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UNEXPLOITED GAINS FROM INTERNATIONAL DIVERSIFICATION: PATTERNS OF PORTFOLIO HOLDINGS AROUND THE WORLD

Tatiana Didier, Roberto Rigobon, and Sergio L. Schmukler*

Abstract—Using unique data on mutual fund portfolios with different investment scopes, we study the extent of international diversification. Mutual funds invest in a surprisingly limited number of stocks—about 100. The number of holdings from a given region declines as the investment scope broadens. Moreover, unexploited gains exist from international diversification. Funds that invest globally could achieve better risk-adjusted returns by adding stocks held by more specialized funds within the same family. These findings are not driven by different sectoral allocations, lack of information or instruments, transaction costs, or different tail risks. Instead, organizational factors might play an important role.

I. Introduction

SINCE the 1990s, the growth in financial globalization has been remarkable. Institutional investors have been significant contributors to this growth by purchasing foreign assets. Given standard economic theory, one might expect to see significant international diversification accompanying the globalization process. Yet, to date, little evidence exists on how investors allocate their global portfolios and what determines their decisions.

In this paper, we aim to fill this gap in the literature by constructing and analyzing a unique micro data set of asset-level portfolios for a group of relevant global institutional investors: U.S. equity mutual funds with an international investment scope. We document important stylized facts regarding their global asset allocations and analyze the drivers of their portfolio decisions.

The data on mutual funds offer significant advantages for the empirical analysis. First, mutual funds, unlike other

types of investors, face regular reporting requirements. Thus, a data set based on asset-level portfolios can be constructed and traced for a relatively long time. Second, the structure of mutual fund families allows us to make within-family comparisons between the behavior of specialized funds (which can invest only in certain countries or regions) and global funds (which can invest anywhere in the world and thus have access to a larger set of firms from more countries). For mutual fund managers, knowing that a fund holds certain stocks is an indication that the transaction costs to hold them are not exceedingly large and that those stocks are indeed desirable (at least to other fund managers within the same family). Moreover, information about those stocks has already been collected at the firm level and, in principle, might be available to all managers in that family. Therefore, the relevance of information sharing and transaction costs discussed in the literature can be analyzed by comparing portfolios across funds within the same mutual fund family and across families. In addition, the returns of specialized funds can be compared to those of global funds. These returns are net of the transaction costs that funds pay when investing in different types of stocks.

We collect portfolio holding and return data for the universe of actively managed open-end U.S. equity mutual funds established to purchase assets around the world. The data on holdings contain asset-level annual portfolios between 1991 and 2005. We work with 499 fund families and 1,904 funds. The total number of fund-year observations is 8,420 and the total number of asset-level holdings for all funds in all years is 1,359,750. We compute daily returns at the fund level using a longer time series (between September 1989 and June 2006) for 36 fund families that have a variety of mutual funds for which useful comparisons can be made. We work with a total of 722,885 daily observations that comprise the returns from all of the funds in these families.

Four initial stylized facts about the international investments of mutual funds emerge from our analysis. First, global funds have grown much more than specialized funds. Second, both specialized and global mutual funds hold a similar number of stocks (the average number of stocks is 150, and the median 95). In fact, the number of asset holdings in the mutual fund portfolios does not tend to be higher for global funds compared to specialized funds within the same mutual fund family, even though the pool of investable assets is significantly larger for global funds. Third, within each region of exposure, global funds hold fewer assets from fewer countries when compared to specialized funds within the same mutual fund family. Fourth, this reduction in the number of stocks is not matched by a reduction in the number of economic sectors they invest in.

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In fact, the sectoral allocation is similar across global and specialized funds. This investment pattern of global funds is relevant because these funds are investing an increasing amount of resources in stocks from a limited set of companies and countries.

The natural question then is, what might explain this restrictive investment practice? First, instrument availability or transaction costs do not appear to be the driving forces. The cross-fund comparison is especially revealing in this case: the fact that one particular fund holds a certain stock is an indication that no clear investment restrictions related to that company exist and that the transaction costs are small enough for that fund to hold that stock. Our point of comparison is the funds within the same family that differ only in their investment scope. For example, global funds, which hold particularly few stocks, could expand their holdings by investing in the stocks that specialized funds within the same firm hold.

Second, by itself, the lack of information at the family level does not seem to explain the apparent lack of international diversification by mutual funds. The problem seems to reside on how information is used across funds within a family. If global and specialized funds within families share information and make similar decisions, one can expect to observe similar portfolios among them. However, we find that the portfolios of global and specialized funds within families are different and that global funds do not seem to follow specialized funds in their portfolio allocations. We also find that the portfolios become more similar when global and specialized funds are managed by some of the same managers, and the similarity increases with the number of common managers. This evidence does not appear to be consistent with managers using, to a large extent, information already gathered or processed by other managers within the same mutual fund family; instead, the evidence seems consistent with competition between managers.

Third, mutual fund family effects appear to be a strong driving factor behind the portfolio choices of individual funds. A large dispersion exists in the number of stocks held around the world by mutual funds across different families. Family effects explain almost 50% of the cross-sectional and time series variation in the number of stock holdings and the loadings on the top ten holdings. These effects vastly exceed the explanatory power of the commonly used measures that capture the abilities of funds and managers to gather and process information and select portfolios.

The fact that global funds do not tend to hold more stocks than specialized funds does not necessarily imply a diversification loss for the investors who own the global funds. If asset returns within and across countries are perfectly correlated, global funds will be able to obtain the same degree of diversification benefits as specialized funds by holding fewer stocks, possibly in fewer countries. Thus, return correlations could account for the patterns observed in the data.

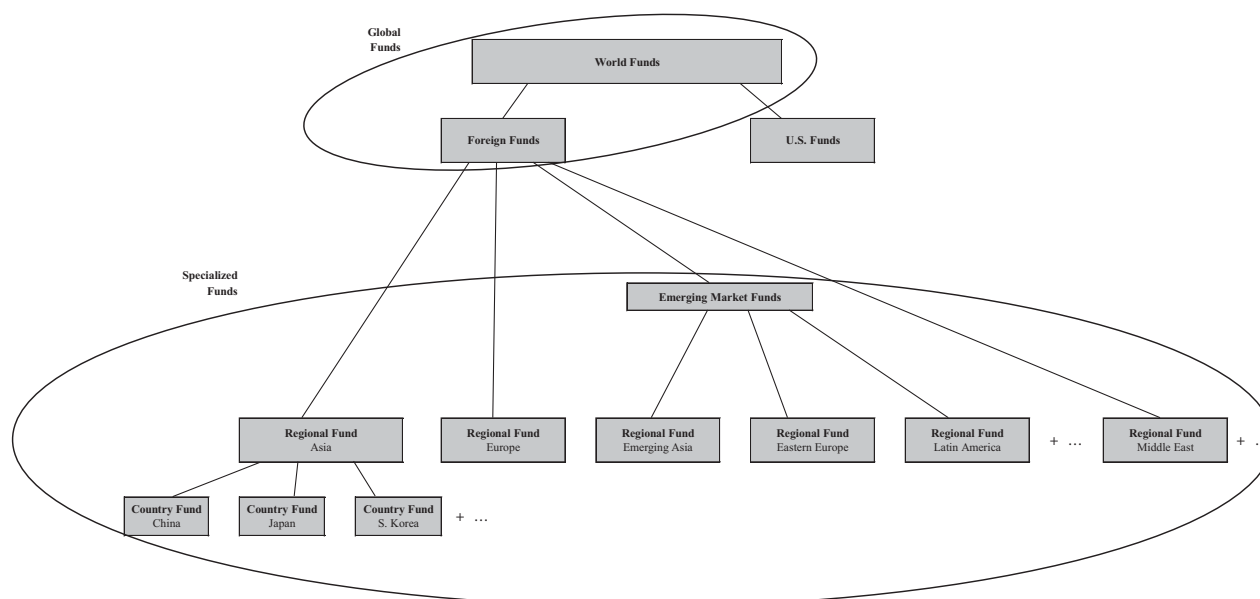
Our analysis suggests that unexploited diversification gains exist and that global funds could benefit from investing in more stocks. To explore this possibility, we first use a mean-variance optimization framework to estimate the performance of simulated global funds, each constructed as a portfolio of specialized funds within a mutual fund family. We then compare the performance of these simulated global funds to that of the corresponding actual global funds within the same family. This exercise is very restrictive because the simulated global funds cannot hold any stock available to any specialized fund; rather, they must invest in a portfolio already held by another fund within their fund family. This restriction guarantees that the stocks are available for investment and are attractive to at least one other manager in the same family and that information about the stocks has already been collected and analyzed by someone working within the same organization as the global fund manager. Our results suggest that global funds could obtain better risk-adjusted returns (between 2.6% and 5.5% per year) if they invest in portfolios that include holdings similar to those of specialized funds within the same mutual fund family.

We also explore whether there is an insurance premium in the returns of global funds. Because global funds can secure gains by moving away from troubled countries, investors might be willing to pay for this benefit and accept lower expected returns. However, global funds do not seem to better shield investors from tail risk. The skewness and the kurtosis of the global fund returns are similar to those of the simulated global funds. Moreover, conditional on large negative returns from either the specialized funds or the MSCI Emerging Market Index, the returns from the simulated global funds are broadly similar to those of the global funds. In sum, the lack of diversification in global funds does not seem to be explained by a better performance during turbulent times.

The analysis in this paper of microlevel international portfolios allows us to contribute to several strands of the academic literature. Our focus on mutual funds with a global reach enables us to shed light on the forces behind the growing but still limited international diversification. Importantly, by studying mutual fund portfolios within and across fund families (companies), we depart from the standard approach in the international diversification literature that focuses mostly on aggregate measures to characterize investment patterns across countries.¹ Moreover, our analysis on how the organization of financial intermediaries can affect investment decisions complements the industrial organization literature. This literature suggests that management practices and idiosyncratic firm effects can explain

¹ Although researchers have begun to exploit asset-level data, as in Strong and Xu (2003), Edison and Warnock (2004), Eun, Huang, and Lai (2008), and Hau and Rey (2008), the evidence remains scarce. For some of the aggregate evidence, see, for example, Tesar and Werner (1995), Kraay et al. (2005), Portes and Rey (2005), and Lane and Milesi-Ferretti (2008).

FIGURE 1.—STYLIZED STRUCTURE OF THE U.S. MUTUAL FUND FAMILIES



This figure characterizes the organizational structure of the U.S. mutual fund families that invest in foreign assets. The figure also shows our classification criteria for global and specialized funds. Global funds comprise both world and foreign funds. Specialized funds comprise emerging market, regional, and country funds. The names used in this figure to characterize specialized funds are just examples.

corporate behavior, diversification, and performance.² Our paper is also related to the finance literature that argues that incentive misalignments might lead managers to hold sub-optimal portfolios for investors.³ Furthermore, by analyzing mutual funds with different investment scopes across countries, we contribute to the literature on the investment patterns of institutional investors.⁴

The rest of the paper is organized as follows. Section II describes the data. Section III studies how mutual funds allocate their portfolios internationally. Section IV analyzes the factors behind the degree of diversification. Section V studies whether there are potential costs to the diversification strategies of global funds. Section VI concludes.

II. Data

We use two types of data: holdings and returns from equity funds in the large and sophisticated U.S. mutual fund industry, established to purchase assets around the world.

