to outsource management to an investment advisory firm that focuses on international investing and that achieves scale by managing not just the family's international fund but other clients' as well.

The central predictions of this hypothesis are that the incidence of outsourcing should be non-linear in family size: medium sized families should do more outsourcing than either very small or very large families. The reason is that larger families with more assets under management (and hence more potential demand by existing clients for other styles) should do more outsourcing. At the same time, fixed costs are no longer an issue for very large families and so one should see these families producing all their funds under one roof. Moreover, one should find that families are most likely to outsource small funds in styles in which they do not specialize. Our analysis confirms these two predictions.

Returning to the Princeton-Wharton example, a downside of hiring an accounting professor from Wharton to teach a course is that she may be distracted with other responsibilities such as her courses at Wharton. At the same time, Princeton has fewer tools with which to motivate her. As a result, standard agency theory predicts that Princeton has to rely more on higher powered incentives related to teaching performance. Similarly, when the family farms out the management of a fund to another firm, it typically does not have any control over what else the manager works on and whether the

other firm is providing enough resources to that manager. The only tool that the family has at its disposal is higher-powered incentives related to performance. By bringing the advisor inside the firm, the family has much more information about the manager including the resources at the manager's disposal and hence does not need to rely as heavily on past performance, which can be sub-optimal given how noisy a measure of ability performance can be.

To test this hypothesis, we check to see if an outsourced fund's implicit incentive (as measured by closures) is indeed steeper. We follow the analysis in Chevalier and Ellison (1999) who find that young funds face steeper incentives (as measured by managerial replacement) than old funds. And more importantly, they find that managers of young funds are much more likely to get replaced following poor past performance whereas the replacement probability is relatively insensitive to good performance. Older funds do not seem to face such convex incentives. Using fund closures, we see if outsourced funds face steeper and more convex incentives than other funds. We find that this is the case and the differential is economically sizeable.

In interpreting these findings, we have to keep in mind that they may be driven by other types of heterogeneity. For instance, outsourced funds may be younger funds and younger funds may face steeper and more convex incentives. Our main concern, however, is associated with the family's commitment to a new style. The fact that the fund is outsourced as opposed to managed-in-house may be an indication that the family is only dipping its feet in a new style and will pull out at the first sign of trouble. Fortunately, we have a host of fund characteristics (such as fund size, fund age, family

size) and can use them with past returns to control for these alternative explanations. We find that our outsourcing effect is robust to these alternatives.

If our hypothesis that families have fewer tools to motivate outsourced funds is right, then we expect to see traces of this in performance. First, the fact that outsourced funds face more convex incentives than other funds ought to lead them to take less risk (see Chevalier and Ellison (1999)). To see if this is true, we compare the holdings of outsourced funds to their in-house counterparts and find that outsourced funds are much more likely to tilt their portfolio toward larger stocks or S&P 500 stocks. In addition, given that families have fewer tools to extract performance from outsourced funds, we ought to find that they under-perform comparable ones ran internally. We find that this is indeed the case.

In sum, these findings indicate that firm boundaries matter a great deal for both incentives and performance in the mutual fund industry. As we discuss in more detail below, the contributions of our paper are to establish the importance of organizations for the mutual fund industry and to clarify the effects of firm boundaries on incentives and performance more generally.

Our paper proceeds as follows. We describe the data, our identification scheme for outsourced funds and some cursory summary statistics regarding them in Section II. We document the characteristics of families that tend to outsource and the funds that get outsourced in Section III. In Section IV, we look at the effect of vertical integration on fund closures. In Section V, we explore the effects of vertical integration on risk-taking and fund returns. We discuss the related literature in Section VI and conclude in Section VII.

II. Data and Identification Scheme for Outsourced Funds

Our paper uses two databases. The first is the CRSP Mutual Fund Database, which goes back to the sixties. It provides information about fund performance along with a host of fund characteristics such as assets-under-management, expenses, age, and the names of the managers. Importantly, it also gives the name of the fund family or complex that each fund belongs to.[2] The second is the Spectrum Mutual Fund Holdings Database, which goes back to the early eighties. It details the portfolio holdings of each fund. Moreover, it provides the names of the investment advisory firms or sub-advisors managing the fund's portfolio. This key piece of information is only available after 1993. As such, our analysis is limited to the post 1993 period.

We merge these two databases using fund ticker symbols for the period of 1994 to 2003. A mutual fund may enter our database multiple times in the same year if it has different share classes. So we first clean the data by eliminating such redundant observations. We then categorize a fund as being outsourced or not by comparing the name of its family complex (provided by CRSP) to the names of its investment advisory firms (provided by Spectrum). The Spectrum Database provides up to two names

[2] We first select mutual funds with Investment Company Data, Inv. (ICDI) mutual fund objective of "aggressive growth" or "long-term growth" and categorize these funds as "Aggressive Growth" funds. We then add in mutual funds with Strategic Insight (SI) mutual fund objectives of "aggressive growth", "flexible" or "growth". We categorize funds with ICDI or SI objectives of "small-cap growth" as "Small-Cap Growth" and categorize funds with ICDI or SI objectives of "growth-income" or "income-growth" as "Growth and Income". We classify mutual funds with ICDI or SI objectives that contains the words "bond(s)", "government", "corporate", "municipal" or "money market" as "Bond or Money Market". Mutual funds whose objective contains the words "sector", "gold", "metals", "natural resources", "real estate" or "utility" are considered "Sector" funds. We classify funds whose objective contains the words "international" or "global" or a name of a country or a region as 'International' unless it is already classified. Finally, we categorize "balanced", "income", "special" or "total return" funds as "Balanced" funds.

because a fund may be managed by two or more advisory firms. To the extent that any of the names of the investment advisors does not match the name of the family complex, we identify that fund as being outsourced.

We carefully do this matching by hand so as to account for issues such as slight variations of names for the same organization (e.g. Smith Barney LTD versus Smith Barney) and to account for different divisions of the same company having different names (e.g. Morgan Stanley Japan is part of Morgan Stanley). The latter issue is relevant mostly for categorizing international funds. Using this scheme, we identify 18,592 fund-year observations as being managed in-house and 17,435 fund-year observations as being outsourced.

This method, however, is imperfect because investment advisory names may sometimes be missing. There are 2,884 fund-year observations that are unidentified because of such missing information. We are able to reduce the number of unidentified funds by using an investment advisory firm code that Spectrum provides in addition to the name of the sub-advisor. For instance, Vanguard is given a code of VANG. We supplement our identification scheme by using this code: of the 2,884 missing fund-year observations, 643 can now be identified as managed in-house and 241 as outsourced. In total, we have 19,232 fund-year observations as being managed in-house, 12,797 as outsourced and 2006 are left unidentified.

Table 1 provides summary statistics regarding our identification scheme. Panel A reports the results by year. The first thing to note is that the fraction of funds left unidentified decreases somewhat during the latter part of our sample (from about 10% at the beginning to 5% during the last year). Our results are robust to different sample

periods. So this makes us feel comfortable that the fraction of funds left unidentified is not driving our results.

We delve into this issue further by breaking down the funds left unidentified each year by styles provided by the CRSP Mutual Fund Database. Panel B reports these results by year. The key thing to note is that most of the funds that are unidentified each year are bond and money market funds. The reason is that the Spectrum Database focuses primarily on equity and has spottier coverage of bond funds. Our results, however, hold even if we just considered equity funds. So these missing observations do not appear to be driving our results. Our final sample excludes funds that we are unable to definitively identify as being outsourced or not.

One final issue that may affect our identification scheme is fund mergers. The reason is that the two databases may not be synchronized when updating information about mergers. For instance, if Mellon Capital merged with Chase Manhattan and CRSP changed the name of the Mellon fund to Chase and Spectrum did not update this information at the same time, then we may inadvertently classify Chase funds as outsourced to Mellon even though they are the same firm.

Luckily, the CRSP Database provides information on the date when a fund is merged into another or if a fund changed management-company (family in the CRSP Mutual Fund Database). We have re-done all of the analyses below by dropping fund-year observations in which there are such mergers. We lose only a small fraction of our sample and our results are unchanged. In addition, we have randomly checked the outcomes of our identification scheme by downloading fund prospectuses from the internet and found it to be accurate.

