

How Global Is Your Mutual Fund? International Diversification from Multinationals

Irem Demirci

Nova School of Business and Economics

Miguel A. Ferreira

Nova School of Business and Economics, CEPR, and ECGI

Pedro Matos

Darden School of Business, University of Virginia

Clemens Sialm

University of Texas at Austin and NBER

We show that mutual funds worldwide provide substantial international exposure through their domestic holdings of multinationals. The international exposure of domestic funds increases, on average, by 32 percentage points when we consider international corporate diversification. We find that funds with higher indirect international exposure perform better in both the cross-section and the time series. This effect is primarily driven by the fund managers' ability to invest in multinationals, rather than the performance of those multinationals. Our findings support the hypothesis that international diversification from multinationals reduces the transaction and information costs of investing abroad. (*JEL* F23, G11, G15, G23)

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Investors are reluctant to invest in foreign markets despite the risk reduction benefits of international portfolio diversification. This home bias in investors' portfolios has been attributed to transaction and information costs of investing in stocks away from home.¹ Markets have become increasingly integrated in recent decades, but significant barriers are still associated with international equity ownership (e.g., Karolyi and Stulz 2003; Stulz 2005; Bekaert et al. 2016).

While the home bias literature has given considerable attention to the ownership of foreign companies (i.e., *Direct international exposure*), the literature has mostly overlooked the exposure to international capital markets through the ownership of domestic companies that have foreign operations (i.e., *Indirect international exposure*). A notable exception is Cai and Warnock (2012), who use survey data on portfolio holdings of U.S. investors to show that investors obtain significant international exposure through holdings of domestic stocks. This occurs because the largest members of major stock indexes are frequently multinational companies whose sales come to a substantial extent from global operations. For example, the percentage of foreign sales of S&P 500 companies is about 44% of total sales, and the percentage of foreign sales is even higher in companies among other major indexes, such as the FTSE 100 at 76%.²

Investors thus can diversify risks internationally either directly through *international portfolio diversification* of their holdings of foreign stocks or indirectly through *international corporate diversification* of their holdings of domestic stocks. In a frictionless Modigliani-Miller environment it should not matter whether international exposure is achieved directly or indirectly. However, these two types of international diversification can differ substantially and have different implications for portfolio performance in an environment with financial frictions. International portfolio diversification enables an investor to hold small minority positions in a relatively large number of foreign stocks. These positions typically can be acquired and liquidated fairly easily in capital markets. However, foreign markets may exhibit low liquidity, limited information availability, and constrained monitoring opportunities due to dispersed ownership, geographic distance, and cultural differences.

Alternatively, international corporate diversification allows a domestic company to diversify internationally by operating in other countries. Through foreign direct investments (FDI), a corporation has control over these foreign operations and often establishes a significant physical presence of employees and capital. International corporate diversification can enhance shareholder

¹ See, for example, French and Poterba (1991), Tesar and Werner (1995), Coval and Moskowitz (1999), Coval and Moskowitz (2001), Dahlquist et al. (2003), Ahearn, Grier, and Warnock (2004), and Kho, Stulz, and Warnock (2009). Theoretical work also notes that investors underweight foreign securities (e.g., Van Nieuwerburgh and Veldkamp 2009). See Cooper, Sercu, and Vanpée (2013) for a survey.

² S&P Dow Jones Indices (2018) "S&P 500 2017: Global Sales - Year in Review," and FTSE (2017) "The Global Sales Ratio, Global and Domestic Firms."

value by exploiting firm-specific assets, increasing operating flexibility, and meeting investors' diversification preferences. Investors may be willing to pay a premium if corporations can reduce the costs of international diversification for them. On the other hand, international corporate diversification can destroy value through the complexity of managing multinational companies and inefficient cross-subsidization of less profitable business units. Overall, the evidence on the valuation of multinational companies is mixed.³

Using a comprehensive sample of open-end equity mutual funds domiciled in 29 countries over the 2005–2015 period, we find that indirect international exposure constitutes a significant fraction of a fund's total exposure to stock markets. This suggests that funds diversify not only through direct ownership of foreign companies but also through investing in domestic companies that source part of their sales from abroad. While foreign stocks represent only 49% of an average mutual fund's portfolio, international exposure increases to 68% when we take into account the fraction of foreign sales of domestic companies. In the case of domestic funds, foreign stocks represent only 10% of a funds' portfolio, but international exposure increases to about 42% when we take into account the fraction of foreign sales. We conclude that home bias is not as severe as previously documented in the literature when we take into account the exposure to international markets from multinationals located in the fund's country of domicile.

Figure 1 shows the average international exposure of equity mutual funds over the 2005–2015 period in selected countries. The figure shows the direct international exposure through investment in foreign stocks and the indirect international exposure through investment into domestic multinational companies as a fraction of fund holdings. The remaining fraction corresponds to purely domestic exposure. The indirect international exposure represents a significant fraction of the fund holdings and ranges between 15% for Canada to 28% for Switzerland.

Given the potential cost-reduction and diversification benefits of indirect international exposure, we test whether this exposure is associated with fund performance. We find that indirect international exposure has a positive effect on fund risk-adjusted performance in the cross-section of domestic funds. On average, a one-standard-deviation increase in indirect international exposure is associated with a 7.7 basis points increase in monthly four-factor alphas in the sample of domestic funds. On the other hand, the results are mixed for direct international exposure. The tests control for benchmark, country, and time fixed effects and a comprehensive set of determinants of fund performance.

³ Brewer (1981) and Fatemi (1984) find no statistical difference in the risk-adjusted performance between multinationals and purely domestic firms. Denis, Denis, and Yost (2002) find that globally diversified firms trade at a discount relative to a portfolio of single-segment domestic firms operating in the same industries. Huang (2015) shows that the information of foreign operations slowly diffuses into the stock prices of U.S. multinationals. Some evidence is consistent with a global diversification premium reflecting the value of operating flexibility (Chang, Kogut, and Yang 2016) and financial flexibility (Jang 2017) during the 2007–2008 financial crisis.



Figure 1
International exposure measures in selected countries

This figure shows the average indirect and direct international exposure measures in the eight selected countries and all countries. *Indirect international exposure* is the fraction of fund holdings invested in domestic stocks weighted by foreign sales. *Direct international exposure* is the fraction of funds holdings invested in foreign stocks. *Pure domestic exposure* is the fraction of fund holdings invested in pure domestic stocks that corresponds to the difference between the exposure to domestic stocks and indirect international exposure. The sample consists of actively managed domestic and international equity mutual funds between 2005 and 2015.

The results are robust to using a larger sample that includes both domestic and international funds.

Indirect international exposure continues to have a positive and significant effect on fund performance when we include fund fixed effects. Thus, that the estimated outperformance is significant in the time series indicates an improvement in performance after a fund increases its indirect international exposure. We find that a one-standard-deviation increase in indirect international exposure is associated with a 4.6 basis points increase in monthly four-factor alphas in the sample of domestic funds. We conclude that indirect international exposure has a positive effect on fund performance in both the cross-section and the time series.

We also employ a characteristic-based adjustment to the returns of the stocks in a fund’s portfolio. We adjust the returns based on not only market capitalization and the book-to-market ratio but also the fraction of foreign sales of the firms in the portfolio. Our results suggest that outperformance is not an artifact of funds investing in multinationals but rather reflects the fund managers’ ability to invest in companies that geographically diversify their operations. Multinational firms tend to be more complex, resulting in the slow

incorporation of new foreign operations information (Huang 2015). Skilled mutual fund managers can generate superior performance by investing in these multinational firms.

The results are robust when we use alternative measures of fund performance, such as alphas based on world-, regional-, and country-specific factors and a five-factor alpha including an illiquidity return premium, value added, excess returns, Sharpe ratio, benchmark-adjusted returns, information ratio, and gross returns. Importantly, the results do not hold for passive funds and are more pronounced among the most active funds. This finding suggests that the outperformance is not a mechanical effect but rather is generated by managerial skill.

Next, we examine the heterogeneity in the relation between fund performance and indirect international exposure. International investments carry significant transaction and information costs. Some of these costs are fixed and therefore may be higher among small fund families and funds with lower assets under management. We also expect such costs to depend on the types of stocks that funds invest in. For instance, small-cap stocks are typically less liquid and information asymmetries are more pronounced. These costs may also change according to the characteristics of the stock markets, and we hypothesize that such costs may be higher in less-developed capital markets. Consistent with our hypotheses, we find that the performance benefits of indirect international exposure are larger in small fund families. In addition, we find that the benefits are more pronounced when funds invest in small-cap and growth stocks. The level of development of capital markets to which the funds are exposed also matters. The performance benefits are more significant for countries with smaller and less liquid stock markets, and with greater barriers to foreign investment.

To study whether indirect international exposure exhausts the international diversification benefits for mutual fund investors by region of the world, we perform spanning tests following Huberman and Kandel (1987), DeSantis (1994), Bekaert and Urias (1996), Errunza, Hogan, and Hung (1999), and Bae, Elkamhi, and Simutin (2019). We find that returns of U.S. funds investing in foreign stocks are spanned by U.S. domestic funds with differential indirect international exposure. In contrast to funds in the United States, funds domiciled elsewhere in the world investing in foreign stocks are not spanned by their domestic counterparts with above- and below-median indirect international exposure. The differential results between these regions may be due to the dominating role of the U.S. stock market. Whereas it is important for foreign investors to obtain direct exposure to the U.S. market, it is less important for U.S. investors to obtain direct exposure to foreign markets, as U.S. multinationals already provide fairly large diversification benefits.

We contribute to the literature on mutual funds by proposing a new and economically important determinant of fund performance—indirect international exposure—acquired by investing in local firms that are

internationally diversified.⁴ We show that international corporate diversification plays a role in explaining fund performance. In a contemporaneous paper, Bai et al. (2020) use textual analysis to construct a new measure that captures a mutual fund's offshore exposure concentration through holding U.S. multinational firms. They find that funds with higher offshore concentration index (i.e., funds that overweight firms with foreign sales concentrated in a few countries) have better performance.

