Outsourcing Mutual Fund Management: Firm Boundaries, Incentives and Performance

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ABSTRACT

We investigate the effects of managerial outsourcing on the performance and incentives of mutual funds. Fund families outsource the management of a large fraction of their funds to advisory firms. These funds under-perform those ran internally by about 50 basis points per year. After instrumenting for a fund's outsourcing status, the estimate of under-performance is three times larger. We hypothesize that contractual externalities due to firm boundaries make it difficult to extract performance from an outsourced relationship. Consistent with this view, an outsourced fund faces higher-powered incentives; they are more likely to be closed after poor performance and excessive risk-taking.

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Over the most recent decades, open-end mutual funds have been one of the fastest growing institutions in this country. From 1980 to 2011, the percentage of American households owning mutual funds rose from 5.7% to 44% (Investment Company Institute (ICI 2012)). While the flow of new money has leveled off in the recent years, the mutual fund industry remains among the most important in the economy. 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 around 4% of all U.S. equity, but that number increased to around 30% by 2011 (Investment Company Institute (2012)). Over a similar period, the fraction of U.S. equity directly held by individuals fell from 47.9% to 21.5% (French (2008)).

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 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.¹

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,² 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

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mutual fund families. A fund is categorized as being outsourced if one of its investment advisors is not affiliated with the mutual fund family.³

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 other funds. The range of the estimates of under-performance varies depending on specifications such as benchmarking and sub-samples such as whether to consider all funds or to focus on just equity or bond funds. The high end, when we consider all funds using beta-adjusted returns, is 72.0 basis points a year with a \( t \)-statistic of around 4.4. The low range of these estimates is 25 basis points a year with a \( t \)-statistic of 1.5 when we focus on just equity funds and use the Daniel et al. (DGTW 1997) portfolio benchmarking technique. Most of our estimates are around 50 basis points with a \( t \)-statistic of around 3 when using all funds and considering multi-factor models of benchmarking, including various bond factors. These are significant effects given that the typical equity fund in our sample under-performs the performance benchmark by 80.4 basis points a year and charges 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 (IV) approach to further determine the causal relationship between outsourcing and underperformance. We instrument for a fund’s outsourcing status based on the number of funds a family offers at its inception controlling for family size. The idea is that funds run into capacity constraints when they have to offer many funds and hence need to outsource.\(^4\) The first-stage of this instrumenting strategy gives a sizeable economic effect and has a \(t\)-statistic of 3.7. The second-stage yield bigger estimates for the under-performance of around 1.94\% with a \(t\)-statistic of 3 using elaborate benchmarking portfolios. Most importantly, our IV estimates, in contrast to our OLS estimates, are extremely robust to various sub-samples such as focusing only on equity funds and using portfolio benchmarking techniques.

Having established a causal relationship between outsourcing and underperformance, 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.\(^7\)

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 the 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.\textsuperscript{8} We find that outsourced funds do indeed face steeper incentives than in-house funds in that closures for outsourced funds are more sensitive to poor performance and excess risk-taking, where excessive risk-taking is measured by either the deviation of fund betas from its peers or the degree of idiosyncratic risk (see, \textit{e.g.}, Chevalier and Ellison (1999), Sirri and Tufano (1998)). 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 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 I. We describe the data, our identification scheme for outsourced funds and summary statistics regarding them in Section II. We document the performance of outsourced funds in Section III. In Section IV, 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 V, and conclude in Section VI.

I. 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 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 et al. (2005) attempt to understand whether small organizations are better at carrying out certain specific tasks than large organizations in
the context of banks. Chen et al. (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.
II. 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. 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. Importantly, it also gives the name of the fund family or complex that each 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. 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.

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 35,491 fund-year observations as being managed in-house, 13,907 as outsourced and 2,538 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 accurate. We exclude index funds from our sample.

Table I 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 336 companies. This number increases to a peak of 486 in 2005, and falls to 464 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 41% 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.

[Insert Table I here]
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 II, 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 2868 funds. They have average total net assets (TNA) of 681 million dollars, with a standard deviation of 1758 million dollars. Note that outsourced funds tend to be smaller than in-house funds (425 million compared to 768 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.

[Insert Table II here]
The funds in our sample have expense ratios as a fraction of year-end TNA (EXPRATIO) that average about 1.3 % 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 90.2 % per year. Outsourced funds do not have substantial differences in turnover than their in-house counterparts (83.4% compared to 91.9%). The average fund age (AGE) is about 10.6 years, and outsourced funds tend to be younger (8.0 years to 11.4 years). Funds charge a total load (TOTLOAD) of about 2.4 % (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 42.5 % a year. FLOW does not appear to depend on outsourcing status. PRET is the past one-year cumulative return of the fund.\textsuperscript{14}

III. Outsourcing and Mutual Fund Performance

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 et al. (2004)). We first discuss our main model specification and discuss various robustness checks later in Section V.

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).\textsuperscript{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 (1997)).\textsuperscript{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. Finally, we also consider a 10-factor model, which better adjusts performance of bond funds. We follow the methodology in Blake, Elton and Gruber (1993) and augment the four-factor model by adding 6 bond indices returns, all in excess of the one-month Treasure rate. Those bond indices include three for government bond (Barclays US Treasure Long, Barclays US Treasure Intermediate, and Barclay US Treasure Bill 3-6m), two for corporate bond (Barclays US Corp Investment Grade, and Barclays US High-Yield Composite), and one for agency bond (Barclays GNMA 30-Year). Bond indices data are from Bloomberg.

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 et al. (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 \((VWRF, SMB, HML, UMD, MSCI,LABI, \text{and six Barclays bond indices})\). 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 \((\beta_i's)\) between in-house and outsourced funds, but the alphas of the outsourced funds on average are smaller across size quintiles of funds.\(^ {17}\) The average alpha of equity funds managed in-house is \(-6.4\) basis points per month, while the average alpha of outsourced
equity funds is –8.0 basis points per month. Annualized, this difference in alphas is 20.4 basis points per year, with a \( t \)-statistic of 0.96. 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 86.4 basis points per year. Outsourced non-equity funds also have smaller alphas on average across size quintiles. Averaged across the five portfolios, the alphas are smaller by 32.4 basis points per year with a \( t \)-statistic of 0.92, but again 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

\[
FUNDRET_{i,t} = \mu + \phi \text{OUTSOURCED}_{i,t-1} + \gamma X_{i,t-1} + \varepsilon_{i,t}
\]  

(1)

where \( FUNDRET_{i,t} \) is the alpha of fund \( i \) in month \( t \) adjusted by various performance benchmarks, \( \mu \) is a constant, \( \text{OUTSOURCED}_{i,t-1} \) is an indicator for whether or not a fund is outsourced, and \( X_{i,t-1} \) is a set of control variables (in month \( t-1 \)) that includes \( \log TNA_{i,t-1}, \log \text{FAMFUNDS}_{i,t-1}, \log \text{FAMSIZE}_{i,t-1}, \text{EXPRATIO}_{i,t-1}, \text{TURNOVER}_{i,t-1}, \)
\( \text{AGE}_{t-1}, \text{TOTLOAD}_{t-1}, \text{FLOW}_{t-1}, \text{PRET}_{t-1} \). \( \varepsilon_{i,t} \) is an error term that is uncorrelated with all other independent variables. The coefficient of interest is \( \phi \), which captures the relationship between outsourcing and fund performance, controlling for other fund characteristics. The coefficient \( \gamma \) 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 III, 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 \( \text{OUTSOURCED} \) is negative and statistically significant across the five performance measures. The coefficient using market-adjusted returns is -0.052 with a \( t \)-statistic of 3.34. This means that outsourced funds under-perform funds managed in-house by about 62.4 basis points a year. The corresponding coefficient is -0.062 for CAPM-adjusted returns with a \( t \)-statistic of 4.41. The magnitudes are somewhat smaller when we use the four- and six- and ten-factor models: -0.051 with a \( t \)-statistic of 3.55 for the four-factor, -0.046 with a \( t \)-statistic of 3.35 for the six-factor, and -0.042 with a \( t \)-statistic of 3.06 for the ten-factor. So an outsourced fund under-performs other funds between 50.4 and 74.4 basis points a year.

[Insert Table III here]

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 86.4 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 74.4 basis points a year is economically quite substantial in comparison.\textsuperscript{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; \textit{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.\textsuperscript{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 et al. (2004) who argue that the fund size 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 et al. (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 the number of family funds and family size 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 IV. The overall results are roughly unchanged; the coefficient in front of OUTSOURCED remains negative and statistically significant across all five performance measures. The coefficients range from −0.045 to −0.055, indicating that an outsourced fund under-performs funds managed in-house by anywhere from 53.0 to 66.0 basis points per year. The t-statistics are usually slightly 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.

[Insert Table IV here]

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
\textit{LOGFAMFUNDS}_{i,0} (\textit{LOGFAMFUNDS AT INCEPTION}) 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 \textit{FAMSIZE DUMMIES}_{i,0} (\textit{FAMSIZE AT INCEPTION}) as the size of
the fund family when the fund was launched parameterized as percentile dummies. The
first stage is a logit regression:

\[
\text{Prob}(\text{OUTSOURCED}_{i,t} = 1) = \Lambda(\mu + \varphi \text{LOGFAMFUNDS}_{i,0} \\
+ \kappa \text{FAMSIZE DUMMIES}_{i,0} \\
+ \eta \text{LOGFAMFUNDS}_{i,t} + \theta \text{LOGFAMSIZE}_{i,t} \\
+ \gamma \mathbf{X}_{i,t-1} + \delta I_t ) \tag{2}
\]

where \textit{OUTSOURCED}_{i,t} is a dummy variable that equals one if fund \( i \) is outsourced in
year \( t \) and zero otherwise. The notation \( \Lambda(\cdot) \) indicates the logistic cumulative distribution
function and \( \lambda \) 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\times year) effects represented by \( I_t \).

21
The results of this logit first stage regression are presented in Table V. 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 $5.62 \times 1.86 = 10.45\%$. This is substantial considering that roughly 26\% of funds in our sample are outsourced. The precision of the estimate on $LOGFAMFUNDS\ AT\ INCEPTION$ ($t\text{-stat} = 3.70$) also suggests that we do not have a problem with a weak instrument.

[Insert Table V here]

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). The second stage specification is:

$$FUNDRET_{i,t} = \mu + \phi OUTSOURCED_{i,t-1} + \kappa FAMSIZE\ DUMMIES_{i,0}$$
$$+ \eta LOGFAMFUNDS_{i,t} + \theta LOGFAMSIZE_{i,t} + \gamma X_{i,t-1}$$
$$+ \delta I_i + \eta \text{ FIRST STAGE RESIDUALS}_{i,t} + \epsilon_{i,t} \tag{3}$$

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 VI. For all of the performance measures, we find that the coefficient of FIRST STAGE RESIDUALS is positive and 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 1.93% to 2.32% 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

[Insert Table VI here]

E. Additional Robustness Checks

We have conducted extensive robustness exercises of our outsourcing fund under-performance results. Many of these are collected in the Online Supplementary Appendix. But, we want to highlight one set of checks in this section. In Table VII, we show the OLS and IV estimates for the relationship between fund returns and outsourcing status for only equity funds and using either the Carhart (1997) four-factor benchmarking model and DGTW (1997) portfolio benchmarking approach. The OLS results are reported in the first two columns; in the third and fourth columns, we show the corresponding IV estimates. Notice that the OLS estimates using DGTW portfolio benchmarking point to an under-performance of only about 25 basis points per year with a t-statistic of around
1.5. But the IV estimate is substantially larger: the under-performance is around 2% per year and with a t-statistic of over 2. Our IV estimates, in general, are extremely robust to various sub-samples and benchmarking technique.

[Insert Table VII here]

**IV. Outsourcing and Family Complex-Fund Incentives**

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 the key testable auxiliary implications. First, an outsourced fund faces higher-powered incentives, which we measure using closures of funds due to poor past performance and 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 and Excessive Risk-Taking

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 probit regression specification:

\[
\text{Prob}(\text{CLOSED}_{i,t} = 1) = \Phi(\mu + \lambda Z_{i,t-1})
\]

\(CLOSED_{i,t}\) is a dummy variable that equals one if fund \(i\) is closed in year \(t\) and zero otherwise. The notation \(\Phi(\bullet)\) indicates the cumulative distribution function of the standard normal, and \(\lambda\) 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 and does not appear subsequently in the CRSP database. We denote \(\mu\) as a constant and \(Z_{i,t-1}\) 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 \((\text{INMODALSTYLE}_{i,t-1})\). 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 \(Z_{i,t-1}\) are as before and include \(\text{LOGTNA}_{i,t-1}\), \(\text{LOGFAMFUNDS}_{i,t-1}\), \(\text{LOGFAMSIZE}_{i,t-1}\), \(\text{EXPRATIO}_{i,t-1}\), \(\text{TURNOVER}_{i,t-1}\), \(\text{AGE}_{i,t-1}\), \(\text{TOTLOAD}_{i,t-1}\), \(\text{FLOW}_{i,t-1}\) and \(\text{PRET}_{i,t-1}\). Our main variables of interest are \(\text{PRETLOW}_{i,t-1}\) (which is an indicator variable equal to 1 if the fund’s past performance is below the median and zero otherwise) and \(\text{OUTSOURCED}_{i,t-1}\). 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.

Another distinct implication of the firm boundaries- contractual externalities explanation is that we should see that the family more closely track not only the performance of outsourced funds but also its risk-taking profile. We expect that funds which take excessive risk and have poor performance are much more likely to be closed down by the family. 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 \(\hat{\beta}_{f,i,t}\) and calculate the average \(\overline{\beta}_{f,t}\) 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) separately for high risk-taking funds (defined as the top one-third of the risk measure distribution) and low risk-taking funds (the remaining funds).

Table VIII 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 4.01%. The coefficient in front of OUTSOURCED is positive and statistically significant. The marginal effect is 1.172%, suggesting that an outsourced fund is about $1.17/4.01 = 29\%$ more likely to be closed than other funds. The coefficient in front of PRETLOW is also positive and statistically significant. The marginal effect suggests that a low performing fund is about $3.03/4.01 = 76\%$ more likely to be closed than other funds.

[Insert Table VIII here]

In the second column, we add in an additional explanatory variable: the interaction of OUTSOURCED and PRETLOW to see if outsourced funds face a differential sensitivity of closure to performance. Because the non-linearity of the probit 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. We find that the coefficient on the interaction of OUTSOURCED with PRET is positive 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. The marginal effects imply that an outsourced fund is $2.01/2.59 = 78\%$ more likely to be closed after poor performance compared to in-house funds. 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 interact them with past fund returns to control for these alternative explanations in these closure regressions.

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 also 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.

The third column of Table VIII shows the results when all of these additional controls are added to the probit specification. The coefficient in front of
PRETLOW×OUTSOURCED remains positive; it is almost identical to the coefficient in column (2). Not surprisingly, the statistical significance of the interaction is weaker with all of these interaction controls, but they do not move the point estimate at all.

Next, we estimate this relationship separately for funds taking high risks based on our risk-taking deviation measures. We only show the results using the beta-deviation risk measure; the results using the idiosyncratic risk measure are very similar. Column (4) of Table VIII shows that the coefficient in front of PRETLOW×OUTSOURCED is positive and statistically significant. The marginal effect for this sample of high risk taking funds is substantially higher than for the entire sample. This suggests that the greater penalty to outsourced funds of poor performance is much larger if the funds are high risk takers. Column (5) shows that this effect is almost identical when additional controls are added to the probit specification.

The last two columns of Table VIII estimate the same probit specification for a sample of low risk taking funds. The interaction term of PRETLOW×OUTSOURCED is positive, but not surprisingly it is smaller than the estimates for the sample of high risk taking funds. So there is a bigger penalty for performance of outsourced funds if they take risks.

