DISCUSSION PAPER SERIES

No. 10465

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FINANCIAL ECONOMICS

Centre for Economic Policy Research

ISSN 0265-8003

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Discussion Paper No. 10465
March 2015
Submitted 19 February 2015

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SUBCONTRACTING IN INTERNATIONAL ASSET MANAGEMENT: NEW EVIDENCE ON MARKET INTEGRATION[†]

Abstract

We study the decisions of international asset managers to outsource portfolio management of their funds and we link these decisions to market integration. Using a structural model of selfselection, we endogenize the decision to outsource in a comprehensive sample of international mutual funds and identify both performance and non-performance related determinants of outsourcing. Outsourcing fund management generates net positive gains to fund families of around 8-17 bp per month despite the ex-post underperformance of outsource funds relative to inhouse funds. Then, we establish that the performance improvements from outsourcing are directly related to segmentation in the underlying asset markets.

JEL Classification: G15, G23, G30 and G32
Keywords: international markets, market integration, mutual funds and outsourcing

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[†] Some of the results in this draft were circulated in a previous version called "Happy Loser: Subcontracting in International Asset Management".

1 Introduction

A fundamental debate in international finance is whether markets are integrated or segmented and how investors account for such segmentation. If markets are segmented, investors face limitations in investing freely across assets and therefore *modify their portfolio* to account for segmentation. Alternatively, investors may react to segmentation by *modifying the investment process itself* – i.e., they may choose to sub-delegate the investment to other asset managers who are better positioned to carry out the task of managing the portfolio.

We focus on the professional asset management industry and make this intuition more precise by asking the following question: is there a link between the process that major fund families choose to manage their funds – directly or sub-delegating them – and the degree of segmentation in the assets in which the funds invest? More specifically, consider, say, a US fund family that offers funds focused on Asian stocks. This family may choose to directly manage such funds in its own asset management structure (managing them as "inhouse funds") or it may outsource their management to some unaffiliated asset manager, say in Asia.

In this paper, we address this issue. We hypothesize that outsourcing is a reflection of the underlying segmentation in asset markets. Fund families select to outsource those funds in which they have a competitive disadvantage and hire subadvisors that help them mitigate these disadvantages. While this form of self-selection (induced by market segmentation) may mean that outsourced funds perform worse than inhouse funds[1], families may optimally choose to outsource if it improves performance relative to the counterfactual comparison of directly managing the fund (i.e., keeping the fund inhouse). In other words, in the presence of segmentation, outsourcing is a means of achieving "the second best": the more segmented the

[1] This result has been established in the literature within the US by Chen et al. (2013) and by Chuprinin et al. (forthcoming) in the international context.

asset markets are, the less likely the families will be able to achieve the "first best solution", and the more they will have to resort to the second best.

In econometric terms, self-selection implies that the gap between the actual outcomes – i.e., the actual performance of inhouse versus outsourced funds – drastically differs from the gap between the actual and counterfactual expected outcome – i.e., the actual performance of an outsourced fund versus its counterfactual performance had it been kept inhouse. If this is the case, the difference between actual and counterfactual choices allows us to quantify the degree by which asset market segmentation affects investor choices.

To take on this ambitious task, we perform a detailed analysis of self-selection when mutual fund families decide on the management statuses of their funds, relying on the most comprehensive sample of international outsourcing relationships in the mutual fund industry over the period 2001 to 2010. This testing environment has two appealing features. First, outsourcing affects a significant number of funds. Over 20% of global mutual funds are managed in such subadvisory relationships. Second, by analyzing the characteristics of the fund families that chose to outsource and the management companies they select as subadvisors, we are not only able to observe the actual choices but are also able to infer the counterfactual alternatives. This allows us to precisely identify the dimensions along which fund families make choices.

We estimate an endogenous switching regression specification (Lee (1978)). This structural model postulates that the decision to outsource is driven by the difference in expected fund performances between the case when the fund is outsourced and the case when the fund is managed inhouse as well as by other, non-performance related determinants. We find that differences in expected fund performance are a strong determinant of the outsourcing choice. Families tend to outsource funds that trade in assets that are distant from their realm of expertise.

For example, families outsource to unaffiliated subadvisors located closer to the assets in which the funds invest in terms of both geographic and cultural distance (language). A one standard deviation increase in proximity between subadvisor and assets in terms of common language is associated with a 5.2%-age points higher probability that the fund is outsourced (t-statistic 2.43)[2] and to a 7.5 (12.3) bp per month higher 4-factor (8-factor) alpha for outsourced funds with a t-statistic of 1.88 (2.84). Likewise, families hire subadvisors that manage more assets in the specific investment style. A one standard deviation increase in the size of the subadvisor in the specific style is associated with a 5.9%-age points higher probability that the fund is outsourced (t-statistic 4.47) and with a 4.1 (6.4) bp per month higher 4-factor (8-factor) alpha for outsourced funds with a t-statistic of 2.23 (3.09). This indicates that outsourcing allows the family to deliver a higher performance compared to what it could have expected to deliver had it managed the fund inhouse.

In contrast, the degree of specialization of the family and its overall size (and therefore the resources it has available) are strong determinants of inhouse fund performance. A one standard deviation increase in the degree of specialization of the family in the style or the size of the family lowers the probability that the fund is outsourced by 6.7%-age (5.4%-age) points with a t-statistic of -4.90 (-3.24). This relates to, respectively, a 4.5 (4.8) bp per month higher 4-factor (8-factor) alpha and to 2.2 (3.1) bp per month higher 4-factor (8-factor) alpha for inhouse managed funds, all of which highly significant.

There are, however, other dimensions that drive the decision to outsource that are different from performance considerations. First, Chen et al. (2013) suggest that families outsource new funds when they lack the capacity to manage the funds themselves. We use their proposed instrument in our global sample and confirm that capacity constraints at the time of fund

[2] The unconditional mean to outsource a fund is about 20.5%.

inception are significantly related to the outsourcing choice. A one standard deviation increase in the (log of the) number of funds the family manages at the time of inception of the fund (controlling for the overall family size at inception) increases the probability that the new fund is outsourced by 2.5%-age points (t-statistic 1.78).

Second, the risk of expropriation can deter a fund family from hiring a foreign subadvisor because it exposes the family to political risk. Using a measure of expropriation risk from the law and finance literature, we indeed find that funds are less likely to be outsourced when the risk of expropriation in the country of the subadvisor is high. The marginal effect at the mean indicates that if the measure of expropriation risk increases by one standard deviation, the probability that a fund is outsourced falls by 3.9%-age points (t-statistic 2.78).

Third, the international distribution reach of the family influences the choice of cooperating with an unaffiliated subadvisor. In outsourcing relationships, portfolio management is typically carried out by the subadvisor while marketing and distribution is typically a domain of the fund family. In this context, sharing the benefits of a powerful distribution channel with a subadvisor is economically less interesting because it can help the subadvisor build its name with many investors. And indeed, funds are less likely to be outsourced when the distribution reach of the family is such that it is able to sell the funds to a broad international investor clientele (controlling for its size). A one standard deviation increase in the families' international distribution reach lowers the probability that the fund is outsourced by 4.5%-age points (t-statistic 3.73), suggesting that families with large international distribution reach are unwilling to share it with a potential future competitor.

Endogenizing the decision to outsource delivers unbiased and selectivity-free estimates of fund performance and allows us to directly compute the gains from outsourcing. The average

outsourced fund improves its risk-adjusted 4-factor (8-factor) performance by around 16.6 (8.0) bp per month in *compared to the counterfactual estimate* – i.e., compared to the performance fund families could have rationally expected to generate had they managed the fund inhouse instead. Equally, but perhaps less surprising, inhouse funds are optimally managed inhouse as they perform better (32.2 (58.8) bp per month in terms of 4-factor (8-factor) performance) compared to their counterfactual expected performance had they instead been outsourced.

In an additional experiment, we use our estimates of expected performance improvements from outsourcing to verify if fund families take previously outsourced funds back inhouse when the performance benefits from outsourcing deteriorate. We find that this is indeed the case. For a one standard deviation decrease in the expected monthly performance improvement from outsourcing, the probability that a previously outsourced fund is taken back inhouse increases by around 17%-age points over a 2-year horizon, significant at the 1% level.

In a final step, we directly relate the expected performance improvements from outsourcing to segmentation in the assets where the funds invest. Traditionally, segmentation has been measured by asset prices (e.g. stock price or market co-movement) or investor portfolio choice (usually via the difference between the predictions of an unconstrained and a constrained equilibrium). We consider some standard measures of market segmentation – e.g., absolute pricing errors, explanatory power of international factor models, the degree of foreign institutional ownership – and document that in investment styles in which the average performance improvements from outsourcing are higher, the underlying stocks display greater degrees of mispricing in terms of higher absolute pricing errors and lower explanatory power relative to various international factor models. These stocks also have lower levels of foreign institutional ownership. For example, a one standard deviation increase in the average monthly

expected gain (approximately 25 bp per month) from outsourcing that we measure for the funds is related to a 2.5 bp (8.8 bp) increase in the annualized absolute pricing error in the underlying stocks when measured against a 4-factor (8-factor) model, to a 0.07 (0.06) standard deviation reduction in explanatory power of a 4-factor (8-factor) model and a 0.17 (0.27) standard deviation reduction in foreign institutional ownership, all of which statistically and economically significant.

These findings make two main contributions. First, we resolve an apparent issue in the literature on mutual fund outsourcing. Two recent papers have established that outsourced funds underperform inhouse managed funds in the cross-section, a finding we reconfirm here. Chen et al. (2013) (CHJK hereafter) approach the issue from the perspective of the fund families that find it hard to extract performance from outsourcing relationships. Chuprinin et al. (forthcoming) (CMS hereafter) show that the subadvisors treat outsourced funds under their custody less favorably than the inhouse funds they manage in parallel. Both papers seem at odds with the notion that in this environment, all actors are sophisticated investors. In this paper, we fill a gap in the literature by showing that the ex post underperformance of outsourced funds does not detract from the benefits of outsourcing. In fact, one of our main results shows that the realized gains from outsourcing remain positive on average. More specifically, our first contribution is to endogenize the fund family's decision to outsource. Controlling for self-selection, we find that mutual fund outsourcing is instead *value increasing* for fund families and we quantify those value improvements. This finding also contributes to the literature on offshoring and outsourcing (e.g., Antras (2003, 2005), Antras and Helpman (2004), Grossman and Helpman (2002, 2005), Feenstra and Hanson (2005)) and, more specifically, to outsourcing in financial markets (Del Guercio and Reuter (2013)).

The second contribution is to use the setting of international outsourcing in the asset management industry as a testing ground to investigate market integration. We use the "revealed preferences" of fund families to quantify the degree of market segmentation in the assets in which they invest. Our results strongly suggest that the gains from outsourcing are directly related to the degree of segmentation in the underlying asset markets and we identify the relevant asset management characteristics along which fund families seek to mitigate their competitive disadvantages. As such we contribute to the literature on market integration (e.g., Harvey (1991), Bekaert and Harvey (1995, 1997, 2000), Henry (2002)) by providing a novel way of thinking about market integration using revealed preferences of fund families.

Our results also have important normative implications because they link market integration to the industrial organization of the global asset management industry, and, more specifically to the organizational choices asset managers make when they decide on the management statuses of their funds. Recent regulatory changes can drastically affect this process. For example, the new Financial Transaction Tax (FTT) regulation that will be applied in Europe is likely to have large implications for cross-country outsourcing as European firms will find themselves at a cost-disadvantage relative to non-European firms when they trade internationally. This could lead to more international outsourcing of mutual fund management for just tax-related reasons, even at the expense of improving fund performance. In fact, the FTT represents a form of expropriation by European governments and our results suggest that fund families will respond by outsourcing portfolio management.

The paper proceeds as follows. We describe the data, sample and main variables in section 2. We present our empirical results on the determinants of outsourcing in section 3, on the gains

from outsourcing in section 4. In section 5, we relate the gains from outsourcing to market integration. A conclusion follows.

2 Data

We now describe the data, the way we construct the main variables and provide some preliminary results on the link between performance and outsourcing. We begin by separating funds along their management status following CMS, recognizing the two main functions that need to be carried out when managing a mutual fund – marketing & distribution and portfolio management. For inhouse funds, both functions are carried out by the same or by affiliated entities which we label the "fund family". For outsourced funds, marketing & distribution is carried out by the fund family and portfolio management is delegated to an unaffiliated subadvisor which we label the "management company" or the "manager".

