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Outsourcing Mutual Fund Management: Firm Boundaries, Incentives and Performance

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Abstract:

This paper investigates the effects of managerial outsourcing on the incentives and performance of mutual funds. We document that mutual fund families outsource the management of a significant fraction of their funds to unaffiliated advisory firms. Funds managed externally significantly under-perform those ran internally. To establish the causality of this relationship, we instrument for whether a fund is outsourced and find similar estimates. We hypothesize that contractual externalities due to firm boundaries make it more difficult to extract performance from an outsourced relationship. We verify two auxiliary predictions of this hypothesis: compared to counterparts ran internally, an outsourced fund faces higher-powered incentives in that they are more likely to be closed due to poor performance or excessive risk-taking, and an outsourced fund takes less risk in response.

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I. Introduction

Over the most recent decades, open-end mutual funds have been one of the fastest growing institutions in this country. From 1980 to 2007, the percentage of American households owning mutual funds rose from 5.7% to 43.6% (Investment Company Institute (2007)). While the flow of new money has leveled off in the recent years,[1] the mutual fund industry remains among the most important in the economy. These actively managed funds control a sizeable stake of corporate equity and play a pivotal role in the determination of stock prices (see, e.g., Grinblatt, Titman and Wermers (1995), Gompers and Metrick (2001)). At the beginning of 1980, they held 4.6% of all U.S. equity, but that number increased to 32.4% by the end of 2007 (French (2008)). Over the corresponding period, the fraction of U.S. equity directly held by individuals fell from 47.9% to 21.5%.

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 benchmarks by about 65 basis points per year after expenses (see Malkiel (1995) and Gruber (1996)). The second is the agency problem between individual investors and mutual fund companies arising out of delegated portfolio management. An important message of this literature is that performance-based incentives related to fund flows influence the risk-taking behavior of fund managers (see, e.g., Brown, Harlow and Starks (1996), Chevalier and Ellison (1997, 1999)).

The role of organization in shaping the incentives and performance of mutual funds has received less attention in the literature. 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 Fidelity and Vanguard. The

[1] From 2001 to 2003, the number of households with mutual funds fell to 53.3 million from 56.3 million, but the percentage of U.S. households with mutual funds is still near an all time high of 47.8 percent (Investment Company Institute (2007)).

second is investment advisors who manage the portfolios of these funds and often have little role in marketing mutual funds to individual investors. A little recognized fact is that mutual fund companies often outsource the management of their funds to sub-advisory firms. For example, while Vanguard's index funds are managed in-house, a number of their actively-managed funds are run (in part or completely) by external investment advisory firms.

In a typical outsourcing arrangement, the family retains the marketing and distribution fees while the external advisor obtains the management fees. Like for any of its funds, the family of an outsourced fund, through a board of directors, keeps track of its performance and monitors fund activities such as the fund's risk-taking behavior relative to its peers. The family retains the ability to replace the external advisor or close down the fund, while the external advisor can manage outsourced funds for other families as well funds they market themselves. Mutual fund investors are typically not aware if the managements of their funds are outsourced or not.[2]

In this paper, we investigate the relationship between firm boundaries, incentives and performance in the mutual fund industry. We build a unique database from 1994 to 2007 that tracks for each year whether a fund is at least partially outsourced or fully managed internally. We take the CRSP Mutual Fund Database, which has information on fund families and their funds, and merge it with the Thomson Mutual Fund Holdings Database,[3] which reports the names of the investment advisory companies managing these funds. In conjunction with an SEC database of filings by investment advisory companies, we are able to identify the relationships between investment sub-advisors and mutual fund families. A fund is categorized as being outsourced if one of its investment advisors is not affiliated with the mutual fund family.[4]

We begin our analysis by comparing the performance of outsourced funds to funds ran internally. Depending on performance benchmarks, we find that outsourced funds under-perform

[2] We thank Burton Malkiel for providing a number of the stylized facts regarding outsourcing arrangements in the mutual fund industry.
[3] Formerly called "CDA/Spectrum Mutual Fund Holdings Database".
[4] The SEC defines affiliated as having either ownership of or some controlling interest in the other party.

other funds by between 50.4 and a 72.0 basis points a year. These are sizeable effects given that the typical equity fund in our sample under-performs the performance benchmark by 80.4 basis points a year and charge roughly 130 basis points a year in expenses.

There are a few potential explanations for this under-performance. First, a fund being outsourced may be a signal that it is being run on the cheap. To see if this is the case, we include controls for fund size and management fees and find that the under-performance remains. We also add in as controls a fund's family size, past fund flows, turnover and fund age and find that the under-performance result is not driven by such observable characteristics. More generally, we include fund family and advisor fixed effects to account for any fixed unobserved family and advisor characteristics and find similar results. Lastly, we turn to an instrumental variable approach to further determine the causal relationship between outsourcing and underperformance.

Having established a relationship between outsourcing and under-performance, we consider an explanation due to Holmstrom (1999). In his rendition of the main theories of the firm,[5] he argues that contractual externalities due to firm boundaries make it more difficult to extract output from an outsourced relationship than from an employee within the firm.[6] Moreover, in a multi-task principal-agent setting, the firm optimally wants to use lower-powered incentives to extract output from an employee, but has to rely on higher-powered incentives, such as replacement of fund managers or closures of funds, in an outsourcing relationship due to the inability to coordinate incentives with the external firm.[7]

[5] See Coase (1937), Williamson (1975), Klein, Crawford and Alchian (1978), Grossman and Hart (1986) and Hart and Moore (1990).

[6] Ideas in Holmstrom (1999) build on Holmstrom and Milgrom (1991, 1994). Other papers on the theory of the firm include Bolton and Whinston (1993), Aghion and Tirole (1997), Baker, Gibbons, and Murphy (2002), and Stein (2002).

[7] Implicit in Holmstrom (1999) are measurement costs (*i.e.* the costs of getting a better measure of how output depend on effort, manipulation, etc.). He discusses other settings that can yield similar predictions. For instance, the firm may have additional information about an employee other than past performance (*e.g.*, how often he shows up to work) and may not need to rely as much on past performance. We do not attempt to distinguish between different alternatives within the contractual externalities characteristic of imperfect information environments.

The mutual fund industry maps nicely into this framework of firm boundaries creating contractual externalities. An external advisory firm owns the technology that produces performance and gets the right to assign their employees to tasks. There is typically no coordination of task assignments or incentives between the principal and the sub-advisor. So when a family farms out the management of a fund to an external advisory firm, the family typically does not have control over a number of crucial variables. These include employees the advisory firm assigns to work on its fund and whether the advisory firm is providing enough time and resources to those employees. Indeed, we know that external advisors often manage multiple funds for different families as well as other types of institutional investors such as pension funds and university endowments. In contrast, if the advisor was inside the firm, the family has more control over task assignments and hence has more levers to oversee the employees with. As a result, we should see outsourced funds under-perform funds managed in-house.

To distinguish our hypothesis from alternatives, we test two key auxiliary implications of this hypothesis. First, the family has to lean more heavily on high-powered incentives related to realized returns and other observable metrics for outsourced funds than if the advisor was part of the firm.[8] We use two measures of family-fund incentives in the mutual fund literature: the sensitivity of fund closures to past performance and the sensitivity of fund closures to excess risk-taking relative its peers (see, *e.g.*, Chevalier and Ellison (1999), Sirri and Tufano (1998)). We find that outsourced funds do indeed face steeper incentives than in-house funds. We also find that closures for outsourced funds are more sensitive to excess risk-taking, using two measures of risk-taking from the literature: the deviation of fund betas from its peers or the degree of idiosyncratic risk. Second, we also expect that outsourced funds, because they face steeper incentives than funds managed in-house, should take less risk in response (see Chevalier and

[8] It may seem counter-intuitive that outsourced funds face steeper incentives and do worse. But the point of Holmstrom (1999) is that outsourced funds would do even worse otherwise. One should view these two auxiliary implications as symptoms that go along with the under-performance of outsourced funds.

Ellison (1999)). We compare the risk-taking behavior outsourced funds to their in-house counterparts and find that outsourced funds take less risk.

Our paper proceeds as follows. We first discuss the related literature in Section II. We describe the data, our identification scheme for outsourced funds and summary statistics regarding them in Section III. We document the performance of outsourced funds in Section IV. In Section V, we study the incentives and risk-taking profiles of outsourced mutual funds relative to funds managed in-house. We consider various robustness checks of our results in Section VI, and conclude in Section VIII.

II. Related Literature

There are other recent papers that examine various aspects of mutual fund subadvisory arrangements. Cashman and Deli (2009) look at these arrangements by constructing a different data set based on N-SAR filings with the SEC, but only for the year 2002. Their main focus is on how decision rights vary by fund style (equity versus debt, corporate debt versus government debt). Del Guercio, Reuter and Tkac (2010) look in detail at a comprehensive sample of sub-advisory contracts for domestic equity mutual funds in 2002 and analyze the distribution channels of portfolio management services. Kuhnen (2009) tests whether the decision to approve subadvisory contracts are influenced by social network connections of mutual fund boards. In comparison, our focus on the relationships between boundaries and incentives and performance is absent from these papers.

More broadly speaking, our paper links two strands of economics literature. The first is the emerging literature on how mutual fund families influence performance and activities of individual mutual funds. The second is on the nature of how organizational structure affects the way firms conduct business.

A. Interpretations of our findings for the mutual fund literature

There is an emerging literature that examines the influences of mutual fund families on mutual funds.[9] Massa (2003) documents that investors tend to pick a fund family first and then choose to invest in funds offered by the family from their menu. In response, mutual fund families offer greater degree of product differentiation that negatively affects performance. Gasper, Massa and Matos (2006) show that mutual fund families may subsidize the performance of a favorable fund in the family at the expense of another fund. Part of this is explained through the allocation of under-priced initial public offering to a favored fund in the family. Kacperczyk, Sialm and Zheng (2008) confirm this result and documents that mutual funds have other hidden costs, such as agency costs, which affect performance. These papers present direct performance subsidization as one possible mechanism, but they leave unexplained significant part of the observed differences.

These findings suggest that that families (or advisors) subsidize their own funds, but not for funds for which they act an advisor. Hence, they are consistent with the multi-task agency model of Holmstrom and Milgrom (1991) that we are trying to establish in more detail. It may be difficult for the family to extract performance from an advisor because they may have funds of their own (or have other objectives). Direct performance subsidization is a specific example of the mechanisms regarding the lack of resources and effort that are devoted to an outsourced fund by its advisor.