B. Outsourcing and Fund Risk-Taking Behavior

Given the previous findings suggesting that outsourced funds are more likely to be punished for poor performance if it takes high risks, 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:

\[
RISKDEV_{i,t-1} = \mu + \zeta Z_{i,t-1} + \epsilon_{i,t}
\]  

(5)

In Equation (5), \(Z_{i,t-1}\) is the vector of the same set of fund characteristics described earlier, and \(\zeta\) 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 IX. From the first column, outsourced funds do have lower beta deviation than other funds; the coefficient in front of \(OUTSOURCED\) is -0.076 with a \(t\)-statistic of 3.14. In comparison, the coefficient in front of \(LOGTNA\) and \(PRET\) are -0.029 and 0.007. Because a standard deviation of \(LOGTNA\) and \(PRET\) are 1.9 and 13.6, respectively, a fund with one-standard deviation larger assets or under-performance in the past one-year reduces beta risk deviation by \(-0.029 \times 1.9 = -0.055\) and \(0.007 \times -13.6 = -0.095\), 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 IX, we look at how outsourcing affects the fund idiosyncratic-risk deviations. The coefficient on \(OUTSOURCED\) is -0.062 (-0.062% per month) with a \(t\)-statistic of 2.94, and other coefficients remain qualitatively similar. The coefficients in front of \(LOGTNA\) and \(PRET\) are -0.022 and 0.002, respectively, so a fund with one standard deviation larger assets or under-performance reduces idiosyncratic risk deviation by \(-0.022 \times 1.9 = -0.042\) and \(0.002 \times -13.6 = -0.027\),
respectively. Hence, an outsourced fund reduces risk-taking by slightly more than a fund with one-standard deviation larger size or under-performance.

[Insert Table IX here]

C. 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 management. 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). 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-subsidizations.

Our main results are reported in Table X and XI. In the first column of Table X, we regress a fund’s return gap measure on our outsourcing status measure and a host of the usual fund characteristics. We find a negative 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 outsourced 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.

[Insert Table X here]
In Table XI, we find that our outsourcing underperformance result is robust to inclusion of these additional hidden action control variables. Consistent with Kacperczyk, Sialm and Zheng (2008), we find in column (1) of Table XI 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 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.

[Insert Table XI here]

In sum, Table XI 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.

V. 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 the Online 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 individual 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 outperform 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 an alternative, more strict definition of outsourced status, completely outsourced. That is, if two advisors are listed (two is the maximum number listed), we require that both advisors be unaffiliated external advisors rather than just one or the other for us to identify the fund as outsourced. The table in appendix shows that our result regarding the effect of outsourcing on performance is hardly changed.

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 18%. 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×PRETLOW.

VI. 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 run internally by about 50 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.
REFERENCE


Table I: 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.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Families</th>
<th>Average Number of Funds per Family</th>
<th>Fraction with Any Outsourcing</th>
<th>Average Fraction of Outsourced Funds</th>
<th>Average Fraction of Assets in Modal Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>336</td>
<td>5.76</td>
<td>0.38</td>
<td>0.23</td>
<td>0.75</td>
</tr>
<tr>
<td>1995</td>
<td>346</td>
<td>6.30</td>
<td>0.36</td>
<td>0.21</td>
<td>0.74</td>
</tr>
<tr>
<td>1996</td>
<td>368</td>
<td>6.62</td>
<td>0.37</td>
<td>0.21</td>
<td>0.73</td>
</tr>
<tr>
<td>1997</td>
<td>399</td>
<td>7.36</td>
<td>0.34</td>
<td>0.19</td>
<td>0.73</td>
</tr>
<tr>
<td>1998</td>
<td>416</td>
<td>7.67</td>
<td>0.39</td>
<td>0.23</td>
<td>0.72</td>
</tr>
<tr>
<td>1999</td>
<td>441</td>
<td>8.06</td>
<td>0.47</td>
<td>0.32</td>
<td>0.73</td>
</tr>
<tr>
<td>2000</td>
<td>484</td>
<td>7.57</td>
<td>0.45</td>
<td>0.28</td>
<td>0.73</td>
</tr>
<tr>
<td>2001</td>
<td>464</td>
<td>7.91</td>
<td>0.44</td>
<td>0.28</td>
<td>0.73</td>
</tr>
<tr>
<td>2002</td>
<td>445</td>
<td>8.08</td>
<td>0.44</td>
<td>0.28</td>
<td>0.73</td>
</tr>
<tr>
<td>2003</td>
<td>454</td>
<td>8.06</td>
<td>0.43</td>
<td>0.28</td>
<td>0.73</td>
</tr>
<tr>
<td>2004</td>
<td>442</td>
<td>8.27</td>
<td>0.44</td>
<td>0.28</td>
<td>0.73</td>
</tr>
<tr>
<td>2005</td>
<td>486</td>
<td>8.11</td>
<td>0.44</td>
<td>0.27</td>
<td>0.74</td>
</tr>
<tr>
<td>2006</td>
<td>457</td>
<td>8.18</td>
<td>0.43</td>
<td>0.27</td>
<td>0.75</td>
</tr>
<tr>
<td>2007</td>
<td>464</td>
<td>8.31</td>
<td>0.42</td>
<td>0.25</td>
<td>0.75</td>
</tr>
<tr>
<td>Average</td>
<td>428</td>
<td>7.59</td>
<td>0.41</td>
<td>0.26</td>
<td>0.73</td>
</tr>
</tbody>
</table>
Table II: 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 (index funds are excluded). 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.

<table>
<thead>
<tr>
<th></th>
<th>All funds</th>
<th>In-house funds</th>
<th>Outsourced funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of funds</td>
<td>2868.2</td>
<td>2122.9</td>
<td>745.2</td>
</tr>
<tr>
<td>Total net assets (TNA) ($ million)</td>
<td>681.3</td>
<td>767.6</td>
<td>425.1</td>
</tr>
<tr>
<td>Log of TNA (LOGTNA) (log $ million)</td>
<td>4.9</td>
<td>5.0</td>
<td>4.4</td>
</tr>
<tr>
<td>Log family funds (LOGFAMFUNDS) (log #)</td>
<td>2.6</td>
<td>2.7</td>
<td>2.6</td>
</tr>
<tr>
<td>Log family TNA (LOGFAMSIZE) (log $ million)</td>
<td>8.0</td>
<td>8.2</td>
<td>7.5</td>
</tr>
<tr>
<td>Expense ratio (EXPRATIO) (% per year)</td>
<td>1.3</td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td>Fund turnover (TURNOVER) (% per year)</td>
<td>90.2</td>
<td>91.9</td>
<td>83.4</td>
</tr>
<tr>
<td>Fund age (AGE) (years)</td>
<td>10.6</td>
<td>11.4</td>
<td>8.0</td>
</tr>
<tr>
<td>Total sales load (TOTLOAD) (%)</td>
<td>2.4</td>
<td>2.4</td>
<td>2.1</td>
</tr>
<tr>
<td>Fund flow (FLOW) (% per year)</td>
<td>42.5</td>
<td>41.3</td>
<td>45.7</td>
</tr>
<tr>
<td>Past year return (PRET) (%) per year</td>
<td>11.3</td>
<td>11.4</td>
<td>10.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>All funds</th>
<th>In-house funds</th>
<th>Outsourced funds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[1757.5]</td>
<td>[1873.4]</td>
<td>[1341.9]</td>
</tr>
<tr>
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<td>[1.9]</td>
<td>[1.8]</td>
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<td>[1.2]</td>
<td>[1.1]</td>
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<td>[2.9]</td>
<td>[2.9]</td>
<td>[2.6]</td>
</tr>
<tr>
<td></td>
<td>[0.5]</td>
<td>[0.5]</td>
<td>[0.5]</td>
</tr>
<tr>
<td></td>
<td>[99.3]</td>
<td>[99.5]</td>
<td>[95.6]</td>
</tr>
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<td>[12.4]</td>
<td>[9.0]</td>
</tr>
<tr>
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<td>[2.5]</td>
<td>[2.5]</td>
<td>[2.4]</td>
</tr>
<tr>
<td></td>
<td>[133.6]</td>
<td>[131.7]</td>
<td>[137.2]</td>
</tr>
</tbody>
</table>
Table III: 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 10-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 (index funds are excluded), and consists of 452,904 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.

<table>
<thead>
<tr>
<th></th>
<th>Market-Adj</th>
<th>Beta-Adj</th>
<th>4-Factor</th>
<th>6-Factor</th>
<th>10-Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTSOURCED_{t-1}</td>
<td>-0.052</td>
<td>-0.062</td>
<td>-0.051</td>
<td>-0.046</td>
<td>-0.042</td>
</tr>
<tr>
<td></td>
<td>(-3.34)</td>
<td>(-4.41)</td>
<td>(-3.55)</td>
<td>(-3.35)</td>
<td>(-3.06)</td>
</tr>
<tr>
<td>LOGTNA_{t-1}</td>
<td>-0.023</td>
<td>-0.027</td>
<td>-0.032</td>
<td>-0.033</td>
<td>-0.032</td>
</tr>
<tr>
<td></td>
<td>(-1.39)</td>
<td>(-1.87)</td>
<td>(-2.32)</td>
<td>(-2.36)</td>
<td>(-2.43)</td>
</tr>
<tr>
<td>LOGFAMFUNDS_{t-1}</td>
<td>-0.021</td>
<td>-0.024</td>
<td>-0.024</td>
<td>-0.029</td>
<td>-0.025</td>
</tr>
<tr>
<td></td>
<td>(-0.99)</td>
<td>(-1.12)</td>
<td>(-1.18)</td>
<td>(-1.40)</td>
<td>(-1.21)</td>
</tr>
<tr>
<td>LOGFAMSIZE_{t-1}</td>
<td>0.022</td>
<td>0.026</td>
<td>0.027</td>
<td>0.033</td>
<td>0.027</td>
</tr>
<tr>
<td></td>
<td>(1.91)</td>
<td>(2.27)</td>
<td>(2.33)</td>
<td>(2.92)</td>
<td>(2.38)</td>
</tr>
<tr>
<td>EXPRATIO_{t-1}</td>
<td>0.043</td>
<td>0.046</td>
<td>0.047</td>
<td>0.060</td>
<td>0.048</td>
</tr>
<tr>
<td></td>
<td>(0.46)</td>
<td>(0.50)</td>
<td>(0.51)</td>
<td>(0.66)</td>
<td>(0.52)</td>
</tr>
<tr>
<td>TURNOVER_{t-1}</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.80)</td>
<td>(0.78)</td>
<td>(0.76)</td>
<td>(0.75)</td>
<td>(0.76)</td>
</tr>
<tr>
<td>AGE_{t-1}</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.29)</td>
<td>(0.04)</td>
<td>(-0.33)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>TOTLOAD_{t-1}</td>
<td>-0.006</td>
<td>-0.004</td>
<td>-0.004</td>
<td>-0.004</td>
<td>-0.004</td>
</tr>
<tr>
<td></td>
<td>(-0.92)</td>
<td>(-0.72)</td>
<td>(-0.74)</td>
<td>(-0.63)</td>
<td>(-0.75)</td>
</tr>
<tr>
<td>FLOW_{t-1}</td>
<td>-0.000</td>
<td>-0.000</td>
<td>-0.000</td>
<td>-0.000</td>
<td>-0.000</td>
</tr>
<tr>
<td></td>
<td>(-2.07)</td>
<td>(-2.48)</td>
<td>(-2.49)</td>
<td>(-2.76)</td>
<td>(-2.51)</td>
</tr>
<tr>
<td>PRET_{t-1}</td>
<td>0.024</td>
<td>0.026</td>
<td>0.026</td>
<td>0.027</td>
<td>0.026</td>
</tr>
<tr>
<td></td>
<td>(3.94)</td>
<td>(4.13)</td>
<td>(4.15)</td>
<td>(4.36)</td>
<td>(4.16)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.174</td>
<td>0.180</td>
<td>0.179</td>
<td>0.180</td>
<td>0.179</td>
</tr>
</tbody>
</table>
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 (index funds are excluded), and consists of 452,904 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.

<table>
<thead>
<tr>
<th></th>
<th>Gross fund returns (monthly %)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Market-Adj</td>
</tr>
<tr>
<td>OUTSOURCED$_{i,t-1}$</td>
<td>-0.055</td>
</tr>
<tr>
<td></td>
<td>(-3.60)</td>
</tr>
<tr>
<td>LOGTNA$_{i,t-1}$</td>
<td>-0.032</td>
</tr>
<tr>
<td></td>
<td>(-1.90)</td>
</tr>
<tr>
<td>EXPRATIO$_{i,t-1}$</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
</tr>
<tr>
<td>TURNOVER$_{i,t-1}$</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.91)</td>
</tr>
<tr>
<td>AGE$_{i,t-1}$</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(0.71)</td>
</tr>
<tr>
<td>TOTALLOAD$_{i,t-1}$</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>(1.01)</td>
</tr>
<tr>
<td>FLOW$_{i,t-1}$</td>
<td>-0.000</td>
</tr>
<tr>
<td></td>
<td>(-2.23)</td>
</tr>
<tr>
<td>PRET$_{i,t-1}$</td>
<td>0.019</td>
</tr>
<tr>
<td></td>
<td>(3.74)</td>
</tr>
<tr>
<td>Family Fixed Effect?</td>
<td>Yes</td>
</tr>
<tr>
<td>Advisor Fixed Effect?</td>
<td>Yes</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.158</td>
</tr>
</tbody>
</table>
Table V: 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. The other independent variables include LOGTNA, LOGFAMFUNDS, LOGFAMSIZ, EXPRATIO TURNOVER, AGE, TOTLOAD, FLOW and PRET. Percentile dummies of FAMSIZE AT INCEPTION (the size of the family that the fund belongs to when the fund was created) are included in the specification; a complete set of Month × Year dummies is also included. The sample is from January 1994 to December 2007 (168 months), is comprised of all funds (index funds are excluded), and consists of 452,904 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%.

<table>
<thead>
<tr>
<th></th>
<th>OUTSOURCED_{i,t-1}</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOGFAMFUNDS AT INCEPTION</td>
<td>0.304</td>
</tr>
<tr>
<td></td>
<td>(3.70)</td>
</tr>
<tr>
<td></td>
<td>[5.62]</td>
</tr>
<tr>
<td>LOGTNA_{i,t-1}</td>
<td>-0.083</td>
</tr>
<tr>
<td></td>
<td>(-2.97)</td>
</tr>
<tr>
<td></td>
<td>[-1.36]</td>
</tr>
<tr>
<td>LOGFAMFUNDS_{i,t-1}</td>
<td>0.205</td>
</tr>
<tr>
<td></td>
<td>(1.56)</td>
</tr>
<tr>
<td></td>
<td>[3.61]</td>
</tr>
<tr>
<td>LOGFAMSIZ_{i,t-1}</td>
<td>-0.033</td>
</tr>
<tr>
<td></td>
<td>(-0.77)</td>
</tr>
<tr>
<td></td>
<td>[-0.55]</td>
</tr>
<tr>
<td>EXPRATIO_{i,t-1}</td>
<td>-0.046</td>
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<tr>
<td></td>
<td>(-0.40)</td>
</tr>
<tr>
<td></td>
<td>[-0.77]</td>
</tr>
<tr>
<td>TURNOVER_{i,t-1}</td>
<td>-0.001</td>
</tr>
<tr>
<td></td>
<td>(-2.67)</td>
</tr>
<tr>
<td></td>
<td>[-0.02]</td>
</tr>
<tr>
<td>AGE_{i,t-1}</td>
<td>-0.039</td>
</tr>
<tr>
<td></td>
<td>(-3.72)</td>
</tr>
<tr>
<td></td>
<td>[-0.60]</td>
</tr>
<tr>
<td>TOTLOAD_{i,t-1}</td>
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</tr>
<tr>
<td></td>
<td>(-0.56)</td>
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<tr>
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<td>[-0.28]</td>
</tr>
<tr>
<td>FLOW_{i,t-1}</td>
<td>-0.001</td>
</tr>
<tr>
<td></td>
<td>(-0.05)</td>
</tr>
<tr>
<td></td>
<td>[-0.12]</td>
</tr>
<tr>
<td>PRET_{i,t-1}</td>
<td>-0.001</td>
</tr>
<tr>
<td></td>
<td>(-0.89)</td>
</tr>
<tr>
<td></td>
<td>[-1.54]</td>
</tr>
<tr>
<td>Pseudo R-squared</td>
<td>0.106</td>
</tr>
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</table>
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. The independent variables include LOGTNA, LOGFAMFUNDS, LOGFAMSIZE, EXPERATIO, TURNOVER, AGE, TOTLOAD, FLOW and PRET. FIRST STAGE RESIDUAL is the residual from the first stage logit regression of the 2SRI estimation. Percentile dummies of FAMSIZE AT INCEPTION (the size of the family that the fund belongs to when the fund was created) are included in the specification; a complete set of Month × Year dummies is also included. The sample is from January 1994 to December 2007 (168 months), is comprised of all funds (index funds are excluded), and consists of 452,904 fund-month observations. *-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.