² A number of papers in this literature emphasize these effects in different contexts. See Nelson (1991), Bartelsman and Doms (2000), Black and Lynch (2001), Bertrand and Schoar (2003), Bloom and Van Reenen (2007), and Gibbons and Henderson (2012), among many others.

³ See Shleifer and Vishny (1990), Brown, Harlow, and Starks (1996), Chevalier and Ellison (1997, 1999), Dow and Gorton (1997), Bolton, Freixas, and Shapiro (2004), and Stein (2005), among others.

⁴ A strand of this literature studies the investment patterns of institutional investors in foreign markets. See, for example, Kang and Stulz (1997), Dahlquist and Robertsson (2001), Grinblatt and Keloharju (2001), Kim and Wei (2002), Kaminsky, Lyons, and Schmukler (2004), Chan, Covrig, and Ng (2005), Gelos and Wei (2005), Broner, Gelos, and Reinhart (2006), Jotikasthira, Lundblad, and Ramadorai (2012), and Raddatz and Schmukler (2012).

The U.S. mutual fund industry is organized by splitting funds according to their investment scope (figure 1). In particular, five classifications exist: world funds, foreign funds, emerging market funds, regional funds, and country funds. World funds invest all over the world, including the United States. Foreign funds invest around the world, excluding the United States. Emerging market funds invest only in emerging market assets. Regional funds invest only in specific regions and are typically called Asia (and Pacific) funds, Europe funds, Latin America (and Caribbean) funds, and so forth. Country funds are similar in that they invest only in specific countries. For ease of exposition, we group the funds into two categories: global funds and specialized funds. Global funds encompass world funds and foreign funds. All other fund types are called specialized funds, and each of these funds can invest only in a subset of the assets available to global funds. Global funds are always able to invest in the stocks held by specialized funds, but not vice versa.

The data on the mutual fund portfolio holdings come from Morningstar. Using the last reported portfolio for each fund in any given year, we compile end-of-year detailed information on the portfolio holdings between 1991 and 2005. We gather information on the stock names, the amount invested in each stock by each fund, the sectoral classification, and the country of origin for the stocks (regardless of where they trade).⁵ One difficulty in constructing this database is that mutual funds report their

⁵ The funds considered in the analysis invest almost exclusively in publicly listed companies. Although mutual funds are allowed to invest at most 15% of their assets in illiquid or thinly traded securities (including private companies), investment in private firms appears to be, if any, very small (typically less than 0.3% of the portfolios).

asset allocations separately over time. Therefore, each security needs to be identified at each point in time and then matched over time with the different fund portfolios.

We collect data on 8,420 fund-year portfolio holdings that cover 499 mutual fund families (companies) with a total of 1,904 funds. Each mutual fund family has on average four different funds. While some families sell the same portfolio to investors under slightly different names depending on their fee structure and minimum investment requirements, we consider these different funds with identical portfolios only once (we do not treat them as separate funds). The total number of asset-level observations in our data set is 1,359,750, counting each stock-level allocation across all of the funds over time.

We also collect the time series of mutual fund returns. Because these are open-end funds, the value of each fund each day (or net asset value, NAV) reflects the value of its underlying holdings. To be able to compare returns across funds within families, we restrict our focus to large families with several types of funds. We thus use daily returns at the fund level between September 1989 and June 2006 for 36 mutual fund families. We work with a total of 722,885 daily observations that comprise all of the returns for all of the funds in our sample. We include all funds within a given family. On average, each family in the sample has ten distinct mutual funds.⁶

III. How Do Mutual Funds Allocate Their Portfolios Globally?

The U.S. mutual fund industry's activity in international markets has expanded sharply since the early 1990s. For example, in 1991 there were fewer than 170 mutual funds established to invest in international equity, while in 2005 there were almost 700 funds (490 global). The number of global funds increased steadily until the early 2000s. Relative to global funds, specialized funds were important initially, increased until 1998, and declined afterward (figure 2, panel A). The differences are even starker in terms of assets under management. Global (specialized) funds managed \$29 (\$7) billion in 1991 and \$781 (\$160) billion in 2005. The data show a clear trend in favor of the funds with a wider investment scope relative to the funds that invest in specific regions or countries.⁷

As the investment scope expands, do mutual funds hold more assets across more countries? Table 1 (top panel) pre-

sents the average, the median, and the standard deviation of the number of holdings across the different mutual fund types over the entire 1991–2005 period. The table shows that the median number of holdings for world funds is 106 stocks and for foreign funds is 105 stocks, while the median for emerging market funds is 121 stocks. The medians for the more specialized Europe and Asia funds are 71 and 65 stocks, respectively, while those for Latin America and country funds are 56 and 63 stocks, respectively. The number of asset holdings in the mutual fund portfolios does not tend to be higher for global funds than for specialized funds, even though the pool of investable assets is significantly larger for global funds. Moreover, the median number of stock holdings for the different mutual fund types is very stable over the fifteen-year period and not very different across fund types (figure 2, panel B). In other words, the data suggest that mutual fund managers tend to invest in a limited number of stocks that does not increase significantly as the investment scope widens, even as the amount of money these funds manage rises markedly over time.

Do global funds hold fewer assets from fewer countries in each region than specialized funds within the same mutual fund family? The results in table 2 show that this is the case. In fact, global funds hold significantly fewer stocks and countries. For example, emerging market funds hold on average 34% fewer assets in Latin America than Latin America funds, whereas foreign and world funds hold 93% and 94% fewer assets in this region, respectively. Moreover, the median number of countries is six in Latin America fund portfolios, whereas the median number of countries falls to less than two in global fund portfolios. We observe similar trends for Asia and Europe.

Are the holdings across countries related to funds investing in different economic sectors? Using the funds' own reporting, we classify stocks as belonging to one of the following sectors: consumer goods, financial services, health, industrial, services, technology, and utility.⁸ We compute the asset allocation for each type of fund in these different sectors and calculate the median allocation across funds. The results show that the asset allocations across these sectors are almost identical for global and specialized funds as well as across the different fund subtypes (table 3). Thus, the patterns of portfolio holdings across global and specialized funds are difficult to attribute to different sectoral allocations. This result is robust to a number of (unreported) alternative specifications, including the use of averages instead of medians, portfolio loadings in each sector instead of the number of stocks, and different definitions of the sectors (classifying stocks homogeneously across funds over time or using the Standard Industrial Classification (SIC)).⁹

⁶ See the working paper version of this paper, Didier, Rigobon, and Schmukler (2010), and the online appendix for more details on the collection, construction, and features of the data.

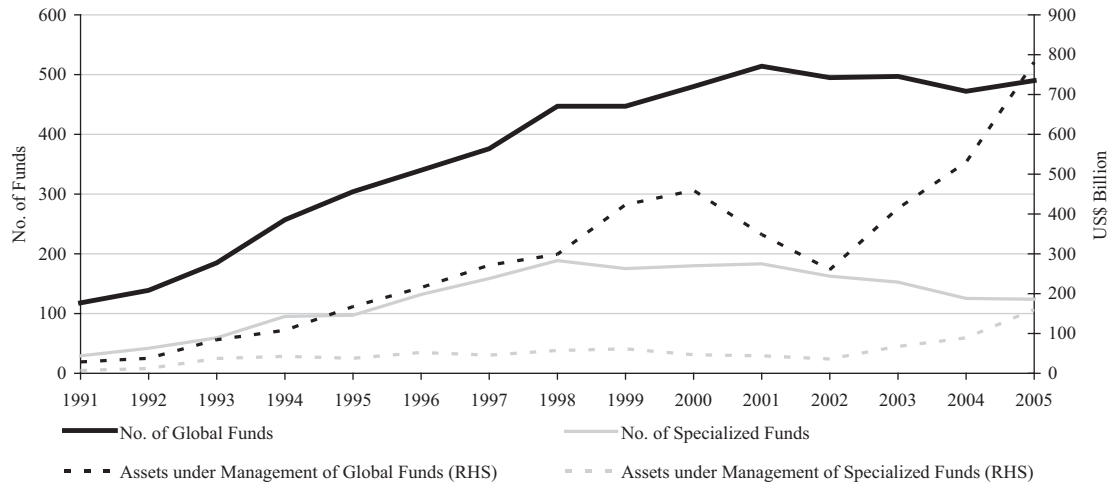
⁷ The increase in the number (and total assets) of global funds might be driven by a desire to have funds that can invest more freely around the world, while giving investors a unique global portfolio. Moreover, mutual fund families have incentives to offer a broad range of funds to investors. A greater number of funds allow companies to differentiate their products and likely expand their assets under management and their revenues. Different funds also give investors more flexibility to invest internationally according to their preferences and constraints.

⁸ If a fund does not identify a sectoral classification for a particular holding, we assign the classification most cited by other funds in our sample, which allows us to classify 96% of the stock holdings in our data.

⁹ See the online appendix.