We also contribute to the home bias literature. This literature shows that most investors hold local stocks in excess of the country weights on the world market portfolio, but has mostly overlooked the role of multinationals in providing international diversification benefits. Errunza, Hogan, and Hung (1999) examine whether U.S. investors can replicate the benefits of international diversification by simply investing in U.S. stocks. They find that international diversification does not provide significant gains beyond those attainable with foreign market mimicking portfolios, formed based on domestic stocks in the United States. Bae, Elkamhi, and Simutin (2019) show that investing in developed market firms that trade with emerging markets provides diversification benefits not attainable by directly investing in emerging stock markets. Moshirian et al. (2018) show that after a firm makes a cross-border acquisition, it attracts investment from the destination-country funds. This mechanism is different from ours as it studies direct investment in foreign companies, while we investigate investment in domestic firms that provide economic exposures to foreign markets.

Our study offers new insights to the home bias literature. We show that the degree of home bias in mutual fund holdings worldwide is smaller than previously documented after we adjust for the international exposure of the firms that funds invest in. In addition, we show that indirect international exposure can play an important role in reducing the transaction and information costs of investing internationally.

1. Data and Variable Definitions

In this section, we describe the data sources and variables, and report summary statistics.

1.1 Data

Data on the performance of equity mutual funds over the 2005–2015 period come from the Lipper survivorship bias-free database, which covers many

⁴ This vast literature includes, for example, Carhart (1997), Daniel et al. (1997), Kacperczyk, Sialm, and Zheng (2005), Kacperczyk, Sialm, and Zheng (2008), Cremers and Petajisto (2009), Schultz (2010), Amihud and Goyenko (2013), Doshi, Elkamhi, and Simutin (2015), Berk and van Binsbergen (2015), and Cremers et al. (2016).

countries worldwide.⁵ Although multiple share classes are listed as separate observations in Lipper, they have the same holdings and returns before expenses. We therefore use the primary share class as our unit of observation and aggregate variables across all share classes using total net assets (TNA) weights. We exclude offshore funds (e.g., funds domiciled in Luxembourg or Dublin), funds of funds, and closed-end funds. Our main sample consists of actively managed equity funds, but we also examine passive funds (index funds and exchange-traded funds) in placebo tests.

We obtain information on each fund's portfolio holdings from the FactSet Ownership database, which covers the portfolio holdings of mutual funds worldwide.⁶ We match each Lipper fund with the fund's portfolio holdings data in FactSet using ISIN and CUSIP fund identifiers as well as management company and fund names. We focus our analysis on the sample of domestic funds because international funds are restricted from investing in domestic (multinational) companies by their mandates.⁷ Our sample of domestic funds includes 3,581 open-end equity funds in 29 countries that managed \$4 trillion as of December 2015. We also examine the sample of both domestic and international funds (including foreign, regional, and global funds); the sample includes 7,304 funds that managed \$6.3 trillion as of December 2015. Table IA.1 in the Internet Appendix reports the distribution of funds by country and year. The United States, the United Kingdom, and Canada are the three countries with the highest number of funds.

We use the FactSet Fundamentals database to measure the percentage of sales that come from sources other than the country of domicile (based on the headquarter location). Under both U.S. GAAP and IFRS accounting standards, companies are required to disclose sales not only in their country of domicile but also in foreign countries. In additional tests, we make use of the FactSet Revere Geographic Exposure database that provide firms' sales to each individual country worldwide as reported in 10-K and other corporate filings, and sales estimated based on country gross domestic product (GDP) weights.⁸

In our main specifications, we winsorize the variables at the top and bottom 1%, but we do not winsorize our international exposure variables since these are bounded between zero and one.

1.2 Variable definitions

Let $i \in I$ denote a mutual fund, $c \in C$ a country, and c_i the domicile country of fund i . Firms are denoted by $j \in J$ with some key subsets: J_c is the set of

⁵ See Ferreira et al. (2013), Cremers et al. (2016), and Ferreira, Matos, and Pires (2018) for a detailed description of Lipper's worldwide data coverage. Lipper's worldwide data coverage is comprehensive compared to the aggregate statistics from the Investment Company Institute (2015).

⁶ Ferreira and Matos (2008) describe this database in detail.

⁷ A domestic fund is a fund whose geographic focus is the same as its country of domicile.

⁸ FactSet Research Systems (2014), "FactSet Geographic Revenue Exposure (GeoRev): Data and Methodology Guide."

stocks domiciled in country c , J_i is the set of stocks in fund i 's portfolio, and J_{c_i} represents the set of fund i 's holdings in the fund's domicile country. $V_{i,j}$ is the market value of fund i 's holdings of firm j and π_j is the fraction of foreign sales in firm j 's total sales.⁹ In calculating direct international exposure, we include cross-listings as ownership of foreign stocks.¹⁰ The direct and indirect international exposure measures are computed at the quarterly frequency based on quarterly fund holdings and annual foreign sales of the firms in the fund's portfolio. The time index is suppressed for simplicity.¹¹

The *Direct international exposure* is equal to one minus the fund's ownership of domestic stocks (*Pure domestic exposure*):

$$\text{Direct International Exposure}_i = 1 - \frac{\sum_{j \in J_{c_i}} V_{i,j}}{\sum_{j \in J_i} V_{i,j}}. \quad (1)$$

We measure a fund's indirect exposure to international markets as the weighted average of a firm's foreign sales (as a fraction of the firm's total sales in the previous fiscal year relative to the quarter in which fund holdings are measured) of all domestic firms in a fund's portfolio:

$$\text{Indirect International Exposure}_i = \frac{\sum_{j \in J_{c_i}} \pi_j \times V_{i,j}}{\sum_{j \in J_i} V_{i,j}}. \quad (2)$$

The *Indirect international exposure* captures the impact in the *Direct international exposure* that results from failing to adjust for foreign sales generated by multinational companies based on the fund's domicile country.¹² The total international exposure is the sum of *Direct international exposure* and *Indirect international exposure*. Since domestic funds mostly invest in domestic stocks, they can rely more extensively on indirect international exposure than international funds. International funds can only rely on indirect international exposure to the extent that they invest in stocks of the country of fund domicile. While regional funds (only those whose investment region includes the country of domicile) and global funds can invest in domestic stocks and thus have some indirect international exposure, foreign funds should have low indirect international exposure. For these reasons, we focus on the sample of domestic funds in which fund managers can actively choose whether or not to have indirect exposure.

⁹ If a fund's portfolio contains different share classes for the same firm, we aggregate the classes in order to calculate the firm's overall portfolio weight.

¹⁰ Cross-listings include American Depositary Receipts (ADRs), Global Depositary Receipts (GDRs), Depositary Receipts/Certificates (DRs), and Nonvoting Depositary Receipts (NVDRs).

¹¹ We use the most recent foreign sales prior to the beginning of the quarter in which fund holdings are reported.

¹² Our measures ignore the sales of foreign companies generated in the fund's domicile country (e.g., a U.S. fund's holdings of a German multinational firm that generates some of its sales in the United States). This feedback effect would reduce the direct international exposure of funds.

Our main performance measure uses alphas calculated based on the Carhart (1997) four-factor model. Following Bekaert, Hodrick, and Zhang (2009), we estimate four-factor alphas using regional factors based on a fund's investment region in the case of domestic, foreign, and regional funds.¹³ We use global factors in the case of global funds and emerging market funds. For each fund-month, we estimate factor loadings using the previous 36 months of return data (we require a minimum of 24 months of return data),

$$R_{i,t} = \alpha_i + \beta_1 MKT_{i,t} + \beta_2 SMB_{i,t} + \beta_3 HML_{i,t} + \beta_4 MOM_{i,t} + \varepsilon_{i,t}, \quad (3)$$

where $R_{i,t}$ is the return net of fees in U.S. dollars of fund i in month t in excess of the 1-month U.S. Treasury-bill rate; $MKT_{i,t}$ is the excess return in the fund's investment region in month t ; $SMB_{i,t}$ is the average return on the small-capitalization stock portfolio minus the average return on the large-capitalization stock portfolio in the fund's investment region; $HML_{i,t}$ is the difference between the return on the portfolio with high book-to-market stocks and the return on the portfolio with low book-to-market stocks in the fund's investment region; and $MOM_{i,t}$ is the difference between the return on the portfolio with the past 12-month stock winners and the return on the portfolio with the past 12-month stock losers in the fund's investment region, excluding the immediately preceding month. Using the estimated factor loadings over the prior 36 months, we subtract the expected return from the realized fund return to obtain the fund's abnormal return (alpha) in each month.

To analyze the robustness of our results, we adopt several alternative performance measures. First, we estimate fund alphas based on a five-factor model that incorporates the illiquidity return premium (*IML*) developed in Amihud et al. (2015a). The *IML* factor is constructed as the difference between the monthly return on the most illiquid and the least illiquid quintile portfolios in a fund's investment region. We calculate the illiquidity premium using value-weighted portfolio returns.¹⁴

Second, we use characteristic-adjusted returns based on Daniel et al. (1997). Our measure adjusts not only for the market capitalization and the book-to-market ratio but also for foreign sales. This adjustment is important as the performance of funds with high indirect international exposure may be driven by the foreign sales of the firms in which they invest. Each month, within each firm domicile region, we first form five market capitalization-sorted portfolios.¹⁵ We further split each of these five portfolios based on book-to-market quintiles.

¹³ The investment regions (based on the geographical focus) are North America, Europe, Asia Pacific, Emerging Markets, Global (ex-U.S.), and Global.

¹⁴ We thank Allaudeen Hameed for sharing the *IML* data. The start of the data in 2007 reduces the number of observations relative to our baseline results. Amihud et al. (2015b, 2019) also have used the illiquidity return premium.

¹⁵ The regions are North America, Europe, Asia Pacific, and emerging markets.

Then, we split each of these 25 portfolios into two based on whether or not foreign sales exceed 25% of total sales.

Third, we compute the value-added measure of Berk and van Binsbergen (2015), defined as the product between gross return and lagged TNA (in millions of U.S. dollars). The gross return is the four-factor alpha plus one-twelfth of the expense ratio. The value-added measure captures the total investment ability of the fund managers, whereas the alpha-based performance measure captures the net factor-adjusted performance that fund investors obtain.¹⁶

Finally, we report results using alternative performance measures, such as excess returns (over the risk-free rate), Sharpe ratio (i.e., the ratio of the excess fund return to the fund total risk), benchmark-adjusted returns (i.e., the difference between the fund's return and the return on its benchmark), information ratio (i.e., the ratio of the alpha to the fund idiosyncratic risk), and gross returns. In addition, we consider alternative factor models that include country-specific, regional, and world factors.