<table>
<thead>
<tr>
<th></th>
<th>Gross fund returns</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Market-Adj</td>
<td>Beta-Adj</td>
<td>4-Factor</td>
<td>6-Factor</td>
<td>10-Factor</td>
</tr>
<tr>
<td>OUTSOURCED_{i,t-1}</td>
<td>-0.161</td>
<td>-0.193</td>
<td>-0.170</td>
<td>-0.188</td>
<td>-0.162</td>
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<tr>
<td></td>
<td>(-3.31)</td>
<td>(-4.18)</td>
<td>(-4.19)</td>
<td>(-4.68)</td>
<td>(-4.02)</td>
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<tr>
<td>LOGTNA_{i,t-1}</td>
<td>-0.039</td>
<td>-0.045</td>
<td>-0.043</td>
<td>-0.045</td>
<td>-0.042</td>
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<tr>
<td></td>
<td>(-6.53)</td>
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<td>(-7.69)</td>
<td>(-7.84)</td>
<td>(-7.66)</td>
</tr>
<tr>
<td>LOGFAMFUNDS_{i,t-1}</td>
<td>0.042</td>
<td>0.038</td>
<td>0.039</td>
<td>0.033</td>
<td>0.040</td>
</tr>
<tr>
<td></td>
<td>(2.59)</td>
<td>(2.29)</td>
<td>(2.77)</td>
<td>(2.35)</td>
<td>(2.83)</td>
</tr>
<tr>
<td>LOGFAMSIZE_{i,t-1}</td>
<td>0.006</td>
<td>0.011</td>
<td>0.012</td>
<td>0.019</td>
<td>0.011</td>
</tr>
<tr>
<td></td>
<td>(0.92)</td>
<td>(1.75)</td>
<td>(1.99)</td>
<td>(3.16)</td>
<td>(1.75)</td>
</tr>
<tr>
<td>EXPERATIO_{i,t-1}</td>
<td>0.002</td>
<td>0.012</td>
<td>0.013</td>
<td>0.026</td>
<td>0.013</td>
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<tr>
<td></td>
<td>(0.10)</td>
<td>(0.79)</td>
<td>(0.58)</td>
<td>(1.16)</td>
<td>(0.60)</td>
</tr>
<tr>
<td>TURNOVER_{i,t-1}</td>
<td>-0.000</td>
<td>-0.000</td>
<td>-0.000</td>
<td>-0.000</td>
<td>-0.000</td>
</tr>
<tr>
<td></td>
<td>(-1.59)</td>
<td>(-1.55)</td>
<td>(-1.66)</td>
<td>(-1.69)</td>
<td>(-1.52)</td>
</tr>
<tr>
<td>AGE_{i,t-1}</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.002</td>
<td>-0.002</td>
</tr>
<tr>
<td></td>
<td>(-1.67)</td>
<td>(-2.13)</td>
<td>(-1.94)</td>
<td>(-1.96)</td>
<td>(-1.90)</td>
</tr>
<tr>
<td>TOTLOAD_{i,t-1}</td>
<td>-0.008</td>
<td>-0.008</td>
<td>-0.008</td>
<td>-0.008</td>
<td>-0.008</td>
</tr>
<tr>
<td></td>
<td>(-2.40)</td>
<td>(-2.68)</td>
<td>(-2.29)</td>
<td>(-2.27)</td>
<td>(-2.36)</td>
</tr>
<tr>
<td>FLOW_{i,t-1}</td>
<td>-0.038</td>
<td>-0.042</td>
<td>-0.042</td>
<td>-0.044</td>
<td>-0.042</td>
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<tr>
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<td>(-6.80)</td>
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<td>(-8.50)</td>
</tr>
<tr>
<td>PRET_{i,t-1}</td>
<td>0.019</td>
<td>0.020</td>
<td>0.020</td>
<td>0.020</td>
<td>0.020</td>
</tr>
<tr>
<td></td>
<td>(4.29)</td>
<td>(4.08)</td>
<td>(3.40)</td>
<td>(3.43)</td>
<td>(3.45)</td>
</tr>
<tr>
<td>FIRST STAGE RESIDUAL_{i,t-1}</td>
<td>0.141</td>
<td>0.158</td>
<td>0.147</td>
<td>0.162</td>
<td>0.148</td>
</tr>
<tr>
<td></td>
<td>(3.53)</td>
<td>(3.45)</td>
<td>(3.71)</td>
<td>(4.04)</td>
<td>(3.80)</td>
</tr>
</tbody>
</table>
Table VII: Outsourcing and Equity Fund Performance

The first two columns of the table show 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 4-Factor model, and also using size/book-to-market/momentum matched returns (DGTW). The last two columns of the table show the second stage of the 2SRI estimation of the effect of outsourcing on mutual fund performance using the same adjustments to returns. 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. Intercepts have been suppressed. The sample is from January 1994 to December 2007 (168 months), is comprised of equity funds for which portfolio holdings sum to 0.7 to 1.3 of reported TNA, and consists of 118,084 fund-month observations. Time-series averages of monthly regression R-squareds are reported in the last row of the first two columns. The t-statistics are adjusted for serial correlation using Newey-West (1987) lags of order three and are shown in parentheses. In the last two columns, 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.

<table>
<thead>
<tr>
<th></th>
<th>Gross fund returns (monthly %)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS</td>
</tr>
<tr>
<td></td>
<td>4-Factor</td>
</tr>
<tr>
<td>OUTSOURCED_{t,t-1}</td>
<td>0.031</td>
</tr>
<tr>
<td></td>
<td>(-1.65)</td>
</tr>
<tr>
<td>LOGTNA_{t,t-1}</td>
<td>0.039</td>
</tr>
<tr>
<td></td>
<td>(-3.23)</td>
</tr>
<tr>
<td>LOGFAMFUNDS_{t,t-1}</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(-0.76)</td>
</tr>
<tr>
<td>LOGFAMSIZE_{t,t-1}</td>
<td>0.015</td>
</tr>
<tr>
<td></td>
<td>(2.90)</td>
</tr>
<tr>
<td>EXPRATIO_{t,t-1}</td>
<td>0.108</td>
</tr>
<tr>
<td></td>
<td>(1.82)</td>
</tr>
<tr>
<td>TURNOVER_{t,t-1}</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(1.10)</td>
</tr>
<tr>
<td>AGE_{t,t-1}</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(1.33)</td>
</tr>
<tr>
<td>TOTALLOAD_{t,t-1}</td>
<td>0.031</td>
</tr>
<tr>
<td></td>
<td>(-4.15)</td>
</tr>
<tr>
<td>FLOW_{t,t-1}</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>(-0.15)</td>
</tr>
<tr>
<td>PRET_{t,t-1}</td>
<td>0.021</td>
</tr>
<tr>
<td></td>
<td>(2.77)</td>
</tr>
<tr>
<td>FIRST STAGE RESIDUAL_{t,t-1}</td>
<td>0.125</td>
</tr>
<tr>
<td></td>
<td>(3.34)</td>
</tr>
</tbody>
</table>

R-squared  0.204  0.094
Table VIII: Fund Closures and Past Performance

This table investigates the determinants of mutual fund closures and reports pooled panel probit 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 LOW is an indicator that the 6 factor fund return over the past twelve months is above the median. 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, LOGFAMSIZ, TURNOVER, AGE, TOTLOAD, and FLOW. High risk funds are observations of funds with a beta-deviation measure in the top one-third of the distribution; low risk funds are the remaining observations. All regressions include year-effects and investment style effects. The total sample is from January 1994 to December 2006, comprised of all funds, and consists of 27,760 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 4.01% per year.

<table>
<thead>
<tr>
<th></th>
<th>CLOSED&lt;sub&gt;t-1&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline case</td>
</tr>
<tr>
<td>OUTSOURCED&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>0.130</td>
</tr>
<tr>
<td>PRET LOW&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>0.337</td>
</tr>
<tr>
<td>PRET LOW&lt;sub&gt;t-1&lt;/sub&gt;×OUTSOURCED&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>0.155</td>
</tr>
<tr>
<td>LOGFAMFUNDS&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>0.106</td>
</tr>
<tr>
<td>LOGFAMSIZ&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>0.010</td>
</tr>
<tr>
<td>EXPRATIO&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>-0.020</td>
</tr>
<tr>
<td>TURNOVER&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>0.001</td>
</tr>
<tr>
<td>AGE&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>0.001</td>
</tr>
<tr>
<td>TOTLOAD&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>0.017</td>
</tr>
<tr>
<td>FLOW&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>-0.001</td>
</tr>
</tbody>
</table>

(continues to next page)
Table VIII (continued)

<table>
<thead>
<tr>
<th></th>
<th>Baseline case</th>
<th>Include Interaction with Outsourcing</th>
<th>Add Additional Controls</th>
<th>High Risk Funds</th>
<th>High Risk w Additional Controls</th>
<th>Low Risk Funds</th>
<th>Low Risk w Additional Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRET LOW _i,t \times LOGTNA _i,t-1</td>
<td>0.023</td>
<td>0.033</td>
<td>0.018</td>
<td>(0.98)</td>
<td>(0.82)</td>
<td>(0.57)</td>
<td>(0.208)</td>
</tr>
<tr>
<td>PRET LOW _i,t \times LOGFAMFUNDS _i,t-1</td>
<td>-0.025</td>
<td>-0.047</td>
<td>-0.026</td>
<td>(-0.50)</td>
<td>(-0.53)</td>
<td>(-0.36)</td>
<td>(-0.226)</td>
</tr>
<tr>
<td>PRET LOW _i,t \times LOGFAMSIZE _i,t-1</td>
<td>0.022</td>
<td>0.086</td>
<td>0.015</td>
<td>(0.17)</td>
<td>(0.45)</td>
<td>(0.08)</td>
<td>(0.194)</td>
</tr>
<tr>
<td>PRET LOW _i,t \times EXPRATIO _i,t-1</td>
<td>-0.025</td>
<td>-0.009</td>
<td>-0.138</td>
<td>(-0.59)</td>
<td>(-0.23)</td>
<td>(-1.63)</td>
<td>(-0.227)</td>
</tr>
<tr>
<td>PRET LOW _i,t \times TURNOVER _i,t-1</td>
<td>-0.023</td>
<td>-0.031</td>
<td>-0.022</td>
<td>(-2.48)</td>
<td>(-2.18)</td>
<td>(-1.33)</td>
<td>(-0.204)</td>
</tr>
<tr>
<td>PRET LOW _i,t \times AGE _i,t-1</td>
<td>-0.003</td>
<td>0.001</td>
<td>-0.004</td>
<td>(-1.15)</td>
<td>(0.11)</td>
<td>(-1.22)</td>
<td>(-0.025)</td>
</tr>
<tr>
<td>PRET LOW _i,t \times TOTLOAD _i,t-1</td>
<td>-0.010</td>
<td>-0.012</td>
<td>-0.004</td>
<td>(-0.74)</td>
<td>(-0.55)</td>
<td>(-0.19)</td>
<td>(-0.094)</td>
</tr>
<tr>
<td>PRET LOW _i,t \times FLOW _i,t-1</td>
<td>0.005</td>
<td>0.075</td>
<td>-0.002</td>
<td>(0.59)</td>
<td>(0.93)</td>
<td>(-0.71)</td>
<td>(0.045)</td>
</tr>
<tr>
<td>PRET LOW _i,t \times INMODALSTYLE _i,t-1</td>
<td>-0.083</td>
<td>-0.124</td>
<td>-0.066</td>
<td>(-0.44)</td>
<td>(-0.44)</td>
<td>(-0.28)</td>
<td>(-0.744)</td>
</tr>
<tr>
<td>LOGTNA _i,t-1 \times INMODALSTYLE _i,t-1</td>
<td>-0.001</td>
<td>0.053</td>
<td>-0.038</td>
<td>(-0.02)</td>
<td>(1.24)</td>
<td>(-1.01)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>LOGTNA _i,t-1 \times INMODALSTYLE _i,t-1</td>
<td>0.025</td>
<td>0.026</td>
<td>0.025</td>
<td>(0.68)</td>
<td>(0.44)</td>
<td>(0.50)</td>
<td>(0.222)</td>
</tr>
<tr>
<td>Pseudo R-squared</td>
<td>0.110</td>
<td>0.110</td>
<td>0.114</td>
<td>0.119</td>
<td>0.105</td>
<td>0.107</td>
<td></td>
</tr>
</tbody>
</table>
Table IX: 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 based on 6-factor model. 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 (index funds are excluded). $t$-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.

<table>
<thead>
<tr>
<th></th>
<th>RISKDEV$_{it}$</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta Deviation</td>
<td>Idio-Risk Deviation</td>
<td></td>
</tr>
<tr>
<td>OUTSOURCED$_{it-1}$</td>
<td>-0.0762</td>
<td>-0.0615</td>
<td>(-3.14)</td>
</tr>
<tr>
<td>INMODALSTYLE$_{it-1}$</td>
<td>0.0513</td>
<td>0.0174</td>
<td>(2.92)</td>
</tr>
<tr>
<td>LOGTNA$_{it-1}$</td>
<td>-0.0291</td>
<td>-0.0220</td>
<td>(-4.62)</td>
</tr>
<tr>
<td>LOGFAMFUNDS$_{it-1}$</td>
<td>-0.0151</td>
<td>-0.0284</td>
<td>(-0.66)</td>
</tr>
<tr>
<td>LOGFAMSIZE$_{it-1}$</td>
<td>-0.0055</td>
<td>-0.0019</td>
<td>(-0.61)</td>
</tr>
<tr>
<td>EXPRATIO$_{it-1}$</td>
<td>0.1918</td>
<td>0.1904</td>
<td>(4.38)</td>
</tr>
<tr>
<td>TURNOVER$_{it-1}$</td>
<td>0.0005</td>
<td>0.0004</td>
<td>(5.01)</td>
</tr>
<tr>
<td>AGE$_{it-1}$</td>
<td>0.0019</td>
<td>0.0019</td>
<td>(2.60)</td>
</tr>
<tr>
<td>TOTLOAD$_{it-1}$</td>
<td>-0.0138</td>
<td>-0.0057</td>
<td>(-2.73)</td>
</tr>
<tr>
<td>FLOW$_{it-1}$</td>
<td>0.0000</td>
<td>0.0000</td>
<td>(-0.73)</td>
</tr>
<tr>
<td>PRET$_{it-1}$</td>
<td>0.0065</td>
<td>0.0020</td>
<td>(9.31)</td>
</tr>
<tr>
<td>Pseudo R-squared</td>
<td>0.3606</td>
<td>0.3981</td>
<td></td>
</tr>
</tbody>
</table>


Table X: Outsourcing and Hidden Actions

This table shows the Fama-MacBeth (1973) estimates of various measures of hidden actions on fund characteristics lagged one month. 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 155,942 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.

