Do foreign stocks substitute for international diversification?*

Vicente J. Bermejo† José M. Campa‡ Rodolfo G. Campos§
Mohammed Zakriya¶

Date of this version: February, 2020

Abstract

Using a novel sample of foreign securities available for trade in 42 countries during the last four decades (1979-2018), we characterize the rise in importance of foreign stocks for investors in their host countries and its implications for diversification benefits across industries and countries. The availability of foreign stocks in host countries 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 significantly contributes towards increasing the integration of global markets.

JEL classification: G11; G15; F36

Keywords: International diversification; country/industry effects; foreign stocks; international capital markets

*We have benefited from comments by Javier Díaz-Giménez, Ilias Filippou, Pedro Ángel García Ares, Gonzalo Gómez Bengoechea, María Gutiérrez Urtiaga, Pablo Ruiz Verdú, Josep Tribó, Lucciano Villacorta, Daniel Wolfenzon, and participants at Universidad Carlos III and the FREE seminar series. Vicente Bermejo acknowledges financial assistance from the International Mobility Program UC3M. Mohammed Zakriya is thankful for financial support from the Government of Catalonia (grants 2017-FI_B-00502 and 2018-FI_B-00170). The views expressed in this paper are those of the authors and do not necessarily represent the views of Banco de España or the Eurosystem.

†Corresponding author, Universitat Ramon Llull, ESADE Business School, Av. Torreblanca, 59, 08172 Sant Cugat, Barcelona, Spain; email: vicente.bermejo@esade.edu.

‡IESE Business School, Camino del Cerro del Águila 3, 28023 Madrid, Spain;
email: jcampa@iese.edu.

§Banco de España, Calle de Alcalá 48, 28014 Madrid, Spain; email: rodolfo.campos@bde.es.

¶Universitat Ramon Llull, ESADE Business School, Av. Torreblanca, 59, 08172 Sant Cugat, Barcelona, Spain; email: mohammed.zakriya@esade.edu.

1 Introduction

In the past four decades, international equity positions in portfolio investment have increased substantially. This has been mainly driven by the demand from investors to increase their international exposure (Bena, Ferreira, Matos, and Pires, 2017). At the same time, the amount of foreign stocks that are available for trade in host countries has increased dramatically. This can be explained through several factors, such as the firms' decision to increase their cross-listing in foreign markets as a way to broaden their investor base, or recent technological developments (e.g., the introduction of electronic trading platforms) facilitating the increase in the number of stocks traded overseas. These changes in the relative demand and supply for cross-border equities raise questions on their subsequent impact on international portfolio diversification. In this context, and through the rest of this paper, "foreign stocks" refer to the equity stock of firms made available for trade in the markets outside of their home country. What effects do these foreign stocks have on the net benefits from international portfolio diversification? How have the relative values of industry and country diversification changed as a result of the increasing availability of foreign stocks for trade in host countries?

This paper focuses on these questions which are of paramount importance for optimal portfolio investment strategies. We first provide insights on the evolution of foreign stocks available for trade in international financial markets over the last four decades and show that the number of foreign stocks has increased substantially in many of the host countries. Whereas before 1989 there were roughly 750 foreign firms' stocks traded, this figure rose 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 period 2009-2018.[1] This shows that foreign stocks have become a significant part of the domestic investors' investment opportunity set.

Further, and more importantly, our paper shows that the availability of foreign

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

stocks significantly changes the relative gains from international portfolio diversification. There is a long literature examining the importance of industry and country sources of diversification when looking at international portfolio allocation. On one end, this literature has highlighted the prevalence of country shocks relative to industry shocks in internationally diversified portfolios (e.g., Heston and Rouwenhorst, 1994; Griffin and Karolyi, 1998). This prevalence implied that there were substantial benefits from diversification across countries in an international portfolio. On the other end of the spectrum, and later in time, a number of papers have highlighted that the gains from international diversification for a U.S. based investor could be essentially achieved by investing in available securities traded within U.S. markets. For example, in a classical paper, Errunza, Hogan, and Hung (1999) show that a diversified portfolio of U.S. issued securities that includes foreign firms listed in U.S. markets, international closed-end funds, and U.S. multinationals can essentially replicate a portfolio of international diversified securities.

This paper, thus, provides insights to integrate these different views on the benefits from international portfolio diversification. We show that the prevalence of foreign stocks has implied a shift in the relative role that industry and country shocks play in an internationally diversified portfolio. Our results are robust to using both the dummy variables specification for countries and industries (Heston and Rouwenhorst, 1994), and explanatory variables in the form of individual country's and industry's orthogonalized returns in a factor model (Faias and Ferreira, 2017). In both these approaches industry effects gain prominence when compared to country effects once foreign stocks are added to the sample. This is especially the case starting in the 1990s. Across the 40 years of data, the ratio of country to industry effects persistently stays below 1 irrespective of the model specification, confirming the dominance of industry effects when foreign stocks are included in the sample. The relative decline in the importance of country effects after the inclusion of foreign stocks, is not only at the expense of industry effects but also of a global factor. Lastly, on separating the country effects attributable to the domestic and foreign stocks, we find that the correlation between these two has deteriorated over

time. This further supports our argument that foreign stocks do provide diversification opportunities.

To the best of our knowledge, we are the first to examine the role of foreign securities available for trade in host countries on country and industry effects. By using a complete dataset of domestic and foreign stocks in our sample of host countries, we are able to show that an internationally diversified portfolio that includes foreign securities experiences a significant decline in the size of country shocks, especially in the last three decades, with the country shocks becoming markedly less important than the industry shocks. This decline in our sample is mainly driven by the presence of foreign firms. In an internationally diversified portfolio that does not include investment in foreign securities, diversification across countries is more effective than across industries, except for a few years after the dot-com bubble of 2000. The inclusion of foreign securities, however, lowers the importance of country effects, with the same becoming markedly less important than industry effects beyond 1989. In recent years, the industry factors seem to be maintaining persistent prominence over the country factors for investment portfolios that combine domestic and foreign stocks, showing that the foreign stocks may be an effective investment instrument for domestic investors to achieve international diversification.

Foreign stocks may possibly be indicative of many other factors, for example size, the dominance of multinational businesses, financial integration of developing economies, etc. A complete characterization of all possible driving forces in the international diversification process is outside the scope of this paper and would require a different empirical strategy to disentangle country effects based on these underlying forces. Moreover, from the point of view of an investor whose central objective is to determine whether to diversify across countries or industries, these characteristics may be of little relevance, and we therefore do not take a stand on them.

The rest of this paper is organized as follows. The next section presents a short literature review on the benefits from international portfolio diversification and the sources for these diversification benefits. Section 3 describes the data and provides evidence on the evolution of foreign stocks available for investors. Section 4 provides the

methodological approaches used to identify relative gains from international portfolio diversification. Section 5 presents the empirical evidence on the role of foreign stocks as a substitute for international diversification, and Section 6 concludes.

2 Literature review

After the intrinsic tradeoff between risk and return was formally settled by Markowitz (1952), ways of reducing risk through diversification have been extensively studied. Potential gains from industrial and international portfolio diversification have been measured in extant literature started by Grubel (1968) and Levy and Sarnat (1970). Heston and Rouwenhorst (1994) show that diversification across countries within an industry is a much more effective tool for risk reduction than industry diversification within a country even in a geographically concentrated and economically integrated regions such as Western Europe. Griffin and Karolyi (1998) extend this result by showing that similar findings are obtained even with a broader sample of countries that include emerging markets.

Following Rouwenhorst (1999), a series of papers including Baca, Garbe, and Weiss (2000), Ferreira and Gama (2005), Campa and Fernandes (2006) and Faias and Ferreira (2017) have analyzed the evolution of country and industry factors in different contexts. A large part of this literature concludes that industry factors have grown in importance and may now be dominating country factors. However, Brooks and Del Negro (2004) and Soriano and Climent (2006) argue that this may just have been a temporary phenomenon associated with the stock market bubble at the beginning of the 21st century. More recently, a number of authors have used different methodologies that show mixed results on the relative importance of country and industry factors. Thus, the debate is still open. Phylaktis and Xia (2006), Baele and Inghelbrecht (2009) and Bekaert, Hodrick, and Zhang (2009) have found that geographical diversification continues to be superior to industry diversification, while Bai and Green (2010) and Eiling, Gerard, Hillion, and de Roon (2012) state that international equity returns are

mainly driven by industry factors. Moreover, Chen, Bennett, and Zheng (2006) and Christoffersen, Errunza, Jacobs, and Langlois (2012) have argued that there has been a decline of the benefits from international diversification over time, and showed that emerging markets offer greater diversification benefits than developed markets. A wide variety of adaptations to the methodology of Heston and Rouwenhorst (1994) and alternative models have been suggested. Since the Heston and Rouwenhorst (1994) model is widely used by practitioners, and it is also the conventional workhorse for the analysis of country and industry effects; we employ it in our preliminary results. To ascertain that our results are not driven by the assignment of dummy variables for each of the countries and industries, we additionally employ the factor model from Faias and Ferreira (2017) that introduces value-weighted country and industry returns as factors in place of the Heston and Rouwenhorst (1994) dummies. Our results are confirmed.

Another strand of the literature has argued that investors can effectively diversify across countries with instruments available in their home markets. Errunza, Hogan, and Hung (1999) tested this hypothesis and found that home-made diversification through investment in multinational corporation stocks, closed-end country funds, and American Depositary Receipts essentially exhausts gains from international diversification. Moreover, they claim that incremental gains from international diversification beyond home-made diversification portfolios have diminished over time in a way consistent with changes in investment barriers. Rowland and Tesar (2004) also showed that multinational corporations, which are usually included in the literature on industry versus country effects, have provided diversification benefits for investors.

A number of recent articles have argued that home bias and investor's preferences for home-stocks may limit the effectiveness of the diversification benefits highlighted by Errunza, Hogan, and Hung (1999). Portes and Rey (2005) showed that investors prefer the stocks of foreign countries that are closer and Chan, Covrig, and Ng (2005) showed that investors prefer the stocks of foreign countries whose equity markets are more, not less, correlated with their own. Moreover, the decision of where to cross-list may itself limit the effectiveness of international diversification. Sarkissian and Schill (2004)

argued that geographic, cultural, and industrial proximity are the main determinants of choosing where to cross-list. They found that contrary to the notion that firms maximize international portfolio diversification gains in listing abroad, cross-listing activity is more common across markets for which diversification gains are relatively low. The main finding in this paper, that adding foreign stocks to the set of available investment vehicles reduces international portfolio diversification gains, contrasts with this view. Finally, in consonance with our findings, Doidge, Karolyi, and Stulz (2009), Sarkissian and Schill (2016) and Fernandes and Giannetti (2014) have evaluated cross-listing waves in host markets, home markets and industry levels and remark an increase of foreign stocks available for trade.