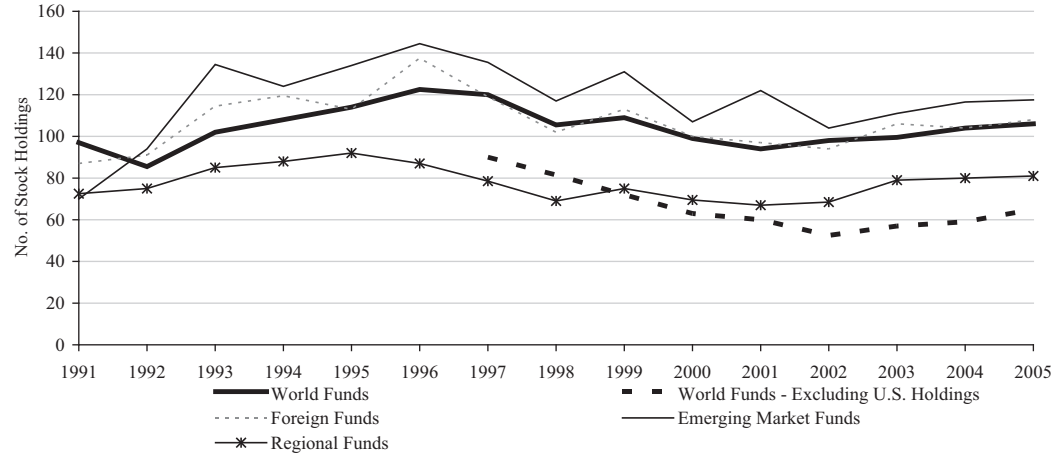
FIGURE 2.—NUMBER OF FUNDS, ASSETS UNDER MANAGEMENT, AND NUMBER OF HOLDINGS

A. Total Number of Funds and Total Assets under Management

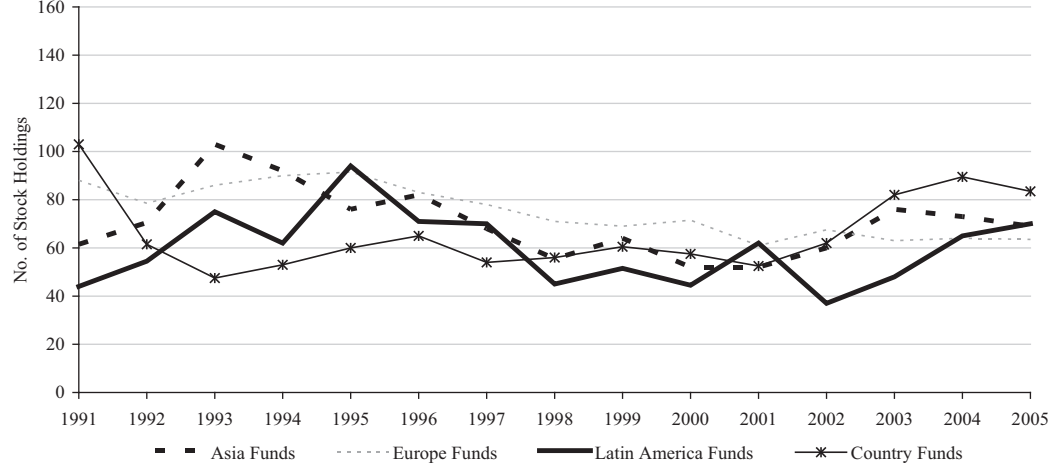


B. Median Number of Holdings

All Funds



Specialized Funds



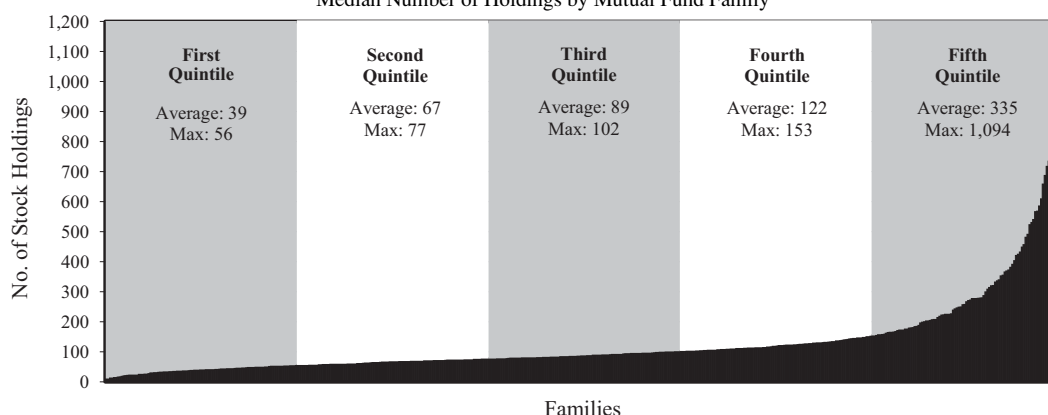
This figure shows the evolution of the total number of mutual funds (panel A), the total value of assets under management (panel A), and the median number of stock holdings by fund type (panel B) in our holdings database from 1991 to 2005. Global funds comprise world and foreign funds. Specialized funds comprise emerging market, regional, and country funds.

TABLE 1.—NUMBER OF MUTUAL FUND HOLDINGS

Fund Type	Average	Median	SD
Global funds	155	96	196
World funds	136	106	132
Excluding the U.S. holdings	101	76	100
Foreign funds	175	105	219
Specialized funds	117	79	136
Emerging market funds	161	121	138
Asia funds	89	65	110
Europe funds	111	71	158
Latin America funds	58	56	24
Country funds	126	63	178
All funds	150	95	186

Dispersion in the Number of Mutual Fund Holdings

Median Number of Holdings by Mutual Fund Family



The table in the top panel shows the average, the median, and the standard deviation of the number of stock holdings by fund type across all mutual funds over the 1991–2005 period. The figure in the bottom panel shows the dispersion in the number of stock holdings across mutual fund families. It shows the median number of stock holdings across all funds within each mutual fund family over the 1991–2005 period. All of the funds in any given family are considered for this figure. The families are then divided into five groups (quintiles). The average and maximum values for each quintile are reported.

TABLE 2.—DIFFERENCES IN HOLDINGS WITHIN REGIONS BY FUND TYPE

Fund Type: Regional Funds	Number of Stocks		
	Asia	Developed Europe	Latin America
Median number of holdings	60	62	41
Drop in the number of stocks in each region by fund type (in percent, relative to regional funds)			
Emerging market funds	–33%	–	–34%
Foreign funds	–42%	–5%	–93%
World funds	–69%	–49%	–94%
Fund Type: Regional Funds	Number of Countries		
	Asia	Developed Europe	Latin America
Median number of countries	8	12	6
Drop in the number of countries in each region by fund type (in percent, relative to regional funds)			
Emerging market funds	–10%	–	–17%
Foreign funds	–30%	0%	–72%
World funds	–36%	–14%	–75%

This table reports the differences in the regional portfolio allocations across fund types within mutual fund families over the 1997–2005 period. The top panel shows the differences in the number of stock holdings within each region across fund types. The bottom panel shows the differences in the number of countries receiving investments within each region across fund types. The first row within each panel reports the median number of stocks/countries in a given region that regional funds hold. The drop in the number of stocks/countries is calculated as the percentage change between the median number of stocks/countries held by emerging market, foreign, or world funds relative to regional funds. The comparisons are conducted within mutual fund families.

IV. What Factors Might Explain the Global Portfolio Allocations?

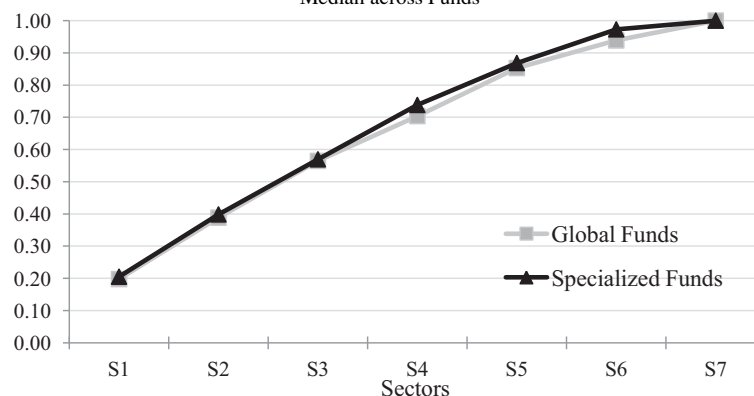
A. Asset Availability and Transaction Costs

As a first step to understanding why, as their investment scope broadens, mutual funds invest larger amounts in fewer

stocks and countries within each region of exposure, we analyze the universe of investable assets. Table 4 reports the number of listed stocks across different regions in 1997 and 2004. The table also reports the actual number of mutual fund holdings and the percentage of holdings relative to the number of listed companies. In 1997, mutual funds invested in about 9,000 different firms from around the world. In

TABLE 3.—ALLOCATION OF THE MUTUAL FUND HOLDINGS ACROSS SECTORS

Fund Type	Median Portfolio Allocation							
	Number of Classified Holdings	Consumer Goods (S1)	Financial Services (S2)	Health (S3)	Industrial (S4)	Services (S5)	Technology (S6)	Utility (S7)
Global funds	88	14%	20%	6%	16%	19%	8%	13%
World funds (excluding U.S. holdings)	63	15%	18%	6%	15%	20%	8%	12%
Foreign funds	96	14%	20%	6%	17%	19%	8%	13%
Specialized funds	69	13%	20%	3%	16%	19%	9%	15%
Emerging market funds	106	13%	20%	2%	19%	17%	10%	18%
Asia funds	56	13%	22%	2%	14%	19%	13%	11%
Europe funds	64	13%	22%	8%	14%	19%	7%	14%
Latin America funds	42	14%	14%	0%	21%	26%	0%	18%
Country funds	75	6%	17%	2%	23%	21%	12%	19%
All funds	81	14%	20%	6%	16%	19%	8%	13%

Cumulative Distribution of the Number of Holdings
Median across Funds

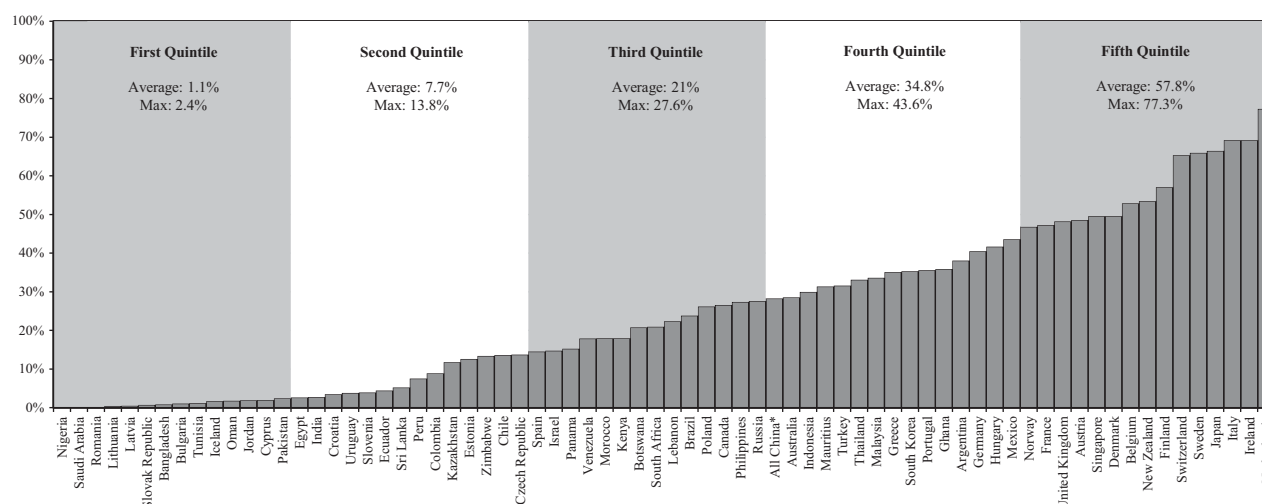
The top panel of the table shows the median portfolio allocation across the different sectors by mutual fund type over the 1997–2005 period. The portfolio allocations are based on the number of stock holdings. The bottom panel shows separately the median cumulative distribution of the stock holdings across sectors for global and specialized funds. The sectoral classification of the mutual fund holdings follows the funds' own classification. If a particular fund holding is not classified by the reporting fund, we assign the most cited classification for that asset by other funds in our sample.

TABLE 4.—MUTUAL FUND HOLDINGS

TABLE 4. RETAIL FUND HOLDINGS					
		All Fund Holdings		Global Fund Holdings	
	Number of Listed Stocks	Number of Holdings	As a Percentage of Listed Stocks	Number of Holdings	As a Percentage of Listed Stocks
			A. 1997		
Total	30,319	9,086	30%	6,267	21%
Developed countries	12,987	6,815	52%	4,953	38%
Asia	5,760	3,249	56%	2,246	39%
Europe	6,392	3,459	54%	2,635	41%
Middle East	802	87	11%	54	7%
Developing countries	17,332	2,271	13%	1,314	8%
Asia	10,089	1,304	13%	693	7%
Europe	2,697	319	12%	167	6%
Latin America	2,196	399	18%	297	14%
Middle East and Africa	2,350	249	11%	157	7%
			B. 2004		
Total	39,061	6,289	16%	5,510	14%
Developed countries	18,282	5,204	28%	4,799	26%
Asia	7,758	2,748	35%	2,429	31%
Europe	9,817	2,392	24%	2,315	24%
Middle East	686	45	7%	37	5%
Developing countries	20,779	1,085	5%	711	3%
Asia	10,444	566	5%	394	4%
Europe	6,279	184	3%	114	2%
Latin America	1,525	195	13%	141	9%
Middle East and Africa	2,531	140	6%	62	2%

This table shows the numbers of listed stocks and stock holdings by mutual funds in developed and developing countries across the selected regions. The top panel shows the data for 1997 the bottom panel for 2004. The first column shows the number of listed stocks across the countries' main stock exchanges within each region. The second and third columns show the number of stock holdings in these regions by all of the mutual funds in our sample, in absolute terms and as a percentage of the number of listed stocks. The fourth and fifth columns report the same statistics but consider the portfolio holdings of global funds only. The data on the number of listed stocks come from the Global Financial Database. We exclude the stock holdings in the United States and in offshore financial centers from this analysis.