2.1 Data and sample

We draw our data from different sources. We obtain fund holdings from the FactSet Ownership database. The database allows us to identify the management company for a given fund as well as the ultimate parent company of the management company. We consider semi-annual portfolios for every fund by taking the last available portfolio report for every half year period (January to June or July to December). We focus on open-end, actively managed equity funds with total net assets (TNA) greater than 5 million U.S. dollars. Our sample spans from December 2000 to December 2010.

Monthly fund performance is obtained from the Morningstar Direct mutual fund database, section Global Open-End funds. We merge the databases via links that are provided by FactSet as well as a complementary string matching algorithm that compares fund names that we verify manually. To compute measures of historical fund performance, we require a history of at least

24 monthly return observations. We use the Morningstar variable "global category" as our major style metric. This categorizes fund styles by geography (e.g., U.S., Europe, Asia ex. Japan, etc.) as well as size (e.g., Large Cap versus Mid/Small Cap). Our main sample contains 26 different styles based on the global category classification.

2.2 Variable definitions

In order to identify the fund management status (inhouse or outsourced), we follow the procedure in CMS and exploit the different viewpoints adopted by the FactSet and the Morningstar Global databases. While FactSet reports the management company and the financial group that manages the portfolio of the fund, Morningstar Global reports the fund family for every fund. We follow the steps in CMS. First, for each fund we check whether the name of the management company in FactSet equals the name of the family in Morningstar. If so, we classify the fund as inhouse. If not, the fund is an outsourced candidate. Second, we use the entire organizational structure of the FactSet database to identify related entities with different names. In particular, since FactSet reports the pinnacle of the financial group that every management company is a part of, we check if the fund family corresponds to any of the associated subsidiaries that are connected to the ultimate parent of the management company in question. If we fund such an affiliation, we classify the fund as inhouse. Finally, for the remaining candidates, we perform a web search to determine whether the management company and the fund family are related. We browse the company websites, the websites of ultimate parents, and, if possible, the management company announcements or annual reports. If we cannot find any evidence that the two companies are related, we classify the fund as outsourced.

This classification allows us to determine the fund status at two points in time where we have downloads from both the FactSet and the Morningstar databases, namely December 2008 (or the

end of the fund life if the fund was terminated before 2008) and December 2010 (or the end of the fund life if the fund was terminated in between 2008 and 2010). To ensure the correct classification over time, for each fund we analyze historical individual manager data reported by Morningstar. Going back from 2008 and 2010 (or the last month of the fund life), we retain the 2008 and 2010 (latest) fund status as long as the same individual manager remains in charge of the fund or at least one manager from the 2008 and 2010 (latest) team if the fund was team-managed. Like CMS, we assume that the management status of the fund does not change as long as the individual manager or the management team stays constant. We set such status to "undefined" in all the periods preceding the latest manager change. For example, if fund X replaced its manager in July 2006 and retained its new manager until December 2008, we are able to confirm the management status of this fund for the period between July 2006 and December 2008. However, all earlier observations for this fund do not feature in our analysis. We repeat the same procedure for the period 2009 to 2010 using the classification that we establish as of December 2010 and the individual manager data for the years 2009 and 2010. Our major variable of interest is $Outsourced_{j,t}$ which equals 1 if fund j was managed by an external management company at the end of period t, 0 if it was managed inhouse, and 'missing' if the management status for that fund in that period cannot be established. The data appendix in CMS shows the accuracy of this procedure in comparison to other data sources that are only available for domestic US funds.

Next, we construct several measures of fund performance. $Grossreturn - rf_{j,t}$ is the monthly return of fund j before fees in excess of the risk-free rate that we obtain from Kenneth French's website. The funds gross-of-fees return in a given month is the TNA-weighted average of gross returns of the fund share classes. We correct for risk using standard factor corrections

applied to our international setting. We first construct international Fama-French-Carhart factors as follows. For every country in the Worldscope database, we download stock returns as well as the market and book value of equity of all firms, and construct country-level market, size, value, and momentum factors following the methodologies of Fama and French (1993) and Carhart (1997). Then, for every fund, we estimate two sets of factor models: style-specific factor models and international factor models. The style-specific factor model is a standard 4-factor model that includes a market, size, value and momentum factor where the factors are market-capitalization weighted averages over the country factors in which funds of the investment style typically invest. For example, the performance of funds in the style "Europe Equity Large Cap" is adjusted for risk exposure to European country factors and funds in the style "US Equity Large Cap" are adjusted, as in the domestic literature, for risk exposure to the traditional US Fama-French-Carhart factors.

To complement the approach, we also construct 4 "Rest of the World" factors for every investment style that capture the residual market, size, value and momentum factors and adjust fund performance using 8 factors in total – the 4 style-specific (i.e., "local") factors and the 4 residual (i.e., "global") factors. While Griffin (2002) shows that local Fama-French factors best explain international stock returns and Fama and French (2012) draw similar conclusions, new evidence presented in Hou, Karolyi and Kho (2011) and Karolyi and Wu (2012) suggests that international factors improve international asset pricing tests and may therefore be important for international mutual fund attribution as well. Furthermore, while our 4-factor alphas are consistent with the standard approach used in the domestic mutual fund literature, our 8-factor alphas are more general in the sense that they accommodate both segmented and integrated asset

pricing. Since the debate on what drives global stock returns is not settled, we remain agnostic and entertain both possibilities of integrated or segmented asset pricing in our analysis.[3]

For each fund-period, we calculate the fund four- (eight-) factor alpha as the difference between the fund actual gross return net of the risk-free rate over the period and the excess return predicted by the four- (eight-) factor model estimated over the past 36-month return history (at least 24 non-missing monthly observations are required).[4]

For our analysis of the determinants of outsourcing, we postulate that the decision is driven on the one hand by the performance difference the family expects when outsourcing the fund versus managing it inhouse and, on the other hand, by other, non-performance related determinants (more details on the structural model below).

For the non-performance related determinants that influence the decision to outsource directly – i.e., not via expected performances – we entertain 3 relevant dimensions.

The first dimension borrows from Chen et al. (2013) and is based on the intuition that having many funds to manage puts some capacity constraints on the family and induces it to subcontract out. Indeed, as Chen et al. (2013) suggest and show, the decision to outsource is in part driven by capacity constraints of the fund family at the time of fund creation. This is proxied by the number of funds that the family has when the fund is launched. If the fund family manages a lot of funds at the time a new fund is created (controlling for the size of the family at that time), it is more likely to outsource that new fund because it has no spare capacity to run an additional fund. We follow this conjecture and define the variable $Family\ Funds\ at\ Inception_j$ as the log of the number funds the family runs at the inception date of the fund in question. To control for the

[3] CMS use an additional factor correction that adjusts for liquidity risk. We implement the same approach that is based on the procedure in Liang and Wei (2012) and the liquidity concepts of Amihud (2002), Pastor and Stambaugh (2003) or Sadka (2006). We find that our results are robust to this additional specification. In the interest of brevity, we do not report these estimates, they are available on request.

[4] We treat as 'missing' fund performance observations in Morningstar that fall outside the bottom and top 0.5 percentile.

overall size of the family (and therefore its overall capacity), we demean the variable $Family\ Funds\ at\ Inception_j$ for every family size decile where we measure family size as the total TNA of the family at the time of the fund inception.[5]

The second dimension is related to the political risk of the country of the manager. More specifically, we focus on the risk of expropriation in the country of the subadvisor. The intuition is that the family will be less willing to start a relationship with a manager who can be expropriated by the government. Indeed, a change in control of the subadvisor will affect its operative ability and therefore represents a source of business risk. This will affect the assets of the family if and when the expropriation happens, but before that should not directly affect performance. It therefore affects the choice of subcontracting directly. Moreover, we consider the risk of the country in which the managers are located as opposed to the risk of the countries in which the fund invests (e.g., if the management company is located in France but the fund invests in Asia, we consider the risk of expropriation in France, not in Asia). This further removes any direct link to performance. We capture this idea using the variable $Expropriation\ Risk_c$ that proxies for the risk of expropriation in the country c where we observe the fund's portfolio to be ultimately managed (i.e., the country of residence of the management company). The variable is obtained from Andrei Shleifer's website and was established in La Porta, Lopez-de-Silanes and Shleifer (1998).

The third dimension is linked to the distribution capabilities of the family. We speculate that distribution capability can influence the outsourcing decision in different ways.

[5] Some funds in our sample were created before the start of our sample. In those cases, we define the variable as per the beginning of our sample. Also, Chen et al. (2013) include dummies to control for the size category the family belongs to. To avoid the over-parameterization of the specification, we demean the instrument by subtracting the average value across all the families belonging to the size decile at the time of inception. In other words, instead of explicitly estimating the size dummies, we demean the instrument for every size decile.

First, families with strong distribution channels could be reluctant to team up with subadvisors with limited distribution reach because they would not want to share their competitive advantage with a firm that could ultimately become their competitor. This would predict a *negative* relationship between the reach of the families' distribution channels and the presence of outsourced funds under its umbrella.

Alternatively, a management company with a particular asset management expertise but limited distribution capabilities might seek to expand its assets under management by approaching a family with commensurate distribution capabilities. This would lead to a *positive* relationship between the reach of the families' distribution channels and the presence of outsourced funds under its umbrella. Given the prominent role of the US as a market, we use two variables that proxy for the distribution-related driver of outsourcing: $Sold\ to\ US_{f,s,t}$ and $Sold\ to\ International_{f,s,t}$. These proxies use information on the countries in which the funds of a family in a specific investment style are "available for sale" from Morningstar. $Sold\ to\ US_{f,s,t}$ is a dummy that equals 1 if the funds of the family *f* in the investment style *s* are available for sale in the US and 0 otherwise, $Sold\ to\ International_{f,s,t}$ is the fraction of the rest of the world in which the funds of family *f* in the investment style *s* are available for sale. The fraction is computed using market capitalization weights of the country stock markets over global market capitalization. It captures the international distribution strategy of fund families and measures the fraction of non-US countries in which the funds of the family in the style are available for sale.

As before, we argue that the impact of distribution channels on outsourcing is direct and not through performance. Indeed, the distribution capabilities may be related to historical reasons such as the age of the group, the geographical location and physical presence on the territory, the

historical reputation and the link with specific groups such as insurance companies or pension funds etc. All these reasons contribute to make the distribution channel effective, but do not directly affect the performance of the asset manager. Furthermore, we control for the overall size of the family which we allow to impact fund performance (see below).

Next, we allow the decision to outsource to be driven by expected differences in returns between the case when the fund is outsourced and the case when the fund is managed inhouse. We allow fund performance to depend on a number of variables. $Manager\ Style\ Size_{j,s,t}$ is the log of 1 plus the total TNA of management company of fund j in the investment style s of the fund at time t (excluding fund j). This variable is a first proxy for the capability of a given firm in the investment objective in question. $Common\ Language_{m,s,t}$ is the fraction of countries in the investment style s of the fund that share an official language with the country of residence of management company m. This variable approximates cultural proximity in our international environment. $KM\ Distance_{m,s,t}$ is constructed similarly but measures the average distance in thousands of kilometers between the country of residence of management company m and the investment style s of the fund. This variable is computed using GPS coordinates between country capitals and measures geographical distance. $Family\ Style\ Specialization_{f,s,t}$ is the fraction of the total TNA of fund family f in style s – i.e., $Family\ Style\ Specialization_{f,s,t} = \frac{Family\ Style\ TNA_{f,s,t}}{Family\ TNA_{f,t}}$. It measures the degree to which the family is specialized in a given investment style. $Family\ Size_{j,t}$ is the log of 1 plus the total family TNA (excluding fund j) and captures the overall size of the family of fund j. Finally, we use a proxy of bargaining power between the family and the management company. This variable ($Fund\ Dependence_{j,m,t}$) is the ratio of fund TNA over total management company TNA and measures the importance of a given fund in terms of assets under management to the management company.

