Human Capital and the Structure of the Mutual Fund Industry

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Abstract

Production functions necessarily play a significant role in determining an industry's ultimate organization. In the mutual fund industry human capital is one of the primary inputs and thus one would expect the industry's structure to work towards its optimal use. This paper shows that the efficient allocation of human capital helps to explain the existence of mutual fund families as well as and the number and quality of managers assigned to various portfolios in a family and the resources the family devotes to a particular sector. Empirically, it appears the industry has arranged itself so that talented managers can stand out by running funds where: (1) the competition is thin enough that financial research is likely be improve performance by enough to be noticeable, (2) the fund family's marketing arm can publicize good performance to a degree that it attracts new capital and (3) where a family has committed above average investment research resources. As a result we find that fund families exist in part to allocate talented managers into areas with superior support systems that a standalone operation cannot easily duplicate.

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Recently a number of papers have explored the industrial organization of today's mutual fund industry. Topics have included internal structures such as the use of managerial teams to run a fund (Prather and Middleton (2002)), the types of funds offered by a particular family (Gavazza (2011)), why some funds have multiple share classes (Nanda, Wang and Zheng (2009)) and how liquidity issues can induce families to offer a large array of smaller funds (Chen, et al. (2004)). Others have examined the forces that may have encouraged the rise of mutual families. Massa (2003) and Gavazza (2011) look at how investor preferences to keep all of their funds inside a single family have encouraged the use of this structure. Fund families may have also arisen as a way to take advantage of opportunities to engage in profitable cross subsidization (Gaspar, Massa and Matos (2006)). This paper explores another force that has helped determine the structure of the mutual fund industry: the efficient allocation of human capital. We find that families create structures that let them place talented managers in those areas where their skills might matter most; in terms of generating returns and attracting new investments. Our work also indicates that mutual fund families arise because they are also efficient at marketing and at offering investment research relative to what standalone operation can afford. This creates a valuable synergy between skilled managers who want capital to manage and a marketing team that can make use of exceptional performance.

Fund managers compete with each other for the opportunity to manage consumer and institutional investments. But, they do not do so in isolation. A single mutual fund is rarely a "one man shop." A mutual fund family never is. These families include wide ranging support teams that do everything from conducting investment research to marketing their top performing funds. For a talented investment professional these support teams can be invaluable. A manager's compensation depends critically on the amount of money under management. Doing well may make a manager feel good, but to benefit financially that performance has to be publicized if it is to draw in additional capital. A fund family can potentially do this in ways a standalone fund cannot. This likely helps explain why families that provide international investment funds saw their market share grow from 68% of assets under management in 2001 to 86% in 2008.

Consider a talented manager. What does he need to succeed? First, a good research team that lets the fund generate above market returns. Second, a support system to publicize good results and bring in additional funds.

This paper examines whether or not the above two forces regarding the efficient allocation of human capital (talented managers and support personal) have indeed shaped the industry's structure. The tests focus on actively managed international open-end equity funds over the period 2001–2008. International funds are used for two reasons. First, the general efficiency of the U.S. market makes it very difficult for domestic funds to generate long term superior performance (Hendricks, Patel and Zeckhauser (1993), Goetzmann and Ibbotson (1994), Brown and Goetzmann (1995), Carhart (1997), Bollen and Busse (2005) and Spiegel and Zhang (2007)). Second even if that were not true, the vast number of such U.S. funds that invest domestically may preclude a manager from attracting enough attention over a long enough period of time to acquire large capital flows. In contrast, in the global market, these two issues are often separated and thus provide additional degrees of freedom with which to test the paper's hypotheses. For example, consider a fund that raises capital in Japan for investment in European stocks. To the degree that there are relatively few Japanese domiciled funds investing in European stocks a fund family might expect superior performance to translate into large capital inflows. Similarly, fund families may differ in their resource allocation across international sectors to a degree that they do not domestically; giving the empirical tests greater power. At the same time, however, the intensity of competition within European stock markets means that it may be particularly difficult to generate superior performance for very long if at all. While most of the paper's tests use data on funds domiciled outside the U.S. some tests are repeated using data from U.S. domiciled funds investing overseas. This is done as a robustness check and the results largely confirm those found using non-U.S. based fund data.

Most of the paper's tests derive from two measures. One dubbed "trading competition" and another called "resource devotion." The former variable measures how difficult it is likely to be for a foreign investor to earn above market returns in a particular country. The latter variable quantifies a family's apparent commitment to a particular investment area. Using these variables the paper explores how the efficient allocation of human capital has influenced the mutual fund industry's structure.

While the influence of investment competition on the allocation of managers may be relatively straightforward, the impact of resource devotion deserves some discussion. Why do fund families dominate the market as opposed to standalone operations? One explanation is that a fund family can share overhead costs. True, and is likely one source. However, a large operation that engages in cross subsidization (Gaspar et al. (2006)) seems likely to lose its top performers to either a shop they start up or a hedge fund with more flexibility.[5] What then prevents this countervailing force from dominating? To answer this question the resource devotion measure is constructed twice. The first measure compares the number of funds in family *Z* that invest in country *X*; a measure of family resource devotion. Presumably, a fund family signals it willingness to devote resources to an investment area by maintaining a large number of funds that invest in it. For fund managers higher levels of resource devotion should improve upon the chance that consistent above market returns can be produced. The empirical results confirm this intuition. Funds inside a family that invest in countries with low capital competition and high family resource devotion can produce predictable above market returns. Using a variety of measures, our tests find that this outperformance extends for up to 92 months ahead. Those outside this "box" do not exhibit any predictability in their ability to generate above market returns. We interpret these findings as evidence that the family structure allows for synergies between marketing, research and fund management in ways a standalone operation cannot readily duplicate.

The second resource devotion measure compares the number of funds in country *Y* that invest in country *X*. We call this a measure of global resource devotion and it is used as a control. While the family resource devotion measure should relate to the resources a particular fund has available for its support, the global resource devotion measure should not. At the same time if there is something about the pairing of funds in a particular country and where they invest then the global measure should pick that up. However none of the return, flow or persistence results appear if the global measure is used. This helps verify that the conclusions using the family based measure are not due to an omitted variable like those described above.

Our findings contribute in several respects to the literature on delegated asset management. First, they contribute to the literature on mutual fund performance and its persistence and forecastability. Hendricks, Patel and Zeckhauser (1993), Goetzmann and Ibbotson (1994), Brown and Goetzmann (1995), Carhart (1997), and

[5] Empirically, however, both Cici et al. (2010) and Deuskar et al. (2011) that find mutual funds try to get around this issue by allowing some of their managers to also run hedge funds.

Bollen and Busse (2005) find evidence of short-term persistence in the performance of mutual funds. More recently, Mamaysky, Spiegel and Zhang (2007, 2008) find that managerial skill can be identified dynamically. Kacperczyk, Sialm and Zheng (2008) use a new measure of performance based on unobserved actions of mutual funds – the return gap – and show that it can predict future fund performance. Avramov and Wermers (2006) find that there exist profitable investment strategies that incorporates predictability in manager skills, fund risk loadings and benchmark returns. Our paper contributes to this literature by presenting evidence for one of the main drivers of fund performance – the degree of competition in the mutual fund industry.

The remainder of the paper is structured as follows. In Section I, we hypothesize the role of competition in the mutual fund industry. Section II describes the data used and the construction of the main variables. In Section III, we look at the relation between competition, resource provision and performance. In Sections IV examines out-of-sample performance persistence as a function of a fund's support and the level of local competition in the country where it invests. The conclusion follows in Section V.

I. Hypotheses

This paper's central hypothesis is that the dominance of fund families in the mutual fund industry has been driven, at least in part, as a way to efficiently allocate human capital. The claim here is that fund families offer opportunities and resources a standalone operation cannot duplicate and these let top managers stand out.

The first testable hypothesis has to do with the trading environment. A fund manager in country *X* trading in country *Y* against counterparties primarily domiciled in *Y* will find it difficult to generate above market returns. This will be tied to human capital and fund families shortly. For now however the empirical claim is that:

Hypothesis 1 (Trading Competition): *The greater the fraction of securities in country Y held by professional investors in Y, the more difficult it will be for managers in country X trading in Y to generate persistent positive alpha values.*

Fund families have to allocate resources just like any other entity. In part, that means making decisions regarding what funds will get more or less research support. Unfortunately, this cannot be observed by outsiders.