<table>
<thead>
<tr>
<th></th>
<th>RGAP$_{t-1}$</th>
<th>IPO$_{t-1}$</th>
<th>ICI$_{t-1}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTSOURCED$_{t-1}$</td>
<td>-0.0377</td>
<td>-0.0010</td>
<td>-0.0023</td>
</tr>
<tr>
<td></td>
<td>(-3.36)</td>
<td>(-4.10)</td>
<td>(-2.98)</td>
</tr>
<tr>
<td>LOGTNA$_{t-1}$</td>
<td>-0.0194</td>
<td>-0.0001</td>
<td>0.0011</td>
</tr>
<tr>
<td></td>
<td>(-5.93)</td>
<td>(-0.94)</td>
<td>(5.42)</td>
</tr>
<tr>
<td>LOGFAMFUNDS$_{t-1}$</td>
<td>-0.0265</td>
<td>-0.0022</td>
<td>-0.0069</td>
</tr>
<tr>
<td></td>
<td>(-3.21)</td>
<td>(-8.41)</td>
<td>(-12.45)</td>
</tr>
<tr>
<td>LOGFAMSIZE$_{t-1}$</td>
<td>0.0244</td>
<td>0.0011</td>
<td>0.0013</td>
</tr>
<tr>
<td></td>
<td>(6.07)</td>
<td>(9.81)</td>
<td>(6.91)</td>
</tr>
<tr>
<td>EXPRATIO$_{t-1}$</td>
<td>0.0239</td>
<td>0.0055</td>
<td>0.0203</td>
</tr>
<tr>
<td></td>
<td>(1.63)</td>
<td>(11.94)</td>
<td>(22.55)</td>
</tr>
<tr>
<td>TURNOVER$_{t-1}$</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td></td>
<td>(-0.06)</td>
<td>(7.57)</td>
<td>(4.07)</td>
</tr>
<tr>
<td>AGE$_{t-1}$</td>
<td>-0.0004</td>
<td>-0.0001</td>
<td>0.0000</td>
</tr>
<tr>
<td></td>
<td>(-1.42)</td>
<td>(-5.55)</td>
<td>(-0.64)</td>
</tr>
<tr>
<td>TOTLOAD$_{t-1}$</td>
<td>-0.0065</td>
<td>-0.0002</td>
<td>-0.0017</td>
</tr>
<tr>
<td></td>
<td>(-2.17)</td>
<td>(-5.26)</td>
<td>(-13.92)</td>
</tr>
<tr>
<td>FLOW$_{t-1}$</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td></td>
<td>(0.80)</td>
<td>(3.03)</td>
<td>(3.59)</td>
</tr>
<tr>
<td>PRET$_{t-1}$</td>
<td>0.0042</td>
<td>0.0003</td>
<td>-0.0001</td>
</tr>
<tr>
<td></td>
<td>(3.98)</td>
<td>(3.96)</td>
<td>(-0.41)</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.04</td>
<td>0.12</td>
<td>0.10</td>
</tr>
</tbody>
</table>
### Table XI: 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 155,942 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.

<table>
<thead>
<tr>
<th>Gross fund returns (monthly %)</th>
<th>RGAP&lt;sub&gt;i,t-1&lt;/sub&gt;</th>
<th>IPO&lt;sub&gt;i,t-1&lt;/sub&gt;</th>
<th>ICI&lt;sub&gt;i,t-1&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTSOURCED&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>-0.0396</td>
<td>-0.0476</td>
<td>-0.0506</td>
</tr>
<tr>
<td></td>
<td>(-2.34)</td>
<td>(-2.76)</td>
<td>(-3.23)</td>
</tr>
<tr>
<td>LOGTNA&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>-0.0316</td>
<td>-0.0376</td>
<td>-0.0393</td>
</tr>
<tr>
<td></td>
<td>(-2.45)</td>
<td>(-2.95)</td>
<td>(-3.16)</td>
</tr>
<tr>
<td>LOGFAMFUNDS&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>-0.0257</td>
<td>-0.0341</td>
<td>-0.0356</td>
</tr>
<tr>
<td></td>
<td>(-1.17)</td>
<td>(-1.65)</td>
<td>(-1.83)</td>
</tr>
<tr>
<td>LOGFAMSIZE&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>0.0178</td>
<td>0.0269</td>
<td>0.0288</td>
</tr>
<tr>
<td></td>
<td>(2.00)</td>
<td>(3.25)</td>
<td>(3.56)</td>
</tr>
<tr>
<td>EXPRATIO&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>0.0098</td>
<td>0.0227</td>
<td>0.0283</td>
</tr>
<tr>
<td></td>
<td>(0.15)</td>
<td>(0.45)</td>
<td>(0.59)</td>
</tr>
<tr>
<td>TURNOVER&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>0.0002</td>
<td>0.0001</td>
<td>0.0002</td>
</tr>
<tr>
<td></td>
<td>(0.47)</td>
<td>(0.41)</td>
<td>(0.57)</td>
</tr>
<tr>
<td>AGE&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>-0.0006</td>
<td>-0.0003</td>
<td>-0.0003</td>
</tr>
<tr>
<td></td>
<td>(-0.67)</td>
<td>(-0.42)</td>
<td>(-0.29)</td>
</tr>
<tr>
<td>TOTLOAD&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>-0.0023</td>
<td>-0.0044</td>
<td>-0.0043</td>
</tr>
<tr>
<td></td>
<td>(-0.48)</td>
<td>(-0.99)</td>
<td>(-1.11)</td>
</tr>
<tr>
<td>FLOW&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>-0.0003</td>
<td>-0.0003</td>
<td>-0.0003</td>
</tr>
<tr>
<td></td>
<td>(-1.88)</td>
<td>(-2.11)</td>
<td>(-2.06)</td>
</tr>
<tr>
<td>PRET&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>0.0190</td>
<td>0.0218</td>
<td>0.0223</td>
</tr>
<tr>
<td></td>
<td>(2.58)</td>
<td>(3.27)</td>
<td>(3.27)</td>
</tr>
<tr>
<td>RGAP&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>0.5036</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(31.49)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IPO&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td></td>
<td>2.4239</td>
<td>(1.48)</td>
</tr>
<tr>
<td>ICI&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td></td>
<td></td>
<td>0.4651</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.62)</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.26</td>
<td>0.22</td>
<td>0.22</td>
</tr>
</tbody>
</table>
We thank Burton Malkiel for providing a number of the stylized facts regarding outsourcing arrangements in the mutual fund industry. The composition of the advisory board, including independent board members, is picked by the mutual fund family. The fund family has considerable influence over the governance of different funds by setting constraints on what the fund can do.

Formerly called “CDA/Spectrum Mutual Fund Holdings Database”.

The SEC defines affiliated as having either ownership of or some controlling interest in the other party.

We have also considered an even more refined strategy in which an fund’s outsourcing status depends on both its family offering many funds controlling for their total assets at inception and its family headquarters location being in a small city that is not New York or Boston (where many fund managers reside and presumably where it is easier to hire). Funds in smaller cities do more outsourcing presumably because it is more difficult to find managers nearby. Our IV estimates from this strategy is similar, so we opt for the simpler version in this paper.


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.

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.

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.

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”. 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.

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

See the Supplemental Appendix for additional information on this process.

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.

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).

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 the online supplement tables.

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.

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 III and IV, our main results are largely unchanged.

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.

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.
Supplementary Appendix for
Outsourcing Mutual Fund Management:
Firm Boundaries, Incentives and Performance

JOSEPH CHEN, HARRISON HONG, WENXI JIANG, and JEFFREY D. KUBIK*

This appendix provides details on how we constructed our outsourcing status measure, how we constructed our fund performance benchmarks construction choices, and robustness checks.

A. Categorizing Outsourcing Status

If two advisors are listed in Thomson Mutual Fund Holdings Database, but only one of the names does not match the name of the family complex, we identify that fund as a candidate for being outsourced. Note the limitation to “candidate” because advisors with different names may still be affiliated. We carefully do this matching by hand so as to account for issues such as slight variations of names for the same organization (e.g. Smith Barney Ltd versus Smith Barney) and to account for different divisions of the same company having different names (e.g. Morgan Stanley Japan is a part of Morgan Stanley). The latter issue is relevant mostly for categorizing international funds. Using this scheme alone, we identify roughly 56% of fund-year observations as being managed in-house and 44% of fund-year observations as candidates for being outsourced.1

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1 Chen is from the University of California at Davis, Hong is from Princeton University, Jiang is from Yale School of Management, and Kubik is from Syracuse University.
We then use the SEC database of disclosures by investment advisors to check the relationship of advisors with different names. The worry is that we might misidentify an advisor who is a part of the same ownership structure as the mutual family because the names vary within the ownership structure. For example, The Dreyfus Corporation is a mutual fund family that is owned by Mellon Financial Corporation and there are funds in Dreyfus whose advisor is Mellon Bank. Similarly, there are other advisors in Dreyfus, such as The Boston Company, who are affiliated with the Mellon Financial Corporation. Fortunately, investment advisors are required by the Investment Advisers Act of 1940 to disclose their ownership structure to the SEC in their registration via Form ADV.\textsuperscript{2} In all of our analysis, we exclude index funds.

Panel A of Supplement Table I provides a summary of our identification scheme by year. We find that the incidence of outsourcing has increased over time. As the mutual fund industry (\textit{i.e.} families) has grown substantially during this period (as witnessed by the dramatic increase in the number of funds), they are, in turn, outsourcing a larger portion of their management. On average, we find that the managements of about 27\% of the funds in our sample are outsourced. This figure is slightly higher than other estimates given by industry practitioners and regulators, which hover anywhere from the mid-teens to twenty-percent.\textsuperscript{3}

[Insert Supplement Table I here]

Panel B of Supplement Table I shows the break down of our identification scheme by the investment styles provided by the CRSP Mutual Fund Database. The percentage of funds being farmed out is uniform across almost every style; for six of the seven styles, on average about 28\% (range from 24\% to 32\%) of funds are outsourced.
The exception is sector funds; about 19% of these funds are outsourced on average. Thus, outsourcing does not appear to be limited to a few styles. Furthermore, most of the funds that are unidentified are bond and money market funds. The reason is that the Thomson Database focuses primarily on equity and has spottier coverage of bond funds. Our results, however, hold even if we just considered equity funds. So these missing observations do not appear to be driving our results. Our final sample excludes funds that we are unable to definitively identify as being outsourced or not.

B. *Fund Performance Benchmarks*

In Supplement Table II, we report summary statistics on the performance benchmarks used in our analysis.

[Insert Supplement Table II here]

C. *Additional Analyses*

In Supplement Table III, we use a fund’s previous 60 months of returns to estimate the factor loadings at each month. Hence we require a fund to be in existence for at least 5 years before it enters the sample. As the table shows, the coefficients on the effects of outsourcing on performance do not change much when we compared them to our main table (Table III of the paper). This is true whether we use the CAPM, the 4-Factor model or the 6-Factor model.

[Insert Supplement Table III here]
In Supplement Table IV, we change the definition of outsourcing to the following. If two advisors are listed (two is the maximum number listed), we require that both advisors be unaffiliated external advisors rather than just one or the other for us to identify the fund as outsourced. Doing so reduces the average number of outsourced funds at any given time from 808 funds to roughly 600 funds. As the table shows, our result regarding the effect of outsourcing on performance is hardly changed. If anything, there is a very slight improvement with this identification scheme.

[Insert Supplement Table IV here]

In Supplement Table V, we apply double-clustered standard error for family and advisor to our Table VI (second stage regression the IV regression), since this is a linear regression. We did not apply double-clustered standard error to our main regression, since its empirical specification is Fama-MacBeth. We note that our \( t \)-statistic using double-clustered standard error for family and advisor are of slightly lower statistical significance.

[Insert Supplement Table V here]

In Supplement Table VI, we look at the relationship between expense ratios and flows and outsourcing status. We find that outsourced funds have a lower expense ratio but there is no difference in flows.

[Insert Supplement Table VI here]

\[D. \quad Robustness \text{ Checks}\]
In Supplement Tables III-I to III-XIV, we report the tables for the robustness checks discussed in the Section V of our paper regarding our baseline Table III on the effect of outsourcing on performance. For brevity, we briefly summarize here the check performed by each table.

Table III-I: The dependent variable is net fund returns.

Table III-II: Loadings for performance benchmarks are calculated using gross fund returns.

Table III-III: Loadings for performance benchmarks are calculated using each investment style rather than equity versus non-equity.

Table III-IV: Loading for performance benchmarks are calculated using past return portfolios.

Table III-V: Performance regression includes style fixed effects.

Table III-VI: Performance regression excludes international and sector funds.

Table III-VII: Control separately for expense ratio net of 12B1 fees and 12B1 fees.

Table III-VIII: Control separately for front load and rear load.

Table III-IX: Control for log of advisor size or assets under management.

Table III-X: Control for Family Size interacted with Advisor Size.

Table III-XI: Use decile rankings for advisor size control.

Table III-XII: Control for log of number of funds managed by advisor.

Table III-XIII: Control for tenure of manager.

Table III-XIV: OLS estimates and control for year and month fixed effects.
In Supplement Table VIII-I, we add as additional controls to the specification of Table VIII a style ends dummy.

In Supplement Table IX-I, we add as an additional control manager tenure to the specification in Table IX.
**Supplement Table I: Identification of Mutual Fund Management**

This table reports the number of mutual funds we identify as being managed in-house versus being outsourced. Index funds are excluded. We match mutual fund in CRSP Mutual Fund Database with entries in Thomson Mutual Fund Holdings Database. We identify a fund as being managed in-house if the name of its mutual fund family reported in CRSP matches the names of its investment advisory firm reported in CDA/Spectrum. We also identify a fund as being managed in-house if the names do not match but they are filed with the SEC’s ADV forms as the names of one company that owns another or as the names of two affiliated companies. Otherwise, we identify the mutual fund management as being outsourced. If the names are not provided and we cannot further identify the management using manager abbreviation codes, we label the fund as being unidentified.