Our paper complements these findings by highlighting the importance of firm boundaries and providing clearer economic foundations necessary to understand these results. The mutual fund literature documents other instances where agency costs and conflicts of interest lead to inefficient outcomes. For example, Edelen and Kadlec (2006) consider the agency costs within a

[9] Mamaysky and Spiegel (2002) and Gervais, Lynch and Musto (2005) analyze the organization of investment management firms from a theoretical perspective. Massa (1997) examines causes and effects of product proliferation in the mutual fund industry.

fund between the portfolio managers who make investment decisions and traders who execute them, and find conflicts of interest that lead to fund underperformance. Stoughton, Wu and Zechner (2008) consider a model with financial intermediation by investment advisory services where brokered mutual funds may underperform direct channel mutual funds. Our paper shows that due to firm boundaries, there are agency costs that make it more difficult for the mutual fund family to extract performance from an outsourced mutual fund. Consistent with the agency story of Holmstrom and Milgrom (1991), we document that these firm boundaries also affect fund closure decisions and fund risk-taking behavior.

B. Relation of our findings to the organizational economics literature

More broadly, our paper establishes the importance of organizations for the mutual fund industry and clarifies the effects of firm boundaries on incentives and performance. Related papers attempt to test the basic Grossman-Hart-Moore insight in other settings. Notable examples include Baker and Hubbard (2004) whose work examines the trucking industry and the question of whether drivers should own the trucks they operate. Simester and Wernerfelt (2005) look at the ownership of tools in the carpentry industry. Berger, Miller, Petersen, Rajan and Stein (2005) attempt to understand whether small organizations are better at carrying out certain specific tasks than large organizations in the context of banks. Chen, Hong, Huang and Kubik (2004) tackle the same question using mutual funds. The common idea behind these recent studies is that one can learn something useful by examining in detail how different types of organizations behave when faced with similar tasks. This is a different approach than the standard one of trying to explain organizational form (e.g., integration vs. non-integration) based on a variety of industry characteristics.

Our paper is also related to recent work on how the nature of an organization affects both the way that a firm conducts its business and the kinds of activities that it can efficiently

undertake. Guedj and Scharfstein (2005) and Guedj (2006) look at the strategies and performance of big pharmaceutical firms, start-up firms and joint ventures between the two in comparison to internal projects of big firms. They find that joint ventures (which may be viewed as being similar to an outside manager) are less performance sensitive than internal investment and have worse outcomes on average. Their setting is different from ours in a number of ways and hence we would expect different results. First, their joint ventures involve investment on the part of both firms whereas mutual fund families rely exclusively on the external advisory company to manage the fund. There is more of a principal-agent problem in our context and hence the model of Holmstrom (1999) regarding coordinating incentives is more appropriate. Second, whereas an advisory company manages many different funds, the joint ventures typically involve only one project for the smaller firm and hence the issues of multi-tasking seem more appropriate for our setting. Nonetheless, we sound a cautionary note from this comparison that our findings only hold under certain contexts where the assumptions of Holmstrom (1999) apply.

III. Data and Identification Scheme for Outsourced Funds

Our paper utilizes three databases. The first, the CRSP Mutual Fund Database, goes back to the 1960's.[10] It provides information about fund performance along with a host of fund characteristics such as assets under management, expenses, age, the names of the managers, and investment styles.[11] Importantly, it also gives the name of the fund family or complex that each

[10] The CRSP Mutual Fund Database experienced a significant change in the database structure and historical content with the data release ending in September 2007. Our data consists of an initial database ending in December 2004 and later updated to include observations from January 2005 to December 2007 based on a newer release.

[11] We first select mutual funds with Investment Company Data, Inc. (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".

fund belongs to. The second is the Thomson Mutual Fund Holdings Database, which goes back to the early 1980's. It details the portfolio holdings of each fund and 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, and therefore, our analysis is limited to the post-1993 period. The third is the SEC's database of disclosures by investment advisors, which informs us if investment advisors are affiliated with fund families.

We merge the first two mutual fund databases using the Mutual Fund Links (MFLINKS) tables developed by Wermers (2000). A mutual fund may enter our database multiple times in the same year if it has different share classes. We identify multiple share classes using the MFLINKS tables and create asset-weighted averages across share classes of variables of interest. We begin categorizing 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 Thomson). The latter database provides up to two names because two or more advisory firms may manage any single fund. 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 a candidate for being outsourced.[12] Because advisors with different names may still be affiliated, we look up the Form ADV of every family complex in our sample. If a candidate fund is contained in the same ownership structure, then we identify that fund as being managed in-house, and otherwise we identify it as being outsourced.[13]

Therefore, the funds we identify as being outsourced have at least one investment advisor whose name differs from the name of the family complex and that advisor does not belong to the same ownership structure as the family complex. In total, we identify 37,227 fund-year

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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.

[12] Since it is difficult to figure out the responsibilities of various sub-advisors on a fund, this is a conservative and sensible categorization.

[13] See the Supplemental Appendix for additional information on this process.

observations as being managed in-house, 14,574 as outsourced and 2,656 as left unidentified. In addition, we have randomly checked the outcomes of our identification scheme by downloading fund prospectuses from the Internet and found it to be fairly accurate.

Table 1 reports by year the characteristics of mutual fund families in our sample. In the first column, we report the number of mutual fund companies in our sample. In 1994, there are 345 companies. This number increases to a peak of 510 in 2000, and falls to 467 in 2007. In the second column, we report the average number of funds marketed per family by year. The typical family markets roughly eight funds, though this number has gone up somewhat over time. In the third column, we report the fraction of companies that does any outsourcing; roughly 43% of families outsource to some degree. In the fourth column, we report the fraction of funds per family that get outsourced; a typical family on average farms out the management of 26% of its funds.

The last column of this panel reports the concentration in investment styles of the fund families in our sample. For each fund family, we calculate its modal style in a given year, which we define as the investment style with the majority of the family's assets under management. A fund's modal style is highly persistent across years, and around 73% of assets are in the modal style. This indicates that many families, even very big ones, tend to specialize and have a style in which they have expertise.

In Table 2, we provide monthly descriptive statistics regarding the funds in our sample. We report means and standard deviations for the variables of interest by all funds, in-house funds and outsourced funds. In each month, our sample includes on average about 3079 funds. They have average total net assets (*TNA*) of 683 million dollars, with a standard deviation of 1770 million dollars. Note that outsourced funds tend to be smaller than in-house funds (425 million compared to 771 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*). We measure fund family size in two ways. The first measure is *LOGFAMFUNDS*, which is the log of the number of funds in the fund's family. This measure captures the number of product lines a fund family markets. Another family size measure 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*). Outsourced funds tend to be from smaller families in terms of fund family assets than in-house ones but come from families with similar number of products.

The funds in our sample have expense ratios as a fraction of year-end *TNA* (*EXPRATIO*) that average about 1.3 percent per year. The expense ratios of outsourced funds do not differ from in-house funds. Fund turnover (*TURNOVER*) is defined as the minimum of purchases and sales over average *TNA* for the calendar year. The average fund turnover is 87.6 percent per year. Outsourced funds do not have substantial differenced in turnover than their in-house counterparts (81.4% compared to 89.3%). The average fund age (*AGE*) is about 10.3 years, and outsourced funds tend to be younger (7.9 years to 11.1 years). Funds charge a total load (*TOTLOAD*) of about 2.3 percent (as a percentage of new investments) on average; outsourced funds charge a slightly lower total load than in-house ones. *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 42.8 percent a year. *FLOW* does not appear to depend on outsourcing status. *PRET* is the past one-year cumulative market-adjusted return of the fund.[14]

IV. Outsourcing and Mutual Fund Performance

[14] Expense ratios reported in CRSP Mutual Fund Database seem to have some extreme outliers on the positive side that appear to be erroneous. We winsorize EXPRATIO above at the 99.9% level in each period. PRET is also winsorized above and below at the 99.9% and 0.1% levels in each period.

Our empirical strategy utilizes cross-sectional variation to see how mutual fund performance varies with whether a fund is outsourced or managed in-house. One major worry that arises when using cross-sectional variation is that outsourcing is correlated with other observables that affect performance. For instance, funds that are outsourced might be less likely than funds managed in-house to pursue strategies that have been documented to generate abnormal returns, such as small stock, value stock and price momentum strategies. Therefore, we control for performance factors that reflect these strategies as well as factor exposures to the domestic equity market, the international market and the bond market. Moreover, a fund's outsourcing status might be correlated with other fund characteristics such as fund size and family size, and it may be these characteristics that are driving performance. For instance, smaller funds are more likely to be outsourced, so we have to be careful in dealing with fund size when making performance inferences regarding outsourcing because fund size strongly predicts performance (see Chen, Hong, Huang and Kubik (2004)). We first discuss our main model specification and discuss various robustness checks later in Section VI.

A. Fund Performance Benchmarks

One way to deal with the concern about heterogeneity in fund strategies is to adjust for fund performance using various benchmarks. We use in addition to simple market-adjusted returns, returns adjusted by the Capital Asset Pricing Model (CAPM) of Sharpe (1964) and Lintner (1965). We also use returns adjusted using the Fama and French (1993) three-factor model augmented with a factor reflecting momentum effect of Jegadeesh and Titman (1993).[15] This four-factor model has been shown in various contexts to provide explanatory power for the observed cross-sectional variation in fund performance of equity funds (see, *e.g.*, Carhart

[15] Among these are the returns on the CRSP value weighted stock index net of the one-month Treasury rate (*VWRF*), the returns to the Fama and French (1993) *SMB* (small stocks minus large stocks) and *HML* (high book-to-market stocks minus low book-to-market stocks) portfolios, and the returns to price momentum portfolio *UMD* (a portfolio that is long stocks that are past twelve month winners and short stocks that are past twelve month losers and hold for one month).

(1997)).[16] To be more conservative because we have balanced and international funds in our sample, we consider a six-factor model and augment this four-factor model with the Morgan Stanley Capital International index return (*MSCI*) that includes Europe, Australia and the Far East, and the Lehman Aggregate Bond Index (*LABI*) return, both in excess of the one-month Treasury rate.

Because we are interested in the relationship between outsourcing and performance, we sort mutual funds into two portfolios at the beginning of each month, those that are outsourced and those that are not. We also treat equity funds separately from non-equity funds because they have different drivers of performance. Because fund size is both a strong predictor of outsourcing status and performance (see Chen, Hong, Huang and Kubik (2004)), we calculate the loadings of outsourced versus in-house funds within fund size quintiles according to their TNA. We use the entire time series of these twenty equal-weighted portfolios monthly net returns to calculate the loadings on the various factors (*VWRF*, *SMB*, *HML*, *UMD*, *MSCI* and *LABI*). For each month, each mutual fund inherits the loadings of one of these twenty portfolios that it belongs to.

