Does Institutional Ownership Matter for International Stock Return Comovement?*

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Abstract

There has been a long dispute about the relative importance of country versus industry diversification. We test the hypothesis that institutional ownership affects the relative importance of country and industry effects in explaining stock returns worldwide. We find that industry effects become relatively more important than country effects as more institutions hold a larger share of a firms shares. Additionally, industry effects dominate country effects among stocks in the top quartile of ownership by institutions, especially by foreign-based ones. Our findings show that cross-border portfolio affect return variation across national stock markets and international diversification.

KEYWORDS: Stock return comovement, Diversification, Institutional ownership

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1 Introduction

The importance of geographical and sectoral breakdowns in portfolio management have changed in the last decade. Galati and Tsatsaronis (2003) addressed this question from the viewpoint of a manager at two different points in time, 1997 and 2001. He asked several managers what they felt to be the dominant factor at the time. Those who cited country factors shifted from 50% to 10%, whereas those who mentioned industry factors shifted from 20% to 75%. From a different perspective, Sonney (2009) notices that "...the issue of how financial research departments should be structured has become of critical importance. While there has been a general tendency over the last decade to switch from country-based to more sector-oriented structures, there is no consensus about which approach is best."

The dispute between geographic and sectoral stock selection has been a topic of debate in the academy for a longtime as well. Several studies show that country allocation plays a more relevant role in explaining stock return variation (Heston and Rouwenhorst (1994), Beckers, Connor, and Curds (1996), Griffin and Karolyi (1998) , Marsh and Pfleiderer (1997), Rouwenhorst (1999), Kuo and Satchell (2001), L'Her, Sy, and Tnani (2002), Hamelink, Harasty, and Hillion (2001), and De Moor and Sercu (2006), among many others). On the other hand, many argue that in more recent times industry allocation has become more relevant (Baca, Garbe, and Weiss (2000), Cavaglia, Brightman, and Aked (2000), Brooks and Catão (2000) and Eiling, Gerard, and de Roon (2004)). Furthermore, some also show that this was only a temporary phenomenon rather than a permanent structural change due to the TMT sector in the late nineties (Brooks and Del Negro (2004), Bekaert, Hodrick, and Zhang (2009) and Baele and Inghelbrecht (2009)). Campa and Fernandes (2006) analyze the determinants of country and industry specific factors and find that they are correlated with measures of economic and financial international integration and development. Global factors are explained by interest rates and exchange rates, industry factors are explained by R&D investments, mergers and acquisitions, and bankruptcies within industry while coun-

try factors are explained by differences in tax regimes, inflation rates, economic activity, legislation, and even natural catastrophes. Moerman (2008) shows that, for the euro area stock market, diversification over industries yields more efficient portfolios than diversification over countries, whereas Griffin and Karolyi (1998) find that emerging countries are less integrated at international level and traded-goods are on average more influenced by industrial factors than are non traded-goods industries. In the end, Stulz (2005) argues that "Although barriers to international investment have fallen sharply over the last 50 years, the impact of financial globalization has been limited – countries still matter a great deal."

Institutional investors play a crucial role in the world trade market and they have even been becoming more relevant. Friedman (1996) shows that aggregate institutional ownership increased from less than 10 percent in 1950 to over 50 percent in 1994 and Schwartz and Shapiro (1992) estimate that institutions account for 70 percent of trading volume in NYSE. International Monetary Fund (2005) reports that assets under management of institutions have tripled since the mid 1990s and they are amongst the major players in developed markets. In fact, Gonnard, Kim, and Ynesta (2008) reports that institutional investors have been gaining in importance in OECD countries – 6.6 per cent yearly growth in assets over the period 1995-2005 which amounts to more than US$ 40.3 trillion in 2005, corresponding to 162.6 per cent of GDP. Moreover, Khorana, Servaes, and Tufano (2005) states that there is a surge in emerging markets countries as well. Bennett, Sias, and Starks (2003) suggest that institutional investors' informational advantages are greatest in smaller-capitalization securities.