FIGURE 3.—MUTUAL FUND HOLDINGS AS A PROPORTION OF THE TOTAL NUMBER OF LISTED STOCKS BY COUNTRY



This figure shows the percentage of the listed stocks that receive investments from mutual funds. Countries are sorted according to their average percentage over the 1997–2004 period. Countries are divided into quintiles. The figure reports the average and maximum values for each quintile. The United States is excluded from the figure, along with other countries with no data on the total number of listed stocks. The data for the total number of listed stocks come from the Global Financial Database.

*“All China” includes assets in the following economies: mainland China, Hong Kong, and Taiwan.

developed countries, they held on average 52% of the listed assets, whereas in developing countries, they held only 13% of the listed stocks. A more pronounced pattern is observed when considering only global funds, which became very large over the sample period. In 1997, global funds held 38% (8%) of the number of stocks in developed (developing) economies. Table 4 also shows that although the universe of listed companies increased between 1997 and 2004, there is a considerable decline in the number of mutual fund holdings. This decline is not concentrated in any particular region but is more accentuated in developing countries, where we observe a fall of 52% in the asset holdings.

Although the overall number of different mutual fund holdings fell between 1997 and 2004, the amount invested in the stocks held grew significantly. The investments in developed countries rose from \$204 billion in 1997 to \$446 billion in 2004. In developing countries, they increased from \$30 billion to \$62 billion. Thus, a growing amount of funds is being invested in fewer firms, more significantly so in developing countries.

To complement the evidence that mutual fund investments are concentrated in a few companies, figure 3 illustrates how mutual funds invest across countries. The figure plots the ratio of the number of companies held in the mutual fund portfolios to the total number of listed companies across countries. These ratios are computed on a yearly basis and reported according to their averages over the entire 1997–2004 period. The figure shows that the mutual fund holdings are not spread evenly across countries. For around half of the countries in the sample, mutual funds invest in at most 20% of the listed companies. In no country do mutual funds exhaust the number of listed stocks. Only developed countries appear in the highest quintile.

Transaction costs could be an impediment to the expansion in the number of stocks in the mutual fund portfolios because

not all of the listed stocks can be bought at a relatively low cost. However, the cross-fund comparison is revealing and suggests that even when present, transaction costs do not seem to constitute a strong binding constraint. Specifically, the fact that specialized funds hold more stocks than global funds within each region of exposure is an indication that there are no clear investment restrictions related to those companies. Global funds could thus expand the range of their investments by simply purchasing the same stocks that specialized funds hold. The same applies to the stocks that global funds hold and specialized funds do not. Furthermore, mutual funds hold a small fraction of the listed stocks. Although the case could be that market thinness plays a role, both types of funds typically invest in the largest firms in each country, and their holdings are small relative to the firms’ market capitalization (on average, 0.12% of the firms’ market capitalization). Moreover, though the firms held by global funds are typically larger than those held by specialized funds, no significant difference exists in their liquidity.¹⁰

In sum, neither the lack of available assets nor transaction costs (broadly understood as the ability to purchase stocks) appear to strongly determine the portfolio choices of mutual funds.

B. Stock Commonality

If global and specialized funds within mutual fund families share information and make similar decisions, one might expect to observe similar portfolios across them. To the extent that information is costly to obtain and process, the managers of global funds might benefit from the information that the managers of specialized funds already have.

¹⁰ See Didier (2011) for the differences in the underlying liquidity of the mutual fund stock holdings across fund types and the online appendix for the size of the mutual fund holdings relative to market capitalization.

In particular, the managers of specialized funds need to decide on an asset allocation in their particular countries or regions, and in doing so they are likely to collect specific information that the managers of global funds might use. On the other hand, if managers compete with each other and each manager gathers his or her own information, one will observe dissimilar portfolios across funds within families. From the evidence presented earlier, we know that global funds do not hold the same portfolios as specialized funds; they hold fewer stocks within each region. But we do not know whether the stocks picked are actually a subset of those held by specialized funds. The within-family comparison is particularly important given a large heterogeneity in the holdings across mutual fund families and given the interest in whether managers in the same company make similar decisions as a sign of information sharing.

To assess the similarity in the portfolios, we first compute frequency counts. We consider the global and specialized funds within a mutual fund family and count the number of observations for which a stock is held by either one of these two fund types, with each of the almost 400,000 observations being a family-year-stock observation. Then, we compute the fraction of the observations in which a stock is held (a) by one fund type but not the other, (b) by both fund types, and (c) by the global fund when there is no specialized fund within the same family that could hold that stock. We make these comparisons within each year. By construction, for every specialized fund, there is always a global fund within the mutual fund family.¹¹ Also by construction, there are no observations for which a stock is held by neither a global nor a specialized fund.

Table 5 shows the results. The numbers in the table report the relative frequency of the observations, that is, the joint probability that global and specialized funds hold or do not hold a particular stock. The conditional probabilities can be obtained by looking at a particular row or column. The table shows that global and specialized funds do not hold many stocks in common. Only 16% of the actual holdings are shared by both fund types. Of the global fund holdings, only 23% are shared by specialized funds. Moreover, 32% of the stocks are held by specialized funds alone but not by global funds. Unreported results show that 75% of the mutual fund investments in developing countries are held by specialized funds. Conditional on being held by a specialized fund, there is only a 15% probability that a stock from a developing country is held by a global fund. Therefore, global and specialized funds seem to invest in different firms.¹²

¹¹ We exclude all of the stock observations for mutual fund families that do not have one of the fund types in a given year. We also exclude the U.S. stocks from this analysis.

¹² In the online appendix, we split the sample by considering the holdings only in developing countries and obtain qualitatively similar patterns. In the working paper version of this paper (Didier et al., 2010), we further split global funds into world funds and foreign funds and compare them with specialized funds. World funds and specialized funds share only 10% of their holdings. This percentage increases to 15% when we use foreign funds.

TABLE 5.—PROBABILITIES OF BEING HELD BY A MUTUAL FUND

TABLE 3.—PROBABILITIES OF BEING HELD BY A MUTUAL FUND			
	Global Funds Probability of:		
	Not Being Held	Being Held	Total
Specialized funds			
Probability of:			
Not being held	0%	25%	25%
Being held	32%	16%	48%
No specialized fund	0%	27%	27%
Total (number of observations)	32%	68%	100%
			(396,388)

This table shows a two-way frequency count for the mutual fund stock holdings from 1997 to 2005. The reported numbers correspond to the joint probability of a stock being held by a specialized fund and a global fund in a given year, conditional on a family having both fund types. Each observation is a family-year-stock observation. The total number of observations is reported in parentheses. When a global fund in a given family-year holds a stock in a country not covered by the specialized funds within that family in that year, this observation is counted in the "No specialized fund" row. For this analysis, we use all stock holdings, except the U.S. stocks. Global funds comprise both world and foreign funds. Specialized funds comprise emerging market, regional, and country funds.

While the frequency counts measure to what extent mutual funds with different investment scopes hold similar assets, they do not consider the value of the mutual fund investments in each stock. To account for the possibility that global and specialized fund portfolios contain large loadings on common stocks (even when the range of stocks in which they invest differs), we study entropy measures that capture how alike the mutual fund investments actually are. The measure is

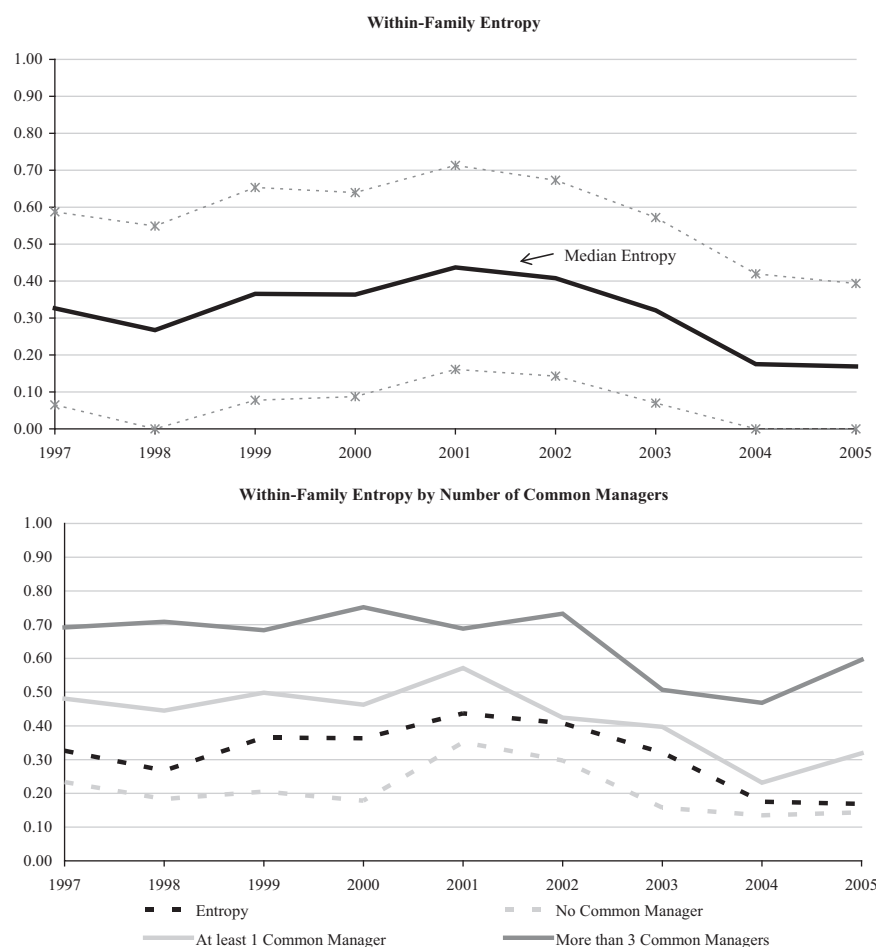
$$Entropy_{f,t}^{i,j} = \frac{\sum_{s,i} NAV_{s,f,t}^i + \sum_{s,j} NAV_{s,f,t}^j}{\sum_i NAV_{f,t}^i + \sum_j NAV_{f,t}^j}, \quad (1)$$

where $Entropy_{f,t}^{i,j}$ is calculated for all funds within types i and j for family f at time t , $i, j \in \{\text{global fund, specialized fund}\}$ and s are stocks common to the portfolio of both funds i and j from family f at time t . The measure is constructed within families for every family in every year. For a given pair of different fund types within the same mutual fund family, this entropy measure is the ratio of the sum of the dollar investment (NAV) in stocks common to the portfolio of these two fund types over the sum of the total net assets of the same funds. This ratio can be regarded as an upper bound of commonality because it compares global funds to aggregates of all specialized funds within families.

The entropy measure indicates that global and specialized funds do indeed hold more similar portfolios than what the frequency counts suggest (figure 4, top panel), though they still invest in quite different portfolios. For example, the entropy measure shows that, on average, 36% of the value of their holdings is in common assets, while the number of their holdings suggests a commonality of only 16% (table 5). Moreover, the entropy measure is stable over the sample period and, if anything, it has decreased since 2001.