A proxy for it, however, is likely to be the fraction of funds a family offers in an area. Presumably, if a family has decided to offer numerous funds that invest in country *Y* then it will support them with research funds. Furthermore, as the number of managers working on the valuation of country *Y s*ecurities increases the chances that a manager investing in *Y* will get a valuable idea from his colleagues increases. This leads to the second hypothesis:

Hypothesis 2 (Resource Devotion): *Consider a fund family domiciled in country X and investing in countries Y and Z. Further assume the family has a greater fraction of its funds investing in Y than Z. Then family will try to place its managers with the best chance of producing positive persistent alphas into investment funds that specialize in country Y rather than Z.*

To get at the paper's main question about the tie between human capital and the structure of the mutual fund industry the next hypothesis ties the first two together:

Hypothesis 3 (Interaction between Trading Competition and Resource Devotion): *The larger the fraction of a family's funds specializing in country Y, the greater the capital inflow to the family from a 1% increase in performance.*

Hypothesis 2 and Hypothesis 3 addresses the primary question at issue: Have synergies from the allocation of marketing, research, managerial talent and other limited resources across investment areas helped to generate the dominance of the family structure observed today? If these synergies do exist and are being exploited then that should mean several things. First, the funds should be placing their best managers in those areas where the family plans to devote the most resources. Since funds investing in the same area will all benefit from the family's research and marketing resources for that area, the family should cluster its better managers together and provide them with better resources. The result should be that within a family the managers that can generate positive persistent alphas will be found in funds that can share in the benefits these other resources can provide. Of course, if there are in fact synergies that are driving this process then it should also be the case that the family will see greater inflows of capital via its exploitation. Thus, if a fund outperforms in an area where the family is devoting its resources then that outperformance should generate greater capital inflows than it does in areas that are not receiving similar levels of support.

II. Data and Main Variables

A. Data Sources

We focus on international actively managed open-end equity funds. Our data is drawn from various sources. Fund holdings come from the Factset/Lionshares database.[6] The Factset/Lionshares holdings data on international funds is sparse before 2001 so we restrict our sample to the period 2001–2008. From these data we construct our holdings-based variables, as described below. We match the database to the Morningstar mutual fund database that reports monthly total returns for global mutual funds. From Morningstar, we obtain additional controls by fund including: management expenses, total net assets (TNA), turnover ratios, fund ages, and return volatilities, etc. We also require a fund to belong to a benchmark category followed by at least ten funds. Funds must also have at least two years of reported returns in order to estimate the factor loadings on its returns. The benchmarks are drawn from Morningstar ("Primary Prospectus Benchmark").

A fund is classified as international, as opposed to domestic, if its leading investment country – i.e., the country where its portfolio holding has the largest investment value – differs from its country of domicile. Restricting international funds to those that have less than 50% or even 20% of their equity portfolio invested in stocks listed in their country of domicile does not materially change the paper's main conclusions. Index funds have been removed from the sample.[7] Also, eliminated are funds with holdings valued at less than USD 5 million.

To compute returns, all prices are converted into U.S. dollars at the day's exchange rate. For the analysis of fund performance, we proceed as follows. From Morningstar, monthly fund total returns net of fees are gathered. When a portfolio has multiple share classes its total return is calculated as the lagged total net asset-weighted return of all share classes of the portfolio. Other fund characteristics (e.g., expense ratios and turnover ratios) are computed in a similar way.

[6] Ferreira and Matos (2008) provide a detailed description of this database.
[7] Morningstar provides information on whether a fund is an "Index Fund" or not. Our results are also robust if we follow Gil-Bazo and Ruiz-Verdú (2009) to identify index funds based on the key strings provided in their paper.

To compute net-of-risk performance ("alpha"), tests use the international Fama-French-Carhart model, the Fung and Hsieh's (2001) seven-factor model, as well as the benchmark-adjusted return. The international Fama-French-Carhart model extends the standard factor-based risk-corrections used in the domestic literature to account for the international dimension. It includes four domestic factors (market, size, book-to-market, and momentum) and four foreign factors (the value-weighted average of the four domestic factors in all other countries).[8] The construction of the international factors is as in Griffin (2002), but extended to include momentum. The factors in the Fung and Hsieh's (2001) seven-factor model are: S&P 500 total return minus risk free rate, Russell 2000 total return minus S&P 500 total return, changes in the constant maturity yield of the 10-year Treasury, changes in the spread of Moody's Baa yield minus the 10-year Treasury constant maturity yield, as well as bond, currency and commodity trend-following factors. These factors control for the possibility that the total return reported by some international equity funds may be affected by assets than equity (e.g. currency exchange rates). Further details on the construction of the factors are reported in the Appendix. Finally, in line with the literature, the benchmark adjustment is achieved by subtracting from the fund return the average return of all the funds following the same benchmark (e.g., Kempf and Ruenzi, 2008; Spiegel and Zhang, 2012). We also adopt a Daniel, Grinblatt, Titman and Wermers (1997) holding-based adjustment. Given that the results are similar to the reported ones, in the interest of brevity, we leave them unreported.

In terms of *trading competition* local funds – i.e., the funds that trade stocks in their domicile country – are shown to have better local information (Coval and Moskowitz 1999; Grinblatt and Keloharju, 2001). These locally based funds are therefore likely to be tough competitors to trade against and thus construct a trading competition measure that focuses on them. There are two steps. First, a stock-level trading competition proxy is created by taking the ratio between the number of shares held by the local funds and the number of shares held by all funds. Second, a portfolio-level trading competition is created by taking the investment-value weighted

[8] More specifically, for a given country, we download all (active and defunct) stocks from Thomson Datastream and complement them with necessary accounting data from the Worldscope database. Then, for each country, we construct market (RMF), size (SMB), value (HML), and momentum (MOM) factors following closely the original methodology of Fama and French (1993) and Carhart (1997). We apply domestic factors to the leading investment country of international funds.

average of the stock-level trading competition value calculated in step 1 for all the stocks held in the portfolio: *Trade Competition I*. Algebraically, *Trade Competition I* for fund f in quarter t equals:

$$Trade\,Competition\,I_{f,t} = \sum_{i\in f} w_{f,i,t} \times \frac{N_{Local,i,t}}{N_{All,i,t}}, \quad (1)$$

where $w_{f,i,t}$ refers to the investment weight of the fund f in stock i, while $N_{Local,i,t}$ and $N_{All,i,t}$ refer to the total number of shares of stock *i* that are held by local funds and all funds respectively.

As a robustness check, we also construct a broader index that captures additional information about a fund's trading environment. The general idea is that competition may be particularly strong where competing funds have access to superior resources, information, trading platforms, etc. These features tend to be related to the size of the fund or its affiliation with larger mutual fund families, larger financial conglomerates (including other insurance companies, hedge funds, pension funds and banks) or banking groups. We therefore incorporate these observable variables into a broader trading competition index dubbed *Trade Competition II*.

To create the variable *Trade Competition II* for each stock the ratio between the number of shares held by large funds (or by large families, or by large conglomerates or by bank-related funds) and the number of shares held by all funds is computed. "Large funds" are defined as funds in a family or conglomerate with TNA above the median of all the funds within families or conglomerates respectively. A financial conglomerate is defined as a firm that ultimately owns one or more fund families. A fund is then defined as belonging to the conglomerate if it is run by one of those management companies.[9] "Bank-related funds" are grouped in a similar manner. In this case the funds are managed by firms whose ultimate parent is classified as a bank in FactSet or an ultimate parent that also controls a bank. We then compute fund-level competition proxies in a way similar to that used to create the *Trade Competition I* variable. We call these proxies *BigFund-to-All* – competition by big funds; *BigFam-to-All* – competition by funds affiliated with big families; *BigGroup-to-All* – competition by funds affiliated with big financial conglomerates, and *Bank-to-All* – competition by funds affiliated with banking groups. Note, all of

[9] For example, "BlackRock European Equity Portfolio" is a mutual fund managed by the fund family named "BlackRock International Ltd.". The fund family itself is owned by "BlackRock Inc", which is a financial conglomerate. This example illustrates the vertical ownership structure of international funds. Meanwhile, our main results remain unchanged if use the top quintile to define large funds, families and conglomerates.

these ratios range between 0 and 1. Taking advantage of this, the aggregate trading competition variable *Trading Competition II* is created by summing up all specific trading competition proxies (i.e., *Trade Competition I*, *BigFund-to-All*, *BigFam-to-All*, *BigGroup-to-All* and *Bank-to-All*.

We now consider *resource devotion*. Given the growing evidence that fund families play a strategic role in shaping within-family fund flows (Nanda, Wang and Zheng, 2004; Kempf and Ruenzi, 2008), we use the ratio between the number of international funds within a family and the overall number of funds in the family as our main proxy for resource devotion and denote it as *Resource Devotion*. The intuition is that if a fund family has created a large number of international funds it probably provides them with the resources they need to prosper.

As controls, we also construct a broader index that reflects resource devotion beyond the family level. In particular, we consider two additional layers of resource devotion that can be captured by the following proxies: *International-to-Dom* and *SameLead-to-Dom*. *International-to-Dom* is defined as the ratio between the number of international funds being offered in the country and the overall number of domestic funds in the same country. This variable helps to guarantee that the reported results do not arise from a spurious uncontrolled for variable that just happens to be related to the number of international funds offered in a particular country.