In addition, we define several standard fund-level control variables that the literature on fund performance has established as follows. $Fund\ Size_{j,t}$ is the log of fund *j*'s equity TNA (in millions) at the end of period *t*; $Age_{j,t}$ is the time (in years) that elapsed from the inception of fund j to the end of period *t*; $Expenses_{j,t}$ is the annual expense ratio for fund j in a year that contains period *t*; $Pastreturn_{j,t}$ is the cumulative return of fund j over the period of 12 months preceding period *t*; $Volatility_{j,t}$ is the annualized standard deviation of fund *j*'s monthly gross returns estimated over the period of 12 months preceding period *t*; $Shareclasses_{j,t}$ is the number of share-classes of fund j as of period *t*; $Turnover_{j,t}$ is computed from semi-annual holdings as the change in the position of every stock multiplied by the beginning of the period price and divided by fund TNA and $Load\ Fees_j$ is a dummy that equals 1 if fund j has either front- or deferred-load fees and 0 otherwise.

2.3 Descriptive statistics

We start by providing some descriptive statistics of our sample in table 1. We assemble what is probably the most comprehensive sample of international mutual funds with their management status to date. As of December 2010, our sample contains 6,238 mutual funds, 1,130 of which are outsourced and 5,108 are managed inhouse (Table 1, panel A). Over the sample period, the number of funds has grown by a factor of 6 which mirrors the strong growth of the global investment management industry. The fraction of outsourced funds has been stable between 21%-22% of the sample with a slight decline in outsourcing activity in the last two sample years. In terms of composition, our sample is comparable to the domestic samples used in CHJK, Del

Guercio and Reuter (2013) and the international sample in CMS[6]. Cashman and Deli (2009) and Duong (2012) present samples where the fraction of outsourced funds is slightly lower.

In panel B of table 1, we report fund-level summary statistics separating funds by their management status. The average inhouse fund in our total sample has a TNA of 944.6 million USD but the average outsourced fund is smaller (649.9 million USD). The average outsourced fund is also about 2 years younger (11.0 years) than the average inhouse fund (13.2 years). This is perhaps intuitive given that fund families are unlikely to outsource their largest and most well established funds but instead are likely to outsource newer, potentially non-core products. While inhouse and outsourced funds do not differ markedly on expense ratios (1.54% p.a. for inhouse, 1.60% p.a. for outsourced funds on average), outsourced funds have lower performance on average as illustrated by both raw and risk-adjusted performance, all in accordance with CHJK and CMS.

In panel C of table 1, we explore at a descriptive level the new variables that may drive mutual fund outsourcing via expected performances. A strong advantage of our empirical set up is that we simultaneously observe actual and counterfactual characteristics of the funds. For example, for the variable *KM Distance* we observe both the distance of the family to the investment style and the chosen management company. For inhouse funds, these two tend to coincide because the two entities are affiliated[7] but for outsourced funds, they generally differ. Indeed, we find that when families outsource, they chose subadvisors that are significantly "closer" to the investments of the fund. The average (median) outsourced funds would have been 2,380 km (1,020 km) away from its expected investments had it been managed inhouse.

[6] For the period where our sample overlaps with the sample in CMS, we obtain very comparable descriptive statistics to theirs. We attribute the differences between our sample and theirs to the increased number of funds we are able to include in the analysis here.

[7] For inhouse funds, we only report the characteristic of the affiliated management company that manages the fund.

However, we observe the average (median) outsourced fund to be located 2,000 km (620 km) away from its expected investments – an improvement of 15.8% (38.9%).

A similar pattern emerges for all the other characteristics we consider. Indeed, families outsource funds in investment styles in which they are less specialized (or have less capabilities as measured by raw TNA) and choose subadvisors with higher degrees of specialization (an average 46.7% improvement) or more capabilities (a 13.6% average improvement in terms of raw TNA). Families also choose advisors that are closer in terms of cultural proximity (a 6.1% improvement in $Common\ Language$) (row 3).

2.4 Preliminary results: Underperformance of outsourced funds in the cross-section

The literature on mutual fund outsourcing (e.g., Duong (2012), CHJK and CMS) has established that outsourced funds underperform inhouse managed funds in the cross-section. As a starting point, we verify that this result holds in our sample. Table 2 presents standard panel regressions of fund performance on the $Outsourced$ dummy, control variables and fixed effects. The previously documented underperformance of outsourced funds is robustly estimated between 4-6 bp per month for different fund performance measures (raw or adjusted performance, different factor models, before and after fee returns).

This already established result raises a question. Given that fund families are professional asset management firms, why do we see differential performance between inhouse and outsourced funds in equilibrium? This is the focus of our paper. As we argued, the solution to this intriguing puzzle lies in the choice of the subadvisor: families choose to outsource if the benefits of doing so are higher than the costs. We therefore need to properly model the outsourcing decision. This is the next topic.

3 Determinants of outsourcing

In this section we provide the first main result of the paper, directly addressing the question of what drives outsourcing. We provide a novel modeling framework and we use it to investigate the determinants of outsourcing.

3.1 Outsourcing and self-selection: The framework

We start by briefly describing the structural model we use to model the outsourcing choice. We endogenize the fund family's choice of outsourcing using an endogenous switching regression model. This is a structural model that is a generalized form of a Heckman model. The model was originally developed in the field of Labor Economics by Lee (1978) to study the impact of unionism on wages. It was applied in the finance literature by Dunbar (1995), textbook discussions of the model can be found in Cameron and Trivedi (2005) and Li and Prabhala (2007). The model is articulated in three simultaneous equations:

$$\begin{aligned} Outsourced_{j,t} &= \beta\left(ER_{j,t}^{Outsourced} - ER_{j,t}^{Inhouse}\right) + \gamma Z_{j,t} + e_{j,t} \\ ER_{j,t}^{Outsourced} &= \delta^{O} X_{j,t}^{O} + \epsilon_{j,t}^{O} \\ ER_{j,t}^{Inhouse} &= \delta^{I} X_{j,t}^{I} + \epsilon_{j,t}^{I}, \end{aligned} \tag{1}$$

where $ER_{j,t}$ stands for expected performance of fund *j* in period *t*.

The model postulates that the choice of outsourcing is determined by the difference in expected performances between the case in which the fund is outsourced and the case in which the fund is managed inhouse as well as other, non-performance related determinants of outsourcing that are captured in the vector $Z_{j,t}$. The first equation in (1) illustrates these considerations; we call it the "Selection Equation". The second and third equations in (1) are the "Performance Equations" that model the expected performances for inhouse and outsourced

funds separately as a function of the variables in the two vectors $X_{j,t}^{O}$ and $X_{j,t}^{I}$ (that, in principle, may contain different variables).

Following Lee (1978), unbiased estimates can be obtained by first substituting the performance equations in the selection equation and estimating the latter in reduced form as a probit model. From these estimates, one obtains the selectivity variables (i.e., the Inverse Mills Ratios) that are subsequently added as additional regressors to the second stage performance equations. The inverse mills ratios are defined as $\lambda_{j,t}^{O} = -\frac{f(\widehat{\Psi}_{j,t})}{F(\widehat{\Psi}_{j,t})}$ for the outsourcing performance equation and $\lambda_{j,t}^{I} = \frac{f(\widehat{\Psi}_{j,t})}{1-F(\widehat{\Psi}_{j,t})}$ for the inhouse performance equation where $f()$ ($F()$) is the marginal (cumulative) standard normal distribution function and $\widehat{\Psi}_{j,t}$ is the prediction from the first stage probit regression. Once unbiased estimates of δ^{O} and δ^{I} are obtained via OLS regressions, expected performance improvements can be computed directly and the selection equation can be estimated in structural form. This closes the model.

This structural estimation allows us to directly quantify the gains the family derives from outsourcing. These are derived by the comparison of the actual returns to the counterfactual expected performances – i.e., the performance the family would have had, had it managed the fund directly as an inhouse fund instead. Formally, we compute the gain from outsourcing as:

$$R_{j,t}^{O} - E\left(R_{j,t}^{I} \middle| Outsourced_{j,t} = 1\right) = R_{j,t}^{O} - \delta^{I} \times X_{j,t}^{O} - \pi^{I}\lambda_{j,t}^{O}, \qquad (2)$$

where $R_{j,t}^{O}$ is the realized return of outsourced fund j in month t and $E\left(R_{j,t}^{I} \middle| Outsourced_{j,t} = 1\right)$ is the counterfactual expected return of fund j had it been managed inhouse conditional on observing it as an outsourced fund and where δ^{I} includes the sensitivities of fund performance of the inhouse performance equation and π^{I} is the alternative sensitivity to the inverse mills ratio that would have been applied had the fund been managed inhouse.

It is important to notice that these gains may, and indeed will be, very different from the ones one would infer by simply comparing the observed returns of outsourced funds to the observed returns of inhouse funds.

More specifically, these gains can come from two sources. First, the coefficients δ^O and δ^I are allowed to differ across the two regimes – i.e., inhouse and outsourced. Intuitively, the model allows for the possibility that there are different "return generating technologies" at work for inhouse and outsourced funds. Changing the management status of the fund can be interpreted as applying a different "return generating technology" to the fund. Second, the inverse mills ratios capture the unobservable characteristics of self-selection (e.g., "private information") that are associated with the choice of outsourcing. This can generate a second wedge between inhouse and outsourced managed funds. In other words, the gains from outsourcing are composed of two drivers: differences in the return-generating technology and other unobservable factors captured by the selectivity variables.

Finally, the model can, in principle, be estimated without the vector $Z_{j,t}$ since the first-stage probit regression is a non-linear model. However, the estimates gain robustness if additional identifying restrictions that govern the choice via a channel that is different from expected performances are added to the selection equation. As indicated above, we test three such channels – capacity constraints, risk of expropriation and marketing & distribution strategies– and give further details below.

3.2 Outsourcing and self-selection: The main results

We present the first main result of the paper – i.e., the estimates of the endogenous switching regressions – in table 3. We present two versions of the model that use different measures of fund performances in the estimation. Columns 2 and 3 use the monthly 4-factor alpha, columns 4

and 5 use the monthly 8-factor alpha in the second stage performance equations. Further robustness tests on the results in this section are provided below.

The selection equation for both models in reduced form is identical and presented in column 1. We report the marginal effects. The non-performance related drivers for outsourcing are strongly related to the outsourcing choice. The risk of expropriation lowers the probability that a fund is outsourced. The variable $Expropriation\ Risk$ ranges from 1 to 10 where 10 indicates high risk of expropriation. The marginal effect at the mean indicates that if expropriation risk increases by 1 standard deviation, the probability that a fund is outsourced falls by 3.9%-age points (t-statistic 2.78). This is in line with our assumption that, in their optimal choice of management status, families take into account the political risk when deciding on giving the fund to an unaffiliated subadvisor.

When it comes to distribution capabilities, we find that the international reach of the distribution channels of the family matters for outsourcing decisions. When the funds of the family are available for sale in many international countries, they are less likely to be outsourced. A one standard deviation increase in the variable $Sold\ to\ International$ lowers the probability that the fund is outsourced by 4.5%-age points (t-statistic 3.73). This is in line with our hypothesis that families with international distribution reach are unwilling to share it with a potential competitor, as it would give access to distribution channels which might help the management company grow and build a reputation which could be detrimental to the family in the future.

The result on the distribution strategy allows us to rule out the alternative possibility that management companies with management skills but lacking distribution instead approach fund families to create mutually beneficial partnerships. This situation should produce a positive

correlation between the probability that a fund is outsourced and the distribution capabilities of the family. The fact that we observe the reverse helps to rule out this potential explanation. This confirms our assumption that the family makes the choice of outsourcing.

Finally, we confirm the result of Chen et al. (2013). The variable *Family Funds at Inception* is significantly related to the probability that the fund is outsourced. A one standard deviation increase in the variable increases the probability that the fund is outsourced by about 2.5%-age points, underlining that capacity considerations at the time of fund creation influence the family's decision to outsource.

The remaining coefficients in column 1 are the reduced form coefficients on the drivers of fund performance. Their links to the probability of outsourcing are intuitive. Like in the descriptive statistics, we find a strong positive correlation between cultural proximity and the probability of outsourcing. The probability of outsourcing a fund is positively related to the proximity between the management company and the assets ($Common\ Language$). A one standard deviation increase in $Common\ Language$ is associated with a 5.2%-age points higher probability that the fund is outsourced (t-statistic 2.43). Similarly, the probability of outsourcing a fund is positively related to the size of the manager in the specific style (*Manager Style Size*). A one standard deviation increase in *Manager Style Size* is associated with a 5.9%-age points higher probability that the fund is outsourced (t-statistic 4.47).