3 Data: The rise of foreign stocks

To study the evolution of foreign stocks available for trade across borders, 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.[2] The use of research lists allows the inclusion of firms with relative small market capitalization and in some cases, from different stock exchanges within a country.[3] The use of 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.[4] We classify a stock as

[2]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 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. We follow their lead and use individual stocks as our unit of analysis. This also essentially helps us to separate the effect of domestic and foreign stocks when considering the diversification benefits.

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

[4]These research lists also include stocks in over the counter markets. When dealing with monthly

foreign if it is incorporated in a different country to the country where it is listed. We do so using the first two letters of the stock's ISIN number. A complete list of these ISIN codes is shown in the Appendix Table A.2.

All data are monthly and in US dollars, expressed at the current exchange rate.[5] The return-based data that we use are 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 correcting for stock splits.

The dataset used in this paper covers stocks traded in 42 countries, 22 developed and 20 emerging markets, over a period of 4 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 countries other than the 42 that we consider. In total, in our dataset there are 104 different home countries of the foreign stocks (see Appendix Table A.2).

Table 1 shows the prevalence of foreign firms in each country and their respective 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, more foreign stocks have become available for investors over time.[6] Both the number and the percentage of foreign firms have increased with time. Until the end of 1988, there were only 765 foreign firms (7% of the total). By 2018, however, this number rose to 23,183 (28% of the total). The impressive pace of this growth is depicted by the fact that the last decade of our sample has almost 30 times the number of foreign firms in the first decade. Foreign stocks are concentrated in a few countries. Large developed countries (US, UK, Germany) and small countries with large financial centers (Hong

returns, we exclude those stocks with returns over 200% or below -100%. We drop observations if market capitalization is zero or missing.

[5]We use U.S. dollars to have a unified currency and to easily compare returns across countries. 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.

[6]We use the date a stock first appears in Datastream in a given market. 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.

Table 1 Summary of sample by host country

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
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
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

Notes: 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 summarize the growth in numbers by categorizing our sample period into four decades spanning 1979 to 2018 both inclusive. All the time periods begin in January of the first year and end in December of the last year.

Kong, Singapore) account for the vast majority of foreign stocks in our sample. However, the growing numbers of foreign stocks are not fully explained 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.[7] 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 one. In the last 10 years of our sample, Germany appears to be the second largest destination for foreign stocks. In the same period, whereas the proportion of foreign stocks in our sample world market is 28%, countries like Hong Kong (87.8%) Germany (79.8%), Austria (72.5%) and Switzerland (69.6%) seem to be attracting them in large numbers. On 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. Foreign stocks have become more stable over time. In the 1980s there were countries with a relative large number of foreign stocks that did not remain in the sample for very long. 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.[8]

Since the stocks available for trade in the US form a considerable portion of our sample over the years, we additionally 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). While the growth rate for non-US foreign stocks is comparatively lower, the overall growth pattern for domestic stocks is comparable for the two cases. While the ratio of foreign to domestic stocks in the last sample month is roughly 1:3.5 for the full sample of stocks, the same ratio is 1:6 for non-US stocks.

To classify firms by industry, we group the firms according to their primary activity.

[7]Concentration ratio C"n" is calculated by adding the number of foreign stocks in the "n" countries with most foreign stocks and dividing by the total number of foreign stocks.

[8]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 if there is an alarming number of "dropouts" from the sample dataset.

We use Datastream Industrial Classification Levels, which are analogous to the Industry Classification Benchmark developed by FTSE.[9] 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 must be similar to accurately measure the country and industry effects.[10]

Similar to Table 1, we summarize the number of foreign stocks for each of the 35 industries in Appendix Table A.1. This table is structurally similar to Table 1, with both the number of foreign firms/observations and the total number of listed firms/observations (i.e. both domestic and foreign) categorized by industry, instead of country, for the four decades in the period 1979-2018. Both the number of foreign stocks and total stocks grow over the years in a homogeneous manner across the industries. The industrial proportion of foreign stocks to total stocks in our sample ranges from 2.5% for electricity to 14.4% for alternative energy & 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 shows the home country summary of foreign firms available for trade in our 42 markets. We group the 104 home countries that appear in our data based on the United Nations regions and economic classifications (for a complete list of these countries and their categorization, see Appendix Table A.2). 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 firms. The Caribbean is over-represented, presumably because tax benefits drives firms to incorporate in these countries. Panel B, meanwhile, shows that developed countries are home to the majority of foreign stocks. However, while the ratio of foreign firms based in developed to those based in developing economies rose considerable in the first three decades of our sample, it has declined in the last decade indicating that many more firms from emerging markets

[9] All firms that do not have an industrial classification are dropped. Moreover, those firms that belong to the "Unquoted Equity Classification" are also dropped.

[10] Although the total number of countries is 42, not all countries have data for each date, so that 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 are unchanged.

Table 2 Summary of foreign stocks by home country

Panel A:

UN Region of	Number of Firms			
Home Country	1979–1988	1989–1998	1999–2008	2009–2018
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

Panel B:

UN Economic	Number of Firms			
Classification	1979–1988	1989–1998	1999–2008	2009–2018
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

Notes: 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 to 2018. All the time periods begin in January of the first year and end in December of the last year.

are listing their stocks abroad than in the past.

We also examine the country- and industry-wise distribution of market values of foreign firms with respect to the total market value of all listed firms (i.e. both foreign and domestic stocks). These are shown in Appendix Tables A.3 and A.4, for countries and industries respectively. We find that the relative market values of the foreign stocks have risen across countries and industries in tandem with the increasing number of firms in Tables 1 (country) and A.1 (industry). As expected, this increasing trend of the market value of foreign stocks is practically homogeneous among all industries.[11] However, this increasing trend exhibits significant variation among countries, since the market values of foreign stocks in developed countries have risen more rapidly than those in developing markets. The large fraction of market value accounted for by foreign stocks implies that investors can easily invest in each industry, and potentially diversify across industries, using foreign stocks.

In Table 3, we report time-series mean returns, standard deviations and Sharpe 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. If foreign stocks provide significant diversification benefits across countries, then their equilibrium expected returns 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 USA, UK, Hong Kong and Switzerland, which have a lower Sharpe ratio for their foreign stocks than for their domestic stocks.[12] Thus, there seems to be some evidence indicating the existence of a diversification premium for foreign stocks.[13] Additionally, the correlation between country-wise mean returns of the domestic and the foreign stocks in Table 3 is much higher (0.72) than the correlation between industry-wise mean returns of the domestic and the foreign stocks in Appendix Table A.5 (0.16). Since a

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

[12] The exception is Germany, which is possibly due to the fact that many of the foreign stocks in German markets are European stocks which have fairly similar characteristics to the domestic German stocks (which provide no diversification benefits).

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

Table 3 Summary statistics for value-weighted country portfolio returns.

Country	DOMESTIC STOCKS			FOREIGN STOCKS		
	Mean Value-Weighted Return	Std Dev. Of Value-Weighted Return	Sharpe Ratio	Mean Value-Weighted Return	Std Dev. Of Value-Weighted Return	Sharpe Ratio
Argentina	1.58%	25.40%	6.21%	–	–	–
Austria	0.86%	6.80%	12.63%	1.10%	7.94%	13.88%
Australia	1.08%	6.74%	16.08%	1.05%	7.65%	13.70%
Belgium	0.93%	4.76%	19.57%	1.12%	5.85%	19.10%
Brazil	1.42%	13.15%	10.78%	–	–	–
Canada	0.86%	5.28%	16.28%	0.81%	10.00%	8.08%
Switzerland	0.89%	4.71%	18.84%	1.02%	6.60%	15.41%
Chile	2.07%	10.62%	19.47%	–	–	–
China	2.00%	16.06%	12.45%	–	–	–
Colombia	4.09%	27.71%	14.77%	5.38%	35.58%	15.13%
Germany	0.85%	5.52%	15.33%	0.71%	4.38%	16.31%
Denmark	1.17%	5.40%	21.65%	1.21%	8.51%	14.17%
Spain	1.24%	7.42%	16.67%	1.31%	13.51%	9.71%
Finland	1.19%	7.82%	15.26%	1.15%	11.91%	9.69%
France	1.07%	6.00%	17.75%	0.75%	6.89%	10.88%
UK	0.92%	5.01%	18.43%	0.70%	4.75%	14.83%
Greece	0.67%	10.33%	6.46%	–	–	–
Hong Kong	1.29%	8.35%	15.46%	0.79%	7.05%	11.16%
Hungary	1.14%	9.61%	11.86%	-1.07%	11.89%	-9.04%
Indonesia	1.36%	8.62%	15.80%	–	–	–
Ireland	1.02%	7.54%	13.57%	0.92%	9.94%	9.26%
India	1.11%	10.08%	11.05%	–	–	–
Italy	0.93%	7.09%	13.16%	1.71%	12.79%	13.38%
Japan	0.75%	5.91%	12.62%	1.00%	6.73%	14.80%
South Korea	1.10%	9.69%	11.34%	-0.53%	14.25%	-3.74%
Luxembourg	0.81%	5.71%	14.16%	0.37%	10.48%	3.50%
Mexico	1.00%	8.02%	12.50%	0.98%	14.01%	6.99%
Netherland	0.99%	5.23%	18.96%	0.90%	5.36%	16.76%
Norway	1.37%	7.61%	18.04%	0.81%	10.31%	7.85%
New Zealand	1.02%	6.43%	15.87%	0.92%	6.99%	13.23%
Phillippines	0.91%	9.11%	9.99%	–	–	–
Poland	1.31%	11.65%	11.28%	0.65%	8.68%	7.45%
Portugal	0.43%	6.21%	6.86%	0.73%	9.39%	7.76%
Romania	0.77%	12.21%	6.33%	2.77%	23.43%	11.84%
Russia	2.23%	13.60%	16.43%	–	–	–
Sweden	1.34%	6.91%	19.38%	0.74%	6.52%	11.38%
Singapore	1.00%	6.76%	14.73%	1.08%	7.88%	13.72%
Thailand	1.15%	9.22%	12.51%	–	–	–
Turkey	1.82%	15.10%	12.03%	–	–	–
Taiwan	0.78%	9.50%	8.16%	0.21%	6.71%	3.10%
USA	0.94%	4.23%	22.14%	0.42%	7.01%	5.93%
South Africa	1.16%	7.80%	14.92%	1.49%	8.29%	17.98%

Notes: This table summarizes the time-series averages of value-weighted portfolios' mean returns, standard deviation of returns and Sharpe ratios for each of our sample countries when all the stocks available for trade are grouped into domestic or foreign stocks. Mean value-weighted returns are obtained by value-averaging firm returns available in each country for every month, and then computing averages for each country across time. Value-weighted standard deviations are obtained by calculating standard deviations of monthly stock returns in each country, and then obtaining the average of these monthly standard deviations. The Sharpe ratio is the return per unit of total risk, which is presented as a proxy to measure 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.

higher correlation between the stock portfolios corresponds to a lower diversification potential, this implies that the introduction of foreign stocks seems to benefit more the industry diversification than the country diversification. Thus, we expect that the introduction of foreign stocks should increase industry diversification benefits relative to country diversification benefits.