Interestingly, this commonality measure increases substantially with the number of common managers across funds within mutual fund families (figure 4, bottom panel). For example, the median entropy for the families in which funds have no common manager is 29%, while the median

FIGURE 4.—ENTROPY



This figure shows in the top panel the within-family entropy measure for stock holdings from 1997 to 2005. The entropy measure captures the commonality of stock holdings in the portfolios of funds within a mutual fund family. The thick line represents the median value of the entropy measure across mutual fund families in a given year, while the dotted gray lines represent ± 1 standard deviation from the median. The bottom panel shows the entropy measure from 1997 to 2005 according to the number of common managers shared by funds within mutual fund families. The entropy measure is calculated separately for the family-year observations in which the global and specialized funds share no managers, have at least one common manager, and have more than three common managers. For comparative purposes, the bottom panel of this figure also reports the same entropy measure (black-dashed line) reported in the top panel of the figure. For the calculation of the entropy measures, we use all stock holdings, except the U.S. stocks.

entropy for the family-years with at least one common manager across different funds is 43%, and the one with more than three common managers is 65%. Furthermore, the number of common managers is statistically significant and positively related to the entropy measure (table 6). As the number of common managers across funds within families increases, so does the degree of commonality in the mutual fund portfolios.

C. Family Effects

We next analyze the role of family effects in explaining portfolio choices.¹³ Our data show a significant dispersion in the number of stock holdings. For instance, 73% of the

observations correspond to portfolios with fewer than 150 stocks, whereas 9% of the observations represent portfolios with more than 350 stocks. This dispersion in the number of stocks in the fund-year observations is linked to the variance in the number of stocks held across mutual fund families. In fact, mutual fund families differ substantially in the number of stocks their mutual funds hold in their portfolios. For example, funds that belong to GAM Funds and Oppenheimer Funds hold on average substantially fewer than 200 stocks, while funds in other families like Dreyfus Founders and Vanguard Group hold about twice as much. The bottom panel of table 1 shows the sorted median number of stocks in the mutual fund portfolios across families. The mean of the first quintile of the distribution is 39 stocks, whereas the mean of the fifth quintile is 335. Although extreme cases exist, funds in most families hold a limited number of stocks.¹⁴

¹³ We follow the organizational literature that emphasizes the importance of firm effects (as opposed to plant effects within firms) to understand corporate behavior. Much of this literature (e.g., Henderson & Cockburn, 1994; Klette, 1999) studies the existence of firm effects (family effects in our paper) through firm-level dummies and measures their relevance by the increase in the R^2 of the regressions. Analogously, Bertrand and Schoar (2003) analyze the impact of managerial effects on corporate policies and performance.

¹⁴ The working paper version of this paper (Didier et al., 2010) and the online appendix show the dispersion in the number of holdings across mutual funds.

TABLE 6.—COMMONALITY IN HOLDINGS ACROSS FUND TYPES

	Dependent Variable: Entropy Measure			
	(1)	(2)	(3)	(4)
Independent variables				
Number of common managers	0.061*** [0.006]	0.059*** [0.006]		
No common manager (NCM0)			0.292*** [0.018]	0.207*** [0.042]
One common manager (NCM1)			0.362*** [0.034]	0.284*** [0.052]
Two common managers (NCM2)			0.421*** [0.031]	0.329*** [0.049]
At least three common managers (NCM3)			0.543*** [0.035]	0.456*** [0.052]
Year dummies	No	Yes	No	Yes
Number of observations	370	370	370	370
R^2	0.15	0.18	0.69	0.70
Adjusted R^2	0.15	0.16	0.68	0.69
T-tests:				
NCM0 = NCM1			3.390*	4.060**
NCM0 = NCM2			13.190***	11.050***
NCM0 = NCM3			40.800***	42.230***

This table reports the regressions of the within-family entropy measure of stock holdings on the number of common managers and, alternatively, on the dummy variables that indicate whether funds within a family-year share no common manager or one, two, or at least three common managers. The entropy measure captures the commonality of stock holdings in the portfolios of funds within mutual fund families. The sample period is from 1997 to 2005. The *t*-tests of equality of the estimated coefficients on the dummy variables capturing the number of common managers are also reported. For this analysis, we use all stock holdings except the U.S. stocks. Standard errors are clustered at the family level. Standard errors are shown in brackets. Significant at ***1%, **5%, and *10%.

In table 7, we test more formally the importance of family effects in explaining both the number of stock holdings (a measure of portfolio breadth) and the portfolio loadings on the top ten holdings (a measure of portfolio concentration). Panel A shows the R^2 from the regressions of each of these variables on year, fund type, and family dummies. The year dummies explain just 1% of the variance in the mutual fund holdings or the top ten holdings. The fund type dummies explain only 2% of the variance in the number of holdings and 11% of the variance in the top ten holdings. In contrast, family dummies explain 46% of the variance in the number of holdings and 36% of the variance in the top ten holdings across funds and over time, much greater percentages than those explained by fund type and year effects alone.¹⁵ When combining these three types of dummies, the R^2 is relatively large only when the family dummies are included. When all dummies are included, there is only a slight increase in the R^2 in comparison to the other regressions with family dummies. Therefore, family effects indeed seem relevant to the portfolio decisions of mutual funds by affecting both the number of stock holdings and the allocation in the top holdings.

The importance of family effects raises the immediate question of which factors might be behind the observed patterns. To shed light on these family effects, and in line with the organizational literature, we estimate regressions similar to those in panel A of table 7 but controlling for other variables believed to fundamentally affect the portfolio choices of mutual funds. In particular, we explore the relevance of

family-level and fund-level variables. We relate the number of stock holdings and loadings on the top ten stocks to (a) the ability of funds to gather and process information (approximated by the number of managers, family expenses, and family size), (b) variables related to the characteristics of funds and their managers that could also affect portfolio decisions (fund age, manager tenure, and fund type fixed effects), and (c) family effects themselves, which capture any remaining attribute or practice at the family level.¹⁶ The first set of variables directly captures the extent to which costly information is a binding factor in driving portfolio decisions.

The results in panel B of table 7 show that the number of managers and family size are positively associated with the number of holdings, while expenses at the family level show a negative correlation.¹⁷ Although statistically significant, these variables explain only a small proportion (5% to 7%) of the variance in the number of stocks held, versus the 49% explained when family dummies are included. Moreover, when family dummies are present, not only does the R^2 increase considerably, but also some of the fund- and family-level variables become statistically not significant. The regressions on the top ten holdings yield similar results.

¹⁶ The working paper version of this paper (Didier et al., 2010) reports regressions with fund-level (instead of family-level) variables to capture the funds' ability to gather and process information. The results are qualitatively similar to the ones shown here.

¹⁷ Unreported results (available in the online appendix) show that funds with one manager hold an average of 133 stocks, funds with two managers average 135 stocks, and funds with six managers average 197 stocks.

¹⁵ This increase in the variance explained is not due to the increase in the number of dummies since the adjusted R^2 also rises significantly.

TABLE 7.—PORTFOLIO CHOICE OF MUTUAL FUNDS: IMPORTANCE OF YEAR, FUND TYPE, AND FAMILY EFFECTS

	Dependent Variable: Number of Stock Holdings			Dependent Variable: Percentage of Net Assets in the Top Ten Holdings				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Importance of Year, Fund Type, and Family Dummies								
R^2	0.01	0.02	0.46	0.48	0.01	0.11	0.36	0.44
Adjusted R^2	0.01	0.02	0.42	0.44	0.01	0.11	0.32	0.40
Independent variables								
Year dummies	Yes	No	No	Yes	Yes	No	No	Yes
Fund type dummies	No	Yes	No	Yes	No	Yes	No	Yes
Family dummies	No	No	Yes	Yes	No	No	Yes	Yes
Number of observations	6,394	6,394	6,394	6,394	6,379	6,379	6,379	6,379
B. Importance of Family Effects								
Independent variables								
Number of managers	16.180*** [4.655]	14.762*** [4.569]	4.693 [3.702]	4.601 [3.703]	-0.554*** [0.175]	-0.529*** [0.178]	-0.186 [0.188]	-0.179 [0.187]
Manager tenure	2.964 [2.488]	1.468 [2.255]	2.260* [1.208]	2.243* [1.203]	-0.067 [0.118]	-0.033 [0.115]	-0.133 [0.084]	-0.129 [0.084]
Fund age	0.211 [0.775]	0.316 [0.845]	-1.027 [0.863]	-1.013 [0.863]	-0.129*** [0.053]	-0.106*** [0.052]	-0.126*** [0.049]	-0.128*** [0.049]
Family expenses		-0.650*** [0.252]		-0.014 [0.160]		-0.001 [0.011]		-0.010 [0.009]
Family size		7.535*** [2.786]		0.575 [1.543]		-0.062 [0.110]		0.053 [0.088]
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund type dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Family dummies	No	No	Yes	Yes	No	No	Yes	Yes
Number of observations	6,093	6,093	6,093	6,093	6,080	6,080	6,080	6,080
R^2	0.05	0.07	0.49	0.49	0.13	0.13	0.45	0.45
Adjusted R^2	0.05	0.07	0.45	0.45	0.12	0.13	0.41	0.41

This table reports the regressions of the number of stock holdings (left four columns) and the percentage of net assets in the top ten stock holdings (right four columns) on year dummies, fund type dummies, or family dummies (panel A), and the number of managers, manager tenure, mutual fund age, mutual fund family expenses, and mutual fund family size (panel B). Depending on the specification, year, fund type, or family dummies are included in the regressions, although the estimated coefficients on these dummies are not reported. Family expenses are measured in millions of U.S. dollars, and family size is measured in billions of U.S. dollars. Fund age is measured in years. The sample period for the regressions in both panels is 1997 to 2005. Each data point is a fund-year observation. The standard errors are clustered at the family level. The standard errors are in brackets. Significant at ***1%, **5%, and *10%.

In sum, the evidence presented thus far indicates that the factors typically emphasized in the literature such as asset availability, transaction costs, and common managers are not able to account for the patterns in the portfolio allocations. There is in fact a strong family effect beyond fundamentals that explains these holdings, which suggests that industrial organization factors might be important.

V. Returns to Diversification

The fact that global funds tend to hold fewer stocks from fewer countries than specialized funds within their regions of exposure might be explained by the lack of potential diversification gains (due to correlated returns) or by the desire of investors to minimize tail risk, or both. We explore these effects next.

A. Standard Portfolio Model: Mean-Variance Analysis

To evaluate whether global funds seem to forgo potential diversification gains, we compare the returns of global funds to those of what we call simulated global funds. We construct one simulated global fund for each actual global fund that consists of a portfolio of the specialized funds from the same mutual fund family and the global fund itself. This simulation is analogous to letting a global fund invest in a portfolio that replicates the holdings of specialized funds at any point in time. The portfolio weights on the specialized funds and the global fund itself are obtained through mean-variance optimizations. The returns of the simulated global funds are compared to the returns of the actual global funds over the same period. This comparison is a conservative exercise to evaluate the potential gains from international diversification because it does not use all of the stocks in the investment universe of global funds to construct the alternative portfolios (which might include assets that are hard to reach but could yield substantially higher risk-adjusted returns). Our comparison uses only the stocks already chosen by the specialized funds within the same family.¹⁸ The fact that at least one specialized fund is already holding an asset is an indication that this asset is within the subset of investable assets and that the family has already paid for the potential costs of collecting and processing information related to that stock.