Likewise, the higher the degree of specialization of the family and the larger the family size, the lower the probability that it outsources the fund. A one standard deviation increase in $Family\ Style\ Specialization$ ($Family\ Size$) lowers the probability that the fund is outsourced by 6.7%-age (5.4%-age) points with a t-statistic of -4.90 (-3.24).

In contrast, the reliance of the subadvisor on the fund (*Fund Dependence*) increases the probability that the fund is outsourced. A one standard deviation increase in *Fund Dependence* increases the probability that the fund is outsourced by 7.1%-age points with a t-statistic of 7.05, consistent with the idea that families choose subadvisors that are dependent on the business relationship with the family and whose incentives may therefore be better aligned.

From the other fund control variables, fund age and fund size are negatively related to the outsourcing status. A one standard deviation increase in $Fund\ Size$ (Age) decreases the probability that the fund is outsourced by 1.6%-age (3.2%-age) points with a t-statistic of -1.54 (-3.87). This is consistent with the intuition that older and bigger funds are likely to play strategic roles for the family, such as being a cash cow or a flagship fund with an important marketing role. In both cases, the incentives to outsource are lower.

Finally, it is interesting to notice the different role played by fees. While a high expense ratio increases the probability to outsource, a high level of load fees reduces it (with marginal significance only). A one standard deviation increase in $Expense\ Ratio$ ($Load\ Fees$) increases (decreases) the probability that the fund is outsourced by 2.1%-age (2.7%-age) points with a t-statistic of 2.27 (-1.73). These results may capture the different incentives the family has in providing performance to investors. Funds with high expenses need to deliver high performance to retain investors. Lack of expertise on part of the family may therefore require outsourcing such high fee funds to a more specialized subadvisor and sharing them. Load fees, in contrast, discourage rebalancing and may therefore indicate that the investors in the fund are less performance-sensitive and with long investment horizons. This lowers the incentives to generate performance and to outsource in case the family lacks investment expertise.

The remaining columns of table 3 report the performance equations for both inhouse and outsourced funds separately (the last two equations of (1)). These columns have been augmented with the inverse mills ratios that were extracted from the estimates of column 1. They are reported at the bottom of the table. The significance of the inverse mills ratios points to significant self-selection in the data, in particular in the sub-sample of outsourced funds. Indeed, the truncation effects – i.e., the coefficient on the mills ratio multiplied by the mills ratios themselves, indicated at the bottom of table 3 – are all positive. This means that ignoring self-selection in the data would lead to an *underestimation* of performance for *both* outsourced and inhouse funds. In other words, a positive truncation effect is induced by the selection of management status – i.e., inhouse or outsourced – that generates higher performance compared to the average fund with the same characteristics. We will quantify the total gains resulting from those estimates in table 4 below.

Before that, we note that there are interesting differences in the coefficient estimates of the other drivers of fund performance. We start with the performance of the outsourced funds (columns 2 and 4 of table 3). We note that the ability of the subadvisor to generate performance is positively related to both the cultural proximity between the management company and the assets ($Common\ Language$) and the size of the manager in the specific style (*Manager Style Size*). A one standard deviation increase in $Common\ Language$ is associated with a 7.5 (12.3) bp per month higher 4-factor (8-factor) alpha for outsourced funds with a t-statistic of 1.88 (2.84). For *Manager Style Size* the same effect amounts to 4.1 (6.4) bp per month (t-statistic 2.23 and 3.09 respectively). This is as expected: better ability and proximity of the subadvisor is related to better performance. Also, the effect of $Fund\ Dependence$ is positive for outsourced funds, though only significant when performance is measured by 8-factor alpha. A one standard

deviation increase in $Fund\ Dependence$ is associated with a 6.7 bp per month increase in outsourced fund performance consistent with the idea that when the management company assets under management depend on a given outsourced fund, the incentives to generate performance are higher.

In the case of the inhouse funds (columns 3 and 5), we find that the ability of the family to generate performance is positively related to the degree of specialization of the family and its size. A one standard deviation increase in $Family\ Style\ Specialization$ is related to a 4.5 (2.2) bp per month higher 4-factor (8-factor) alpha for inhouse funds with a t-statistic of 4.26 (2.01). The similar figure for $Family\ Size$ is 4.8 (3.1) with a t-statistic of 3.94 (2.40). This is as expected as family specialization and ability to draw on many resources (size) should directly impact performance in a positive way.

Finally, we note the negative relation between $Common\ Language$ and performance of inhouse funds. This is in contrast to what we found for the case the fund is outsourced. While the negative coefficient in column 3 is puzzling, we note that it does not appear robust (column 5).

If we consider the remaining fund controls, we find some differences across the two fund regimes. $Fund\ Size$ has a negative effect on both inhouse and outsourced fund performance consistent with the literature (e.g., Chen et al. (2004)), for outsourced funds, this effect is somewhat stronger. Likewise, the negative effect of $Pastreturn$ does not seem to differ greatly across inhouse and outsourced funds. The effect of Age is only positively significant for inhouse funds which might stem from the fact that there is less variation in fund age among outsourced funds. One interesting difference is the effect of $Load\ Fees$ – they have a significant negative relation only on the performance of outsourced funds confirming the idea that when funds with

performance insensitive investors are outsourced, there is little incentive for the family to monitor and / or for the subadvisor to exert effort.

Overall, this section has established some key insights. The choice of outsourcing is driven both by performance and non-performance related characteristics, a point we will further verify below. The model estimates of self-selection are consistent with fund families optimally choosing the management statuses of their funds. The flexibility of the endogenous switching regression detects significant differences in the performance-relevant characteristics of outsourced versus inhouse funds consistent with the drivers that determine the choice of outsourcing in the first place.

3.3 Robustness tests

We perform a series of robustness tests on our main specification in table 3. They are reported in table 4 for the specification where fund performance is measured using the 8-factor alpha. Similar tables where the 4-factor alpha is used are available on request.

Specifically, we consider different geographical subsamples. In columns 1-3 of Panel A, we exclude all funds in the domestic US Equity styles. The US is the dominant market in our sample and we want to make sure that our results are not predominantly driven by this one market but derive sufficient power from the international dimension of the data. We find that this is indeed the case. In columns 4-6 of Panel A, we exclude all funds that invest in European Equity. Given that these European Equity funds are the second largest block of funds and the biggest block of international funds, we want to assess whether our results depend on them. Also in this case, the results hold. Then, in Panel B, we exclude funds that invest in Global Equity (columns (1)-(3)) and Emerging Markets and Asia Pacific Equity (columns (4)-(6)), again with no major effect on our results.

In unreported tests, we perform further tests on the specification of table 3. For example, we use a global 4-factor model to measure mutual fund performance where the performance of every fund is corrected with the same global market, size, value and momentum factors. As indicated in the data section, we also use a 5-factor model that corrects for liquidity risk and find that the results hold. In addition, we allow outsourcing and fund performance to depend on a measure of "horizontal" governance between private contracting institutions. Our instrument to determine outsourcing (directly and not via fund performance) is the risk of expropriation in the country where the fund is managed. In the sense of Acemoglu and Johnson (2005), this is a measure of "vertical" governance that emphasizes the role of property rights (i.e., the relationship between the government and private parties). However, governance between private contracting institutions (i.e., between private parties) might influence outsourcing decisions. We use a variable from the World Bank's World Governance Indices that measures the number of procedures necessary to enforce a commercial debt contract. This is a measure of private contract enforcement. We find that our main results hold in this specification and that the impact of this variable in the first-stage selection equation is insignificant. In the interest of brevity, we do not report those results. Finally, we ensure that the coefficients on the different size-related variables in the regressions are robust to the omission of individual variables and thus not driven by multi-colinearity.

4 Gains from outsourcing

We are now able to properly quantify the gains from outsourcing. We first provide the main analysis and then consider an additional experiment in which we analyze the decision of families to switch the management status of their funds from outsourced to inhouse or vice versa.

4.1 Quantifying the gains from outsourcing

The estimates of the endogenous switching regressions not only confirm self-selection consistent with performance maximization on part of the families, they also allow for an exact quantification of the gains from outsourcing. Arguably, it is these gains that drive the decision to outsource rather than the ex-post underperformance of outsourced funds in the cross-section. However, quantifying them has always been a formidable task. Here, we can achieve this goal.

We compute the realized gains as stated in equation (2) for outsourced funds. For inhouse funds, these gains are defined correspondingly. The counterfactual returns are computed by applying the coefficients of the alternative management regime to the characteristics of the funds, taking into account self-selection (i.e., the inverse mills ratios).

We present the quantification of the monthly realized gains from outsourcing in table 5. Column 1 focuses on outsourced funds, while column 2 focuses on inhouse funds. In both cases, these gains can be interpreted as the realized improvement over the alternative choice of management status.

We see that both the choice to outsource and the choice to keep in house provide positive gains on average. Critically, the realized returns of outsourced funds, despite being lower than the realized returns of inhouse funds, are higher than the alternative – i.e., the expected counterfactual return estimates of managing an outsourced fund inhouse. The gain is 16.6 bp per month for the 4-factor alpha and 8.0 bp per month for the 8-factor alpha specification. On average, this corresponds to 12.3 bp per month for the outsourced funds. In other words, had the family chosen to manage the fund inhouse instead of outsourcing it, the fund would have had lower performance. This is significant at the 1% level and provides a direct justification of why

fund families outsource despite the apparent underperformance of outsourced funds. It implies that outsourcing represents a net improvement over the alternative for the fund family.

Similarly, in the case of inhouse funds, the realized benefits are higher than the counterfactual return estimates. The gain is 32.2 bp per month for the 4-factor alpha and 58.8 bp per month for the 8-factor alpha specification. On average, this corresponds to 45.5 bp per month for the inhouse funds. In other words, had the family chosen to outsource the fund instead of managing it inhouse, the fund would have had lower performance. Again, this is significant at the 1% level.

In Panel B, we present the gains for the subsamples described in the previous Table 4. When we split the sample geographically by investment focus, we note two interesting facts. First, we find that the gains from outsourcing are positive in all cases, regardless of which group of funds we drop from the sample. Second, for outsourced funds, we find that the gains from outsourcing are higher on average when we drop those styles from the market that seem *a priori* most integrated – i.e., when we drop domestic US Equity funds and Global Equity funds in which the US dominates. In this case, the realized gains from outsourcing are higher in the remaining sample, consistent with our postulated link between outsourcing and integration. We will investigate this idea in greater detail below.

4.2 Structural form estimates of the selection equation

To this point, we have only presented the selection equation in reduced form (table 3 column 1). Having obtained unbiased estimates of the performance equation, we can close the model and estimate the selection equation in structural form, using the estimates of expected return improvements for outsourced versus inhouse management status for every fund. This is a useful consistency check for our conjecture that the decision to outsource is driven by both performance and non-performance related considerations.

Table 6 presents the results. In panel A, we re-estimate column 1 of table 3 in structural form. That is, we include in the estimation the expected return improvement the family expects to achieve should it outsourced the fund. This part of the gains from outsourcing does not condition on the observed choice of management status – i.e., it does not take into account the part of the gain attributable to self-selection, and is simply computed as $X_{j,t} \times (\delta^O - \delta^I)$.[8]

Panel A has two messages. First, in line with our working hypothesis, the expected return improvement from outsourcing is a strong determinant of the outsourcing choice, robustly in both specifications. For every 1%-age point increase in the expected improvement, the probability that the fund is outsourced increases by 11.7%-age points (18.1%-age points) when fund performance is measured by the 4-factor (8-factor) alpha, significant at the 1% level. Second, the non-performance related determinants of outsourcing largely retain their statistical and economic significance in predicting the management status of the funds. This confirms the robustness of the non-performance related determinants of outsourcing.

4.3 Outsourcing switches

Next, we go one step further and ask if families change the management status of their fund when the expected performance from outsourcing improves or deteriorates. For example, is it the case that fund families take a previously outsourced fund inhouse if the expected return improvements from outsourcing are low? Or alternatively, do fund families outsource a previously inhouse managed fund when the expected return improvements are high?

