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Do foreign stocks substitute for international diversification?

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Abstract

Using a novel sample of foreign securities available for trade in 42 countries during the last four decades (1979–2018), we examine the rise in importance of foreign stocks for investors in their host countries and its implications for diversification across industries and countries. The availability of foreign stocks allows domestic investors to increase their international diversification from home by investing in these stocks. We conclude that including foreign stocks in portfolio investments offers an effective substitute for international diversification, and contributes significantly towards increasing the integration of global markets.

KEYWORDS

country/industry effects, foreign stocks, international capital markets, international diversification

JEL CLASSIFICATION

F36; G11; G15

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1 | INTRODUCTION

Over the last decades, stocks that are listed and available for trade outside their home markets have increased markedly (Doidge, Karolyi, & Stulz, 2009; Fernandes & Giannetti, 2014; Sarkissian & Schill, 2016). In this article, we document the rise of these "foreign stocks"[1] over a 40-year period and study how their presence affects the benefits of international portfolio diversification. In particular, we focus on how the increasing availability of foreign stocks has affected the relative value of diversifying across industries compared with countries.

The question as to whether it is more beneficial for investors to diversify across industries or countries is far from settled. Initial studies by Heston and Rouwenhorst (1994), Griffin and Karolyi (1998), and Rouwenhorst (1999) decomposed stock returns into industry and country effects and found that stock returns are driven mainly by country effects. This implies that diversification across countries is more valuable than diversification across industries. Since then, this result has been confirmed by, for example, the studies of Phylaktis and Xia (2006), Baele and Inghelbrecht (2009), and Bekaert, Hodrick, and Zhang (2009), while Baca, Garbe, and Weiss (2000), Cavaglia, Brightman, and Aked (2000), and Eiling, Gerard, Hillion, and de Roon (2012), among others, found the opposite result, that international equity returns are driven mainly by industry factors.[2]

To our knowledge, the issue of how the presence of foreign stocks affects the benefits of industry versus country diversification has not been studied directly to date. In this article, we first characterize the rise of foreign stocks available for trade over the last four decades and show that they currently amount to a significant fraction of investment opportunities available to investors. Whereas there were roughly 750 foreign stocks listed internationally before 1989, this figure has risen to over 23,000 in the last few years. In relative terms, foreign stocks, which represented less than 7% of total listed stocks in the 1980s, accounted for over 28% of total listed stocks in the last decade.[3]

We show that the presence of foreign stocks raises the relative importance of industry to country effects in an internationally diversified portfolio. We estimate both the standard dummy-variable model for countries and industries by Heston and Rouwenhorst (1994) and a more general factor model by Faias and Ferreira (2017) on a sample with and without foreign stocks, and find strong evidence that industry effects exceed country effects once foreign stocks are taken into account. Using the Faias and Ferreira (2017) model, we find that the relative decline in the importance of country effects is not only at the expense of industry effects but also at the expense of a global factor.

We assess the performance of our model in explaining stock return comovements successfully by comparing its root-mean-squared error with those of other standard factor models. We find that our model outperforms these other models, confirming the finding by Bekaert et al. (2009) that methodologies based on the Heston and Rouwenhorst model are appropriate for explaining variations in international returns. To strengthen the point that foreign stocks substitute for international

[1] Throughout this article, we use the term "foreign stocks" to refer to the equity stock of firms made available for trade in markets outside their home country.

[2] Brooks and Del Negro (2004) and Soriano and Climent (2006) argue that the predominance of industry effects may have been only a temporary phenomenon associated with the stock-market bubble at the beginning of the 21st century. Other articles weighing in on the debate of country versus industry effects are those by Ferreira and Gama (2005), Hargis and Mei (2006), Campa and Fernandes (2006), Bai and Green (2010), and Faias and Ferreira (2017). See the recent review by Bekaert, Harvey, Kiguel, and Wang (2016) for further references on both sides of the debate.

[3] This increase in foreign stocks occurred despite the increased cost of cross-listing in many countries, such as the United States (triggered by the introduction of Sarbanes Oxley Act in 2002), as shown in Doidge, Karolyi, and Stulz (2010).

diversification, we also perform mean–variance spanning tests in the spirit of Bae, Elkamhi, and Simutin (2019), and show that including foreign stocks in a portfolio expands the efficient frontier.

Our results imply that locally traded foreign stocks act as a substitute for international diversification. This complements the findings in the extensive literature, starting with Errunza, Hogan, and Hung (1999), who highlight that gains from international diversification can be achieved by investing in locally traded securities.[4] An important difference between our approach and that of such literature is that we do not restrict the analysis to the investors of any particular country (usually the analysis is framed from the point of view of investors from the United States or other developed economies). A second difference is that we focus on stocks instead of focusing on different types of indexes or funds. Therefore, the evidence of a decline in the importance of country effects that we uncover is disentangled cleanly from a decline related to the composition of indexes, changes in the availability of mutual funds, or the strategies that fund managers use.[5]

A number of articles following French and Poterba (1991) argue that home bias and investor's preferences for home stocks or differential information may limit the effective advantages of diversification (e.g., recently, Dumas, Lewis, & Osambela, 2017). In this same vein, Portes and Rey (2005) show that investors prefer the stocks of foreign countries that are geographically closer, and Chan, Covrig, and Ng (2005) show that investors prefer the stocks of foreign countries with equity markets more, not less, correlated with their own. We show that the presence of foreign stocks in local markets can rationalize investing only domestically, given that international diversification may be achieved through investing in these foreign stocks.

We structure the article as follows. In Section 2 we describe the data and characterize the evolution of foreign stocks available to investors; in Section 3 we go over the methodology that we use to identify the relative gains from international portfolio diversification; in Section 4 we present our empirical results; and in Section 5 we conclude.

2 | THE RISE OF FOREIGN STOCKS

To study the evolution of foreign stocks available for cross-border trade, we use the information available in the research lists of Datastream, which cover a broad set of markets with comparable data across countries. This provides the added benefit of comparability relative to previous work. These research lists cover the entire menu of stocks in which an investor can invest. The lists include all stocks listed in a particular country and do not *a priori* exclude stocks based on certain criteria, such as market capitalization or country of origin.

We focus our analysis on firm-level data and include all stocks listed in a particular country.[6] The use of research lists allows the inclusion of firms with relatively small market capitalization and, in some cases, from different stock exchanges within a country.[7] The use of

[4]See Bae et al. (2019) and Lu and Vivian (2020) for two recent examples of this approach.

[5]As stressed by Bai and Green (2010) and Bae et al. (2019), using individual stocks to assess diversification benefits is preferable.

[6]Bai and Green (2010) argue that the use of data on individual stocks is preferable to using indices, because indices have several limitations: first, investment managers usually buy individual shares and not indices; and second, weighting and composition of indices change over time in a manner that does not necessarily reflect underlying market trends. In addition, Bae et al. (2019) suggest that relying on equity indices to assess the benefits of diversification understates potential gains. We follow their lead and use individual stocks as our unit of analysis.

[7]For example, in Germany we include stocks from the seven stock exchanges: Stuttgart, Frankfurt, Berlin, Munich, Hanover, Hamburg, and Düsseldorf.

this broader database is an advantage of our analysis, since we use all stocks available for trade in a country, including all foreign and domestic stocks.[8] We classify a stock as foreign if it is incorporated in a country other than the country where it is listed. We do so by using the first two letters of the stock's ISIN number. A complete list of these ISIN codes is shown in the online Appendix in the Supporting Information; see Table A.1.

All data are monthly and in United States dollars, expressed at the current exchange rate.[9] We use monthly total return indices and market capitalizations for each firm. Total return indices represent the theoretical growth in value of holding a stock over a month, assuming that dividends and other payments are re-invested to purchase additional units of equity and adjusting for stock splits.

The dataset used in this article covers stocks traded in 42 countries, of which 22 developed and 20 emerging markets, over a period of four decades (from January 1979 to December 2018). Stocks traded in the 42 national markets belong to either domestic firms based in each of these countries or to foreign firms. The home country of foreign stocks may be from a country other than the 42 we consider. In total, in our dataset there are 104 different home countries of foreign stocks (see Appendix Table A.1 in the Supporting Information).

Table 1 shows the prevalence of foreign firms in each country and the number of observations over time. The first column lists the 42 countries in our sample. The next eight columns show the number of firms in each country that are foreign and the total number of listed firms by decade. Two salient features are visible from this summary. First, both the number and the percentage of foreign firms have increased over time.[10] Until the end of 1988, there were only 765 foreign stocks (7% of the total). By 2018, however, this number had risen to 23,183 (28% of the total). In the last decade of our sample, there are almost 30 times more foreign stocks than in the first decade. Foreign stocks are concentrated in a few countries. Large developed countries (United States, United Kingdom, Germany) and small countries with large financial centers (Hong Kong, Singapore) account for the vast majority of foreign stocks in our sample.[11] However, the growing numbers of foreign stocks are not explained fully by these countries. We find that the concentration of foreign stocks has not changed monotonically over time. For example, the C3 concentration ratio stood at 69% before 1988, but dropped to 52% in the 1989–1998 period, and then rose to around 75% in 1999–2018.[12] For the C5 concentration ratio, the numbers were 87% in the first decade of our sample, 74% in the second, 90% in the third, and 89% in the last. In the last 10 years of our sample, Germany appears to be the second largest destination for foreign stocks. In that period, whereas the proportion of foreign stocks in the world is 28%, countries like Hong Kong (87.8%), Germany (79.8%), Austria (72.5%), and Switzerland

[8]These research lists also include stocks in over-the-counter markets. When dealing with monthly returns, we exclude those stocks with returns over 200% or below −100%. We drop observations if market capitalization is zero or missing.

[9]We use US dollars to have a unified currency and to compare returns across countries easily. Given the law of one price, and assuming no arbitrage opportunities, the results will remain the same whether we choose dollars or any other currency. We also perform the currency conversion tests of Heston and Rouwenhorst (1994) and show the results in the online Appendix.

[10]We include a stock in our sample on the same date the stock first appears in Datastream. This may lead to a lag, since some time may pass until Datastream includes newly listed stocks. However, according to Datastream, they make an effort to fill in the data retrospectively to minimize this error.

[11]Since the stocks available for trade in the United States amount to a considerable portion of our sample over the years, we also examine the growth of foreign and domestic stocks in our full sample of 42 countries and a comparable non-US sample (see Appendix Figure A.1 in the Supporting Information). While the growth rate for non-US foreign stocks is comparatively lower, the overall growth pattern for domestic stocks is similar for the two cases. The ratio of foreign to domestic stocks in the last sample month is roughly 1:3.5 for the full sample of stocks, and the same ratio is 1:6 for non-US stocks.

[12]Concentration ratio C“*n*” is calculated by adding the number of foreign stocks in the “*n*” countries with the most foreign stocks and dividing by the total number of foreign stocks.