1.3 Summary statistics

Our sample includes actively managed equity mutual funds between 2005 and 2015. Panel A of Table 1 shows summary statistics for the sample of domestic funds, and panel B shows summary statistics for the sample of all funds (domestic and international funds). Panel A reports that the average indirect international exposure is 31.8% in the sample of domestic funds. Domestic funds mostly invest in domestic stocks with only 10% direct international exposure. Panel B presents summary statistics for the sample of all funds; the panel shows that direct international exposure is 48.6% on average. The average indirect international exposure for this sample is 18.9%. Figure 2 shows the average of the international exposure measures over time for both samples. International exposure trends slightly upward during our sample period.

The average fund has a monthly four-factor alpha of -0.042% and -0.114% per month in the sample of domestic funds and the sample of all funds, respectively. The average fund age is 14.5 years in the sample of domestic funds. Domestic funds have an average TNA of \$918 million and a fund family TNA of about \$40 billion. The average TNA and fund family TNA of international funds are smaller than those of their domestic counterparts. Table A.1 in the appendix defines the variables.

Table IA.2 in the Internet Appendix reports the country averages of fund characteristics. Table IA.3 reports the country averages of our international exposure measures, pure domestic exposure, and the average share of each country in the world market portfolio. The indirect international exposure is the highest in Switzerland, Austria, and Sweden, and the lowest in Indonesia,

¹⁶ Since our database includes international funds, we cannot feasibly use the Berk and van Binsbergen (2015) set of Vanguard index funds as benchmark portfolios. Berk and van Binsbergen (2015) find consistent results using four-factor-adjusted returns and benchmark-adjusted returns.

China, and Poland in the sample of domestic funds.¹⁷ Table IA.3 indicates the extent of the average home bias before and after adjusting for indirect international exposure. For example, U.S. equity funds overall invest 70.3% of their holdings in domestic stocks, although U.S. stocks account for only 33.1% of world market capitalization. After indirect international exposure is taken into consideration, the U.S. funds' exposure to purely domestic markets decreases to 49.1%. Table IA.4 reports the correlation coefficients between fund characteristics and international exposure measures. The correlation between direct international exposure and indirect international exposure is -0.146. This correlation is negative primarily because direct international holdings do not have indirect international exposure by construction.

2. Main Results

In this section, we investigate the fund performance implications of indirect international exposure using both portfolio and regression approaches.

Table 1
Summary statistics

A. Domestic funds

	Mean	SD	25th percentile	Median	75th percentile	Number of observations
Indirect international exposure	0.318	0.154	0.217	0.299	0.399	456,235
Direct international exposure	0.100	0.127	0.013	0.066	0.136	456,235
Four-factor alpha (%)	-0.042	2.916	-1.325	-0.045	1.241	456,235
Five-factor alpha (%)	-0.031	3.092	-1.424	-0.031	1.362	360,572
Characteristic-adjusted return (%)	-0.002	2.513	-1.142	0.045	1.208	456,227
Value added (\$ million)	0.471	47.982	-1.396	0.020	1.810	456,106
Fund age	14.458	11.127	7.250	11.750	17.833	456,235
Fund TNA (\$ million)	918	4,205	34	136	547	456,235
Family TNA (\$ million)	39,908	131,357	724	4,594	23,724	456,235
Total expense ratio (%)	1.525	0.680	1.073	1.429	1.801	456,235
Flow (%)	-0.311	5.239	-1.681	-0.518	0.615	456,212
Total load (%)	2.187	2.398	0.000	1.738	3.500	456,235
Number of countries of sale	1.166	0.888	1.000	1.000	1.000	456,235
Team managed	0.510	0.500	0.000	1.000	1.000	456,235
Four-factor alpha (global) (%)	-0.026	3.231	-1.669	-0.019	1.612	456,235
Eight-factor alpha (global + regional) (%)	-0.011	3.010	-1.370	-0.016	1.333	456,235
Four-factor alpha (country) (%)	-0.034	2.564	-1.057	-0.044	0.987	456,235
Eight-factor alpha (country + regional) (%)	-0.043	2.640	-1.127	-0.062	1.025	456,235
Excess return (%)	0.498	5.597	-2.539	0.851	3.831	456,235
Total risk	0.181	0.089	0.115	0.159	0.227	456,230
Sharpe ratio	0.398	3.581	-2.009	0.681	2.907	456,230
Benchmark-adjusted return (%)	-0.003	1.967	-0.913	-0.017	0.901	455,409
Tracking error	0.064	0.041	0.037	0.054	0.078	454,630
Information ratio	-0.113	3.975	-2.550	-0.092	2.351	456,235
Active share	0.724	0.224	0.588	0.769	0.913	403,233

(Continued)

¹⁷ These differences are primarily driven by the prevalence of multinational companies. Figure IA.1 reports the average foreign sales in selected countries over time for all firms included in the FactSet Fundamentals database.

Table 1
Continued
B. All funds

	Mean	SD	25th percentile	Median	75th percentile	Number of observations
Indirect international exposure	0.189	0.185	0.007	0.167	0.313	902,482
Direct international exposure	0.486	0.427	0.063	0.323	0.985	902,482
Four-factor alpha (%)	-0.114	2.759	-1.352	-0.126	1.114	902,482
Five-factor alpha (%)	-0.110	2.903	-1.438	-0.112	1.211	713,665
Characteristic-adjusted return (%)	-0.005	2.263	-0.995	0.029	1.042	902,341
Value added (\$ million)	0.068	43.209	-1.205	-0.000	1.288	902,210
Fund age	13.481	9.901	6.917	11.083	16.917	902,482
Fund TNA (\$ million)	726	3696	31	111	403	902,482
Family TNA (\$ million)	30,405	107,235	847	4,654	21,217	902,482
Total expense ratio (%)	1.617	0.663	1.176	1.550	1.961	902,482
Flow (%)	-0.280	5.444	-1.718	-0.481	0.690	902,432
Total load (%)	2.610	2.558	0.026	2.000	4.027	902,482
Number of countries of sale	1.456	1.575	1.000	1.000	1.000	902,482
Team managed	0.482	0.500	0.000	0.000	1.000	902,482
Domestic fund	0.506	0.500	0.000	1.000	1.000	902,482
Global fund	0.170	0.375	0.000	0.000	0.000	902,482
Regional fund	0.248	0.432	0.000	0.000	0.000	902,482
Foreign fund	0.077	0.266	0.000	0.000	0.000	902,482
Four-factor alpha (global) (%)	-0.123	3.027	-1.650	-0.125	1.386	902,482
Eight-factor alpha (global + regional) (%)	-0.098	2.829	-1.383	-0.107	1.178	902,482
Four-factor alpha (country) (%)	-0.105	2.551	-1.192	-0.114	0.973	902,482
Eight-factor alpha (country + regional) (%)	-0.112	2.610	-1.243	-0.124	1.006	902,482
Excess return (%)	0.437	5.596	-2.559	0.739	3.774	902,482
Total risk	0.181	0.087	0.115	0.158	0.227	902,476
Sharpe ratio	0.347	3.578	-2.038	0.592	2.861	902,476
Benchmark-adjusted return (%)	-0.036	2.016	-0.982	-0.040	0.917	898,578
Tracking error	0.066	0.040	0.039	0.056	0.080	895,969
Information ratio	-0.277	3.981	-2.723	-0.270	2.181	902,482
Active share	0.734	0.216	0.604	0.781	0.912	792,180

This table presents the mean, standard deviation, 25th percentile, median, 75th percentile, and number of observations for each variable. The sample in panel A consists of actively managed domestic equity mutual funds over the 2005 to 2015 period. The sample in panel B consists of actively managed domestic and international equity mutual funds over the 2005 to 2015 period. Table A.1 in the appendix defines the variables.

2.1 Portfolio results

To examine the performance of funds with different levels of international exposure, we sort funds into five portfolios at the beginning of each month according to their level of indirect or direct international exposure. For each quintile portfolio, we compute the equal-weighted average excess return in each month using four-factor alphas based on a fund’s investment region. Newey-West standard errors with 12 lags are reported in parentheses.

Columns 1 and 2 of Table 2 present the results for the sample of domestic funds. While funds in the lowest indirect exposure quintile (i.e., quintile 1) exhibit an alpha of -10.6 basis points per month, funds in the highest indirect exposure quintile (i.e., quintile 5) exhibit an alpha of 8.7 basis points per month. The difference in performance of 19.3 basis points per month is economically and statistically significant. In contrast, less significant performance differences are observed among domestic funds with distinct levels of direct international exposure. Funds with the highest direct international exposure actually