Overall, we find that there is not much difference in the market beta (β_i's) between in-house and outsourced funds, but the alphas of the outsourced funds are smaller in each size quintile of funds.[17] The average alpha of equity funds managed in-house is –5.4 basis points per month, while the average alpha of outsourced equity funds is –10.2 basis points per month. Annualized, this difference in alphas is 57.6 basis points per year, with a t-statistic of 4.16. However, it is difficult to gauge the significance of this difference in this set-up given the lack of controls for other fund characteristics. Also, it is worthwhile noting that the average equity fund in our sample under-performs the six-factor model by 80.4 basis points per year. Outsourced non-equity funds also have smaller alphas for each size quintile. Averaged across the five portfolios,

[16] See Elton and Gruber (1997) for a review of multi-index models and performance measurement.
[17] Detailed estimates of factor loadings and alphas are available in a separate supplement tables.

the alphas are smaller by 84.0 basis points per year with a t-statistic of 3.37, though the correct significance of the difference is still difficult to ascertain without additional controls.

B. Cross-sectional Performance Regressions

To deal with the concern related to the correlation of fund performance with other observable fund characteristics, we analyze the relationship between outsourcing and 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

$$FUNDRET_{i,t} = \mu + \phi\, OUTSOURCED_{i,t-1} + \boldsymbol{\gamma} \boldsymbol{X}_{i,t-1} + \varepsilon_{i,t} \qquad (1)$$

where $FUNDRET_{i,t}$ is the alpha of fund i in month t adjusted by various performance benchmarks, μ is a constant, $OUTSOURCED_{i,t-1}$ is an indicator for whether or not a fund is outsourced, and $\boldsymbol{X}_{i,t-1}$ is a set of control variables (in month $t-1$) that includes $LOGTNA_{i,t-1}$, $LOGFAMFUNDS_{i,t-1}$, $LOGFAMSIZE_{i,t-1}$, $EXPRATIO_{i,t-1}$, $TURNOVER_{i,t-1}$, $AGE_{i,t-1}$, $TOTLOAD_{i,t-1}$, $FLOW_{i,t-1}$, and $PRET_{i,t-1}$. $\varepsilon_{i,t}$ is an error term that is uncorrelated with all other independent variables. The coefficient of interest is ϕ, which captures the relationship between outsourcing and fund performance, controlling for other fund characteristics. The coefficient $\boldsymbol{\gamma}$ is the vector of loadings on the control variables. We then take the estimates from these monthly 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 performance. We adjust for serial correlations using Newey and West (1987) estimates of standard errors with lags of order three.

In Table 3, we report the estimation results for the regression specification given in Equation (1) using fund returns before expenses (gross fund returns). Notice that the coefficient in front of *OUTSOURCED* is negative and statistically significant across the four performance measures. The coefficient using market-adjusted returns is -0.060 with a t-statistic of 4.32. This

means that outsourced funds under-perform funds managed in-house by about 72.0 basis points a year. The corresponding coefficient is -0.058 for CAPM-adjusted returns with a t-statistic of 4.05. The magnitudes are somewhat smaller when we use the four- and six-factor models: -0.046 with a t-statistic of 3.31 and -0.042 with a t-statistic of 3.10. So an outsourced fund under-performs other funds between 50.4 and 72.0 basis points a year.

To put these magnitudes into some perspective, we compare our fund under-performance result to other findings regarding mutual fund performance. A typical equity mutual fund has a performance net of expenses that under-performs the benchmark. Gruber (1996) shows that average equity mutual fund under-performs a four-factor model by about 65 basis points per year. In our sample, the average equity mutual fund under-performs a six-factor model by 80.4 basis points per year. A part of this mutual fund under-performance can be attributed to annual expense ratio that averages 130 basis points a year. Therefore, a reduction in fund performance of anywhere from 50.4 to 72.0 basis points a year is economically quite significant in comparison.[18]

There are a few potential explanations for this under-performance. First, a fund being outsourced may be a signal that it is being run on the cheap; *i.e.*, the external advisor may not get the same management fees as funds managed in-house. This is unlikely to be an explanation because earlier mutual fund studies typically find that funds with higher management fees actually under-perform.[19] Nonetheless, to rule out this explanation, remember that we include in the cross-sectional performance regression controls for management fees and fund size (because the size of the fund in conjunction with fees determines the incentive package for the advisor). With fund returns gross of fees as our dependent variable, the coefficient in front of fees is insignificant, consistent with earlier studies. Fund size also attracts a negative coefficient consistent with the results of Chen, Hong, Huang and Kubik (2004) who argue that the fund size

[18] When calibrated to the cross-sectional distribution of alphas derived from Kosowski, Timmermann, Wermers, and White (2006), our result is similar to taking a fund at the 70th percentile of their distribution of alphas and making that fund the 30th percentile fund.

[19] See Elton, Gruber and Blake (2003) for a study of incentives fees and mutual fund performance.

finding is associated with liquidity and organizational diseconomies. So the under-performance of outsourced funds is not simply due to outsourced funds having lower management fees. We also include as controls a fund's family size, asset size of the family, turnover, fund age, past fund flows, and past returns. Notably, family assets size also comes in with a significant positive sign, also consistent with Chen, Hong, Huang and Kubik (2004). Past fund performance also comes in significantly, which is consistent with earlier research. Despite these controls for observable characteristics, we continue to find that outsourced funds under-perform.

C. Cross-Sectional Performance Regressions with Advisor and Family Fixed Effects

We also include family fixed effects and advisor fixed effects in the cross-sectional performance regressions presented in Equation (1). When we include family fixed effects, we omit family characteristics such as family size and family assets from the specification. Family fixed effects control for any unobserved heterogeneity across families; in essence, the fixed effect specification allows us to compare the performance of funds managed in-house to performance of outsourced funds within the same families. Similarly, we also include advisor fixed effects. This allows us to also measure the outsourcing effect by comparing the performance of funds managed by an advisory firm on its own behalf to funds that it manages for other families. This specification allows us to rule out the possibility that poorly managed mutual fund families tend to outsource more, or superior fund advisors tend to only manage in-house funds.

We report the estimation results including these fixed effects in Table 4. The overall results are roughly unchanged; the coefficient in front of *OUTSOURCED* remains negative and statistically significant across all four performance measures. The coefficients range from –0.045 to –0.037, indicating that an outsourced fund under-performs funds managed in-house by anywhere from 44.4 to 54.0 basis points per year. The t-statistics are all smaller (not surprisingly given the addition of the fixed effects), but they remain statistically significant. The effects of

fund size and past returns on future performance also remain significant with family and advisor fixed effects.

Overall, our Fama-MacBeth performance regressions illustrate that outsourced mutual funds under-perform mutual funds managed in-house funds. This relationship persists when we control for fund and family characteristics. The addition of family and advisor fixed-effects also does not alter this relationship.

D. Instrumental Variables Analysis

Finally, we employ an instrumental variables strategy to document the causal effect of outsourcing on mutual fund performance. If a fund family is increasing the number of product offerings relative to its asset base, that family might be more likely to outsource the creation of a fund rather than build it in-house. We propose an instrument for whether or not a fund is outsourced based on the characteristics of the fund's family at the *inception date* of the fund. The instrument is the number of funds a family offers at the time a fund is started, controlling for the family asset size. We also control for the number of funds in the family and family asset size at the time performance is measured. To have a good instrument, we need the number of funds in a family to be correlated with whether or not a fund is outsourced. That is, we need a strong first stage regression.

Furthermore, we need to assume an exclusion restriction for our specification in the second stage regression. Our exclusion restriction is that, controlling for other variables, the number of funds in a family at the time of fund inception is only correlated with the performance of that fund because of the outsourcing decision, and not for any other reason. We continue to control for contemporaneous family size and number of funds in a family, but we are assuming that past number of funds in a family affects performance only through the outsourcing decision made at the time of fund inception. We cannot think of any obvious economic stories for why this

assumption would be false and hence we believe that the underlying exclusion restriction behind our instrument is a plausible one.

We proceed with a two-stage estimation method where the first stage regression models the outsourcing decision by the family at the time of fund inception. We define $LOGFAMFUNDS_{i,0}$ (*LOGFAMFUNDS AT INCEPTI*ON) with a '0' subscript to be the log of one plus the number of funds in the fund family at the time the fund is launched. In addition, we define $LOGFAMSIZE_{i,0}$ (*LOGFAMSIZE AT INCEPTION*) as the natural logarithm of one plus the size of the fund family when the fund was launched. The first stage is a logit regression:

$$\begin{aligned}\text{Prob}(\text{OUTSOURCED}_{i,t} = 1) = \Lambda(&\mu + \varphi \text{LOGFAMFUNDS}_{i,0} + \kappa \text{LOGFAMSIZE}_{i,0} \\ &+ \eta \text{LOGFAMFUNDS}_{i,t} + \theta \text{LOGFAMSIZE}_{i,t} \\ &+ \gamma \mathbf{X}_{i,t-1} + \delta I_t) \qquad (2)\end{aligned}$$

where $OUTSOURCED_{i,t}$ is a dummy variable that equals one if fund i is outsourced in year t and zero otherwise. The notation $\Lambda(\bullet)$ indicates the logistic cumulative distribution function and λ is the vector of coefficients. $\mathbf{X}_{i,t-1}$ is the same set of control variables from Equation (1) and the model includes time (month×year) effects represented by I_t.

The results of this logit first stage regression are presented in Table 5. The first stage is strong; the coefficient on *LOGFAMFUNDS AT INCEPTION* is positive and statistically significant, indicating that funds created by families with more existing funds are more likely to outsource their new fund. The magnitude of the coefficient suggests that a one standard deviation increase in the log number of funds in a family at the time of inception (1.86) increases the likelihood that a fund is outsourced by 3.577×1.86=6.66%. This is substantial considering that roughly 28% of funds in our sample are outsourced. The precision of the estimate on *LOGFAMFUNDS AT INCEPTION* (t-stat = 4.71) also suggests that we do not have a problem with a weak instrument.

Given that the first stage is a non-linear model (logit), we do not use 2SLS but instead use two-stage residual inclusion (2SRI) first proposed by Hausman (1978).[20] The second stage specification is:

$$FUNDRET_{i,t} = \mu + \phi\, OUTSOURCED_{i,t-1} + \kappa \text{LOGFAMSIZE}_{i,0} + \eta \text{LOGFAMFUNDS}_{i,t} + \theta \text{LOGFAMSIZE}_{i,t} + \boldsymbol{\gamma X}_{i,t-1} + \delta I_t + \eta \text{ FIRST STAGE RESIDUALS}_{i,t} + \varepsilon_{i,t} \quad (3)$$

where *FIRST STAGE RESIDUALS* is the residuals from the estimation of Equation (2), and other variables are defined as above. Note that the only explanatory variable from the first-stage regression that has been excluded from list of explanatory variables of the second-stage regression is our instrument, *LOGFAMFUNDS AT INCEPTION*. We estimate Equation (3) as a pooled panel regression with standard errors clustered by family.