TABLE 1 Summary by host country

This table reports the number of foreign firms and total listed firms along with the number of observations for each of them, based on the host countries in our sample. We classify our sample period into four decades spanning 1979–2018, both inclusive. Each time period begins in January of the first year and ends in December of the last year

Host	Number of firms								Number of observations							
	1979–1988		1989–1998		1999–2008		2009–2018		1979–1988		1989–1998		1999–2008		2009–2018*	
Country	Foreign	Total	Foreign	Total	Foreign	Total	Foreign	Total	Foreign	Total	Foreign	Total	Foreign	Total	Foreign	Total
Argentina			0	66	5	107	6	122			0	4,904	421	8,292	676	8,928
Austria	1	29	22	196	31	261	518	711	15	2,461	261	14,457	1,162	16,458	7,688	18,889
Australia	11	249	56	1,077	82	2,463	113	3,041	564	12,327	3,269	68,741	5,182	162,878	5,889	213,594
Belgium	38	187	58	333	73	466	62	424	1,154	10,340	5,506	28,165	4,116	32,309	1,510	21,658
Brazil			0	697	0	950	0	933			0	24,634	0	60,357	0	57,841
Canada	13	768	57	2,129	103	3,490	210	5,121	448	31,976	3,890	153,191	5,477	237,305	11,465	340,812
Switzerland	4	230	162	583	436	887	1,111	1,597	246	16,359	14,771	53,589	28,839	63,928	32,116	64,952
Chile			0	252	1	274	9	311			0	19,651	19	22,397	400	21,521
China			0	890	0	1,762	0	3,544			0	34,573	0	159,717	0	313,652
Colombia			0	29	0	110	22	151			0	2,618	0	6,016	1,012	7,889
Germany	45	368	497	1,184	7,103	8,585	6,608	8,135	174	13,945	14,441	67,179	249,782	359,898	164,029	268,474
Denmark	1	141	9	302	16	361	16	278	9	5,631	670	27,660	787	25,076	1,142	21,052
Spain	0	44	8	174	53	294	61	328	0	994	349	13,019	3,401	22,381	4,455	22,720
Finland	0	4	2	159	7	248	9	262	0	291	55	10,648	358	19,345	506	17,936
France	3	189	253	1,206	272	1,710	322	1,653	328	13,400	22,624	90,704	14,835	116,834	10,098	100,966
UK	300	1,487	749	2,972	1,559	5,157	1,703	4,384	21,396	120,908	39,506	218,241	67,840	279,544	47,509	205,853
Greece	0	93	0	288	2	418	2	353	0	999	0	21,524	122	35,308	137	25,314
Hong Kong	111	252	488	682	1,115	1,341	2,821	3,215	3,337	9,438	31,534	51,512	88,809	111,684	183,679	212,445
Hungary			0	15	2	78	25	107			0	603	35	5,338	1,940	7,214
Indonesia			0	300	0	440	0	663			0	18,726	0	33,186	0	51,567

(Continues)

TABLE 1 (Continued)

Host Country	Number of firms								Number of observations							
	1979–1988		1989–1998		1999–2008		2009–2018		1979–1988		1989–1998		1999–2008		2009–2018*	
	Foreign	Total	Foreign	Total	Foreign	Total	Foreign	Total	Foreign	Total	Foreign	Total	Foreign	Total	Foreign	Total
Ireland	6	30	24	99	34	136	23	95	149	2,213	1,218	8,341	1,222	8,258	725	5,823
India			0	2,425	0	3,830	1	5,431			0	143,198	0	287,560	8	425,316
Italy	1	246	5	380	50	574	102	665	108	12,011	320	34,561	1,819	39,273	6,817	43,242
Japan	1	1,572	70	3,375	62	4,748	67	4,650	30	102,339	5,725	314,292	3,898	439,680	1,541	436,729
South Korea	0	448	1	1,169	3	2,320	21	2,978	0	17,164	1	94,890	30	182,368	1,251	226,436
Luxembourg			30	42	46	97	67	91			661	2,578	1,898	5,432	2,315	3,338
Mexico	0	57	45	337	46	314	51	352	12	564	1,614	17,482	1,189	16,582	660	15,643
Netherlands	14	168	92	396	128	475	103	355	956	14,544	3,119	25,654	5,722	28,057	2,152	14,735
Norway	0	22	26	276	89	489	141	544	0	3,591	680	15,170	3,698	26,398	6,312	29,266
New Zealand	3	39	35	168	55	286	55	303	72	722	1,432	12,139	2,702	17,499	1,809	16,972
Philippines			0	251	2	319	3	392			0	16,741	218	25,929	307	31,643
Poland			0	139	17	494	42	1,168			0	3,982	395	26,594	2,954	82,424
Portugal	0	66	0	152	8	164	8	115	0	703	0	12,186	334	9,792	514	7,304
Romania			0	20	1	193	25	243			0	600	11	12,809	1,548	17,498
Russia			1	194	2	743	3	954			41	2,686	122	25,658	79	38,869
Sweden	0	67	8	445	32	852	75	1,323	0	3,347	159	27,246	1,678	52,702	3,651	76,368
Singapore	94	210	148	446	164	855	284	1,125	6,971	14,372	13,090	35,662	8,198	59,496	12,383	78,823
Thailand	0	149	0	565	0	721	0	914	0	2,349	0	41,373	0	49,375	0	71,008
Turkey	0	57	1	252	1	344	1	446	0	596	12	17,565	119	32,663	45	41,247
Taiwan	0	21	0	566	0	1,038	78	1,227	0	431	0	35,885	0	90,937	4,431	110,767
USA	118	3,644	524	10,157	3,052	16,919	8,329	23,210	8,042	280,091	26,174	600,191	149,407	1,032,785	429,507	1,244,053
South Africa	1	70	25	761	48	844	86	691	120	7,021	1,973	51,625	2,221	48,894	5,408	40,619
Total	765	10,907	3,396	36,149	14,700	66,157	23,183	82,605	44,131	701,127	193,095	2,438,386	656,066	4,296,992	958,668	5,061,400

(69.6%) seem to be attracting them in large numbers. At the other extreme, there are no foreign stocks available for trade as per our sample for Brazil, China, Indonesia and Thailand.

Table 1 also reports the number of observations for each of the four decades. An observation in these columns is a firm-month pair. The persistence of foreign stocks is high throughout our sample, with the correlation coefficient between the number of firms and the number of observations hovering around 0.99 through the decades.[13]

To classify firms by industry, we group the firms according to their primary activity. We use Datastream Industrial Classification Levels, which are analogous to the Industry Classification Benchmark developed by FTSE.[14] Our final industry classification has 35 groups, so that the number of industries roughly coincides with the number of countries. Griffin and Karolyi (1998) argue that the number of countries and industries ought to be similar in order to measure the country and industry effects accurately.[15]

We summarize the number of foreign stocks for each of the 35 industries in Appendix Table A.2 in the Supporting Information. This table shows the number of foreign stocks and the total number of listed stocks categorized by industry, for the four decades covering the period 1979–2018. Both the number of foreign stocks and the total stocks grow homogeneously across industries over the years. The proportion of foreign stocks to total stocks in our sample ranges from 2.5% for electricity to 14.4% for alternative energy and distribution before 1989. In the last 10 years of our sample period, the industrial proportion of foreign stocks to total stocks ranges from 19% for financial services to 44.5% for mining.

Table 2 summarizes the origin of foreign stocks available for cross-border trade. We group the 104 home countries that appear in the data according to the United Nations regions and economic classifications.[16] Panel A shows that most of the foreign stocks originate from the Americas and Europe. Within these continents, North America and Western/Northern Europe have the largest share of such stocks. The Caribbean is overrepresented, presumably because tax benefits drive firms to incorporate in these countries. Panel B, meanwhile, shows that the majority of foreign stocks are from developed countries. However, while the ratio of foreign firms based in developed economies compared with those based in developing economies rose considerably in the first three decades of our sample, it has declined in the last decade. This indicates that the proportion of firms from emerging markets that are listing their stocks abroad has been increasing in recent years.

We also examine the distribution of market values of foreign stocks with respect to the total market value of all listed stocks by country (Appendix Table A.3 in the Supporting Information) and industry (Appendix Table A.4). We find that the relative market values of foreign stocks have risen across countries and industries in tandem with the increasing number of firms in Table 1 (country) and Appendix Table A.2 (industry). This increasing trend of the market value of foreign stocks is almost homogeneous among all industries.[17] However, this increasing trend

[13]This correlation coefficient is calculated per period, using the number of foreign stocks and their respective observations as the two arrays. This helps us to assess whether there is an alarming number of "dropouts" from our sample.

[14]All firms that do not have an industrial classification or that belong to the "Unquoted Equity Classification" are dropped from the sample.

[15]Although the total number of countries is 42, not all countries have data for each date; therefore, on average the effective number of countries is close to 35 when we estimate the country and industry coefficients. We use alternate industry classifications for robustness tests, and results remain qualitatively similar.

[16]A complete list of these countries and their categorization is available in Appendix Table A.1 in the Supporting Information.

[17]Although some industries, such as general industrials, have permanently had a large weight of foreign stocks.

TABLE 2 Summary of foreign stocks by home country

This table reports the number of unique foreign firms grouped by their home regions (i.e., the region to which the country of origin belongs) for our sample period, divided into four 10-year periods from 1979–2018. All the time periods begin in January of the first year and end in December of the last year

	Number of firms			
	1979–1988	1989–1998	1999–2008	2009–2018
Panel A: UN region of home country				
Caribbean	31	157	1,146	2,602
Central America	9	10	17	17
Eastern Africa	1	0	4	19
Eastern Asia	10	238	878	1,919
Eastern Europe	0	50	153	198
Middle Africa	2	2	2	3
North America	367	1,699	8,031	9,783
Northern Africa	0	2	5	6
Northern Europe	15	120	418	757
Oceania	25	98	878	1,428
South America	0	3	65	138
South-Eastern Asia	105	149	282	651
Southern Africa	48	97	162	199
Southern Asia	0	3	0	2
Southern Europe	5	107	506	757
Western Africa	1	10	14	18
Western Asia	16	86	207	275
Western Europe	135	715	2,705	4,410
Unclassified	1	2	2	3
Total	765	3,396	14,700	23,182
	Number of firms			
	1979–1988	**1989–1998**	**1999–2008**	**2009–2018**
Panel B: UN economic classification				
Developed economies	433	2,294	11,170	16,114
Economies in transition	0	10	12	19
Developing economies	323	1,072	3,337	6,674
Unclassified	9	20	181	375
Total	765	3,396	14,700	23,182

exhibits significant variation between countries, since the market values of foreign stocks in developed countries have risen faster than those in developing markets. The large fraction of market value accounted for by foreign stocks implies that investors can invest easily in each industry, and potentially diversify across industries using foreign stocks.

In Table 3, we report mean returns, standard deviations, Sharpe ratios, and Sortino ratios for country portfolios of value-weighted domestic stocks and foreign stocks. We report a similar analysis of industry portfolios in Appendix Table A.5 in the Supporting Information. If foreign stocks provide significant diversification benefits across countries, then their expected returns in equilibrium should be lower than those of domestic stocks. We observe that this is indeed true for all countries with a high number of foreign firms (see Table 1), such as the United States, United Kingdom, Hong Kong, and Switzerland, which have a lower Sharpe and Sortino ratio for their foreign stocks than for their domestic stocks.[18] Thus, there seems to be some evidence indicating the existence of a diversification premium for foreign stocks.[19] Furthermore, the correlation between countrywise mean returns of the domestic and foreign stocks in Table 3 is much higher (0.72) than the correlation between industrywise mean returns of the domestic and foreign stocks in Appendix Table A.5 in the Supporting Information (0.16). Since a higher correlation between the stock portfolios corresponds to a lower diversification potential, this implies that the introduction of foreign stocks seems to benefit industry diversification more than country diversification. Thus, we expect that the introduction of foreign stocks should increase industry diversification benefits compared with country diversification benefits.

3 | METHODOLOGY

In the previous section, we have characterized the nature and diffusion of foreign stocks. Now we move on to study whether foreign stocks have an impact on diversification opportunities. To begin with, we employ the ubiquitous Heston and Rouwenhorst (1994) methodology. This methodology uses country and industry dummies as factors constrained by an assumed neutral influence on stock returns (due to diversification). By comparing two separate samples, that is, (a) one that includes only the domestic stocks from the host countries and (b) another that combines domestic and foreign stocks available in host countries, we identify the impact of foreign stocks on diversification. To complement our analysis, we also disentangle the marginal contribution of foreign stocks on country effects. We do so by modifying the Heston and Rouwenhorst (1994) framework and allowing for differential country and industry effects for domestic and foreign stocks. In this way, we disentangle the pure foreign effects from the domestic effects of diversification. Bekaert et al. (2009) argue that risk-factor models can explain international stock comovements better than the dummy-variable model does. For this reason, we also use the methodology of Faias and Ferreira (2017) to confirm our results, and we compare the goodness of fit of these two models with other alternative models. Finally, we carry out mean–variance spanning tests to assess whether an investor can expand the efficient frontier and benefit from diversification by adding foreign stocks to their portfolio.