Our sample excluding the unidentified funds is described in Table 2. Panel A presents the number of in-house funds in our sample by style and by year. In Panel B, we look at the fraction of funds that are outsourced by fund style. First, the incidence of the portfolio management of funds being farmed out is uniform across almost every style---for seven of the eight styles, about 40% of funds on average are outsourced. The exception is Sector funds---about 28% of these funds are outsourced on average. So outsourcing does not appear to be limited to a few styles. And we see that the incidence of outsourcing has also increased over time across almost every style (except for bond and money market funds). A small part of this increase may be due to identification rates going up slightly over time if we tend to not be able to identify outsourced funds. More plausibly, it appears to reflect the mutual fund industry (i.e. families) having gotten significantly bigger during this period (as witnessed by the dramatic increase in the number of funds) and outsourcing a significant portion of their management in turn.

In Table 3, we provide monthly descriptive statistics regarding the funds in our sample. We separate these statistics out by equity funds (Panel A) and bond/money market funds (Panel B). In Panel A, we report the means and standard deviations for the variables of interest for each fund size quintile. In each month, our sample includes on average about 2533 funds. They have average total net assets (TNA) of 574.9 million dollars, with a standard deviation of 1600.69 million dollars. For the usual reasons related to scaling, the proxy of fund size that we will use in our analysis is the log of a fund's total net assets under management or TNA (LOGTNA). The statistics for this variable are reported in the row right below that of TNA. Another variable of interest is

LOGFAMSIZE, which is the log of one plus the cumulative TNA of the other funds in the fund's family (i.e. the TNA of a fund's family excluding its own TNA).

In addition, the database reports a host of other fund characteristics that we utilize in our analysis. The first is fund turnover (TURNOVER), defined as the minimum of purchases and sales over average TNA for the calendar year. The average fund turnover is 71.57 percent per year. The average fund age (AGE) is about 8.43 years. The funds in our sample have expense ratios as a fraction of year-end TNA (EXPRATIO) that average about 1.23 percent per year. They charge a total load (TOTLOAD) of about 1.94 percent (as a percentage of new investments) on average. FLOW in month t is defined as the fund's TNA in month t minus the product of the fund's TNA at month t-12 with the net fund return between months t-12 and t, all divided by the fund's TNA at month t-12. The funds in the sample have an average fund flow of about 37.59 percent a year. PRET is the past one-year cumulative return of the fund. Panel B reports similar statistics for bond funds.

III. Determinants of Outsourcing

We begin by presenting summary statistics on outsourcing outcomes in this industry. Table 4 reports by year the characteristics of mutual fund families that outsource. Panel A presents these statistics for all mutual fund families. In the first column, we report the number of mutual fund companies in our sample. In 1994, there are 340 companies. This number increases to a peak of 499 in 2000. And following the end of the dot-com bubble, it falls to 439 in 2003. In the second column, we report the average number of funds marketed per family by year. The typical family markets

roughly seven funds, though this number has gone up somewhat overtime. In the third column, we report the fraction of companies that do any outsourcing. Roughly 40% of families outsource to some degree in the first-half of the sample (1994-1998) and about 51% of families do so in the second-half (1999-2003). In the fourth column, we report the fraction of funds per family that get outsourced. The typical family on average farms out the management of 32.5% of its funds.

The last two columns of this panel report how concentrated in a style are the families in our sample. For each fund family, we calculate two measures of concentration. The first is its modal style in a given year (among the styles offered by the family in a given year, the one with the most of the family's assets under management). The second is its core or initial style (among the styles offered by the family during its first year in the CRSP Mutual Fund Database which goes back the 1960s, the one with the most of the family's assets under management). A fund's modal style is highly persistent across years and is highly correlated with its core style. As the results in these two columns attests, most families' funds are concentrated in one style---around 74% of assets are in the modal style and around 45% of assets in the core style. These two measures indicate that many families, even very big ones, tend to specialize and have a core style in which they have expertise.

We next consider what drives this make-or-buy decision. We argue that a key factor is the demand for and the fixed cost of producing funds in a new style. In the introduction, we developed this hypothesis by using an analogy to the hiring of visitors by academic departments to staff courses. In particular, we introduced the Princeton-Wharton example and made clear why this example applies equally well to mutual fund

families. The central predictions of this hypothesis are that the incidence of outsourcing should be non-linear in family size: medium sized families should do more outsourcing than either very small or very large families. The reason is that larger families with more assets under management (and hence more potential demand by existing clients for other styles) should do more outsourcing. At the same time, fixed costs are no longer an issue for very large families and so one should see these families producing all their funds under one roof. Moreover, one should find that families are most likely to outsource small funds in styles in which they do not specialize. We use two proxies for family expertise: its modal style and its core style. Below, we present results using only a fund's modal style but similar results obtain if we used a fund's core style.

To test these predictions, we estimate, for each year of our sample, the following cross-sectional regression specification:

$$OUTSOURCED_{i,t} = \mu + \gamma \mathbf{X}_{i,t-1} + \varepsilon_{i,t} \qquad i=1,\ldots,M. \tag{1}$$

$OUTSOURCED_{i,t}$ is a dummy variable that equals one if fund i in year t is outsourced and zero otherwise. μ is a constant term. $\mathbf{X}_{i,t-1}$ is a vector of fund characteristics. And $\varepsilon_{i,t}$ stands for an error term that is uncorrelated with all other independent variables. $\mathbf{X}_{i,t-1}$ (measured at the end of year t-1) includes an indicator for whether or not the fund is in the modal style of the family ($INMODALSTYLE_{i,t-1}$), $LOGTNA_{i,t-1}$, $LOGFAMSIZE_{i,t-1}$, $TURNOVER_{i,t-1}$, $AGE_{i,t-1}$, $EXPRATIO_{i,t-1}$, $TOTLOAD_{i,t-1}$, $FLOW_{i,t-1}$, $PRET_{i,t-1}$, and a quadratic term $LOGFAMSIZE^2_{i,t-1}$ to capture the non-linear effect in family size. γ is the vector of coefficients of interest. We then take the estimates of γ from these cross-

sectional regressions and follow Fama and MacBeth (1973) in taking their time series means and standard deviations to form our overall estimates of the effects of fund characteristics on whether or not a fund is outsourced.

Table 5 reports the results. In column (1), we consider a baseline specification in which the aforementioned fund characteristics enter linearly. A fund that is in the modal style of the family is significantly less likely to be outsourced. The coefficient in front of INMODALSTYLE is -0.0364 with a t-statistic of -3.99. Since about 38% of funds get outsourced in a typical year in our sample, this means that being in the modal style cuts down on the chances of a fund being outsourced by 10% of the mean (0.0364 of 0.38). Moreover, a large fund is also significantly less likely to be outsourced than a small fund. The coefficient in front of LOGTNA is -0.0271 with a t-statistic of -10.35. One standard deviation of LOGTNA is about 2, so a one-standard deviation increase in LOGTNA means that a fund's chances of being outsourced decreases by 0.05 (-0.0271 x 2), which is nearly 13% of the mean (0.05 of 0.38). In contrast, a fund from a large family is much more likely to be outsourced. The coefficient in front of LOGFAMSIZE is 0.0188 with a t-statistic of 10.42. A one-standard deviation movement in LOGFAMSIZE is about 3.25. Changing the size of the family that the fund belongs to by one-standard deviation increases its chances of being outsourced by 0.06 (0.0188 x 3.25), which is nearly 16% of the mean (0.06 of 0.38).

These three findings are consistent with our hypothesis that larger families are more likely to outsource small funds not in its expertise. Other characteristics that significantly cut down on the chances of a fund being outsourced are if the fund has high

turnover, if it is old and if it had good returns last year. All three of these effects make intuitive sense though they do not speak directly to our hypothesis.