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

<table>
<thead>
<tr>
<th>Year</th>
<th>In-house</th>
<th>Outsourced</th>
<th>Unidentified</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>1576 (69%)</td>
<td>459 (20%)</td>
<td>252 (11%)</td>
</tr>
<tr>
<td>1995</td>
<td>1740 (69%)</td>
<td>555 (22%)</td>
<td>235 (9%)</td>
</tr>
<tr>
<td>1996</td>
<td>1950 (69%)</td>
<td>627 (22%)</td>
<td>245 (9%)</td>
</tr>
<tr>
<td>1997</td>
<td>2366 (69%)</td>
<td>749 (22%)</td>
<td>302 (9%)</td>
</tr>
<tr>
<td>1998</td>
<td>2455 (67%)</td>
<td>930 (25%)</td>
<td>292 (8%)</td>
</tr>
<tr>
<td>1999</td>
<td>2467 (62%)</td>
<td>1323 (33%)</td>
<td>187 (5%)</td>
</tr>
<tr>
<td>2000</td>
<td>2887 (70%)</td>
<td>1034 (25%)</td>
<td>183 (4%)</td>
</tr>
<tr>
<td>2001</td>
<td>2965 (70%)</td>
<td>1093 (26%)</td>
<td>197 (5%)</td>
</tr>
<tr>
<td>2002</td>
<td>2938 (70%)</td>
<td>1085 (26%)</td>
<td>186 (4%)</td>
</tr>
<tr>
<td>2003</td>
<td>2924 (68%)</td>
<td>1161 (27%)</td>
<td>197 (5%)</td>
</tr>
<tr>
<td>2004</td>
<td>2885 (66%)</td>
<td>1239 (29%)</td>
<td>216 (5%)</td>
</tr>
<tr>
<td>2005</td>
<td>2765 (70%)</td>
<td>1210 (30%)</td>
<td>15 (0%)</td>
</tr>
<tr>
<td>2006</td>
<td>2596 (68%)</td>
<td>1189 (31%)</td>
<td>15 (0%)</td>
</tr>
<tr>
<td>2007</td>
<td>2977 (70%)</td>
<td>1253 (30%)</td>
<td>16 (0%)</td>
</tr>
<tr>
<td>Total</td>
<td>35491 (68%)</td>
<td>13907 (27%)</td>
<td>2538 (5%)</td>
</tr>
</tbody>
</table>

Panel B: Breakdown of in-house funds, outsourced funds and unidentified funds by style

<table>
<thead>
<tr>
<th>Year</th>
<th>Aggressive Growth</th>
<th>Small-Cap Growth</th>
<th>Growth and Income</th>
<th>Bond or Money Mkt</th>
<th>Sector</th>
<th>International</th>
<th>Balanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-house</td>
<td>6519 (69%)</td>
<td>3941 (66%)</td>
<td>3668 (69%)</td>
<td>7757 (62%)</td>
<td>2971 (79%)</td>
<td>6314 (71%)</td>
<td>4318 (70%)</td>
</tr>
<tr>
<td>Outsourced</td>
<td>2745 (29%)</td>
<td>1913 (32%)</td>
<td>1515 (28%)</td>
<td>2955 (24%)</td>
<td>709 (19%)</td>
<td>2362 (27%)</td>
<td>1708 (28%)</td>
</tr>
<tr>
<td>Unidentified</td>
<td>140 (1%)</td>
<td>77 (1%)</td>
<td>138 (3%)</td>
<td>1736 (14%)</td>
<td>87 (2%)</td>
<td>204 (2%)</td>
<td>156 (3%)</td>
</tr>
</tbody>
</table>
Supplement Table II: Summary Statistics for Performance Benchmarks

This table reports the loadings of equal-weighted fund portfolios on various factors. The portfolios are first sorted by TNA and then separated into funds managed in-house and outsourced funds. VWRF is the return on the CRSP value-weighted stock index in excess of the one-month Treasury rate. SMB is the return on a portfolio of small stocks minus large stocks. HML is the return on a portfolio long high book-to-market stocks and short low book-to-market stocks. UMD is the return on a portfolio long stocks that are past winners and short those that are past losers. MSCI is the excess return on the MSCI EAFE index. LABI is the excess return on the Lehman Aggregate Bond Index. Panel A reports the means, standard deviations and correlations of the factors. Panel B and C report factor loadings for Fama-French (1993) model augmented with the momentum factor, MSCI and LABI (6-Factor model). Panel B shows results for equity funds while Panel C shows results for non-equity funds. The sample period is from January 1994 to December 2007 and is comprised of equity funds (Index funds are excluded).

Panel A: Summary statistics of the factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Mean Return</th>
<th>SD of Return</th>
<th>Cross-correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>VWRF</td>
</tr>
<tr>
<td>VWRF</td>
<td>0.61%</td>
<td>4.16%</td>
<td>1.00</td>
</tr>
<tr>
<td>SMB</td>
<td>0.13%</td>
<td>3.85%</td>
<td>1.00</td>
</tr>
<tr>
<td>HML</td>
<td>0.34%</td>
<td>3.48%</td>
<td>1.00</td>
</tr>
<tr>
<td>UMD</td>
<td>0.81%</td>
<td>4.98%</td>
<td>1.00</td>
</tr>
<tr>
<td>MSCI</td>
<td>0.26%</td>
<td>4.02%</td>
<td>1.00</td>
</tr>
<tr>
<td>LABI</td>
<td>0.18%</td>
<td>1.08%</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Panel B: Loadings for equity funds calculated using the 6-Factor model

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Alpha</th>
<th>VWRF</th>
<th>SMB</th>
<th>HML</th>
<th>UMD</th>
<th>MSCI</th>
<th>LABI</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-house</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1(small)</td>
<td>0.03%</td>
<td>0.98</td>
<td>0.20</td>
<td>0.09</td>
<td>-0.01</td>
<td>-0.01</td>
<td>-0.14</td>
</tr>
<tr>
<td>2</td>
<td>-0.01%</td>
<td>0.98</td>
<td>0.23</td>
<td>0.14</td>
<td>0.01</td>
<td>0.00</td>
<td>-0.12</td>
</tr>
<tr>
<td>3</td>
<td>-0.08%</td>
<td>1.00</td>
<td>0.23</td>
<td>0.07</td>
<td>0.03</td>
<td>0.00</td>
<td>-0.12</td>
</tr>
<tr>
<td>4</td>
<td>-0.15%</td>
<td>0.99</td>
<td>0.22</td>
<td>0.06</td>
<td>0.04</td>
<td>0.02</td>
<td>-0.11</td>
</tr>
<tr>
<td>5(large)</td>
<td>-0.11%</td>
<td>0.98</td>
<td>0.09</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
<td>-0.09</td>
</tr>
<tr>
<td>Outsourced</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alpha</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.02%</td>
<td>0.97</td>
<td>0.17</td>
<td>0.12</td>
<td>-0.04</td>
<td>0.02</td>
<td>-0.20</td>
<td></td>
</tr>
<tr>
<td>-0.09%</td>
<td>1.02</td>
<td>0.17</td>
<td>0.12</td>
<td>-0.02</td>
<td>-0.02</td>
<td>-0.15</td>
<td></td>
</tr>
<tr>
<td>-0.10%</td>
<td>1.01</td>
<td>0.19</td>
<td>0.03</td>
<td>0.03</td>
<td>0.00</td>
<td>-0.07</td>
<td></td>
</tr>
<tr>
<td>-0.12%</td>
<td>0.97</td>
<td>0.14</td>
<td>0.04</td>
<td>0.01</td>
<td>0.03</td>
<td>-0.14</td>
<td></td>
</tr>
<tr>
<td>-0.11%</td>
<td>0.99</td>
<td>0.07</td>
<td>0.02</td>
<td>0.00</td>
<td>0.02</td>
<td>-0.10</td>
<td></td>
</tr>
</tbody>
</table>

Panel C: Loadings for non-equity funds calculated using the 6-Factor model

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Alpha</th>
<th>VWRF</th>
<th>SMB</th>
<th>HML</th>
<th>UMD</th>
<th>MSCI</th>
<th>LABI</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-house</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1(small)</td>
<td>0.07%</td>
<td>0.64</td>
<td>0.17</td>
<td>0.09</td>
<td>-0.05</td>
<td>0.20</td>
<td>0.06</td>
</tr>
<tr>
<td>2</td>
<td>-0.02%</td>
<td>0.57</td>
<td>0.17</td>
<td>0.10</td>
<td>-0.02</td>
<td>0.19</td>
<td>0.16</td>
</tr>
<tr>
<td>3</td>
<td>-0.05%</td>
<td>0.55</td>
<td>0.14</td>
<td>0.04</td>
<td>0.02</td>
<td>0.20</td>
<td>0.20</td>
</tr>
<tr>
<td>4</td>
<td>-0.02%</td>
<td>0.57</td>
<td>0.14</td>
<td>0.05</td>
<td>0.04</td>
<td>0.18</td>
<td>0.18</td>
</tr>
<tr>
<td>5(large)</td>
<td>-0.05%</td>
<td>0.61</td>
<td>0.13</td>
<td>0.00</td>
<td>0.04</td>
<td>0.18</td>
<td>0.15</td>
</tr>
<tr>
<td>Outsourced</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alpha</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-0.03%</td>
<td>0.63</td>
<td>0.16</td>
<td>0.04</td>
<td>-0.06</td>
<td>0.19</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>-0.08%</td>
<td>0.59</td>
<td>0.14</td>
<td>0.10</td>
<td>0.00</td>
<td>0.18</td>
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|
Supplement Table III: Robustness to Fund-Level Factor Loadings

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. Index funds are excluded. These returns are adjusted using the market model, the CAPM, the 4-Factor model, and the 6-Factor model, where factor-loadings are based on past 60-months of returns for each fund estimated separately. 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 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 1999 to December 2007 (108 months), is comprised of all funds, and consists of 140,052 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.

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<tr>
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<td>LOGTNA_{t-1}</td>
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<tr>
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<tr>
<td>LOGFAMFUNDS_{t-1}</td>
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<tr>
<td>LOGFAMSIZE_{t-1}</td>
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<tr>
<td>EXPRATIO_{t-1}</td>
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<td></td>
<td>(1.18)</td>
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<tr>
<td>TURNOVER_{t-1}</td>
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</tr>
<tr>
<td></td>
<td>(0.08)</td>
</tr>
<tr>
<td>AGE_{t-1}</td>
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<tr>
<td></td>
<td>(-2.69)</td>
</tr>
<tr>
<td>TOTALLOAD_{t-1}</td>
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<tr>
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<tr>
<td>FLOW_{t-1}</td>
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<tr>
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<td>(-1.96)</td>
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<tr>
<td>PRET_{t-1}</td>
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<td>(3.37)</td>
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<tr>
<td>R-squared</td>
<td>0.220</td>
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Supplement Table IV: Complete Outsourcing and Fund Performance

This table shows the Fama-MacBeth (1973) estimates of monthly fund returns regressed on fund characteristics lagged one month. Index funds are excluded. 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. **COMPLETELY OUTSOURCED is an indicator variable that equals one if the fund management is completely 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 452,904 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.

<table>
<thead>
<tr>
<th></th>
<th>Gross fund returns (monthly %)</th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
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<td>6-Factor</td>
<td>---------</td>
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<td>COMPLETELY_</td>
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<td>-0.072</td>
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<td>OUTSOURCED_{t-1}</td>
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</tr>
<tr>
<td>LOGTNA_{i,t-1}</td>
<td>-0.036</td>
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<td>-0.044</td>
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</tr>
<tr>
<td></td>
<td>(-1.83)</td>
<td>(-2.33)</td>
<td>(-2.74)</td>
<td>(-2.86)</td>
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<td>LOGFAMFUNDS_{i,t-1}</td>
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<td>-0.021</td>
<td>-0.022</td>
<td>-0.025</td>
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<tr>
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<td>(-0.65)</td>
<td>(-0.81)</td>
<td>(-0.85)</td>
<td>(-0.98)</td>
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<tr>
<td>LOGFAMSIZE_{i,t-1}</td>
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<td>0.024</td>
<td>0.025</td>
<td>0.028</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.31)</td>
<td>(1.71)</td>
<td>(1.75)</td>
<td>(1.99)</td>
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<tr>
<td>EXPRATIO_{i,t-1}</td>
<td>-0.028</td>
<td>-0.021</td>
<td>-0.020</td>
<td>-0.010</td>
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<tr>
<td></td>
<td>(-0.26)</td>
<td>(-0.19)</td>
<td>(-0.18)</td>
<td>(-0.09)</td>
<td></td>
</tr>
<tr>
<td>TURNOVER_{i,t-1}</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.91)</td>
<td>(0.87)</td>
<td>(0.84)</td>
<td>(0.83)</td>
<td></td>
</tr>
<tr>
<td>AGE_{i,t-1}</td>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
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</tr>
<tr>
<td></td>
<td>(-0.04)</td>
<td>(-0.49)</td>
<td>(-0.14)</td>
<td>(-0.25)</td>
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<tr>
<td>TOTLOAD_{i,t-1}</td>
<td>-0.005</td>
<td>-0.004</td>
<td>-0.004</td>
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</tr>
<tr>
<td></td>
<td>(-0.75)</td>
<td>(-0.54)</td>
<td>(-0.56)</td>
<td>(-0.57)</td>
<td></td>
</tr>
<tr>
<td>FLOW_{i,t-1}</td>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-1.91)</td>
<td>(-2.21)</td>
<td>(-2.26)</td>
<td>(-2.29)</td>
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<tr>
<td>PRET_{i,t-1}</td>
<td>0.022</td>
<td>0.022</td>
<td>0.023</td>
<td>0.023</td>
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</tr>
<tr>
<td></td>
<td>(3.02)</td>
<td>(3.08)</td>
<td>(3.12)</td>
<td>(3.13)</td>
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<tr>
<td>R-squared</td>
<td>0.175</td>
<td>0.178</td>
<td>0.177</td>
<td>0.177</td>
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Supplement Table V: 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. 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. Percentile dummies of FAMSIZE AT INCEPTION (the size of the family that the fund belongs to when the fund was created) are included in the specification; a complete set of Month × Year dummies is also included. The sample is from January 1994 to December 2007 (168 months), is comprised of all funds (index funds are excluded), and consists of 452,904 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 and by fund advisor.

<table>
<thead>
<tr>
<th></th>
<th>Gross fund returns</th>
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<th>Beta-Adj</th>
<th>4-Factor</th>
<th>6-Factor</th>
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<td>-0.170</td>
<td>-0.188</td>
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<td>(-2.45)</td>
<td>(-2.92)</td>
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<td>(-2.74)</td>
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<tr>
<td>LOGTNA_{it-1}</td>
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<td>-0.039</td>
<td>-0.045</td>
<td>-0.043</td>
<td>-0.045</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-7.19)</td>
<td>(-7.60)</td>
<td>(-8.14)</td>
<td>(-8.22)</td>
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<td>LOGFAMFUNDS_{it-1}</td>
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<td>0.039</td>
<td>0.033</td>
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<tr>
<td></td>
<td></td>
<td>(2.86)</td>
<td>(2.58)</td>
<td>(2.65)</td>
<td>(2.18)</td>
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<tr>
<td>LOGFAMSIZE_{it-1}</td>
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<td>0.011</td>
<td>0.012</td>
<td>0.019</td>
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<td></td>
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<td>(1.74)</td>
<td>(1.76)</td>
<td>(3.01)</td>
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<td>0.013</td>
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<td></td>
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<td>(0.69)</td>
<td>(0.73)</td>
<td>(1.52)</td>
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<tr>
<td>TURNOVER_{it-1}</td>
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<td>-0.000</td>
</tr>
<tr>
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<td>(-1.57)</td>
<td>(-1.60)</td>
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<td>-0.002</td>
<td>-0.002</td>
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<td>(-1.84)</td>
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<tr>
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<td>(-2.71)</td>
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<td>-0.042</td>
<td>-0.042</td>
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<tr>
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<td>(2.92)</td>
<td>(3.03)</td>
<td>(3.09)</td>
<td>(3.07)</td>
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<td>FIRST STAGE RESIDUAL_{it-1}</td>
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<td></td>
<td></td>
<td>(2.25)</td>
<td>(2.43)</td>
<td>(2.31)</td>
<td>(2.51)</td>
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Supplement Table VI: Expense Ratios/Flows and Outsourcing

This table shows the Fama-MacBeth (1973) estimates of expense ratios and flows regressed on outsourcing. Index funds are excluded. The dependent variable is EXPRATIO or FLOW. 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 all funds, and consists of 452,904 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.

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<th>FLOW&lt;sub&gt;_t-1&lt;/sub&gt;</th>
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</tr>
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<td>LOGTNA&lt;sub&gt;_t-1&lt;/sub&gt;</td>
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<td>-5.497</td>
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<tr>
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<td>0.030</td>
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<tr>
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<td>-1.708</td>
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<tr>
<td></td>
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<td>(5.31)</td>
</tr>
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<td></td>
</tr>
<tr>
<td></td>
<td>(0.33)</td>
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</tr>
<tr>
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<td>R-squared</td>
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<td>0.126</td>
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Supplement Table III-I: 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 after (net) 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 (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 all funds (index funds are excluded), and consists of 452,904 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.