[18]The exception is Germany; this seems to be because many of the foreign stocks in German markets are European stocks that have fairly similar characteristics to the domestic German stocks (and provide limited diversification benefits).

[19]This diversification premium may be due to growth expectations, as discussed in Hail and Leuz (2009), or the informational rationale that is proposed by Fernandes and Ferreira (2008).

TABLE 3 Summary statistics for value-weighted country portfolio returns

This table reports the time-series averages of value-weighted (VW) portfolio mean returns, the standard deviation (SD) of returns, Sharpe ratios, SD of negative (–) VW returns, and Sortino ratios, for each of our sample countries, when all the stocks available for trade are grouped into domestic and foreign stocks. Mean value-weighted returns are obtained by value-averaging the firm returns available in each country for every month, and then computing the averages for each country across time. Value-weighted standard deviations are obtained by calculating the standard deviations of monthly stock returns in each country, and then obtaining the average of these monthly standard deviations. The Sharpe and Sortino ratios are the returns per unit of total risk and downside risk respectively, which are presented as a measure of risk-adjusted returns. When the number of foreign stocks is less than 15 for any country (see Table 1), we omit these foreign stocks from the analysis

	Domestic stocks					Foreign stocks				
Country	Mean VW returns	SD VW returns	Sharpe ratios	SD (–) VW returns	Sortino ratios	Mean VW returns	SD VW returns	Sharpe ratios	SD (–) VW returns	Sortino ratios
Argentina	1.58%	25.40%	6.21%	14.95%	10.54%					
Austria	0.86%	6.80%	12.63%	4.66%	18.45%	1.10%	7.94%	13.88%	9.18%	12.02%
Australia	1.08%	6.74%	16.08%	5.08%	21.33%	1.05%	7.65%	13.70%	5.91%	17.73%
Belgium	0.93%	4.76%	19.57%	3.36%	27.73%	1.12%	5.85%	19.10%	4.36%	25.62%
Brazil	1.42%	13.15%	10.78%	7.62%	18.59%					
Canada	0.86%	5.28%	16.28%	3.93%	21.89%	0.81%	10.00%	8.08%	5.53%	14.60%
Switzerland	0.89%	4.71%	18.84%	3.34%	26.59%	1.02%	6.60%	15.41%	6.51%	15.63%
Chile	2.07%	10.62%	19.47%	5.73%	36.09%					
China	2.00%	16.06%	12.45%	6.48%	30.86%					
Colombia	4.09%	27.71%	14.77%	4.92%	83.18%	5.38%	35.58%	15.13%	6.14%	87.73%
Germany	0.85%	5.52%	15.33%	3.98%	21.28%	0.71%	4.38%	16.31%	3.30%	21.62%
Denmark	1.17%	5.40%	21.65%	3.71%	31.51%	1.21%	8.51%	14.17%	5.62%	21.48%
Spain	1.24%	7.42%	16.67%	4.43%	27.95%	1.31%	13.51%	9.71%	4.93%	26.61%
Finland	1.19%	7.82%	15.26%	4.83%	24.70%	1.15%	11.91%	9.69%	7.74%	14.91%

TABLE 3 (Continued)

	Domestic stocks					Foreign stocks				
Country	Mean VW returns	SD VW returns	Sharpe ratios	SD (–) VW returns	Sortino ratios	Mean VW returns	SD VW returns	Sharpe ratios	SD (–) VW returns	Sortino ratios
France	1.07%	6.00%	17.75%	4.32%	24.64%	0.75%	6.89%	10.88%	4.44%	16.87%
UK	0.92%	5.01%	18.43%	3.39%	27.28%	0.70%	4.75%	14.83%	3.12%	22.58%
Greece	0.67%	10.33%	6.46%	6.53%	10.22%					
Hong Kong	1.29%	8.35%	15.46%	6.24%	20.69%	0.79%	7.05%	11.16%	5.51%	14.28%
Hungary	1.14%	9.61%	11.86%	6.49%	17.57%	−1.07%	11.89%	−9.04%	11.24%	−9.57%
Indonesia	1.36%	8.62%	15.80%	6.22%	21.90%					
Ireland	1.02%	7.54%	13.57%	4.78%	21.40%	0.92%	9.94%	9.26%	6.66%	13.83%
India	1.11%	10.08%	11.05%	5.64%	19.75%					
Italy	0.93%	7.09%	13.16%	4.25%	21.94%	1.71%	12.79%	13.38%	4.87%	35.13%
Japan	0.75%	5.91%	12.62%	3.40%	21.90%	1.00%	6.73%	14.80%	4.62%	21.59%
South Korea	1.10%	9.69%	11.34%	5.93%	18.54%	−0.53%	14.25%	−3.74%	9.94%	−5.36%
Luxembourg	0.81%	5.71%	14.16%	3.56%	22.69%	0.37%	10.48%	3.50%	7.35%	4.99%
Mexico	1.00%	8.02%	12.50%	6.30%	15.91%	0.98%	14.01%	6.99%	8.27%	11.85%
Netherlands	0.99%	5.23%	18.96%	4.41%	22.49%	0.90%	5.36%	16.76%	3.86%	23.27%
Norway	1.37%	7.61%	18.04%	5.02%	27.34%	0.81%	10.31%	7.85%	6.73%	12.01%
New Zealand	1.02%	6.43%	15.87%	4.62%	22.09%	0.92%	6.99%	13.23%	4.75%	19.46%
Philippines	0.91%	9.11%	9.99%	5.54%	16.42%					
Poland	1.31%	11.65%	11.28%	6.63%	19.82%	0.65%	8.68%	7.45%	8.36%	7.74%
Portugal	0.43%	6.21%	6.86%	4.20%	10.13%	0.73%	9.39%	7.76%	6.19%	11.78%

(Continues)

TABLE 3 (Continued)

Country	Domestic stocks					Foreign stocks				
	Mean VW returns	SD VW returns	Sharpe ratios	SD (–) VW returns	Sortino ratios	Mean VW returns	SD VW returns	Sharpe ratios	SD (–) VW returns	Sortino ratios
Romania	0.77%	12.21%	6.33%	8.81%	8.77%	2.77%	23.43%	11.84%	8.57%	32.37%
Russia	2.23%	13.60%	16.43%	9.27%	24.09%					
Sweden	1.34%	6.91%	19.38%	4.52%	29.63%	0.74%	6.52%	11.38%	3.86%	19.22%
Singapore	1.00%	6.76%	14.73%	4.90%	20.33%	1.08%	7.88%	13.72%	5.15%	21.00%
Thailand	1.15%	9.22%	12.51%	6.44%	17.90%					
Turkey	1.82%	15.10%	12.03%	8.18%	22.22%					
Taiwan	0.78%	9.50%	8.16%	6.34%	12.22%	0.21%	6.71%	3.10%	4.51%	4.62%
USA	0.94%	4.23%	22.14%	3.20%	29.27%	0.42%	7.01%	5.93%	4.12%	10.09%
South Africa	1.16%	7.80%	14.92%	5.44%	21.38%	1.49%	8.29%	17.98%	5.64%	26.45%

3.1 | The Heston and Rouwenhorst model

In the Heston and Rouwenhorst (1994) model, it is assumed that the returns depend on a global market factor and on industry and country factors. Specifically, the return of the ith security that belongs to industry j and country k can be decomposed as

$$R_{ijk}(t) = \alpha(t) + \beta_j(t) + \gamma_k(t) + \varepsilon_{ijk}(t), \tag{1}$$

where $R_{ijk}(t)$ is the total return index of firm i that belongs to industry j and country k in month t, $\alpha(t)$ is the base-level return in period t, $\beta_j(t)$ is the industry factor in month t, $\gamma_k(t)$ is the country factor in month t, and $\varepsilon_{ijk}(t)$ represents idiosyncratic unobserved heterogeneity.

For each month t, we estimate the global factor $\alpha(t)$, the industry factor $\beta_j(t)$, and the country factor $\gamma_k(t)$ using a cross-sectional regression of all firms on country and industry dummies:

$$\begin{aligned} R_{ijk}(t) = \alpha(t) + \beta_1(t)I_1(t) + \beta_2(t)I_2(t) + \cdots + \beta_{35}(t)I_{35}(t) \\ + \gamma_1(t)C_1(t) + \gamma_2(t)C_2(t) + \cdots + \gamma_{42}(t)C_{42}(t) + \varepsilon_{ijk}(t). \end{aligned} \tag{2}$$

Again, R_{ijk} is the total return index of firm i that belongs to industry j and country k, $\beta_j(t)$ and $\gamma_k(t)$ are the pure industry and country effects, and I and C are the industry and country dummies, which take value one if firm i belongs to that industry and country or value zero otherwise. All cross-sectional regressions are estimated through weighted least squares.[20]

As is well known, when using dummy variables as regressors, if all the dummy variables (industry and country in our case) are included in the model, their effects cannot be identified because of perfect multicollinearity between the regressors. There are several ways of dealing with this issue. One practice is to exclude one industry and one country from the regression. The estimated coefficients are then interpreted as the industry and country effects relative to the excluded industry and country. The solution favored in the literature on country and industry effects is to add two additional restrictions, one for industries and one for countries, to remove the redundant degrees of freedom (Bekaert et al., 2009; Campa & Fernandes, 2006). We follow the literature and restrict parameters using the following two linear constraints: $\sum_{j=1}^{35} \omega_{j,t}^{i}\beta_{j,t} = 0$ and $\sum_{k=1}^{42} \omega_{k,t}^{i}\gamma_{k,t} = 0$, where $\omega_{j,t}^{i}$ and $\omega_{k,t}^{i}$ are the weights of industry j and country k in the world market portfolio at month t.[21] In this way, the weighted sum of the pure industry and country effects adds up to zero, and the intercept α is interpreted as the return on the value-weighted world market factor at t. A country pure effect γ_k is the excess return of a portfolio of country k that is free of incremental industrial effects. Likewise, an industry pure effect β_j is the excess return of a portfolio for industry j that is free of incremental country effects.

[20]Weights used in the regressions are the market-value weights of each firm i at time t.

[21]To construct the weights, we follow the methodology of Rouwenhorst (1999) and Campa and Fernandes (2006). Weights $\omega_{j,t}^{i}$ and $\omega_{k,t}^{i}$ are the weights of industry j and country k in the world market portfolio at month t, that is, the market value of those industries and countries as a fraction of the world market value.

3.1.1 | Mean absolute deviations

For each period t, we obtain estimated coefficients for the industry and country effects from the cross-sectional regressions described in Equation (2). We compare industry and country effects by using the monthly time series of the coefficients obtained. We follow Rouwenhorst (1999) and construct mean absolute deviation (MAD) measures: $MAD_\beta(t) = \sum_{j=1}^{35} \omega_j \mid \beta_t^j \mid$ and $MAD_\gamma(t) = \sum_{k=1}^{42} \omega_k \mid \gamma_t^k \mid$, where ω_j and ω_k are the industry and country weights, and $\mid \beta_t^j \mid$ and $\mid \gamma_t^k \mid$ are the absolute values of industry and country effects in month t. The $MAD_\beta(t)$ measures the weighted mean absolute deviation industry effects, and the $MAD_\gamma(t)$ measures the weighted mean absolute deviation country effects. These measures gauge the importance of the pure industry and country effects in terms of their dispersions. In other words, the higher the MADs, the higher the dispersion of the weighted absolute estimated coefficients, and thus the industry and country returns are more dispersed around the world return in that period. For all our figures, we plot 24-month moving averages of the monthly weighted absolute values of the industry and country effects.