SameLead-to-Dom is defined as the ratio between the number of international funds within a country that have the same foreign country focus (as measured by the *leading investment country* variable)[10] to the overall number of funds domiciled in the focused upon country.[11] As with the *International-to-Dom* variable the idea is to ensure that our *Resource Allocation* variable is not picking up some spurious relationship that arises from a particular country's desire to invest in some other particular country.

So far our main resource devotion proxies are based on the number of funds rather than the assets that the funds' manage. As a robustness check, we also create alternative measures of resource devition based on the total net assets of the funds. For example, we define *TNA-weighted Resource Devotion I* as the total TNA of

[10] Recall, "leading investment country" is the country in which the fund's portfolio has the largest stake.
[11] There are very few international funds within that same family that have the same (foreign) leading investment country. Hence within family we focus only on the fraction of all international funds.

international funds in a family divided by that of all funds in the same family, and similarly for the other TNA-weighted proxies. These alternative proxies deliver very similar results.

B. ***Descriptive Statistics***

Table 1, reports the data's descriptive statistics. Panels A1 through A4 tabulate the distribution of the main variables. Panel B computes the correlation matrix for the trading competition and resource devotion proxies. We find that most of the trading competition proxies are positively correlated with each other, except *Bank-to-All*, which is negatively correlated with the other trading competition proxies.

Panel A, indicates that the trading competition and resource devotion proxies (*Trade Competition I* and *Resource Devotion* respectively) have widely spread values across the funds. *Trade Competition I* has a mean of 0.797, a standard deviation of 0.175, and covers values 0.544 and 0.982 between the 10^{th} and 90^{th} percentile values. This suggests that intensity of local competition varies substantially across different international mutual funds. *Resource Devotion* also exhibits a broad set of values falling between 0.08 and 0.90 across the 10^{th} and 90^{th} percentile values. Based on these proxies, international mutual funds face very different competitive environments and families vary greatly in their focus on this sector.

Not surprisingly, Panel B shows that the *Trade Competition II* index is positively correlated with all the individual measures. Its correlation with *Trade Competition I* is 0.77, which is lower than its correlations with *BigFund-to-All* (0.86) and *BigFam-to-All* (0.89). Thus, *Trade Competition II* seems to reflect forces beyond those in *Trade Competition I*.

III. Competition, Resources and Fund Performance

The paper postulates that scarce human capital has helped to generate fund families. As indicated in Section I this, in turn, is manifested through fund family decisions regarding the number of funds to have in a sector and the sectors they seek to target. Table 2 begins testing the paper's hypotheses.

At the beginning of each year, funds are sorted into quartiles according to either lagged trading competition or resource devotion either weighted by the number of funds (equally weighted) or by TNA (value weighted). Average performance is then computed within each quartile, as well as the differences between quartiles with high or low competition (*Top 25%−Bottom 25%*). In the interest of brevity, we tabulate only the statistics for the differences. Performance returns are calculated by adjusting them with either the international Fama-French-Carhart model, or the Fung and Hsieh's (2001) seven-factor model, or the fund benchmark.

The results, reported in Table 2, show that trading competition lowers fund performance. Portfolios of funds characterized by high *Trade Competition I* display an annualized 52.8 (75.6, 63.6) bps lower international Fama-French-Carhart adjusted (seven-factor-adjusted, benchmark-adjusted) performance than the portfolios of funds characterized by low *Trade Competition I*.[12] When it comes to single attribute sorts, *Resource Devotion* apparently has no impact on performance. Thus, if managers capable of producing above market returns are located in high *Resource Devotion* areas this is being hidden by other factors. The next set of tests will show that this is indeed the case.

The first set of multivariate tests are presented in Table 3. The values come from a Fama-MacBeth regression of performance on the competition and resource devotion measures, their interaction and a set of control variables. Models (4) and (8) include dummies that proxy for the interaction between the degree of trading competition and resource devotion across four possible extreme quantile combinations of high and low values (low trading competition and low resource devotion; low trading competition and high resource devotion, etc.). Models 1 to 4 use *Trade Competition I* as an independent variable and models 5 to 8 *Trade Competition II*). The control variables include fund size, defined as the logarithm of TNA; expense ratio, defined as the annual expense ratio; turnover, defined as the annual turnover ratio; and fund age, defined as the logarithm of number of operational years since inception.

Table 3 Panel A reports the results from using returns adjusted via the international Fama-French-Carhart model. Panels B and C adjust returns with the Fung and Hsieh's (2001) seven-factor model and the fund's

[12] For example, the annual impact of the international Fama-French-Carhart model is computed as $-0.044\% \times 12 = 0.528\%$, where -0.044% is the monthly performance difference between the top and bottom quartiles of funds as reported in the table.

benchmark portfolio respectively. The factor loadings are estimated over the entire sample period as in Black, Jensen and Scholes (1972), Fama and French (1992), Lettau and Ludvigson (2001), and Chen, Hong, Huang and Kubik (2004) to obtain better estimates of the risk coefficients. The monthly alphas are then defined as the difference between the fund returns and the product between loadings and value of the factors in the month.

As with the single variable sorted fund portfolio results reported in Table 2, in columns (1) to (3) and (5) to (7) of Table 3 trading competition significantly reduces fund performance. A one standard deviation increase in *Trade Competition I* (*Trade Competition II*) reduces annualized performance by 2.52% (3.07%) in the case of international Fama-French-Carhart model-adjusted return, 2.77% (3.38%) in the case of a seven-factor-adjusted return, and 3.12% (4.31%) in the case of a benchmark-adjusted return in models (1) and (5).[13] Resource devotion produces similar parallels to the Table 2 results: it does not directly affect performance. However, the interaction between trading competition and resource devotion indicates that resource devotion does indeed play an important role. As postulated, performance is highest when *trading competition is low and resource devotion is high.* Resources help when the competitive environment is such that abnormal returns are obtainable via research (low trading competition environments). In contrast, when the competitive environment is intense some research helps a fund keep up with the overall market, but after that provides very little value. This is seen in Models 4 and 8 where high trading competition environments combined with low levels of resource devotion yield funds with particularly poor returns, while those with high levels of resource devotion do no better than expected.

In the interest of brevity, we do not include the tests using TNA-weighted capital competition proxies as the results are qualitatively and quantitatively similar. In (unreported) robustness checks we also consider Daniel, Grinblatt, Titman and Wermers (1997) adjusted holding-based performance, the Fama-French-Carhart four-domestic factor model-adjust fund performance, as well as applying factor models to benchmark-adjusted returns to compute risk-adjusted performance. Again, the results remain the same.

A fund family's ultimate goal is to see above market growth in its assets under management. Ideally, then, additional resources (which include marketing) should help bring in investment capital. Table 4 examines this

[13] For example, the annual impact of the international Fama-French-Carhart model is computed as $-1.201\% \times 0.175 \times 12 = 2.52\%$, where -1.201% is the regression parameter and 0.175 is the standard deviation of *Trade Competition I*.

issue. The dependent variable is a measure of the fund family's asset growth within its international funds. These growth measures include market share, total assets under management and percentage flows. For a fund domiciled in country *X* market share is defined as its international fund assets under management divided by the total of all international funds under management across all funds domiciled in country *X*. The variable $\Delta MarketShare_{Fam,m}$ is thus the change in this value from one quarter to the next. Growth in assets under management is represented by $TNAGrowth_{Fam,m}$ which equals the quarterly change in the family's international funds total assets under management. Finally, $Flow_{Fam,m}$ is the family's fractional flow to its international funds. Unlike returns, these variables are defined at the family rather than fund-by-fund. Returns arise from an individual fund's investment decisions and thus if a variable influences returns it should show up on a fund-by-fund basis. However, papers have shown that mutual fund investors tend to split their investments within a family rather evenly across the family's offerings. Thus, if an investor intends to invest $100 in international funds it may be allocated somewhat evenly across all of a family's international funds. This kind of behavior will induce a mechanical negative correlation between this paper's measure of resource devotion and flows if measured fund-by-fund. Furthermore, flows per fund are not of particular concern to the fund family. What they are presumably interested in is the flow to the entire family. By aggregating all of a family's international funds together the growth measures employed here alleviate the problems caused by investors splitting their investments evenly across a family's offerings and at the same time focuses on the variable of actual concern to the family, its total assets under management.

Taken together the results from Table 3 and Table 4 lend considerable support to the paper's hypotheses. Table 3 shows that when a family devotes resources to its international funds in low trading competition areas the result is better performance. Table 4 shows that additional resources boost the funds a family will receive in response to good performance. In Panels A, B and C the cross product of resource devotion and performance is significant and positive. Thus, however one measures growth there are clear synergies between placing talented managers into areas where significant resources can allow them to outperform the market and the capital inflows the family can then expect to receive as a result. While not directly related to the paper's hypotheses it is worth noting that fund families appear to devote resources, in part, to areas where they are having difficulty retaining funds. In both Panels B and C the coefficient on *ResDev* is negative and significant. However, it is appears that when this happens it is something of an industry wide problem. While statistically insignificant, in every market share based model the coefficient on *ResDev* is positive. Thus, it may be that while increasing resources to a sector may reduce the hemorrhaging of funds it is not enough to completely reverse the flow.