Our paper contributes to the ongoing debate by providing new insights on the relative importance of country and industry effects in stock returns by analyzing more than 48,720 individual stocks from 48 countries and 77 industries over the period from 2001 to 2007.[1] We propose a new explanation for the relative importance of country and industry portfolio allocation in explaining return variation. We find that as institutions hold proportionally more

[1]Using the two-digit SIC code classification.

stock of a firm, more important are industry factors in determining stock return variation. Industry effects dominate country effects for the firms in the top quartile of institutional ownership. In particular, it is the holdings of foreign institutions that matter. We show that what conveys the domination of industry against country effects is the importance of foreign institutions as firm's shareholders. We also show that after controlling for size, these conclusions still hold.

We first use the traditional dummy model (HR) as in Heston and Rouwenhorst (1994). In this model, excess returns are explained by country and industry dummies. Country (industry) dummies take the value one when the stock belongs to the country (industry) and zero otherwise. This model has been criticized since it assumes unitary loadings on factors. As an alternative, we propose a factor model (FM) to overcome this issue. We also suggest a different way to construct the factors. For each month, we construct two factors, country and industry, where each entry corresponds to the respective stock country and industry return. Notice that for either model, we use the firm as the unit of measurement in accordance with Griffin and Karolyi (1998) and Campbell, Lettau, Malkiel, and Xu (2001) who show that firm return variation is the most relevant unit in opposition to country, region, or industry indexes.[2]

The next step involves the use of stock institutional ownership to contrast country and industry effects between firms with low institutional ownership and high institutional ownership. We form quartiles on institutional ownership and we discuss the differences between the first and fourth quartiles. We also form quartiles on domestic and foreign

[2]One way to tackle this question is to use risk based models such as the CAPM, the Fama-French model, and the Heston and Rouwenshorst model. Bekaert, Hodrick, and Zhang (2009) use a range of different risk-based models and found that a Fama and French and APT risk-based model fits the data covariance structure the best, when regional factors are incorporated in addition to global factors, and when a time-varying beta model is used. A different proposed solution is the so called volatility model as in Ferreira and Gama (2005), which extend the methodology of Campbell, Lettau, Malkiel, and Xu (2001). This type of models investigate the evolution of global, country, and local industry risk over time. An alternative methodology is the analysis under the mean-variance setting. which tackles directly the consequences of the market changes for the tangency and minimum variance portfolio of investors as discussed in Ehling and Ramos (2006).

institutional ownership. This allows to understand the influence of cross-border shareholders in explaining which effect, country or industry, dominates.

We also present a non-parametric visualization of this issue by studying the benefits of portfolio diversification distinguishing between geographical and industrial allocation. We show that institutional ownership allows for different levels of risk reduction and industrial allocation is more beneficial from the group of firms with more institutional ownership. In addition, if this group is constituted by proportionately more foreign institutions, then it is even more beneficial.

The paper is organized as follows. Section 2 presents our data. Section 3 describes the methodology used. Empirical results are detailed in section 4 by analyzing the influence of institutional ownership. Section 5 shows the benefits of portfolio diversification. We provide some concluding remarks in section 6.

2 Data

The sample includes all stocks in the Datastream/WorldScope (DS/WS) database. We draw monthly return data for 48,720 stocks from all over the world from January 2001 until December 2007 (84 months). The sample includes monthly US currency denominated excess returns[3] and the three-month Treasury Bill from FRED is used to proxy for the risk-free rate.

Table 1 reports statistics for each country. The dataset includes 48 countries from every continent in the world, developed and developing, although a few number of countries makes the majority of the total market capitalization and total number of firms. US firms account for half of the sample in terms of market capitalization. Five more countries (Japan, UK, France, Germany, and Canada) account for an additional 28% of the market capitalization. These differences are attenuated in terms of the number of firms. The US accounts for

[3]Some studies as in Heston and Rouwenhorst (1994) and Brooks and Del Negro (2004) find that using returns in local currencies do not change the results.