3.1.2 | MAD ratios

The usual plots of the time series of MADs represent the trends of country and industry effects over the years visually, but these plots do not indicate how country effects compare with the global intercept α (Faias & Ferreira, 2017; Ferreira & Gama, 2005). Thus, we also compute the ratios of country to industry effects (c2i) and country to global effects (c2g) using the corresponding MADs and the intercept α. These ratios help us to interpret the country effects economically by taking either the industry or the global effect as a reference.[22]

3.1.3 | The country effects attributable to foreign stocks

In addition, to disentangle the marginal contribution of foreign stocks on country effects, we also use a more flexible specification of the Heston and Rouwenhorst (1994) model that relaxes the assumption in Equation (1) that foreign stocks and purely domestic stocks should command the same country effect. Specifically, the return of a stock in country k is allowed to have a different effect depending on whether the stock is foreign or domestic. The return for a foreign

[22]In our analysis, the number of countries does not remain constant over time. We try to replicate the universe of investment possibilities available to a typical investor. As new countries appear, international investors are able to diversify over a larger set of countries. Nevertheless, for a given period, if there are fewer than 35 firms listed in a country, we drop these firms from our sample, and therefore the said country is excluded from the analysis for that month. This adjustment is not necessary for the industrial sectors, because the industry classification levels are pre-adjusted to have a sizable number of firms per level. Excluding countries with a low number of observations serves two purposes. First, a minimum number of observations ensures that we are able to identify the country's coefficient econometrically in an accurate manner. Second, from the investors' perspective, the number of firms in a market is negatively correlated with the ability and ease of investment selection in frontier markets, when such markets enter our sample. In any case, we control for this when value weights are applied in the constraints while determining the country coefficients. Furthermore, country MADs also control for these time-changing investment possibilities by including the country size dispersions. We also conduct a number of robustness checks by restricting the number of countries to those that are available across the entire sample period, as well as by considering all countries available for any given month. All of our reported results remain robust to these alternative sample specifications.

stock has a country effect γ_k^{F} that is potentially different from the country effect for domestic stocks γ_k^{D}. Thus, returns are modeled as follows:

$$R_{ijk}(t) = \begin{cases} \alpha(t) + \beta_j^{\mathrm{D}}(t) + \varepsilon_{ijk}(t) & \text{if it is domestic, and} \\ \alpha(t) + \beta_j^{\mathrm{F}}(t) + \varepsilon_{ijk}(t) & \text{if it is foreign.} \end{cases} \tag{3}$$

In terms of the estimation, this amounts to adding interaction terms of country dummies, with a dummy variable for foreign stocks.

$$\begin{aligned} R_{ijk}(t) = {} & \alpha(t) + \beta_1 I_1(t) + \beta_2 I_2(t) + \cdots + \beta_{35} I_{35}(t) \\ & + \gamma_1 C_1(t) + \gamma_2 C_2(t) + \cdots + \gamma_{42} C_{42}(t) \\ & + \rho_1 C_1 F(t) + \rho_2 C_2 F(t) + \cdots + \rho_{42} C_{42} F(t) + \varepsilon_{ijk}(t). \end{aligned} \tag{4}$$

Again, R_{ijk} is the total return index of firm i that belongs to industry j and country k; β_j, γ_k, and ρ_k are the pure industry, country, and foreign effects; and I and C are the industry and country dummies, which take value one for the industry and country to which firm i belongs. F is a dummy that takes a value of one if firm i is foreign, and a value of zero otherwise.[23]

The pure country effect attributable to domestic stocks is given directly by the estimate of γ_k^{D}. On the other hand, the pure country effect attributable to foreign stocks can be calculated as the sum of the domestic country effect and the coefficient on the interaction term, that is, $\gamma_k^{\mathrm{F}} = \gamma_k^{\mathrm{D}} + \rho_k$. Finally, the correlation between γ_k^{D} and γ_k^{F} measures the relationship between the country effects attributable to domestic and foreign stocks. If this correlation is close to one, then the country effect of domestic and foreign stocks moves in lockstep. On the other hand, a decreasing correlation indicates a decoupling of the country effects of domestic and foreign stocks. Foreign stocks become distinct from their domestic counterparts, hence creating opportunities for diversification within the host countries.

3.2 | An alternative factor model

In the Heston and Rouwenhorst (1994) model, all industries and countries are assumed to have an equivalent influence on returns, which has been criticized in the past (Bekaert et al., 2009; De Moor & Sercu, 2011). We therefore also use the alternative factor model proposed by Faias and Ferreira (2017) to check if the international diversification benefits of foreign stocks are robust to this assumption.

Following Brooks and Del Negro (2006), in the factor model by Faias and Ferreira (2017), each of the country and industry returns is introduced as the respective factor. Thus, monthly cross-sectional regressions for each month t take the form:

$$R_{ijk}(t) = \alpha_f(t) + \beta_{f_j}(t) R_j(t) + \gamma_{f_k}(t) R_k(t) + \varepsilon_{ijk}(t), \tag{5}$$

where, as before, $R_{ijk}(t)$ is the total return for firm i from industry j and country k, $\alpha(t)$ is the base-level return or the global factor, and $\beta_{f_j}(t)$ and $\gamma_{f_k}(t)$ represent the industry and country

[23]To avoid sample size bias, we require that there are at least four foreign stocks in a country in a given month.

factors, respectively. The factors $R_j(t)$ and $R_k(t)$ are computed as the respective value-weighted returns of all stocks that belong to a particular industry j or country k for a given month t. As in Faias and Ferreira (2017), the industry factors $R_j(t)$ are orthogonalized for each month t by regressing the industry returns on country returns and retaining their residuals.[24]

3.2.1 | Variance decomposition

Using the cross-sectional regressions for each month t given in Equation (5), we obtain estimated coefficients for industry and country effects. Since we have used portfolio returns to explain individual stock returns, the respective variations across industries and countries can be computed simply as the standard deviation (σ) of the estimated parameters for each period t times the standard deviation of their returns. The overall standard deviation of returns can be represented as

$$\sigma[R_{ijk}(t)] = \alpha_f(t) + \sqrt{{\beta_f}_j^{\,2}(t)}\,\sigma[R_j(t)] + \sqrt{{\gamma_f}_k^{\,2}(t)}\,\sigma[R_k(t)] + \sigma[\varepsilon_{ijk}(t)]. \tag{6}$$

To compare the industry and country effects, we use the monthly time series of the coefficients obtained from Equation (5) and, as in Faias and Ferreira (2017), we compute the following standard deviation (SD) measures: $SD_{\beta(t)} = \sqrt{{\beta_f}_j^{\,2}(t)} \times \sigma[R_j(t)]$ and $SD_{\gamma(t)} = \sqrt{{\gamma_f}_k^{\,2}(t)} \times \sigma[R_k(t)]$. $SD_{\beta(t)}$ and $SD_{\gamma(t)}$ measure industry and country effects, respectively, in terms of their dispersions, in a similar way to the MADs in the Heston and Rouwenhorst (1994) model. We plot 24-month moving averages of each of these industry and country effects to compare their respective trends over the years. Following the explanation in Section 3.1.2, we again compute and plot the ratios of country to industry effects (c2i) and country to global effects (c2g) using the corresponding SDs.

3.3 | Comparison with standard factor models

Following Bekaert et al. (2009), we compare the root-mean-squared error (RMSE) from each of our two main models with the RMSE from other asset-pricing models.[25]

We compare our results with the following five different asset-pricing models: (a) the International Capital Asset-Pricing Model (ICAPM), with only one global market factor, (b) the Fama and French (1998) International Three-Factor Model (IFF3F), which includes size and value factors along with the global market factor, (c) an international four-factor model (Fama & French, 2012) that combines the IFF3F with a momentum factor (IFF3F + MOM), (d) the Fama and French (2017) Five-Factor Model (IFF5F), which enriches the IFF3F by introducing profitability and investment factors, and, lastly, (e) a model that combines IFF5F with Momentum Factor (IFF5F + MOM). Similarly to Bekaert et al. (2009), we introduce variation in these factor models by considering semi-annual intervals and running the estimations for every six-month period to obtain a time series of RMSEs. To examine the difference between these RMSEs and the RMSEs of our two main country/industry attribution models, we consider the semi-annual estimations for Equations (1) and (5).

[24] In a robustness exercise, we orthogonalize country returns alternatively with respect to industry returns.

[25] We thank an anonymous referee for making this suggestion.

3.4 | Diversification benefits: mean–variance spanning tests

We examine whether foreign stocks provide diversification benefits in our sample of host countries by applying the mean–variance spanning tests of Bekaert and Urias (1996) and Bae et al. (2019). We assess whether each country's foreign stock portfolio (test portfolio) is spanned by its domestic portfolio (benchmark portfolio). The mean–variance spanning test is rejected if a test portfolio outperforms a benchmark portfolio, implying that an investor's efficient frontier expands if the test portfolio is added to the benchmark portfolio (Huberman & Kandel, 1987).

Bekaert and Urias (1996) and Bae et al. (2019) use mean–variance spanning tests to compare the diversification benefits of emerging and developed economies. Unlike them, we test for possible diversification benefits arising from foreign stock portfolios, while using domestic portfolios as our benchmark portfolios. Thus, our mean–variance spanning test estimates

$$R_{kt}^{\mathrm{F}} = \alpha_k + \sum_{j=1}^{n} \beta_{kj} R_{kjt}^{\mathrm{D}} + \epsilon_{kt}, \tag{7}$$

where R_{kt}^{F} is the return of the foreign stock portfolio for country k in month t and R_{kjt}^{D} are benchmark portfolio returns for the following three benchmark portfolios j. For each country, we consider three groups of benchmark portfolios: Benchmark 1 uses only the value-weighted portfolio of domestic stocks ($n = 1$), Benchmark 2 is composed of both the value- and equal-weighted portfolios of domestic stocks ($n = 2$), and Benchmark 3 combines the overall value-weighted portfolio and additional industry portfolios of domestic stocks ($n = 36$, i.e., 35 industry portfolios + 1 country portfolio). For foreign stocks to be mean–variance spanned by the domestic benchmarks, Huberman and Kandel (1987) show that the following two conditions have to be satisfied: $\alpha_k = 0$ and $\sum_{j=1}^{n} \beta_{kj} = 1$. Following Bae et al. (2019), we employ generalized method of moments (GMM) regression-based spanning tests.

4 | RESULTS

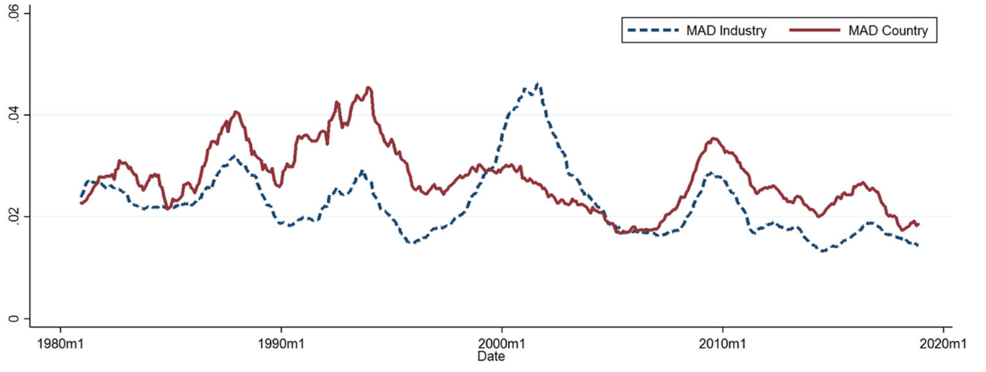
4.1 | The relative importance of industry and country effects

We use the Heston and Rouwenhorst (1994) methodology throughout this section. In our first iteration, following what has been done in the literature (e.g., Campa & Fernandes, 2006), we omit foreign stocks from our sample of host countries, in both the cross-sectional regressions and the calculation of the MADs. In the second iteration, we include all the foreign stocks available in our sample of host countries.