In column (2), we augment the specification in column (1) by adding in an interaction term involving $LOGFAMSIZE^2_{i,t-1}$. The idea here is to see if medium sized families do more outsourcing then either small or big families as predicted by our hypothesis. We find that the coefficient in front of the linear term is 0.0719 with a t-statistic of 8.12 and the coefficient in front of the quadratic term is -0.0051 with a t-statistic of 6.76. So the incidence of outsourcing increases initially with family size but then decreases with family size when size is large. To figure out at what family size level the peak incidence of outsourcing is reached, the derivative of the incidence of outsourcing with respect to log family size is 0.0719 – 2 * 0.0051 * LOGFAMSIZE. Setting this derivative equal to zero, we obtain at the maximum point of outsourcing is reached when LOGFAMSIZE equals 7.04, which according to Table 3 is roughly the median log family size in our sample.

So our key hypothesis is confirmed: families of medium size outsourced more than small or large families. This confirms well with what we know about small families but also about large families such as Fidelity and American, the two largest families in our sample. These two mega-families outsource collectively only a couple of funds.

IV. Firm Boundaries, Fund Closures and Implicit Incentives

Having established the determinants of outsourcing outcomes in this industry, we now focus on the effects of firm boundaries on incentives. As we argued by analogy to the Princeton-Wharton example in the introduction, we expect outsourced funds to face

steeper incentives than in-house funds because when the family farms out the management of a fund to another firm, it typically does not have any control over what else the manager works on and whether the other firm is providing enough resources to that manager. The only tool that the family has at its disposal is higher-powered incentives related to performance and so it needs to rely more heavily on this tool. By bringing the advisor inside the firm, the family has much more information about the manager including the resources at the manager's disposal and hence does not need to rely as heavily on past performance.

To test this hypothesis, we check to see if an outsourced fund's implicit incentive (as measured by closures) is indeed steeper. We follow the analysis in Chevalier and Ellison (1999) who find that younger funds face steeper implicit incentives (as measured by managerial replacement) than older funds. Importantly, they also find that managers of younger funds are much more likely to get replaced following poor past performance, whereas the replacement probability is relatively insensitive to good performance. Older funds do not seem to face such convex incentives.

Using fund closures instead of managerial replacement, we see if outsourced funds face steeper and more convex incentives than other funds. We estimate the following regression specification:

$$CLOSED_{i,t} = \mu + \boldsymbol{\theta}\, \mathbf{X}_{i,t-1} + \varepsilon_{i,t} \qquad i=1,\ldots,M. \tag{2}$$

$CLOSED_{i,t}$ is a dummy variable that equals one if fund i is closed in year t and zero otherwise.[3] μ is a constant. $\mathbf{X}_{i,t-1}$ is a vector of fund characteristics (measured at the end of year t-1) that includes an indicator for whether the fund is outsourced ($OUTSOURCED_{i,t-1}$), and an indicator for whether it is in the modal style of its family ($INMODALSTYLE_{i,t-1}$). The other independent variables of interest in $\mathbf{X}_{i,t-1}$ are $LOGTNA_{i,t-1}$, $LOGFAMSIZE_{i,t-1}$, $TURNOVER_{i,t-1}$, $AGE_{i,t-1}$, $EXPRATIO_{i,t-1}$, $TOTLOAD_{i,t-1}$, $FLOW_{i,t-1}$ and $PRET_{i,t-1}$. We will also include interactions of these variables as additional independent variables. $\boldsymbol{\theta}$ is the vector of coefficients on these variables. $\varepsilon_{i,t}$ again stands for an error term that is uncorrelated with all other independent variables. We then take the estimates from pooled annual regressions.

Table 6 reports the results. Column (1) reports the results for the baseline regression specification. In interpreting the results below, it is useful to keep in mind that the mean probability that a fund is closed down in a given year is 2.3%. The coefficient in front of OUTSOURCED is positive and statistically significant. Being outsourced increases a fund's chances of being closed down by 0.0068 or a 29% (0.0068/0.023) increase relative to the mean probability of being closed. The coefficient in front of PRET is negative (-0.0004) and statistically significant (t-statistic of -6.46). A fund that has a 10% lower past year return increases its probability of closure by 17% relative to the mean closure probability (-0.0004*10/0.023).

Other significant predictors of closures include INMODALSTYLE, LOGTNA, LOGFAMSIZE and AGE. The coefficient in front of INMODALSTYLE is -0.0054 with a t-statistic of -2.68. So being in the modal style of the family lowers a fund's chances of

[3] A fund is defined as closed in year t if it does not have a full set (twelve months) of fund returns in that year.

being closed by -0.0054 percentage points or a 23% decrease relative to the mean probability of being closed down. Moreover, a large fund faces a significantly lower probability of being closed down. The coefficient in front of LOGTNA is -0.0111 with a t-statistic of -6.07. One standard deviation of LOGTNA is about 2, so a one-standard deviation increase in LOGTNA means that a fund's chances of being closed is decreased by about 0.02 (-0.0111 x 2), which is nearly 95% of the mean. Being from a big family and being older also increase the chances of a fund being closed down.

In column (2), we add in an additional explanatory variable in the form of the interaction of OUTSOURCED and PRET to see if outsourced funds face a differential sensitivity of closure to performance. We find that the coefficient is negative and statistically significant, indicating that outsourced funds are more likely to be closed down for poor performance. A 10% decrease in returns for an outsourced fund increases its chances of being closed by 30% relative to the mean probability (-0.0007*10/0.023). In other words, outsourced funds face significantly steeper incentives than their in-house counterparts.

In interpreting the regression in column (2), we have to keep in mind that these results may be driven by other types of heterogeneity. For instance, outsourced funds may be younger funds and younger funds face steeper incentives. Or outsourced funds are more likely to be part of larger families and large families can more easily replace managers. Fortunately, we have a host of fund characteristics (such as fund size, fund age, family size) and use them along with past fund returns to control for these alternative explanations in the above closure regressions.

We do just this in columns (3) and (4). In column (3), we add in additional interaction terms including PRET*LOGTNA, PRET*LOGFAMSIZE, and PRET*AGE. These three interaction terms should pick up if our effect in column (2) is due to OUTSOURCED being a proxy for LOGTNA, LOGFAMSIZE or AGE. Notice that the coefficient in front of PRET*LOGTNA is positive and statistically significant, indicating that larger funds face flatter incentives. The coefficient in front of PRET*LOGFAMSIZE is negative (indicating that funds from large families face steeper incentives) but is not statistically significant. The coefficient in front of PRET * AGE is negative but is not statistically significant. In other words, these controls appear to be doing their job and yet the coefficient in front of PRET*OUTSOURCED is still negative and statistically significant. So even with these controls, outsourced funds still face steeper incentives, suggesting that there is an independent outsourcing effect.

We continue along this vein in column (4) by adding in three additional interaction terms including PRET*EXPRATIO, PRET*TOTLOAD, and PRET*FLOW. These additional terms, except for PRET*FLOW, do not attract statistically significant coefficients. More importantly, the coefficient in front of PRET*OUTSOURCED remains negative and statistically significant. In sum, it does not appear that our finding in column (2) is driven by obvious omitted fund characteristics

Our main concern, however, is that what is driving our result in column (2) is that a fund being outsourced is associated with the family's lack of commitment to a new style. In other words, the fact that the fund is outsourced as opposed to managed in-house is an indication that the family is only dipping its feet in a new style and will pull

out at the first sign of trouble. This is a very plausible alternative hypothesis that can explain our key result.

To deal with this alternative, we control for whether or not the fund is in the modal style of the family and interact this with fund size. If it is indeed a commitment issue, we would expect that small funds in non-modal styles face a much higher sensitivity to past performance and for this control to take out the outsourcing effect identified in column (2). To see if this is the case, we add in several new variables in column (5) including PRET*LOGTNA*INMODALSTYLE. Indeed, we find that the coefficient in front of PRET*LOGTNA*INMODALSTYLE is negative (suggesting that small funds not in the modal style of the family are much more likely to be closed down for poor performance) but is not statistically significant. This is very consistent with our lack-of-commitment to new styles alternative. However, the coefficient in front of OUTSOURCED*PRET remains negative and statistically significant. So a lack of commitment to a new style does not appear to be driving our outsourcing effect.

In Panel B, we replace PRET with PRETLOW, which equals PRET if PRET is below average when compared to the average fund performance in the market and equals the average PRET in the market otherwise. The idea here, motivated by the work of Chevalier and Ellison (1999), is to see if fund closures are more sensitive to poor than good past performance (i.e. are implicit incentives convex)? And more importantly from our perspective, whether outsourced funds' increased closure sensitivity to performance in Panel A is due to the fact that it faces more convex incentives. In column (1), we find that the coefficient in front of PRETLOW is negative and statistically significant and is significantly larger in absolute value than the coefficient in front of PRET in column (1)

of Panel A. This suggests that funds in our sample do in fact face convex incentives on average.