34% of the total number of firms and Japan now accounts for 16% of the sample, although the top three countries still account for almost the same proportion as before. Another asymmetry present in this dataset is the fact that industrial structure is quite diverse across countries. The number of industries across countries is highly disperse, although the majority is close to 17. The level of institutional ownership also differs markedly across countries. The values range from around 20% (Canada, Denmark, Finland, Ireland, Norway, Sweden, the UK, and the US), to 4% (Colombia, Chile, Malaysia, Morocco, New Zealand, Pakistan, Peru, and Thailand).

Each stock belongs to one of the 66 industries 2-digit SIC[4] classification, although we adopt the industry classification from Kenneth R. French.[5] We use a grid constituted by only 17 industries in order to get at least as many industries as countries. Using only 17 industries biases us against finding industry effects domination, since Beckers, Connor, and Curds (1996) and Griffin and Karolyi (1998) show that industry influences grow with a finer definition of industrial sectors.[6] For each month in the sample, countries or industries which are represented by less than ten firms are excluded from the analysis in order to minimize estimation error. Table 2 exhibits statistics for each industry and it shows that some industries are more global than others. Financials, Food and Construction exist in more countries, whereas Fabricated products are only present in 21 different countries. The most important industry is Financials and accounts for 23% of total market capitalization and 17% of total number of firms. Institutional ownership dispersion between industries is smoother than between countries. There are industries with a magnitude of institutional ownership as high as 28% (Oil, Chemicals) and others a little bit lower, around 18% (Construction and Steel). Notice that all countries and industries present positive mean returns in this period of time.

[4]SIC stands for Standard Industrial Classification and it was replaced in 1997 by The North American Industry Classification System (NAICS), but it is widely used in academic literature.

[5]Check the webpage http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

[6]We check afterwards that this industry grid choice does not change the overall conclusions.

The FactSet/LionShares database is used to obtain institutional investors' holdings. Institutional investors are financial institutions engaged in delegated portfolio management such as insurance companies, pension funds, investment companies, and others.[7] The main variable used in this study is total institutional ownership (IO) which corresponds to the sum of all holdings of all institutions in a firm's stock divided by the market capitalization at the end of each calendar year and we set Institutional ownership to zero if a stock is not held by any institution in the database. We breakdown institutional ownership between domestic and foreign institutional ownership. Domestic (foreign) institutional ownership corresponds to the sum of all holdings of all domestic (foreign) institutions in a firm's stock divided by the market capitalization at the end of each calendar year. We assume that these three variables are held constant within each year for each firm. The top panel of Figure 1 exhibits the evolution of total, domestic and foreign institutional ownership between 2001 and 2007. Total institutional ownership increased from 20% in 2001 to 30% in 2007.[8] Domestic institutions are the bulk of firm's institutional shareholders, although foreigners institutions have been becoming more relevant over time. We sort firms with positive institutional ownership into four equal size groups corresponding to four quartiles formed based on institutional ownership for each month.[9] The first quartile, IO1, corresponds to the lower quartile in institutional ownership and the fourth quartile, IO4, corresponds to the higher quartile in IO. Table 3 displays summary statistics for the whole sample and these two groups. For the whole sample, the mean number of countries is 46, the mean number of industries is 17, and the mean number of firms is 13,414. 88% of the firms have positive institutional holdings. The mean total institutional ownership is 24%, of which 19% are domestic holdings and 5% are foreign holdings. Each quartile contains 2,946 firms on average. The mean number of industries is 17 which is the same across quartiles. The number of countries, almost the same

[7]Investment advisors, endowments, hedge funds, among others.

[8]This agrees with OCDE data shown in Gonnard, Kim, and Ynesta (2008) in which they say "Institutional investors have been gaining in importance in OECD countries: within the OECD (17) area, institutional investors recorded increases in their assets with a yearly average of 6.6 per cent over the period 1995-2005."