<table>
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<th></th>
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<th>Beta-Adj</th>
<th>4-Factor</th>
<th>6-Factor</th>
</tr>
</thead>
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<td>OUTSOURCED&lt;sub&gt;t-1&lt;/sub&gt;</td>
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<td>-0.062</td>
<td>-0.051</td>
<td>-0.046</td>
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<td>(-3.36)</td>
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<td>-0.027</td>
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<td>-0.033</td>
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<td></td>
<td>(-1.39)</td>
<td>(-1.87)</td>
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<td>-0.023</td>
<td>-0.024</td>
<td>-0.027</td>
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<td>(-1.30)</td>
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<td>0.026</td>
<td>0.027</td>
<td>0.029</td>
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<td>(2.31)</td>
<td>(2.56)</td>
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<td>-0.036</td>
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<td>-0.026</td>
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<td></td>
<td>(-0.41)</td>
<td>(-0.39)</td>
<td>(-0.37)</td>
<td>(-0.28)</td>
</tr>
<tr>
<td>TURNOVER&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>0.000</td>
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<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.80)</td>
<td>(0.79)</td>
<td>(0.76)</td>
<td>(0.74)</td>
</tr>
<tr>
<td>AGE&lt;sub&gt;t-1&lt;/sub&gt;</td>
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<td>(0.26)</td>
<td>(0.08)</td>
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<td>TOTALLOAD&lt;sub&gt;t-1&lt;/sub&gt;</td>
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<td>-0.004</td>
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<td>-0.004</td>
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<td>(-0.76)</td>
<td>(-0.76)</td>
</tr>
<tr>
<td>FLOW&lt;sub&gt;t-1&lt;/sub&gt;</td>
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</tr>
<tr>
<td></td>
<td>(-2.07)</td>
<td>(-2.48)</td>
<td>(-2.49)</td>
<td>(-2.51)</td>
</tr>
<tr>
<td>PRET&lt;sub&gt;t-1&lt;/sub&gt;</td>
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<td>0.026</td>
<td>0.026</td>
<td>0.026</td>
</tr>
<tr>
<td></td>
<td>(3.94)</td>
<td>(4.13)</td>
<td>(4.15)</td>
<td>(4.15)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.174</td>
<td>0.180</td>
<td>0.179</td>
<td>0.178</td>
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</table>
Supplement Table III-II: 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, where loadings are calculated using gross fund return (rather than net fund returns). 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. Intercepts have been suppressed. The sample is from January 1994 to December 2007 (168 months), is comprised of all funds (index funds are excluded), and consists of 452,904 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.

<table>
<thead>
<tr>
<th></th>
<th>Gross fund returns (monthly %)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Market-Adj</td>
</tr>
<tr>
<td>OUTSOURCED&lt;sub&gt;\text{L-1}&lt;/sub&gt;</td>
<td>-0.052</td>
</tr>
<tr>
<td></td>
<td>(-3.34)</td>
</tr>
<tr>
<td>LOGTNA&lt;sub&gt;\text{L-1}&lt;/sub&gt;</td>
<td>-0.023</td>
</tr>
<tr>
<td></td>
<td>(-1.39)</td>
</tr>
<tr>
<td>LOGFAMFUNDS&lt;sub&gt;\text{L-1}&lt;/sub&gt;</td>
<td>-0.021</td>
</tr>
<tr>
<td></td>
<td>(-0.99)</td>
</tr>
<tr>
<td>LOGFAMSIZE&lt;sub&gt;\text{L-1}&lt;/sub&gt;</td>
<td>0.022</td>
</tr>
<tr>
<td></td>
<td>(1.91)</td>
</tr>
<tr>
<td>EXPRATIO&lt;sub&gt;\text{L-1}&lt;/sub&gt;</td>
<td>0.043</td>
</tr>
<tr>
<td></td>
<td>(0.46)</td>
</tr>
<tr>
<td>TURNOVER&lt;sub&gt;\text{L-1}&lt;/sub&gt;</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.80)</td>
</tr>
<tr>
<td>AGE&lt;sub&gt;\text{L-1}&lt;/sub&gt;</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
</tr>
<tr>
<td>TOTLOAD&lt;sub&gt;\text{L-1}&lt;/sub&gt;</td>
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</tr>
<tr>
<td></td>
<td>(-0.92)</td>
</tr>
<tr>
<td>FLOW&lt;sub&gt;\text{L-1}&lt;/sub&gt;</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(-2.07)</td>
</tr>
<tr>
<td>PRET&lt;sub&gt;\text{L-1}&lt;/sub&gt;</td>
<td>0.024</td>
</tr>
<tr>
<td></td>
<td>(3.94)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.174</td>
</tr>
</tbody>
</table>
Supplement Table III-III: 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, where loadings are calculated within each investment style portfolios (rather than equity versus non-equity). 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 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 all funds (index fundes are excluded), and consists of 452,904 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.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Gross fund returns (monthly %)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Market-Adj</td>
</tr>
<tr>
<td>OUTSOURCED_{t-1}</td>
<td>-0.052</td>
</tr>
<tr>
<td></td>
<td>(-3.33)</td>
</tr>
<tr>
<td>LOGTNA_{t-1}</td>
<td>-0.023</td>
</tr>
<tr>
<td></td>
<td>(-1.39)</td>
</tr>
<tr>
<td>LOGFAMFUNDS_{t-1}</td>
<td>-0.021</td>
</tr>
<tr>
<td></td>
<td>(-0.99)</td>
</tr>
<tr>
<td>LOGFAMSIZE_{t-1}</td>
<td>0.022</td>
</tr>
<tr>
<td></td>
<td>(1.91)</td>
</tr>
<tr>
<td>EXPRATIO_{t-1}</td>
<td>0.043</td>
</tr>
<tr>
<td></td>
<td>(0.46)</td>
</tr>
<tr>
<td>TURNOVER_{t-1}</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.79)</td>
</tr>
<tr>
<td>AGE_{t-1}</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
</tr>
<tr>
<td>TOTLOAD_{t-1}</td>
<td>-0.006</td>
</tr>
<tr>
<td></td>
<td>(-0.92)</td>
</tr>
<tr>
<td>FLOW_{t-1}</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(-2.07)</td>
</tr>
<tr>
<td>PRET_{t-1}</td>
<td>0.024</td>
</tr>
<tr>
<td></td>
<td>(3.94)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.174</td>
</tr>
</tbody>
</table>
Supplement Table III-IV: 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, where loadings are calculated from past return quintile portfolios (rather than size quintile portfolios). 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. Intercepts have been suppressed. The sample is from January 1994 to December 2007 (168 months), is comprised of all funds (index funds are excluded), and consists of 452,904 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.

<table>
<thead>
<tr>
<th>Gross fund returns (monthly %)</th>
<th>Market-Adj</th>
<th>Beta-Adj</th>
<th>4-Factor</th>
<th>6-Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTSOURCED (_{t-1})</td>
<td>-0.050</td>
<td>-0.054</td>
<td>-0.050</td>
<td>-0.047</td>
</tr>
<tr>
<td>(3.19)</td>
<td>(3.80)</td>
<td>(3.62)</td>
<td>(3.43)</td>
<td></td>
</tr>
<tr>
<td>LOGTNA (_{t-1})</td>
<td>-0.017</td>
<td>-0.019</td>
<td>-0.034</td>
<td>-0.034</td>
</tr>
<tr>
<td>(0.97)</td>
<td>(1.25)</td>
<td>(2.34)</td>
<td>(2.37)</td>
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</tr>
<tr>
<td>LOGFAMFUNDS (_{t-1})</td>
<td>-0.020</td>
<td>-0.025</td>
<td>-0.022</td>
<td>-0.024</td>
</tr>
<tr>
<td>(0.91)</td>
<td>(1.16)</td>
<td>(1.05)</td>
<td>(1.16)</td>
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<tr>
<td>LOGFAMSIZE (_{t-1})</td>
<td>0.021</td>
<td>0.025</td>
<td>0.026</td>
<td>0.028</td>
</tr>
<tr>
<td>(1.74)</td>
<td>(2.12)</td>
<td>(2.20)</td>
<td>(2.46)</td>
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</tr>
<tr>
<td>EXPRATIO (_{t-1})</td>
<td>0.039</td>
<td>0.040</td>
<td>0.025</td>
<td>0.035</td>
</tr>
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<td>(0.41)</td>
<td>(0.43)</td>
<td>(0.29)</td>
<td>(0.41)</td>
<td></td>
</tr>
<tr>
<td>TURNOVER (_{t-1})</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>(0.78)</td>
<td>(0.80)</td>
<td>(0.55)</td>
<td>(0.53)</td>
<td></td>
</tr>
<tr>
<td>AGE (_{t-1})</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>(0.50)</td>
<td>(0.36)</td>
<td>(0.20)</td>
<td>(0.35)</td>
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<tr>
<td>TOTLOAD (_{t-1})</td>
<td>-0.005</td>
<td>-0.003</td>
<td>-0.003</td>
<td>-0.002</td>
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<tr>
<td>(0.77)</td>
<td>(0.51)</td>
<td>(0.47)</td>
<td>(0.44)</td>
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<tr>
<td>FLOW (_{t-1})</td>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
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<tr>
<td>(-2.75)</td>
<td>(-3.16)</td>
<td>(-2.38)</td>
<td>(-2.51)</td>
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<tr>
<td>PRET (_{t-1})</td>
<td>0.023</td>
<td>0.025</td>
<td>0.015</td>
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<td>(3.88)</td>
<td>(4.23)</td>
<td>(3.79)</td>
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</tr>
<tr>
<td>R-squared</td>
<td>0.170</td>
<td>0.173</td>
<td>0.105</td>
<td>0.102</td>
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**Supplement Table III-V: 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 (buy-hold) fund return over the past twelve months. **The regressions include style fixed-effects.** Intercepts have been suppressed. The sample is from January 1994 to December 2007 (168 months), is comprised of all funds (index funds are excluded), and consists of 452,904 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.

<table>
<thead>
<tr>
<th></th>
<th>Gross fund returns (monthly %)</th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Market-Adj</td>
<td>Beta-Adj</td>
<td>4-Factor</td>
<td>6-Factor</td>
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<tr>
<td>OUTSOURCED&lt;sub&gt;l-1&lt;/sub&gt;</td>
<td>-0.053</td>
<td>-0.057</td>
<td>-0.046</td>
<td>-0.042</td>
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<tr>
<td></td>
<td>(-4.35)</td>
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</tr>
<tr>
<td>LOGTNA&lt;sub&gt;l-1&lt;/sub&gt;</td>
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<td>-0.021</td>
<td>-0.026</td>
<td>-0.027</td>
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<td>-0.029</td>
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<tr>
<td></td>
<td>(-1.96)</td>
<td>(-1.93)</td>
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<td>(-2.09)</td>
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<td>0.025</td>
<td>0.026</td>
<td>0.026</td>
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<tr>
<td></td>
<td>(3.90)</td>
<td>(3.89)</td>
<td>(4.15)</td>
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<tr>
<td>EXPRATIO&lt;sub&gt;l-1&lt;/sub&gt;</td>
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<td>0.041</td>
<td>0.042</td>
<td>0.043</td>
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<tr>
<td></td>
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<td>(0.76)</td>
<td>(0.79)</td>
<td>(0.80)</td>
<td></td>
</tr>
<tr>
<td>TOTALLOAD&lt;sub&gt;l-1&lt;/sub&gt;</td>
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<td>0.000</td>
<td>0.000</td>
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<tr>
<td></td>
<td>(0.58)</td>
<td>(0.58)</td>
<td>(0.55)</td>
<td>(0.56)</td>
<td></td>
</tr>
<tr>
<td>AGE&lt;sub&gt;l-1&lt;/sub&gt;</td>
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<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.04)</td>
<td>(0.03)</td>
<td>(0.30)</td>
<td>(0.37)</td>
<td></td>
</tr>
<tr>
<td>FLOW&lt;sub&gt;l-1&lt;/sub&gt;</td>
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<td>-0.003</td>
<td>-0.002</td>
<td>-0.003</td>
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</tr>
<tr>
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<td>(-0.73)</td>
<td>(-0.68)</td>
<td>(-0.67)</td>
<td>(-0.71)</td>
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</tr>
<tr>
<td>PRET&lt;sub&gt;l-1&lt;/sub&gt;</td>
<td>0.023</td>
<td>0.024</td>
<td>0.024</td>
<td>0.024</td>
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</tr>
<tr>
<td></td>
<td>(4.01)</td>
<td>(4.05)</td>
<td>(4.03)</td>
<td>(4.07)</td>
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<tr>
<td>Style Fixed Effect?</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.329</td>
<td>0.316</td>
<td>0.313</td>
<td>0.306</td>
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</tbody>
</table>
Supplement Table III-VI: 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. 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) and is comprised of all funds except international and sector funds (index funds are excluded). Time-series average of monthly regression r-squared is 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.

<table>
<thead>
<tr>
<th></th>
<th>Gross fund returns (monthly %)</th>
<th>Market-Adj</th>
<th>Beta-Adj</th>
<th>4-Factor</th>
<th>6-Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTSOURCED(_{t-1})</td>
<td>-0.041</td>
<td>(-2.35)</td>
<td>(-3.35)</td>
<td>(-2.21)</td>
<td>(-1.85)</td>
</tr>
<tr>
<td>LOGTNA(_{t-1})</td>
<td>-0.018</td>
<td>(-1.20)</td>
<td>(-1.91)</td>
<td>(-1.91)</td>
<td>(-2.01)</td>
</tr>
<tr>
<td>LOGFAMFUNDS(_{t-1})</td>
<td>-0.036</td>
<td>(-1.68)</td>
<td>(-1.92)</td>
<td>(-1.99)</td>
<td>(-2.09)</td>
</tr>
<tr>
<td>LOGFAMSIZE(_{t-1})</td>
<td>0.026</td>
<td>(3.39)</td>
<td>(3.89)</td>
<td>(4.05)</td>
<td>(4.18)</td>
</tr>
<tr>
<td>EXPRATIO(_{t-1})</td>
<td>0.076</td>
<td>(0.88)</td>
<td>(0.73)</td>
<td>(0.77)</td>
<td>(0.83)</td>
</tr>
<tr>
<td>TURNOVER(_{t-1})</td>
<td>0.000</td>
<td>(0.17)</td>
<td>(0.34)</td>
<td>(0.25)</td>
<td>(0.31)</td>
</tr>
<tr>
<td>AGE(_{t-1})</td>
<td>0.000</td>
<td>(-0.58)</td>
<td>(-0.87)</td>
<td>(-0.55)</td>
<td>(-0.61)</td>
</tr>
<tr>
<td>TOTALLOAD(_{t-1})</td>
<td>-0.008</td>
<td>(-1.26)</td>
<td>(-0.99)</td>
<td>(-1.00)</td>
<td>(-0.98)</td>
</tr>
<tr>
<td>FLOW(_{t-1})</td>
<td>0.000</td>
<td>(-1.52)</td>
<td>(-1.77)</td>
<td>(-1.81)</td>
<td>(-1.93)</td>
</tr>
<tr>
<td>PRET(_{t-1})</td>
<td>0.020</td>
<td>(2.96)</td>
<td>(3.05)</td>
<td>(3.12)</td>
<td>(3.20)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.185</td>
<td>0.175</td>
<td>0.174</td>
<td>0.175</td>
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</tbody>
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Supplement Table III-VII: 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. **EXPRATIO_12B1** is the **total annual management fees and expenses divided by TNA, minus the 12-B1 fees. 12B1 is the actual 12-B1 fees as a percentage of 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) and is comprised of all funds (index funds are excluded). Time-series average of monthly regression r-squared is 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.