In column (2), we look to see if outsourced funds face more convex incentives than in-house funds. The coefficient of interest is the one in front of PRETLOW*OUTSOURCED. This coefficient is negative and statistically significant. More importantly, it is bigger in absolute value than the coefficient in front of PRET*OUTSOURCED in Panel A. What this means is that outsourced funds' sensitivity to past returns is bigger for poor past returns than it is for good past returns. In other words, outsourced funds face more convex incentives than their counterparts.

In columns (3) through (5), we check to see if our finding in column (2) is due to omitted variables along the lines discussed earlier. We find that this is not the case. But just as a final check, we confront in Table 7 the lack-of-commitment alternative head on by calculating whether when an outsourced fund is shut down it means that the family pulls out of that style. This table looks at funds that were closed. The dependent variable is an indicator that the family no longer offers a fund (the next year) in the style of the fund that was closed. The probability that a family shuts a style when they close a fund in the data is 26.6%. The independent variables are the usual controls we use in other regressions. The coefficient of interest is on OUTSOURCED. The negative coefficient suggests that families are less likely to end a style when they close an outsourced fund compared to when they close other funds. But this is not statistically significant. In other words, it does not appear that outsourcing even appears to be a signal of a lack of family commitment toward a new style.

We have also considered a number of other less compelling alternatives. First, perhaps the outsourcing effect reflects the fact that there are a lot of other funds in an outsourced fund's style and so it is easy to replace that fund. To deal with this, we introduce a new variable, the number of other funds from the family in a fund's style (NUMBERINSTYLE), as a control and find that our outsourcing effect is not due this alternative. We have experimented with other proxies including an indicator for whether a fund is the only fund in its style (ONLYFUNDINSTYLE). Again, it does not affect the estimate in front of OUTSOURCED*PRET. (We omit these results for brevity.) Second, the steeper implicit incentives faced by outsourced funds may reflect mutual fund investors being more vary of funds that are outsourced than ran in-house. However, we do not believe that this is a plausible alternative since most retail investors are not even aware that their funds are being outsourced.

V. Effects of Firm Boundaries on Performance: Risk-Taking and Returns

A. Risk-Taking

The fact that outsourced funds face more convex implicit incentives than other funds ought to lead them to take less risk (see Chevalier and Ellison (1999)). We see if this is true in this section. Our measure of risk-taking is the extent to which a fund's portfolio is tilted toward large stocks or S&P 500 stocks. Funds that closely track the market we will consider as taking less risk. We estimate the following quarterly regressions to see how outsourcing affects risk-taking:

$$RISKTAKING_{i,t} = \mu + \boldsymbol{\delta}\, \mathbf{X}_{i,t-1} + \varepsilon_{i,t} \qquad i=1,\ldots,M. \tag{3}$$

We will consider two measures of $RISKTAKING_{i,t}$. The first is the log of the average market capitalization of the stocks held by the mutual fund in the quarter.[4] The second is the percentage of a mutual fund's holdings that consist of stocks in the S&P 500. $\mathbf{X}_{i,t-1}$ is a vector of fund characteristics (measured at the end of quarter t-1) that includes an indicator for whether the fund is outsourced ($OUTSOURCED_{i,t-1}$), an indicator for whether it is in the modal style of its family ($INMODALSTYLE_{i,t-1}$), $FUNDSIZE_{i,t-1}$, $LOGFAMSIZE_{i,t-1}$, $TURNOVER_{i,t-1}$, $AGE_{i,t-1}$, $EXPRATIO_{i,t-1}$, $TOTLOAD_{i,t-1}$, $FLOW_{i,t-1}$ and $PRET_{i,t-1}$.

We also include a dummy variable for each mutual fund investment objective as fund style control, but do not report their estimates. The sample is from the first quarter of 1994 to the fourth quarter of 2003. $\boldsymbol{\delta}$ is the vector of coefficients on these variables. $\varepsilon_{i,t}$ again stands for a generic error term that is uncorrelated with all other independent variables. We then take the estimates from these quarterly regressions and again follow Fama and MacBeth (1973) in taking their time series means and standard deviations to form our overall estimates.

From column (1), we see that outsourced funds are more likely to hold stocks with large market capitalization in their portfolios. Outsourcing increases the average market capitalization of stocks in the fund's portfolio by about 10% (exp(0.0918)-1). The other variables with statistically significant coefficients are INMODALSTYLE, LOGFAMSIZE, EXPRATIO and TOTLOAD. Being in the modal style leads a fund to hold fewer large stocks in its portfolio. In contrast, funds from large families are more

[4] The average is taken by weighting the market caps of each stock in a fund's portfolio by the portfolio weight of that stock.

likely to hold large stocks. Funds with high expense ratios are less likely to hold large stocks whereas funds with high total load are more likely to hold large stocks. The important thing to note is that OUTSOURCED remains statistically and economically significant in spite of these controls.

In column (2), we look at how outsourcing affects whether or not a fund invests a larger percentage of their portfolio in S&P 500 stocks. The average percentage of stocks in the S&P 500 held by funds in our sample is about 40%. The coefficient on OUTSOURCED is 0.0147. That means that being an outsourced fund increases the amount of S&P stocks a fund owns by 0.0147 divided by 0.4 or 12%. Interestingly, the coefficient in front of INMODALSTYLE is now positive as opposed to negative as in column (1). So it appears that outsourcing is distinct from whether or not a fund is in the modal style of the family. The other coefficients remain largely the same.

B. Fund Returns

Our hypothesis suggests that if it is more difficult to motivate outsourced funds than ones ran internally, then we ought to find that outsourced funds under-perform their in-house counterparts. We see if such a differential exists in this section. We analyze the effect of outsourcing on performance in the regression framework proposed by Fama and MacBeth (1973), where we can control for the effects of other fund characteristics on performance. Specifically, the regression specification that we utilize is

$$FUNDRET_{i,t} = \mu + \boldsymbol{\lambda}\, \mathbf{X}_{i,t-1} + \varepsilon_{i,t} \qquad i=1,\ldots,M. \qquad (4)$$

where $FUNDRET_{j,t}$ is the raw return (either gross or net) of fund i in month t adjusted by various performance benchmarks, μ is a constant, $\mathbf{X}_{i,t-1}$ is a set of variables (in month t-1) that includes $OUTSOURCED_{i,t-1}$ (an indicator of whether or not the fund is outsourced in month t-1), $LOGTNA_{i,t-1}$, $LOGFAMSIZE_{i,t-1}$, $TURNOVER_{i,t-1}$, $AGE_{i,t-1}$, $EXPRATIO_{i,t-1}$, $TOTLOAD_{i,t-1}$, $FLOW_{i,t-1}$ and $PRET_{i,t-1}$. Here, $\varepsilon_{i,t}$ again stands for a generic error term that is uncorrelated with all other independent variables. λ is the vector of loadings on the control variables. We then take the estimates from these monthly regressions and take their time series means and standard deviations to form our overall estimates of the effects of fund characteristics on performance.

In Table 9, we report the estimation results for the baseline regression specification given in Equation (4). We begin by reporting the results for gross fund returns in columns (1). The coefficient of interest in front of OUTSOURCED is -0.072 with a t-statistic of -3.2. So an outsourced fund under-performs other funds by 7.2 basis points a month or roughly 84 basis points a year. To put this magnitude into some perspective, observe that a standard deviation of mutual fund returns is about 17% annual. So an 84 basis points annual spread is economically significant. Another way to think about these magnitudes is that the typical fund has a gross fund performance net of the market return that is basically near zero. As a result, a spread in fund performance of 84 basis points a year is quite meaningful to investors.