4 Methodology

We have characterized the nature and the 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, i.e. (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. Bekaert, Hodrick, and Zhang (2009) argue that risk factor models can explain international stock comovements better than the dummy variable model does. Thus, next, we use the Faias and Ferreira (2017) methodology to confirm our results. Finally, to complement our analysis, we 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 the domestic and foreign stocks. In this way, we are able to segregate the pure foreign effects from the domestic effects of diversification.

4.1 Preliminary Analyses

In the Heston and Rouwenhorst (1994) framework, it is assumed that the returns depend on a global market factor along with the industry and country factors. Specifically, the

return of the i^{th} 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:

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

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 industry and country pure effects, I and C are the industry and country dummies which take value one if firm i belongs to that industry and country, or take value zero otherwise. All cross sectional regressions are estimated through weighted least squares.[14]

As is well known, when using dummy variables as regressors it is not possible to identify the effects of the dummies (industry and country in our case) if all the dummies in each category (one dummy for each industry and one dummy for each country) are included, 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 in 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 (Campa

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

and Fernandes, 2006; Bekaert, Hodrick, and Zhang, 2009). This is, in fact, the procedure we follow in this paper; we add 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.[15] In this way, the weighted sum of the pure industry and country effects add 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.

4.1.1 MADs

For each period t, we obtain estimated coefficients for the industry and country effects from the cross-sectional regressions previously described. In order to compare industry and country effects, we use the monthly time series of the coefficients obtained and follow Rouwenhorst (1999) to construct mean absolute deviation (MAD) measures: $MAD_{\beta}(t) = \sum_{j=1}^{35} \omega_j |\beta_t^j|$ and $MAD_{\gamma}(t) = \sum_{k=1}^{42} \omega_k |\gamma_t^k|$ where ω_j and ω_k are the industry and country weights respectively, and $|\beta_t^j|$ and $|\gamma_t^k|$ are the absolute 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 more dispersed are the industry/country returns around the world 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.

[15]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, i.e., the market value of those industries and countries as a fraction of the world market value.

4.1.2 MAD ratios

It is important to understand how the country effects stand in comparison to the global intercept α (Ferreira and Gama, 2005; Faias and Ferreira, 2017). By plotting the time-series of the MADs, we are able to visually represent the trends of the country and industry effects over the years. However, these plots do not provide insights into their economic significance. Thus, we compute the ratios of country to industry effects (c2i) and country to global effects (c2g) using the corresponding MADs and the intercept α. We plot both ratios to understand their relative changes over the years and to study the corresponding relational impacts on diversification. In other words, these ratios help us to economically interpret the country effects by taking either the industry or the global effects as a reference.

4.1.3 Sample selection

In our analysis, the number of countries does not remain constant through 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 less 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 accurately identify the country's coefficient econometrically. 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 were 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 selections.[16]

4.2 Alternative factor model

In the Heston and Rouwenhorst (1994) framework all of the industries and countries are assumed to have an equivalent influence on returns, which can be problematic (Bekaert, Hodrick, and Zhang, 2009; De Moor and Sercu, 2011). We apply the alternative factor model from Faias and Ferreira (2017) to check if the international diversification benefits of foreign stocks are robust to this specification bias.

Following Brooks and Del Negro (2006), in the factor model by Faias and Ferreira (2017), each of the countries' and industries' returns are introduced as respective factors. Thus, the monthly cross-sectional regressions for each month t take the form:

$$R_{ijk}(t) = \alpha_f(t) + \beta_{f_j}(t)R_j(t) + \gamma_{f_k}(t)R_k(t) + \varepsilon_{ijk}(t) \tag{3}$$

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, $\beta_{f_j}(t)$ and $\gamma_{f_k}(t)$ represent the industry and country factors respectively. $R_j(t)$ and $R_k(t)$ are the respective value-weighted returns of all stocks that belong to a particular industry j or country k for a given month t. Note that, 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. For robustness, we alternatively orthogonalize country returns with respect to industry returns.

4.2.1 Variance decomposition

Using the cross-sectional regressions for each month t given in Equation 3, we obtain estimated coefficients for industry and country effects. Since we have used portfolio returns to explain individual stock returns, the respective variations across the industries

[16]These results are available upon request.

and countries can be simply computed 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:

$$\sigma[R_{ijk}(t)] = \alpha_f(t) + \sqrt{{\beta_{f_j}}^2(t)}\sigma[R_j(t)] + \sqrt{{\gamma_{f_k}}^2(t)}\sigma[R_k(t)] + \sigma[\varepsilon_{ijk}(t)] \tag{4}$$

To compare the industry and country effects, we use the monthly time series of the coefficients obtained from Equation 3 and follow Faias and Ferreira (2017) to obtain standard deviation (SD) measures: $SD_{\beta(t)} = \sqrt{{\beta_{f_j}}^2(t)} \times \sigma[R_j(t)]$ and $SD_{\gamma(t)} = \sqrt{{\gamma_{f_k}}^2(t)} \times \sigma[R_k(t)]$. The $SD_{\beta(t)}$ and $SD_{\gamma(t)}$, thus, measure the industry and country effects respectively in terms of their dispersions, similar to the MADs measure in the Heston and Rouwenhorst (1994) approach. We plot 24-month moving averages of each of these industry and country effects to compare their respective trends over the years.

4.2.2 SD ratios

While the plots allow for graphical comparison of country and industry effects, they do not show the magnitude of their relationship. Moreover, to truly identify the influence of foreign stocks on international diversification, there is a need to examine if the trend seen by country effects over the years exists both with respect to industry effects and with respect to the global effects. Thus, we compute the ratios of country to industry effects (c2i) and country to global effects (c2g) using the corresponding SDs and plot them.

4.3 The country effects attributable to foreign stocks

What influence do the foreign stocks have on country effects? The methodology introduced in the previous sections does not permit to disentangle the marginal contribution of foreign stocks on country effects. To capture this, we 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. Whereas the return for a domestic stock is similar to Equation 1, the return for a foreign stock has a country effect γ_k^F that is potentially different from the country effect for domestic stocks γ_k^D. Equation 1 now becomes:

$$R_{ijk}(t) = \begin{cases} \alpha(t) + \beta_j^D(t) + \varepsilon_{ijk}(t) & \text{if it is domestic, and} \\ \alpha(t) + \beta_j^F(t) + \varepsilon_{ijk}(t) & \text{if it is foreign} \end{cases} \tag{5}$$

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

$$\begin{aligned} R_{ijk}(t) = \alpha(t) + \beta_1 I_1(t) + \beta_2 I_2(t) + ... + \beta_{35} I_{35}(t) \\ + \gamma_1 C_1(t) + \gamma_2 C_2(t) + ... + \gamma_{42} C_{42}(t) \\ + \rho_1 C_1 F(t) + \rho_2 C_2 F(t) + ... + \rho_{42} C_{42} F(t) \\ + \varepsilon_{ijk}(t) \end{aligned} \tag{6}$$

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 industry, country and foreign pure effects; and I and C are the industry and country dummies that take value one for the industry and country to which the firm i belongs. F is a dummy which takes value one if firm i is foreign, or value zero otherwise.[17]

The pure country effect attributable to domestic stocks is directly given 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, i.e.: $\gamma_k^F = \gamma_k^D + \rho_k$. 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 lock-step. On the other hand, a decreasing correlation indicates a decoupling of

[17]To avoid sample size bias, we require that there are at least 4 foreign stocks in a country in a given month.

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.

5 Results

5.1 Preliminary results: The relative importance of industry and country effects

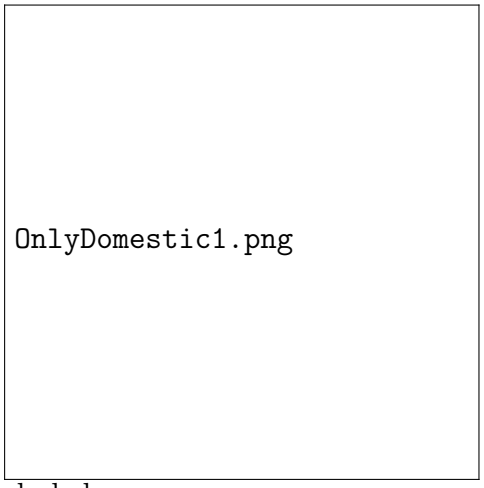
We use the same empirical approach throughout this section but we gradually vary our sample. In our first iteration, following what has been done in the literature (e.g. Campa and Fernandes, 2006), we omit foreign stocks from our sample, both in the cross-sectional regressions and in the calculation of the MADs. At each date, we use all available countries. In the second iteration, we include all the foreign stocks in our sample countries.

When foreign stocks are excluded from the sample, country factors dominate industry factors. This is the case for all the sample, except for a short period due to the bursting of the dot-com bubble (around the year 2000).[18] In Figure 1 Panel A 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 3 industries that drive these results. The industries of software and computer services, technology hardware and equipment, and telecommunications exhibit the largest coefficients during this short period. More generally, the picture qualitatively resembles the findings of prior literature, indicating that our sample and methodology are overall comparable. While country effects diminish their 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.

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

Figure 1 Pure Country and Industry Effects

Panel A: Only domestic Stocks.



Panel B: Foreign stocks included.

Panel C: Foreign stocks included only for the weights in MADs.

Notes: MADs (mean absolute deviations) are calculated following the methodology explained in Section 4.1.1. 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 at any stage. Panel B had foreign stocks and domestic stocks for host countries both combined to calculate the weights of the MADs and in the regressions. Lastly, Panel C considers betas from the cross-sectional regressions of domestic stocks, but introduces foreign stocks for calculating the weights used in computing the MADs.

The findings change drastically once foreign stocks are included in the sample (Figure 1 Panel B). The relative importance of pure country effects is 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 reduced.[19] In the last 10 years of our sample, the diversification benefits from foreign stocks continues to be noticeable, since the dispersions in country coefficients remain marginally below that 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 relative to domestic ones. These countries (US, Great Britain, Germany, Hong Kong, Singapore and Switzerland) also represent a large fraction of world market value (see Appendix Table A.3). 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 mechanically increase the country MADs. 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 Figure 1 Panels A and B, the samples vary based on whether foreign stocks are included or not 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. When the weights of the MADs are calculated including foreign firms, more globally integrated countries (i.e. those with more foreign listings) increase their weights and consequently country effects decrease. This is because, as we noted before, foreign stocks are defined at the country where they are listed (host country), not at the country of origin (home country). The second phenomenon arises by the selection of foreign firms that are available for trade. As shown in Section 3, more

[19]These results hold despite the fact that countries that are late entrants into our sample (mid-2000s) are emerging markets. Emerging markets exhibit larger country effects.

globally integrated firms have a higher propensity to make their stock available for trading 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 re-weighting them using market values of the sample that includes foreign listings. The results of this iteration are shown in Figure 1 Panel C. We observe that country effects decrease slightly relative to Panel A, but still dominate industry effects, except for the dot-com bubble period.

The results from Figure 1 Panel C, thus, 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 rebalancing of global market value to venues in which foreign stocks are relatively abundant for trade.