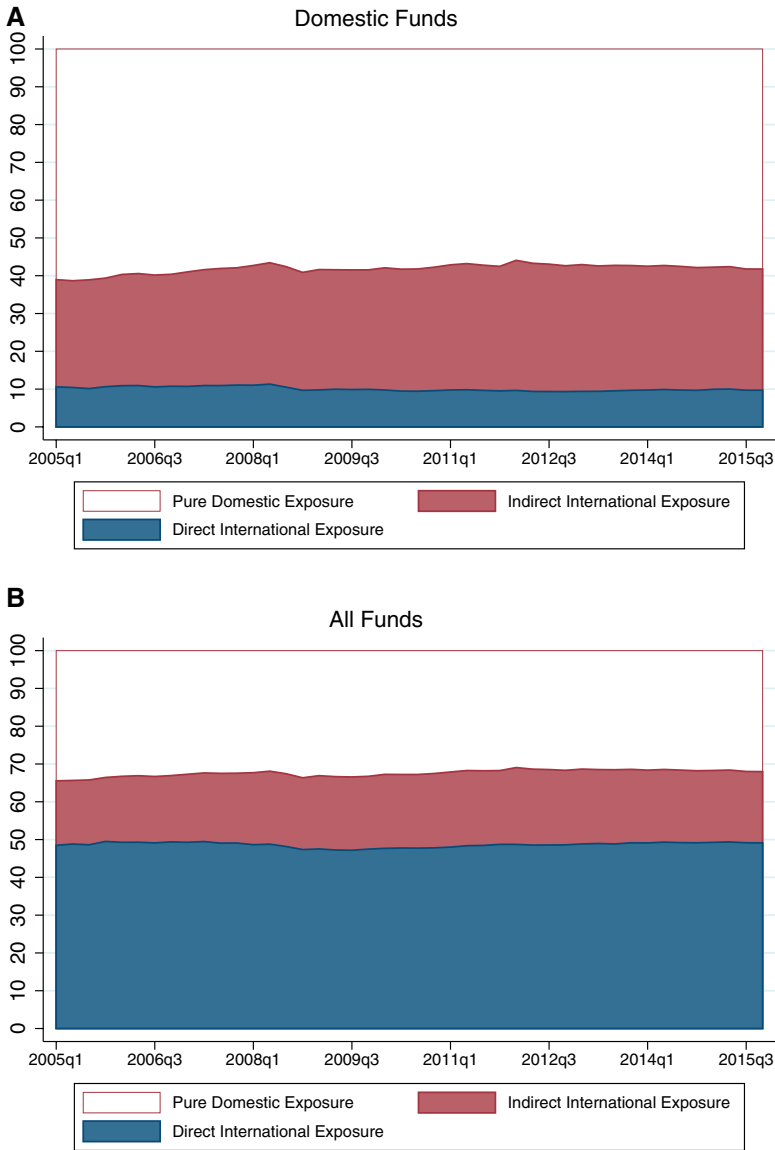


Figure 2

International exposure measures over time

This figure shows the average indirect and direct international exposure measures by quarter. *Indirect international exposure* is the fraction of fund holdings invested in domestic stocks weighted by foreign sales. *Direct international exposure* is the fraction of fund holdings invested in foreign stocks. *Pure domestic exposure* is the fraction of fund holdings invested in pure domestic stocks that corresponds to the difference between the exposure to domestic stocks and indirect international exposure. The sample in panel A consists of actively managed domestic equity mutual funds over the 2005 to 2015 period. The sample in panel B consists of actively managed domestic and international equity mutual funds over the 2005 to 2015 period.

Table 2
Univariate sort results

	Domestic funds		All funds	
	Indirect international exposure (1)	Direct international exposure (2)	Indirect international exposure (3)	Direct international exposure (4)
Quintile 1	-0.106 (0.090)	-0.039 (0.119)	-0.198 (0.072)	-0.047 (0.075)
Quintile 2	-0.079 (0.040)	-0.044 (0.027)	-0.187 (0.048)	-0.021 (0.023)
Quintile 3	-0.055 (0.038)	-0.024 (0.025)	-0.119 (0.057)	-0.113 (0.061)
Quintile 4	-0.055 (0.038)	-0.011 (0.028)	-0.075 (0.036)	-0.192 (0.046)
Quintile 5	0.087 (0.065)	-0.091 (0.080)	0.010 (0.050)	-0.197 (0.072)
Quintile 5 - Quintile 1	0.193** (0.076)	-0.052 (0.095)	0.208*** (0.046)	-0.150** (0.059)

This table presents the average risk-adjusted performance for portfolios of mutual funds. The performance measure is the monthly alpha from the four-factor model estimated using regional factors based on a fund's investment region. In each month, funds are split into five quintiles based on the previous quarter's indirect and direct international exposure measures. *Indirect international exposure* is the fraction of fund holdings invested in domestic stocks weighted by foreign sales. *Direct international exposure* is the fraction of the fund's holdings invested in foreign stocks. The sample in columns 1 and 2 consists of actively managed domestic equity mutual funds over the 2005 to 2015 period. The sample in columns 3 and 4 consists of actively managed domestic and international equity mutual funds over the 2005 to 2015 period. Table A.1 in the appendix defines the variables. Newey-West standard errors with 12 lags are reported in parentheses. * $p < .1$; ** $p < .05$; *** $p < .01$.

underperform funds with the lowest direct international exposure by 5.2 basis points per month, but this difference is not statistically significant.

Columns 3 and 4 present the results for the sample of all funds. The impact of indirect international exposure on fund performance is similar to that of domestic funds. Funds in the top quintile of indirect international exposure outperform funds in the bottom quintile by 21 basis points per month, which is statistically significant at the 1% level. Funds with a high direct international exposure *underperform* funds with a low direct international exposure by 15 basis points per month. The evidence suggests performance benefits are associated with indirect international exposure, whereas the costs seem to outweigh the benefits for the case of the direct international exposure.

2.2 Baseline regression results

In this section, we study the relation between indirect international exposure and fund performance using multivariate regressions, which allow us to control for fixed effects and several fund characteristics that are important determinants of fund performance.

Table 3 presents the estimates in which the dependent variable is the four-factor alpha based on a fund's investment region. The main explanatory variable is the lagged indirect international exposure based on a firm's foreign sales. The regressions also include the lagged direct international exposure and

Table 3
Baseline regression results

	Domestic funds		All funds	
	(1)	(2)	(3)	(4)
Indirect international exposure	0.503*** (7.669)	1.127*** (10.743)	0.401*** (7.205)	1.166*** (12.483)
Direct international exposure	-0.111** (-2.066)	-0.079 (-0.747)	0.015 (0.401)	0.270*** (3.627)
log(1+fund age)	-0.005 (-0.714)	-0.134*** (-2.646)	0.007 (1.253)	-0.088** (-2.442)
log(fund TNA)	-0.015*** (-4.943)	-0.242*** (-21.402)	-0.017*** (-7.874)	-0.241*** (-30.082)
log(family TNA)	0.016*** (6.871)	-0.085*** (-5.089)	0.016*** (9.198)	-0.053*** (-4.446)
Total expense ratio	-0.085***	-0.124***	-0.071***	-0.060***
Total load	-0.001 (-0.242)	-0.013 (-1.150)	-0.002 (-1.585)	-0.009 (-1.002)
log(1+number of countries of sale)	0.024 (1.375)	12.488*** (103.185)	0.045*** (4.777)	12.644*** (145.090)
Team managed	0.009 (1.071)	-0.177 (-0.198)	0.025*** (4.062)	-0.511 (-0.942)
Benchmark FE	Yes	No	Yes	No
Country FE	Yes	No	Yes	No
Time FE	Yes	Yes	Yes	Yes
Fund FE	No	Yes	No	Yes
Observations	456,235	456,235	902,482	902,482
Adjusted R ²	.039	.040	.038	.040

This table presents estimates of ordinary least squares (OLS) regressions of future fund performance. The dependent variable is the monthly alpha from the four-factor model estimated using regional factors based on a fund's investment region. *Indirect international exposure* is the fraction of fund holdings invested in domestic stocks weighted by foreign sales. All control variables are lagged by one period. The sample in columns 1 and 2 consists of actively managed domestic equity mutual funds over the 2005 to 2015 period. The sample in columns 3 and 4 consists of actively managed domestic and international equity mutual funds over the 2005 to 2015 period. Robust *t*-statistics adjusted for clustering at the fund level are reported in parentheses. **p* <.1; ***p* <.05; ****p* <.01.

other fund characteristics, fund benchmark fixed effects, fund domicile country fixed effects, and time fixed effects. Standard errors are clustered at the fund level.

Columns 1 and 2 present the results for the sample of domestic funds. Consistent with the portfolio results, we find that the indirect international exposure is positively related to fund performance. A one-standard-deviation increase in the indirect international exposure (i.e., 0.154) results in an increase in the four-factor alpha of 7.7 basis points per month using the estimate in column 1. The direct international exposure coefficient is negative, and economically and statistically weaker than the indirect exposure coefficient.

To capture the time-series relation between international exposure and fund performance, we also run regressions with fund fixed effects, which absorb country and benchmark fixed effects. Consistent with the cross-sectional regression results, column 2 shows that the indirect international exposure coefficient is positive and significant. These results are also economically

significant: a one-standard-deviation (within-fund) increase in the indirect international exposure (i.e., 0.041) is associated with a 4.6 basis points increase in the four-factor alpha. In the fund fixed effects specification, we find that the direct international exposure is not significantly associated with fund performance.

Columns 3 and 4 report the results for the sample of all funds. The economic magnitude and the statistical significance of the results for the indirect international exposure are similar to those for domestic funds. The estimate in column 3 indicates that a one-standard-deviation (i.e., 0.185) increase in indirect international exposure is associated with a 7.4 basis points increase in the four-factor alpha. We also find similar estimates when we include fund fixed effects. The estimate in column 4 indicates that a one-standard-deviation (i.e., 0.027) increase in indirect international exposure is associated with a 3.1 basis points increase in the four-factor alpha.

The coefficients for the control variables are in line with prior studies that find that performance is negatively related to fund size and expenses (e.g., Chen et al. 2004; Gil-Bazo and Ruiz-Verdú 2009; Pástor, Stambaugh, and Taylor 2015; Cremers et al. 2016; Ferreira, Matos, and Pires 2018).

Mutual funds can gain international exposure through both direct and indirect international investments. Our results indicate that the performance implications differ between these two methods of diversifying internationally. Whereas indirect international exposure is consistently associated with superior fund performance, the performance implications of direct international exposure are more mixed. Fund managers are able to generate superior performance for their indirect international exposure, as the higher complexity of multinationals generates profitable investment opportunities (Huang 2015). On the other hand, mutual fund managers tend to have informational disadvantages investing in foreign firms, which is reflected in the more mixed performance implications of direct international exposure.

2.3 Alternative performance measures

Table 4 presents the results using alternative performance measures. Panel A shows the results for the sample of domestic funds. Columns 1 and 2 report the results using alphas based on a five-factor model that adds the illiquidity return premium of Amihud et al. (2015a) to the Carhart (1997) four-factor model. The consistent results across the two models indicate that the performance benefits of indirect exposure are not explained by differences in liquidity.