IV. Competition and Out-of-Sample Persistence

If competition and resource devotion are structural constraints on managerial performance it should manifest itself as predictable fund performance over time. In particular, if low trading competition and high resource devotion induce better fund performance it should appear as positive persistence in funds characterized by this pairing.

A. The Sample of International Funds

Table 5 tests this hypothesis via a standard Carhart (1997) out-of-sample performance test. The tests begin by taking the set of international funds in month *t* and double sorting them based on their trading competition and resource devotion levels into four independent groups. Within each double-sorted trading competition group the funds are further sorted into deciles according to their past performance in the prior two years. This produces a total of forty fund portfolios– ten deciles per trading competition and resource devotion group. Next, the out-of-sample performance in month *t*+1 for each decile, based on the average return generated by the funds in each decile, is then calculated. In the table, performance is defined as the risk-adjusted return based on either the international Fama-French-Carhart model, the Fung and Hsieh's (2001) seven-factor model or a benchmark adjustment. As a robustness check we also apply factor models to benchmark-adjusted returns to compute a multiple performance measure adjusted return.

Models (1) to (5) in Table 5 Panel A report the risk-adjusted decile returns and the return difference between the highest and lowest deciles (*High−Low*), as well as their Newey-West adjusted *t*-statistics (Newey and West, 1987), for funds belonging to the low *Trade Competition I* and high *Resource Devotion* groups. Models (6) to (10) report similar statistics for funds belonging to the low *Trade Competition II* and high *Resource Devotion* groups.

Funds in this panel have face both a favorable environment in which to use information and have the resources to potentially generate persistent performance. Panels B, C and D report the Carhart test for other double-sorted groups of funds. In the interest of brevity these latter three panels' report only the performance of the high and low deciles as well as the difference between the two.

Table 5 Panel A shows that if a talented manager is allowed to trade in a country with low levels of trading competition and is given the resources to conduct adequate research it is possible to produce positive persistent abnormal returns. While, unsurprisingly, most managers cannot a few can. In the panel, depending on the adjustment used, typically the top two or three decile groups exhibit statistically significant positive persistent performance. These top performers also do better than their lower ranked brethren facing the same environment. In every model, other than Model 10, the difference is statistically significant at that 5% level and in Model 10 it is significant at the 10% level. Economically, the estimated alphas are also significant ranging from about 2.75% to 10.49% per annum.

In contrast to the funds in the low trading competition and high resource devotion groups the evidence for persistent performance in the other three pairings is quite weak. For the most part the top decile performers in month *t* are no more likely to produce positive alphas in month *t*+1 than are the managers drawn from lower deciles. Indeed, with few exceptions the high minus low performance portfolio returns have insignificant alphas.

As also noted in Spiegel and Zhang (2008), managers only produce positive abnormal returns when they are both talented and have access to useful information. Table 5 shows that a family can take advantage of this dual requirement by putting managers that it believes may have talent into funds that invest in low trading competition environments and then handing them the resources they need to make wise investments. This is a freedom to put resources to their best use that a standalone fund cannot duplicate.

B. The U.S. Case

So far the analysis has focused exclusively on non-U.S. domiciled funds. To help insure the results are not due simply to some quirk in the foreign data, some of the tests are repeated here using data from U.S. domiciled funds.

Table 6 replicates the Table 5 Carhart tests on domestic U.S. funds for which the U.S. is their leading *but not only* investment market. Many of these funds have substantial foreign investments. Thus, as before, their returns are adjusted using international as well as domestic factors. The results are largely consistent with those on non-U.S. domiciled funds when funds are sorted based on the *Trade Competition I* variable and somewhat weaker when using *Trade Competition II*. Nevertheless, even in the latter case the top decile funds exhibit statistically and economically significant forecastable positive abnormal returns using 3 out of 5 alpha measures. In the other two cases, while statistically insignificant the alpha remains positive. Also paralleling the results using non-U.S. domiciled funds in almost every case the U.S. based funds facing either strong trading competition or limited resource devotion lack performance persistence. The one exception seems to be those facing low levels of trading competition based on the *Trade Competition II* measure but with limited resource support. In this one case it appears one can find alpha persistence in among the U.S. domiciled funds that is not apparent in the non-U.S. domiciled funds. It may be that relative to the rest of the world even a U.S. fund with limited resources has superior access to relevant research compared to their foreign locally based counterparts. Still, given the very marginal results using the parallel *Trade Competition I* measure it would be premature to conclude with any certainty that the U.S. domiciled funds are able to overcome limited resource provision relative to their foreign locally based counterparts.

V. Conclusion

Industries organize themselves in ways that most efficiently use resources and serve consumers. There is no reason to believe the mutual fund industry is any different. While there are no doubt any number of factors that have contributed to the rise of fund families, this paper suggests that one has been the efficient allocation of human capital.

In the mutual fund industry human capital comes in a variety of forms. Funds need good managers, analysts and marketing forces. When they come together the funds connected to them can be expected to prosper. A fund family offers a potentially efficient way to organize this talent. A team of managers increases the chances that a family can identify those with talent. If a family thinks a manager is particularly good it can assign him to an investment category where the competition is mild and thus persistent above market returns might be easier to produce. Families have numerous funds. That lets them create funds that invest in in broadly similar areas (like securities in emerging markets). These funds can share research and marketing support. Plus, their managers can offer each other insights that may help everyone in the group produce superior returns. Finally, a family can afford a good marketing group maximize the capital inflows good returns might generate. This paper argues that all of these factors help explain why fund families have come to dominate the industry.

The data provide considerable for this paper's thesis tying the efficient allocation of human capital to industrial organization of the mutual fund industry. Because fund families invest in numerous areas they have the option to, for example, place their better managers and resources in what this paper terms "low trading competition" areas. Indeed the paper finds that fund returns are better when they invest in low trading competition areas and have above average resource support. As one might expect, this pairing also helps to draw in new capital flows at a rate greater than would be produced by a fund that either faced a tougher trading environment or had fewer resources available for its support.

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Table 1: Summary Statistics

This table presents the summary statistics for data used in the paper between 2001 and 2008. Panel A reports the mean, median, standard deviation, and the quantile distribution of mutual fund monthly return, flow, annual fund characteristics, and quarterly competition and resource devotion proxies. Panel B reports the correlation among competition and resource allocation proxies. The Appendix provides the detailed definition of each variable.

Panel A: Quantile Distribution

			Quantile Distribution				
	Mean	Std.Dev.	10%	25%	Median	75%	90%
A1: Fund Return (in %)							
Total Return	0.758	4.284	-4.503	-1.496	1.026	3.397	5.715
Int'l Fama-French-Carhart adj.	0.233	1.726	-1.663	-0.651	0.178	1.065	2.214
Seven-factor adjusted	0.342	2.431	-2.416	-0.925	0.206	1.569	3.262
Benchmark adjusted	-0.003	1.982	-2.081	-0.921	-0.015	0.885	2.113
Benchmark & Int'l Fama-French-Carhart adj.	-0.006	1.476	-1.614	-0.733	-0.031	0.687	1.635
Benchmark & 7-factor adj.	0.002	1.680	-1.828	-0.809	-0.011	0.795	1.853
A2: Fund Characteristics							
Flow (in %)	1.638	16.558	-3.145	-1.377	-0.075	1.833	6.538
Log (TNA)	5.430	1.615	2.884	5.131	6.120	6.183	6.402
Expense Ratio	1.350	0.205	1.309	1.320	1.386	1.390	1.392
Turnover	1.112	0.313	0.986	1.042	1.052	1.271	1.290
Log (Age)	1.710	0.814	0.693	1.099	1.872	2.197	2.708
A3: Family Asset Growth							
Mkt. Share Chng. (bps)	3.387	38.950	-7.996	-0.871	0.072	2.248	13.328
TNA Growth (in %)	0.059	9.139	-9.175	-3.389	0.582	4.041	8.027
Family Flow (in %)	0.438	6.211	-3.777	-1.596	-0.118	1.564	4.673

A4: Competition and Resource Proxies

Trade Competition I	0.797	0.175	0.544	0.674	0.814	0.964	0.982
BigFund-to-All	0.666	0.174	0.405	0.563	0.701	0.800	0.863
BigFam-to-All	0.878	0.159	0.636	0.857	0.950	0.977	0.986
BigGroup-to-All	0.774	0.094	0.669	0.747	0.795	0.827	0.861
Bank-to-All	0.186	0.133	0.062	0.079	0.124	0.286	0.395
Trade Competition II	3.301	0.417	2.661	3.089	3.427	3.606	3.716
Resource Devotion	0.421	0.302	0.080	0.148	0.333	0.667	0.900
International-to-Dom	1.289	2.044	0.078	0.103	0.472	1.043	4.255
SameLead-to-Dom	0.616	1.515	0.000	0.000	0.000	0.257	2.375