<table>
<thead>
<tr>
<th>Gross fund returns (monthly %)</th>
<th>Market-Adj</th>
<th>Beta-Adj</th>
<th>4-Factor</th>
<th>6-Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTSOURCED_{i,t-1}</td>
<td>-0.056</td>
<td>-0.066</td>
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<td>-0.049</td>
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<td>(-3.61)</td>
<td>(-4.76)</td>
<td>(-3.82)</td>
<td>(-3.65)</td>
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<tr>
<td>LOGTNA_{i,t-1}</td>
<td>-0.025</td>
<td>-0.029</td>
<td>-0.034</td>
<td>-0.036</td>
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<tr>
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<td>(-1.44)</td>
<td>(-1.89)</td>
<td>(-2.25)</td>
<td>(-2.31)</td>
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<td>LOGFAMFUNDS_{i,t-1}</td>
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<td>-0.024</td>
<td>-0.025</td>
<td>-0.028</td>
</tr>
<tr>
<td></td>
<td>(-0.96)</td>
<td>(-1.08)</td>
<td>(-1.13)</td>
<td>(-1.26)</td>
</tr>
<tr>
<td>LOGFAMSIZE_{i,t-1}</td>
<td>0.023</td>
<td>0.027</td>
<td>0.028</td>
<td>0.030</td>
</tr>
<tr>
<td></td>
<td>(1.82)</td>
<td>(2.14)</td>
<td>(2.18)</td>
<td>(2.42)</td>
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<tr>
<td>EXPRATIO_12B1_{i,t-1}</td>
<td>0.029</td>
<td>0.033</td>
<td>0.034</td>
<td>0.044</td>
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<tr>
<td></td>
<td>(0.23)</td>
<td>(0.26)</td>
<td>(0.27)</td>
<td>(0.34)</td>
</tr>
<tr>
<td>12B1_{i,t-1}</td>
<td>1.685</td>
<td>1.921</td>
<td>1.925</td>
<td>1.427</td>
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<td>(0.14)</td>
<td>(0.16)</td>
<td>(0.16)</td>
<td>(0.12)</td>
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<tr>
<td>TURNOVER_{i,t-1}</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.80)</td>
<td>(0.79)</td>
<td>(0.76)</td>
<td>(0.74)</td>
</tr>
<tr>
<td>AGE_{i,t-1}</td>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
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<tr>
<td></td>
<td>(0.14)</td>
<td>(-0.18)</td>
<td>(0.13)</td>
<td>(0.03)</td>
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<td>-0.001</td>
<td>-0.001</td>
</tr>
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<td>(-0.73)</td>
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<td>FLOW_{i,t-1}</td>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(-1.91)</td>
<td>(-2.33)</td>
<td>(-2.35)</td>
<td>(-2.36)</td>
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<tr>
<td>PRET_{i,t-1}</td>
<td>0.024</td>
<td>0.026</td>
<td>0.026</td>
<td>0.026</td>
</tr>
<tr>
<td></td>
<td>(3.96)</td>
<td>(4.16)</td>
<td>(4.17)</td>
<td>(4.17)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.182</td>
<td>0.188</td>
<td>0.187</td>
<td>0.187</td>
</tr>
</tbody>
</table>
**Supplement Table III-VIII: 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. 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. FRONTLOAD and REARLOAD are the total front-end charges and rear-end charges as percentages 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) and is comprised of all funds. Time-series average of monthly regression r-squared is 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.

<table>
<thead>
<tr>
<th></th>
<th>Gross fund returns (monthly %)</th>
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<tr>
<td></td>
<td>Market-Adj</td>
</tr>
<tr>
<td>OUTSOURCED_{i,t-1}</td>
<td>-0.051</td>
</tr>
<tr>
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<td>(-3.31)</td>
</tr>
<tr>
<td>LOGTNA_{i,t-1}</td>
<td>-0.023</td>
</tr>
<tr>
<td></td>
<td>(-1.39)</td>
</tr>
<tr>
<td>LOGFAMFUNDS_{i,t-1}</td>
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<tr>
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<td>(-0.85)</td>
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<tr>
<td>LOGFAMSIZE_{i,t-1}</td>
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</tr>
<tr>
<td></td>
<td>(1.85)</td>
</tr>
<tr>
<td>EXPRATIO_{i,t-1}</td>
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</tr>
<tr>
<td></td>
<td>(0.41)</td>
</tr>
<tr>
<td>TURNOVER_{i,t-1}</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.77)</td>
</tr>
<tr>
<td>AGE_{i,t-1}</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(-0.08)</td>
</tr>
<tr>
<td>FRONTLOAD_{i,t-1}</td>
<td>-0.387</td>
</tr>
<tr>
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<td>(-0.93)</td>
</tr>
<tr>
<td>REARLOAD_{i,t-1}</td>
<td>-0.023</td>
</tr>
<tr>
<td></td>
<td>(-0.05)</td>
</tr>
<tr>
<td>FLOW_{i,t-1}</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(-2.10)</td>
</tr>
<tr>
<td>PRET_{i,t-1}</td>
<td>0.024</td>
</tr>
<tr>
<td></td>
<td>(3.92)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.175</td>
</tr>
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</table>
Supplement Table III-IX: 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. LOGADVSIZE is the natural logarithm of one plus the size of the advisor 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 all funds (index funds are excluded), and consists of 452,904 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.

<table>
<thead>
<tr>
<th>Gross fund returns (monthly %)</th>
<th>Market-Adj</th>
<th>Beta-Adj</th>
<th>4-Factor</th>
<th>6-Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTSOURCED&lt;sub&gt;it-1&lt;/sub&gt;</td>
<td>-0.055</td>
<td>-0.063</td>
<td>-0.051</td>
<td>-0.046</td>
</tr>
<tr>
<td></td>
<td>(-3.50)</td>
<td>(-4.51)</td>
<td>(-3.56)</td>
<td>(-3.32)</td>
</tr>
<tr>
<td>LOGTNA&lt;sub&gt;it-1&lt;/sub&gt;</td>
<td>-0.022</td>
<td>-0.026</td>
<td>-0.031</td>
<td>-0.033</td>
</tr>
<tr>
<td></td>
<td>(-1.39)</td>
<td>(-1.88)</td>
<td>(-2.33)</td>
<td>(-2.41)</td>
</tr>
<tr>
<td>LOGFAMFUNDS&lt;sub&gt;it-1&lt;/sub&gt;</td>
<td>-0.022</td>
<td>-0.023</td>
<td>-0.024</td>
<td>-0.026</td>
</tr>
<tr>
<td></td>
<td>(-0.99)</td>
<td>(-1.08)</td>
<td>(-1.13)</td>
<td>(-1.26)</td>
</tr>
<tr>
<td>LOGFAMSIZE&lt;sub&gt;it-1&lt;/sub&gt;</td>
<td>0.024</td>
<td>0.027</td>
<td>0.028</td>
<td>0.030</td>
</tr>
<tr>
<td></td>
<td>(1.83)</td>
<td>(2.05)</td>
<td>(2.12)</td>
<td>(2.31)</td>
</tr>
<tr>
<td>LOGADVSIZE&lt;sub&gt;it-1&lt;/sub&gt;</td>
<td>-0.002</td>
<td>-0.001</td>
<td>-0.001</td>
<td>-0.001</td>
</tr>
<tr>
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<td>(-0.63)</td>
<td>(-0.32)</td>
<td>(-0.34)</td>
<td>(-0.19)</td>
</tr>
<tr>
<td>EXPRATIO&lt;sub&gt;it-1&lt;/sub&gt;</td>
<td>0.043</td>
<td>0.045</td>
<td>0.047</td>
<td>0.055</td>
</tr>
<tr>
<td></td>
<td>(0.46)</td>
<td>(0.50)</td>
<td>(0.51)</td>
<td>(0.60)</td>
</tr>
<tr>
<td>TURNOVER&lt;sub&gt;it-1&lt;/sub&gt;</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.81)</td>
<td>(0.79)</td>
<td>(0.76)</td>
<td>(0.74)</td>
</tr>
<tr>
<td>AGE&lt;sub&gt;it-1&lt;/sub&gt;</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.04)</td>
<td>(0.04)</td>
<td>(0.06)</td>
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<tr>
<td>TOTLOAD&lt;sub&gt;it-1&lt;/sub&gt;</td>
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<td>-0.004</td>
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<td>(-0.92)</td>
<td>(-0.73)</td>
<td>(-0.75)</td>
<td>(-0.76)</td>
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<td>FLOW&lt;sub&gt;it-1&lt;/sub&gt;</td>
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</tr>
<tr>
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<td>(-2.08)</td>
<td>(-2.50)</td>
<td>(-2.51)</td>
<td>(-2.53)</td>
</tr>
<tr>
<td>PRET&lt;sub&gt;it-1&lt;/sub&gt;</td>
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<td>0.026</td>
<td>0.026</td>
<td>0.026</td>
</tr>
<tr>
<td></td>
<td>(3.95)</td>
<td>(4.14)</td>
<td>(4.15)</td>
<td>(4.15)</td>
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<tr>
<td>R-squared</td>
<td>0.175</td>
<td>0.181</td>
<td>0.180</td>
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</table>
Supplement Table III-X: 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. LOGADVSIZE is the natural logarithm of one plus the size of the advisor that the fund belongs to excluding the asset of the fund itself. EXPRA TIO 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 all funds (index funds are excluded), and consists of 452,904 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.

<table>
<thead>
<tr>
<th></th>
<th>Gross fund returns (monthly %)</th>
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<th></th>
<th></th>
<th></th>
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<td>Beta-Adj</td>
<td>4-Factor</td>
<td>6-Factor</td>
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<td>OUTSOURCED_{i,t-1}</td>
<td>-0.046</td>
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<td>-0.041</td>
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<tr>
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<td>(-2.88)</td>
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<td>(-2.97)</td>
<td>(-2.60)</td>
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<td>LOGTNA_{i,t-1}</td>
<td>-0.024</td>
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<td>-0.033</td>
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<td>(-1.98)</td>
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<tr>
<td>LOGFAMFUNDS_{i,t-1}</td>
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<td>-0.033</td>
<td>-0.035</td>
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<td>(-1.33)</td>
<td>(-1.49)</td>
<td>(-1.59)</td>
<td>(-1.74)</td>
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<tr>
<td>LOGFAMSIZE_{i,t-1}</td>
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<td>0.024</td>
<td>0.025</td>
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<td></td>
<td></td>
<td>(1.56)</td>
<td>(1.79)</td>
<td>(1.82)</td>
<td>(2.00)</td>
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<tr>
<td>LOGADVSIZE_{i,t-1}</td>
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<td>-0.015</td>
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<td>0.002</td>
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<tr>
<td></td>
<td></td>
<td>(2.08)</td>
<td>(2.34)</td>
<td>(2.65)</td>
<td>(2.83)</td>
</tr>
<tr>
<td>LOGFAMSIZE_{i,t-1}</td>
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<tr>
<td>× LOGADVSIZE_{i,t-1}</td>
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<td>0.044</td>
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<td>(0.43)</td>
<td>(0.47)</td>
<td>(0.48)</td>
<td>(0.57)</td>
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<tr>
<td>TURNOVER_{i,t-1}</td>
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<td>0.000</td>
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<td></td>
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<td>(0.80)</td>
<td>(0.78)</td>
<td>(0.75)</td>
<td>(0.73)</td>
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<td>AGE_{i,t-1}</td>
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<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
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<td>(-0.07)</td>
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<td>(-0.10)</td>
<td>(-0.20)</td>
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<td>-0.004</td>
<td>-0.004</td>
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<tr>
<td></td>
<td></td>
<td>(-0.92)</td>
<td>(-0.74)</td>
<td>(-0.76)</td>
<td>(-0.77)</td>
</tr>
<tr>
<td>FLOW_{i,t-1}</td>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
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<td>(-2.11)</td>
<td>(-2.53)</td>
<td>(-2.54)</td>
<td>(-2.56)</td>
</tr>
<tr>
<td>PRET_{i,t-1}</td>
<td>0.024</td>
<td>0.026</td>
<td>0.026</td>
<td>0.026</td>
<td></td>
</tr>
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<td>(3.95)</td>
<td>(4.14)</td>
<td>(4.16)</td>
<td>(4.15)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.176</td>
<td>0.182</td>
<td>0.181</td>
<td>0.181</td>
<td></td>
</tr>
</tbody>
</table>
Supplement Table III-XI: 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. D_LOGADVSIZE is decile ranking of the size of the advisor that the fund belongs to. 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 all funds (index funds are excluded), and consists of 452,904 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.

<table>
<thead>
<tr>
<th>Gross fund returns (monthly %)</th>
<th>Market-Adj</th>
<th>Beta-Adj</th>
<th>4-Factor</th>
<th>6-Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTSOURCED_{it-1}</td>
<td>-0.050</td>
<td>-0.058</td>
<td>-0.046</td>
<td>-0.040</td>
</tr>
<tr>
<td></td>
<td>(-3.29)</td>
<td>(-4.23)</td>
<td>(-3.35)</td>
<td>(-3.02)</td>
</tr>
<tr>
<td>LOGTNA_{it-1}</td>
<td>-0.022</td>
<td>-0.027</td>
<td>-0.032</td>
<td>-0.033</td>
</tr>
<tr>
<td></td>
<td>(-1.37)</td>
<td>(-1.89)</td>
<td>(-2.31)</td>
<td>(-2.41)</td>
</tr>
<tr>
<td>LOGFAMFUNDS_{it-1}</td>
<td>-0.025</td>
<td>-0.026</td>
<td>-0.027</td>
<td>-0.030</td>
</tr>
<tr>
<td></td>
<td>(-1.14)</td>
<td>(-1.23)</td>
<td>(-1.34)</td>
<td>(-1.47)</td>
</tr>
<tr>
<td>LOGFAMSIZE_{it-1}</td>
<td>0.018</td>
<td>0.021</td>
<td>0.021</td>
<td>0.022</td>
</tr>
<tr>
<td></td>
<td>(1.19)</td>
<td>(1.39)</td>
<td>(1.40)</td>
<td>(1.49)</td>
</tr>
<tr>
<td>D_LOGADVSIZE_{it-1}</td>
<td>-0.008</td>
<td>-0.006</td>
<td>-0.009</td>
<td>-0.009</td>
</tr>
<tr>
<td></td>
<td>(-1.19)</td>
<td>(-1.01)</td>
<td>(-1.42)</td>
<td>(-1.46)</td>
</tr>
<tr>
<td>LOGFAMSIZE_{it-1} x D_LOGADVSIZE_{it-1}</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(0.93)</td>
<td>(0.95)</td>
<td>(1.21)</td>
<td>(1.36)</td>
</tr>
<tr>
<td>EXPRATIO_{it-1}</td>
<td>0.042</td>
<td>0.045</td>
<td>0.046</td>
<td>0.054</td>
</tr>
<tr>
<td></td>
<td>(0.45)</td>
<td>(0.49)</td>
<td>(0.50)</td>
<td>(0.58)</td>
</tr>
<tr>
<td>TURNOVER_{it-1}</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.80)</td>
<td>(0.79)</td>
<td>(0.76)</td>
<td>(0.74)</td>
</tr>
<tr>
<td>AGE_{it-1}</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(-0.00)</td>
<td>(-0.35)</td>
<td>(-0.04)</td>
<td>(-0.15)</td>
</tr>
<tr>
<td>TOTLOAD_{it-1}</td>
<td>-0.006</td>
<td>-0.004</td>
<td>-0.004</td>
<td>-0.004</td>
</tr>
<tr>
<td></td>
<td>(-0.94)</td>
<td>(-0.75)</td>
<td>(-0.76)</td>
<td>(-0.77)</td>
</tr>
<tr>
<td>FLOW_{it-1}</td>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(-2.06)</td>
<td>(-2.48)</td>
<td>(-2.49)</td>
<td>(-2.51)</td>
</tr>
<tr>
<td>PRET_{it-1}</td>
<td>0.024</td>
<td>0.026</td>
<td>0.026</td>
<td>0.026</td>
</tr>
<tr>
<td></td>
<td>(3.95)</td>
<td>(4.15)</td>
<td>(4.16)</td>
<td>(4.16)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.176</td>
<td>0.182</td>
<td>0.181</td>
<td>0.181</td>
</tr>
</tbody>
</table>
Supplement Table III-XII: 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. LOGADVFUNDS is the natural logarithm of number of funds managed by the advisor. 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 all funds (index funds are excluded), and consists of 452,904 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.