We also employ a characteristic-based adjustment to the returns of the stocks in a fund's portfolio based on Daniel et al. (1997). Besides the market capitalization and the book-to-market ratio, we also adjust for the level of foreign sales as the outperformance of funds with high indirect international exposure might be driven by the foreign sales of the firms that funds invest into. Columns 3 and 4 present the results. We find that outperformance is not

Table 4
Alternative performance measures

	Five-factor alpha		Characteristic-adjusted return		Value added	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>A. Domestic funds</i>						
Indirect international exposure	0.400*** (5.042)	0.946*** (6.644)	0.514*** (8.067)	0.925*** (9.222)	1.738** (2.145)	2.802*** (2.747)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Benchmark FE	Yes	No	Yes	No	Yes	No
Country FE	Yes	No	Yes	No	Yes	No
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	No	Yes	No	Yes	No	Yes
Observations	360,572	360,562	456,227	456,227	456,106	456,102
Adjusted R^2	.043	.043	.047	.048	.004	.004
<i>B. All funds</i>						
Indirect International Exposure	0.273*** (4.056)	1.031*** (8.019)	0.408*** (7.809)	0.851*** (9.504)	1.827*** (2.955)	4.476*** (5.095)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Benchmark FE	Yes	No	Yes	No	Yes	No
Country FE	Yes	No	Yes	No	Yes	No
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	No	Yes	No	Yes	No	Yes
Observations	713,663	713,634	902,341	902,341	902,210	902,203
Adjusted R^2	.042	.043	.037	.038	.002	.001

This table presents estimates of ordinary least squares (OLS) regressions of future fund performance. The dependent variable in columns 1 and 2 is the monthly alpha from the five-factor model estimated using regional factors, including the illiquidity return premium, based on a fund's investment region. The dependent variable in columns 3 and 4 is the characteristic-adjusted return, estimated as the fund portfolio-weighted average of the individual stock characteristic-adjusted returns, that is, the difference between the individual stock return and the return of the size/book-to-market/foreign sales portfolio to which a stock belongs in each month. The portfolios are estimated using five quintiles based on size by five quintiles based on book-to-market ratio. These 25 portfolios are further split into two groups based on whether or not foreign sales exceed 25% of total sales. The dependent variable in columns 5 and 6 is the value added (in millions of U.S. dollars per month) estimated as the gross four-factor alpha multiplied by the lagged fund TNA. *Indirect international exposure* is the fraction of fund holdings invested in domestic stocks weighted by foreign sales. All control variables are lagged by one period. The sample in panel A consists of actively managed domestic equity mutual funds over the 2005 to 2015 period. The sample in panel B consists of actively managed domestic and international equity mutual funds over the 2005 to 2015 period. Robust t -statistics adjusted for clustering at the fund level are reported in parentheses. * $p < .1$; ** $p < .05$; *** $p < .01$.

an artifact of funds investing in multinationals but rather reflects the funds' ability to invest in companies that successfully diversify internationally.¹⁸

Columns 5 and 6 show the results using the value-added measure of Berk and van Binsbergen (2015). A one-standard-deviation increase in the indirect international exposure in the cross-sectional specification in column 5 results in an increase in the value added of about one-quarter of a million dollars. The

¹⁸ Consistent with the prior literature, we do not find that multinational firms outperform nonmultinational firms. Table IA.5 of the Internet Appendix shows that the performance differences between multinational and nonmultinational firms are insignificant when using the market model or the four-factor model. Table IA.6 shows that multinational firms do not perform better than their counterparts in the same size and book-to-market portfolios. Overall, our results suggest that the performance effect of indirect international exposure is not driven by the superior performance of multinational firms.

Table 5
Alternative factor models

	Four-factor alpha (global)		Eight-factor alpha (global + regional)		Four-factor alpha (country)		Eight-factor alpha (country + regional)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Indirect international exposure	0.637*** (9.327)	1.283*** (11.931)	0.579*** (8.191)	1.243*** (11.730)	0.136** (2.336)	0.476*** (5.191)	0.217*** (3.585)	0.532*** (5.879)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Benchmark FE	Yes	No	Yes	No	Yes	No	Yes	No
Country FE	Yes	No	Yes	No	Yes	No	Yes	No
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	No	Yes	No	Yes	No	Yes	No	Yes
Observations	456,235	456,235	456,235	456,235	456,235	456,235	456,235	456,235
Adjusted R^2	.038	.038	.037	.039	.048	.049	.051	.052

This table presents estimates of ordinary least squares (OLS) regressions of future fund performance. The dependent variable in columns 1 and 2 is the monthly alpha from the four-factor model estimated using global factors. The dependent variable in columns 3 and 4 is the monthly alpha from the eight-factor model estimated using global factors and regional factors based on a fund's investment region. The dependent variable in columns 5 and 6 is the monthly alpha from the four-factor model estimated using country factors based on a fund's investment country. The dependent variable in columns 7 and 8 is the monthly alpha from the eight-factor model estimated using country factors based on a fund's investment country and regional factors based on a fund's investment region. *Indirect international exposure* is the fraction of fund holdings invested in domestic stocks weighted by foreign sales. All control variables are lagged by one period. The sample consists of actively managed domestic equity mutual funds over the 2005 to 2015 period. Robust t -statistics adjusted for clustering at the fund level are reported in parentheses. * $p < .1$; ** $p < .05$; *** $p < .01$.

time-series specification in column 6 indicates that a one-standard-deviation increase in the indirect international exposure is associated with an increase in value added of more than \$100,000. The results in panel B using the sample of all funds are consistent with those in panel A.

2.4 Alternative factor models

The results in Table 3 use factors based on the fund's focus region. We also present regression results using alphas based on global, regional, and country-specific factors as dependent variables. Table 5 reports the regression results for the sample of domestic funds (our main sample).¹⁹ Columns 1 and 2 report the results using four-factor alphas based on global factors. Columns 3 and 4 report the results from an eight-factor model based on both the fund's investment region factors and global factors. This specification, which is more stringent than our baseline model, captures not only the region-specific risks but also global risks. Our results are robust to these alternative measures of fund performance.

Columns 5–8 of Table 5 report the results using four-factor alphas based on the fund's investment country factors as well as the results using eight-factor alphas based on both country-specific factors and regional factors. The indirect international exposure coefficients remain positive and significant, but with

¹⁹ Table IA.7 in the Internet Appendix reports the results for the sample of all funds.

lower magnitudes. This may be due to measurement error in country-specific factors in countries with a relatively low number of stocks.

We also control for funds' exposure to exchange rate risk. To do so, we estimate monthly alphas based on a six-factor model that includes not only Carhart four factors but also two additional factors proposed by Lustig, Roussanov, and Verdelhan (2011): (1) the dollar risk factor (RX), defined as the equally weighted average of excess returns on all non-U.S. dollar currencies available in the forward market; and (2) the carry-trade risk factor ($HMLX$), defined as the return on a zero-cost strategy that goes long high-interest rate currencies and goes short low-interest rate currencies. Table IA.8 in the Internet Appendix reports the results, which show that our findings continue to hold after accounting for funds' exchange rate exposure.

2.5 Future returns

We also investigate whether the impact of changes in indirect international exposure can predict future alphas for horizons longer than 1 month. To test the persistence of the relation between performance and indirect exposure, we first calculate the average of the monthly alpha for each of the next four quarters. Then, we run our baseline tests using the average alpha for each of the next four quarters as dependent variables. Table IA.9 in the Internet Appendix reports the results, which indicate that the effect remains statistically significant during the next four quarters, although the effect declines with the length of the horizon.

3. Cross-Sectional Heterogeneity

In this section, we examine the heterogeneity of the relation between fund performance and indirect international exposure using fund and country characteristics.

3.1 Fund characteristics

We first investigate the heterogeneity of the relation between performance and indirect international exposure using several fund characteristics: fund size (TNA) measured at both the fund and the family levels, and fund style (i.e., firm size and book-to-market) based on the characteristics of the fund's stock holdings. Small fund families and small funds are likely to face relatively higher transaction and information costs when investing abroad. Thus, they may benefit more from investing internationally using home-based multinationals with economic exposure to other countries. In each month and country, we sort funds into terciles based on their lagged fund family TNA or fund TNA. We then interact our indirect international exposure measure with dummy variables for fund family size terciles (*Small family*, *Mid family*, *Large family*) and fund size terciles (*Small fund*, *Mid fund*, *Large fund*). All regressions also include dummy variables for the direct effect of fund family size and fund size.

Table 6 presents the regression results for the sample of domestic funds. Columns 1 and 2 show that the relation between performance and indirect international exposure is more pronounced among funds that belong to small fund families. The relation is significantly weaker among funds that belong to families in the top tercile of fund family TNA (*Large family*). Columns 3 and 4 report the results for fund size terciles; the results suggest that the relation between indirect international exposure and fund performance is not significantly affected by fund size.²⁰

Next, we study the role of fund style in the relation between performance and indirect international exposure. We expect transaction and information costs to be higher for funds investing in small and growth stocks, as discussed by Schultz (2010). Thus, these funds would benefit more from indirect international exposure. We use the Lipper fund classification into 12 fund styles based on market capitalization (large, multi-, mid-, or small) and book-to-market ratio (value, core, or growth), which is only available for about half of our sample. We then construct a *Large style* dummy variable that takes a value of one for large-cap funds and zero for multi-, mid-, and small cap funds. Similarly, we define a *Value style* dummy variable that takes a value of one for funds investing in value stocks and zero for funds investing in core and growth stocks. We interact our indirect international exposure measure with the dummy variables for *Large style* or *Value style* fund style. All regressions also include dummy variables for the direct effect of fund style.

Columns 5 and 6 show the differential effects of indirect international exposure on the performance of large-cap funds. The estimates of the indirect international exposure coefficients are positive and statistically significant for the benchmark group of funds that is composed of all funds other than large-cap funds. The negative and significant coefficient for the interaction term between the indirect international exposure and the *Large style* dummy variable suggests that the positive impact of indirect international exposure is more pronounced for funds investing in small- and mid-cap stocks.

Next, we include the interaction of the indirect international exposure with the *Value style* dummy variable. The cross-sectional and times-series regression estimates in columns 7 and 8 suggest that the relation between indirect international exposure and fund performance is positive and significant for funds investing in growth and core stocks. The coefficient for the interaction term between the indirect international exposure and the *Value style* dummy variable is negative and significant in the case of the fund fixed effects specification. The effect of indirect international exposure on performance is insignificant for funds that focus on value stocks when we sum the interaction term coefficient and the indirect international exposure coefficient.²¹

²⁰ The total effect of indirect international exposure is positive and statistically significant at the 1% level for all fund size terciles.

²¹ Table IA.10 in the Internet Appendix reports the results for the sample of all funds.