Table 1—Continued

Panel B: Correlation among Competition Proxies

					Bank-to-All	Trade Comp.II	Resource Devotion	Int'l-to-Dom	SameLead -to-Dom	Mkt Share Chng.	TNA Growth	Family Flow
BigFund-to-All	0.587	1.000										
BigFam-to-All	0.537	0.853	1.000									
BigGroup-to-All	0.291	0.492	0.665	1.000								
Bank-to-All	-0.522	-0.744	-0.675	-0.363	1.000							
Trade Comp. II	0.768	0.860	0.894	0.686	-0.553	1.000						
Capital Competition I	-0.465	-0.166	-0.191	-0.144	0.064	-0.346	1.000					
International-to-Dom	-0.403	-0.092	-0.112	-0.077	-0.003	-0.271	0.579	1.000				
SameLead-to-Dom	0.025	0.370	0.271	0.137	-0.456	0.157	0.325	0.859	1.000			
Market Share Change	-0.061	-0.059	-0.072	-0.075	0.057	-0.074	0.053	0.042	0.003	1.000		
TNA Growth	-0.005	0.005	-0.030	-0.085	-0.066	-0.053	-0.068	-0.044	-0.019	0.193	1.000	
Family Flow	0.049	0.078	0.027	-0.002	-0.122	0.022	-0.107	-0.057	-0.022	0.093	0.599	1.000

Table 2: Performance in Single-Sorted Fund Portfolios

At the beginning of each year, mutual funds are sorted into quartiles according to lagged trading competition proxies and resource devotion either on an equally weighted basis by fund or by TNA. Average MorningStar-reported total return and flow of funds are computed within each quartile, as well as the differences between quartiles with high or low competitions ("Top 25%−Bottom 25%"). Fund returns are further adjusted by the international Fama-French-Carhart model, Fung and Hsieh's (2001) seven-factor model, as well as the benchmark return of funds. For brevity, this table tabulates only the "Top 25%−Bottom 25%" statistics. Newey-West adjusted t-statistics are shown in parentheses. Numbers with "*", "**" and "***" are significant at the 10%, 5% and 1% level, respectively.

Sorted by:	Trade Competition		Resource Devotion	
	Trade Competition I	Trade Competition II	Fund Count	TNA-weighted
'Top 25%–Bottom 25%' of Return (in %)				
Fund Total Return	-0.129***	-0.136***	-0.004	0.024
	(-4.52)	(-4.54)	(-0.10)	(0.67)
International Fama-French-Carhart adjusted	-0.044***	-0.045***	-0.049**	-0.033
	(-3.41)	(-3.24)	(-2.38)	(-1.59)
Seven-factor adjusted	-0.063***	-0.069***	-0.015	0.001
	(-4.49)	(-4.53)	(-0.71)	(0.03)
Benchmark adjusted	-0.053***	-0.078***	-0.017	-0.007
	(-3.23)	(-4.44)	(-0.68)	(-0.29)

Table 3: Trading Competition and Resource Devotion's Impact on Performance

This table presents the results of the following quarterly Fama-MacBeth regressions, as well as their corresponding Newey-West adjusted t-statistics,

$$Perf_{f,t} = \alpha_0 + \beta_1 TraComp_{f,t-1} + \beta_2 ResDev_{f,t-1} + \beta_3 DummyRes_{f,t-1} + cM_{f,t-1} + e_{f,t},$$

where $Perf_{f,t}$ is the average monthly performance of fund f in quarter t, $TraComp_{f,t-1}$ and $ResDev_{f,t-1}$ refer to a list of trading and capital competition ratios (the Appendix provides the details), respectively and the vector M stacks all other control variables, including the log(TNA), the annual expense ratio, turnover ratio, and log(fund age). Panel A reports the regression parameters when fund returns are adjusted by the international Fama-French-Carhart model. In Panels B and C, returns are adjusted with the Fung and Hsieh's (2001) seven-factor model, as well as the leading benchmark of the fund. Numbers with "*", "**" and "***" are significant at the 10%, 5% and 1% level, respectively.

	TraComp = Trade Competition I ResDev = Resource Devotion				TraComp = Trade Competition II ResDev = Resource Devotion			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Panel A: International Fama-French-Carhart Model adjusted Return (in %) Regressed on Trading Competition and Resource Devotion Proxies								
Constant	0.045	-0.042	-0.039	0.035	0.025	-0.042	-0.059	0.031
	(1.15)	(-0.61)	(-0.56)	(0.84)	(0.61)	(-0.61)	(-0.82)	(0.74)
TraComp	-1.201***		-1.159***		-0.614***		-0.576***	
	(-4.58)		(-4.57)		(-5.98)		(-3.90)	
ResDev		0.089	-0.010			0.089	0.002	
		(1.66)	(-0.19)			(1.66)	(0.04)	
I{Bottom 25% TraComp} × I{Bottom 25% ResDev}				-0.008				-0.016
				(-0.28)				(-0.42)
I{Bottom 25% TraComp} × I{Top 25% ResDev}				0.081***				0.090**
				(2.81)				(2.25)
I{Top 25% TraComp} × I{Bottom 25% ResDev}				-0.072**				-0.019
				(-2.11)				(-0.84)
I{Top 25% TraComp} × I{Top 25% ResDev}				-0.019				0.039**
				(-0.65)				(2.24)
Log (TNA)	-0.013**	-0.006	-0.007	-0.013*	-0.007	-0.006	-0.003	-0.013*
	(-2.07)	(-0.66)	(-0.79)	(-1.89)	(-1.23)	(-0.66)	(-0.34)	(-1.87)
Expense Ratio	0.043***	0.025	0.015	0.048***	0.039***	0.025	0.026	0.049***
	(3.20)	(0.93)	(0.55)	(3.47)	(2.79)	(0.93)	(0.95)	(3.59)
Turnover	0.000	0.051***	0.055***	-0.000	0.001	0.051***	0.055***	-0.000
	(0.05)	(3.05)	(3.11)	(-0.05)	(0.14)	(3.05)	(3.00)	(-0.02)
Log (Age)	-0.012	-0.000	0.001	-0.011	-0.015**	-0.000	-0.000	-0.011
	(-1.50)	(-0.01)	(0.08)	(-1.40)	(-2.09)	(-0.01)	(-0.02)	(-1.43)

	TraComp = Trade Competition I ResDev = Resource Devotion				TraComp = Trade Competition II ResDev = Resource Devotion			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Panel B: Seven-factor Model adjusted Return (in %) Regressed on Trading Competition and Resource Devotion Proxies								
Constant	0.150***	0.153*	0.158*	0.136**	0.129**	0.153*	0.129	0.128**
	(2.84)	(1.73)	(1.79)	(2.45)	(2.40)	(1.73)	(1.43)	(2.36)
TraComp	-1.319***		-1.396***		-0.675***		-0.709***	
	(-3.01)		(-3.36)		(-4.30)		(-3.60)	
ResDev		0.044	-0.060			0.044	-0.058	
		(1.10)	(-1.32)			(1.10)	(-1.25)	
I{Bottom 25% TraComp} × I{Bottom 25% ResDev}				0.017				0.002
				(0.45)				(0.06)
I{Bottom 25% TraComp} × I{Top 25% ResDev}				0.096***				0.131***
				(4.65)				(3.36)
I{Top 25% TraComp} × I{Bottom 25% ResDev}				-0.015				-0.034
				(-0.35)				(-1.33)
I{Top 25% TraComp} × I{Top 25% ResDev}				-0.026				0.042
				(-0.60)				(1.34)
Log (TNA)	-0.025***	-0.023**	-0.024**	-0.024***	-0.019**	-0.023**	-0.019*	-0.024***
	(-3.13)	(-2.28)	(-2.55)	(-2.91)	(-2.4)	(-2.28)	(-1.96)	(-2.88)
Expense Ratio	0.006	-0.001	-0.012	0.010	0.003	-0.001	0.003	0.013
	(0.27)	(-0.02)	(-0.39)	(0.45)	(0.13)	(-0.02)	(0.08)	(0.65)
Turnover	-0.011	-0.009	-0.005	-0.012	-0.010	-0.009	-0.004	-0.011
	(-1.60)	(-0.30)	(-0.15)	(-1.66)	(-1.43)	(-0.30)	(-0.13)	(-1.63)
Log (Age)	0.012	0.009	0.011	0.012	0.009	0.009	0.009	0.012
	(0.75)	(0.45)	(0.55)	(0.74)	(0.55)	(0.45)	(0.44)	(0.75)
Panel C: Benchmark adjusted Return (in %) Regressed on Trading Competition and Resource Devotion Proxies								
Constant	0.128**	0.078	0.081	0.112**	0.103*	0.078	0.054	0.105*
	(2.38)	(0.81)	(0.81)	(2.08)	(1.98)	(0.81)	(0.52)	(1.92)
TraComp	-1.486***		-1.411***		-0.861***		-0.818***	
	(-4.74)		(-4.14)		(-6.70)		(-4.95)	
CapComp		0.003	-0.122**			0.003	-0.123*	
		(0.06)	(-2.31)			(0.06)	(-1.99)	
I{Bottom 25% TraComp} × I{Bottom 25% ResDev}				0.012				0.030
				(0.32)				(0.88)
I{Bottom 25% TraComp} × I{Top 25% ResDev}				0.106***				0.113**
				(2.80)				(2.27)
I{Top 25% TraComp} × I{Bottom 25% ResDev}				0.021				-0.044
				(0.31)				(-1.26)
I{Top 25% TraComp} × I{Top 25% ResDev}				0.027				0.048
				(0.38)				(1.21)
					-0.016*	-0.026**	-0.022*	-0.024**
Log (TNA)	-0.025**	-0.026**	-0.027**	-0.024**	(-1.90)	(-2.20)	(-1.91)	(-2.57)
	(-2.74)	(-2.20)	(-2.37)	(-2.67)	0.036	0.015	0.017	0.052**
Expense Ratio	0.043	0.015	0.004	0.047*	(1.56)	(0.40)	(0.44)	(2.07)
	(1.66)	(0.40)	(0.11)	(1.90)	-0.001	0.048	0.053	-0.002
Turnover	-0.002	0.048	0.053	-0.002	(-0.10)	(1.32)	(1.40)	(-0.35)
	(-0.28)	(1.32)	(1.42)	(-0.35)	-0.011	0.019	0.018	-0.006
Log (Age)	-0.006	0.019	0.020	-0.005	(-0.54)	(0.77)	(0.76)	(-0.30)
	(-0.29)	(0.77)	(0.82)	(-0.28)	0.103*	0.078	0.054	0.105*