In our sample, as discussed in the data section, we can confirm the outsourcing status at two points in time – in December of 2008 and 2010. Hence, we are able to observe some switches in the management statuses of the funds. If we focus on inhouse funds, we find that there are very

[8] In this case, we use the unbiased estimates of δ^O and δ^I that we have obtained from our two-step estimation.

few switches – i.e., the funds that were classified as inhouse in 2008 are generally classified as inhouse in 2010. However, in the case of outsourced funds, we do observe a few, though not many, switches. In total, we observe that 254 funds that were outsourced in 2008 were subsequently classified as inhouse in 2010.

We therefore set out to determine why the families have chosen to end their subadvisory relationships drawing on our estimates from the endogenous switching regressions. We re-estimate the selection equation but change the dependent variable. For funds that were outsourced in 2008, we define $Switch\ to\ Inhouse$ as a dummy that equals 1 if the fund has become an inhouse fund in 2010 and 0 otherwise. For funds that were inhouse managed in 2008, we define $Switch\ to\ Outsourced$ as a dummy that equals 1 if the fund has become an outsourced fund in 2010 and 0 otherwise. We then estimate probit regressions for those two cross-sections separately where we use as explanatory variables the average expected return improvements over the year of 2008 for those funds as well as the expropriation risk and distribution channel variables for 2008.

Panel B of table 6 present the results. For funds that were outsourced in 2008, we find strong evidence that low expected return improvements during 2008 influence the decision to take the fund inhouse by 2010. The estimates in column 2 (4) indicate that a one standard deviation reduction in average monthly expected return improvement in terms of 4-factor (8-factor) alpha leads to a 17.0%-age points (17.8%-age points) higher chance that the fund is taken inhouse by 2010, both significant at 1%.

If we focus on the other variables, we find that funds that were outsourced to managers located in countries with higher risk of expropriation (higher values of $Lag\ Exporpriation\ Risk$) are more likely to be taken back inhouse. Distribution channel

consideration do not seem to play a major role in the switching decision, the variables are either not significant or the economic significance is negligible ($Lag\ Sold\ to\ US$).

Interestingly, capacity constraints, as postulated by Chen et al. (2013), at the time of inception seem to have a strong impact on the management status of the fund even many years after the setup of the fund. A one standard deviation increase in the variable *Lag Family Funds at Inception* lowers the probability that a previously outsourced fund is taken back inhouse by about 8.9%-age points to 9.3%-age points, dependent on the specification, significant at the 1% level.

In contrast, for the funds that were classified as inhouse in 2008, we find no evidence that high expected return improvements from outsourcing would trigger a change in the management status. In the interest of brevity, we do not report those results, they are available on request. However, we do not want to over-interpret these regressions since we observe a very low number of switches to begin with (only 105 cases) which might lead to unstable estimates in the probit regressions.

5 Gains from outsourcing and market integration

We can now explicitly link the gains from outsourcing to the degree of integration in the underlying asset markets. In perfectly integrated markets with efficient pricing, there should be no room for all the considerations we have entertained to this point. In integrated markets, there is no need for "local skills" or investment specific expertise that helps in identifying the best investments. Yet, the results we document here point to the contrary. This induces us to ask whether there is a link between the gains from outsourcing and capital market integration. We expect that, the more segmented the underlying asset markets, the larger the gains from outsourcing should be.

To test this hypothesis, we draw on the international asset pricing literature (e.g., Griffin (2002), Fama and French (2012), Hou, Karolyi and Kho (2011), Karolyi and Wu (2012)) and construct a series of measures of market integration in the underlying stocks in which the funds invest. Then, we relate those measures to the average expected return improvements from outsourcing that accrue to funds that invest in those markets and that we derive from our endogenous switching regressions.

We proceed as follows. We collect daily stock returns for all stocks around the world from Datastream in a similar fashion as described in the data section. For every stock-month, we regress daily excess returns on the market, size, value and momentum factors and consider the same factor models as in the mutual fund performance attribution. That is, for every stock we both estimate a "local" 4-factor model that includes the market, size, value and momentum factor of the home market of the stock and a "global" 8-factor model that adds the 4 residual (rest of the world) market, size, value and momentum factors. From those regressions, we collect the pricing error (i.e., the intercept) as well as the Adjusted R2 for every stock in every month. We then convert these into test statistics.

The absolute value of the pricing error ("$|Intercept|$") measures the extent to which the stocks are mispriced relative to the factor model employed, the variable *Co-movement* is the log-transformation of the adjusted R^2 as in Morck, Yeung and Yu (2000). Forming value-weighted averages across all the stocks in the investment style gives us the price-based measures of market integration.

We also consider another proxy for market integration: the average ownership by institutions that are foreign with respect to the underlying stock. This captures the intuition that in segmented markets, foreign institutional ownership is lower, consistent with recent evidence that analyzes

institutional ownership around the world (e.g., Ferreira and Matos (2008)). We define the foreign institutional ownership on the stock-level as in Ferreira and Matos (2008) and form the value-weighted average in every investment style. This gives an alternative measure of integration that we label $Foreign\ Institutional\ Ownership$.

In order to link the stock level measures of market integration to the mutual funds, we aggregate all our fund-level estimates of the expected return improvements from outsourcing to the style level for every month. That is, we take the average expected return improvements from outsourcing across all the funds in the investment style which we label $Avg.Expected\ Return\ Improvement$. This is our main explanatory variable.

We then estimate panel regressions of our proxies of market integration on the $Avg.Expected\ Return\ Improvement$ on the style-month level with time fixed effects. We also include a set of control variables to proxy for market characteristics such as size, overvaluation, liquidity, leverage etc. In particular, we include as controls: $Style\ Avg\ Firm\ Size_{s,t}$, defined as the log of the average market capitalization of the stocks that constitute investment style s, $Style\ BTM_{s,t}$, defined as the average book-to-market ratio of all stocks in investment style s, $Style\ Momentum_{s,t}$, defined as the average trailing 12 month return of all the stocks in investment style s, $Style\ Leverage_{s,t}$ defined as the average total leverage of the stocks in investment style s and $Style\ ZeroFraction_{s,t}$, defined as the average fraction of daily returns that are exactly 0 in the investment style following Lesmond et al. (1999). All the averages are value-weighted by beginning-of-the-month market capitalization of the stocks.

We report the results in table 7. In Panel A, we compute the *Avg. Expected Return Improvement* from the specification where fund performance is measured by 4-factor alpha,

while in Panel B the variable is computed from the estimates that use 8-factor alpha as the measure of fund performance.

In line with our working hypothesis, we find that, in the cross-section, the higher the average expected return improvement from outsourcing that funds in these investment styles generate, the higher the level of segmentation, or "mispricing", in the underlying assets. This manifests itself in terms of higher absolute pricing errors (columns 1 and 2), lower explanatory power of the factor model captured by the variable *Co-movement* (columns 3 and 4) and lower fraction of foreign institutional ownership (columns 5 and 6). The effects are not only statistically significant, but also economically relevant. In particular, if we focus on the full specifications (columns 2, 4, and 6), we see that a one standard deviation increase in the average monthly expected return improvement (app. 25 bp per month) from outsourcing that we measure for the funds is related to a 2.5 bp (8.8 bp) increase in the annualized absolute pricing error in the underlying stocks when measured against a 4-factor (8-factor) model, to a 0.07 (0.06) standard deviation reduction in co-movement (i.e., explanatory power) of a 4-factor (8-factor) model and a 0.17 (0.27) standard deviation reduction in foreign institutional ownership. All these results are also highly statistically significant.

In panel C, we perform a robustness test where we compute the price-based measures of integration (i.e., |*Intercept*| and *Co-movement*) from aggregate style returns instead of individual stock returns and find our results consistent with the estimates of panels A and B.

Overall, these results confirm the conjecture that outsourcing in the international mutual fund industry is related to the degree of segmentation in the underlying asset markets. The more segmented the markets, the greater the need for specialized investment skills which gives rise to outsourcing mutual fund management in the first place.

6 Conclusion

We study the choices of international asset managers on whether to directly manage their portfolios or to subcontract out their management to unaffiliated entities. Families outsource funds in investment styles in which they are poorly positioned to generate performance and hire subadvisors that help them mitigate their competitive disadvantages. Non-performance related drivers of outsourcing include management of political risk, distribution channel considerations and capacity constraints. Taking into account this self-selection in the data allows us to reconcile the lower performance of outsourced funds in the cross-section with performance maximization of fund families. Outsourcing is a way of achieving "the second best" – the gains from outsourcing that we quantify using a structural model of self-selection are positive.

Next, we argue that outsourcing is a reflection of segmentation in asset markets. We are able to show that the gains from outsourcing are larger in investments styles that are more segmented in terms of price-based and ownership-based measures of market integration.

These findings are important not only from an analytical point of view, but also from a normative standpoint. Indeed, they provide a first view on the link between stock market integration and the organizational structure of the asset management industry. As we pointed out in the introduction, any regulatory change that affects the incentives of the asset managers to operate in different markets will have a direct repercussion on the way the asset management industry is structured.

References

Acemoglu, Daron, and Johnson, Simon, 2005. Unbundling Institutions. Journal of Political Economy 113, 949-995.

Amihud, Yakov, 2002. Illiquidity and stock returns: cross-section and time-series effects. Journal of Financial Markets 5, 31–56.

Antras, Pol, 2003. Firms, Contracts, And Trade Structure. Quarterly Journal of Economics 118, 1375-1418.

Antras, Pol, 2005. Incomplete Contracts and the Product Cycle. American Economic Review 95, 1054-1073.

Antras, Pol and Helpman, Elhanan, 2004. Global Sourcing. Journal of Political Economy 112, 552-580.

Bekaert, Geert, and Harvey, Campbell R., 1995. Time-varying world market integration. Journal of Finance 50, 403–444.

Bekaert, Geert, and Harvey, Campbell R., 1997. Emerging equity market volatility. Journal of Financial Economics 43, 29–77.

Bekaert, Geert, and Harvey, Campbell R., 2000. Foreign speculators and emerging equity markets. Journal of Finance 55, 565–613.

Cameron, Colin A. and Trivedi, Pravin K., 2005. Microeconometrics, Methods and Applications. Cambridge University Press.

Carhart, Marc M, 1997. On the Persistence of Mutual Fund Performance. Journal of Finance 52, 57-82.

Cashman, George D. and Deli, Daniel N., 2009. Locating decision rights: Evidence from the Mutual Fund Industry. Journal of Financial Markets 12, pp. 645-671.

Chen, Joseph, Hong, Harrison, Huang, Ming and Kubik, Jeffery D., 2004. Does Fund Size Erode Mutual Fund Performance? The Role of Liquidity and Organization. American Economic Review 94, 1276-1302.

Chen, Joseph, Hong, Harrison, Jiang, Wengxi and Kubik, Jeffery D., 2013. Outsourcing Mutual Fund Management: Firm Boundaries, Incentives and Performance. Journal of Finance 68, 523-558.

Chuprinin, Oleg, Massa, Massimo and Schumacher, David, 2014. Outsourcing in the International Mutual Fund Industry: An Equilibrium View. Journal of Finance, forthcoming.

Del Guercio, Diane and Reuter, Jonathan, 2013. Mutual Fund Performance and the Incentive to Generate Alpha. Journal of Finance in press.

Dunbar, Craig G., 1995. The use of warrants as underwriter compensation in initial public offerings. Journal of Financial Economics 38, 59-78.

Duong, Truong, 2012. Outsourcing in the Mutual Fund Industry. Working Paper.

Fama, Eugene F. and French, Kenneth R., 1993. Common Risk Factors in the Returns on Stocks and Bonds. Journal of Financial Economics 33, 3-56.

Fama, Eugene F. and French, Kenneth R., 2012. Size, Value and Momentum in International Stock Returns. Journal of Financial Economics 105, 457-472.

Feenstra, Robert C. and Hanson, Gordon H., 2005. Ownership and Control in Outsourcing to China: Estimating the Property-Rights Theory of the Firm. Quarterly Journal of Economics 120, 729-761.

Ferreira, Miguel A. and Matos, Pedro, 2008. The Colors of Investors' Money: The Role of Institutional Investors Around the World. Journal of Financial Economics 88, 499-533.

Griffin, John M., 2002. Are the Fama and French Factors Global or Country Specific?. Review of Financial Studies 15, 783-803.