The coefficients which are statistically significant besides OUTSOURCED are LOGTNA, LOGFAMSIZE and PRET. The coefficient in front of LOGNTA is negative and the one in front of LOGFAMSIZE is positive. So fund size hampers performance while being part of a large family helps performance. These results are similar to those

obtained in Chen, Hong, Huang and Kubik (2004) and the interpretation of these findings is the focus of their paper. We discuss their paper in the related literature section below. The thing to observe is that the economic effect of outsourcing on performance is similar to that of fund size and family size. For instance, the coefficient in front of LOGTNA is around –0.046 with a t-statistic of around -2.5. Since one standard deviation of LOGTNA is around 2, a two standard deviation shock to fund size means that performance changes by –0.046 times 4, or about 18 basis points per month. The outsourcing effect is about one-third of the fund size effect.

The fact that the coefficient in front of PRET is significant suggests that there is some persistence in fund returns. As for the rest of the variables, some come in with expected signs, though none are statistically significant. The coefficient in front of EXPRATIO is negative, consistent with industry observations that larger funds have lower expense ratios. The coefficients in front of TOTLOAD and TURNOVER are positive as these two variables are thought to be proxies for whether a fund is active or passive. Fund flow has a negligible ability to predict fund returns and the age of the fund comes in with a negative sign but is statistically insignificant.

In column (2), we check the robustness of the results in column (1) by allowing for fund-style by fund-size effects. The idea is that fund performance may differ because of variations in styles and we do not want our OUTSOURCED variable to be picking up heterogeneity in fund styles. To be extra conservative, we interact fund-style dummies with fund-size dummies (by quintiles) to also soak up any variation in performance due to fund size within a style. Adding these extra conservative controls is similar to demeaning fund performance by fund style loadings. Our outsourcing result is robust to

these additional controls. The coefficient in front of OUTSOURCED falls---from -0.072 to -0.64---but the t-statistic remaining at around 5. The added controls do not significantly change the coefficients on the other variables.

We next report the results of the baseline regression using net fund returns in column (3). The coefficient in front of OUTSOURCED is still negative and statistically significant. Indeed, the coefficient in front of OUTSOURCED is only slightly smaller using net fund returns than using gross fund returns. The observations regarding the economic significance of fund size made earlier continue to hold. If anything, they are even more relevant in this context since the typical fund tends to under-perform the market by about 96 basis points annually. The coefficients in front of the other variables have similar signs as those obtained using gross fund returns. Finally, we augment the specification in column (3) by considering fund-size by fund-style effects and find that our key results remain. In sum, it appears that outsourced funds under-perform comparable funds run internally and this result is robust to different measures of performance.

VI. Related Literature

Our paper is related to two literatures. The first is the literature on mutual funds. As we explained in the introduction, much of this literature has focused on the measurement of mutual fund performance and the agency problem between investor and portfolio manager. There are very few papers on the role of organization form in the mutual fund industry. Some exceptions include Chen, Hong, Huang and Kubik (2004) and Ivkovic (2002) who consider the effect of fund size on mutual fund performance.

Chen, Hong, Huang and Kubik (2004) document that fund returns, both before and after fees and expenses, decline with lagged fund size, even after accounting for various performance benchmarks. They find that this association is most pronounced among funds that have to invest in small and illiquid stocks, suggesting that these adverse scale effects are related to liquidity. However, they also find that controlling for its size, a fund's return does not deteriorate with the size of the family that it belongs to, indicating that scale need not be bad for performance depending on how the fund is organized. Using data on whether funds are solo-managed or team-managed and the composition of fund investments, they explore the idea that scale erodes fund performance because of the interaction of liquidity and organizational diseconomies along the lines of suggested by Grossman and Hart (1986), Aghion and Tirole (1997) and Stein (2002).

Our paper is also part of a broader literature on the theory of the firm and in particular, the make-or-buy decision. Recent reviews of these theories and the related empirical work are Joskow (2004) and Klein (2004). As the reviews make clear, most of the empirical studies have focused on how asset specificity or product complexity affect the decision to vertically integrate along the lines suggested by the transactions cost economics model of Williamson (1975, 1985) and Klein, Crawford and Alchian (1978). While the nearly five-hundred empirical papers along this line make clear that asset specificity appears to matter, these studies do not give us a detailed view of the interplay of firm boundaries, incentives and performance because of data limitations. Our paper makes clear that the mutual fund industry is unique in offering a setting with sufficiently detailed data about integration, incentives, risk-taking behavior and performance to allow a detailed analysis of these issues. There are few other studies with as rich a dataset.

Exceptions include papers by Baker and Hubbard (2000), Berger, Miller, Petersen, Rajan and Stein (2002), and Simester and Wernefelt (2002) who test the theory of the firm according to the property rights model of Grossman and Hart (1986).

VII. Conclusion

Many mutual fund families farm out the management of a number of their funds to investment advisory firms. We study this make-or-buy decision. We hypothesize that this decision is driven by client demand for styles outside of family expertise and the fixed cost of offering them. Consistent with this hypothesis, we find the following. First, medium sized families are more likely to outsource than either small or large families. Second, a fund is more likely to be farmed out if its style is not the same as that of its family's area of expertise (measured by a family's modal or core style).

We then argue that it is more difficult for a family to extract performance from an outsourced fund than an in-house one. Indeed, we find that they are more likely to be closed down for poor past performance, suggesting that families have to rely more heavily on performance-based incentives. In other words, outsourced funds face more convex incentives (closures more sensitive to losses than gains). We also find evidence that they take less risk as a response to these steeper incentives. And importantly, they perform less well than comparable funds ran internally. We rule out alternative explanations related to outsourcing being a signal of a lack of family commitment to that fund's style. These latter findings suggest firm boundaries matter a great deal for incentives and performance in the mutual fund industry.

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Table 1: Identification of Mutual Fund Management

This table reports the number of mutual funds we identify as being managed in-house versus being outsourced. We match every mutual fund in CRSP Mutual Fund Database with entries in Spectrum Mutual Fund Database using its ticker symbol. We identify a fund as being managed in-house if the name of its mutual fund family reported in CRSP matches the names of its investment advisory firm reported in Spectrum. If the names do not match, then we identify the mutual fund management as being outsourced. If the names are not provided and we cannot further identify the management using manager abbreviation codes, we label the fund as being unidentified. Panel A reports the distribution of fund management outcomes by year. Panel B breaks down the unidentified mutual funds by style. Percentages of total within each year are reported in parenthesis.

Panel A: Number of funds that are managed in-house, outsourced and left unidentified

Year	In-house	Outsourced	Unidentified
1994	1429 (64%)	559 (25%)	229 (10%)
1995	1526 (62%)	717 (29%)	199 (8%)
1996	1662 (61%)	855 (31%)	209 (8%)
1997	2011 (61%)	1010 (31%)	280 (8%)
1998	1975 (56%)	1313 (37%)	269 (8%)
1999	1897 (49%)	1770 (46%)	171 (4%)
2000	2210 (55%)	1632 (41%)	154 (4%)
2001	2286 (56%)	1676 (41%)	156 (4%)
2002	2188 (55%)	1668 (42%)	145 (4%)
2003	2048 (53%)	1597 (42%)	194 (5%)
Total	19232 (57%)	12797 (38%)	2006 (6%)

Panel B: Breakdown of unidentified funds by style

Year	Aggressive Growth	Small-Cap Growth	Growth and Income	Bond or Money Market	Sector	International	Balanced
1994	24	15	23	103	9	25	30
1995	16	13	17	103	7	23	20
1996	16	13	16	113	6	25	20
1997	23	16	17	147	16	39	22
1998	19	19	15	144	18	39	15
1999	5	1	4	141	2	11	7
2000	3	0	1	138	1	8	3
2001	2	0	2	140	1	7	4
2002	4	0	3	127	1	6	4
2003	6	3	8	137	8	21	11
Total	118	80	106	1293	69	204	136

Table 2: Investment Styles of Mutual Funds

This table shows the styles of mutual funds identified as managed in-house versus outsourced for our final sample of funds that excludes unidentified funds. Panel A breaks down in-house funds by style. Panel B breaks down outsourced funds by style.