Table 4: Resource Devotion and Performance's Impact on Family Asset Growth and Flows

This table presents the results of the following quarterly Fama-MacBeth regressions, as well as their corresponding Newey-West adjusted t-statistics,

$$Growth_{Fam,t} = \alpha_0 + \beta_1 Perf_{Fam,t-1} + \beta_2 Devotion_{Fam,t-1} + \beta_3 Perf_{Fam,t-1} \times Devotion_{Fam,t-1} + cM_{Fam,t-1} + e_{Fam,t},$$

where $Growth_{Fam,t}$ refers to the family-level asset, growth measured in a variety of ways, from its international funds. The indices Fam and t represent the family and quarter in question. The growth measures include$\Delta Market\ Share_{Fam,t}$ (the average monthly market share change in basis points), $TNA\ Growth_{Fam,t}$ (the average monthly total net assets growth in percentage) and $Flow_{Fam,t}$ (the average monthly flow in percentage). $Perf_{Fam,t-1}$ refers to the average monthly benchmark-adjusted return (Models 1 to 4) or its rank (Models 5 to 8). Ranks are normalized to a [0, 1] uniform distribution within the domicile country. The variable $ResDev_{Fam,t-1}$ is the ratio between the number of international funds within the family and the overall number of funds in the family. The vector M stacks all other control variables, including the log(family TNA), the annual expense ratio, turnover ratio, and log(age). When applicable, the family-level variables (e.g., performance, expense ratio, turnover ratio and age) are computed as the lagged TNA-weighted average of fund characteristics. In Panel A, market share change in a given month m is defined as $\Delta Market\ Share_{Fam,m} = TNA_{Fam,m}/\sum TNA_m - TNA_{Fam,m-1}/\sum TNA_{m-1}$, where $TNA_{Fam,m}$ is the TNA of all international funds in family Fam in month m, and $\sum TNA_m$ is the overall TNA of all international funds in the same country in that month. In Panel B, monthly TNA growth is defined as $TNA\ Growth_{Fam,m} = \left(TNA_{Fam,m} - TNA_{Fam,m-1}\right)/TNA_{Fam,m-1}$, where $TNA_{Fam,m}$ is defined as before. In Panel C, monthly family flow is defined as $Flow_{Fam,m} = \sum_{f\in Fam}\left[TNA_{f,m} - TNA_{f,m-1} \times \left(1 + R_{f,m}\right)\right] / \sum_{f\in Fam} TNA_{f,m-1}$, where $TNA_{f,m}$ is the TNA of international fund f in month m. Numbers with "*", "**" and "***" are significant at the 10%, 5% and 1% level, respectively.

	Perf = Benchmark-adjusted Return				Perf = Rank of Benchmark-adjusted Return			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Panel A: Out-of-sample Market Share Change (in bps) Regressed on Performance and Performance Rank								
Constant	-8.240	-9.789	-9.199	-9.138	-12.843	-9.789	-13.558**	-14.528
	(-0.78)	(-1.10)	(-1.08)	(-1.05)	(-1.69)	(-1.10)	(-2.24)	(-1.67)
Perf	0.552		0.732	-1.571	9.646***		9.520***	2.928
	(0.51)		(0.66)	(-1.19)	(5.13)		(5.24)	(1.27)
ResDev		4.884	4.073	3.684		4.884	3.153	-6.918
		(1.55)	(1.12)	(0.93)		(1.55)	(1.08)	(-1.65)
Perf × ResDev				4.919**				16.991**
				(2.48)				(2.65)
Log (TNA)	-0.186	-0.297	-0.161	-0.171	-0.140	-0.297	-0.124	0.040
	(-0.18)	(-0.23)	(-0.14)	(-0.15)	(-0.22)	(-0.23)	(-0.17)	(0.06)
Expense Ratio	1.664	1.517	1.174	0.687	1.895*	1.517	1.341	2.010
	(1.13)	(1.04)	(0.78)	(0.47)	(1.77)	(1.04)	(1.17)	(1.27)
Turnover	-1.680	-1.979	-1.791	-1.406	-2.191	-1.979	-2.120	-1.178
	(-0.62)	(-0.78)	(-0.65)	(-0.59)	(-0.94)	(-0.78)	(-0.9)	(-0.62)
Log (Age)	5.625	5.793	5.475	5.590	5.126	5.793	5.068	5.697
	(0.87)	(0.82)	(0.83)	(0.84)	(1.13)	(0.82)	(1.09)	(1.16)

	Perf = Benchmark-adjusted Return				Perf = Rank of Benchmark-adjusted Return			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Panel B: Out-of-sample Family TNA Growth (in %) Regressed on Performance and Performance Rank								
Constant	2.864**	3.322**	3.385**	3.731***	2.593**	3.322**	3.061**	3.753***
	(2.26)	(2.65)	(2.59)	(2.88)	(2.15)	(2.65)	(2.45)	(3.04)
Perf	0.188**		0.185**	-0.064	0.618***		0.761***	-0.574**
	(2.47)		(2.63)	(-0.61)	(5.96)		(6.7)	(-2.4)
ResDev		-0.828***	-0.803***	-0.881***		-0.828***	-0.895***	-2.754***
		(-3.63)	(-3.45)	(-3.03)		(-3.63)	(-4.23)	(-5.36)
Perf × ResDev				0.725***				3.237***
				(2.96)				(5.36)
Log (TNA)	-0.115	-0.165**	-0.154*	-0.156**	-0.105	-0.165**	-0.147*	-0.141*
	(-1.42)	(-2.23)	(-2.03)	(-2.21)	(-1.27)	(-2.23)	(-1.88)	(-1.77)
Expense Ratio	-0.178	-0.170	-0.165	-0.365***	-0.225	-0.170	-0.194	-0.312**
	(-0.94)	(-1.04)	(-0.90)	(-2.90)	(-1.42)	(-1.04)	(-1.25)	(-2.46)
Turnover	-0.612**	-0.642**	-0.672**	-0.584**	-0.540*	-0.642**	-0.603**	-0.504**
	(-2.05)	(-2.27)	(-2.30)	(-2.39)	(-1.97)	(-2.27)	(-2.27)	(-2.17)
Log (Age)	-0.550***	-0.444***	-0.492***	-0.546***	-0.626***	-0.444***	-0.560***	-0.537***
	(-4.85)	(-3.36)	(-4.21)	(-5.13)	(-5.06)	(-3.36)	(-4.62)	(-4.42)
Panel C: Out-of-sample Family Flow (in %) Regressed on Performance and Performance Rank								
Constant	2.579***	2.818***	2.860***	3.037***	2.300***	2.818***	2.558***	2.928***
	(3.70)	(3.78)	(3.86)	(3.88)	(3.12)	(3.78)	(3.30)	(3.60)
Perf	0.166***		0.161***	0.071	0.615***		0.700***	-0.192
	(3.44)		(3.55)	(0.89)	(8.80)		(9.93)	(-0.94)
ResDev		-0.469***	-0.461***	-0.571***		-0.469***	-0.525***	-1.832***
		(-4.86)	(-4.99)	(-4.25)		(-4.86)	(-6.31)	(-4.63)
Perf × ResDev				0.324*				2.200***
				(1.70)				(3.83)
Log (TNA)	-0.040	-0.064	-0.061	-0.063	-0.025	-0.064	-0.048	-0.045
	(-0.78)	(-1.47)	(-1.32)	(-1.64)	(-0.50)	(-1.47)	(-1.02)	(-1.02)
Expense Ratio	-0.187	-0.180	-0.168	-0.252	-0.239	-0.180	-0.211	-0.252
	(-1.46)	(-1.22)	(-1.22)	(-1.52)	(-1.61)	(-1.22)	(-1.34)	(-1.50)
Turnover	-0.251	-0.256	-0.276	-0.230	-0.195	-0.256	-0.224	-0.150
	(-0.94)	(-1.02)	(-1.08)	(-0.99)	(-0.77)	(-1.02)	(-0.93)	(-0.71)
Log (Age)	-0.590***	-0.539***	-0.560***	-0.583***	-0.660***	-0.539***	-0.629***	-0.595***
	(-4.72)	(-4.62)	(-4.69)	(-4.70)	(-4.38)	(-4.62)	(-4.32)	(-4.40)