Grossman, Gene M. and Helpman, Elhanan, 2002. Integration versus Outsourcing in Industry Equilibrium. Quarterly Journal of Economics 117, 85-120.

Grossman, Gene M. and Helpman, Elhanan, 2005. Outsourcing in a Global Economy. Review of Economic Studies 72, 135-159.

Harvey, Campbell R., 1991. The world price of covariance risk. Journal of Finance 46, 111–157.

Henry, Peter Blair, 2002. Stock market liberalization, economic reform, and emerging market equity prices. Journal of Finance 55, 529–564.

Hou, Kewei, Karolyi, G. Andrew and Kho, Bong-Chan, 2011. What Factors Drive Global Stock Returns?. Review of Financial Studies 24, 2527-2574.

Karolyi, G. Andrew and Wu, Ying, 2012. The Role of Investability Restrictions on Size, Value, and Momentum in International Stock Returns. Working Paper.

LaPorta, Rafael, Lopez-de-Silanes, Florencio and Shleifer, Andrei, 1998. Law and Finance. Journal of Political Economy 106, 1113-1155.

Lee, Lung-Fei, 1978. Unionism and wage rates: A simultaneous equations model with qualitative and limited dependent variables. International Economic Review 19, 415–433.

Lesmond, D., Ogden, J. and Trzcinka, C., 1999. A new estimate of transaction costs. Review of Financial Studies 12, 1113–1141.

Li, Kai, and Nagpurnand R. Prabhala, 2007. Handbook of Corporate Finance. Vol. 1 (Elsevier B.V.).

Liang, Samuel X., and Wei, John K.C., 2012. Liquidity risk and stock returns around the world. Journal of Banking and Finance 36, 3274–3288.

Morck, Randall, Yeung, Bernard and Yu, Wayne, 2000. The information content of stock markets: why do emerging markets have synchronous stock price movements?. Journal of Financial Economics 58, 215-260.

Pastor, Lubos, and Stambaugh, Robert, 2003. Liquidity risk and expected stock returns. Journal of Political Economy 111, 642–685.

Sadka, Ronnie, 2006. Momentum and post-earnings-announcement drift: The role of liquidity risk. Journal of Financial Economics 80, 309–349.

TABLE 1: DESCRIPTIVE STATISTICS

The table presents descriptive statistics of the sample of international mutual funds. Panel A displays the number of funds in the sample as of December of each calendar year broken down into the number of inhouse funds, outsourced funds, the total number of funds and the percentage of the sample that is managed outsourced. Panel B presents descriptive statistics on the fund level computed separately over the entire sample for inhouse and outsourced funds. *Fund TNA* is the total-net-assets (TNA) of the funds in million USD, *Fund Age* is the number of years since inception of the oldest share-class of the fund, *Expense Ratio* is the annual management expense ratio in %, *Fund Grossreturn – rf* is the monthly fund return before fees in excess of the risk-free rate, *4F Alpha* is monthly risk-adjusted fund performance where the gross-return of the fund is corrected for risk using a style-specific 4-factor model that includes a market, size, value and momentum factor that are averages over the factors of the investment destination countries where the funds invest, *8F Alpha* is monthly risk-adjusted fund performance where the style-specific 4-factor model is augmented with additional 4-factors that capture the rest-of-the-world market, size, value and momentum factors from the perspective of every fund. Panel C presents descriptive statistics on the family and management company level for both inhouse and outsourced managed funds. For inhouse funds, since the fund family and the management company are the same or affiliated entities, only one statistic is reported for every fund. For outsourced funds, the variables are reported both from the perspective of the fund family and the perspective of the management company separately. For outsourced funds, the last two columns of the panel report the percentage improvement over the mean or median in every variable that was achieved by selecting the observed management company. *Family (Manager) Style Specialization* is the ratio of Family-Style-TNA (Management Company-Style-TNA) over Family-TNA (Management Company-TNA), *Family (Manager) Style TNA* is the total TNA of the family (management company) in the investment style of the fund, *Family (Manager) Common Language* as the fraction of countries in the investment style that share an official language with the country of residence of the fund family (management company) and *Family (Manager) KM Distance* is the average distance in thousands of kilometers between the country of residence of the fund family (management company) and the investment destination countries of the funds.

Panel A: Sample Evolution and Composition (Number of Funds)

Year	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Inhouse	828	1363	1797	2227	2695	3220	3704	4347	4847	4911	5108
Outsourced	246	381	500	624	741	872	1019	1176	1285	1063	1130
Total	*1074*	*1744*	*2297*	*2851*	*3436*	*4092*	*4723*	*5523*	*6132*	*5974*	*6238*
% Outsourced	*22.9%*	*21.8%*	*21.8%*	*21.9%*	*21.6%*	*21.3%*	*21.6%*	*21.3%*	*21.0%*	*17.8%*	*18.1%*

Panel B: Fund-level Descriptive Statistics (whole sample)

	Inhouse Funds			Outsourced Funds		
	Mean	**Median**	**St. Dev.**	**Mean**	**Median**	**St. Dev.**
Fund TNA (million USD)	944.6	151.8	4220.8	649.9	124.9	2247.9
Fund Age (years)	13.2	10.5	10.6	11.0	9.0	8.4
Expense Ratio (% p.a.)	1.54	1.50	0.65	1.60	1.56	0.61
Fund Grossreturn - rf (% p.m.)	0.611	1.100	6.357	0.474	1.012	5.988
4F Alpha (% p.m.)	0.053	-0.003	2.694	0.033	-0.016	2.486
8F Alpha (% p.m.)	0.028	-0.014	2.827	0.018	-0.029	2.616

Panel C: Family versus Management Company Characteristics on the Fund-level (whole sample)

	Inhouse Funds			Outsourced Funds			Improvement over	
	Mean	**Median**	**St. Dev.**	**Mean**	**Median**	**St. Dev.**	**Mean**	**Median**
Family Style Specialization (%)	0.384	0.289	0.336	0.359	0.247	0.315		
Manager Style Specialization (%)				0.527	0.538	0.368	46.7%	118.0%
Family Style TNA (million USD)	6626.5	690.6	28574.5	5133.4	507.8	24954.5		
Manager Style TNA (million USD)				5829.0	645.5	15686.2	13.6%	27.1%
Family Common Language (%)	0.62	0.72	0.40	0.74	1.00	0.356		
Manager Common Language (%)				0.78	1.00	0.31	6.1%	0.0%
Family KM Distance ('000 km)	2.53	1.38	2.83	2.38	1.02	2.85		
Manager KM Distance ('000 km)				2.00	0.62	2.53	15.8%	38.9%

TABLE 2: PERFORMANCE OF OUTSOURCED FUNDS IN THE CROSS SECTION

This table presents monthly panel regressions of fund performance on the dummy variable *Outsourced* that equals 1 if the fund is outsourced and 0 if the fund is managed inhouse as well as control variables. The fund performance variables include *Grossreturn – rf* as the monthly fund return before fees in excess of the risk-free rate, *4F Alpha* as fund performance before expenses corrected for risk using a style-specific 4-factor model, *4F Alpha (Net)* as fund performance after expenses and corrected for risk using a style-specific 4-factor model, *8F Alpha* as fund performance before expenses corrected for risk using a style-specific 8-factor model that augments the 4-factors with additional 4-factors that capture the rest of the world market, size, value and momentum factors and *4F Alpha (World)* as fund performance before expenses corrected for risk using a global 4-factor model. Additional control variables include *Fund Size* as the log of fund TNA, *Age* as the number of years since inception of the fund, *Expenses* as the annual fund expense ratio, *Turnover* as the semi-annual turnover computed from holdings changes, *Volatility* as the trailing 12 month standard deviation of fund returns, *Pastreturn* as the cumulative fund return of the trailing 12 month period and *Load Fees* as a dummy that equals 1 if the fund has either front or deferred load fees. * / ** / *** indicate statistical significance at the 10% / 5% / 1% levels respectively computed from standard errors that allow for clustering at the family level.

	(1)	(4)	(3)	(4)	(5)
Dependent Variable:	*Grossreturn - rf*	*4F Alpha*	*4F Alpha (Net)*	*8F Alpha*	*4F Alpha (World)*
Outsourced	-0.0642***	-0.0426***	-0.0431***	-0.0458***	-0.0501***
	(-3.64)	(-3.24)	(-3.23)	(-3.24)	(-3.09)
Fund Size	-0.0496***	-0.0274***	-0.0265***	-0.0345***	-0.0462***
	(-10.46)	(-7.05)	(-6.86)	(-8.80)	(-10.29)
Age	0.0025***	0.0010**	0.0010**	0.0015***	0.0020***
	(4.89)	(2.48)	(2.43)	(3.32)	(4.11)
Expenses	0.0409***	0.0623***	-0.0066	0.0428***	0.0115
	(2.65)	(4.68)	(-0.48)	(3.22)	(0.69)
Turnover	-0.0000	0.0000	0.0000	0.0000	0.0000
	(-0.48)	(0.70)	(0.76)	(1.00)	(0.06)
Volatility	-0.0175***	-0.0122***	-0.0126***	-0.0011	-0.0127***
	(-7.99)	(-6.81)	(-7.02)	(-0.66)	(-6.66)
Shareclasses	0.0067*	0.0005	0.0001	-0.0004	0.0082**
	(1.77)	(0.17)	(0.02)	(-0.15)	(2.29)
Pastreturn	0.0004	-0.0058***	-0.0057***	-0.0122***	-0.0202***
	(0.51)	(-9.01)	(-8.89)	(-19.08)	(-25.24)
Load Fees	-0.0384*	-0.0244	-0.0260	-0.0145	-0.0240
	(-1.95)	(-1.36)	(-1.45)	(-0.84)	(-1.12)
Fixed Effects		Time, Style and Management Company			
Sample	Full	Full	Full	Full	Full
Observations	455279	455279	455279	455279	455279
Adjusted R^2	0.77	0.04	0.04	0.03	0.08

TABLE 3: ENDOGENOUS SWITCHING REGRESSIONS

This table presents estimates of the endogenous switching regressions. Column 1 presents the selection equation if a fund is managed outsourced or inhouse, i.e., $Outsourced_{j,t} = \beta\left(ER_{j,t}^{Outsourced} - ER_{j,t}^{Inhouse}\right) + \gamma Z_{j,t} + e_{j,t}$, in reduced form. The choice of outsourcing is determined by the difference in expected performance when the fund is outsourced versus inhouse as well as other, non-performance related determinants that are captured in the vector $Z_{j,t}$. Columns 2 and 3 present the second stage performance equation estimates for outsourced funds (column 2) and inhouse funds (column 3) where the variable *4F Alpha* is used to measure fund performance. Columns 4 and 5 present an alternative specification where the variable *8F Alpha* is used to measure fund performance. The performance equation for outsourced funds is specified as $ER_{j,t}^{Outsourced} = \delta^O X_{j,t}^O + \pi^O \lambda_{j,t}^O + \epsilon_{j,t}^O$ where the vector $X_{j,t}^O$ contains determinants of fund performance for outsourced funds and the variable $\lambda_{j,t}^O$ is the inverse mills ratio computed as $-f(\widehat{\Psi}_{j,t})/F(\widehat{\Psi}_{j,t})$ where $\widehat{\Psi}_{j,t}$ is the predicted value from the selection equation and where f() (F()) are the marginal (cumulative) standard normal distribution functions following Lee (1978). Likewise, the performance equation for inhouse funds is specified as $ER_{j,t}^{Inhouse} = \delta^I X_{j,t}^I + \pi^I \lambda_{j,t}^I + \epsilon_{j,t}^I$ where the vector $X_{j,t}^I$ contains determinants of fund performance for inhouse funds and the variable $\lambda_{j,t}^I$ is the inverse mills ratio computed as $f(\widehat{\Psi}_{j,t})/(1 - F(\widehat{\Psi}_{j,t}))$ from the estimates of the selection equation, again as in Lee (1978). The vector $Z_{j,t}$ contains four variables that drive the choice of outsourcing directly, i.e., not via expected performance: *Expropriation Risk* measures the risk of expropriation in the country where the fund is ultimately managed using the measure of La Porta et al. (1998) (high values refer to high risk), *Sold to International* measures if the fund family sells to international investors and is measured as the fraction of non-US countries in which the funds of the family in the style are available for sale, *Sold to US* is a dummy that equals 1 if the funds of the family in the style are available for sale in the US and captures if the family targets US investors and *Family Funds at Inception* is the log of the number of funds in the fund family at the inception date, demeaned for every family size decile at the inception date. The vector $X_{j,t}$ for both outsourced and inhouse funds contain the variables *Manager Style Size* as the log of 1 plus the total TNA the management company of the fund (excluding the fund itself) in the investment style, *Common Language* as the fraction of countries in the investment style that share an official language with the country of residence of the management company, *KM Distance* as the average distance in thousands of kilometers between the country of residence of the management company and the investment destination countries, *Family Style Specialization* as the ratio of Family-Style-TNA over Family-TNA, *Family Size* as the log of 1 plus total Family-TNA (excluding the fund itself) as well as standard fund controls as defined in table 2 above, time and style fixed effects. The performance equation for outsourced funds includes in addition a measure of bargaining power between the fund family and the management company. *Fund Dependence* is the ratio of Fund-TNA over Management-Company-TNA. * / ** / *** indicate statistical significance at the 10% / 5% / 1% levels respectively computed from standard errors that allow for clustering at the family level. The model is estimated using a two-step procedure that first substitutes out the expected performance in the selection equation and estimates the choice of outsourcing in reduced form as a probit model (marginal effects are reported). Second, the inverse mills ratios are computed and the second stage monthly performance equations are estimated controlling for self-selection, producing unbiased estimates of fund performance.