Panel A: Breakdown of in-house funds by style

Year	Aggressive Growth	Small-Cap Growth	Growth and Income	Bond or Money Market	Sector	International	Balanced
1994	217 (75%)	135 (76%)	190 (74%)	262 (58%)	118 (89%)	265 (77%)	242 (72%)
1995	241 (71%)	142 (67%)	194 (68%)	272 (56%)	123 (88%)	303 (75%)	251 (67%)
1996	263 (69%)	166 (67%)	207 (66%)	312 (57%)	134 (83%)	329 (71%)	251 (63%)
1997	326 (69%)	214 (67%)	252 (69%)	378 (58%)	159 (80%)	401 (70%)	281 (63%)
1998	325 (61%)	209 (67%)	230 (60%)	369 (53%)	176 (76%)	398 (64%)	268 (57%)
1999	308 (52%)	193 (60%)	223 (51%)	395 (53%)	178 (66%)	344 (48%)	256 (51%)
2000	361 (56%)	223 (48%)	260 (56%)	458 (59%)	221 (67%)	414 (56%)	273 (57%)
2001	386 (55%)	237 (55%)	269 (56%)	476 (60%)	239 (66%)	414 (55%)	265 (58%)
2002	369 (53%)	232 (56%)	257 (55%)	478 (62%)	242 (66%)	378 (54%)	232 (53%)
2003	339 (52%)	225 (54%)	231 (52%)	454 (59%)	235 (69%)	337 (55%)	227 (54%)
Total	3135 (59%)	1976 (58%)	2313 (59%)	3854 (58%)	1825 (72%)	3583 (61%)	2546 (59%)

Panel B: Breakdown of outsourced funds by style

Year	Aggressive Growth	Small-Cap Growth	Growth and Income	Bond or Money Market	Sector	International	Balanced
1994	73 (25%)	42 (24%)	67 (26%)	192 (42%)	15 (11%)	78 (23%)	92 (28%)
1995	100 (29%)	70 (33%)	91 (32%)	214 (44%)	17 (12%)	102 (25%)	123 (33%)
1996	118 (31%)	80 (33%)	105 (34%)	239 (43%)	27 (17%)	137 (29%)	149 (37%)
1997	145 (31%)	105 (33%)	113 (31%)	272 (42%)	39 (20%)	173 (30%)	163 (37%)
1998	207 (39%)	142 (40%)	155 (40%)	322 (47%)	57 (24%)	225 (36%)	205 (43%)
1999	290 (48%)	210 (52%)	215 (49%)	353 (47%)	92 (34%)	367 (52%)	243 (49%)
2000	288 (44%)	181 (45%)	202 (44%)	323 (41%)	109 (33%)	323 (44%)	206 (43%)
2001	313 (45%)	189 (44%)	208 (44%)	317 (40%)	121 (34%)	333 (45%)	195 (42%)
2002	321 (47%)	197 (46%)	209 (45%)	299 (38%)	123 (34%)	316 (46%)	203 (47%)
2003	311 (48%)	193 (46%)	213 (48%)	310 (41%)	104 (31%)	271 (45%)	195 (46%)
Total	2166 (41%)	1409 (42%)	1578 (41%)	2841 (42%)	704 (28%)	2325 (39%)	1774 (41%)

Table 3: Mutual Fund Summary Statistics

This table reports summary statistics for the funds in our sample. Number of Funds is the number of mutual funds in our sample each month. TNA is the total net assets under management in millions of dollars. LOGTNA is the logarithm of TNA. LOGFAMSIZE is the logarithm of one plus the assets under management of the other funds in the family that the fund belongs to (excluding the asset base of the fund itself). TURNOVER is fund turnover, defined as the minimum of aggregate purchases and sales of securities divided by the average TNA over the calendar year. AGE is the number of years since the organization of the fund. EXPRATIO is the total annual management fees and expenses divided by year-end TNA. TOTLOAD is the total front-end, deferred and rear-end charges as a percentage of new investments. FLOW is the percentage new fund flow into the mutual fund over the past year. PRET is the cumulative returns of the fund over the past twelve months. TNA, LOGTNA, LOGFAMSIZE, FLOW and PRET are reported monthly. All other fund characteristics are reported once a year. All variables are winsorized below at the 1% level and winsorized above at the 99% level within each month. The sample is from January 1993 to December 2002. We classify funds with self-reported investment objective of 'Bond' or 'Money Market' as bond funds and all other objectives as equity funds. Within equity funds and bond funds, we sort mutual funds into size quintiles according to assets under management for every month. Panel A reports the time-series averages of monthly cross-sectional averages and monthly cross-sectional standard deviations (shown in brackets) of fund characteristics for equity funds. Panel B reports these statistics for bond funds.

Panel A: Equity Funds

	Mutual Fund Size Quintile					All
	1	2	3	4	5	Funds
Number of Funds	505.3	501.6	506.1	508.4	512.0	2533.4
TNA	10.6	39.6	104.4	288.3	2405.8	574.9
($ million)	[14.53]	[29.50]	[65.30]	[166.84]	[2898.13]	[1600.69]
LOGTNA	1.63	3.17	4.25	5.31	7.18	4.32
($ million)	[1.24]	[1.31]	[1.26]	[1.21]	[1.24]	[2.27]
LOGFAMSIZE	4.73	6.36	7.42	8.16	9.53	7.25
($ million)	[3.69]	[3.48]	[3.12]	[2.87]	[2.46]	[3.56]
TURNOVER	65.40	72.90	74.58	75.81	69.11	71.57
(% per year)	[96.03]	[90.39]	[80.08]	[78.11]	[65.45]	[84.08]
AGE	3.67	5.04	6.94	9.55	16.80	8.43
(years)	[6.60]	[6.80]	[9.74]	[12.29]	[16.48]	[11.99]
EXPRATIO	1.36	1.31	1.27	1.21	1.03	1.23
(% per year)	[0.85]	[0.67]	[0.58]	[0.52]	[0.46]	[0.65]
TOTLOAD	1.66	1.85	1.97	2.03	2.20	1.94
(%)	[2.29]	[2.37]	[2.42]	[2.43]	[2.55]	[2.43]
FLOW	25.09	29.18	41.96	49.48	42.15	37.59
(% per year)	[182.54]	[159.28]	[170.85]	[176.26]	[145.35]	[170.96]
PRET	4.71	7.11	8.94	10.51	12.06	9.02
(% per year)	[17.49]	[16.43]	[17.68]	[17.50]	[15.03]	[17.10]

Panel B: Bond and Money Market Funds

	Mutual Fund Size Quintile					All
	1	2	3	4	5	Funds
Number of Funds	136.0	134.1	134.4	134.9	130.1	669.5
TNA	15.7	51.5	120.9	311.3	1412.0	374.8
($ million)	[18.61]	[30.13]	[89.72]	[150.59]	[1204.11]	[749.97]
LOGTNA	2.14	3.59	4.43	5.47	6.91	4.49
($ million)	[1.15]	[1.07]	[1.16]	[1.05]	[0.97]	[1.96]
LOGFAMSIZE	5.70	7.17	7.66	8.53	9.64	7.72
($ million)	[3.48]	[2.83]	[2.62]	[2.18]	[1.82]	[2.97]
TURNOVER	78.42	88.10	93.59	103.17	107.04	93.93
(% per year)	[105.16]	[109.24]	[101.77]	[107.85]	[95.91]	[105.51]
AGE	4.08	4.96	6.19	8.64	13.84	7.50
(years)	[6.09]	[4.85]	[6.61]	[7.94]	[10.65]	[8.28]
EXPRATIO	0.97	0.96	0.94	0.94	0.95	0.95
(% per year)	[0.61]	[0.53]	[0.50]	[0.44]	[0.38]	[0.50]
TOTLOAD	1.86	1.86	1.41	1.80	2.39	1.86
(%)	[2.17]	[2.21]	[2.09]	[2.30]	[2.35]	[2.26]
FLOW	20.16	26.63	24.23	31.77	25.73	25.69
(% per year)	[155.22]	[152.17]	[109.48]	[145.30]	[108.94]	[144.93]
PRET	5.03	5.93	7.43	8.13	8.60	7.15
(% per year)	[11.54]	[9.23]	[11.16]	[11.40]	[11.82]	[11.31]

Table 4: Characteristics of Mutual Fund Families

This table reports the characteristics of mutual fund families in our dataset. For each year, we report the total number of distinct mutual fund families in the CRSP Mutual Fund Database, and the average number of mutual funds we have identified as either managed in-house or outsourced in each family. We also report the fraction of mutual fund families that outsource any of its fund management and the average across families of the fractions of funds outsourced within a mutual fund family. We indicate the concentration of mutual fund family business with the fraction of total assets under management in a family's modal style and core style. We define the modal style for each family as the investment style for which the mutual fund family has the most assets under management and define the core style for each family as the investment style for which the mutual fund family has the most assets under management during the earliest year it appears in the CRSP Mutual Fund Database.