The results of the second-stage are presented in Table 6. Depending on the performance measures, we find that the coefficient of *FIRST STAGE RESIDUALS* is slightly statistically significant. This coefficient represents an augmented regression test and its significance suggests that data supports an endogenous effect in our model specification (Hausman, 1978). Controlling for this endogeneity, the effect of being outsourced on performance is negative and statistically different from zero, using any of our mutual fund performance measures. The range of our estimates suggests that being outsourced reduces performance by 1.20% to 1.68% per year. So if anything, we uncover a stronger effect by controlling for endogeneity rather than a weaker one. Therefore, we conclude that our results are robust to this instrumental variable strategy.[21]

V. Outsourcing and Family Complex-Fund Incentives

[20] See, for example, Terza et al. (2008) for a description of this procedure.

[21] This difference is not being driven by the fact that we are running a pooled regression here but our OLS results were from Fama-MacBeth regressions. When we run a pooled panel regression version of the Fama-MacBeth performance regressions of Table 4 and 5, our main results are largely unchanged.

Having established a link between outsourcing and fund performance, we now consider an explanation due to Holmstrom (1999) who, in his version of the main theories of the firm, points out that contractual externalities due to firm boundaries make it more difficult to extract output from an outsourced relationship than from an employee within the firm. The idea is that in a multi-task principal-agent setting, the firm optimally wants to use lower-powered incentives to extract output from an employee, but has to rely on higher-powered incentives in an outsourcing relationship due to the inability to coordinate incentives with the other firm.

It is important to note that the starting point of the Holmstrom theory is that these higher-powered incentives are still imperfect because they are all second-best solutions. In other words, there does not exist a feasible technology such that the family can get back to a first-best world of in-house management. A family would not want to use outsourced management unless capacity constraints or associated costs of in-house production made the family use the outsource option. This is the premise of our instrument for outsourcing earlier. The family does optimally choose its mix of in-house versus out-source given all constraints/costs and demand. In this sense, it is indifferent at its first-order condition but subject to a set of constraints.

In conjunction with the under-performance of outsourced funds, this theory has two key and testable auxiliary implications. First, an outsourced fund faces higher-powered incentives, which we measure using closures of funds due to poor past performance or excessive risk-taking. And second, its risk-taking profile should deviate less for outsourced funds than from other funds with similar investment styles.

A. Sensitivity of Fund Closures to Past Performance

We begin by seeing if there is a relationship between firm boundaries and whether a fund complex relies more on higher-powered incentives for outsourced funds. We use a standard measure of mutual fund incentives in the mutual fund literature: the sensitivity of fund closures

(controlled by the family) to past performance (due to the advisor or manager). We estimate the following logit regression specification:

$$\text{Prob}(\text{CLOSED}_{i,t} = 1) = \Lambda(\mu + \boldsymbol{\lambda}\, \mathbf{Z}_{i,t-1}) \qquad (4)$$

$CLOSED_{i,t}$ is a dummy variable that equals one if fund i is closed in year t and zero otherwise. The notation $\Lambda(\bullet)$ indicates the logistic cumulative distribution function and $\boldsymbol{\lambda}$ is the vector of coefficients. 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. We denote μ as a constant and $\mathbf{Z}_{i,t-1}$ as 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 latter variable controls for the possibility that a fund family is more likely to close down products outside of the area of their expertise. The other independent variables of interest in $\mathbf{Z}_{i,t-1}$ are as before and include $LOGTNA_{i,t-1}$, $LOGFAMFUNDS_{i,t-1}$, $LOGFAMSIZE_{i,t-1}$, $EXPRATIO_{i,t-1}$, $TURNOVER_{i,t-1}$, $AGE_{i,t-1}$, $TOTLOAD_{i,t-1}$, $FLOW_{i,t-1}$ and $PRET_{i,t-1}$. Our main variables of interest are $PRET_{i,t-1}$ and $OUTSOURCED_{i,t-1}$. The idea here, motivated by the work of Chevalier and Ellison (1999), is to see if fund closures are more sensitive to poor past performance for outsourced funds than funds managed in-house. We will also include interactions of these variables as additional independent variables as well as year dummies and fund investment style dummies in the regression specification. The standard errors are clustered at the family level. We also report the average marginal effects expressed as percentages in brackets.

Table 7 reports the results. The first column shows the results for the baseline regression specification. In interpreting these results, it is useful to keep in mind that the mean probability that a fund is closed down in a given year is about 2.33%. The coefficient in front of *OUTSOURCED* is 0.738 and is statistically significant. Because exp(0.738)=2.09, the odds of an outsourced fund being closed is 109% greater than for a fund managed in-house. The marginal effect of *OUTSOURCED* is 0.913% per year, which is close to the difference between the mean

probability that an in-house fund is closed (1.95% per year) and the mean probability that an outsourced fund is closed (3.40% per year). The coefficient in front of *PRET* is negative (–0.043) and statistically significant (t-statistic of 8.76). A fund that has a one standard deviation lower past year return (13.5% return over the past year) increases the odds of closure by exp(–0.043×13.5)-1=79%. In terms of marginal effect (-0.049), a one standard deviation lower past year return increases the likelihood of fund closure by 0.049×13.5% = 0.662% per year.

In the second column, we add in an additional explanatory variable: the interaction of *OUTSOURCED* and *PRET* to see if outsourced funds face a differential sensitivity of closure to performance. Because the non-linearity of the logistic function makes statistical significance and marginal effects of interaction terms difficult to interpret, we follow Ai and Norton (2003) to account for the non-linear terms in computing marginal effects and their standard errors.[22] We find that the coefficient on the interaction of *OUTSOURCED* with *PRET* is negative and statistically significant using both the conventional t-statistic and the Ai-Norton t-statistic. This indicates that outsourced funds are more likely to be closed down for poor performance than funds managed in-house. In terms of marginal effects, a 13.5% decrease in returns for an in-house fund increases the likelihood of being closed by –0.028×13.5=0.378% per year. In contrast, a 13.5% decrease in returns for an outsourced fund increases the likelihood of being closed by (–0.028-0.070)×13.5=1.323%. This difference is statistically significant. In short, outsourced funds face significantly steeper incentives than their in-house counterparts.

We have to keep in mind that other types of heterogeneity may drive these results. For instance, outsourced funds tend to be smaller funds and smaller funds may face steeper incentives. Or outsourced funds tend to be younger and younger funds might be more easily closed. Fortunately, we have a host of fund characteristics (such as fund size and fund age) and

[22] We calculate the marginal effects with the non-linear terms for each observation and report the average marginal effect. Using the Delta-method, we calculate the standard errors for each observation and take their averages. The t-statistic we report is the average marginal effect divided by the average standard error. For brevity, we only make these corrections for interaction terms of interest.

interact them with past fund returns to control for these alternative explanations in these closure regressions.

We do this in the third and fourth columns of Table 7. We first add in additional interaction terms including *PRET×LOGTNA*, *PRET×LOGFAMFUNDS*, *PRET×LOGFAMSIZE*, and *PRET×EXPRATIO*. These interaction terms should pick up if our effect is due to *OUTSOURCED* proxying for *LOGTNA*, *LOGFAMFUNDS*, *LOGFAMSIZE* or *EXPRATIO*. The coefficient in front of *PRET×LOGTNA* and *PRET×EXPRATIO* are negative, indicating that smaller funds and funds with lower expense ratios face steeper incentives. The coefficient in front of *PRET×LOGFAMFUNDS* and *PRET×LOGFAMSIZE* are not statistically significant, indicating that family characteristics do no appear to drive steepness of incentives. These controls appear to have some explanatory power, but the coefficient in front of *PRET×OUTSOURCED* is remains 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 the fourth column by adding in additional interaction terms including *PRET×TURNOVER*, *PRET×AGE*, *PRET×TOTLOAD* and *PRET×FLOW*. The estimates suggest that higher turnover, younger, higher load and funds experiencing outflow tend to face steeper incentives. However, even in the presence of these additional variables, the coefficient in front of *PRET×OUTSOURCED* again still remains negative and statistically significant. Thus, it does appear that our finding that outsourced funds face steeper incentives is not driven by other omitted fund characteristics.

Another concern, however, is that what is driving this result is that a fund being outsourced might be associated with the family's lack of commitment to a new investment 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 effect of outsourcing interacted with past returns. To see if this is the case, we add in three new variables in the last column, including *PRET×INMODALSTYLE*. Indeed, we find that the coefficient in front of *PRET×INMODALSTYLE* is negative, suggesting that funds not in the modal style of the family are much more likely to be closed down for poor performance. This is consistent with our lack-of-commitment to new styles alternative. However, the coefficient in front of *PRET×OUTSOURCED* remains negative and statistically significant. So a lack of commitment to a new style does not appear to be driving our outsourcing effect.

B. Sensitivity of Fund Closures to Fund Risk-Taking Behavior

Another distinct implication of the firm boundaries-contractual externalities explanation is that we should see that the family more closely tracks other aspects of fund behavior of outsourced funds, notably its risk-taking profile and how it differs from other funds with similar investment style. We use two measures of risk-taking deviations from Chevalier and Ellison (1999). The first is the deviation of a fund's beta from the average beta of funds in its class. We calculate a fund's beta for each calendar year using the 6-factor model using the twelve monthly returns. For each factor *f*, fund *i*, in year *t*, we save the estimated $\beta_{f,i,t}$ and calculate the average $\overline{\beta_{f,\iota,t}}$ for each mutual fund style. The beta deviation risk measure for fund *i* in year *t* is defined as the square-root of total squared deviations from the style means of the six factor loadings. The second risk-taking measure is a fund's idiosyncratic risk, defined as the standard deviation of idiosyncratic risk of the 6-factor model in percentages per month. We will call either of these two measures *RISKDEV*.

With these two measures, we re-estimate Equation (4) except that we now include *RISKDEV* and *RISKDEV×OUTSOURCED*. The coefficient of interest is in front of the interaction, which tells us whether the sensitivity of fund closures to risk-taking deviations is different for *OUTSOURCED* funds. The results are reported in Table 8.

The first two columns of Table 8 report the results for the beta-deviation risk measure. In the first column, the coefficient in front of *OUTSOURCED* remains positive and statistically significant. The coefficient in front of *RISKDEV* is negative (-0.128) and statistically significant (t-statistic of 2.09). A marginal effect of –0.132 indicates that fund that has a one standard deviation greater beta-deviation measure (one standard deviation is 1.99) decreases rather than increases the likelihood of closure by -0.132×1.99=-0.263%. We would have expected this variable to come in positively since managers might be more penalized for taking excessive risk. However, we have an additional explanatory variable in the form of the interaction of *OUTSOURCED* and *RISKDEV* to see if outsourced funds face a different sensitivity of closure to risk-taking deviations. We find that the coefficient on this interaction is positive (0.356) and statistically significant (Ai-Norton t-statistic of 2.90), indicating that a family is more likely to close down an outsourced fund than a fund managed in-house for taking excessive risk. A one standard deviation increase in the beta-deviation for an outsourced fund increases the likelihood of being closed down by (-0.132+0.395)×1.99=0.52% per year. In other words, outsourced funds are more likely to be penalized for risk-taking than their in-house counterparts.