Table 6
Effect of fund characteristics

	Fund family size		Fund size		Fund style market capitalization		Fund style book-to-market	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Indirect international exposure	0.600*** (7.695)	1.176*** (8.428)	0.503*** (6.252)	1.015*** (7.520)	0.241** (2.091)	0.765*** (5.579)	0.235** (2.448)	0.798*** (6.315)
Indirect international exposure × Mid family	-0.048 (-0.640)	0.117 (0.764)						
Indirect international exposure × Large family	-0.239*** (-3.300)	-0.311* (-1.655)						
Indirect international exposure × Mid fund			-0.028 (-0.342)	0.055 (0.400)				
Indirect international exposure × Large fund			-0.025 (-0.333)	0.202 (1.223)				
Indirect international exposure × Large style					-0.280* (-1.929)	-0.492** (-2.490)		
Indirect international exposure × Value style							-0.221 (-0.847)	-1.075*** (-3.522)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Benchmark FE	Yes	No	Yes	No	Yes	No	Yes	No
Country FE	Yes	No	Yes	No	Yes	No	Yes	No
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	No	Yes	No	Yes	No	Yes	No	Yes
Observations	456,235	456,235	456,235	456,235	254,853	254,853	254,853	254,853
Adjusted R ²	.039	.040	.039	.040	.066	.070	.066	.070

This table presents estimates of ordinary least squares (OLS) regressions of future fund performance. The dependent variable is the monthly alpha from the four-factor model estimated using regional factors based on a fund's investment region. *Indirect international exposure* is the fraction of fund holdings invested in domestic stocks weighted by foreign sales. The regressions include interactions of indirect international exposure with the dummy variables as well as their direct effect (coefficients not shown). Funds are classified into terciles based on their lagged fund family TNA and fund TNA in each country of domicile and month. *Mid family* is a dummy variable that takes a value of one if the fund is in the mid tercile of fund family size. *Large family* is a dummy variable that takes a value of one if the fund is in the top tercile of fund family size. *Mid fund* is a dummy variable that takes a value of one if the fund is in the mid tercile of fund size. *Large fund* is a dummy variable that takes a value of one if the fund is in the top tercile of fund size. Funds are also classified based on their Upper fund style classification in terms of market capitalization (large, mid, multi, or small) and book-to-market ratio (value, core, or growth) of portfolio holdings. *Large style* is a dummy variable that takes a value of one if the fund is classified as large cap, and zero if classified as multi, mid, or small cap. *Value style* is a dummy variable that takes a value of one if the fund is classified as core or growth. All control variables are lagged by one period. The sample consists of actively managed domestic equity mutual funds over the 2005 to 2015 period. Robust *t*-statistics adjusted for clustering at the fund level are reported in parentheses. * $p < .1$; ** $p < .05$; *** $p < .01$.

3.2 Country characteristics

Our indirect international exposure variable is constructed based on the firm's total foreign sales. The FactSet Revere data allow us to observe foreign sales of each stock at the country level and calculate separately a fund's exposure to different countries. We use this more granular data to exploit the cross-country variation in the relationship between indirect international exposure and performance. We require funds to have nonmissing foreign sales information for at least 75% of their portfolio holdings.

We hypothesize that the positive impact of indirect international exposure on fund performance is less pronounced for funds that invest in stock markets with lower asymmetric information and higher liquidity, which arguably corresponds to developed capital markets. To test this prediction, we use several measures to proxy for the exposure of the fund portfolio to developed markets: (1) the stock market capitalization-to-GDP; (2) the stock market turnover (i.e., ratio of the value of total shares traded to the average market capitalization); (3) the financial openness proxied by the index of Chinn and Ito (2006) that measures a country's degree of capital account openness; (4) the size of the mutual fund industry relative to stock market capitalization; and (5) the legal enforcement (La Porta et al. 1998).²²

To calculate a fund's indirect exposure to developed markets, we first estimate the exposure of each domestic stock in the fund's portfolio to developed markets. We split countries into two groups based on the sample exposure of our developed market proxies in each year and generate a dummy variable for developed markets that takes a value of one for countries above the median of the distribution of each proxy, and zero for countries below the median. Then, we take the sales-weighted average of this dummy variable to obtain an exposure measure at the stock level. Thus, the stock-level exposure to developed markets is the average proportion of sales generated in developed markets. A fund's exposure to developed markets is the portfolio-weighted average of stock-level exposures to developed markets.

Table 7 presents the estimates of the indirect international variable and the indirect international exposure to developed markets variables. We present the regression results for the sample of domestic funds.²³ In all specifications, the estimates of the indirect exposure coefficient are positive and significant, which indicates that indirect exposure is associated with higher fund performance in less-developed markets. The negative and significant coefficient for the indirect exposure to developed markets indicates that the effect is attenuated for funds with higher exposure to developed markets. This result holds across

²² The legal enforcement is based on the following five variables: the efficiency of the judicial system, the rule of law, the corruption level, the expropriation (outright confiscation and forced nationalization by the government), and the likelihood of contract repudiation by the government. The variables are rescaled to range between 0 and 10, and higher values correspond to superior levels of legal enforcement.

²³ Table IA.11 in the Internet Appendix reports the results for the sample of all funds.

Table 7
Effect of investment country characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Stock market capitalization	Stock market capitalization	Stock market turnover	Stock market turnover	Financial openness	Financial openness	Mutual fund industry size/stock market capitalization	Mutual fund industry size/stock market capitalization	Legal enforcement	Legal enforcement
Indirect international exposure	1.286*** (10.220)	2.908*** (17.123)	0.948*** (7.550)	2.376*** (14.110)	0.867*** (7.070)	2.416*** (14.505)	0.767*** (7.359)	2.412*** (15.725)	0.708*** (5.901)	2.285*** (13.824)
Indirect international exposure to developed markets	-0.646*** (-6.923)	-0.980*** (-8.404)	-0.279*** (-3.171)	-0.245*** (-2.052)	-0.237*** (-2.361)	-0.347*** (-2.431)	-0.184* (-1.769)	-0.452*** (-3.210)	-0.068 (-0.659)	-0.156 (-1.063)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Benchmark FE	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Country FE	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	372,643	372,639	372,643	372,639	372,643	372,639	372,643	372,639	372,643	372,639
Adjusted R ²	.044	.047	.043	.046	.043	.046	.043	.046	.043	.046

This table presents estimates of ordinary least squares (OLS) regressions of future fund performance. The dependent variable is the monthly alpha from the four-factor model estimated using regional factors based on a fund's investment region. The exposure measures are calculated based on FactSet Revere data, which decomposes foreign sales by individual countries. Funds are required to have nonmissing total foreign sales for at least 75% of their stock holdings. *Indirect international exposure* is the fraction of fund holdings invested in domestic stocks weighted by foreign sales. *Indirect international exposure to developed markets* is the fraction of foreign sales generated in developed markets and is calculated based on a dummy variable that takes a value of one if the country in which the sales are generated is above-median for each developed market proxy, and zero otherwise. The developed market proxies are stock market capitalization-to-GDP, stock market turnover, financial openness, the size of mutual fund industry, and legal enforcement. Stock market turnover is the ratio of the value of total shares traded to the average real market capitalization. Financial openness is proxied by the index of Chinn and Ito (2006); the index measures a country's degree of capital account openness. Mutual fund industry size is calculated as the sum of TNAs of all funds under each management company. Legal enforcement is based on the following five variables as defined in La Porta et al. (1998): efficiency of the judicial system, rule of law, corruption, risk of expropriation (outright confiscation and forced nationalization by the government), and the likelihood of contract repudiation by the government (the variables are rescaled to range between 0 to 10 and higher values correspond to superior levels of legal enforcement). The sample consists of actively managed domestic equity mutual funds over the 2005 to 2015 period. Table A.1 in the appendix defines the variables. Robust *t*-statistics adjusted for clustering at the fund level are reported in parentheses. * $p < .1$; ** $p < .05$; *** $p < .01$.

all our measures of capital market development with the exception of the legal enforcement measure. We conclude that indirect international exposure generates superior performance when a fund is more exposed to less-developed markets.

4. Fund Risk and Diversification

In this section, we discuss the effect of indirect international exposure on fund risk and diversification.

4.1 Risk-return trade-off

Our baseline tests focus on fund performance measured by alpha, which adjusts for common risk factors and style, but not for portfolio risk. If indirect international exposure helps funds to diversify their portfolios, then this benefit can affect the fund return volatility or the fund risk-return trade-off. Given the wide coverage of our sample of funds with different investment objectives, we must control for portfolio risk.

Table 8 presents the regression results for the sample of domestic funds. Panel A reports the results for the excess returns (over the risk-free rate), the total risk, and the Sharpe ratio, respectively. The total risk is the annualized standard deviation of the fund return using a 12-month window. The Sharpe ratio is the annualized excess fund return divided by the total risk. We find that the indirect international exposure provides significantly higher excess returns and higher Sharpe ratios to investors in both the cross-section and the time series. While the relationship between total risk and indirect international exposure is insignificant in the cross-section, it is negative and significant in the time series.

Panel B of Table 8 provides additional results on the risk-return trade-off based on the benchmark-adjusted return, the tracking error, and the information ratio, respectively. The tracking error is the annualized standard deviation of the benchmark-adjusted return. The information ratio is the annualized four-factor alpha divided by the annualized standard deviation of the residuals from the four-factor model. We find that the indirect international exposure is associated with higher benchmark-adjusted returns, lower tracking errors, and higher information ratios.

Overall, our findings suggest a negative relationship between indirect international exposure and portfolio risk. This is consistent with the indirect international exposure providing international diversification gains to fund investors. Table IA.12 in the Internet Appendix shows that the results are similar in the sample of all funds.

4.2 Spanning tests

To study whether indirect international exposure exhausts the international diversification benefits for mutual fund investors, we perform portfolio spanning tests following Huberman and Kandel (1987), DeSantis (1994),

Table 8
Fund performance and risk

A. Excess return, total risk, and Sharpe ratio

	Excess return		Total risk		Sharpe ratio	
	(1)	(2)	(3)	(4)	(5)	(6)
Indirect international exposure	0.469*** (5.390)	0.986*** (7.395)	0.005 (0.865)	-0.011** (-2.203)	0.177*** (3.316)	0.398*** (4.605)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Benchmark FE	Yes	No	Yes	No	Yes	No
Country FE	Yes	No	Yes	No	Yes	No
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	No	Yes	No	Yes	No	Yes
Observations	456,235	456,235	456,230	456,230	456,230	456,230
Adjusted R^2	.678	.679	.764	.829	.670	.671

B. Benchmark-adjusted return, tracking error, and information ratio

	Benchmark-adjusted return		Tracking error		Information ratio	
	(1)	(2)	(3)	(4)	(5)	(6)
Indirect international exposure	0.149*** (2.698)	0.432*** (5.492)	-0.049*** (-6.614)	-0.016*** (-5.011)	0.381*** (4.776)	1.126*** (9.122)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Benchmark FE	Yes	No	Yes	No	Yes	No
Country FE	Yes	No	Yes	No	Yes	No
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund FE	No	Yes	No	Yes	No	Yes
Observations	455,409	455,409	454,630	454,630	456,235	456,235
Adjusted R^2	.028	.035	.509	.866	.030	.034

This table presents estimates of ordinary least squares (OLS) regressions of fund risk and risk-adjusted performance measures. *Excess return* is the fund return in excess of the 1-month U.S. Treasury-bill rate in each month. *Total risk* is the annualized standard deviation of fund return using a 12-month window in each month. *Sharpe ratio* is the ratio of the annualized excess fund return to the annualized standard deviation of fund return using a 12-month window in each month. *Benchmark-adjusted return* is defined as the difference between the fund's return and the return on its benchmark in each month. *Tracking error* is the annualized standard deviation of the benchmark-adjusted return using a 12-month window in each month. *Information ratio* is the ratio of the annualized four-factor alpha to the annualized standard deviation of the residuals from the four-factor model in each month. *Indirect international exposure* is the fraction of fund holdings invested in domestic stocks weighted by foreign sales. All control variables are lagged by one period. The sample consists of actively managed domestic equity mutual funds over the 2005 to 2015 period. Robust *t*-statistics adjusted for clustering at the fund level are reported in parentheses. * $p < .1$; ** $p < .05$; *** $p < .01$.