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) here to check if the relative decline of country effects persists also with respect to the global factor, so that the international diversification benefits truly disappear after the inclusion of foreign 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 pronounced with the c2i ratio (almost 1.5 times). Moreover, in Panel B, both ratios c2i and c2g stay below 1 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). In comparison, when excluding foreign stocks (Panel A), the c2i ratio remains persistently above one, and the c2g 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 i.e. domestic only and full (domestic + foreign) samples for both the MADs and MAD ratios.

Figure 2 Country Relative to Industry and Global Effects

Panel A: Only domestic stocks.

Panel B: Foreign stocks included.

Panel C: Foreign stocks included only for the weights in MADs.

Notes: We plot the ratios of 24-month moving averages of the monthly weighted absolute values (i.e. MADs) of the country betas to that of the industry betas (dashed line), and the same ratios of averages for country MADs to the global constant (solid line). Panel A shows the plots when foreign stocks are excluded from the analysis. Panel B has foreign stocks and domestic stocks for host countries to calculate the weights of the MADs and in the regressions. Lastly, Panel C considers betas from the cross-sectional regressions of domestic stocks, but introduces foreign stocks to calculate the weights used in computing the MADs.

Table 4 Summary of country, industry and global effects

	Average MADs			Average MAD Ratios	
	Country	Industry	Global	c2i	c2g
Panel A: Full sample period					
Domestic Stocks Only	0.027	0.022	0.033	1.281	0.849
Foreign + Domestic Stocks	0.020	0.023	0.032	0.884	0.640
Panel B: Decade-long subperiods					
(1979–1988)					
Domestic Stocks Only	0.029	0.025	0.034	1.157	0.869
Foreign + Domestic Stocks	0.026	0.027	0.033	0.972	0.782
(1989–1998)					
Domestic Stocks Only	0.030	0.019	0.030	1.643	1.062
Foreign + Domestic Stocks	0.022	0.020	0.028	1.105	0.788
(1999–2008)					
Domestic Stocks Only	0.023	0.027	0.034	0.996	0.691
Foreign + Domestic Stocks	0.015	0.028	0.033	0.553	0.453
(2009–2018)					
Domestic Stocks Only	0.025	0.018	0.035	1.377	0.780
Foreign + Domestic Stocks	0.018	0.020	0.035	0.923	0.562

Notes: This table shows the time-series average MADs (see Section 4.1.1) and MAD ratios (see Section 4.1.2) when the sample excludes the foreign stocks (domestic only) or includes them (foreign + domestic). We report MADs for the country, industry and global effects. For global effects, the MADs are replaced by absolute cross-sectional αs. 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.

These averages confirm our previous inferences drawn from Figures 1 and 2. In Panel A, when we consider the full 40 year sample period, although the country MADs are higher than the industry MADs when only the domestic stocks are analyzed, the inclusion of foreign stocks make the average of country effects significantly lower than the average of industry effects. This translates to a decline in the c2i (c2g) ratio from 1.28 (0.85) to 0.88 (0.64) with the inclusion of foreign stocks. Panel B (with each sample decade period separated) confirms our earlier findings that the dominance of industry effects has been largely driven by the trend seen beyond the year 1989 as the number of foreign stocks mushroomed in our sample host countries. Additionally, across these four decades,

while country MADs for the domestic only sample visibly dominates the same for the full (domestic + foreign) sample, results are reversed when we look at the industry MADs.

5.2 Alternative factor model: Industry versus country factors

We next apply Faias and Ferreira (2017) factor model to segregate the industry, country and global effects. In our first iteration, similar to Section 5.1, we omit foreign stocks from our sample to identify the importance of country effects in relation to industry effects when foreign stocks are ignored. Following this, in the second iteration, we introduce the foreign stocks in our sample to examine how it impacts the country versus industry effects seen in the previous iteration.

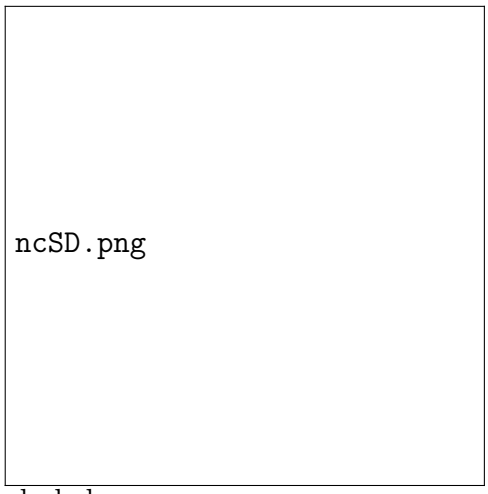
In Figure 3 Panel A (Panel B) we plot 24-month moving averages of industry and country SDs when foreign stocks are excluded (included). In Panel A, the country factors show persistent dominance over the industry factors over the years. In fact, the average magnitude of industry effects generally remains 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 (Figure 3 Panel B), industry SDs dominate country SDs.[20]

Many of the trends seen in this figure confirm our inferences from the MADs of the Heston and Rouwenhorst (1994) model in Figure 1. Similar to the trend seen with the MADs, country SDs are relatively higher for the domestic stocks sample (Panel A) when compared to the sample that includes the foreign stocks (Panel B), especially beyond 1990s. Across both Panels A and B, country factors gradually increase to dominate industry factors beyond mid-1990s, but in Panel B the industry factors regain their relative importance over time. These results confirm the inferences drawn from Figure 1 and show the significant international diversification benefits of foreign stocks. Especially during the dot-com bubble and the global financial crisis, the comparison of Panels A and B provide further insights on the diversification costs and benefits associated with foreign stocks. Relative to Panel A, the dispersion in industry coefficients for Panel B is

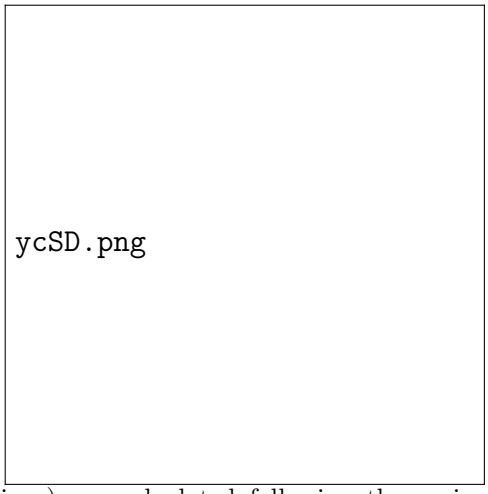
[20]Except during the global financial crisis and the years of the Brexit vote, when the country SDs briefly overtake industry SDs

Figure 3 Country and Industry Effects Using Factor Model

Panel A: Only domestic Stocks.



Panel B: Foreign stocks included.



Notes: SDs (standard deviations) are calculated following the variance decomposition explained in Section 4.3.1. 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 considers both the foreign and domestic stocks in the sample.

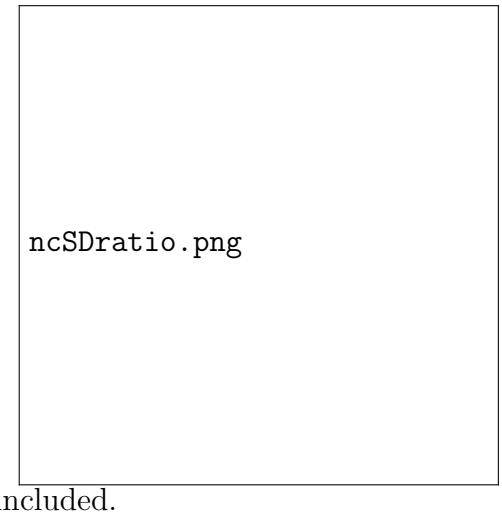
much greater in the aftermath of the dot-com bubble and the 2007-2008 crisis.[21]

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). On comparing Panels A and B in Figure 4, the lower relative prominence of country effects (especially for c2i) is clearly visible with the 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

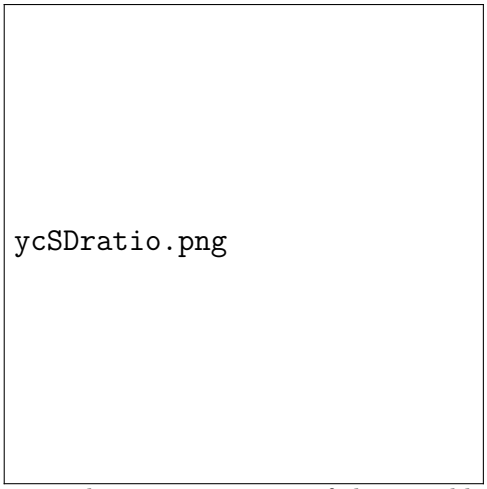
[21]Marcelo, Quirós, and Martins (2013) show the distinctive dominance of industry effects over country effects after volatile times. Our results corroborate the same for both the domestic-only and all stocks (foreign + domestic) samples.

Figure 4 Country Relative to Industry and Global Effects Using Factor Model

Panel A: Only domestic stocks.



Panel B: Foreign stocks included.



Notes: We plot the ratios of 24-month moving averages of the monthly standard deviations (i.e. SDs) of the country betas to that of the industry betas (dashed line), and the same ratios of averages for country SDs and the global factor (solid line). See Section 4.3.2 for more details. Panels A and B differ in the sample stocks introduced in the analyses. While Panel A shows the plots when foreign stocks are excluded, Panel B includes both foreign and domestic stocks together for host countries.

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

	Average SDs			Average SD Ratios	
	Country	Industry	Global	c2i	c2g
Panel A: Full Sample					
Domestic Stocks Only	7.076	4.626	4.668	1.503	1.498
Foreign + Domestic Stocks	2.983	4.176	2.638	0.736	1.176
Panel B: Decade-long subperiods					
(1979–1988)					
Domestic Stocks Only	2.184	4.055	3.221	0.553	0.655
Foreign + Domestic Stocks	1.426	3.598	2.251	0.397	0.626
(1989–1998)					
Domestic Stocks Only	8.960	4.551	5.202	1.989	1.750
Foreign + Domestic Stocks	2.917	3.326	2.223	0.900	1.354
(1999–2008)					
Domestic Stocks Only	10.841	5.038	6.304	2.170	1.882
Foreign + Domestic Stocks	4.001	5.276	3.258	0.802	1.253
(2009–2018)					
Domestic Stocks Only	5.369	4.753	3.658	1.115	1.542
Foreign + Domestic Stocks	3.285	4.394	2.748	0.782	1.337

Notes: This table shows the time-series average SDs (see Section 4.3.1) and SD ratios (see Section 4.3.2) when the sample excludes the foreign stocks (domestic only) or includes them (foreign + domestic). We report SDs for the country, industry and global effects. The ratio 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.

vote years). The c2i ratio of SDs stays below 1 in Panel B indicating that diversification potential across industries consistently outpaces that across countries. When excluding foreign stocks (Panel A), however, the c2i ratio is 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 the Brexit vote.[22]

Table 5 summarizes the time-series averages for both the SDs and SD ratios using the domestic-only sample and the all stocks (domestic + foreign) sample. These

[22]In unreported analysis, we run the factor model on a sub-sample of Non-European countries, and find that this recent upward trend disappears. Meanwhile, for this sub-sample, in the pre-Brexit period there is no considerable change in the magnitudes of the country and industry effects, as well as their ratios.

averages confirm our previous results from Table 4. As before, with the full 40-year sample period (Panel A), the country average SDs are higher than and industry ones when only the domestic stocks are analyzed. However, when the foreign stocks are included, the magnitude of country effects significantly becomes lower than the magnitude of industry effects. The declines in the c2i and c2g SD ratios with the inclusion of foreign stocks are also qualitatively similar to that seen for the MAD ratios in Table 4. Furthermore, the diversification benefits seen from the ratios in Table 5 are considerably more pronounced with the use of the factor 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 results in a decline of the c2i ratio from 1.5 to 0.74 when the foreign stocks are introduced in the sample. Across each of the four decades (Panel B), both the c2i and c2g ratios decrease with the inclusion of foreign stocks. 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 the Brexit vote may have negatively influenced this diversification potential.