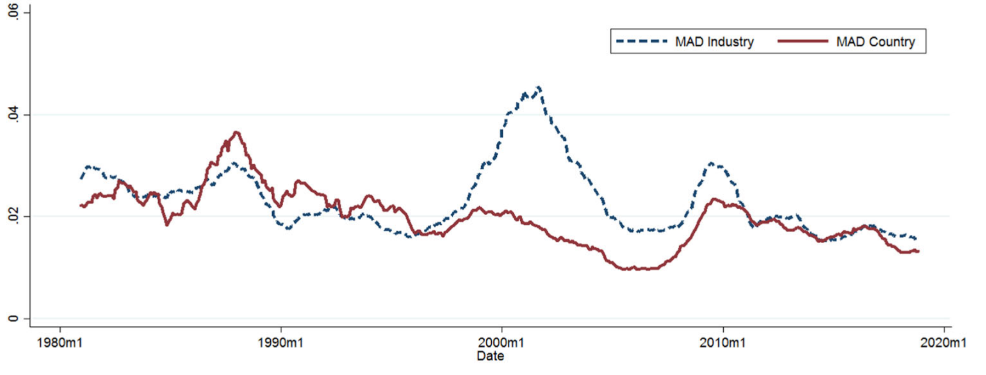
When foreign stocks are excluded from the sample, country factors dominate industry factors. This is the case for the entire sample, except for a short period due to the bursting of the dot-com bubble (around the year 2000).[26] In Panel A of Figure 1 we plot 24-month moving averages of industry and country MADs. As documented by Brooks and Del Negro (2004) and Soriano and Climent (2006), industry MADs exceed country MADs around the year 2000, due to the stock market dot-com bubble and crash. Consistent with their findings, in our data there are three industries that drive these results. The industries of software and computer services, technology hardware and

[26]The global financial crisis affects both country and industry factors, and a peak can be observed for both factors around 2010.

Panel A: Only domestic stocks.



Panel B: Foreign stocks included.



Panel C: Foreign stocks included only to calculate the weights of the MADs.

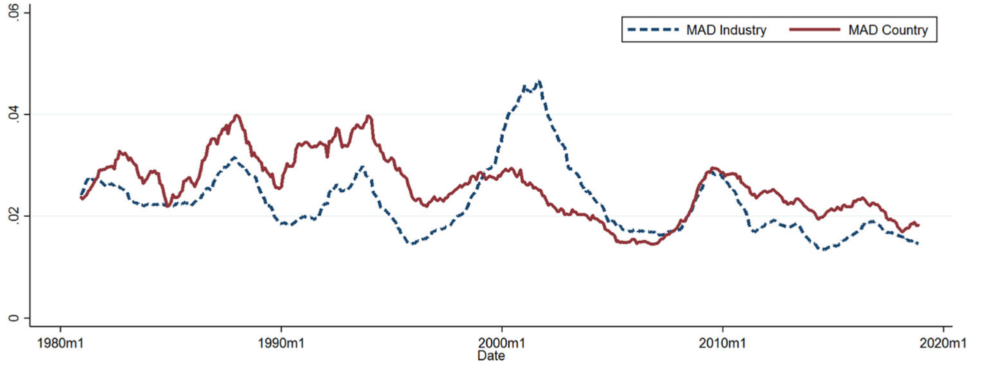


FIGURE 1 Pure country and industry effects. These figures present country and industry MADs (mean absolute deviations). MADs are calculated following the methodology explained in Section 3.1.1. We plot 24-month moving averages of the monthly weighted absolute values of the industry (dashed line) and country (solid line) effects. Panel A shows the plots when foreign stocks are not included in the analysis. Panel B includes foreign stocks and domestic stocks, both in the regressions and in the calculation of the weights of the MADs. Lastly, Panel C uses the betas from the cross-sectional regressions of domestic stocks, but introduces foreign stocks in the sample to calculate the weights of the MADs

equipment, and telecommunications exhibit the largest coefficients during this short period. More generally, the picture qualitatively resembles the findings of previous literature, indicating that our sample and methodology are comparable overall. While country effects diminish in importance relative to industry effects for a few years after the late 1990s, the trend reverses after 2006. In fact, after 2006, country effects largely dominate the industry effects.

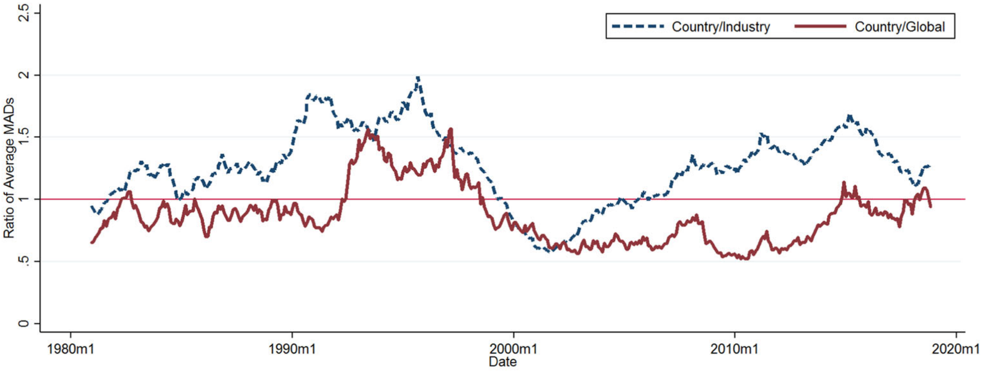
The findings change drastically once foreign stocks are included in the sample (Panel B of Figure 1). The relative importance of pure country effects is clearly reduced. In Panel B, while the country MADs are relatively lower than the corresponding country MADs in Panel A, the industry MADs are marginally higher than their counterparts in Panel A. In other words, once we include foreign stocks, the relative importance of pure country effects with respect to pure industry effects is clearly reduced. In the last 10 years of our sample, the diversification benefits from foreign stocks continue to be noticeable, since the dispersions in country coefficients remain marginally below those of the industry coefficients.

Here, a clarification on a subtle point is in order. As we have seen in Table 3, for markets with a high prevalence of foreign listings, foreign stocks have a high variance compared with domestic ones. These countries (United States, Japan, Australia, Canada, Singapore, or Switzerland) also represent a large fraction of world market value (see Appendix Table A.3 in the Supporting Information). Because these markets carry a large weight in the cross-sectional regressions and construction of MADs, we could expect the inclusion of foreign firms to increase the country MADs mechanically. However, in contrast, we find that the inclusion of foreign stocks reduces country MADs. This implies that the drop in country effects due to increased diversification benefits is particularly strong, such that it even overcomes the mechanical effect (or possible positive bias) due to differential variances.

Note that, in the two iterations reported in Panels A and B of Figure 1, the samples vary depending on whether or not foreign stocks are included within the Heston and Rouwenhorst (1994) framework. When foreign listings are introduced in the cross-sectional regressions and in the MAD calculations, there are basically two distinct phenomena that make country effects decrease. First, when the weights of the MADs are calculated with foreign firms included, the weights of the more globally integrated countries (i.e., those with more foreign listings) increase and consequently country effects decrease. This is because, as we noted before, foreign stocks are defined by the country where they are listed (host country), not by the country of origin (home country). The second phenomenon arises by selecting foreign firms that are available for trade. As shown in Section 2, more globally integrated firms have a higher propensity to make their stock available for trade in foreign countries. Therefore, when including foreign stocks in the regressions, country effects are likely to decrease. In order to disentangle these two effects, we examine MADs estimated in the sample without foreign stocks by reweighting them using market values of the sample that includes foreign listings. The results of this iteration are shown in Panel C of Figure 1. We observe that country effects decrease slightly compared with Panel A, but still dominate industry effects, except for the dot-com bubble period. Thus, the results from Panel C of Figure 1 suggest that the factor driving the reduction of country effects is truly an increase in the benefits of international diversification, and that it is not simply due to the impact that rebalancing market values has on the weights of the MADs.

To get a better picture of the declining importance of country effects, in Figure 2 we plot the ratios of country to industry effects (c2i) and country to global effects (c2g) for the same three iterations represented in Figure 1. We consider the global factor (i.e., α from Equation (1)) to check if the relative decline of country effects also persists with respect to the global factor, so that the international diversification benefits truly disappear after the inclusion of foreign

Panel A: Only domestic stocks.



Panel B: Foreign stocks included.

Panel C: Foreign stocks included only to calculate the weights of the MADs.

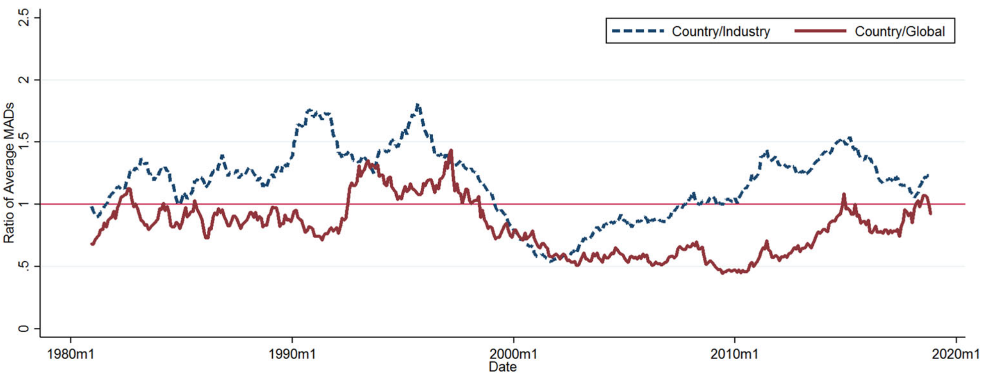


FIGURE 2 Country relative to industry and global effects. These figures show the ratios of 24-month moving averages of the monthly weighted absolute values (i.e., MADs) of the country betas to those of the industry betas (dashed line), and the ratios of 24-month moving averages of the monthly weighted absolute values (i.e., MADs) of the country betas to the global constant (solid line). Panel A shows the plots when foreign stocks are not included in the analysis. Panel B includes foreign stocks and domestic stocks, in both regressions and calculation of the weights of the MADs. Lastly, Panel C uses the betas from the cross-sectional regressions of domestic stocks, but introduces foreign stocks in the sample to calculate the weights of the MADs

stocks. When we compare Panels A and B in Figure 2, in Panel B (with foreign stocks) we observe a drastic drop in the relative prominence of country effects across the whole sample period. While both ratios are significantly larger in Panel A than in Panel B, the effect is more pronounced in the c2i ratio (almost 1.5 times). Moreover, in Panel B, both ratios c2i and c2g remain below one in the last 20 years of our sample, indicating that the diversification potential across countries has consistently remained below the diversification across industries, and across our sample universe (globally). On the other hand, when we exclude foreign stocks (Panel A), the c2i ratio remains persistently above one, and the c2g ratio is very close to one. Using Panel C, once again we confirm that the introduction of differential market values for MAD computations in Panels A and B does not drive the decrease of country effects.