In the second column, we also include the interaction of *OUTSOURCED* and *PRET* to see if the effect of risk-deviation on incentives is independent of the effect of performance on incentives. When both interaction terms are included, we find that both interaction terms are slightly weakened, but they continue to enter significantly. In the last two columns of Table 8, we report the corresponding results for the idiosyncratic risk deviation measure. We find that the coefficient on this interaction is positive and statistically significant, indicating that outsourced

funds are more likely to be closed down for this type of risk-taking deviation. A one standard deviation increase in the idiosyncratic-risk deviation measure (one standard deviation is 0.85% per month) for an outsourced fund increases its likelihood of being closed down by (-0.392+0.639)×0.85=0.88% per year. Compared to mean closure probability of 2.33% per year, these are economically significant increases in closure probabilities.

C. Outsourcing and Fund Risk-Taking Behavior

We now look at the relationship between firm boundaries and fund risk-taking behavior. If outsourced funds do in fact face steeper incentives for risk-taking deviations, then in response, they ought to deviate less than other funds (see Chevalier and Ellison (1999)). We estimate the following linear pooled panel regression using our sample of equity funds to see how outsourcing affects *RISKDEV*:

$$\text{RISKDEV}_{i,t-1} = \mu + \zeta \mathbf{Z}_{i,t-1} + \varepsilon_{i,t} \qquad (5)$$

In Equation (5), $\mathbf{Z}_{i,t-1}$ is the vector of the same set of fund characteristics described earlier, and z denotes the vector of coefficients. We continue to include a dummy variable for each mutual fund investment style and year dummies but do not report their estimates.

The results are presented in Table 9. From the first column, outsourced funds do have lower beta deviation than other funds; the coefficient in front of *OUTSOURCED* is -0.078 with a t-statistic of 3.72. In comparison, the coefficient in front of *LOGTNA* and *PRET* are –0.040 and 0.005. Because a standard deviation of *LOGTNA* and *PRET* are 1.9 and 13.5, respectively, a fund with one-standard deviation larger assets or under-performance in the past one-year reduces beta risk deviation by –0.040×1.9=-0.076 and 0.005×-13.5=-0.065, respectively. Thus the effect of outsourcing on beta risk-taking is comparable to the effect of size on risk-taking and the effect of under-performance on risk-taking. In the second column of Table 9, we look at how outsourcing affects the fund idiosyncratic-risk deviations. The coefficient on OUTSOURCED is -0.066 (-

0.066% per month) with a t-statistic of 3.36, and other coefficients remain qualitatively similar. The coefficients in front of *LOGTNA* and *PRET* are –0.027 and 0.002, respectively, so a fund with one standard deviation larger assets or under-performance reduces idiosyncratic risk deviation by –0.027×1.9=-0.051 and 0.002×-13.5=-0.027, respectively. Hence, an outsourced fund reduces risk-taking by slightly more than a fund with one-standard deviation larger size or under-performance.

D. Outsourcing and Closet Indexing, IPO Allocations and Subsidies

We next relate our outsourcing measure to other measures of fund/family actions such as closet indexing or preferential IPO allocations. These are typically regarded as hidden actions because they are not easily observable by those outside of the manager's organization, whether the principal be investors or the family that outsources its managerment. We expect our outsourcing measure to be correlated with some of these hidden actions because the premise of our risk-taking analysis is that outsourced funds are likely to take less risk and potentially take less effort and as a result become a closet indexer. Also, outsourced funds are less likely to benefit from preferential IPO allocations or other forms of subsidies that an in-house fund might benefit from. At the same time, there are other forms of unobservable effort and hence we expect that our outsourcing status measure, though correlated with these other hidden action measures, would still retain incremental explanatory power for performance when we control for these other measures of hidden action.

We need to base our analysis on the holdings of mutual funds and look only at equity funds, the subsample of funds for which we have more detailed data. We gather the following three variables from the literature. The first is the return gap measure of Kacperczyk, Sialm and Zheng (2008); their measure is the difference between reported monthly fund returns, grossed up with expenses, and the returns reconstructed from portfolio holdings. The return gap also accounts for percentage of holdings held in cash and bonds. The second variable is the fund IPO

allocations measure of Gasper, Massa and Matos (2006).[23] For our analysis, we designate a stock to be an IPO stock if it has been listed for six months or less at the time we observe portfolio holdings. We then calculate percentage of assets held in an IPO stock for each fund. The third variable is the industry concentration index (ICI), a measure of closet indexing, as defined by Kacperczyk, Sialm and Zheng (2005). ICI is the sum of squared deviations of portfolio weights in industries from the market average, so higher ICI indicates a more concentrated portfolio. These measures reflect, in one form or another, measures of activeness/closet-indexing, IPO allocations and cross-subsidations.

Our main results are reported in Table 10 and 11. In the first colum of Table 10, we regress a fund's return gap measure on our outsourcing status measure and a host of the usual fund characteristics. We find that there is no relationship between whether a fund is outsourced and its return gap. In the second column, we perform the same analysis using IPO allocations as the dependent variable. Here we find that outsourced funds are less likely to have IPO allocations. This is consistent with our auxiliary findings that outsourced funds take less risk. It might also reflect less preferential treatment on the part of the managing fund family. Both interpretations would be consistent with the outsourcing family having a harder time to extract value from the otusourced fund. In the third column, we find that outsourced funds are less likely to have a lower industry concentration index, again consistent with the finding that outsourced funds take less risk.

In Table 11, we find that our outsourcing underperformance is robust to inclusion of these additional control variables. Consistent with Kacperczyk, Sialm and Zheng (2008), we find in column (1) of Table 11 that contemporaneous return gap is strongly correlated with gross fund returns. However, return gap does not erode our underperformance result, which suggests that underperformance is coming not only from unobserved actions by funds. When we regress fund

[23] Gasper, Massa and Matos (2006) think of IPO allocations as families favoring some funds in the family at the expense of other funds in the same family.

performance on a firm's IPO allocation in column (2), we find that the coefficient is positive though it is not statistically significant. In other words, funds with IPO allocations do better but this variable does not change the coefficient on our outsourcing status variable. Finally, when we regress gross fund returns on ICI in column (3), we get a positive coefficient, which indicates that a concentrated fund performs well and a closet-indexer (with industry weights closer to market average) tends to underperform other funds. However, again this control does not erode the underperformance of outsourced funds, which also indicates that there is more to the story than simply closet-indexing.

In sum, Table 11 is consistent with outsourcing status containing information regarding unobservable effort that is not completely captured by the closet indexing or subsidization variables. As such, our outsourcing effect, while correlated is unique to these other hidden action measures identified in the literature.

VI. Robustness Checks and Additional Analyses

In this section, we first consider various robustness checks of our results. We simply summarize the checks here and the tables can be found in a Supplementary Appendix.

A. Robustness of Fund Performance Regressions

We first consider various other ways of calculating the factor loadings used to estimate mutual fund performance. To estimate factor loadings, our base case specification splits funds into equity funds and non-equity funds, and then sorts funds on fund size and then on outsourcing status. Because past performance also may drive future performance, we have also tried sorting funds first by past twelve-months performance and then by outsourcing status. Furthermore, fund styles determine factor loadings; we have also tried sorting funds by style and then by outsourcing status. In either case, our results remain unchanged. Our base case specification also calculates factor loadings on returns net of expenses and we examine fund performance on returns

gross of expenses. We also calculate factor loadings on gross returns and examine fund performance on returns net of expenses. We have also estimated loadings using fund returns. The results are virtually identical in all these cases.

In addition to using fund styles to estimate factor loadings, we also consider controlling for fund styles more directly. Even though the earlier summary statistics indicate that there are equal fractions of outsourced funds across styles, the summary statistics alone do not completely mitigate the concern that poorly performing styles are less likely to be outsourced. In particular, specialized funds such as those in international equity style or sector style might be more likely to be outsourced and funds in these styles might appear to out-perform relative to our 6-factor model. To address this concern, we remove international funds and sector funds from the data and repeat the performance regressions. We also consider including style fixed-effects in our regressions. In both cases, our results remain unchanged.

We have also used portfolio holdings rather than style analysis to estimate performance benchmarks. The issue here is that our sample shrinks considerably and as a result the t-statistics are smaller. But the economic significance is very similar.

We also consider a number of additional control variables for the fund performance regressions. One worry is that total management fees may not accurately capture the incentives on the part of the advisor. Hence, we break the management fee (*EXPRATIO*) into the 12B-1 fee, which is typically obtained by the family complex, and the remaining portion which is kept by the fund advisor. We also break the total sales load (*TOTLOAD*) into front-end load and rear-end load and find that our results are unchanged. Finally, we include more conventional advisor quality controls, rather than advisor fixed-effects, in the form of the number of funds managed by the advisor, size of the fund advisor, or the number of years the fund manager has managed the fund. We find similar results in all cases.

B. Checks on Effects of Outsourcing on Fund Incentives

We also consider additional robustness checks of the effects of outsourcing on fund incentives. We find that the sensitivity of fund flows to past performance does not differ between in-house versus outsourced funds. Studies typically find, as we do, that fund flows are sensitive to performance. The interpretation given in the literature is that this sensitivity captures the reaction of investors to fund performance. To this extent, this finding is consistent with outside investors not being aware that a fund is outsourced and that the under-performance of outsourced funds is unlikely to be related to differences in incentives provided by outside investors vis-a-vis fund flows.

As a check regarding the interpretation of the fund closure regressions related to past performance, we confront 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. 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 17%. The independent variables are the usual controls we use in other regressions and the coefficient of interest is on *OUTSOURCED*. We obtain a positive coefficient, which suggests that families are more likely to end a style when they close an outsourced fund compared to when they close other funds. But this coefficient is small and not statistically significant. In other words, it does not appear that outsourcing is a signal of a lack of family commitment toward a new style.

We have also considered a number of other less compelling alternatives. For instance, 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 to 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*.

VII. Conclusion

In sum, we investigate the effects of managerial outsourcing on the incentives and performance, using the mutual fund industry as our setting. We first document that many families outsource the management of a sizeable fraction of their funds to unaffiliated advisory firms. Importantly, we document that funds managed externally significantly under-perform those ran internally by 50.4 to 72.0 basis points per year. This result is robust to controlling for various observable characteristics about the mutual fund and to unobservable characteristics of fund families or advisors. We argue that contractual externalities due to firm boundaries make it more difficult to extract performance from an outsourced relationship and force the firm to rely more on high-powered incentives.