Equation:	***SELECTION EQUATION***	***PERFORMANCE EQUATIONS***		***PERFORMANCE EQUATIONS***	
Sample:	***All funds***	***Outsourced funds***	***Inhouse funds***	***Outsourced funds***	***Inhouse funds***
	(1)	(2)	(3)	(4)	(5)
Dependent Variable:	*Outsourced*	*4F Alpha*	*4F Alpha*	*8F Alpha*	*8F Alpha*
Expropriation Risk	-0.1613***				
	(-2.78)				
Sold to International	-0.0048***				
	(-3.73)				
Sold to US	-0.0002				
	(-0.51)				
Family Funds at Inception	0.0326*				
	(1.78)				
Manager Style Size	0.0166***	0.0114**	0.0016	0.0178***	0.0025
	(4.47)	(2.23)	(0.72)	(3.09)	(1.13)
Common Language	0.1340**	0.2388*	-0.0910**	0.3909***	0.0023
	(2.43)	(1.88)	(-2.47)	(2.84)	(0.06)
KM Distance	-0.0003	0.0007	-0.0073*	-0.0030	-0.0034
	(-0.05)	(0.06)	(-1.71)	(-0.26)	(-0.78)
Family Style Specialization	-0.0021***	-0.0003	0.0014***	-0.0017**	0.0007**
	(-4.90)	(-0.56)	(4.26)	(-2.56)	(2.01)
Family Size	-0.0201***	0.0050	0.0177***	-0.0043	0.0116**
	(-3.24)	(0.83)	(3.94)	(-0.63)	(2.40)
Fund Dependence	0.2447***	0.0979		0.1892***	

	(7.05)	(1.59)		(2.64)	
Fund Size	-0.0092	-0.0350***	-0.0249***	-0.0377***	-0.0267***
	(-1.54)	(-4.43)	(-6.14)	(-4.69)	(-6.74)
Age	-0.0031***	0.0015	0.0011**	-0.0004	0.0013**
	(-3.87)	(1.36)	(2.17)	(-0.38)	(2.09)
Expenses	0.0333**	0.0317	0.0033	0.0521**	0.0043
	(2.27)	(1.41)	(0.25)	(2.08)	(0.36)
Turnover	-0.0000	0.0000	0.0000	0.0000	0.0000
	(-0.77)	(0.95)	(0.09)	(0.72)	(0.02)
Volatility	-0.0005	-0.0136***	-0.0081***	0.0021	0.0010
	(-0.40)	(-4.71)	(-4.33)	(0.72)	(0.57)
Shareclasses	0.0052	0.0095*	0.0063*	0.0099**	0.0055
	(0.87)	(1.90)	(1.78)	(2.12)	(1.63)
Pastreturn	-0.0002	-0.0041***	-0.0027***	-0.0112***	-0.0099***
	(-0.57)	(-3.24)	(-3.49)	(-8.23)	(-14.20)
Load Fees	-0.0563*	-0.1162***	-0.0190	-0.1215***	-0.0255
	(-1.73)	(-3.44)	(-1.02)	(-3.77)	(-1.54)
Inv. Mills Ratio[#]		-0.1803**	0.1028*	-0.3240***	0.0526
		(-2.39)	(1.75)	(-3.53)	(0.82)
Fixed Effects			Time & Style		
Observations	451932	93476	358456	93476	358456
Adjusted (Col.1: Pseudo) R^2	0.10	0.04	0.03	0.04	0.03

The truncation effects from self-selection associated with the inverse mills ratios are -0.1803 (-0.3240) * $-f(\widehat{\Psi}_{j,t})/F(\widehat{\Psi}_{j,t})$ for column 2 (4) and 0.1028 (0.0526) * $f(\widehat{\Psi}_{j,t})/(1-F(\widehat{\Psi}_{j,t}))$ for column 3 (5).

TABLE 4: ENDOGENOUS SWITCHING REGRESSIONS – ROBUSTNESS TESTS

This table presents robustness tests on the endogenous switching regression that is presented in table 3 above, dropping selected investment styles from the sample. In panel A, Columns 1-3 drop domestic US Equity funds and columns 4-6 of the same panel drop European Equity funds. Columns 1-3 of panel C drop Global Equity funds and columns 4-6 of that panel drop Emerging Markets & Asia Pacific funds. The measure of fund performance in all those tables is *8F Alpha.* All other specifications are as in table 3.

Panel A: Excluding US Domestic Equity Styles or Excluding European Equity

Sub-Sample:	***EXCLUDING DOMESTIC US EQUITY***			***EXCLUDING EUROPEAN EQUITY***		
	SELECTION EQUATION	***PERFORMANCE EQUATIONS***		***SELECTION EQUATION***	***PERFORMANCE EQUATIONS***	
Sample:	***All funds***	***Outsourced funds***	***Inhouse funds***	***All funds***	***Outsourced funds***	***Inhouse funds***
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	*Outsourced*	*8F Alpha*	*8F Alpha*	*Outsourced*	*8F Alpha*	*8F Alpha*
Expropriation Risk	-0.1269***			-0.1720***		
	(-2.65)			(-2.64)		
Sold to International	-0.0040***			-0.0049***		
	(-3.55)			(-2.91)		
Sold to US	-0.0001			-0.0001		
	(-0.16)			(-0.27)		
Family Funds at Inception	0.0319*			0.0444*		
	(1.94)			(1.89)		
Manager Style Size	0.0163***	0.0044	-0.0013	0.0193***	0.0215***	0.0026
	(5.04)	(0.52)	(-0.42)	(4.23)	(3.59)	(1.05)
Common Language	0.1343***	0.3762**	-0.0396	0.1245*	0.4476***	0.1374***
	(2.65)	(2.36)	(-0.89)	(1.79)	(2.93)	(3.49)
KM Distance	0.0065	-0.0077	-0.0126**	-0.0045	0.0058	0.0086
	(1.33)	(-0.52)	(-2.39)	(-0.70)	(0.39)	(1.50)
Family Style Specialization	-0.0027***	-0.0001	0.0015***	-0.0027***	-0.0025***	0.0002
	(-4.89)	(-0.09)	(2.74)	(-5.42)	(-3.56)	(0.61)
Family Size	-0.0355***	0.0053	0.0248***	-0.0241***	-0.0065	0.0107*
	(-5.79)	(0.31)	(3.10)	(-3.19)	(-0.94)	(1.96)
Fund Dependence	0.2073***	0.0819		0.2781***	0.2366***	
	(5.59)	(0.86)		(6.79)	(3.30)	
Fund Size	-0.0043	-0.0549***	-0.0332***	-0.0069	-0.0354***	-0.0249***
	(-0.58)	(-4.28)	(-6.27)	(-1.03)	(-4.23)	(-5.06)
Age	-0.0015	0.0026*	0.0012	-0.0038***	-0.0013	0.0016**
	(-1.49)	(1.66)	(1.35)	(-4.08)	(-1.14)	(2.17)
Expenses	0.0267**	-0.0050	-0.0022	0.0409**	0.0766***	0.0195
	(2.18)	(-0.15)	(-0.16)	(2.09)	(2.90)	(1.38)
Turnover	-0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(-1.44)	(0.87)	(-0.05)	(-0.56)	(-0.53)	(-0.20)
Volatility	-0.0003	0.0037	-0.0002	-0.0008	0.0009	0.0006
	(-0.24)	(1.00)	(-0.10)	(-0.56)	(0.28)	(0.31)
Shareclasses	0.0024	0.0070	0.0077	0.0064	0.0103**	0.0008
	(0.45)	(1.01)	(1.62)	(0.95)	(2.26)	(0.22)
Pastreturn	0.0001	-0.0106***	-0.0102***	-0.0003	-0.0120***	-0.0128***
	(0.45)	(-5.80)	(-11.57)	(-0.83)	(-10.36)	(-16.58)
Load Fees	-0.0628*	-0.1074**	-0.0272	-0.0628*	-0.1236***	-0.0175
	(-1.79)	(-2.22)	(-1.17)	(-1.75)	(-3.83)	(-1.00)
Inv. Mills Ratio		-0.1836	0.1375*		-0.3710***	0.0609
		(-1.60)	(1.65)		(-4.21)	(0.90)
Fixed Effects			Time & Style			
Observations	274508	47119	227389	353974	83355	270619
Adjusted (Col.1,4: Pseudo) R^2	0.13	0.05	0.04	0.09	0.05	0.04

Panel B: Excluding Global Equity or Excluding Emerging Markets & Asia Pacific Equity

Sub-Sample:	***EXCLUDING GLOBAL EQUITY***			***EXCLUDING EMERGING MARKETS & ASIA PACIFIC EQUITY***		
	SELECTION EQUATION	***PERFORMANCE EQUATIONS***		***SELECTION EQUATION***	***PERFORMANCE EQUATIONS***	
Sample:	***All funds***	***Outsourced funds***	***Inhouse funds***	***All funds***	***Outsourced funds***	***Inhouse funds***
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	*Outsourced*	*8F Alpha*	*8F Alpha*	*Outsourced*	*8F Alpha*	*8F Alpha*
Expropriation Risk	-0.1155**			-0.1939*		
	(-2.22)			(-1.70)		
Sold to International	-0.0046***			-0.0047***		
	(-3.67)			(-3.59)		
Sold to US	-0.0003			-0.0002		
	(-0.80)			(-0.55)		
Family Funds at Inception	0.0263			0.0319*		
	(1.45)			(1.66)		
Manager Style Size	0.0152***	0.0226***	0.0024	0.0145***	0.0201***	0.0044*
	(3.91)	(3.11)	(0.89)	(3.63)	(3.47)	(1.91)
Common Language	0.1124**	0.5228***	-0.0002	0.1261**	0.3216***	0.0107
	(2.09)	(2.99)	(-0.01)	(1.99)	(2.81)	(0.30)
KM Distance	-0.0009	0.0049	-0.0038	-0.0033	-0.0209**	-0.0040
	(-0.18)	(0.35)	(-0.77)	(-0.56)	(-2.09)	(-0.90)
Family Style Specialization	-0.0017***	-0.0019***	0.0007**	-0.0019***	-0.0018**	0.0007**
	(-3.69)	(-2.66)	(2.06)	(-4.40)	(-2.49)	(2.21)
Family Size	-0.0148**	-0.0002	0.0130**	-0.0161**	-0.0024	0.0100**
	(-2.33)	(-0.03)	(2.52)	(-2.49)	(-0.37)	(1.99)
Fund Dependence	0.2433***	0.2423**		0.2537***	0.2493***	
	(6.86)	(2.53)		(6.72)	(2.98)	
Fund Size	-0.0120*	-0.0465***	-0.0280***	-0.0090	-0.0355***	-0.0264***
	(-1.93)	(-4.57)	(-6.58)	(-1.42)	(-4.50)	(-6.45)
Age	-0.0031***	-0.0007	0.0014**	-0.0032***	-0.0014	0.0011*
	(-4.00)	(-0.45)	(2.11)	(-3.85)	(-1.03)	(1.70)
Expenses	0.0257*	0.0494*	0.0020	0.0351**	0.0828***	0.0078
	(1.72)	(1.82)	(0.15)	(2.21)	(3.19)	(0.62)
Turnover	-0.0000	0.0000	-0.0000*	-0.0000	0.0000	0.0000**
	(-0.27)	(1.06)	(-1.95)	(-1.09)	(0.36)	(2.31)
Volatility	-0.0008	0.0036	0.0007	-0.0004	0.0005	-0.0007
	(-0.71)	(1.06)	(0.37)	(-0.34)	(0.16)	(-0.39)
Shareclasses	0.0042	0.0076	0.0104***	0.0057	0.0113**	0.0059*
	(0.69)	(1.42)	(2.76)	(0.93)	(2.37)	(1.74)
Pastreturn	-0.0000	-0.0120***	-0.0101***	-0.0002	-0.0107***	-0.0085***
	(-0.17)	(-7.87)	(-13.89)	(-0.74)	(-7.00)	(-10.82)
Load Fees	-0.0415	-0.1174***	-0.0494***	-0.0627*	-0.1499***	-0.0291*
	(-1.27)	(-3.54)	(-2.69)	(-1.83)	(-4.17)	(-1.73)
Inv. Mills Ratio		-0.3667***	0.0885		-0.3962***	0.0260
		(-2.99)	(1.16)		(-3.61)	(0.39)
Fixed Effects			Time & Style			
Observations	379406	75867	303539	414098	87298	326800
Adjusted (Col.1,4: Pseudo) R^2	0.10	0.04	0.03	0.10	0.03	0.03