In Table 4, we summarize the time-series averages from the first two iterations, that is, domestic only and full (domestic + foreign) samples, for both MADs and MAD ratios. These averages confirm our previous inferences drawn from Figures 1 and 2. In Panel A, when we consider the full 40-year sample period, the country MADs are higher than the industry MADs when the sample of domestic stocks is analyzed. However, when we include foreign stocks in the sample, the average of country effects turns out to be lower than the average of industry effects. This translates into a decline in the c2i (c2g) ratio from 1.28 (0.85) to 0.88 (0.64) when foreign stocks are included. In Panel B, each sample decade period is analyzed separately. Results confirm our earlier findings, that the dominance of industry effects has been largely driven by the trend observed after the year 1989, as the number of foreign stocks increases in our sample. Additionally, across these four decades, while country MADs for the domestic-only sample dominate the country MADs for the full (domestic + foreign) sample visibly, results are not as clear for the industry MADs, and are in fact reversed.

4.2 | Alternative factor model

We next apply the Faias and Ferreira (2017) factor model to segregate the industry, country, and global effects. In our first iteration, similarly to Section 4.1, we omit foreign stocks from our sample and analyze the importance of country effects in relation to industry effects when only domestic stocks are considered. Following this, in the second iteration, we introduce foreign stocks in our sample to examine how this impacts the country versus industry effects ratio.

In Panel A (Panel B) of Figure 3, we plot 24-month moving averages of industry and country SDs when foreign stocks are excluded (included) from the sample. In Panel A, the country factors are seen to dominate the industry factors persistently over the years. In fact, the average magnitude of industry effects generally remains stable across the four decades in this domestic-only sample. This is not the case for the average magnitude of country effects. When foreign stocks are included in the sample (Panel B of Figure 3), industry SDs dominate country SDs.[27]

The trends seen in this figure confirm our inferences from the MADs of the Heston and Rouwenhorst (1994) model in Figure 1. Similarly to the trend seen with the MADs, country SDs are relatively higher for the domestic stocks sample (Panel A) compared with the sample that includes the foreign stocks (Panel B), especially beyond the 1990s. These results confirm the inferences drawn from Figure 1 and reveal the significant international diversification benefits

[27]Except during the global financial crisis and the years of the Brexit vote, when the country SDs briefly overtake industry SDs.

TABLE 4 Summary of country, industry, and global effects

This table reports the time-series average MADs (see Section 3.1.1) and MAD ratios (see Section 3.1.2) when the sample excludes foreign stocks (domestic only) or includes them (foreign + domestic). We report MADs for country, industry, and global effects. For global effects, the MADs are replaced by absolute cross-sectional α. For MAD ratios, as shown in Figure 2, we report the ratio of country to industry effects (c2i) and the ratio of country to global effects (c2g). Panel A summarizes the MADs and MAD ratios for our full sample period of 40 years, whereas Panel B divides the sample into four 10-year periods. All the time periods begin from January of the first year and end on December of the last year. The differences for both the MADs and MAD ratios show levels of significance at 10%, 5%, and 1% using *,**, and ***, respectively

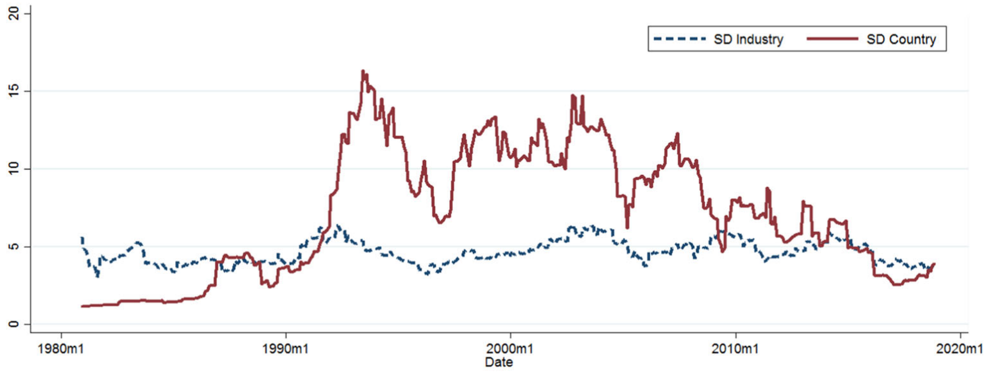
	Average MADs			**Average MAD ratios**	
	Country	**Industry**	**Global**	**c2i**	**c2g**
Panel A: Full sample period					
Domestic Stocks Only	0.0269	0.0222	0.0331	1.2814	0.8495
Foreign + Domestic Stocks	0.0198	0.0234	0.0322	0.8842	0.6396
Differences	0.0071***	−0.0011***	0.0009***	0.2099***	0.3972***
Panel B: Decade-long subperiods					
1979–1988:					
Domestic Stocks Only	0.0294	0.0253	0.0339	1.1566	0.8687
Foreign + Domestic Stocks	0.0260	0.0267	0.0334	0.9720	0.7817
Differences	0.0034***	−0.0013***	0.0005***	0.1846***	0.0870***
1989–1998:					
Domestic Stocks Only	0.0304	0.0187	0.0298	1.6432	1.0620
Foreign + Domestic Stocks	0.0217	0.0197	0.0282	1.1053	0.7884
Differences	0.0087***	−0.0010***	0.0016***	0.5378***	0.2736***
1999–2008:					
Domestic Stocks Only	0.0232	0.0270	0.0337	0.9258	0.6909
Foreign + Domestic Stocks	0.0149	0.0280	0.0329	0.5530	0.4534
Differences	0.0083***	−0.0010***	0.0008***	0.3728***	0.2375***
2009–2018:					
Domestic Stocks Only	0.0251	0.0185	0.0352	1.3769	0.7796
Foreign + Domestic Stocks	0.0178	0.0196	0.0347	0.9235	0.5616
Differences	0.0072***	−0.0011***	0.0005***	0.4534***	0.2180***

of foreign stocks. Especially during the dot-com bubble and the global financial crisis, the comparison of Panels A and B provides further insights on the diversification costs and benefits associated with foreign stocks. Compared with Panel A, the dispersion in industry coefficients for Panel B is greater in the aftermath of the dot-com bubble and the 2007–2008 crisis.[28]

In Figure 4, we plot the ratios of country to industry effects (c2i) and country to global effects (c2g) for the same two samples used in Figure 3. The magnitude of these ratios is similar to that shown in Faias and Ferreira (2017). When comparing Panels A and B of Figure 4, the lower relative prominence of country effects (especially for c2i) is clearly visible with the

[28]Marcelo, Quirós, and Martins (2013) reveal the distinctive dominance of industry effects over country effects after volatile times. Our results corroborate the same for both the domestic-only and all stocks (foreign + domestic) samples.

Panel A: Only domestic stocks.



Panel B: Foreign stocks included.

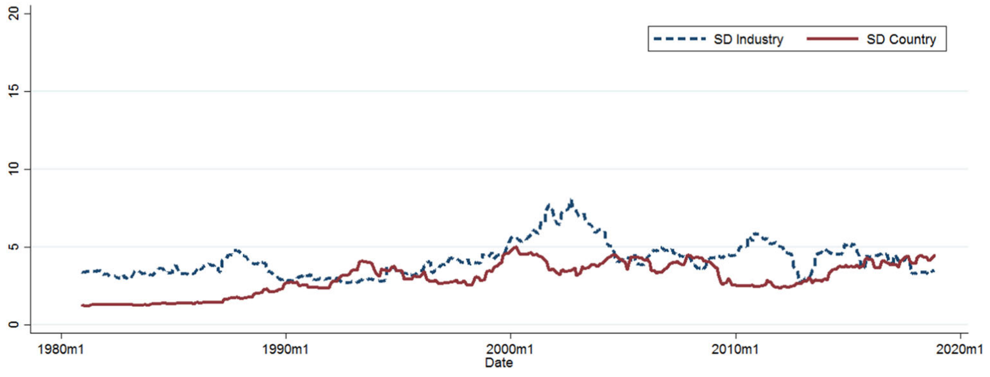


FIGURE 3 Country and industry effects using the factor model. These figures show plots of the SDs (standard deviations) for two different samples. SDs are calculated following the variance decomposition explained in Section 3.2.1. We plot 24-month moving averages of the monthly SDs for the industry (dashed line) and the country (solid line) factors. Panel A shows the plots when foreign stocks are not included in the analysis. Panel B includes both the foreign and domestic stocks in the sample

introduction of foreign stocks, because the magnitude of the ratios in Panel B is lower than that in Panel A (except for the 2007–2008 crisis and post-Brexit vote years). The c2i ratio of SDs stays predominantly below 1 in Panel B, indicating that the diversification potential across industries is larger than that across countries. When excluding foreign stocks (Panel A), however, the c2i ratio remains above one for the majority of the sample period. Although both the c2i and c2g ratios show an upward trend in recent years (Panel B), we find that this is largely driven by the uncertainty surrounding Brexit.[29]

Table 5 summarizes the time-series averages for both the SDs and SD ratios using the domestic-only and all stocks (domestic + foreign) samples. These averages confirm our previous results from Table 4. As in Table 4, with the full 40-year sample period (Panel A of Table 5), the country average

[29]In a robustness test, we run the factor model on a subsample of non-European countries, and find that this recent upward trend disappears. However, for this same subsample, in the pre-Brexit period we find no considerable change in the magnitudes of the country and industry effects, or in their ratios.

Panel A: Only domestic stocks.

Panel B: Foreign stocks included.

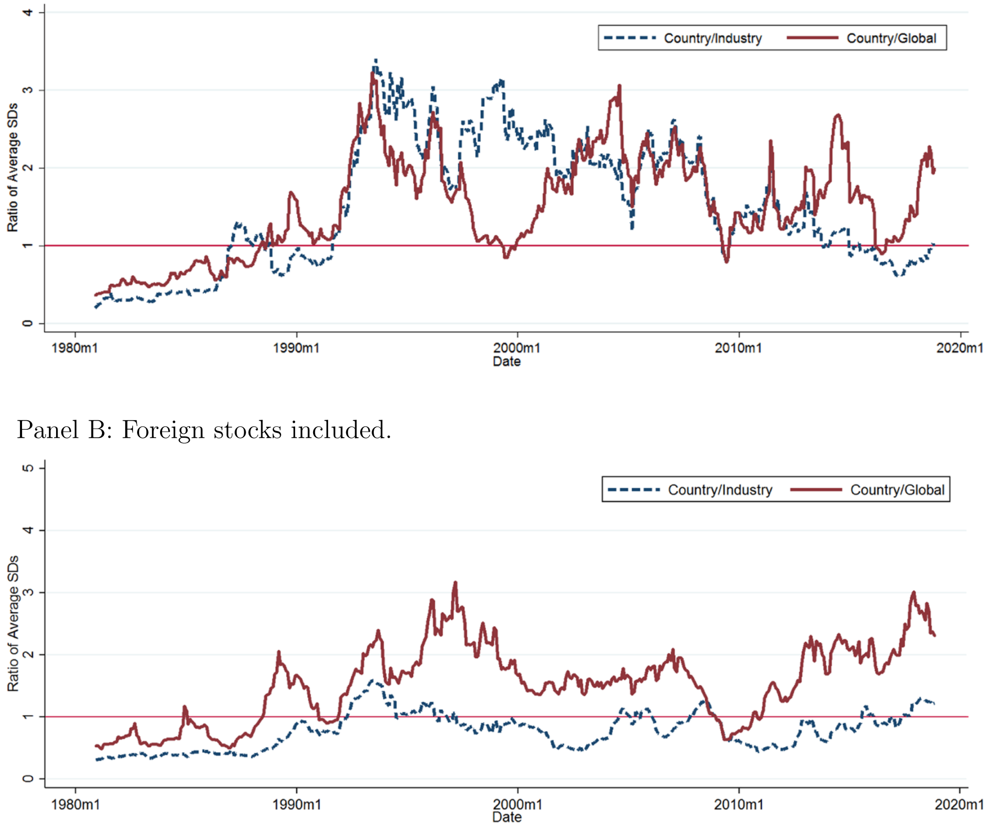


FIGURE 4 Country relative to industry and to global effects using the factor model. These figures plot the ratios of 24-month moving averages of the monthly standard deviations (i.e., SDs) of the country betas to the industry betas (dashed line) and the global factor (solid line). See Section 3.2.1 for more details on the construction of the SDs. Panel A shows the plots when foreign stocks are not included in the analysis. Panel B includes both the foreign and domestic stocks in the sample

SDs are higher than the industry SDs when the domestic-only stocks sample is analyzed. However, when the foreign stocks are included in the sample, the magnitude of the country effects is then much lower than the magnitude of the industry effects. The declines in the c2i and c2g SD ratios with the inclusion of foreign stocks are also qualitatively similar to the results seen for the MAD ratios in Table 4. Furthermore, the diversification benefits evident from the ratios in Table 5 (using the alternative factor model) are considerably more pronounced than those observed in Table 4 (using the Heston and Rouwenhorst, 1994 model). Whereas the average SD of the country effects decreases notably from 7.1% to 3% when foreign stocks are included in the sample, the average SD of the industry effects is only marginally affected. This is translated into a decline of the c2i ratio from 1.5 to 0.74 when foreign stocks are introduced in the sample. Across each of the four decades (Panel B of Table 5), both c2i and c2g ratios decrease significantly with the inclusion of foreign stocks in the sample. However, the effect is more pronounced in the middle two decades. This can be explained by the fact that there were very few foreign stocks available for trade in the 1980s, thus reducing the diversification potential from these stocks. Similarly, in the period starting after 2009, the financial crisis and Brexit may have influenced this diversification potential negatively.