Bekaert and Urias (1996), Errunza, Hogan, and Hung (1999), and Bae, Elkamhi, and Simutin (2019). We regress the value-weighted returns of all international funds in a region of fund domicile (i.e., the United States, Europe, or Asia-Pacific) on the returns of domestic funds with below-median and above-median indirect international exposure in the same region. The portfolio of international funds is spanned by the two portfolios of domestic funds with differential indirect international exposure if the intercept of the regression is zero (i.e., $\alpha = 0$) and if the sum of the loadings on the two domestic fund returns is equal to one (i.e., $\beta_1 + \beta_2 = 1$).

Column 1 of Table 9 shows the results for the sample of U.S. funds. The alpha of the regression is close to zero indicating that international U.S. funds do not

Table 9
Portfolio spanning tests

	U.S. (1)	Europe (2)	Asia-Pacific (3)
Low indirect international exposure return (β_1)	0.519** (2.595)	0.145** (2.350)	0.168** (2.518)
High indirect international exposure return (β_2)	0.533** (2.479)	0.783*** (13.234)	0.726*** (10.248)
Constant (α)	-0.001 (-0.697)	-0.001 (-1.623)	-0.001 (-0.361)
Observations	132	132	132
Adjusted R^2	.864	.969	.895
<hr/>			
$H_0: \alpha = 0$			
F-statistic	0.485	2.634	0.130
p-value	(.487)	(.107)	(.719)
$H_0: \beta_1 + \beta_2 = 1$			
F-statistic	1.763	23.270***	15.768***
p-value	(.187)	(.000)	(.000)
$H_0: \alpha = 0, \beta_1 + \beta_2 = 1$			
F-statistic	0.993	13.898***	8.254***
p-value	(.373)	(.000)	(.000)

This table presents estimates of ordinary least squares (OLS) regressions of the returns on a portfolio of international funds on the returns of a portfolio of domestic funds with below-median (low) indirect international exposure and above-median (high) indirect international exposure by region of the fund domicile. The fund portfolios are weighted by lagged TNA. *Indirect international exposure* is the fraction of fund holdings invested in domestic stocks weighted by foreign sales. The sample consists of actively managed domestic and international equity funds over the 2005 to 2015 period. * $p < .1$; ** $p < .05$; *** $p < .01$.

provide significantly different risk-adjusted performance than domestic funds with different exposures to U.S. multinationals. Furthermore, the exposure of international funds to domestic funds with above-median indirect exposure (i.e., $\beta_2 = 0.533$) is larger than the exposure to domestic funds with below-median indirect exposure (i.e., $\beta_1 = 0.519$). The sum of the two loadings is not significantly different from one (i.e., $\beta_1 + \beta_2 = 0.519 + 0.533 = 1.052$). We conclude that the joint hypothesis that the alpha equals zero and the sum of the two betas equals one cannot be rejected at a conventional significance level (i.e., $p = 0.373$). Thus, returns of U.S. funds investing in foreign stocks are spanned by U.S. domestic funds with different indirect international exposure.

In contrast to funds in the United States, funds domiciled in Europe and Asia-Pacific investing in foreign stocks are not spanned by their domestic counterparts with above- and below-median indirect international exposure, as reported in columns 2 and 3. The rejection of the spanning hypotheses for these regions is because their betas do not add up to one. However, the alphas for these regions are not statistically different from zero. The different results between these regions may be due to the dominating role of U.S. stock market in the world. Whereas it is important for foreign investors to obtain direct exposure to the U.S. market, it is less important for U.S. investors to obtain direct exposure to foreign markets, as U.S. multinationals already provide fairly large diversification benefits.

5. Alternative Sources of Performance

In this section, we conduct several tests to better understand the sources of the superior performance of funds that provide more indirect international exposure. We focus on the sample of domestic funds.

5.1 Expense ratio

Our results so far indicate a positive relation between indirect international exposure and fund performance particularly for funds that belong to small fund families and focus on small and growth stocks. We argue that holding the level of total international diversification constant, indirect international diversification should be associated with lower fund fees.

We examine this hypothesis by estimating regressions in which the dependent variable is the monthly total expense ratio. Table 10 presents the results. Consistent with our hypothesis, we find a smaller coefficient for the indirect international exposure than for the direct exposure, which suggests that diversifying through investments in home-based multinationals is associated with significantly lower expense ratios for the funds. However, the economic magnitude of the indirect international exposure coefficient is small. The estimate in column 2 indicates that a one-standard-deviation increase in indirect international exposure is associated with a 0.06 basis point decrease in the monthly expense ratio. This effect is small relative to the overall performance effect of 4.6 basis points in Table 3.²⁴ We conclude that most of the outperformance is due to differences in gross performance and not due to fees.

5.2 Fund activeness

Our baseline results could be driven by the differential performance of multinational companies. The results based on characteristic-adjusted returns do not support this idea but rather that the outperformance of funds with high indirect international exposure is driven by fund manager skill. To further address this issue, we estimate the impact of indirect exposure on the performance of passive funds (i.e., index funds and exchange-traded funds) whose tracking error is less than 0.01. Panel A of Table 11 shows that the estimated coefficients for the indirect international exposure are not statistically significant in the sample of passive funds. These results suggest that the baseline findings for active funds can be attributed to managerial skill rather than to the passive exposure to multinationals.²⁵

In an alternative analysis, we use the active share measure of Cremers and Petajisto (2009) to proxy for fund activeness. Specifically, we sort funds in

²⁴ Table IA.13 in the Internet Appendix reports similar results for the sample of all funds.

²⁵ In panel A of Table IA.14 of the Internet Appendix, we continue to find an insignificant relation between indirect international exposure and fund returns in the sample of all funds.

Table 10
Total expense ratio

	(1)	(2)
Indirect international exposure	-0.009 (-1.602)	-0.015*** (-4.228)
Direct international exposure	0.034*** (6.495)	-0.000 (-0.099)
Four-factor alpha	-0.000*** (-5.228)	-0.000 (-0.324)
log(1+fund age)	0.001 (1.136)	0.004*** (2.779)
log(fund TNA)	-0.005*** (-15.345)	-0.004*** (-13.174)
log(family TNA)	-0.003*** (-9.451)	-0.001*** (-2.679)
Flow	-0.000* (-1.910)	0.000** (2.415)
Total load	0.006*** (20.318)	0.002*** (3.426)
log(1+number of countries of sale)	0.006** (2.206)	-0.014*** (-4.769)
Team managed	-0.005*** (-4.409)	0.111 (1.575)
Benchmark FE	Yes	No
Country FE	Yes	No
Time FE	Yes	Yes
Fund FE	No	Yes
Observations	456,083	456,079
Adjusted R ²	.594	.931
F-statistic	38.56***	15.02***
p-value	(.000)	(.000)

This table presents estimates of ordinary least squares (OLS) regressions of the total expense ratio in each month (i.e., the annual expense ratio divided by 12). *Indirect international exposure* is the fraction of fund holdings invested in domestic stocks weighted by foreign sales. All control variables are lagged by one period. The sample consists of actively managed domestic equity mutual funds over the 2005 to 2015 period. Table A.1 in the appendix defines the variables. *F*-statistic refers to the test of equality between the estimates for direct and indirect international exposure coefficients. Robust *t*-statistics adjusted for clustering at the fund level are reported in parentheses. **p* < .1; ***p* < .05; ****p* < .01.

our main sample of domestic active funds into quartiles based on their active share and then interact our indirect international exposure measure with dummy variables for these quartiles. Panel B of Table 11 reports the results. We find that the effect of indirect international exposure is more pronounced for funds in the middle and top quartiles of active share than for funds in the bottom quartile.²⁶

5.3 Pseudo-fund returns

To further control for the performance of foreign portfolio investment, we calculate pseudo-fund returns based on a hypothetical portfolio that is invested directly in local stocks in the countries where the sales are originated. The pseudo-fund return is the monthly raw fund return calculated based on local stocks in the same industry as the stocks in a fund’s portfolio. We first calculate

²⁶ Panel B of Table IA.14 of the Internet Appendix reports similar results for the sample of all funds.