Table 5: Carhart Tests on International Funds within Trading Competition and Resource Devotion Groups

This table conducts the Carhart's (1997) test on mutual funds within trading competition and resource devotion double-sorted groups. At the beginning of each month, mutual funds are independently double-sorted into four groups based on their lagged trading competition and resource devotion ratios (i.e., high-TraComp and high-ResDev, etc). Next, within each double-sorted group, funds are further sorted into deciles according to their past performance in the prior two years. Finally, in each month the decile portfolios are rebalanced to create fund-of-funds portfolios for which the out of sample performance are calculated. The decile returns are further adjusted by the international Fama-French-Carhart model (*Carhart*), the Fung and Hsieh's (2001) seven-factor model (*7-factor*), the leading benchmark of the fund (*BMK*), as well as the combination of benchmark and risk factors (*BMK & Carhart* or *BMK & 7-factor*). Panel A reports the risk-adjusted decile returns, as well as their Newey-West adjusted t-statistics for funds in low trading competition and high resource devotion group. The last line reports the performance difference between the top and bottom deciles of funds. Panel B reports similar statistics for funds in other trading competition and resource devotion groups. For brevity, Panel B only reports the performances of the high and low deciles, as well as the difference between the two. Numbers with "*", "**" and "***" are significant at the 10%, 5% and 1% level, respectively.

Panel A: Risk-adjusted Return (in %) for Carhart Deciles Formed Within Low Trading Competition and High Resource Devotion Fund Group

Risk Factors	Sorted by Trade Competition I and Resource Devotion					Sorted by Trade Competition II and Resource Devotion				
	Carhart	*7-factor*	*BMK*	*BMK & Carhart*	*BMK & 7-factor*	*Carhart*	*7-factor*	*BMK*	*BMK & Carhart*	*BMK & 7-factor*
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
1 (Low)	0.038	0.157	-0.175	-0.194	-0.203**	0.044	0.158	-0.176	-0.130	-0.116
	(0.20)	(0.73)	(-1.43)	(-1.59)	(-1.98)	(0.27)	(0.75)	(-1.57)	(-1.40)	(-1.61)
2	0.273*	0.237	-0.241**	-0.147	-0.164**	0.220	0.249	-0.216***	-0.200***	-0.105**
	(1.89)	(1.07)	(-2.40)	(-1.64)	(-2.24)	(1.36)	(1.14)	(-3.39)	(-2.95)	(-2.17)
3	0.228	0.174	-0.146**	-0.233***	-0.112*	0.329**	0.125	-0.223***	-0.122*	-0.116**
	(1.38)	(0.77)	(-2.13)	(-2.62)	(-1.78)	(2.07)	(0.60)	(-3.51)	(-1.84)	(-1.98)
4	0.457***	0.393*	-0.148***	-0.085	-0.007	0.353***	0.364*	-0.120***	-0.036	-0.057
	(3.34)	(1.90)	(-2.81)	(-0.86)	(-0.11)	(2.61)	(1.88)	(-2.74)	(-0.78)	(-1.42)
5	0.377**	0.200	0.012	-0.119	-0.195**	0.313**	0.316	-0.022	-0.191***	-0.075
	(2.16)	(0.82)	(0.19)	(-1.60)	(-2.37)	(1.98)	(1.41)	(-0.36)	(-2.73)	(-1.35)
6	0.474***	0.463*	-0.029	0.111	0.073	0.418***	0.304	-0.029	-0.039	-0.028
	(2.84)	(1.89)	(-0.31)	(0.83)	(1.02)	(2.64)	(1.31)	(-0.53)	(-0.76)	(-0.60)
7	0.458***	0.180	0.042	0.150	0.017	0.419**	0.420*	-0.005	-0.008	0.008
	(2.58)	(0.69)	(0.76)	(1.24)	(0.17)	(2.31)	(1.87)	(-0.08)	(-0.09)	(0.15)
8	0.427**	0.722***	0.161	-0.146	0.168*	0.507***	0.605**	0.053	-0.227**	0.070
	(2.12)	(2.73)	(1.44)	(-1.06)	(1.68)	(3.10)	(2.57)	(0.56)	(-2.32)	(0.75)
9	0.531**	0.621**	0.262**	0.191	0.231*	0.615***	0.399	0.272***	0.186*	0.203**
	(2.12)	(2.16)	(2.15)	(1.40)	(1.72)	(3.01)	(1.53)	(3.13)	(1.73)	(2.15)
10 (High)	0.798**	0.855**	0.565***	0.566***	0.639***	0.874***	0.716**	0.386**	0.230**	0.237
	(2.51)	(2.32)	(2.75)	(3.26)	(3.76)	(3.60)	(2.03)	(2.09)	(2.07)	(1.45)
High−Low	0.874***	0.698**	0.740***	0.595**	0.787***	0.776***	0.515**	0.562***	0.284**	0.353*
	(3.37)	(2.45)	(3.08)	(2.52)	(3.23)	(4.29)	(2.11)	(2.60)	(2.10)	(1.73)

Panel B: Risk-adjusted Return (in %) for Carhart Deciles Formed Within Other Trading Competition and Resource Devotion Double-sorted Fund Groups

Risk Factors	Sorted by Trade Competition I and Resource Devotion					Sorted by Trade Competition II and Resource Devotion				
	Carhart	*7-factor*	*BMK*	*BMK & Carhart*	*BMK & 7-factor*	*Carhart*	*7-factor*	*BMK*	*BMK & Carhart*	*BMK & 7-factor*
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
B1: Low Trading Competition and Low Resource Devotion Fund Group										
1 (Low)	0.074	0.202	-0.158	-0.058	0.062	0.402	0.084	-0.208	0.078	-0.118
	(0.29)	(0.97)	(-1.30)	(-0.49)	(0.54)	(1.34)	(0.49)	(-1.51)	(0.66)	(-1.24)
10 (High)	0.612**	0.536	0.405*	0.073	0.209	0.925***	0.546	0.521***	0.346**	0.177
	(2.08)	(1.46)	(1.71)	(0.33)	(0.99)	(3.81)	(1.62)	(3.01)	(2.20)	(1.05)
High−Low	0.504*	0.334	0.564**	0.116	0.147	0.339	0.462	0.729***	0.298	0.295
	(1.69)	(1.13)	(2.11)	(0.53)	(0.51)	(1.26)	(1.42)	(3.30)	(1.51)	(1.38)
B2: High Trading Competition and Low Resource Devotion Fund Group										
1 (Low)	0.184	-0.368**	-0.347**	-0.101	-0.224**	0.130	-0.067	-0.237	-0.278**	-0.086
	(1.35)	(-2.00)	(-2.45)	(-1.25)	(-2.06)	(0.78)	(-0.29)	(-1.21)	(-2.40)	(-0.52)
10 (High)	0.358***	0.126	0.239*	-0.187	0.073	0.014	0.069	-0.034	-0.173	-0.060
	(2.63)	(0.58)	(1.67)	(-1.01)	(0.68)	(0.06)	(0.29)	(-0.18)	(-0.90)	(-0.43)
High−Low	0.173	0.494*	0.586***	-0.086	0.297	0.066	0.136	0.203	0.096	0.026
	(0.93)	(1.81)	(2.91)	(-0.41)	(1.48)	(0.29)	(0.41)	(0.74)	(0.47)	(0.11)
B3: High Trading Competition and High Resource Devotion Fund Group										
1 (Low)	0.142	-0.202	-0.269**	-0.149	-0.141	0.137	-0.273	-0.223	-0.064	-0.155
	(0.96)	(-1.08)	(-2.12)	(-1.28)	(-1.31)	(0.80)	(-1.43)	(-1.38)	(-0.68)	(-1.15)
10 (High)	0.323	0.207	0.181	-0.007	-0.008	0.583***	0.346	0.200	0.021	0.044
	(1.16)	(0.89)	(1.27)	(-0.06)	(-0.07)	(3.11)	(1.10)	(1.40)	(0.20)	(0.38)
High−Low	0.415*	0.409	0.451**	0.154	0.133	0.378*	0.620*	0.423**	0.142	0.199
	(1.78)	(1.60)	(2.36)	(0.80)	(0.70)	(1.84)	(1.78)	(1.96)	(0.96)	(0.93)