[9]Firms held only by non-institutional investors are excluded from the analysis, since this group is quite heterogenous in terms of its characteristics.

across quartiles, is around 46. The exception is the top quartile, which mainly contains firms from the most developed countries, and therefore only 28 countries are represented.

Figure 1 exhibits the evolution of total, domestic, and foreign institutional ownership for the whole sample (top graph), for IO1 (middle graph) and IO4 (bottom graph). For the whole sample, institutional ownership goes from 20% at the beginning of 2001 to 30% at the end of 2007. Most of total institutional ownership stands for domestic holdings, although foreign holdings are becoming slowly more significative. When restricted to IO1, the total institutional ownership ranges between 0.5% and 1.5%. The most striking difference is that now foreign holdings are relatively more important, but this may be due to the low proportion of total institutional ownership. When restricted to IO4, the values range between 70% and 85%. In this subsample, foreigners seem to play a residual role. Table 3 reports the breakdown of total institutional ownership between domestic and foreign institutional ownership for the whole sample and each quartile on IO, and corroborates our previous findings. The first quartile holds 1% of total institutional ownership and mostly foreign. The second quartile holds 7% of total IO, balanced between domestic and foreign. The third quartile contains the firms with a mean of 23% total IO, but domestic institutional ownership is twice as much as foreign IO. The top quartile represents firms with a 76% total institutional ownership, and predominantly domestic holdings (65%).

3 Methodology

We use two methods – a dummy model and a general factor model – to understand the importance of country versus industry factors in explaining stock return variation.

3.1 Heston and Rouwenhorst Model (HR)

The Heston and Rouwenhorst (1994) model is the most standard model used in the previous literature.[10] It assumes that each individual stock return can be decomposed

[10]Some papers that have used this model are Heston and Rouwenhorst (1995), Griffin and Karolyi (1998), Campa and Fernandes (2006), Bai and Green (2010), among others.

into four components: a global common factor, a country factor, an industry factor and a component that is specific to each firm. Thus, assuming firm i is located in country k and industry j, its returns for period t is described as

$$r_{it} = \alpha_t + \delta_{kt} + \gamma_{jt} + \epsilon_{it}$$

where r_{it} is the excess return at time t, α_t is a term common to every stock in the world at time t, δ_{kt} and γ_{jt} are respectively the pure country k and industry j component of the time t return of a stock at time t that belongs to this particular country and industry, and ϵ_{it} is an idiosyncratic error term. At time t, every country k and industry j, pure effects are estimated using the following cross-sectional regression:

$$r_{it} = \alpha_t + \sum_{k=1}^{K} \delta_{kt} C_{ik} + \sum_{j=1}^{J} \gamma_{jt} I_{jt} + \epsilon_{it}$$

where C_{ik} is a dummy variable that equals 1 if the stock i belongs to country k and zero otherwise and I_{ij} is a dummy variable that equals 1 if the stock i belongs to industry j and zero otherwise. Unfortunately, we cannot estimate the previous equation directly because of the multicollinearity problem induced by the fact that each stock belongs to both one country and one industry. Heston and Rouwenhorst (1994) impose the constraints that the weighted sum of the industry coefficients and the weighted sum of the country coefficients equal zero. Campa and Fernandes (2006) show in their appendix how to exactly estimate this model. By estimating this equation cross-sectionally by weighted least squares at each date t, we obtain $K + J$ time-series of pure country and industry effects. These time-series are then used to determine the relative importance of country and industry factors.

We use the mean absolute deviation (MAD) metric, proposed by Rouwenhorst (1999), for countries $MAD_t^C = \sum_k w_k |\delta_{kt}|$ and for industries $MAD_t^I = \sum_j w_j |\gamma_{jt}|$. The country (industry) MAD can be interpreted as the capitalization weighted average tracking error of the returns on industry-neutral (country-neutral) country (industry) portfolios. The higher

the country (industry) MAD value, the more disperse are the country (industry) returns in that period. We compute the 12-month rolling window arithmetic mean of MAD values to reduce estimation error as it is standard in previous literature. Finally, we compute the ratio between country MAD and industry MAD to gauge the relative importance of country versus industry. A value greater than one for this variable, imply that country factor is more relevant than industry factor in explaining variation stock returns.