However, we do not attempt to distinguish between different alternatives within the contractual externalities characteristic of imperfect information environments. Holmstrom (1999) considers several different settings within this framework that lead to similar implications. For instance, in a single-task setting, a firm may have additional information about an employee other than past performance (*i.e.* how often he shows up to work) and may not need to rely as much on past performance. Another interpretation of the findings regarding fund closures is that it is easier to fire someone outside of an organization than within. This fits with the theme of "intra-firm socialism" in the corporate finance literature on internal capital markets. We cannot rule out all forms of unobserved heterogeneity for such implicit incentives findings. However, the unobserved heterogeneity alternative becomes less compelling relative to the firm boundaries explanation when we consider the performance and incentive results simultaneously. The importance of firm boundaries becomes more compelling because both the performance and incentive results are consistent with the contractual externalities due to firm boundaries alternative.

There are a number of avenues for future work. Namely, we have limited information on the portfolios of external advisory companies. We only know what these companies manage for mutual fund families but not for other institutions such as university endowments. More complete data on the portfolios of these companies might allow us to test other auxiliary implications of firm boundaries. For instance, we might attempt to measure the extent to which an advisory firm faces the multi-tasking trade-offs envisioned by the contractual-externalities-due-to-firm-boundaries framework. The upshot is that our findings are important not only for the mutual fund industry, but they also suggest that this industry is an invaluable laboratory with which to study important issues in organization.

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Table 1: 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.

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
1994	345	6.09	0.39	0.23	0.75
1995	354	6.68	0.37	0.21	0.73
1996	379	7.32	0.37	0.21	0.73
1997	418	7.71	0.36	0.20	0.73
1998	436	8.04	0.41	0.24	0.73
1999	462	8.52	0.48	0.32	0.74
2000	510	8.11	0.45	0.28	0.73
2001	494	8.77	0.47	0.29	0.73
2002	475	9.07	0.47	0.29	0.73
2003	473	9.24	0.46	0.29	0.73
2004	468	9.44	0.48	0.30	0.73
2005	491	8.16	0.44	0.30	0.73
2006	465	8.21	0.43	0.30	0.73
2007	467	8.04	0.42	0.30	0.73
Average	446	8.10	0.43	0.26	0.73

Table 2: 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. LOGFAMFUNDS is the natural logarithm of the number of funds in the fund family. LOGFAMSIZE is the logarithm of one plus the total assets under management of the other funds in the family that the fund belongs to excluding the asset of the fund itself. EXPRATIO is the total annual management fees and expenses divided by year-end TNA. 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. 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, LOGFAMFUNDS, LOGFAMSIZE, FLOW and PRET are calculated each month. 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 1994 to December 2007 and is comprised of all funds. The table reports the time-series averages of monthly cross-sectional averages and monthly cross-sectional standard deviations (shown in brackets) of fund characteristics across all funds, funds managed in-house and outsourced funds.

	All funds	In-house funds	Outsourced funds
Number of funds	3079	2271	808
Total net assets (TNA)	683	771	425
($ million)	[1770]	[1887]	[1353]
Log of TNA (LOGTNA)	4.9	5.0	4.4
(log $ million)	[1.9]	[1.9]	[1.8]
Log family funds (LOGFAMFUNDS)	2.9	3.0	2.9
(log #)	[1.7]	[1.7]	[1.6]
Log family TNA (LOGFAMSIZE)	8.1	8.2	7.5
(log $ million)	[2.9]	[2.9]	[2.6]
Expense ratio (EXPRATIO)	1.3	1.3	1.3
(% per year)	[0.6]	[0.6]	[0.6]
Fund turnover (TURNOVER)	87.6	89.3	81.4
(% per year)	[98.6]	[98.9]	[94.9]
Fund age (AGE)	10.3	11.1	7.9
(years)	[11.6]	[12.2]	[8.9]
Total sales load (TOTLOAD)	2.3	2.4	2.1
(%)	[2.5]	[2.5]	[2.4]
Fund flow (FLOW)	42.8	41.5	45.9
(% per year)	[133.7]	[131.7]	[137.7]
Past year return (PRET)	1.9	2.0	1.6
(% per year)	[13.5]	[13.6]	[12.9]

Table 3: Outsourcing and Fund Performance

This table shows the Fama-MacBeth (1973) estimates of monthly fund returns regressed on fund characteristics lagged one month. Fund returns are calculated before (gross) deducting fees and expenses. These returns are adjusted using the market model, the CAPM, the 4-Factor model, and the 6-Factor model. The dependent variable is FUNDRET. OUTSOURCED is an indicator variable that equals one if the fund management is outsourced. LOGTNA is the natural logarithm of TNA. LOGFAMFUNDS is the natural logarithm of the number of funds in the fund family. LOGFAMSIZE is the natural logarithm of one plus the size of the family that the fund belongs to excluding the asset of the fund itself. EXPRATIO is the total annual management fees and expenses divided by TNA. TURNOVER is fund turnover and AGE is the number of years since the organization of the mutual fund. 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 one year. PRET is the cumulative risk-adjusted fund return over the past twelve months. Intercepts have been suppressed. The sample is from January 1994 to December 2007 (168 months), is comprised of all funds, and consists of 472,469 fund-month observations. Time-series averages of monthly regression R-squareds are reported in the last row. The t-statistics are adjusted for serial correlation using Newey-West (1987) lags of order three and are shown in parentheses.

	Gross fund returns (monthly %)			
	Market-Adj	Beta-Adj	4-Factor	6-Factor
$OUTSOURCED_{i,t-1}$	-0.060	-0.058	-0.046	-0.042
	(4.32)	(4.05)	(3.31)	(3.10)
$LOGTNA_{i,t-1}$	-0.025	-0.019	-0.029	-0.031
	(1.71)	(1.39)	(2.10)	(2.20)
$LOGFAMFUNDS_{i,t-1}$	-0.023	-0.023	-0.023	-0.026
	(1.12)	(1.11)	(1.16)	(1.28)
$LOGFAMSIZE_{i,t-1}$	0.025	0.025	0.026	0.028
	(2.22)	(2.19)	(2.25)	(2.50)
$EXPRATIO_{i,t-1}$	0.043	0.044	0.044	0.052
	(0.49)	(0.50)	(0.51)	(0.60)
$TURNOVER_{i,t-1}$	0.000	0.000	0.000	0.000
	(0.76)	(0.75)	(0.73)	(0.72)
$AGE_{i,t-1}$	0.000	0.000	0.000	0.000
	(0.02)	(0.04)	(0.30)	(0.21)
$TOTALLOAD_{i,t-1}$	-0.006	-0.006	-0.006	-0.006
	(1.01)	(1.00)	(1.05)	(1.03)
$FLOW_{i,t-1}$	0.000	0.000	0.000	0.000
	(2.68)	(2.69)	(2.69)	(2.71)
$PRET_{i,t-1}$	0.025	0.025	0.025	0.025
	(4.07)	(4.07)	(4.08)	(4.07)
R-squared	0.175	0.175	0.174	0.173

Table 4: Outsourcing and Fund Performance with Fixed Effects

This table shows the Fama-MacBeth (1973) estimates of monthly fund returns regressed on fund characteristics lagged one month. Fund returns are calculated before (gross) deducting fees and expenses. These returns are adjusted using the market model, the CAPM, the 4-Factor model, and the 6-Factor model. The dependent variable is FUNDRET. OUTSOURCED is an indicator variable that equals one if the fund management is outsourced. The other independent variables include LOGTNA, EXPRATIO, TURNOVER, AGE, TOTLOAD, FLOW, and PRET. Intercepts have been suppressed. The sample is from January 1994 to December 2007 (168 months), is comprised of all funds, and consists of 472,469 fund-month observations. Time-series averages of monthly regression R-squareds are reported in the last row. The t-statistics are adjusted for serial correlation using Newey-West (1987) lags of order three and are shown in parentheses.

	Gross fund returns (monthly %)			
	Market-Adj	Beta-Adj	4-Factor	6-Factor
$OUTSOURCED_{i,t-1}$	-0.045	-0.043	-0.041	-0.037
	(2.70)	(2.79)	(2.70)	(2.52)
$LOGTNA_{i,t-1}$	-0.034	-0.029	-0.037	-0.040
	(2.33)	(2.05)	(2.68)	(2.81)
$EXPRATIO_{i,t-1}$	0.003	0.004	0.005	0.013
	(0.05)	(0.06)	(0.07)	(0.19)
$TURNOVER_{i,t-1}$	0.000	0.000	0.000	0.000
	(0.85)	(0.82)	(0.80)	(0.77)
$AGE_{i,t-1}$	0.000	0.000	0.001	0.001
	(0.38)	(0.45)	(0.65)	(0.58)
$TOTALLOAD_{i,t-1}$	0.004	0.004	0.003	0.004
	(0.82)	(0.82)	(0.71)	(0.78)
$FLOW_{i,t-1}$	-0.029	-0.031	-0.030	-0.030
	(3.04)	(3.06)	(3.04)	(3.07)
$PRET_{i,t-1}$	0.019	0.020	0.019	0.019
	(3.88)	(3.90)	(3.88)	(3.86)
Family Fixed Effect?	Yes	Yes	Yes	Yes
Advisor Fixed Effect?	Yes	Yes	Yes	Yes
R-squared	0.464	0.464	0.463	0.462

Table 5: First Stage of 2SRI—The Effect of Family Size at Time of Fund Inception on Whether the Fund is Outsourced

This table shows the estimates of the logit regression in the first stage regression the 2SRI estimation of the effect of outsourcing on mutual fund performance. The first stage measures the effect of family characteristics when the fund was created on whether the mutual fund is outsourced. The dependent variable is OUTSOURCED, which is an indicator that equals one if the fund management is outsourced. LOGFAMFUNDS AT INCEPTION is the natural logarithm of the number of funds in the fund family when the fund was created. LOGFAMSIZE AT INCEPTION is the natural logarithm of one plus the size of the family that the fund belongs to when the fund was created, excluding the asset of the fund itself. The other independent variables include LOGTNA, LOGFAMFUNDS, LOGFAMSIZE, EXPRATIO TURNOVER, AGE, TOTLOAD, FLOW and PRET. A complete set of Month × Year dummies is also included in the specification. The sample is from January 1994 to December 2007 (168 months), is comprised of all funds, and consists of 472,469 fund-month observations. 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. Average marginal effects in percentages (%) are shown in square brackets. Unconditional probability of outsourcing is 25.7%.