To perform the mean-variance analysis, consider a global fund with an observed return history G and several specialized funds within the mutual fund family of the global fund with observed returns S_i . The global fund can invest anywhere in the world, including the assets held by the special-

ized funds, whereas the specialized funds invest in specific regions. The simulated global fund is constructed as a portfolio P that assigns nonnegative weights to the global fund itself and to all of the specialized funds within the same mutual fund family. This within-family exercise is isomorphic to allowing a global fund to invest in the specialized funds within its mutual fund family. This portfolio P is constructed such that it maximizes risk-adjusted returns by either minimizing its variance and achieving at least the same expected return as the global fund itself or maximizing its expected returns conditional on not increasing the return volatility (relative to the actual global fund).

In sum, we impose the following restrictions to construct the simulated global funds: (a) the portfolios are constructed for each global fund using a combination of the fund itself and the specialized funds within the same mutual fund family; (b) only buy and hold strategies are considered (funds cannot be shorted); (c) the performance evaluation is always conducted out of sample; (d) the portfolio is optimized by using alternatively the historical daily, weekly, or monthly information; and (e) a mean-variance framework is used.

The first optimization problem minimizes the variance of the returns of the simulated global fund, keeping its returns at least as large as those of the actual global fund. The exercise can be described as

$$\begin{aligned} \text{Min}_x \text{Var}(P) &= x' \Sigma x, \\ \text{such that} \\ E(P) &\geq E(G), 0 \leq x_i \leq 1, \Sigma_i x_i \leq 1, \\ \text{and} \\ P &= (1 - \Sigma_i x_i) \times G + \Sigma_i x_i \times S_i, \end{aligned} \quad (2)$$

where x_i is the portfolio weight on the specialized fund i within the mutual fund family of the global fund and Σ is the variance-covariance matrix (VCM) of all mutual fund returns within the same family.¹⁹ Because the simulated global fund P is evaluated out of sample, the portfolio shares are computed at time t using all available information up to that time and held for the next period, when the return of P is computed. We then compare the return of the simulated global fund P with the return of the global fund G . The portfolio weights are actively reoptimized every period.

We also maximize expected returns, keeping the variance of the simulated global fund from being larger than that of

¹⁸ While this exercise is informative for our purposes, it differs from many others conducted in the literature. In fact, there is a very broad literature that discusses optimal portfolios with different goals in mind, mostly using U.S. data. See, for example, Evans and Archer (1968) and DeMiguel, Garlappi, and Uppal (2009).

¹⁹ We estimate the VCM at every point in time using past return data on mutual funds themselves, not return data at the stock level. This method has the advantage of working with a very limited set of returns: those from the relevant specialized funds within a given family and one from the global fund that we intend to improve. More specifically, our simulations use between a median of five funds (longest available sample simulation) and seven funds (largest number of funds simulation). This limited number of return time series is important because problems of instability in the estimation of VCMs usually arise when the number of stocks increases at the same speed as the sample size.

the global fund itself. This strategy can be described as follows:

$$\begin{aligned} & \text{Max}_x E(P), \\ & \text{such that} \\ & \text{Var}(P) \leq \text{Var}(G), 0 \leq x_i \leq 1, \sum_i x_i \leq 1, \\ & \text{and} \\ & P = (1 - \sum_i x_i) \times G + \sum_i x_i \times S_i. \end{aligned} \quad (3)$$

We perform these exercises for several types of global funds: world funds, foreign funds, and pools of world or foreign funds. The pools of world (or foreign) funds exist when more than one fund in a mutual fund family is classified as a world (or foreign) fund and they have different natures (for example, value, growth, or blend funds). A benefit of this kind of exercise is that it requires information only on mutual fund returns (not individual stock returns) and the investment scope of funds.

Table 8 shows the results, comparing the simulated and actual global funds. The left panel of the table reports the results for the simulated global funds constructed with the largest number of available specialized funds (the largest cross-section), called the “largest number of funds” simulation. This simulation includes all of the possible specialized funds for each family and adjusts the time series accordingly to use the sample available for all of the funds included in the simulation. The right panel of table 8 reports the results with only the specialized funds that allow for estimations of the simulated global funds with a relatively long time series, called the longest available sample simulation. In particular, specialized funds are excluded from the simulations if they reduce the sample size by at least six months. On average, three specialized funds are excluded from these simulations relative to the simulations of the largest number of funds, which leads to an average increase of 44 months in the time span of the simulations. We compute the annualized differences in the returns between the simulated global funds and the global funds over the entire sample period for each simulation and then the averages across the simulations.²⁰ The results are shown for daily, weekly (measured on Wednesday), and monthly returns.

The results show that when minimizing variances with daily data, the simulated global funds yield on average annualized excess returns of 485 basis points per year relative to the world funds, 403 basis points relative to the foreign funds, and 455 basis points relative to the pool of world or foreign funds. Moreover, the daily standard deviations of the returns of the simulated global funds are also smaller than those of the global funds. For example, the standard deviation falls by 8 basis points for the world and foreign funds and 7 basis points for the pool of world or for-

eign funds. The results hold when using weekly and monthly returns. The simulated global funds yield on average 436 (275) basis points more per year than the actual global funds when considering all types of global funds with weekly (monthly) data. The smaller point estimates are expected because the optimization methods use less information at lower data frequencies. The results are similar in the simulations with the longest time span. However, the differences are smaller because fewer specialized funds are used in each simulation, thus reducing the scope for improvement. We obtain similar results when maximizing expected returns while holding the variance constant (table 8, bottom panel).²¹

To capture the idea that mutual funds might have long-term investment horizons, table 9 shows the results with daily data but with longer holding periods. The portfolio weights are held constant for different time periods (1, 5, 20, 60, and 120 business days). The results show that the simulated global funds consistently generate higher returns than global funds. Interestingly, these excess returns do not vary significantly across the different holding periods. This is consistent with the idea that the large gains from diversification come from the simulated funds holding many more stocks than the actual global funds.²²

In sum, the evidence from our simulations suggests that one can reject the hypothesis that there are no gains from further international diversification by holding more stocks within and across countries. Although there is some heterogeneity in the results, the simulated global funds consistently yield higher returns with no greater volatility than the actual global funds within the same mutual fund families.

The findings also suggest that factors other than transaction costs are important to the behavior of mutual funds. First, we compare the performance using risk-adjusted returns. To the extent that specialized funds hold smaller (less liquid) companies with more volatile returns, this effect is already captured in our estimations (we find excess returns after conditioning for volatility). Second, even when considering non-risk-adjusted returns, holding smaller firms does not have to affect the ex post mutual fund returns. Mutual fund returns already embed the potentially higher transaction costs they incur when trading smaller stocks. So

²¹ These results are not driven by significant changes in the weights of the simulated global funds over time. The time series of the portfolio weights typically change smoothly, and the simulated portfolios do not require large shifts in holdings, which could entail large transaction costs. The results above hold when we modify the objective function to account for the possibility that managers care about their performance relative to a benchmark index. The results are also similar when we use rolling windows of the last 240 business days instead of using all past information. See the online appendix and the working paper version of this paper (Didier et al., 2010) for these results.

²² The possibility also exists that different mutual funds pursue different stock trading strategies, which might explain the difference in returns between global and simulated global funds. However, the entropy measures between two consecutive years that capture the similarity of mutual fund portfolios over time are very stable and not statistically different across fund types, which suggests that stock turnover is similar across portfolios. See the online appendix.

²⁰ The working paper version of this paper (Didier et al., 2010) has results at the family level to show the heterogeneity in the estimates.

TABLE 8.—GLOBAL FUND SIMULATIONS AT VARIOUS DATA FREQUENCIES

Type of Global Funds	Simulations Using the Largest Number of Funds				Simulations Using the Longest Available Sample							
	Average Returns (per Year)			Standard Deviation of Returns		Average Returns (per Year)			Standard Deviation of Returns			
	Global Funds	Simulated Global Funds	Average Difference in Returns	Global Funds	Simulated Global Funds	Number of Comparisons	Global Funds	Simulated Global Funds	Average Difference in Returns	Global Funds	Simulated Global Funds	Number of Comparisons
A. Minimizing the Variance of Returns												
Daily data												
World funds	6.22%	11.01%	4.85%	0.87%	0.78%	63	6.81%	9.50%	2.79%	0.91%	0.84%	63
Foreign funds	6.03%	9.95%	4.03%	0.97%	0.89%	77	5.09%	7.69%	2.75%	0.97%	0.90%	77
Pools of world or foreign funds	10.53%	15.23%	4.55%	0.86%	0.80%	25	7.67%	11.62%	4.00%	0.92%	0.85%	25
Total	6.78%	11.14%	4.42%	0.92%	0.84%	165	6.13%	8.97%	2.95%	0.94%	0.87%	165
Weekly data												
World funds	6.28%	11.33%	5.08%	2.05%	1.92%	63	8.07%	9.78%	2.44%	2.66%	2.16%	63
Foreign funds	6.04%	9.70%	3.74%	2.25%	2.13%	77	5.11%	7.33%	2.33%	2.25%	2.16%	77
Pools of world or foreign funds	10.54%	15.16%	4.44%	1.99%	1.90%	25	7.87%	11.93%	4.08%	2.17%	2.03%	25
Total	6.80%	11.13%	4.36%	2.14%	2.01%	165	6.65%	8.95%	2.64%	2.40%	2.14%	165
Monthly data												
World funds	5.05%	6.77%	2.80%	4.02%	3.89%	63	7.78%	8.87%	1.58%	5.42%	4.28%	63
Foreign funds	5.70%	8.23%	2.54%	4.58%	4.62%	77	5.21%	6.71%	1.62%	4.60%	4.57%	77
Pools of world or foreign funds	9.78%	13.07%	3.27%	3.92%	3.96%	25	7.37%	10.29%	2.90%	4.43%	4.37%	25
Total	6.06%	8.39%	2.75%	4.27%	4.24%	165	6.51%	8.07%	1.80%	4.89%	4.43%	165
B. Maximizing Expected Returns												
Daily data												
World funds	6.22%	10.68%	4.46%	0.87%	0.83%	63	6.81%	9.60%	2.86%	0.91%	0.85%	63
Foreign funds	6.03%	10.49%	4.49%	0.97%	0.92%	77	5.09%	7.98%	2.98%	0.97%	0.92%	77
Pools of world or foreign funds	10.53%	14.21%	3.59%	0.86%	0.83%	25	7.67%	11.22%	3.59%	0.92%	0.88%	25
Total	6.78%	11.12%	4.34%	0.92%	0.87%	165	6.13%	9.08%	3.02%	0.94%	0.88%	165
Weekly data												
World funds	6.28%	12.48%	6.09%	2.05%	2.13%	63	8.07%	10.87%	3.20%	2.66%	2.37%	63
Foreign funds	6.04%	11.14%	4.98%	2.25%	2.30%	77	5.11%	8.35%	3.20%	2.25%	2.26%	77
Pools of world or foreign funds	10.54%	16.67%	5.74%	1.99%	2.10%	25	7.87%	13.55%	5.51%	2.17%	2.22%	25
Total	6.80%	12.47%	5.52%	2.14%	2.20%	165	6.65%	10.08%	3.55%	2.40%	2.30%	165
Monthly data												
World funds	5.05%	7.11%	3.52%	4.02%	4.18%	63	7.78%	9.97%	2.52%	5.42%	4.52%	63
Foreign funds	5.70%	9.74%	3.85%	4.58%	4.86%	77	5.21%	7.75%	2.51%	4.60%	4.78%	77
Pools of world or foreign funds	9.78%	17.49%	7.20%	3.92%	4.49%	25	7.37%	14.06%	6.46%	4.43%	4.81%	25
Total	6.06%	9.86%	4.23%	4.27%	4.54%	165	6.51%	9.54%	3.11%	4.89%	4.68%	165

This table shows the differences in the average and the standard deviation of mutual fund returns between the actual and simulated global funds. The results are shown for daily, weekly, and monthly (20 business days) returns. The simulated global funds are constructed from the actual global and specialized funds within the same mutual fund family by using two different procedures. Panel A shows the results from minimizing the variance of returns subject to a restriction on expected returns. Panel B shows the results from maximizing expected returns subject to a restriction on the variance of returns. The simulations that use the portfolios with the largest number of specialized funds (the longest time series) for each global fund in each family are reported in the left (right) six columns. The pools of world or foreign funds are simulations that include several world (foreign) funds within the same family but with different investment natures (e.g., value, growth, or blend funds). The portfolio weights are updated every period. The realized returns of the simulated portfolios are calculated out-of-sample. The annualized differences in returns are calculated over the entire sample for each simulation. The averages across simulations are then computed and reported.