<table>
<thead>
<tr>
<th>Gross fund returns (monthly %)</th>
<th>Market-Adj</th>
<th>Beta-Adj</th>
<th>4-Factor</th>
<th>6-Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTSOURCED&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>-0.051</td>
<td>-0.059</td>
<td>-0.047</td>
<td>-0.041</td>
</tr>
<tr>
<td></td>
<td>(-3.24)</td>
<td>(-4.27)</td>
<td>(-3.24)</td>
<td>(-3.00)</td>
</tr>
<tr>
<td>LOGTNA&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>-0.023</td>
<td>-0.027</td>
<td>-0.032</td>
<td>-0.033</td>
</tr>
<tr>
<td></td>
<td>(-1.41)</td>
<td>(-1.90)</td>
<td>(-2.35)</td>
<td>(-2.43)</td>
</tr>
<tr>
<td>LOGFAMFUNDS&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
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<td>-0.024</td>
<td>-0.025</td>
<td>-0.028</td>
</tr>
<tr>
<td></td>
<td>(-1.00)</td>
<td>(-1.19)</td>
<td>(-1.26)</td>
<td>(-1.42)</td>
</tr>
<tr>
<td>LOGFAMSIZE&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>0.022</td>
<td>0.026</td>
<td>0.026</td>
<td>0.028</td>
</tr>
<tr>
<td></td>
<td>(1.80)</td>
<td>(2.13)</td>
<td>(2.18)</td>
<td>(2.42)</td>
</tr>
<tr>
<td>LOGADVFUNDS&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>0.001</td>
<td>0.004</td>
<td>0.004</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
<td>(0.34)</td>
<td>(0.42)</td>
<td>(0.51)</td>
</tr>
<tr>
<td>EXPRATIO&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>0.043</td>
<td>0.046</td>
<td>0.047</td>
<td>0.055</td>
</tr>
<tr>
<td></td>
<td>(0.46)</td>
<td>(0.50)</td>
<td>(0.51)</td>
<td>(0.60)</td>
</tr>
<tr>
<td>TURNOVER&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
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<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.79)</td>
<td>(0.78)</td>
<td>(0.75)</td>
<td>(0.73)</td>
</tr>
<tr>
<td>AGE&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
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<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.30)</td>
<td>(0.03)</td>
<td>(-0.07)</td>
</tr>
<tr>
<td>TOTLOAD&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>-0.006</td>
<td>-0.004</td>
<td>-0.004</td>
<td>-0.004</td>
</tr>
<tr>
<td></td>
<td>(-0.94)</td>
<td>(-0.75)</td>
<td>(-0.77)</td>
<td>(-0.77)</td>
</tr>
<tr>
<td>FLOW&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>0.000</td>
<td>0.000</td>
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</tr>
<tr>
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<td>(-2.08)</td>
<td>(-2.49)</td>
<td>(-2.50)</td>
<td>(-2.52)</td>
</tr>
<tr>
<td>PRET&lt;sub&gt;i,t-1&lt;/sub&gt;</td>
<td>0.024</td>
<td>0.026</td>
<td>0.026</td>
<td>0.026</td>
</tr>
<tr>
<td></td>
<td>(3.95)</td>
<td>(4.14)</td>
<td>(4.16)</td>
<td>(4.16)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.175</td>
<td>0.181</td>
<td>0.180</td>
<td>0.180</td>
</tr>
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</table>
Supplement Table III-XIII: 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 (buy-hold) fund return over the past twelve months. TENURE is the number of years since the date current manager took control. Intercepts have been suppressed. The sample is from January 1994 to December 2007 (168 months), is comprised of all funds (index funds are excluded). 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.

<table>
<thead>
<tr>
<th></th>
<th>Gross fund returns (monthly %)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Market-Adj</td>
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<tr>
<td>OUTSOURCED$_{t-1}$</td>
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<tr>
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<tr>
<td>LOGTNA$_{t-1}$</td>
<td>-0.025</td>
</tr>
<tr>
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<td>(-1.50)</td>
</tr>
<tr>
<td>LOGFAMFUNDS$_{t-1}$</td>
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<tr>
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<td>EXPRATIO$_{t-1}$</td>
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<tr>
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</tr>
<tr>
<td>TURNOVER$_{t-1}$</td>
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</tr>
<tr>
<td></td>
<td>(0.96)</td>
</tr>
<tr>
<td>AGE$_{t-1}$</td>
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<tr>
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<tr>
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<td>FLOW$_{t-1}$</td>
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<tr>
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<td>(-1.96)</td>
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<tr>
<td>PRET$_{t-1}$</td>
<td>0.025</td>
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<tr>
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<td>(3.99)</td>
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<td>TENURE$_{t-1}$</td>
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<tr>
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<td>(1.24)</td>
</tr>
<tr>
<td>R-squared</td>
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Supplement Table III-XIV: Outsourcing and Fund Performance

This table shows the pooled OLS 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, LOGFAMFUNDS, LOGFAMSIZE, EXPRATIO, TURNOVER, AGE, TOTLOAD, FLOW and PRET. The regressions include year-month fixed-effects. Intercepts have been suppressed. The sample is from January 1994 to December 2007 (168 months), is comprised of all funds (index funds are excluded). 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.

<table>
<thead>
<tr>
<th>Gross fund returns (monthly %)</th>
<th>Market-Adj</th>
<th>Beta-Adj</th>
<th>4-Factor</th>
<th>6-Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTSOURCED_{t-1}</td>
<td>-0.051</td>
<td>-0.046</td>
<td>-0.032</td>
<td>-0.027</td>
</tr>
<tr>
<td></td>
<td>(-2.41)</td>
<td>(-2.41)</td>
<td>(-1.90)</td>
<td>(-1.64)</td>
</tr>
<tr>
<td>LOGTNA_{t-1}</td>
<td>-0.054</td>
<td>-0.042</td>
<td>-0.054</td>
<td>-0.057</td>
</tr>
<tr>
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<td>(-2.03)</td>
<td>(-1.77)</td>
<td>(-2.20)</td>
<td>(-2.19)</td>
</tr>
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<td>LOGFAMFUNDS_{t-1}</td>
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<td>0.022</td>
<td>0.021</td>
<td>0.017</td>
</tr>
<tr>
<td></td>
<td>(0.94)</td>
<td>(1.10)</td>
<td>(1.05)</td>
<td>(0.87)</td>
</tr>
<tr>
<td>LOGFAMSIZE_{t-1}</td>
<td>0.014</td>
<td>0.013</td>
<td>0.013</td>
<td>0.016</td>
</tr>
<tr>
<td></td>
<td>(1.13)</td>
<td>(0.97)</td>
<td>(1.01)</td>
<td>(1.30)</td>
</tr>
<tr>
<td>EXPRATIO_{t-1}</td>
<td>0.087</td>
<td>0.087</td>
<td>0.088</td>
<td>0.095</td>
</tr>
<tr>
<td></td>
<td>(0.47)</td>
<td>(0.47)</td>
<td>(0.48)</td>
<td>(0.52)</td>
</tr>
<tr>
<td>TURNOVER_{t-1}</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.05)</td>
<td>(0.03)</td>
<td>(0.03)</td>
</tr>
<tr>
<td>AGE_{t-1}</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(0.23)</td>
<td>(0.25)</td>
<td>(0.53)</td>
<td>(0.54)</td>
</tr>
<tr>
<td>TOTALLOAD_{t-1}</td>
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<td>-0.011</td>
<td>-0.012</td>
<td>-0.012</td>
</tr>
<tr>
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<td>(-1.48)</td>
<td>(-1.46)</td>
<td>(-1.54)</td>
<td>(-1.54)</td>
</tr>
<tr>
<td>FLOW_{t-1}</td>
<td>-0.058</td>
<td>-0.057</td>
<td>-0.056</td>
<td>-0.057</td>
</tr>
<tr>
<td></td>
<td>(-3.47)</td>
<td>(-3.45)</td>
<td>(-3.40)</td>
<td>(-3.34)</td>
</tr>
<tr>
<td>PRET_{t-1}</td>
<td>0.021</td>
<td>0.021</td>
<td>0.021</td>
<td>0.021</td>
</tr>
<tr>
<td></td>
<td>(1.38)</td>
<td>(1.40)</td>
<td>(1.40)</td>
<td>(1.39)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.070</td>
<td>0.041</td>
<td>0.040</td>
<td>0.033</td>
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</tbody>
</table>
Supplement Table VIII-I: 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, STYLEENDS, is an indicator function that equals one if the only mutual fund in the family for that style is closed during that year. The dependent variable, CLOSED, is an indicator function that equals one if the mutual fund is closed during that year. OUTSOURCED is an indicator variable that equals one if the fund management is outsourced. INMODALSTYLE is an indicator that equals one if the fund is in its family’s modal style. The other independent variables include LOGTNA, LOGFAMFUNDS, LOGFAMSIZE, TURNOVER, EXPRATIO, TOTLOAD, FLOW and PRET LOW. NUMBERINSTYLE is the number of mutual funds in the same style as the fund in the fund family. ONLYFUNDFNSTYLE is an indicator variable that equals one if the fund is the only fund in that style in the fund family. All regressions include year effects and investment style effects. The sample is from January 1994 to December 2006 and consists of all funds, and consists of 27,760 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. The unconditional probability of style ending is 0.75%. The unconditional probability of closure is 4.01% per year.

<table>
<thead>
<tr>
<th></th>
<th>STYLEENDS</th>
<th>CLOSED,t</th>
<th>CLOSED,t-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTSOURCED,_t-1</td>
<td>-0.014</td>
<td>0.019</td>
<td>0.033</td>
</tr>
<tr>
<td></td>
<td>(-0.11)</td>
<td>(0.26)</td>
<td>(0.45)</td>
</tr>
<tr>
<td></td>
<td>[-0.024]</td>
<td>[0.169]</td>
<td>[0.296]</td>
</tr>
<tr>
<td>PRET LOW,_t-1</td>
<td>0.204</td>
<td>0.320</td>
<td>0.287</td>
</tr>
<tr>
<td></td>
<td>(2.41)</td>
<td>(6.77)</td>
<td>(6.74)</td>
</tr>
<tr>
<td></td>
<td>[0.347]</td>
<td>[2.506]</td>
<td>[2.586]</td>
</tr>
<tr>
<td>PRET LOW,&gt;OUTSOURCED,_t-1</td>
<td>0.217</td>
<td>0.157</td>
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<td>0.001</td>
<td>0.001</td>
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<td>(0.12)</td>
<td>(0.08)</td>
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<td>[0.007]</td>
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<tr>
<td>AGE,_t-1</td>
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<td>0.001</td>
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<tr>
<td></td>
<td>(0.10)</td>
<td>(0.93)</td>
<td>(0.78)</td>
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<td>[0.014]</td>
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<td>0.014</td>
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<tr>
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<td>(0.76)</td>
<td>(1.18)</td>
<td>(1.39)</td>
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<td>[0.020]</td>
<td>[0.125]</td>
<td>[0.152]</td>
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<td>-0.081</td>
<td>-0.001</td>
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<td>ONLYFUNDFNSTYLE,_t-1</td>
<td>-0.058</td>
<td>-0.52</td>
<td>-0.085</td>
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<tr>
<td>Pseudo R-squared</td>
<td>0.218</td>
<td>0.115</td>
<td>0.110</td>
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Supplement Table IX-I: 
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, TENURE, INMODALSTYLE, LOGTNA, LOGFAMFUNDS, LOGFAMSIZE, TURNOVER, AGE, EXPRATIO, TOTLOAD, FLOW and PRET. TENURE is the number of years since the date current manager took control. 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.

<table>
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<th></th>
<th>Beta Deviation</th>
<th>Idio-Risk Deviation</th>
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<tr>
<td>OUTSOURCED_{it-1}</td>
<td>-0.070</td>
<td>-0.069</td>
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<td></td>
<td>(-2.55)</td>
<td>(-2.94)</td>
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<tr>
<td>TENURE_{it-1}</td>
<td>0.003</td>
<td>0.002</td>
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<tr>
<td></td>
<td>(1.58)</td>
<td>(1.20)</td>
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<tr>
<td>INMODALSTYLE_{it-1}</td>
<td>0.048</td>
<td>0.016</td>
</tr>
<tr>
<td></td>
<td>(2.63)</td>
<td>(0.90)</td>
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<tr>
<td>LOGTNA_{it-1}</td>
<td>-0.030</td>
<td>-0.021</td>
</tr>
<tr>
<td></td>
<td>(-4.04)</td>
<td>(-2.64)</td>
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<tr>
<td>LOGFAMFUNDS_{it-1}</td>
<td>-0.010</td>
<td>-0.024</td>
</tr>
<tr>
<td></td>
<td>(-0.39)</td>
<td>(-1.04)</td>
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<tr>
<td>LOGFAMSIZE_{it-1}</td>
<td>-0.007</td>
<td>-0.004</td>
</tr>
<tr>
<td></td>
<td>(-0.68)</td>
<td>(-0.42)</td>
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<tr>
<td>EXPRATIO_{it-1}</td>
<td>0.181</td>
<td>0.176</td>
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<tr>
<td></td>
<td>(3.89)</td>
<td>(3.26)</td>
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<tr>
<td>TURNOVER_{it-1}</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(4.04)</td>
<td>(3.44)</td>
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<tr>
<td>AGE_{it-1}</td>
<td>0.002</td>
<td>0.001</td>
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<tr>
<td></td>
<td>(1.96)</td>
<td>(1.88)</td>
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<tr>
<td>TOTLOAD_{it-1}</td>
<td>-0.015</td>
<td>-0.005</td>
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<tr>
<td></td>
<td>(-2.87)</td>
<td>(-0.92)</td>
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<td>FLOW_{it-1}</td>
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<td>0.000</td>
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<tr>
<td></td>
<td>(0.27)</td>
<td>(0.11)</td>
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<tr>
<td>PRET_{it-1}</td>
<td>0.006</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>(7.29)</td>
<td>(3.19)</td>
</tr>
<tr>
<td>Pseudo R-squared</td>
<td>0.554</td>
<td>0.380</td>
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</table>
This method, however, is imperfect because investment advisory names may sometimes be missing. We are able to reduce the number of unidentified funds by using an investment advisory firm code that Thomson provides in addition to the name of the sub-advisor. For instance, Vanguard is given a code of VANG. We supplement our identification scheme by using this code.

The SEC makes available the most recently available Form ADV to the public via the Internet at the Investment Adviser Public Disclosure (IAPD) website, http://www.adviserinfo.sec.gov/IAPD. We look up Schedule A of ADV to identify direct ownerships, Schedule B to identify indirect ownerships, and Schedule C to identify other affiliate relationships. If we cannot find the mutual fund family in IAPD, we search for the investment advisory firm in IAPD.

Del Guercio, Reuter and Tkac (2010) study a sample of subadvisory contracts of domestic equity funds in 2002. They find 18% of funds are subadvised and 38% of families participate in a subadvisory relation. For another estimate, press release by Elliot Spitzer, which can be downloaded at the site http://www.oag.state.ny.us/press/2004/jan/jan06b_04.html, suggests that “less than 20%” of funds are subadvised.