5.3 Examining the country effects of foreign stocks

We plot the cross-sectional correlation of country effects attributable to the 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, domestic and foreign stocks had country effects that tended to move in lock-step, which is not the case in later years.

The wedge between γ_k^D and γ_k^F is given by $\rho_k \equiv \gamma_k^F - \gamma_k^D$. 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 an 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. The plot remains qualitatively similar even when the Faias and Ferreira (2017) factor model is used instead of the Heston and Rouwenhorst (1994) model within the framework specified in Section 4.2.

As shown in Errunza, Hogan, and Hung (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 to achieve international diversification. Thus, as globalization and integration move forward, these foreign-listed firms become more and more similar to the global market portfolio. An additional reason might lie in changes in the behavior of firms themselves, which is then priced into returns. For example, as argued by Doidge, Karolyi, and Stulz (2009) and Karolyi (2006), firms that decide to be listed abroad do so to overcome barriers to international investment, access global investors and bring greater visibility and credibility. Thus, foreign stocks are increasing their exposure to global risk factors and becoming more similar to the world market portfolio. Again, as globalization and integration move forward, these foreign-listed firms also become more and more similar to the global market portfolio. Finally, stocks listed overseas might do so to increase their financing capacity, to reach global investors and to become larger. According to Bekaert, Hodrick, and Zhang (2009), "large growth stocks are more correlated across countries than are small value stocks, and the difference has increased over time", which reinforces the results we find.

6 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 international the equity portfolio composition and their risk management. The literature on country and industry effects has not explored

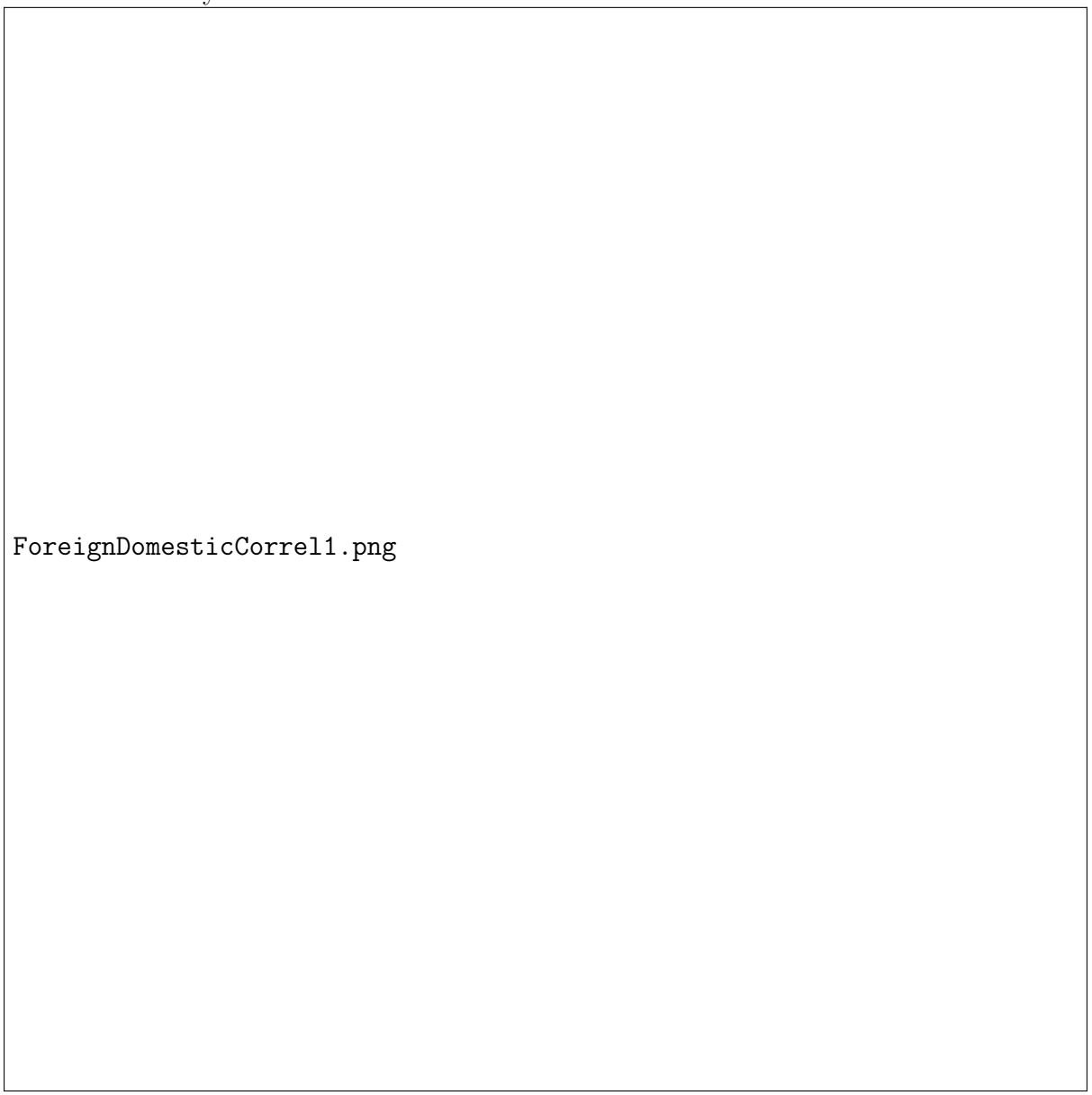
the international diversification benefits from domestic investments that include foreign stocks. In fact, much of the literature restricts itself to purely domestic stocks when examining international diversification benefits. We thus address this gap in the literature by using a more comprehensive dataset that includes foreign stocks. Our analysis reveals that the relative importance of industry and country effects depend heavily on the inclusion of foreign stocks in investment portfolios.

Echoing the findings in Errunza, Hogan, and Hung (1999), 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 an important effect of foreign stocks on the country and industry effects relationship, but from the 1990s onward, industry effects gain in importance relative to country effects. This shift in importance is mainly driven by the presence of foreign stocks since we show that an internationally diversified portfolio that does not include foreign securities still has the characteristics that country shocks dominate industry effects. We can, thus, conclude that the growth in foreign stocks has contributed significantly towards global market integration that has led to the decline in the dominance of country effects relative to industry effects.

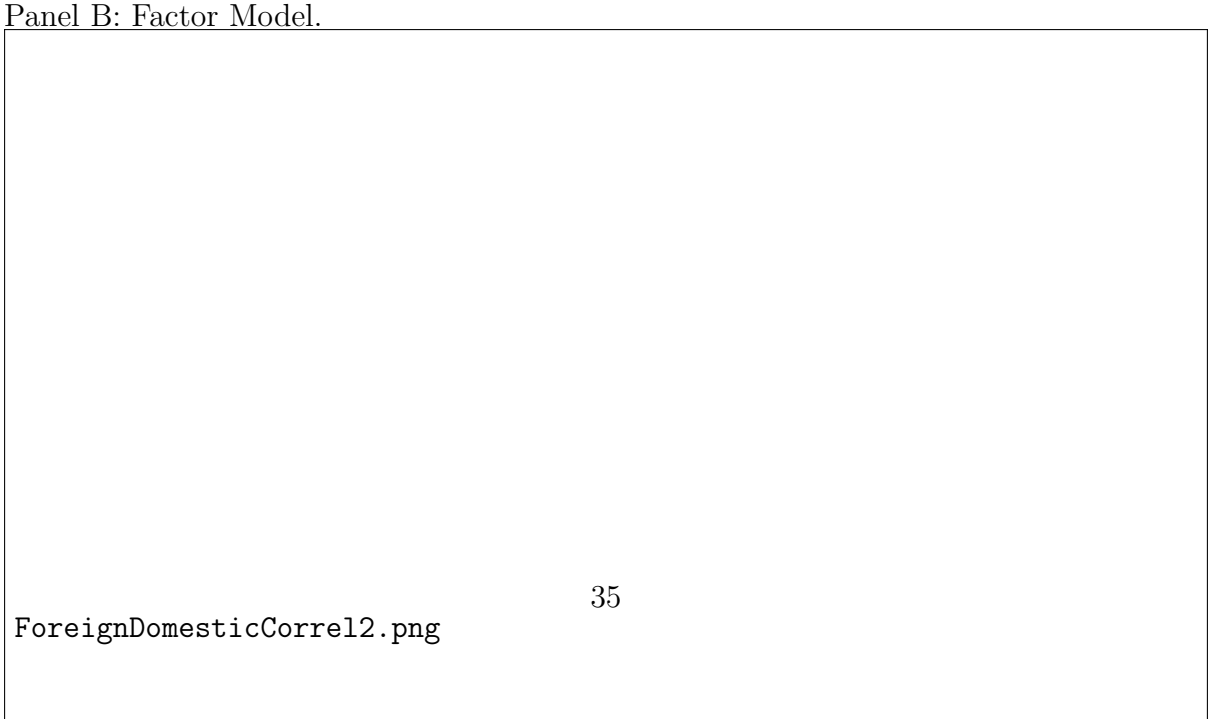
Most academic research on the importance of industry and country effects has implicitly disregarded foreign securities by using databases in which they are not included. Given that foreign stocks are available to investors, the question of how they affect diversification possibilities has practical relevance. Our evidence suggests that international diversification is becoming less important than diversification across industries.

Figure 5 Correlation between γ_k^D and γ_k^F

Panel A: Dummy Variables Model.



Panel B: Factor Model.



References

Baca, Sean P, Brian L Garbe, and Richard A Weiss, 2000, The rise of sector effects in major equity markets, *Financial Analysts Journal* 56, 34–40.

Baele, Lieven, and Koen Inghelbrecht, 2009, Time-varying integration and international diversification strategies, *Journal of Empirical Finance* 16, 368–387.

Bai, Ye, and Christopher J Green, 2010, International diversification strategies: Revisited from the risk perspective, *Journal of Banking and Finance* 34, 236–245.