TABLE 9.—GLOBAL FUND SIMULATIONS WITH VARYING HOLDING PERIODS

Type of Global Funds	Simulations Using the Largest Number of Funds				Simulations Using the Longest Available Sample					
	Average Returns (Per Year)			Standard Deviation of Returns	Average Returns (Per Year)			Standard Deviation of Returns	Number of Comparisons	
	Global Funds	Simulated Global Funds	Average Difference in Accumulated Returns		Global Funds	Simulated Global Funds	Average Difference in Accumulated Returns			
	Global Funds	Simulated Global Funds	Number of Comparisons	Global Funds	Simulated Global Funds	Average Difference in Accumulated Returns	Global Funds	Simulated Global Funds		Average Difference in Accumulated Returns
A. Minimizing the Variance of Returns										
Holding period: 1 business day										
World funds	6.22%	11.01%	4.85%	0.87%	0.78%	6.80%	9.50%	2.79%	0.91%	0.84%
Foreign funds	6.03%	9.95%	4.03%	0.97%	0.89%	5.09%	7.69%	2.75%	0.97%	0.90%
Pools of world or foreign funds	10.53%	15.23%	4.55%	0.86%	0.80%	7.67%	11.62%	3.99%	0.92%	0.85%
Total	6.78%	11.14%	4.42%	0.92%	0.84%	6.13%	8.97%	2.95%	0.94%	0.87%
Holding period: 5 business days										
World funds	6.22%	11.19%	5.03%	0.87%	0.78%	6.80%	9.71%	2.98%	0.91%	0.84%
Foreign funds	6.03%	10.03%	4.10%	0.97%	0.89%	5.09%	7.80%	2.85%	0.97%	0.91%
Pools of world or foreign funds	10.53%	15.22%	4.53%	0.86%	0.80%	7.67%	11.64%	4.00%	0.92%	0.85%
Total	6.78%	11.25%	4.52%	0.92%	0.84%	6.13%	9.10%	3.08%	0.94%	0.87%
Holding period: 20 business days										
World funds	6.22%	11.26%	5.08%	0.87%	0.79%	6.80%	9.89%	3.16%	0.91%	0.84%
Foreign funds	6.03%	10.15%	4.21%	0.97%	0.89%	5.09%	7.92%	2.96%	0.97%	0.91%
Pools of world or foreign funds	10.53%	15.16%	4.48%	0.86%	0.80%	7.67%	11.75%	4.11%	0.92%	0.85%
Total	6.78%	11.32%	4.58%	0.92%	0.84%	6.13%	9.25%	3.21%	0.94%	0.87%
Holding period: 60 business days										
World funds	6.22%	11.24%	5.06%	0.87%	0.79%	6.80%	9.96%	3.22%	0.91%	0.84%
Foreign funds	6.03%	10.18%	4.23%	0.97%	0.90%	5.09%	7.99%	3.03%	0.97%	0.91%
Pools of world or foreign funds	10.53%	15.07%	4.38%	0.86%	0.81%	7.67%	11.63%	3.98%	0.92%	0.85%
Total	6.78%	11.31%	4.57%	0.92%	0.84%	6.13%	9.29%	3.24%	0.94%	0.88%
Holding period: 120 business days										
World funds	6.22%	11.17%	4.97%	0.87%	0.80%	6.80%	9.95%	3.18%	0.91%	0.85%
Foreign funds	6.03%	10.27%	4.30%	0.97%	0.90%	5.09%	8.09%	3.11%	0.97%	0.91%
Pools of world or foreign funds	10.53%	14.89%	4.20%	0.86%	0.81%	7.67%	11.60%	3.94%	0.92%	0.86%
Total	6.78%	11.30%	4.54%	0.92%	0.85%	6.13%	9.33%	3.26%	0.94%	0.88%
B. Maximizing Expected Returns										
Holding period: 1 business day										
World funds	6.22%	10.68%	4.46%	0.87%	0.83%	6.80%	9.60%	2.86%	0.91%	0.85%
Foreign funds	6.03%	10.49%	4.49%	0.97%	0.92%	5.09%	7.98%	2.98%	0.97%	0.92%
Pools of world or foreign funds	10.53%	14.21%	3.59%	0.86%	0.83%	7.67%	11.22%	3.58%	0.92%	0.88%
Total	6.78%	11.12%	4.34%	0.92%	0.87%	6.13%	9.08%	3.02%	0.94%	0.88%
Holding period: 5 business days										
World funds	6.22%	10.62%	4.40%	0.87%	0.83%	6.80%	9.60%	2.86%	0.91%	0.85%
Foreign funds	6.03%	10.59%	4.59%	0.97%	0.92%	5.09%	8.00%	3.01%	0.97%	0.92%
Pools of world or foreign funds	10.53%	14.56%	3.90%	0.86%	0.83%	7.67%	11.26%	3.61%	0.92%	0.88%
Total	6.78%	11.19%	4.41%	0.92%	0.87%	6.13%	9.10%	3.04%	0.94%	0.88%
Holding period: 20 business days										
World funds	6.22%	10.85%	4.59%	0.87%	0.84%	6.80%	9.68%	2.95%	0.91%	0.85%
Foreign funds	6.03%	10.75%	4.75%	0.97%	0.91%	5.09%	8.15%	3.15%	0.97%	0.92%
Pools of world or foreign funds	10.53%	14.97%	4.30%	0.86%	0.83%	7.67%	11.79%	4.14%	0.92%	0.88%
Total	6.78%	11.42%	4.62%	0.92%	0.87%	6.13%	9.28%	3.22%	0.94%	0.89%
Holding period: 60 business days										
World funds	6.22%	11.24%	4.96%	0.87%	0.84%	6.80%	9.68%	2.94%	0.91%	0.85%
Foreign funds	6.03%	10.61%	4.60%	0.97%	0.92%	5.09%	8.07%	3.06%	0.97%	0.92%
Pools of world or foreign funds	10.53%	14.92%	4.30%	0.86%	0.84%	7.67%	11.91%	4.28%	0.92%	0.88%
Total	6.78%	11.49%	4.69%	0.92%	0.88%	6.13%	9.25%	3.20%	0.94%	0.89%

TABLE 9.—(CONTINUED)

Type of Global Funds	Simulations Using the Largest Number of Funds						Simulations Using the Longest Available Sample					
	Average Returns (Per Year)			Standard Deviation of Returns			Average Returns (Per Year)			Standard Deviation of Returns		
	Global Funds	Simulated Global Funds	Difference in Accumulated Returns	Global Funds	Simulated Global Funds	Number of Comparisons	Global Funds	Simulated Global Funds	Difference in Accumulated Returns	Global Funds	Simulated Global Funds	Number of Comparisons
Holding period: 120 business days												
World funds	6.22%	10.38%	4.10%	0.87%	0.85%	63	6.80%	9.77%	3.02%	0.91%	0.86%	63
Foreign funds	6.03%	10.40%	4.38%	0.97%	0.93%	77	5.09%	7.84%	2.81%	0.97%	0.93%	77
Pools of world or foreign funds	10.53%	15.26%	4.62%	0.86%	0.84%	25	7.67%	12.22%	4.57%	0.92%	0.89%	25
Total	6.78%	11.11%	4.31%	0.92%	0.89%	165	6.13%	9.22%	3.16%	0.94%	0.89%	165

B. Maximizing Expected Returns

This table shows the differences in the average and the standard deviation of mutual fund returns between the actual and simulated global funds at different holding periods. These holding periods change according to the frequency at which the portfolio weights are held constant. The results are shown for the following holding periods: 1, 5, 20, 60, and 120 business days. The simulated global funds are constructed from the actual global and specialized funds within the same mutual fund family by using two different procedures. Panel A shows the results from minimizing the variance of returns subject to a restriction on expected returns. Panel B shows the results from maximizing expected returns subject to a restriction on the variance of returns. The simulations that use the portfolios with the largest number of specialized funds (the longest time series) for each global fund in each family are reported in the left (right) six columns. The pools of world or foreign funds are simulations that include several world (foreign) funds within the same family but with different investment natures (e.g., value, growth, or blend funds). The realized returns of the simulated portfolios are calculated out-of-sample. The annualized differences in returns are calculated over the entire sample for each simulation. The averages across simulations are then computed and reported.

finding positive excess returns in mutual funds is indeed informative.

B. Insurance Premium in the Global Fund Returns

One potential limitation of this mean-variance analysis is that it does not capture other effects like the possible existence of an insurance premium in the returns of global funds. Global funds have a greater ability to shift their holdings across countries and regions, and thus to move away from troubled countries during turbulent times. Therefore, investors might be willing to pay for this extra flexibility by requiring lower risk-adjusted returns from global funds. We evaluate then whether global funds indeed have a better ability to minimize their losses relative to specialized funds.

We first analyze higher moments of the distribution of the returns. In particular, we compare the skewness and the kurtosis of the global fund returns to those of the simulated global fund returns, obtained from the mean-variance exercises. The results that use daily data show that the skewness and the kurtosis of the returns are similar between the actual and simulated global funds (table 10). Overall, the evidence suggests that despite the differences in the excess returns, higher moments of the distribution of the returns are not considerably different across the actual and simulated global funds. If anything, the kurtosis is lower for the simulated global funds, which indicates that global funds might not have robust portfolios (their distribution of returns has fatter tails).

Given the limited information on portfolio holdings at high frequencies, we also analyze the incidence of negative returns during turbulent times, which can shed light on whether global funds avoid realized risks by moving away from the turbulence-hit countries or regions. Specifically, we compare the realized returns of both the actual and simulated global funds conditional on large negative returns in the MSCI Emerging Market Index (our proxy for turmoil periods).²³ The results show that their performances are typically not statistically different from each other (table 11). Therefore, global funds do not seem to avoid large losses when compared to specialized funds.²⁴ As an alternative, the table shows the return differentials conditional on the periods in which the simulated global funds perform poorly. In these situations, global funds yield only slightly higher weekly returns, although the return differentials are not always statistically different from 0. However,

²³ The evidence reported here considers only weekly returns. The results are similar when we analyze monthly returns.