TABLE 5: REALIZED GAINS FROM OUTSOURCING

This table presents estimates of the monthly total realized gains in terms of performance from outsourcing by computing the differences between actual fund performance and estimated counterfactual fund performance using the estimates of table 3 above. Panel A, column 1 presents these gains, calculated as $R_{j,t}^{O} - ER_{j,t}\left[R_{j,t}^{Inhouse} \middle| Outsourced_{j,t} = 1\right]$, i.e. the actual fund return of outsourced funds minus the expected counterfactual return had the fund been managed inhouse conditional on observing it being managed outsourced. The first row shows the estimates derived from columns 2 and 3 of table 3 where the fund performance measure is *4F Alpha*, the second row shows the estimates derived from columns 4 and 5 of table 3 where the fund performance measure is *8F Alpha*. Column 2 of the same panel computes the gains for inhouse funds in a similar fashion as the actual return of inhouse funds minus the counterfactual expected returns had the fund been outsourced conditional on observing it being managed inhouse. Panel B presents the gains associated with the robustness tests presented in table 4. * / ** / *** indicate statistical significance of the test that the means in the monthly cross-sections are on average different from zero at the 10% / 5% / 1% levels respectively computed from standard errors that are corrected for serial dependence using the Newey-West procedure with 6 lags.

Panel A: Full Sample Estimates

	OUTSOURCED FUNDS *TOTAL REALIZED GAIN*	***INHOUSE FUNDS*** *TOTAL REALIZED GAIN*
Specification: *4F Alpha*	0.1663***	0.3217***
Specification: *8F Alpha*	0.0798***	0.5878***
AVERAGE TOTAL REALIZED GAIN	*0.1231****	*0.4548****

Panel B: Robustness Tests

	OUTSOURCED FUNDS *TOTAL REALIZED GAIN*	***INHOUSE FUNDS*** *TOTAL REALIZED GAIN*
Excluding Domestic US Equity		
Specification: *4F Alpha*	0.3083***	0.0573**
Specification: *8F Alpha*	0.2340***	0.3360***
Excluding European Equity		
Specification: *4F Alpha*	0.1095***	0.2979***
Specification: *8F Alpha*	0.0849***	0.6660***
Excluding Global Equity		
Specification: *4F Alpha*	0.2358***	0.3777***
Specification: *8F Alpha*	0.1529***	0.6536***
Excluding Emerging Markets & Asia Pacific Equity		
Specification: *4F Alpha*	0.1116***	0.4815***
Specification: *8F Alpha*	0.0320*	0.7180***

TABLE 6: CHOICE OF OUTSOURCING – STRUCTURAL FORM ESTIMATES

This table presents regressions of the choice of outsourcing, directly estimating the selection equation $Outsourced_{j,t} = \beta\left(ER_{j,t}^{Outsourced} - ER_{j,t}^{Inhouse}\right) + \gamma Z_{j,t} + e_{j,t}$ in structural form using the estimates of the expected return improvement computed from table 3 above. These estimates are presented in panel A for the specification that measures fund performance with *4F Alpha* (column 1) or *8F Alpha* (column 2). Panel B estimates in structural form the choices of switching a fund status from Outsourced to Inhouse. These choices are estimated on the end-of-2008 cross-section using the 2008 averages of the explanatory variables and as dependent variable a dummy *Switch to Inhouse* that equals 1 if the fund was classified as Outsourced in 2008 but is subsequently classified as Inhouse and 0 otherwise. All estimates are probit models where marginal effects are reported and where * / ** / *** indicate statistical significance at the 10% / 5% / 1% levels respectively computed from standard errors that allow for clustering at the family level (panel A) or heteroskedasticity robust standard errors (panel B).

Panel A: Selection Equation in Structural Form

Specification:	***Performance with 4F Alpha***	***Performance with 8F Alpha***
	(1)	(2)
Dependent Variable:	*Outsourced*	*Outsourced*
Expected Return Improvement	0.1172***	0.1808***
	(5.52)	(7.04)
Expropriation Risk	-0.1813***	-0.1789***
	(-2.90)	(-3.00)
Sold to International	-0.0062***	-0.0060***
	(-4.19)	(-4.10)
Sold to US	0.0001	-0.0000
	(0.18)	(-0.01)
Family Funds at Inception	0.0071	0.0082
	(0.39)	(0.46)
Observations	451932	451932

Panel B: Switches from Outsourced to Inhouse Status in Structural Form

Specification:	***Performance with 4F Alpha***		***Performance with 8F Alpha***	
	(1)	(2)	(3)	(4)
Dependent Variable:	*Switch to Inhouse*	*Switch to Inhouse*	*Switch to Inhouse*	*Switch to Inhouse*
Lag Expected Return Improvement	-0.6116***	-0.6817***	-0.6993***	-0.7138***
	(-4.19)	(-4.90)	(-6.19)	(-6.55)
Lag Expropriation Risk		0.2036***		0.1908**
		(2.66)		(2.56)
Lag Sold to International		-0.0010		-0.0007
		(-0.49)		(-0.35)
Lag Sold to US		-0.0012***		-0.0011***
		(-3.98)		(-3.37)
Lag Family Funds at Inception		-0.1170***		-0.1221***
		(-6.38)		(-6.68)
Observations	977	977	977	977

TABLE 7: RETURN IMPROVEMENTS FROM OUTSOURCING AND MARKET INTEGRATION

This table presents monthly panel regressions on the style level that relate the return improvements from outsourcing to market integration. The dependent variables are measures of stock market integration and include |*Intercept*| as the average absolute pricing error across all the stocks in the investment style that is estimated monthly using daily data and regressing stock returns in excess of the risk free rate on market, size, value and momentum factors and *Co-movement* is the log-transformed average adjusted R^2 statistic from those regressions following the definition of Morck, Yeung and Yu (2000). *Foreign Institutional Ownership* is the average ownership by institutions that are foreign with respect to the underlying stock as defined in Ferreira and Matos (2008). The main explanatory variable is *Avg. Expected Return Improvement*, the average expected improvement from outsourcing obtained in the investment style that is computed as the average expected improvement from outsourcing across all funds in the investment style. Panel A (B) computes *Avg. Expected Return Improvement* from the specification where fund performance is measures by *4F Alpha (8F Alpha).* In those panels, |*Intercept*| and *Co-movement* are computed using the same factor model that is used to correct fund performance (i.e. a "local" 4-factor model in panel A and a "global" 8-factor model in panel B). Panel C presents the estimates where the variables |*Intercept*| and *Co-movement* are computed from aggregate style market returns as opposed to individual stock returns and a 4-factor model with world-wide universal market, size, value and momentum factors is used to correct for risk. Additional style controls include *Style Avg. Firm Size* as the log of the value-weighted average of the market capitalization of every stock in the investment style, *Style BTM* as the value-weighted average of the book-to-market ratios of all stocks in the style, *Style Momentum* as the value-weighted average trailing 12 month returns of all stocks in the style, *Style Leverage* as the value-weighted average of financial leverage of all stocks in the style and *Style Zerofraction* as the value-weighted average of the fraction of daily returns that are exactly zero of all stocks in the style. All regressions include time fixed effects and * / ** / *** indicate statistical significance at the 10% / 5% / 1% levels respectively computed from standard errors that allow for clustering at the time dimension.

Panel A: Expected Return Improvements from Outsourcing based on the Specification with 4-factor fund alphas

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Variable:	*|Intercept (4F)|*		*Co-movement (4F)*		*Foreign Institutional Ownership*	
Avg. Expected Return Improvement (4F)	0.0009***	0.0004***	-0.3037***	-0.1352***	-0.0498***	-0.0267***
	(5.43)	(4.30)	(-8.65)	(-5.96)	(-40.11)	(-14.58)
Style Avg. Firms Size		-0.0003***		0.1023***		-0.0063***
		(-2.75)		(3.81)		(-5.01)
Style BTM		-0.0033***		1.2532***		0.2346***
		(-4.21)		(7.98)		(22.65)
Style Momentum		-0.0007*		0.3874***		0.0640***
		(-1.98)		(5.33)		(7.01)
Style Leverage		-0.0030**		-0.1532		0.5800***
		(-2.03)		(-0.35)		(16.43)
Style Zerofraction		0.0015		-0.8904***		-0.1018***
		(1.14)		(-3.14)		(-3.59)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3001	3001	3001	3001	3001	3001
Adjusted R^2	0.89	0.89	0.72	0.74	0.31	0.72

Panel B: Expected Return Improvements from Outsourcing based on the Specification with 8-factor fund alphas

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Variable:	*|Intercept (8F)|*		*Co-movement (8F)*		*Foreign Institutional Ownership*	
Avg. Expected Return Improvement (8F)	0.0021***	0.0014***	-0.3134***	-0.1130***	-0.0983***	-0.0437***
	(5.94)	(4.91)	(-6.21)	(-2.88)	(-76.87)	(-12.89)
Style Avg. Firms Size		-0.0006***		0.0755***		-0.0085***
		(-3.28)		(3.00)		(-5.96)
Style BTM		-0.0038***		1.1644***		0.2275***
		(-3.71)		(7.42)		(22.18)
Style Momentum		0.0013***		0.4054***		0.0629***
		(2.72)		(5.52)		(7.20)
Style Leverage		-0.0071***		0.0804		0.5304***
		(-3.07)		(0.19)		(14.98)
Style Zerofraction		0.0061***		-0.9394***		-0.1421***
		(3.28)		(-3.24)		(-5.04)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3001	3001	3001	3001	3001	3001
Adjusted R^2	0.92	0.92	0.71	0.73	0.38	0.73

Panel C: Integration Measures computed from Aggregate Style Market Returns

	(1)	(2)	(3)	(4)
Dep. Variable:	*|Intercept (World 4F)|*		*Co-movement (World 4F)*	
Avg. Expected Return Improvement (8F)	0.0055**	0.0090***	-0.6233***	-1.2321***
	(2.01)	(3.97)	(-4.38)	(-7.72)
Style Avg. Firms Size		-0.0057***		0.9450***
		(-5.09)		(21.20)
Style BTM		0.0470***		-9.1609***
		(6.08)		(-12.63)
Style Momentum		0.0180***		-2.4344***
		(4.19)		(-10.78)
Style Leverage		-0.0474***		6.9832***
		(-3.21)		(6.45)
Style Zerofraction		-0.0134		4.9711***
		(-1.02)		(3.10)
Time Fixed Effects	Yes	Yes	Yes	Yes
Observations	3001	3001	3001	3001
Adjusted R^2	0.11	0.25	0.00	0.31