Bekaert, Geert, Robert J Hodrick, and Xiaoyan Zhang, 2009, International stock return comovements, *Journal of Finance* 64, 2591–2626.

Bena, Jan, Miguel A Ferreira, Pedro Matos, and Pedro Pires, 2017, Are foreign investors locusts? The long-term effects of foreign institutional ownership, *Journal of Financial Economics* 126, 122–146.

Brooks, Robin, and Marco Del Negro, 2004, The rise in comovement across national stock markets: market integration or it bubble?, *Journal of Empirical Finance* 11, 659–680.

——— , 2006, Firm-level evidence on international stock market comovement, *Review of Finance* 10, 69–98.

Campa, José Manuel, and Nuno Fernandes, 2006, Sources of gains from international portfolio diversification, *Journal of Empirical Finance* 13, 417–443.

Chan, Kalok, Vicentiu Covrig, and Lilian Ng, 2005, What determines the domestic bias and foreign bias? Evidence from mutual fund equity allocations worldwide, *Journal of Finance* 60, 1495–1534.

Chen, Jianguo, Andrea Bennett, and Ting Zheng, 2006, Sector effects in developed vs. emerging markets, *Financial Analysts Journal* 62, 40–51.

Christoffersen, Peter, Vihang Errunza, Kris Jacobs, and Hugues Langlois, 2012, Is the potential for international diversification disappearing? A dynamic copula approach, *Review of Financial Studies* 25, 3711–3751.

De Moor, Lieven, and Piet Sercu, 2011, Country versus sector factors in equity returns: The roles of non-unit exposures, *Journal of Empirical Finance* 18, 64–77.

Doidge, Craig, G Andrew Karolyi, and René M Stulz, 2009, Has new york become less competitive than london in global markets? Evaluating foreign listing choices over time, *Journal of Financial Economics* 91, 253–277.

Doidge, Craig, G Andrew Karolyi, and Rene M Stulz, 2010, Why do foreign firms leave us equity markets?, *Journal of Finance* 65, 1507–1553.

Eiling, Esther, Bruno Gerard, Pierre Hillion, and Frans A de Roon, 2012, International portfolio diversification: Currency, industry and country effects revisited, *Journal of International Money and Finance* 31, 1249–1278.

Errunza, Vihang, Ked Hogan, and Mao-Wei Hung, 1999, Can the gains from international diversification be achieved without trading abroad?, *Journal of Finance* 54, 2075–2107.

Faias, José A, and Miguel A Ferreira, 2017, Does institutional ownership matter for international stock return comovement?, *Journal of International Money and Finance* 78, 64–83.

Fernandes, Nuno, and Miguel A Ferreira, 2008, Does international cross-listing improve the information environment, *Journal of Financial Economics* 88, 216–244.

Fernandes, Nuno, and Mariassunta Giannetti, 2014, On the fortunes of stock exchanges and their reversals: Evidence from foreign listings, *Journal of Financial Intermediation* 23, 157–176.

Ferreira, Miguel A, and Paulo M Gama, 2005, Have world, country, and industry risks changed over time? An investigation of the volatility of developed stock markets, *Journal of Financial and Quantitative Analysis* 40, 195–222.

Griffin, John M, and G Andrew Karolyi, 1998, Another look at the role of the industrial structure of markets for international diversification strategies, *Journal of Financial Economics* 50, 351–373.

Grubel, Herbert, 1968, Internationally diversified portfolios: Welfare gains and capital flows, *American Economic Review* 58, 1299–1314.

Hail, Luzi, and Christian Leuz, 2009, Cost of capital effects and changes in growth expectations around us cross-listings, *Journal of Financial Economics* 93, 428–454.

Heston, Steven, and Geert K. Rouwenhorst, 1994, Does industrial structure explain the benefits of international diversification?, *Journal of Financial Economics* 36, 3–27.

Karolyi, G Andrew, 2006, The world of cross-listings and cross-listings of the world: Challenging conventional wisdom, *Review of Finance* 10, 99–152.

Levy, Haim, and Marshall Sarnat, 1970, International diversification of investment portfolios, *American Economic Review* pp. 668–675.

Marcelo, José Luis Miralles, José Luis Miralles Quirós, and José Luís Martins, 2013, The role of country and industry factors during volatile times, *Journal of International Financial Markets, Institutions and Money* 26, 273–290.

Markowitz, Harry M., 1952, Portfolio selection, *Journal of Finance* 7, 77–91.

Phylaktis, Kate, and Lichuan Xia, 2006, Sources of firms' industry and country effects in emerging markets, *Journal of International Money and Finance* 25, 459–475.

Portes, Richard, and Helene Rey, 2005, The determinants of cross-border equity flows, *Journal of International Economics* 65, 269–296.

Rouwenhorst, Geert K., 1999, European equity markets and the EMU, *Financial Analysts Journal* pp. 27–34.

Rowland, Patrick F, and Linda L Tesar, 2004, Multinationals and the gains from international diversification, *Review of Economic Dynamics* 7, 789–826.

Sarkissian, Sergei, and Michael J Schill, 2004, The overseas listing decision: New evidence of proximity preference, *Review of Financial Studies* 17, 769–809.

——— , 2016, Cross-listing waves, *Journal of Financial and Quantitative Analysis* 51, 259–306.

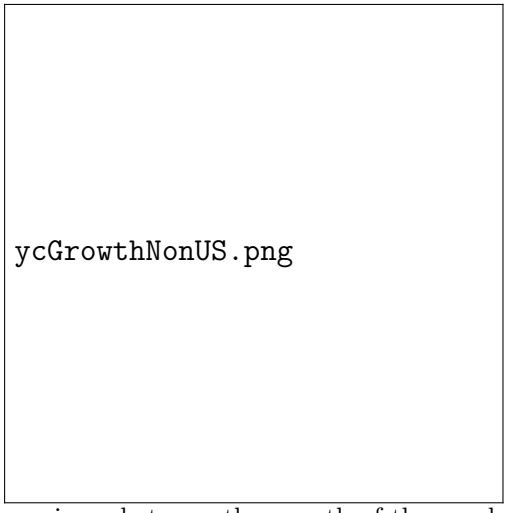
Soriano, Pilar, and Francisco Climent, 2006, Region vs. industry effects and volatility transmission, *Financial Analysts Journal* 62, 52–64.

Appendix: Supplementary Figures and Tables

Figure A.1 Growth Comparisons: Domestic versus Foreign Stocks

Panel A: All Stocks.

Panel B: Non-US Stocks



Notes: This figures draws comparisons between the growth of the number of foreign stocks (solid line) and domestic stocks (dashed line) across the months for our sample period (January 1979 - December 2018). Panel A shows the plots when all the 42 countries in our sample are included. Panel B leaves out US stocks to examine if the Non-US stocks follow similar trends as those in Panel A. We perform this analysis because the stocks available for trade in the US form a significantly large portion of our data.

Table A.1 Summary of sample by industry

Industry	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
Aerospace & Defense	8	92	21	191	110	391	161	462	442	8,181	1,333	14,398	4,804	25,530	5,967	26,242
Alternative Energy & Oil Equipment	16	92	58	360	372	1,032	725	1,708	1,284	7,512	3,448	20,752	14,980	56,892	32,914	98,895
Automobiles & Parts	17	250	103	821	210	1,156	416	1,540	1,073	16,214	5,790	59,728	12,528	93,546	16,761	105,790
Banks	41	701	220	2,354	663	3,708	821	3,917	2,708	40,280	13,193	152,338	34,055	244,970	29,441	219,145
Beverages & Tobacco	14	170	63	494	178	754	284	905	618	10,316	3,879	36,570	8,859	54,045	10,852	54,920
Chemicals	14	372	102	1,309	301	1,944	477	2,455	647	26,395	6,116	96,960	14,430	147,551	19,907	179,244
Construction & Materials	30	569	107	1,661	331	2,475	674	3,040	1,575	35,954	6,345	129,979	14,378	185,486	26,035	217,774
Electricity	8	214	51	636	215	1,292	388	1,632	533	21,562	2,147	40,425	8,857	81,692	13,526	92,334
Electronic & Electrical Equipment	20	548	115	1,568	474	2,546	630	3,066	1,051	37,194	5,838	108,724	20,992	181,873	26,967	212,637
Financial Services	34	645	148	2,474	804	5,530	1,529	7,829	1,764	35,381	8,384	145,223	30,849	289,575	54,428	407,676
Food & Drug Retailers	5	109	22	315	95	523	169	633	243	8,172	1,161	23,166	4,445	35,575	6,904	41,094
Food Producers	41	429	110	1,384	326	2,079	633	2,620	2,309	28,134	7,716	100,715	14,009	146,352	26,310	169,953
Forestry & Paper	10	94	43	348	110	511	149	530	678	6,406	2,178	25,530	5,038	35,064	6,406	35,738
Gas, Water & Multiutilities	4	128	34	321	136	536	229	666	272	11,788	1,510	23,508	6,473	35,009	8,854	37,639
General Industrials	31	239	103	667	175	817	269	966	2,026	16,724	6,566	50,176	9,242	59,013	11,350	60,827
General Retailers	17	402	79	1,324	442	2,282	731	2,762	747	26,456	4,727	89,969	18,948	151,813	27,661	169,067
Health Care Equipment & Services	10	223	52	864	483	1,766	687	2,247	668	14,664	2,638	52,659	20,959	114,019	24,501	124,580
Household Goods & Home Construction	14	328	55	878	197	1,236	327	1,437	638	23,585	3,197	64,799	10,030	89,527	13,918	93,905
Industrial Engineering	26	658	105	1,796	350	2,541	629	3,080	1,861	47,233	6,026	136,696	13,771	180,770	25,564	215,233
Industrial Metals & Mining	20	281	109	982	432	1,784	664	2,172	1,323	16,059	6,124	70,036	18,283	119,258	31,833	156,031
Industrial Transportation	13	241	84	814	317	1,240	532	1,512	950	15,342	4,281	58,459	13,747	80,720	25,690	97,258
Leisure Goods	9	135	50	428	170	764	275	1,008	344	9,429	3,023	29,692	9,305	53,231	12,021	60,948
Life Insurance	8	71	31	177	90	295	135	400	385	5,734	1,663	12,273	4,788	18,393	6,117	23,451
Media	16	292	97	981	533	2,246	709	2,637	826	18,444	4,787	62,206	24,758	139,711	27,174	149,184
Mining	87	543	251	1,629	1,401	3,938	2,776	6,111	6,807	23,846	17,161	121,750	57,600	225,229	137,262	398,366
Non-life Insurance	13	213	59	508	187	670	269	757	315	14,974	2,905	39,671	10,070	43,202	11,240	38,728
Oil & Gas Producers	43	349	158	1,052	770	2,282	1,253	3,030	2,894	24,379	9,244	67,997	30,035	127,936	55,782	167,842
Personal Goods	20	414	93	1,419	316	1,972	571	2,424	1,009	24,231	5,215	102,366	16,930	144,862	28,648	167,815
Pharmaceuticals & Biotechnology	19	229	129	1,038	789	2,441	1,164	3,489	865	13,736	6,011	63,393	36,136	161,871	43,627	206,452
Real Estate Investment & Services	53	419	138	1,453	415	2,250	825	3,027	2,876	24,989	9,843	99,191	18,957	149,144	36,550	183,935
Software & Computer Services	10	243	131	1,520	1,146	4,372	1,237	4,630	108	11,842	4,824	72,290	48,566	267,922	42,034	262,482
Support Services	21	446	92	1,339	524	2,576	729	3,052	1,184	28,010	4,790	84,167	20,276	157,734	27,314	178,551
Technology Hardware & Equipment	18	260	148	1,036	730	2,570	885	2,843	798	15,345	6,815	63,581	37,305	180,031	34,846	188,767
Telecommunications	18	105	109	636	393	1,309	424	1,286	601	7,067	5,857	28,299	17,111	68,091	15,105	56,788
Travel & Leisure	37	403	126	1,372	515	2,329	807	2,732	1,709	25,549	8,360	90,700	24,552	151,355	35,159	162,109
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

Notes: 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 35 industry classification using the Datastream Industrial Classification Levels for our sample. We summarize the growth in foreign stocks for the four decades spanning 1979 to 2018 both inclusive. All the time periods begin in January of the first year and end in December of the last year.