²⁴ A shift of the simulated global funds toward the actual global funds and away from specialized funds does not seem to be driving these results. Portfolio weights on the actual global funds are generally stable in periods in which the MSCI Emerging Market Index falls significantly. Moreover, this stability in the portfolio weights also suggests that such a portfolio shift is not behind the evidence related to the higher moments of the return distribution.

TABLE 10.—SKEWNESS AND KURTOSIS: GLOBAL FUND SIMULATIONS

This table shows the average skewness and kurtosis of the returns of the actual and simulated global funds. The simulated global funds are constructed from the actual global and specialized funds within the same mutual fund family by using two procedures. Panel A shows the results from minimizing the variance of returns subject to a restriction on expected returns. Panel B shows the results from maximizing expected returns subject to a restriction on the variance of returns. The simulations that use the portfolios with the largest number of specialized world (the longest time series) for each global fund in each family are reported in the left (right) five columns. The pools of world or foreign funds are simulations that include several world (foreign) funds within the same family but with different investment natures (e.g., value, growth, or blend funds). The realized returns of the simulated portfolios are calculated out of sample. The annualized differences in returns are calculated over the entire sample for each simulation. The averages across simulations are then computed and reported. The standard deviations of both the skewness and the kurtosis of the distribution of returns are reported in brackets.

TABLE 11.—AVERAGE CONDITIONAL RETURNS

	Conditional on MSCI Emerging Market Index Returns				Conditional on Simulated Global Fund Returns				Conditional on Actual Global Fund Returns			
	Average Conditional Returns (per Week)		Number of Observations		Average Conditional Returns (per Week)		Number of Observations		Average Conditional Returns (per Week)		Number of Observations	
	Global Funds (G)	Simulated Global Funds (P)	T-test: (P) = (G)		Global Funds (G)	Simulated Global Funds (P)	T-test: (P) = (G)		Global Funds (G)	Simulated Global Funds (P)	T-test: (P) = (G)	
A. Minimizing the Variance of Returns												
Largest number of funds simulations												
Conditional returns between 0% and -1%	-0.37%	-0.27%	3.27***	4,878	-0.52%	-0.48%	4.03***	6,380	-0.47%	-0.34%	11.74***	6,371
Conditional returns between -1% and -5%	-1.53%	-1.49%	1.71*	10,193	-2.21%	-2.18%	2.08***	8,946	-2.23%	-1.91%	19.92***	9,273
Conditional returns between -5% and -10%	-4.00%	-4.35%	-2.24**	950	-6.06%	-6.36%	-2.63***	582	-6.36%	-5.25%	13.83***	784
Conditional returns less than -10%	-3.42%	-3.45%	-0.12	191	-11.71%	-12.51%	-1.57	99	-13.02%	-10.84%	4.57***	113
Longest available sample simulations												
Conditional returns between 0% and -1%	-0.30%	-0.25%	2.24**	7,292	-0.49%	-0.47%	2.93***	9,340	-0.47%	-0.37%	11.94***	9,297
Conditional returns between -1% and -5%	-1.50%	-1.48%	0.81	14,342	-2.22%	-2.19%	1.89*	12,529	-2.23%	-1.99%	17.56***	12,840
Conditional returns between -5% and -10%	-4.06%	-4.35%	-2.11**	1,297	-6.23%	-6.37%	-1.69*	907	-6.46%	-5.55%	13.60***	1,140
Conditional returns less than -10%	-3.65%	-3.74%	-0.40	287	-11.89%	-12.74%	-2.08**	156	-13.24%	-11.36%	4.89***	163
B. Maximizing Expected Returns												
Largest number of funds simulations												
Conditional returns between 0% and -1%	-0.37%	-0.29%	2.63***	4,878	-0.49%	-0.47%	1.32	6,183	-0.47%	-0.36%	8.68***	6,371
Conditional returns between -1% and -5%	-1.53%	-1.61%	-3.27***	10,193	-2.14%	-2.22%	-4.43***	9,265	-2.23%	-1.98%	15.00***	9,273
Conditional returns between -5% and -10%	-4.00%	-4.65%	-4.22***	950	-5.69%	-6.23%	-4.84***	631	-6.36%	-5.22%	13.61***	784
Conditional returns less than -10%	-3.42%	-3.70%	-0.96	191	-11.52%	-12.47%	-2.14**	100	-13.02%	-10.37%	5.89***	113
Longest available sample simulations												
Conditional returns between 0% and -1%	-0.30%	-0.27%	1.39	7,292	-0.47%	-0.47%	0.02	9,079	-0.47%	-0.40%	8.14***	9,297
Conditional returns between -1% and -5%	-1.50%	-1.59%	-4.10***	14,342	-2.16%	-2.21%	-3.76***	12,854	-2.23%	-2.02%	15.01***	12,840
Conditional returns between -5% and -10%	-4.06%	-4.65%	-4.38***	1,297	-6.01%	-6.27%	-2.96***	963	-6.46%	-5.43%	15.29***	1,140
Conditional returns less than -10%	-3.65%	-4.11%	-1.88*	287	-12.04%	-12.41%	-1.01	146	-13.24%	-10.84%	6.80***	163

This table shows the average returns of both the actual and simulated global funds conditional on negative returns on the MSCI Emerging Market Index (left four columns), negative returns on the simulated global fund (middle four columns), and negative returns on the actual global funds (right four columns). The simulated global funds are constructed from the actual global and specialized funds within the same mutual fund family by using two different procedures. The top panel shows the results from minimizing the variance of returns subject to a restriction on expected returns. The bottom panel shows the results from maximizing expected returns subject to a restriction on the variance of returns. The realized returns of the simulated portfolios are calculated out-of-sample. The simulations are performed on the daily returns and the portfolio weights are updated daily, but the aggregate weekly returns are reported. The results for the simulations that use the portfolios with the largest number of specialized funds for each global fund in each family and the longest time series for each global fund in each family are reported. The *t*-statistics for the test of the equality of means are shown. The positive *t*-statistics mean that the returns of the simulated global funds (P) are larger than those of the global funds (G). Significant at the ***1%, **5%, and *10%.

when global funds do not perform well, the simulated global funds perform significantly better.

VI. Conclusion

Using a novel micro data set of U.S. mutual funds, this paper studies how institutional investors diversify their portfolios internationally. This data set allows us to document new stylized facts and shed new light on the existing explanations for international portfolio diversification. In particular, we exploit the fact that mutual fund families have several funds with different international investment scopes. To the extent that asset returns are not perfectly correlated, one might expect mutual funds to hold more securities and to have greater international diversification as their investment scope broadens. Moreover, the existence of different types of funds within families enables us to shed new light on which factors might affect international asset allocations and whether managers exploit the potential gains from international diversification.

We find that global funds have expanded substantially, thus giving investors more options to diversify risk. However, regardless of their investment scope, mutual funds tend to invest in a relatively small number of countries and firms—about 100 stocks. In fact, as their investment possibilities widen, mutual funds invest in fewer stocks and fewer countries within each region of exposure. This reduction in the number of stocks is not matched by a reduction in the number of economic sectors in which they invest; global and specialized funds have a similar sectoral allocation. While the number of stock holdings is comparable across funds within mutual fund families, there is significant variability in the number of holdings across families.

Several conclusions can be drawn from our analysis. First, the results that use portfolio holdings suggest that the restrictive investment practices of mutual funds are not driven by instrument availability or transaction costs, which are broadly understood to be barriers to purchase securities. Mutual funds purchase only a very small fraction of the instruments available for investment. Moreover, specialized funds invest in assets that are also available to global funds; this indicates that no clear restrictions exist for global funds to purchase these securities. Furthermore, neither specialized nor global fund holdings are very large relative to the firms' market capitalization. Therefore, this pattern of investment in a few firms does not seem to be driven by fund size, because mutual funds might be able to expand their exposures, probably without incurring major trading costs.

Second, the evidence in this paper suggests that organizational aspects might help explain the investment choices of institutional investors. This evidence does not seem consistent with the idea that the asset allocation is driven by the lack of information at the family level. In particular, we assess the potential diversification gains from investing in assets already held within a mutual fund family for which

the company as a whole has already paid the cost of gathering and processing information. In principle, any mutual fund manager within the company could access the information on these assets. However, the portfolios of the mutual funds that invest in the same region do not appear to be very similar when comparing funds within the same family. Their similarity does increase, though, when the funds share asset managers. This evidence points to competition between managers.²⁵ Competition might also explain the stylized fact that a limited number of assets exist in the mutual fund portfolios, independent of the investment scope. To the extent that managers within families gather and process information independently and have a similar capacity to handle stocks, they will tend to hold a similar number of securities. Furthermore, there are strong family effects for the number of stocks held across fund types and the portfolio loadings on the top ten assets. For example, the number of portfolio holdings is similar within mutual fund companies but different across them, even when funds across families invest in the same regions and have similar investment scopes. These family effects are much more important than other fund-specific and family-specific characteristics considered to affect both the ease of gathering and processing information and portfolio allocations themselves. These family effects suggest that norms at the company level might determine how different funds choose different portfolios and go beyond restrictions and practices at the fund level.²⁶

Third, the mean-variance analysis suggests the presence of significant potential gains from further international diversification. Global funds could gain in risk-adjusted terms by replicating the portfolios already held by other funds within the same company. Furthermore, it is not the case that global funds yield lower returns in exchange for an insurance premium. Namely, global funds do not appear to minimize tail risk despite their ability to shift their holdings across countries and regions. In fact, the skewness and the kurtosis of global funds are similar to those of specialized funds. In the end, we are able to construct a simulated global fund from the specialized funds within the family that has a better risk-return profile than the actual global fund by using nothing but the exact information that is available at the family level.

Further work is needed to explain the excess returns of specialized funds. A possible explanation is that by invest-

²⁵ Although actual competition within families is difficult to quantify, some papers find evidence consistent with tournaments within families. In these tournaments, fund managers try to maximize the pool of assets they manage to increase their compensation, and more generally respond to the incentives they face. See, for example, Brown et al. (1996), Chevalier and Ellison (1999), Carpenter (2000), Chen and Pennachi (2009), Pollet and Wilson (2008), and Csaszar (2012).

²⁶ Family effects, not fully captured by the observables in the estimations, might more broadly reflect investment policies, top management decisions, internal optimization algorithms, and incentives inherent to the organizational structure. See, for example, Nanda, Wang, and Zheng (2004), Gaspar, Massa, and Matos (2006), and Kempf and Ruenzi (2008).

ing in more and relatively smaller companies, specialized funds generate a premium. However, the difference in returns is present beyond the higher volatility that smaller stocks might entail. Moreover, the difference exists even when specialized funds do not carry a higher tail risk and in the strategies that would entail lower trading costs. Furthermore, mutual fund returns are net of any higher transaction costs they might incur when dealing with smaller companies. So the ex post returns to investors of specialized funds do not need to exceed those of global funds because the trading costs are embedded in the fund returns. In sum, even when transaction costs might be important, the excess returns of specialized funds seem to depend on other factors.

The evidence presented in this paper points to significant challenges to the prospects for broad international diversification. To the extent that global funds continue to be large relative to specialized funds, our findings suggest that the forgone diversification gains can be significant. At the same time, many countries and firms might not be able to benefit from tapping into international investors and might thus face higher financing costs.

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