	$OUTSOURCED_{i,t-1}$
LOGFAMFUNDS AT INCEPTION	0.200 (4.71) [3.577]
LOGFAMSIZE AT INCEPTION	-0.131 (1.78) [2.355]
$LOGTNA_{i,t-1}$	-0.090 (3.13) [1.608]
$LOGFAMFUNDS_{i,t-1}$	0.139 (0.99) [2.496]
$LOGFAMSIZE_{i,t-1}$	-0.016 (0.37) [0.284]
$EXPRATIO_{i,t-1}$	-0.086 (0.72) [1.542]
$TURNOVER_{i,t-1}$	-0.001 (2.15) [0.017]
$AGE_{i,t-1}$	-0.041 (3.46) [0.731]
$TOTLOAD_{i,t-1}$	-0.002 (0.07) [0.041]
$FLOW_{i,t-1}$	-0.007 (0.49) [0.131]
$PRET_{i,t-1}$	-0.150 (1.42) [2.685]
Pseudo R-squared	0.056

Table 6: Second Stage of 2SRI—The Effect of Outsourcing on Fund Performance

This table shows the second stage of the 2SRI estimation of the effect of outsourcing on mutual fund performance. Fund returns are calculated before (gross) deducting fees and expenses. These returns are adjusted using the market model, the CAPM, the 4-Factor model, and the 6-Factor model. The dependent variable is FUNDRET. OUTSOURCED is an indicator variable that equals one if the fund management is outsourced. LOGFAMSIZE AT INCEPTION is the natural logarithm of one plus the size of the family that the fund belongs to when the fund was created. The other independent variables include LOGTNA, LOGFAMFUNDS, LOGFAMSIZE, EXPRATIO, TURNOVER, AGE, TOTLOAD, FLOW and PRET. FIRST STAGE RESIDUAL is the residual from the first stage logit regression of the 2SRI estimation. A complete set of Month × Year dummies is also included in the specification. The sample is from January 1994 to December 2007 (168 months), is comprised of all funds, and consists of 472,469 fund-month observations. 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.

	Gross fund returns			
	Market-Adj	Beta-Adj	4-Factor	6-Factor
$OUTSOURCED_{i,t-1}$	-0.140	-0.127	-0.109	-0.100
	(2.45)	(2.29)	(2.07)	(2.04)
LOGFAMSIZE AT INCEPTION	-0.031	-0.032	-0.032	-0.031
	(2.99)	(2.98)	(3.05)	(2.94)
$LOGTNA_{i,t-1}$	-0.040	-0.032	-0.041	-0.043
	(1.95)	(1.63)	(2.04)	(2.10)
$LOGFAMFUNDS_{i,t-1}$	0.038	0.040	0.040	0.037
	(2.70)	(2.87)	(2.93)	(2.68)
$LOGFAMSIZE_{i,t-1}$	0.013	0.013	0.013	0.015
	(1.62)	(1.54)	(1.62)	(1.90)
$EXPRATIO_{i,t-1}$	0.093	0.094	0.094	0.099
	(0.84)	(0.85)	(0.86)	(0.90)
$TURNOVER_{i,t-1}$	0.000	0.000	0.000	0.000
	(0.23)	(0.27)	(0.29)	(0.30)
$AGE_{i,t-1}$	-0.003	-0.002	-0.002	-0.002
	(1.97)	(1.98)	(1.78)	(1.78)
$TOTLOAD_{i,t-1}$	-0.007	-0.007	-0.008	-0.008
	(1.15)	(1.16)	(1.24)	(1.23)
$FLOW_{i,t-1}$	-0.041	-0.041	-0.042	-0.041
	(1.88)	(1.92)	(1.92)	(1.91)
$PRET_{i,t-1}$	0.020	0.020	0.020	0.020
	(1.45)	(1.46)	(1.48)	(1.46)
FIRST STAGE $RESIDUAL_{i,t-1}$	0.101	0.090	0.083	0.077
	(1.98)	(1.83)	(1.75)	(1.77)
R-squared	0.061	0.036	0.036	0.029

Table 7: Fund Closures and Past Performance

This table investigates the determinants of mutual fund closures and reports pooled panel logit 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 the next year. OUTSOURCED is an indicator variable that equals one if the fund management is outsourced. PRET is the market-adjusted fund return over the past twelve months. INMODALSTYLE is an indicator that equals one if the fund is in its family's modal style. The other independent variables include LOGTNA, EXPRATIO, LOGFAMFUNDS, LOGFAMSIZE, TURNOVER, AGE, TOTLOAD, and FLOW. All regressions include year-effects and investment style effects. The sample is from January 1994 to December 2007, is comprised of all funds, and consists of 41,633 fund-year observations. 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. Average marginal effects in percentages (% per year) are shown in square brackets. The unconditional probability of closure is 2.33% per year.

	$CLOSED_{i,t}$				
	Baseline case	Include Interaction w/ Outsourcing	Control for Interactions w/ Characteritics	Add Additional Controls	Control for modal style
$OUTSOURCED_{i,t-1}$	0.738	0.893	0.798	0.807	0.818
	(5.69)	(6.39)	(6.05)	(6.15)	(6.22)
	[0.913]	[1.111]	[0.892]	[0.890]	[0.902]
$PRET_{i,t-1}$	-0.043	-0.025	0.041	0.067	0.075
	(8.76)	(3.81)	(2.01)	(3.07)	(3.53)
	[-0.049]	[-0.028]	[0.043]	[0.068]	[0.077]
$PRET_{i,t-1}$		-0.038	-0.021	-0.023	-0.024
$\times OUTSOURCED_{i,t-1}$		(4.49)	(3.80)	(3.90)	(3.97)
		[-0.070]	[-0.115]	[-0.124]	[-0.124]
{Ai-Norton t-stat}		{3.25}	{3.65}	{3.66}	{3.58}
$INMODALSTYLE_{i,t-1}$	-0.088	-0.064	-0.060	-0.037	-0.297
	(0.78)	(0.56)	(0.51)	(0.32)	(0.92)
	[-0.100]	[-0.072]	[-0.062]	[-0.038]	[-0.298]
$LOGTNA_{i,t-1}$	-0.485	-0.483	-0.468	-0.466	-0.481
	(12.00)	(11.89)	(11.04)	(10.97)	(10.48)
	[-0.555]	[-0.548]	[-0.486]	[-0.476]	[-0.491]
$LOGFAMFUNDS_{i,t-1}$	-0.336	-0.333	-0.330	-0.382	-0.363
	(3.11)	(3.04)	(3.23)	(3.66)	(3.53)
	[-0.384]	[-0.378]	[-0.342]	[-0.390]	[-0.370]
$LOGFAMSIZE_{i,t-1}$	1.469	1.452	1.537	1.777	1.682
	(3.55)	(3.42)	(4.11)	(4.40)	(4.21)
	[1.680]	[1.648]	[1.596]	[1.816]	[1.716]
$EXPRATIO_{i,t-1}$	-4.906	-4.943	-5.125	-5.104	-5.112
	(17.93)	(17.76)	(17.64)	(17.72)	(17.72)
	[-5.612]	[-5.611]	[-5.320]	[-5.216]	[-5.216]
$TURNOVER_{i,t-1}$	0.037	0.033	0.031	0.082	0.082
	(3.60)	(3.18)	(3.15)	(7.17)	(7.20)
	[0.042]	[0.038]	[0.033]	[0.084]	[0.084]
$AGE_{i,t-1}$	0.026	0.026	0.029	0.029	0.030
	(5.25)	(5.17)	(5.16)	(5.40)	(5.51)
	[0.030]	[0.029]	[0.030]	[0.030]	[0.030]
$TOTLOAD_{i,t-1}$	0.306	0.308	0.290	0.283	0.283
	(9.35)	(9.34)	(8.63)	(8.60)	(8.62)
	[0.350]	[0.349]	[0.300]	[0.290]	[0.288]
$FLOW_{i,t-1}$	0.001	0.000	0.000	0.005	0.005
	(0.61)	(0.61)	(0.62)	(3.54)	(3.38)
	[0.000]	[0.000]	[0.000]	[0.005]	[0.005]

(continues to next page)

Table 7 (continued)

	Baseline case	Include Interaction w/ Outsourcing	Control for Interactions w/ Characteritics	Add Additional Controls	Control for modal style
$PRET_{i,t-1}$			-0.003	-0.002	-0.002
$\times LOGTNA_{i,t-1}$			(2.67)	(1.42)	(1.41)
			[-0.003]	[-0.002]	[-0.002]
$PRET_{i,t-1}$			-0.001	0.000	0.000
$\times LOGFAMFUNDS_{i,t-1}$			(0.14)	(0.04)	(0.05)
			[0.000]	[0.000]	[0.000]
$PRET_{i,t-1}$			-0.004	-0.021	-0.023
$\times LOGFAMSIZE_{i,t-1}$			(0.39)	(1.62)	(1.84)
			[0.005]	[-0.021]	[-0.023]
$PRET_{i,t-1}$			-0.062	-0.065	-0.065
$\times EXPRATIO_{i,t-1}$			(16.97)	(16.50)	(16.70)
			[-0.064]	[-0.066]	[-0.066]
$PRET_{i,t-1}$				0.003	0.003
$\times TURNOVER_{i,t-1}$				(5.86)	(5.84)
				[0.002]	[0.003]
$PRET_{i,t-1}$				-0.001	-0.001
$\times AGE_{i,t-1}$				(3.21)	(3.42)
				[-0.001]	[-0.001]
$PRET_{i,t-1}$				0.004	0.004
$\times TOTLOAD_{i,t-1}$				(3.57)	(3.57)
				[0.004]	[0.004]
$PRET_{i,t-1}$				-0.001	-0.001
$\times FLOW_{i,t-1}$				(2.86)	(2.79)
				[-0.001]	[-0.001]
$PRET_{i,t-1}$					-0.021
$\times INMODALSTYLE_{i,t-1}$					(2.07)
					[-0.022]
$LOGTNA_{i,t-1}$					0.055
$\times INMODALSTYLE_{i,t-1}$					(0.97)
					[0.056]
$PRET_{i,t-1} \times LOGTNA_{i,t-1}$					0.002
$\times INMODALSTYLE_{i,t-1}$					(0.94)
					[0.002]
Pseudo R-squared	0.6044	0.6096	0.6438	0.6478	0.6485

Table 8: Fund Closures and Deviations in Fund Risk-Taking from the Norm

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. RISKDEV is either the fund beta-deviation measure or the fund idiosyncratic risk measure. The other independent variables include INMODALSTYLE, LOGTNA, LOGFAMFUNDS, LOGFAMSIZE, EXPRATIO, TURNOVER, AGE, TOTLOAD, FLOW and PRET. All regressions include year-effects and investment style effects. The sample is from January 1994 to December 2007, is comprised of all funds, and consists of 41,633 fund-year observations. 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. Average marginal effects in percentages (% per year) are shown in square brackets. The unconditional probability of closure is 2.33% per year.