Table A.2 Summary of foreign stocks by origin: Country-wise

Origin/ Home Country	ISIN	Number of Firms 1979-1988	1989-1998	1999-2008	2009-2018	UN Region	UN Economic Classification
UAE	AE			2	4	Western Asia	Developing economy
Antigua and Barbuda	AG		1	1	1	Caribbean	Developing economy
Anguilla	AI			6	7	Caribbean	Developing economy
Netherlands Antilles	AN	5	16	10	16	Caribbean	Developed economy
Argentina	AR		2	8	25	South America	Developing economy
Austria	AT	0	28	83	117	Eastern Europe	Developed economy
Australia	AU	18	73	667	1,197	Oceania	Developed economy
Bangladesh	BD	1				Southern Asia	Developing economy
Barbados	BB			2	2	Caribbean	Developing economy
Belgium	BE	3	54	110	166	Western Europe	Developed economy
Bulgaria	BG				4	Eastern Europe	Developed economy
Bahrain	BH			2	3	Western Asia	Developing economy
Bermuda	BM	122	526	1138	1,508	North America	Developing economy
Brazil	BR		0	36	92	South America	Developing economy
Bahamas	BS	2	5	7	7	Caribbean	Developing economy
Botswana	BW		1	1	3	Southern Africa	Developing economy
Belize	BZ	1	2	6	6	Central America	Developing economy
Canada	CA	136	477	2124	4,077	North America	Developed economy
Switzerland	CH	9	56	261	369	Western Europe	Developed economy
Ivory Coast	CI		1	2	3	Western Africa	Developing economy
Cook Islands	CK	1	1	1	1	Oceania	Developing economy
Chile	CL		0	6	9	South America	Developing economy
Cameroon	CM	1	1	1	1	Middle Africa	Developing economy
China	CN		49	240	715	Eastern Asia	Developing economy
Colombia	CO		0	1	2	South America	Developing economy
Costa Rica	CR			2	2	Central America	Developing economy
Serbia	CS		10	8	5	Eastern Europe	Economy in transition
Curaçao	CW	1	1	1	1	Caribbean	Developing economy
Cyprus	CY		3	38	60	Southern Europe	Developed economy
Czech Republic	CZ		4	8	10	Eastern Europe	Developed economy
Germany	DE	15	134	304	802	Western Europe	Developed economy
Denmark	DK	2	14	43	110	Northern Europe	Developed economy
Estonia	EE		3	6	11	Northern Europe	Developed economy
Egypt	EG			1		Northern Africa	Developing economy
Spain	ES	3	27	136	218	Southern Europe	Developed economy
Finland	FI	0	23	72	133	Northern Europe	Developed economy
Falkland Islands	FK			2	3	South America	Unclassified
Faroe Islands	FO			4	8	Northern Europe	Unclassified
France	FR	18	112	385	578	Western Europe	Developed economy
Gabon	GA	1	1	1	2	Middle Africa	Developing economy
UK	GB	19	148	992	1,384	Western Europe	Developed economy
Georgia	GE				1	Eastern Europe	Economy in transition
Guernsey	GG		1	43	90	Western Europe	Unclassified
Gibraltar	GI			5	12	Southern Europe	Developed economy
Greece	GR	0	11	56	68	Southern Europe	Developed economy
Hong Kong	HK	0	37	137	245	Eastern Asia	Developing economy
Croatia	HR			2	2	Eastern Europe	Developed economy
Hungary	HU		7	21	18	Eastern Europe	Developed economy
Indonesia	ID		1	43	99	South-Eastern Asia	Developing economy
Ireland	IE	35	60	175	178	Western Europe	Developed economy
Israel	IL	16	86	193	267	Western Asia	Developing economy
Isle of Man	IM		1	50	90	Western Europe	Unclassified
India	IN		3	0	2	Southern Asia	Developing economy
Iceland	IS			1	2	Northern Europe	Developed economy
Italy	IT	2	56	213	303	Southern Europe	Developed economy
Jersey	JE	8	15	82	184	Western Europe	Unclassified
Japan	JP	10	149	426	931	Eastern Asia	Developed economy
Saint Kitts and Nevis	KN	0	1		15	Caribbean	Developing economy
South Korea	KR		2	9	1	Eastern Asia	Developing economy
Kuwait	KW			1	2263	Western Asia	Developing economy
Cayman Islands	KY	21	96	783	9	Caribbean	Developing economy
Liechtenstein	LI	3	2	6	10	Western Europe	Developed economy
Liberia	LR	1	6	9	7	Western Africa	Developing economy
Lithuania	LT				168	Northern Europe	Developed economy
Luxembourg	LU	7	37	93	6	Western Europe	Developed economy
Morocco	MA		2	4	4	Northern Africa	Developing economy
Monaco	MC	1	3	4	83	Western Europe	Developed economy
Marshall Islands	MH		2	34	11	Oceania	Developing economy
Malta	MT				18	Southern Europe	Developed economy
Mauritius	MU			4	114	Eastern Africa	Developing economy
Mexico	MX	0	3	41	160	North America	Developing economy
Malaysia	MY	100	132	44	4	South-Eastern Asia	Developing economy
Namibia	NA		3	4	1	Southern Africa	Developing economy
Nigeria	NG			1	388	Western Africa	Developing economy
Netherlands	NL	14	112	286	173	Western Europe	Developed economy
Norway	NO	2	36	90	131	Northern Europe	Developed economy
New Zealand	NZ	0	11	64	9	Oceania	Developed economy
Panama	PA	3	5	7	5	Central America	Developing economy
Peru	PE			3	16	South America	Developing economy
Papua New Guinea	PG	4	11	13	46	Oceania	Developing economy
Philippines	PH	2	3	7	25	South-Eastern Asia	Developing economy
Poland	PL		1	6	21	Eastern Europe	Developed economy
Puerto Rico	PR	6	10	19	31	Caribbean	Developing economy
Portugal	PT	0	9	26	2	Southern Europe	Developed economy
Romania	RO		0	2	13	Eastern Europe	Developed economy
Russia	RU		0	4	1	Eastern Europe	Economy in transition
Seychelles	SC				313	Eastern Africa	Developing economy
Sweden	SE	11	64	190	232	Northern Europe	Developed economy
Singapore	SG	4	11	121	1	South-Eastern Asia	Developing economy
Slovenia	SI			3	4	Southern Europe	Developed economy
Slovakia	SK			1	1	Eastern Europe	Developed economy
Senegal	SN		3	1	114	Western Africa	Developing economy
Swaziland	SZ		1		53	Southern Africa	Developing economy
Turks and Caicos	TC		1	2	13	Caribbean	Developing economy
Thailand	TH	0	2	43	4084	South-Eastern Asia	Developing economy
Turkey	TR	0	1	38	2	Southern Europe	Developing economy
Taiwan	TW	0	1	11	282	Eastern Asia	Developing economy
USA	US	188	796	4411	1	North America	Developed economy
Venezuela	VE		1	2	1	South America	Developing economy
Virgin Islands (British)	VG		26	178	1	Caribbean	Developing economy
Virgin Islands (US)	VI			1		Caribbean	Developing economy
South Africa	ZA	48	84	150	182	Southern Africa	Developing economy
Zambia	ZM		1	1	3	Southern Africa	Developing economy
Zimbabwe	ZW	1	7	6	7	Southern Africa	Developing economy
Total		765	3,396	14,700	23,183		

Notes: 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 to 2018. All the time periods begin in January of the first year and end in December of the last year.

Table A.3 Summary statistics for market valuation by host country

Host Country	Average Monthly Market Values in Thousands ($)							
	1979–1988		1989–1998		1999–2008		2009–2018	
	Foreign	Total	Foreign	Total	Foreign	Total	Foreign	Total
Argentina	–	–	0	21,786	210,259	224,665	321,645	369,852
Austria	8,035	3,690	42,883	71,139	256,354	463,059	1,896,661	2,014,923
Australia	1,040	33,791	66,433	235,829	72,159	757,809	51,461	1,289,831
Belgium	127,237	176,887	382,265	1,390,503	613,296	2,704,912	64,533	1,217,323
Brazil	–	–	0	639,994	0	462,353	0	1,285,078
Canada	2,699	50,777	33,946	231,239	24,195	824,392	107,677	1,807,134
Switzerland	2,276	49,798	1,696,483	2,684,367	8,371,376	9,599,098	10,300,000	11,800,000
Chile	–	–	0	90,874	5	100,456	1,092,832	934,491
China	–	–	0	79,553	0	924,842	0	5,218,182
Colombia	–	–	0	12,114	0	29,028	1,349,317	1,381,207
Germany	150,026	108,631	652,680	1,749,449	5,947,154	7,921,498	4,898,437	6,774,192
Denmark	1,159	6,376	5,636	56,596	32,847	178,014	52,373	335,173
Spain	0	26,769	35,863	155,218	603,282	1,169,940	659,199	1,346,172
Finland	0	5,171	391	38,245	42,116	276,470	57,974	303,874
France	966	47,065	2,386,187	2,812,379	3,462,331	4,976,379	1,724,922	3,607,569
UK	441,591	716,939	2,103,396	3,282,434	7,149,640	9,765,779	1,863,600	4,634,124
Greece	0	3,069	0	17,335	5,385	130,539	2,842	59,287
Hong Kong	8,646	28,521	105,567	257,484	1,213,730	1,671,094	3,439,583	4,961,015
Hungary	–	–	0	3,563	1,020	23,503	802,404	825,449
Indonesia	–	–	0	44,521	0	74,043	0	378,707
Ireland	754	3,237	31,673	53,842	49,748	136,943	9,204	124,325
India	–	–	0	98,270	0	770,600	176	1,793,715
Italy	4,567	46,999	26,915	229,106	698,376	1,398,535	2,783,486	3,334,551
Japan	8,837	1,080,960	1,075,575	4,340,002	1,744,917	5,430,997	617,479	5,073,465
South Korea	0	10,641	15	118,888	169	453,864	1,523	1,168,106
Luxembourg	–	–	93,522	101,746	250,852	278,850	32,707	49,395
Mexico	116	715	25,450	148,825	46,882	278,515	142,754	486,151
Netherlands	52,060	83,015	565,598	1,120,635	1,650,440	2,625,900	272,987	868,413
Norway		3,800	3,641	35,347	27,024	170,308	42,848	286,467
New Zealand	3,733	5,733	15,351	30,300	142,863	172,181	208,539	269,527
Philippines	–	–	0	29,510	44,526	80,309	46,437	249,871
Poland	–	–	0	5,233	23,212	80,224	8,225	163,190
Portugal	0	3,822	0	22,023	80,578	145,237	102,255	168,715
Romania	–	–	0	280	16,556	13,574	1,096,521	1,115,602
Russia	–	–	9	22,180	3	361,868	1,361	648,920
Sweden	0	13,789	4,602	154,065	271,663	624,763	412,550	993,405
Singapore	11,589	21,868	66,985	200,996	44,618	279,438	429,166	886,030
Thailand	0	6,782	0	76,382	0	96,886	0	370,520
Turkey	0	2,848	242	23,647	230	103,324	263	222,887
Taiwan	0	56,271	0	195,568	0	422,315	20,079	799,884
USA	34,343	1,087,474	275,828	4,327,175	5,138,595	15,900,000	15,500,000	30,800,000
South Africa	4,477	41,416	26,389	183,498	97,251	322,307	352,543	796,506
Total	864,149	3,726,852	9,723,525	25,392,139	38,333,653	72,424,810	50,766,562	101,213,226