Table 11
Passive funds and fund active share

	(1)	(2)
<i>A. Passive funds</i>		
Indirect international exposure	0.553 (0.547)	0.651 (0.467)
Controls	Yes	Yes
Benchmark FE	Yes	No
Country FE	Yes	No
Time FE	Yes	Yes
Fund FE	No	Yes
Observations	15,009	15,009
Adjusted R^2	.151	.146
<i>B. Fund active share</i>		
Indirect international exposure	0.190** (2.213)	0.700*** (4.539)
Indirect international exposure \times Mid active share	0.189** (2.130)	0.120 (0.785)
Indirect international exposure \times High active share	0.400*** (2.807)	0.975*** (3.850)
Controls	Yes	Yes
Benchmark FE	Yes	No
Country FE	Yes	No
Time FE	Yes	Yes
Fund FE	No	Yes
Observations	405,602	405,593
Adjusted R^2	.041	.042

This table presents estimates of ordinary least squares (OLS) regressions of future fund performance. The dependent variable is the monthly alpha from the four-factor model estimated using regional factors based on a fund's investment region. *Indirect international exposure* is the fraction of fund holdings invested in domestic stocks weighted by foreign sales. Panel B reports the estimates of regressions that include interactions of indirect international exposure with dummy variables for quartiles of active share as well as their direct effect (coefficients not shown). *Mid active share* is a dummy variable that takes a value of one if the fund is in the two middle quartiles of active share. *High active share* is a dummy variable that takes a value of one if the fund is in the top quartile of active share. All control variables are lagged by one period. Panel A reports the estimates for the sample of passive domestic equity mutual funds over the 2005 to 2015 period with a tracking error of less than 0.01. The sample in panel B consists of actively managed domestic equity mutual funds over the 2005 to 2015 period. Robust t -statistics adjusted for clustering at the fund level are reported in parentheses. * $p < .1$; ** $p < .05$; *** $p < .01$.

industry returns by simply taking the equal-weighted average of the returns of all firms in the same industry and country in a given month. Next, to calculate a pseudo-return at the firm level, we take the foreign sales-weighted average of these industry returns in the country where the firm's sales are generated. Finally, we take the portfolio-weighted average of the stock-level pseudo-returns in order to calculate the fund-level pseudo-returns.

Table IA.15 in the Internet Appendix presents the results for the baseline regressions of fund alphas on indirect international exposure in which we control for pseudo-fund returns. In columns 1 and 2, we control for the contemporaneous pseudo-fund return, and, in columns 3 and 4, we control for the 1-month-lagged pseudo-fund return. In all specifications, the indirect international exposure coefficients remain positive and statistically significant, which suggests that the performance effect of indirect exposure cannot be

explained by direct portfolio investment. We conclude that international corporate investment has different implications than international portfolio investment in terms of fund performance.

5.4 Complicated firms

Our results may be explained by the fact that firms with foreign sales may be more complicated than purely domestic firms. We extend the notion of complicated firms in Cohen and Lou (2012) to an international setting. Complicated firms are defined alternatively using three measures. The first measure is a dummy variable that takes a value of one for firms operating in more than one four-digit NAIC industry, and zero otherwise. The second measure is the average of the number of distinct four-digit NAICS industries in which a firm operates. The third measure is a dummy variable that takes a value of one if the firm's entity structure is a holding company, and zero otherwise.²⁷ All three stock-level measures are obtained from FactSet and are aggregated at the fund-level by taking their portfolio-weighted averages. Table IA.16 in the Internet Appendix reports the results of our baseline regression when we control for the exposure to domestic complicated firms. The coefficients for the indirect international exposure remain positive and significant.

5.5 International investment treaties

We also employ an alternative measure of cross-country heterogeneity based on international investment agreements that can take the form of bilateral and multilateral investment treaties and free trade agreements following Bhagwat, Brogaard, and Julio (2021). The international investment agreements data are obtained from the United Nation's Investment Policy Hub website.²⁸ We collect bilateral investment treaties (BITs) between country pairs over the period 1991–2015. Then we construct a dummy variable that takes a value of one if the firm's headquarter country has a BIT with the country in which the sales are generated. We carry this dummy variable forward starting with the year in which the treaty is signed. We calculate the stock-level exposure to BITs by simply taking the sales-weighted average of this dummy variable. Similarly, a fund's indirect international exposure to investment treaties is calculated as the weighted average of the stock-level exposure measures based on portfolio holdings lagged by 1 year relative to the quarter in which fund performance is measured.

Table IA.17 in the Internet Appendix reports the estimates of the regression of the fund alpha on the exposure to BITs. The results show that the coefficient estimates on the exposure to BITs are positive and significant. Thus, funds more

²⁷ In our sample, 61% of the firm-year observations are associated with more than one four-digit NAIC industry and only 1% of the observations belong to a holding company. The median number of distinct four-digit NAIC industries is two.

²⁸ These data are available at <https://investmentpolicyhubold.unctad.org>.

exposed to BITs tend to have better performance. The economic and statistical significance of the estimate is higher in the fund fixed effects regressions.

6. Robustness

We present several robustness tests of our primary findings in the Internet Appendix for the sample of domestic funds. We first check the robustness of our findings from the baseline analysis in Table 3 using an alternative definition of indirect international exposure based on foreign assets rather than foreign sales. Columns 1 and 2 of Table IA.18 report the results. We continue to find a positive and significant effect of indirect international exposure on fund performance. We also check the robustness of our findings using firms' sales in each country, rather than their total foreign sales, drawn from the FactSet Revere database.²⁹ Columns 3 and 4 of Table IA.18 show that the performance effect of indirect international exposure based on individual country sales is similar to those in Table 3.

In our baseline specifications, we winsorize the explanatory variables as well as the dependent variables at the top and bottom 1%, but we do not winsorize our international exposure variables since these are bounded between zero and one. In Table IA.19, we repeat our baseline regressions with international exposure variables winsorized at the top and bottom 1% of the distribution. Our results remain qualitatively unchanged.

In Table IA.20, we check the robustness of our results to alternative methods to cluster the standard errors. Our results are robust when we cluster the standard errors at the fund family level and at the fund and year (two way) levels. Table IA.20 also presents the results using the Fama-MacBeth cross-sectional regression approach. The results are also robust to this alternative estimation method.

Our data allow us to begin the sample period in 2000 but the earlier years of the sample are dominated by U.S. funds. To obtain a more balanced distribution of countries, we focus our baseline regressions in Table 3 on the 2005–2015 period. Table IA.21 shows that the results are robust when we use the extended sample period, 2000–2015. We also check the robustness of our results in two subperiods: 2005–2010 and 2011–2015. Table IA.21 reports the results, which suggest that our findings are similar across subperiods and not specific to a particular time period.

We also examine the relation between performance and indirect international exposure for domestic funds based on the fund's investment region: North America, Asia-Pacific, Europe, and emerging markets. These regions differ in capital market development, fund industry development, as well as regulatory environment. Table IA.22 reports the estimates separately for each region in

²⁹ We obtain total foreign sales by summing the firms' sales in each country other than the domestic country reported on FactSet Fundamentals.

the sample of domestic funds. We find that the impact of indirect international exposure on fund performance is pervasive across regions. We also restrict our sample to mutual funds domiciled in the United States to check whether our results continue to hold in this sample, which is often the sample used in the mutual fund literature. Table IA.23 reports the results for the samples of U.S. domestic funds and non-U.S. domestic funds. Our baseline results hold in the non-U.S. sample, both with and without fund fixed effects. Similarly, indirect international exposure is positively correlated with fund performance in the sample of U.S. funds, but the relation is statistically insignificant in the cross-section. Table IA.24 reports estimates similar to those in Table 3 when we exclude cross-listings from a fund's portfolio holdings.

7. Conclusion

We show that mutual funds worldwide have a large indirect exposure to international stock markets through their holdings of home-based firms with foreign operations. We show that the home bias in fund portfolios is less severe when we take into account that firms source sales from foreign operations.

We find that indirect international exposure improves future fund performance. This effect is primarily driven by fund manager skill, rather than the performance of multinationals. Fund managers are able to generate superior performance for their indirect international exposure, as the higher complexity of multinationals generates profitable investment opportunities. On the other hand, when investing in foreign firms, mutual fund managers tend to face informational disadvantages that are reflected in the more mixed performance results of direct international exposure. The positive effect of indirect international exposure on fund performance is more pronounced in funds with higher transaction and information costs, such as funds that belong to small families, funds that invest in small stocks and growth stocks, and funds more exposed to less-developed capital markets. These findings are consistent with the hypothesis that transaction and information costs impair international portfolio diversification and help to explain the home bias phenomenon.

Our results link international portfolio diversification and international corporate diversification in a new way. We conclude that international corporate diversification can play an important role in overcoming barriers to investing overseas and reducing home bias.

Table A.1
Variable definitions

Variable	Definition
Indirect international exposure	Fraction of fund holdings invested in domestic stocks weighted by a firm's foreign sales from the previous fiscal year relative to the quarter in which the fund holdings are measured (FactSet Fundamentals and Ownership)
Direct international exposure	Fraction of fund holdings invested in foreign stocks (FactSet Fundamentals and Ownership)
Four-factor alpha	Monthly alpha from the four-factor model estimated with 36 months of past fund return data and with regional factors based on a fund's investment region (Lipper)
Five-factor alpha	Monthly alpha from the five-factor model, including the illiquidity return premium, estimated with 36 months of past fund return data and with regional factors based on a fund's investment region (Lipper)
Value added	Gross return (four-factor alpha plus one-twelfth of the expense ratio) multiplied by the lagged fund TNA in millions of U.S. dollars per month
Characteristic-adjusted return	Fund portfolio-weighted average of the individual stock characteristic-adjusted returns, that is, the difference between the individual stock return and the return of the size/book-to-market/foreign sales portfolio to which a stock belongs in each month (Lipper)
Fund age	Number of years since the fund launch date (Lipper)
Fund TNA	Total net assets in millions of U.S. dollars (Lipper)
Family TNA	Total net assets in millions of U.S. dollars of equity funds in the same management company excluding the own fund's TNA (Lipper)
Total expense ratio	Total annual expenses as a fraction of TNA (Lipper)
Flow	Percentage growth in TNA, net of internal growth (assuming reinvestment of dividends and distributions) in each month (Lipper)
Total load	Sum of front- and back-end loads as a fraction of new investments (Lipper)
Number of countries of sale	Number of countries in which the fund is offered for sale (Lipper)
Team managed	Dummy variable that takes a value of one if the fund is managed by a team, and zero otherwise (Lipper)
Excess return	Fund return in excess of the 1-month U.S. Treasury-bill rate in each month (Lipper)
Total risk	Annualized standard deviation of fund return estimated using a 12-month window in each month (Lipper)
Sharpe ratio	Ratio of annualized excess fund return over the risk free rate to the annualized standard deviation of total return estimated using a 12-month window in each month (Lipper)
Benchmark-adjusted return	Difference between the fund's return and the return on its benchmark in each month (Lipper)
Tracking error	Annualized standard deviation of the benchmark-adjusted return using a 12-month window in each month (Lipper)
Information ratio	Ratio of annualized four-factor alpha to the annualized standard deviation of the residuals from the four-factor model estimated with 36 months of past fund return data and with regional factors based on a fund's investment region (Lipper)
Active share	Fraction of a fund's portfolio holdings that differ from its benchmark holdings in each month (FactSet Ownership)

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