	$CLOSED_{i,t}$			
	Beta Deviation		Idio-Risk Deviation	
$OUTSOURCED_{i,t-1}$	1.060	1.174	0.715	0.928
	(5.51)	(5.68)	(3.62)	(3.87)
	[1.225]	[1.358]	[0.661]	[0.869]
$PRET_{i,t-1}$	-0.042	-0.024	-0.042	-0.026
	(7.54)	(3.08)	(4.64)	(2.41)
	[-0.043]	[-0.025]	[-0.036]	[-0.022]
$PRET_{i,t-1}$		-0.035		-0.038
$\times OUTSOURCED_{i,t-1}$		(3.50)		(2.93)
		[-0.061]		[-0.047]
{Ai-Norton t-stat}		{2.64}		{2.06}
$RISKDEV_{i,t-1}$	-0.128	-0.094	0.451	0.449
	(2.09)	(1.60)	(2.22)	(1.99)
	[-0.132]	[-0.096]	[0.392]	[0.388]
$RISKDEV_{i,t-1}$	0.356	0.293	0.585	0.498
$\times OUTSOURCED_{i,t-1}$	(4.33)	(3.62)	(2.61)	(2.11)
	[0.395]	[0.333]	[0.639]	[0.610]
{Ai-Norton t-stat}	{2.90}	{2.60}	{1.96}	{1.83}
$INMODALSTYLE_{i,t-1}$	-0.113	-0.099	-0.112	-0.106
	(0.92)	(0.79)	(0.85)	(0.79)
	[-0.116]	[-0.100]	[-0.097]	[-0.091]
$LOGTNA_{i,t-1}$	-0.504	-0.501	-0.504	-0.500
	(10.44)	(10.43)	(8.56)	(8.57)
	[-0.520]	[-0.514]	[-0.438]	[-0.432]
$LOGFAMFUNDS_{i,t-1}$	-0.401	-0.389	-0.460	-0.464
	(3.65)	(3.54)	(3.41)	(3.50)
	[-0.414]	[-0.399]	[-0.399]	[-0.400]
$LOGFAMSIZE_{i,t-1}$	1.565	1.517	1.815	1.829
	(3.86)	(3.75)	(3.28)	(3.35)
	[1.616]	[1.556]	[1.576]	[1.580]
$EXPRATIO_{i,t-1}$	-5.579	-5.611	-6.375	-6.408
	(15.86)	(15.85)	(12.13)	(12.14)
	[-5.760]	[-5.753]	[-5.538]	[-5.538]
$TURNOVER_{i,t-1}$	0.041	0.038	0.000	0.000
	(4.16)	(3.75)	(5.06)	(4.47)
	[0.042]	[0.039]	[0.038]	[0.035]
$AGE_{i,t-1}$	0.026	0.027	0.022	0.022
	(4.55)	(4.62)	(3.27)	(3.29)
	[0.027]	[0.028]	[0.019]	[0.019]
$TOTLOAD_{i,t-1}$	0.322	0.322	0.318	0.319
	(8.86)	(8.84)	(7.85)	(7.78)
	[0.333]	[0.330]	[0.277]	[0.275]
$FLOW_{i,t-1}$	0.000	0.000	0.000	0.000
	(0.53)	(0.53)	(0.53)	(0.52)
	[0.001]	[0.000]	[0.000]	[0.000]
Pseudo R-squared	0.668	0.671	0.728	0.731

Table 9: Outsourcing and Deviations in Fund Risk-Taking from the Norm

This table reports pooled panel regression estimates of annual regressions of how outsourcing affects the risk-taking of mutual funds. The dependent variable of the first specification, RISKDEV, is either the beta-deviation measure or the idiosyncratic risk measure. The independent variables are OUTSOURCED, INMODALSTYLE, LOGTNA, LOGFAMFUNDS, LOGFAMSIZE, EXPRATIO, TURNOVER, AGE, TOTLOAD, FLOW and PRET. All regressions include year-effects and investment style effects. The sample is from 1994 to 2007 and is comprised of all funds. 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.

	$RISKDEV_{i,t}$	
	Beta Deviation	Idio-Risk Deviation
$OUTSOURCED_{i,t-1}$	-0.078	-0.066
	(3.72)	(3.36)
$INMODALSTYLE_{i,t-1}$	0.035	0.006
	(2.07)	(0.40)
$LOGTNA_{i,t-1}$	-0.040	-0.027
	(8.85)	(4.78)
$LOGFAMFUNDS_{i,t-1}$	-0.011	-0.027
	(0.62)	(1.91)
$LOGFAMSIZE_{i,t-1}$	-0.073	-0.029
	(2.07)	(0.93)
$EXPRATIO_{i,t-1}$	0.084	0.158
	(7.08)	(5.08)
$TURNOVER_{i,t-1}$	0.017	0.000
	(2.85)	(2.22)
$AGE_{i,t-1}$	0.002	0.002
	(2.45)	(2.75)
$TOTLOAD_{i,t-1}$	-0.008	-0.004
	(1.98)	(1.00)
$FLOW_{i,t-1}$	0.000	0.000
	(0.33)	(2.76)
$PRET_{i,t-1}$	0.005	0.002
	(8.37)	(6.13)
Pseudo R-squared	0.353	0.405

Table 10: Outsourcing and Hidden Actions

This table shows the Fama-MacBeth (1973) estimates of monthly fund returns regressed on fund characteristics lagged one month. Fund returns are calculated before (gross) deducting fees and expenses. RGAP is the contemporaneous return gap. IPO is the percentage of assets invested in newly issued stocks (less than 6 months old). ICI is the industry concentration index. The dependent variable is either RGAP, IPO or ICI. OUTSOURCED is an indicator variable that equals one if the fund management is outsourced. LOGTNA is the natural logarithm of TNA. LOGFAMFUNDS is the natural logarithm of the number of funds in the fund family. LOGFAMSIZE is the natural logarithm of one plus the size of the family that the fund belongs to excluding the asset of the fund itself. EXPRATIO is the total annual management fees and expenses divided by TNA. TURNOVER is fund turnover and AGE is the number of years since the organization of the mutual fund. 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 one year. PRET is the cumulative (buy-hold) fund return over the past twelve months. Intercepts have been suppressed. The sample is from January 1994 to December 2007 (168 months), is comprised of equity funds that appear also appear in Thomson Reuters Mutual Fund Holdings database and consists of 125,253 fund-month observations. Time-series averages of monthly regression R-squareds are reported in the last row. The t-statistics are adjusted for serial correlation using Newey-West (1987) lags of order three and are shown in parentheses.

	Gross fund returns (monthly %)		
	$RGAP_{i,t}$	$IPO_{i,t}$	$ICI_{i,t}$
$OUTSOURCED_{i,t-1}$	-0.001	-0.001	-0.002
	(0.11)	(3.06)	(3.40)
$LOGTNA_{i,t-1}$	-0.020	0.000	0.001
	(3.92)	(2.36)	(2.00)
$LOGFAMFUNDS_{i,t-1}$	(0.02)	-0.002	0.000
	(1.61)	(3.34)	(0.14)
$LOGFAMSIZE_{i,t-1}$	0.020	0.001	-0.001
	(4.85)	(5.71)	(5.75)
$EXPRATIO_{i,t-1}$	-0.025	0.004	0.025
	(1.26)	(9.52)	(20.33)
$TURNOVER_{i,t-1}$	0.000	0.000	0.000
	(2.36)	(6.62)	(4.16)
$AGE_{i,t-1}$	0.000	0.000	0.000
	(0.02)	(5.65)	(5.14)
$TOTALLOAD_{i,t-1}$	0.002	0.000	-0.002
	(0.66)	(1.20)	(15.36)
$FLOW_{i,t-1}$	0.000	0.000	0.000
	(0.92)	(2.45)	(3.03)
$PRET_{i,t-1}$	0.004	0.000	0.000
	(3.20)	(3.59)	(1.11)
R-squared	0.051	0.136	0.141

Table 11: Effect of Outsourcing on Performance with Additional Hidden Action Controls

This table shows the Fama-MacBeth (1973) estimates of monthly fund returns regressed on fund characteristics lagged one month. Fund returns are calculated before (gross) deducting fees and expenses. These returns are adjusted using the market model. The dependent variable is FUNDRET. OUTSOURCED is an indicator variable that equals one if the fund management is outsourced. LOGTNA is the natural logarithm of TNA. LOGFAMFUNDS is the natural logarithm of the number of funds in the fund family. LOGFAMSIZE is the natural logarithm of one plus the size of the family that the fund belongs to excluding the asset of the fund itself. EXPRATIO is the total annual management fees and expenses divided by TNA. TURNOVER is fund turnover, and AGE is the number of years since the organization of the mutual fund. 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 one year. PRET is the cumulative (buy-hold) fund return over the past twelve months. RGAP is the contemporaneous return gap. IPO is the percentage of assets invested in newly issued stocks (less than 6 months old). ICI is the industry concentration index. Intercepts have been suppressed. The sample is from January 1994 to December 2007 (168 months), is comprised of equity funds that appear also appear in Thomson Reuters Mutual Fund Holdings database and consists of 125,253 fund-month observations. Time-series averages of monthly regression R-squareds are reported in the last row. The t-statistics are adjusted for serial correlation using Newey-West (1987) lags of order three and are shown in parentheses.

	Gross fund returns (monthly %)		
$OUTSOURCED_{i,t-1}$	-0.046	-0.041	-0.042
	(3.01)	(2.28)	(2.22)
$LOGTNA_{i,t-1}$	-0.042	-0.053	-0.048
	(3.83)	(3.65)	(4.19)
$LOGFAMFUNDS_{i,t-1}$	(0.02)	(0.05)	(0.03)
	(1.39)	(1.07)	(1.47)
$LOGFAMSIZE_{i,t-1}$	0.016	0.024	0.025
	(2.53)	(1.99)	(3.07)
$EXPRATIO_{i,t-1}$	0.110	0.058	0.052
	(1.88)	(0.93)	(1.16)
$TURNOVER_{i,t-1}$	0.000	0.000	0.000
	(1.24)	(0.71)	(0.76)
$AGE_{i,t-1}$	0.002	0.002	0.001
	(1.94)	(1.69)	(1.33)
$TOTALLOAD_{i,t-1}$	-0.031	-0.030	-0.027
	(4.11)	(4.00)	(3.96)
$FLOW_{i,t-1}$	0.000	0.000	0.000
	(0.07)	(0.08)	(0.80)
$PRET_{i,t-1}$	0.020	0.024	0.023
	(2.63)	(3.01)	(3.03)
$RGAP_{i,t}$	0.201		
	(10.25)		
$IPO_{i,t-1}$		2.059	
		(1.24)	
$ICI_{i,t-1}$			1.625
			(2.01)
R-squared	0.236	0.249	0.249