TABLE 5 Summary of country, industry and global effects using the factor model

This table reports the time-series average SDs and SD ratios (see Section 4.2) when the sample includes domestic stocks only, or when it includes both foreign and domestic stocks. We report SDs for the country, industry, and global effects. The ratios of country to industry effects (c2i) and country to global effects (c2g) are plotted. Panel A considers the full sample period of 40 years, whereas Panel B divides the sample into four 10-year periods. All the time periods begin from January of the first year and end on December of the last year. The differences for both the SDs and SD ratios have *,**, or ***, indicating the levels of significance at 10%, 5%, and 1%, respectively

	Average SDs			Average SD ratios	
	Country	Industry	Global	c2i	c2g
Panel A: Full sample					
Domestic Stocks Only	7.0762	4.6253	4.6677	1.5034	1.4975
Foreign + Domestic Stocks	2.9823	4.1742	2.6383	0.7365	1.1758
Differences	4.0939***	0.4511***	2.0294***	0.7670***	0.3217***
Panel B: Decade-long subperiods					
1979–1988:					
Domestic Stocks Only	2.1836	4.0511	3.2206	0.5535	0.6545
Foreign + Domestic Stocks	1.4248	3.5945	2.2509	0.3968	0.6621
Differences	0.7588***	0.4566***	0.9697***	0.1567***	0.0075
1989–1998:					
Domestic Stocks Only	8.9597	4.5508	5.2018	1.9896	1.7503
Foreign + Domestic Stocks	2.9171	3.3237	2.2226	0.9008	1.3537
Differences	6.0426***	1.2271***	2.9792***	1.0888***	0.3967***
1999–2008:					
Domestic Stocks Only	10.8409	5.0379	6.3043	2.1699	1.8822
Foreign + Domestic Stocks	4.0066	5.2759	3.2579	0.8016	1.2532
Differences	6.8343***	0.2379***	3.0464***	1.3684***	0.6291***
2009–2018:					
Domestic Stocks Only	5.3687	4.7523	3.6584	1.1154	1.5416
Foreign + Domestic Stocks	3.2849	4.3933	2.7484	0.7820	1.3372
Differences	2.0838***	0.3589***	0.9100***	0.3334***	0.2044***

4.3 | Examining the country effects of foreign stocks

In this section we analyze the marginal contribution of foreign stocks on country effects, as explained in Section 3.1.3. We plot the cross-sectional correlation of country effects attributable to domestic and foreign stocks (i.e., γ_k^{D} and γ_k^{F} respectively) in Figure 5. It is apparent that the correlation between these two has decreased over time, particularly in the period after the mid-1990s, when it was at its peak. At the beginning of our sample, the country effects of domestic and foreign stocks tended to move in lockstep, and this is not the case in later years.

The wedge between γ_k^{D} and γ_k^{F} is given by $\rho_k \equiv \gamma_k^{\mathrm{F}} - \gamma_k^{\mathrm{D}}$. In our sample period, the correlation between the estimates of γ_k^{D} and ρ_k across countries is negative and becomes increasingly negative over time. This indicates that a stock's country effect is counteracted by values of ρ_k that have the opposite sign in the case of foreign stocks. In other words, the country effect of foreign stocks is a muted version of the country effect of domestic stocks, implying that foreign stocks are more similar to the world market portfolio (α). This evidence reinforces our previous inference that foreign stocks are an effective alternative for diversifying across countries. In Figure 5, the plot in Panel B using the Faias and Ferreira (2017) factor model remains qualitatively similar to that of Panel A, which uses the Heston and Rouwenhorst (1994) model.

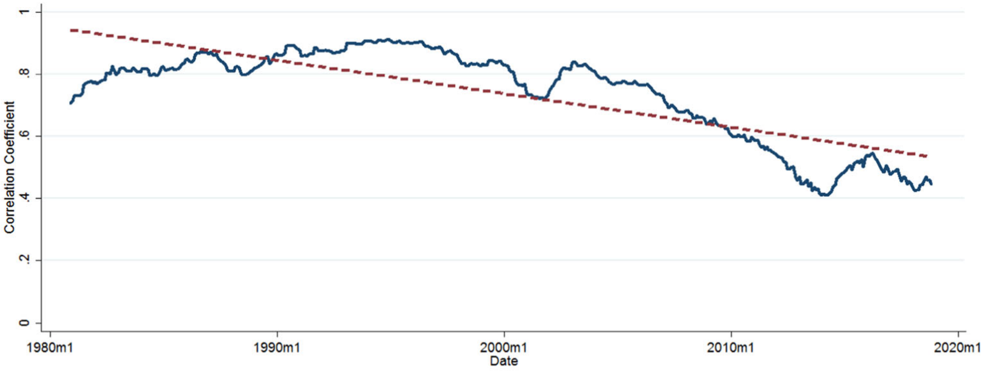
We also apply the Engle (2002) dynamic conditional correlation model (DCC) in Panel C of Figure 5 to examine the correlation between the country effects with and without foreign stocks in a dynamic setting. Given the time series of two variables, the DCC approach makes it possible to compute the current correlation as a function of the past variations, along with the evolving correlations of the two variables. We compute the dynamic correlations between the two country effects obtained using the MADs calculated from the Heston and Rouwenhorst (1994) model. The plot in Panel C of Figure 5 is similar to those seen in the previous two panels, with the trend line showing that the correlations have declined progressively over time.

As shown in Errunza et al. (1999), foreign stocks are highly correlated with international indices (in our case, highly correlated with the world market portfolio and not as much with domestic stocks) and are therefore a tool with which to achieve international diversification. An additional reason that explains our result might lie in the changes in the behavior of firms themselves, which is then priced into returns. For example, as argued by Doidge et al. (2009) and Karolyi (2006), firms that decide to be listed abroad do so to overcome barriers to international investment, access global investors, and achieve greater visibility and credibility. Again, this increases the exposure of foreign stocks to global risk factors and makes them resemble more and more the world market portfolio. Thus, as globalization and integration move forward, foreign-listed firms become more and more similar to the global market portfolio and a better tool with which to achieve international diversification.

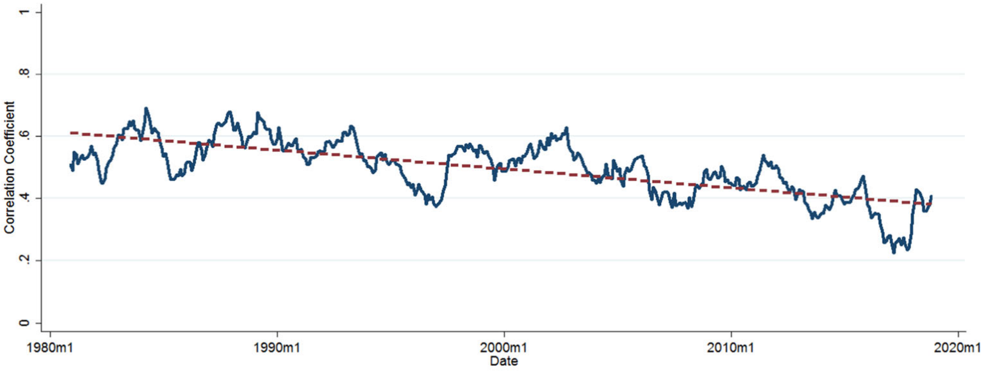
4.4 | Comparison with other factor models

We assess further the two country/industry methodologies used in our analysis, that is, Heston and Rouwenhorst (1994) and Faias and Ferreira (2017), in relation to some other common asset-pricing models. To do this, we compare the RMSE of the models, as explained in Section 3.3. Table 6 shows the model comparisons. We follow Bekaert et al. (2009) and summarize the t-statistics obtained using 1,000 bootstrapping repetitions. Specifically, we test the difference $RMSE(Model\ 1) - RMSE(Model\ 2)$, where Model 1 is our reference model (Table 6 shows two columns, one for each of our reference models) and Model 2 is one of the five common asset-pricing models defined earlier in Section 3.3. All of the t-statistics shown in Table 6 are negative, which implies that both of our main reference models have a significantly lower RMSE than all of the other five factor models. These results indicate that the country/industry models that we have employed can explain our sample stock returns better than these alternative asset-pricing models. The Fama and French (2017) five-factor model (IFF5F) has the lowest average RMSE. Moreover, we also find that the Faias and Ferreira (2017) methodology produces lower RMSEs than the RMSEs of the Heston and Rouwenhorst (1994) methodology (this can be inferred by looking at the marginally higher t-statistics). Our results are consistent with Bekaert et al. (2009), who also show that the Heston and Rouwenhorst (1994) estimations can explain variation in returns better than the global Capital Asset-Pricing Model and global three-factor models.

Panel A: Heston & Rouwenhorst (1994) Model.



Panel B: Factor Model.



Panel C: Dynamic Conditional Correlations.