Notes: This table summarizes the average market valuation of foreign stocks and all listed stocks (foreign + domestic) available for trade in our sample host countries. For each country the total market values are computed on monthly basis, and then their averages in each of the decades are obtained. All the time periods begin in January of the first year and end in December of the last year. Last row represents the average monthly market valuations for the full sample.

Table A.4 Summary statistics for market valuation by industry

Host Country	Average Monthly Market Values in Thousands ($)							
	1979–1988		1989–1998		1999–2008		2009–2018	
	Foreign	Total	Foreign	Total	Foreign	Total	Foreign	Total
Aerospace & Defense	5,886	40,271	66,117	198,439	319,540	684,991	538,822	1,100,880
Alternative Energy & Oil Equipment	16,629	30,260	86,138	142,672	479,723	780,750	846,836	1,600,533
Automobiles & Parts	36,709	162,069	446,311	1,022,818	1,338,541	2,236,920	1,888,301	3,464,801
Banks	55,180	339,590	1,142,241	3,327,464	5,500,912	10,200,000	6,766,354	12,700,000
Beverages & Tobacco	25,647	77,990	546,228	1,055,914	1,350,371	2,306,451	1,875,185	3,537,378
Chemicals	19,730	147,597	411,803	995,275	904,356	1,704,997	1,183,538	2,625,712
Construction & Materials	2,809	88,047	106,339	541,493	322,950	950,660	573,820	1,817,650
Electricity	10,860	135,700	85,961	535,123	507,281	1,500,028	666,426	2,097,055
Electronic & Electrical Equipment	10,822	102,732	126,585	480,613	262,158	789,168	414,120	1,411,310
Financial Services	12,906	132,512	214,094	863,763	667,130	2,061,569	1,075,838	3,160,668
Food & Drug Retailers	392	33,888	31,986	215,845	407,909	855,900	376,534	1,056,171
Food Producers	11,794	90,923	266,433	708,786	600,073	1,314,217	954,571	2,432,394
Forestry & Paper	2,140	153,883	21,668	128,948	90,529	228,872	88,711	255,112
Gas, Water & Multiutilities	1,147	45,979	76,806	266,473	662,714	1,130,630	596,627	1,240,823
General Industrials	72,194	179,365	830,013	1,424,482	1,946,292	2,933,575	1,766,648	2,899,719
General Retailers	1,345	88,710	116,485	660,436	792,275	1,977,577	1,769,012	3,645,712
Health Care Equipment & Services	10,878	43,947	96,742	254,162	514,502	1,005,798	931,810	1,940,955
Household Goods & Home Construction	2,728	53,017	165,244	435,045	538,675	1,023,220	760,140	1,494,684
Industrial Engineering	12,938	110,913	148,789	694,798	351,158	1,033,143	826,658	2,331,761
Industrial Metals & Mining	10,906	69,861	117,281	383,175	536,319	1,133,021	764,679	1,765,289
Industrial Transportation	1,333	53,399	50,814	283,578	332,312	863,753	590,020	1,623,301
Leisure Goods	6,139	66,998	143,796	384,655	266,499	646,499	249,975	580,519
Life Insurance	10,128	35,935	86,907	233,808	619,497	1,117,923	723,738	1,562,119
Media	9,044	67,948	104,986	461,805	752,216	1,751,375	1,018,514	2,320,151
Mining	37,856	88,424	191,115	445,615	656,560	1,357,242	1,203,297	2,371,071
Non-life Insurance	3,718	84,718	231,207	602,660	1,383,107	2,063,396	1,148,279	1,914,992
Oil & Gas Producers	61,257	316,892	953,946	2,021,834	3,599,230	6,444,378	3,336,354	7,178,856
Personal Goods	13,558	62,365	199,101	572,412	737,240	1,386,688	1,482,294	2,776,033
Pharmaceuticals & Biotechnology	16,262	125,575	690,134	1,388,225	2,787,292	4,818,363	3,865,577	6,767,959
Real Estate Investment & Services	3,371	39,065	51,241	269,792	181,978	602,289	753,524	1,805,838
Software & Computer Services	911	102,672	222,560	595,202	1,909,641	3,465,679	3,456,228	5,665,596
Support Services	8,322	55,250	123,330	354,058	351,541	857,624	459,493	1,334,467
Technology Hardware & Equipment	12,103	83,401	354,859	877,801	2,564,361	4,447,747	2,798,814	4,759,763
Telecommunications	39,998	192,982	1,011,814	1,889,264	3,544,265	5,666,341	3,235,822	5,383,027
Travel & Leisure	6,644	80,146	142,496	506,724	493,310	1,161,829	1,219,886	2,597,635
Total	554,284	3,583,025	9,661,569	25,223,154	38,272,456	72,502,613	50,206,445	101,219,934

Notes: This table summarizes the average market valuation of foreign stocks and all listed stocks (i.e., Total = foreign + domestic) grouped into 35 industries. For each industry the total market values are computed on monthly basis, and then their averages in each of the decades are obtained. All the time periods begin in January of the first year and end in December of the last year.

Table A.5 Summary statistics for value-weighted industry portfolio returns

Industries	DOMESTIC STOCKS			FOREIGN STOCKS		
	Mean Value-Weighted Return	Std Dev. Of Value-Weighted Return	Sharpe Ratio	Mean Value-Weighted Return	Std Dev. Of Value-Weighted Return	Sharpe Ratio
Aerospace & Defense	1.09%	5.33%	20.39%	1.01%	6.44%	15.69%
Alternative Energy & Oil Equipments	0.80%	6.61%	12.17%	0.79%	6.80%	11.67%
Automobiles & Parts	0.83%	5.26%	15.73%	0.72%	7.23%	9.92%
Banks	1.13%	6.79%	16.58%	0.92%	7.07%	13.04%
Beverages & Tobacco	1.19%	4.97%	23.90%	1.34%	10.70%	12.54%
Chemicals	0.72%	5.43%	13.32%	0.77%	6.98%	11.03%
Construction & Materials	0.95%	6.36%	14.85%	0.87%	8.74%	9.98%
Electricity	1.01%	5.14%	19.57%	0.76%	4.98%	15.22%
Electronic & Electrical Equipment	0.83%	6.25%	13.25%	0.61%	6.23%	9.72%
Financial Services	0.98%	5.90%	16.55%	0.80%	6.12%	13.06%
Food & Drug Retailers	0.95%	4.63%	20.47%	0.84%	6.88%	12.21%
Food Producers	1.20%	5.95%	20.15%	1.01%	4.84%	20.91%
Forestry & Paper	0.63%	5.80%	10.84%	0.70%	6.56%	10.66%
Gas, Water & Multiutilities	0.96%	4.88%	19.67%	1.31%	13.78%	9.49%
General Industrials	1.02%	5.58%	18.36%	0.91%	5.88%	15.46%
General Retailers	0.81%	5.33%	15.18%	1.89%	12.12%	15.61%
Health Care Equipment & Services	1.09%	4.72%	23.07%	0.92%	5.26%	17.57%
Household Goods & Home Construction	0.90%	5.04%	17.93%	1.25%	8.33%	14.99%
Industrial Engineering	0.70%	6.44%	10.91%	0.85%	7.08%	11.96%
Industrial Metals & Mining	0.89%	7.27%	12.18%	0.58%	7.72%	7.48%
Industrial Transportation	0.85%	4.98%	17.00%	0.81%	7.44%	10.82%
Leisure Goods	0.74%	6.09%	12.12%	0.97%	8.23%	11.76%
Life Insurance	1.09%	5.84%	18.69%	1.63%	15.28%	10.68%
Media	0.93%	5.14%	18.08%	0.71%	8.64%	8.18%
Mining	1.26%	12.68%	9.93%	1.10%	8.96%	12.32%
Nonlife Insurance	0.97%	5.07%	19.07%	1.09%	9.58%	11.35%
Oil & Gas Producers	1.11%	7.04%	15.69%	0.96%	6.70%	14.39%
Personal Goods	0.89%	5.39%	16.54%	1.61%	9.66%	16.63%
Pharmaceuticals & Biothecnology	1.05%	4.19%	25.12%	1.09%	6.58%	16.59%
Real Estate Investment & Services	0.80%	5.79%	13.88%	0.72%	7.66%	9.42%
Software & Computer Services	0.85%	5.98%	14.20%	1.32%	12.74%	10.40%
Support Services	0.79%	5.22%	15.07%	0.81%	5.55%	14.54%
Technology Hardware & Equipment	1.01%	6.92%	14.60%	2.53%	35.11%	7.21%
Telecommunications	0.63%	4.94%	12.77%	1.44%	8.02%	18.01%
Travel & Leisure	1.10%	6.28%	17.46%	0.92%	14.85%	6.19%

Notes: This table summarizes the time-series averages of value-weighted portfolio returns' means, standard deviations and Sharpe ratios for each of our 35 industry classification with the stocks grouped into either domestic or foreign ones. Mean value-weighted returns are obtained by value-averaging firm returns available for each industry in a given month, and averaging these for each industry over time. Value-weighted standard deviations are obtained by computing monthly standard deviations of firm returns belonging to each industry, and then averaging these monthly standard deviations. Sharpe ratio represents the risk-adjusted return, calculated as average returns divided by average standard deviation for each industry.