Year	Number of Families	Average Number of Funds per Famliy	Fraction with Any Outsourcing	Average Fraction of Outsourced Funds	Average Fraction of Assets in Modal Style	Average Fraction of Assets in Core Style
1994	340	5.847	0.412	0.275	0.750	0.514
1995	351	6.390	0.393	0.254	0.737	0.506
1996	375	6.712	0.403	0.261	0.735	0.474
1997	413	7.315	0.380	0.254	0.732	0.441
1998	429	7.664	0.427	0.303	0.728	0.440
1999	455	8.059	0.534	0.411	0.738	0.438
2000	499	7.699	0.509	0.378	0.732	0.430
2001	479	8.271	0.505	0.367	0.732	0.428
2002	457	8.438	0.514	0.372	0.729	0.431
2003	439	8.303	0.513	0.374	0.736	0.437
Average	423.7	7.470	0.459	0.325	0.735	0.454

Table 5: Outsourcing Outcomes by Fund Characteristics

This table shows the Fama-MacBeth (1973) estimates of annual regressions of whether a fund is outsourced on fund characteristics lagged one year. The dependent variable, OUTSOURCED, is an indicator function that equals one if the fund's management is outsourced. INMODALSTYLE is an indicator that equals one if the fund's investment objective is the same as the family's modal style. A family's modal style is the investment objective for which the family has the most assets under management. Independent variables are LOGTNA, LOGFAMSIZE, TURNOVER, AGE, EXPRATIO, TOTLOAD, FLOW and PRET. The sample is from 1994 to 2003 (10 years). The t-statistics adjusted for serial correlation using Newey-West (1987) lags of order three and are shown in parenthesis.

	(1)	(2)
INTERCEPT	0.2657	0.4006
	(11.64)	(6.84)
$INMODALSTYLE_{i,t-1}$	-0.0364	-0.0599
	(3.99)	(3.05)
$LOGTNA_{i,t-1}$	-0.0271	-0.0256
	(10.35)	(6.67)
$LOGFAMSIZE_{i,t-1}$	0.0188	0.0719
	(10.42)	(8.12)
$LOGFAMSIZE^2_{i,t-1}$		-0.0051
		(6.76)
$TURNOVER_{i,t-1}$	-0.0002	-0.0002
	(6.53)	(6.95)
$AGE_{i,t-1}$	-0.0021	-0.0025
	(9.53)	(8.00)
$EXPRATIO_{i,t-1}$	-0.0124	-0.0138
	(0.45)	(0.54)
$TOTLOAD_{i,t-1}$	0.0017	0.0039
	(0.39)	(0.86)
$FLOW_{i,t-1}$	-0.0001	0.0000
	(1.31)	(1.68)
$PRET_{i,t-1}$	-0.0009	-0.0012
	(1.80)	(2.38)

Table 6: Mutual Fund Closures and Fund Characteristics

This table investigates the determinants of mutual fund closures and reports pooled panel regression estimates of whether a mutual fund is closed on fund characteristics lagged one year. The dependent variable, CLOSED, is an indicator function that equals one if the mutual fund is closed during that year. OUTSOURCED is an indicator variable that equals one if the fund management is outsourced. INMODALSTYLE is an indicator that equals one if the fund is in its family's modal style. NUMBERINSTYLE is the number of other funds in the same family with the same investment objective as the fund. ONLYFUNDINSTYLE is an indicator that equals one if the fund is the only fund with that investment objective in the family. The other independent variables include LOGTNA, LOGFAMSIZE, TURNOVER, AGE, EXPRATIO, TOTLOAD, FLOW and PRET. PRETLOW equals PRET if it is below average in the year; it equals the average PRET otherwise. All regressions include year-effects and investment style effects. The sample is from 1994 to 2003. T-statistics are adjusted by allowing for the errors to be correlated across funds within fund families, i.e. the standard errors are clustered by fund families.

Panel A: Probability of closure and past-year fund return

	$CLOSED_{i,t}$				
$OUTSOURCED_{i,t-1}$	.0068	.0089	.0079	.0078	.0077
	(1.98)	(2.29)	(2.00)	(1.96)	(1.94)
$PRET_{i,t-1}$	-.0004	-.0003	-.0015	-.0015	-.0017
	(-6.46)	(-3.80)	(-7.51)	(-5.02)	(-4.49)
$PRET_{i,t-1}$ *$OUTSOURCED_{i,t-1}$		-.0004	-.0003	-.0002	-.0002
		(-3.31)	(-1.89)	(-1.82)	(-1.77)
$INMODALSTYLE_{i,t-1}$	-.0054	-.0054	-.0053	-.0053	-.0056
	(-2.68)	(-2.67)	(-2.63)	(-2.64)	(-0.47)
$LOGTNA_{i,t-1}$	-.0111	-.0111	-.0130	-.0129	-.0130
	(-6.07)	(-6.05)	(-6.63)	(-6.62)	(-5.13)
$LOGFAMSIZE_{i,t-1}$	.0009	.0009	.0010	.0010	.0010
	(1.20)	(1.24)	(1.19)	(1.14)	(1.15)
$TURNOVER_{i,t-1}$	-.0000	-.0000	-.0000	.0000	-.0000
	(-0.65)	(-0.71)	(-1.30)	(-1.30)	(-1.33)
$AGE_{i,t-1}$	.0002	.0002	.0002	.0002	.0002
	(1.83)	(1.78)	(1.65)	(1.63)	(1.59)
$EXPRATIO_{i,t-1}$	-.0002	-.0002	-.0013	-.0013	-.0012
	(-0.12)	(-0.11)	(-0.67)	(-0.75)	(-0.71)
$TOTLOAD_{i,t-1}$	.0006	.0006	.0006	.0007	.0007
	(1.10)	(1.01)	(1.08)	(1.08)	(1.06)
$FLOW_{i,t-1}$	.0000	.0000	.0000	-.0000	-.0000
	(0.69)	(0.47)	(0.02)	(-2.07)	(-2.07)
$PRET_{i,t-1}$ *$LOGTNA_{i,t-1}$			.0003	.0003	.0003
			(5.50)	(5.38)	(4.31)
$PRET_{i,t-1}$ *$LOGFAMSIZE_{i,t-1}$			-.0000	-.0000	-.0000
			(-0.93)	(-0.79)	(-0.66)
$PRET_{i,t-1}$ *$AGE_{i,t-1}$			-.0000	-.0000	-.0000
			(-1.02)	(-0.88)	(-0.91)
$PRET_{i,t-1}$ * $EXPRATIO_{i,t-1}$				.0000	-.0000
				(0.06)	(-0.04)
$PRET_{i,t-1}$ * $TOTLOAD_{i,t-1}$				-.0000	-.0000
				(-0.72)	(-0.71)
$PRET_{i,t-1}$ * $FLOW_{i,t-1}$				.0000	.0000
				(2.16)	(2.18)
$PRET_{i,t-1}$ *$INMODALSTYLE_{i,t-1}$					.0004
					(0.92)
$LOGTNA_{i,t-1}$ *$INMODALSTYLE_{i,t-1}$					.0000
					(0.02)
$PRET_{i,t-1}$*$LOGTNA_{i,t-1}$ *$INMODALSTYLE_{i,t-1}$					-.0001
					(-0.96)