Table 6: Carhart Tests on U.S. Domiciled Funds

This table conducts excess return tests using the same procedure as described in Table 5, with two significant differences. First, the data come from mutual funds domiciled in the U.S and with the U.S. as their leading *but not exclusive* investment country. Second, the alphas are estimated using benchmarks appropriate to funds investing in the U.S. The decile returns are further adjusted by the international Fama-French-Carhart model (*Carhart*), the Fung and Hsieh's (2001) seven-factor model (*7-factor*), the leading benchmark of the fund (*BMK*), as well as the combination of benchmark and risk factors (*BMK & Carhart* or *BMK & 7-factor*). Panel A reports the risk-adjusted decile returns, as well as their Newey-West adjusted *t*-statistics for funds in low trading competition and high resource devotion group. The last line reports the performance difference between the top and bottom deciles of funds. Panel B reports similar statistics for funds in other trading competition and resource devotion groups. For brevity, Panel B only reports the performances of the high and low deciles, as well as the difference between the two. Numbers with "*", "**" and "***" are significant at the 10%, 5% and 1% level.

Panel A: Risk-adjusted Return (in %) for Carhart Deciles Formed Within Low Trading Competition and High Resource Devotion Fund Group

Risk Factors	Sorted by Trade Competition I and Resource Devotion					Sorted by Trade Competition II and Resource Devotion				
	Carhart	*7-factor*	*BMK*	*BMK & Carhart*	*BMK & 7-factor*	*Carhart*	*7-factor*	*BMK*	*BMK & Carhart*	*BMK & 7-factor*
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
1 (Low)	0.286*	-0.039	-0.252*	0.047	-0.097	0.196	-0.043	-0.280***	-0.064	-0.021
	(1.68)	(-0.23)	(-1.84)	(0.48)	(-0.70)	(0.89)	(-0.28)	(-2.62)	(-0.71)	(-0.18)
2	0.292***	0.003	-0.162**	-0.042	-0.128**	0.205**	-0.078	-0.265***	-0.039	-0.053
	(3.25)	(0.03)	(-2.49)	(-0.68)	(-2.35)	(2.32)	(-0.66)	(-3.32)	(-0.75)	(-0.88)
3	0.152	-0.304**	-0.180***	-0.135	-0.139*	0.184**	-0.116	-0.155*	-0.137*	-0.158**
	(1.41)	(-2.16)	(-2.69)	(-1.49)	(-1.76)	(2.12)	(-0.92)	(-1.94)	(-1.93)	(-2.20)
4	0.152	-0.037	-0.086	0.060	-0.153***	0.212**	0.145	-0.067	-0.076	-0.141*
	(1.03)	(-0.41)	(-1.18)	(0.45)	(-3.36)	(2.35)	(1.50)	(-1.28)	(-1.41)	(-1.94)
5	0.317***	-0.060	-0.056	-0.066	0.050	0.073	-0.038	-0.036	-0.080	-0.064
	(3.25)	(-0.48)	(-0.94)	(-1.01)	(0.85)	(0.82)	(-0.43)	(-0.53)	(-1.17)	(-0.93)
6	0.204	0.148	0.046	0.039	0.026	0.070	0.071	0.015	0.035	0.056
	(1.43)	(1.42)	(0.80)	(0.57)	(0.39)	(0.68)	(0.70)	(0.24)	(0.50)	(0.92)
7	0.133	0.258	0.216	-0.122	-0.010	0.355***	0.124	0.076	-0.166*	0.055
	(1.00)	(1.55)	(1.60)	(-1.31)	(-0.08)	(3.72)	(1.14)	(1.02)	(-1.77)	(0.67)
8	0.271*	0.020	0.023	0.070	0.026	0.114	0.093	0.061	-0.158*	-0.058
	(1.93)	(0.13)	(0.28)	(0.64)	(0.32)	(0.77)	(0.68)	(1.00)	(-1.76)	(-0.74)
9	0.605***	0.449**	0.026	0.286**	0.342***	0.260***	0.253	0.138	0.093	0.164**
	(3.73)	(2.38)	(0.25)	(1.98)	(2.79)	(2.84)	(1.61)	(1.51)	(1.25)	(2.27)
10 (High)	0.756***	0.724**	0.550***	0.326**	0.490***	0.811***	0.440	0.394**	0.244**	0.123
	(3.36)	(2.23)	(2.72)	(1.98)	(2.74)	(4.14)	(1.32)	(1.98)	(2.42)	(0.75)
High−Low	0.319	0.676*	0.803***	0.112	0.484*	0.507**	0.483	0.674***	0.308**	0.144
	(1.35)	(1.91)	(3.28)	(0.62)	(1.80)	(2.34)	(1.42)	(2.98)	(2.28)	(0.57)

Panel B: Risk-adjusted Return (in %) for Carhart Deciles Formed Within Other Trading Competition and Resource Devotion Double-sorted Fund Groups

Risk Factors	Sorted by Trade Competition I and Resource Devotion					Sorted by Trade Competition II and Resource Devotion				
	Carhart	*7-factor*	*BMK*	*BMK &*	*BMK & 7-*	*Carhart*	*7-factor*	*BMK*	*BMK &*	*BMK & 7-*
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
B1: Low Trading Competition and Low Resource Devotion Fund Group										
1 (Low)	0.300	-0.079	-0.146	0.025	0.085	0.481*	-0.103	-0.152	0.057	-0.095
	(1.11)	(-0.43)	(-0.89)	(0.21)	(0.56)	(1.88)	(-0.75)	(-1.06)	(0.49)	(-1.01)
10 (High)	0.567*	0.342	0.292	0.061	0.013	0.688***	0.575**	0.532***	0.467**	0.331*
	(1.90)	(0.96)	(1.24)	(0.25)	(0.06)	(2.97)	(2.25)	(2.69)	(2.36)	(1.67)
High−Low	0.204	0.326	0.438	0.057	-0.072	0.228	0.451*	0.684***	0.139	0.201
	(0.68)	(0.80)	(1.52)	(0.22)	(-0.22)	(0.96)	(1.81)	(2.79)	(0.67)	(0.97)
B2: High Trading Competition and Low Resource Devotion Fund Group										
1 (Low)	0.123	-0.373**	-0.395**	-0.165*	-0.237**	0.004	-0.307	-0.283	-0.298***	-0.215
	(0.81)	(-2.04)	(-2.54)	(-1.72)	(-2.10)	(0.03)	(-1.31)	(-1.42)	(-2.79)	(-1.25)
10 (High)	0.423***	0.077	0.266*	-0.168	0.073	0.255	0.114	-0.064	-0.075	0.007
	(2.81)	(0.41)	(1.77)	(-0.88)	(0.73)	(0.90)	(0.51)	(-0.31)	(-0.31)	(0.05)
High−Low	0.300	0.450*	0.662***	0.248	0.309	0.292	0.526*	0.219	0.227	0.303
	(1.42)	(1.80)	(3.05)	(1.44)	(1.62)	(1.00)	(1.74)	(0.75)	(0.86)	(1.42)
B3: High Trading Competition and High Resource Devotion Fund Group										
1 (Low)	0.018	-0.319	-0.389***	-0.167*	-0.178*	0.097	-0.324	-0.287*	-0.046	-0.189
	(0.16)	(-1.60)	(-3.17)	(-1.81)	(-1.65)	(0.65)	(-1.41)	(-1.69)	(-0.47)	(-1.21)
10 (High)	0.316*	0.143	0.183	0.008	0.099	0.348*	0.169	0.198	0.138	0.077
	(1.66)	(0.76)	(1.57)	(0.07)	(1.08)	(1.82)	(0.74)	(1.30)	(0.97)	(0.69)
High−Low	0.327	0.446*	0.572***	0.242	0.275*	0.251	0.493	0.485**	0.062	0.286
	(1.37)	(1.79)	(3.38)	(1.38)	(1.75)	(1.07)	(1.43)	(2.13)	(0.34)	(1.18)