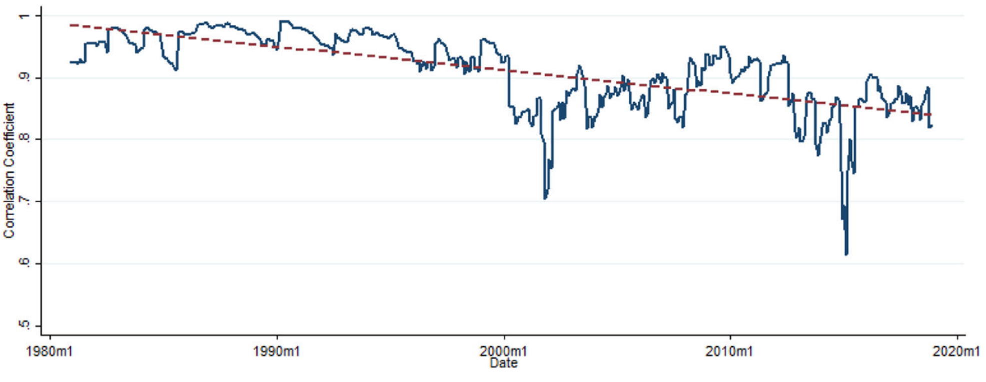


FIGURE 5 Correlation between γ_k^D and γ_k^F. Panels A and B plot the 24-month moving average trends of correlations between γ_k^D (country effect attributable to domestic stocks) and γ_k^F (country effect attributable to foreign stocks) for the Heston and Rouwenhorst (1994) model and the Factor Model. The construction of γ_k^D and γ_k^F is explained in Section 3.1.3. The dashed line shows the linear trend of correlations across the sample period. Panel C shows the dynamic conditional correlation between the country effects with and without foreign stocks

TABLE 6 Comparison of model fit

This table reports the t-statistics for the difference in RMSE for the two main models used in the article and five alternative factor models. We estimate methodologies of each of the two reference models, that is, Heston and Rouwenhorst (1994) and Faias and Ferreira (2017), and compare their RMSE with the following: (a) International Capital Asset Pricing Model (ICAPM), which considers only a global market factor, (b) Fama and French (1998) International Three-Factor Model (IFF3F), which includes size and value factors along with the global market factor, (c) applying Fama and French (2012) to combine IFF3F and Momentum factor (IFF3F + MOM), (d) Fama and French (2017) International Five-Factor Model (IFF5F), which improves IFF3F by introducing profitability and investment factors, and (e) a combination of IFF5F and Momentum Factor (IFF5F + MOM). We report t-statistics using bootstrapping with 1,000 repetitions

	Reference model	
	Heston and Rouwenhorst (1994)	**Faias and Ferreira (2017)**
ICAPM	−21.600***	−23.656***
IFF3F	−21.580***	−23.635***
IFF3F + MOM	−21.713***	−23.775***
IFF5F	−21.525***	−23.581***
IFF5F + MOM	−21.705***	−23.767***

4.5 | Diversification potential of foreign stocks

We next assess whether and how the diversification potential from foreign stocks varies across different countries.

In Table 7, we report the p-values obtained from the GMM-based mean–variance spanning tests for the three benchmark portfolio combinations defined in Section 3.4. In our setting, the p-value represents the probability that a given country's foreign stock portfolio lies within the efficient frontier comprising only the domestic benchmarks. Thus, lower p-values for a country imply that, if investors of that country add foreign stocks traded in that country to their domestic benchmark portfolios, they could potentially benefit from diversification.

For each of the three benchmarks, p-values in the first column (Overall test) provide the results from GMM estimations of Equation (7) when the two Huberman and Kandel (1987) conditions are tested jointly. The next two columns show the p-values testing the alphas (H_0: $\alpha_k = 0$) and deltas (i.e., H_0: $1 - \sum_{j=1}^{n} \beta_{kj} = 0$). The alphas compare tangency portfolios, while the deltas compare the minimum-variance portfolios.

Across all three benchmarks in Table 7, we find that the overall GMM tests for more than two-thirds of our sample countries do not support the null hypothesis that the foreign stocks are mean–variance spanned by domestic portfolios. Moreover, much of the diversification potential for foreign stocks across our sample countries seem to be driven by differences in minimum-variance portfolios (deltas), rather than differences in tangency portfolios (alphas).[30]

[30]While the introduction of additional industry portfolios in Benchmark 3 increases the number of countries showing diversification potential across all three tests in comparison with the first two benchmarks, these numbers have to be interpreted with caution, as the power of these tests is highly sensitive to the number of benchmark portfolios (Bekaert & Urias, 1996).

TABLE 7 Mean-variance spanning tests for foreign stocks

This table reports the results of mean–variance spanning tests considering three benchmarks: only the value-weighted portfolio of domestic stocks (Benchmark 1), both the value- and equal-weighted portfolios of domestic stocks (Benchmark 2), and a combination of the value-weighted country portfolio and industry portfolios (Benchmark 3). We apply GMM spanning tests as shown in Bae et al. (2019). For each of the three benchmarks, the first column shows p-values when the sufficiency of the two conditions of mean–variance spanning is tested (Overall Test). The next two columns cover p-values for the differences in tangency portfolios (Alpha) and the differences in minimum-variance portfolios (Delta). The number of test rejections at 5% significance are summarized below the list of countries. The last two rows show the mean–variance spanning test rejections, segregated by emerging economies and developed economies (in bold). For the classification of these two groups, see Appendix Table A.1 in the Supporting Information

	Benchmark 1			Benchmark 2			Benchmark 3		
Country	Overall test	Alpha	Delta	Overall test	Alpha	Delta	Overall test	Alpha	Delta
Argentina	0.000	0.752	0.000	0.000	0.972	0.000	0.000	0.942	0.000
Austria	**0.015**	**0.704**	**0.004**	**0.975**	**0.916**	**0.835**	**0.002**	**0.559**	**0.001**
Australia	**0.067**	**0.990**	**0.020**	**0.067**	**0.989**	**0.020**	**0.000**	**0.866**	**0.000**
Belgium	**0.462**	**0.238**	**0.538**	**0.327**	**0.739**	**0.175**	**0.124**	**0.567**	**0.075**
Canada	**0.246**	**0.136**	**0.643**	**0.124**	**0.065**	**0.543**	**0.020**	**0.046**	**0.113**
Switzerland	**0.000**	**0.436**	**0.000**	**0.002**	**0.490**	**0.001**	**0.000**	**0.029**	**0.000**
Colombia	0.000	0.022	0.000	0.000	0.167	0.000	0.000	0.000	0.000
Germany	**0.000**	**0.009**	**0.000**	**0.007**	**0.010**	**0.044**	**0.000**	**0.008**	**0.000**
Denmark	**0.000**	**0.584**	**0.000**	**0.000**	**0.829**	**0.000**	**0.000**	**0.131**	**0.000**
Spain	**0.606**	**0.933**	**0.320**	**0.503**	**0.929**	**0.251**	**0.268**	**0.396**	**0.108**
Finland	**0.000**	**0.796**	**0.000**	**0.000**	**0.904**	**0.000**	**0.000**	**0.220**	**0.000**
France	**0.000**	**0.397**	**0.000**	**0.180**	**0.606**	**0.067**	**0.000**	**0.992**	**0.000**
UK	**0.000**	**0.715**	**0.000**	**0.000**	**0.656**	**0.000**	**0.000**	**0.291**	**0.000**
Hong Kong	**0.000**	**0.177**	**0.000**	**0.000**	**0.183**	**0.000**	**0.000**	**0.084**	**0.000**
Hungary	**0.000**	**0.286**	**0.000**	**0.000**	**0.085**	**0.000**	**0.000**	**0.407**	**0.000**
Ireland	**0.006**	**0.089**	**0.042**	**0.026**	**0.071**	**0.277**	**0.000**	**0.081**	**0.000**
Italy	**0.000**	**0.138**	**0.000**	**0.000**	**0.482**	**0.000**	**0.000**	**0.076**	**0.000**
Japan	**0.019**	**0.026**	**0.138**	**0.030**	**0.029**	**0.196**	**0.000**	**0.005**	**0.000**
South Korea	0.000	0.007	0.000	0.000	0.005	0.000	0.000	0.000	0.000
Luxembourg	**0.042**	**0.099**	**0.239**	**0.006**	**0.006**	**0.258**	**0.002**	**0.001**	**0.410**
Mexico	0.009	0.147	0.194	0.042	0.012	0.117	0.000	0.000	0.000
Netherlands	**0.000**	**0.918**	**0.000**	**0.042**	**0.275**	**0.047**	**0.000**	**0.256**	**0.000**
Norway	**0.000**	**0.303**	**0.000**	**0.000**	**0.432**	**0.000**	**0.000**	**0.868**	**0.000**

(Continues)

TABLE 7 (Continued)

Country	Benchmark 1			Benchmark 2			Benchmark 3		
	Overall test	Alpha	Delta	Overall test	Alpha	Delta	Overall test	Alpha	Delta
New Zealand	**0.847**	**0.567**	**0.836**	**0.465**	**0.415**	**0.525**	**0.309**	**0.133**	**0.930**
Philippines	0.000	0.543	0.000	0.000	0.701	0.000	0.000	0.899	0.000
Poland	**0.314**	**0.866**	**0.147**	**0.509**	**0.674**	**0.341**	**0.000**	**0.949**	**0.000**
Portugal	**0.279**	**0.258**	**0.209**	**0.187**	**0.379**	**0.094**	**0.429**	**0.240**	**0.559**
Romania	**0.347**	**0.213**	**0.798**	**0.414**	**0.223**	**0.779**	**0.079**	**0.918**	**0.025**
Russia	0.000	0.475	0.000	0.000	0.199	0.000	0.000	0.260	0.000
Sweden	**0.000**	**0.127**	**0.000**	**0.000**	**0.130**	**0.000**	**0.000**	**0.357**	**0.000**
Singapore	**0.000**	**0.603**	**0.000**	**0.000**	**0.786**	**0.000**	**0.000**	**0.151**	**0.000**
Turkey	0.000	0.461	0.000	0.000	0.586	0.000	0.000	0.127	0.000
Taiwan	0.424	0.373	0.355	0.321	0.380	0.229	0.304	0.166	0.741
USA	**0.009**	**0.014**	**0.093**	**0.047**	**0.033**	**0.278**	**0.006**	**0.048**	**0.069**
South Africa	0.013	0.019	0.121	0.003	0.008	0.046	0.001	0.002	0.069
Rejections	26	6	22	24	7	20	29	10	26
Emerging Economies	8	3	6	8	3	7	8	4	7
Developed Economies	**18**	**3**	**16**	**16**	**4**	**13**	**21**	**6**	**19**

In our main analysis, we conclude that foreign stocks provide diversification benefits. However, we have not yet analyzed whether the diversification potential from these foreign stocks is similar across countries. Bae et al. (2019), for instance, show that, despite high diversification potential being attributed to emerging countries, developed countries remain an important source of diversification benefits. Comparing emerging and developed countries, we find that, for eight out of nine emerging countries, foreign stocks cannot be spanned by domestic stocks. The ratio for developed countries is 18 out of 26. These results suggest that an investor of a typical emerging country clearly benefits from diversification through foreign stocks, while results are not as clear-cut for developed economies.[31]

To gain more insights into the source of the cross-country diversification potential, we calculate the time-series average of country effects from the Heston and Rouwenhorst (1994) model for each of our sample countries and study their relative movement when foreign stocks are included. In Appendix Table A.6 in the Supporting Information we list countries sorted according to the ratio of country effects when including and excluding foreign stocks. We observe that emerging economies tend to appear at the top of this table. Again, it seems that the presence of foreign stocks lowers country effects to a greater degree in emerging economies.

[31]The test can be performed only for the nine emerging economies in which foreign stocks are available.

5 | CONCLUSION

We document the rise of foreign stocks available for trade in world financial markets, and investigate its impact on international diversification. Foreign stocks are important for investors, because they affect the composition of international equity portfolios and the risk management of the latter. The literature on country and industry effects has not explored the international diversification benefits from domestic investments that include foreign stocks. In fact, much of the literature restricts itself to purely domestic stocks when examining international diversification benefits. We thus address this gap in the literature by using a more comprehensive dataset that includes foreign stocks. Our analysis reveals that the relative importance of industry and country effects depends heavily on the inclusion of foreign stocks in investment portfolios.

We find that industry effects have become more effective for risk reduction over time relative to country effects. In the 1980s we do not find a significant impact of foreign stocks on the country and industry effects relationship, but from the 1990s onwards industry effects grow in importance relative to country effects. This shift in importance is driven mainly by the presence of foreign stocks, since we show that an internationally diversified portfolio that does not include foreign securities still has the characteristics of country effects dominating industry effects. We can thus conclude that the growth in foreign stocks has contributed significantly towards global market integration, which has, in turn, led to the decline in the dominance of country effects relative to industry effects.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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