Panel B: Probability of closure and past-year fund return when below average

	$CLOSED_{i,t}$				
$OUTSOURCED_{i,t-1}$	.0070	.0066	.0061	.0060	.0060
	(2.04)	(1.92)	(1.80)	(1.77)	(1.76)
$PRETLOW_{i,t-1}$	-.0008	-.0006	-.0024	-.0025	-.0026
	(-5.31)	(-3.20)	(-6.81)	(-5.04)	(-5.14)
$PRETLOW_{i,t-1}$		-.0006	-.0005	-.0004	-.0004
$*OUTSOURCED_{i,t-1}$		(-3.05)	(-1.98)	(-1.92)	(-1.89)
$INMODALSTYLE_{i,t-1}$	-.0056	-.0054	-.0053	-.0052	-.0048
	(-2.76)	(-2.70)	(-2.56)	(-2.55)	(-0.48)
$LOGTNA_{i,t-1}$	-.0112	-.0111	-.0111	-.0110	-.0110
	(-6.10)	(-6.06)	(-7.27)	(-7.29)	(-5.65)
$LOGFAMSIZE_{i,t-1}$	.0010	.0010	.0009	.0009	.0009
	(1.32)	(1.37)	(1.31)	(1.30)	(1.32)
$TURNOVER_{i,t-1}$	-.0000	-.0000	-.0000	-.0000	-.0000
	(-0.91)	(-0.97)	(-1.77)	(-1.77)	(-1.78)
$AGE_{i,t-1}$	.0002	.0002	.0001	.0002	.0001
	(1.91)	(1.81)	(1.42)	(1.44)	(1.38)
$EXPRATIO_{i,t-1}$	-.0010	-.0009	-.0025	-.0021	-.0021
	(-0.55)	(-0.54)	(-1.25)	(-1.39)	(-1.39)
$TOTLOAD_{i,t-1}$	.0007	.0006	.0007	.0006	.0006
	(1.25)	(1.09)	(1.20)	(1.15)	(1.16)
$FLOW_{i,t-1}$	.0000	.0000	-.0000	-.0000	-.0000
	(0.59)	(0.38)	(-0.24)	(-1.43)	(-1.45)
$PRETLOW_{i,t-1}$			.0005	.0005	.0005
$*LOGTNA_{i,t-1}$			(5.66)	(5.50)	(5.40)
$PRETLOW_{i,t-1}$			-.0000	-.0000	-.0000
$*LOGFAMSIZE_{i,t-1}$			(-0.74)	(-0.57)	(-0.45)
$PRETLOW_{i,t-1}$			-.0000	-.0000	-.0000
$*AGE_{i,t-1}$			(-1.57)	(-1.51)	(-1.41)
$PRETLOW_{i,t-1}$				.0000	.0000
$* EXPRATIO_{i,t-1}$				(0.35)	(0.35)
$PRETLOW_{i,t-1}$				-.0000	-.0000
$* TOTLOAD_{i,t-1}$				(-0.70)	(-0.70)
$PRETLOW_{i,t-1}$				.0000	.0000
$* FLOW_{i,t-1}$				(1.43)	(1.45)
$PRETLOW_{i,t-1}$					.0001
$*INMODALSTYLE_{i,t-1}$					(0.65)
$LOGTNA_{i,t-1}$					.0001
$*INMODALSTYLE_{i,t-1}$					(0.07)
$PRETLOW_{i,t-1}*LOGTNA_{i,t-1}$					-.0000
$*INMODALSTYLE_{i,t-1}$					(-0.75)

Table 7: Style Closures

This table looks at funds that were closed. The dependent variable, STYLEENDS, is an indicator that the family no longer offers a fund (the next year) in the style of the fund that was closed. The independent variables are OUTSOURCED, PRET, INMODALSTYLE, LOGTNA, LOGFAMSIZE, TURNOVER, AGE, EXPRATIO, TOTLOAD, and FLOW. The independent variables are the usual controls we use in other regressions.

	$STYLEENDS_{i,t}$
$OUTSOURCED_{i,t-1}$	-.0166 (-0.74)
$PRET_{i,t-1}$	.0003 (0.35)
$INMODALSTYLE_{i,t-1}$	-.1660 (-6.57)
$LOGTNA_{i,t-1}$	.0099 (1.38)
$LOGFAMSIZE_{i,t-1}$	-.1130 (-24.01)
$TURNOVER_{i,t-1}$	-.0001 (-1.17)
$AGE_{i,t-1}$	.0022 (1.17)
$EXPRATIO_{i,t-1}$	-.0048 (-0.49)
$TOTLOAD_{i,t-1}$	-.0065 (-1.39)
$FLOW_{i,t-1}$	.0000 (0.12)

Table 8: The Effect of Outsourcing on Fund Holdings

This table shows the Fama-MacBeth (1973) estimates of quarterly regressions of how outsourcing affects the holdings of mutual funds. The dependent variable of the first specification is the log of the average market capitalization of the stocks held by the mutual fund in the quarter. The dependent variable of the second specification is the percentage of a mutual fund's holdings that consist of stocks in the S&P 500. The independent variables are OUTSOURCED, INMODALSTYLE, LOGTNA, LOGFAMSIZE, TURNOVER, AGE, EXPRATIO, TOTLOAD, FLOW and PRET. We also include a dummy variable for each mutual fund investment objective as fund style control, but do not report their estimates. The sample is from 1994Q1 to 2003Q4. t-statistics are reported in brackets.

	Log Average Stock Size	Percent S&P
	(1)	(2)
$OUTSOURCED_{i,t-1}$	.0918	.0147
	(15.96)	(10.71)
$INMODALSTYLE_{i,t-1}$	-.0397	.0060
	(-3.23)	(5.42)
$LOGTNA_{i,t-1}$	.0340	-.0019
	(1.30)	(-0.54)
$LOGFAMSIZE_{i,t-1}$	.0197	.0063
	(5.32)	(8.36)
$TURNOVER_{i,t-1}$	-.0000	-.0001
	(-0.19)	(-7.95)
$AGE_{i,t-1}$	.0005	.0005
	(0.15)	(1.24)
$EXPRATIO_{i,t-1}$	-.2022	-.0354
	(-2.62)	(-4.40)
$TOTLOAD_{i,t-1}$	.0200	.0043
	(8.91)	(5.60)
$FLOW_{i,t-1}$	.0001	.0000
	(0.15)	(0.26)
$PRET_{i,t-1}$	.0042	.0008
	(0.50)	(0.81)
Fixed Style Effects	Yes	Yes

Table 9: Effect of Outsourcing on Performance

This table shows the Fama-MacBeth (1973) estimates of monthly regressions of how outsourcing affects the performance of mutual funds. The dependent variables are fund returns, which are calculated before (gross) and after (net) deducting fees and expenses. The independent variables are LOGTNA, LOGFAMSIZE, TURNOVER, AGE, EXPRATIO, TOTLOAD, FLOW and OUTSOURCED. All independent variables are lagged one month. All specifications include unreported constant term and specifications (2) and (4) include unreported dummy variables for each fund size quintile within each mutual fund investment objective. The sample size is from January 1994 to December 2003. The t-statistics are adjusted for serial correlations using Newey-West (1987) lags of order three and are reported in parenthesis.

	Gross Fund Return		Net Fund Return	
	(1)	(2)	(3)	(4)
$LOGTNA_{i,t-1}$	-0.046		-0.045	
	(-2.52)		(-2.45)	
$LOGFAMSIZE_{i,t-1}$	0.010	0.014	0.011	0.014
	(1.49)	(3.90)	(1.53)	(4.00)
$TURNOVER_{i,t-1}$	0.000	0.000	0.000	0.000
	(0.19)	(0.29)	(0.21)	(0.25)
$AGE_{i,t-1}$	0.003	0.001	0.003	0.001
	(1.87)	(1.13)	(1.78)	(1.01)
$EXPRATIO_{i,t-1}$	0.018	0.031	-0.063	-0.049
	(0.22)	(0.66)	(-0.78)	(-1.02)
$TOTLOAD_{i,t-1}$	-0.007	-0.003	-0.007	-0.003
	(-1.31)	(-0.67)	(-1.33)	(-0.70)
$FLOW_{i,t-1}$	0.001	0.001	0.001	0.001
	(0.76)	(0.74)	(0.76)	(0.73)
$PRET_{i,t-1}$	0.026	0.025	0.026	0.025
	(2.96)	(3.06)	(2.98)	(3.08)
$OUTSOURCED_{i,t-1}$	-0.072	-0.064	-0.073	-0.065
	(-3.63)	(-5.06)	(-3.66)	(-5.14)
Style x Fund Size Effects	No	Yes	No	Yes