3.2 Factor Model (FM)

One of the drawbacks of the HR model is the assumption that stocks' sensitivities to countries and industries are either equal to unity or zero, since the model uses dummy variables. Another drawback is that it restricts all companies to be a member of exactly one country and one industry, whereas this assumption is clearly not true for conglomerates and multinationals.

Brooks and Del Negro (2002, 2004, 2005) estimate a latent factor model in which loadings are not constrained to unity. There are two main critiques pointed out to this approach. First, the fact that they need a balanced sample to be able to estimate the model and therefore their results suffer from survivorship bias, as each stock would need to be traded continuously over the sample period. Second, their conclusions are over averages along the sample period.

We propose a different model to understand the importance of country and industry factors in explaining stock return variation. At any given month t, a cross-sectional regression is estimated:

$$r_{it} = \alpha_t + \delta_t C_t + \gamma_t I_t + \epsilon_{it}$$

where C_t is a country specific factor and I_t is a industry specific factor, and ϵ_{it} represents the idiosyncratic shock to the return on stock i at month t. The factors are observables that are constructed in the following way. For each month t, C_t is a vector formed by stacking each

individual country factor vector. Each individual country factor vector is the value weighted excess return of all stocks belonging to that country. We apply the same methodology in the construction of industry factors. We orthogonalize industry factors each month by using as industry factors the residuals of the regression of industry factors on country factors.[11] We then run OLS regressions for each month to estimate the cross-sectional parameters.

The variance of returns can then be decomposed as the sum of country, industry, and idiosyncratic firm variances

$$Var(r_{it}) = \delta_t^2 Var(C_t) + \gamma_t^2 Var(I_t) + Var(\epsilon_{it})$$

The country (industry) specific standard deviation (STD) is given by the square root of the first (second) term on the right hand side of the equation. We then compute the 12-month arithmetic mean rolling window of these estimates. Finally, we measure the importance of country versus industry by using the ratio between these country and industry 12-month arithmetic mean rolling window figures. Values higher than unity for this ratio, imply that country factor is more relevant than industry factor; otherwise, the industry factor is more relevant than country factor.

4 Results

We obtain a monthly time-series of MAD and STD estimates from the cross-sectional regressions between January 2002 and December 2007 (2001 is used for the first estimations). Figure 2 presents results for the two methods, HR model and Factor model. The top panel presents the estimates of country effects, the middle panel presents the estimates of industry effects, and the bottom panel presents the ratio between the previous country and industry effects which stresses the importance of country versus industry. Table 4 points out the mean

[11] It may be argued that this orthogonalization may lead the results. As a consequence, we run this factor model by taking the industry factors and orthogonalize country factors in the same way as explained in the text. The results were even stronger.

values for the factor model.

The first conclusion is that the factor model estimates are slightly greater than HR model estimates for both country and industry figures. Nonetheless, the values for either case are around 10% over this period. The mean time-series standard deviation of countries is 8.68%, whereas mean time-series standard deviation of industries is 6.50%. The ratio between the mean time-series standard deviation of country and industry is 1.37. A value significantly greater than one. This confirms previous results that country effects are more relevant than industry effects. A second conclusion is the slightly decreasing pattern in the industry estimates. This implies an increase in the ratio between the two estimates which can be seen in the bottom panel. Overall, either method shows that country effects are more relevant than industry effects in the 2000's, which is consistent with previous literature (Heston and Rouwenhorst (1994), Griffin and Karolyi (1998), Bekaert, Hodrick, and Zhang (2009), among others), and the effect has become even more relevant over time.

4.1 The Influence of Institutional Ownership

We aim to explain the importance of country versus industry cross-sectionally. We hypothesize that institutional ownership can be used to explain differences in the relative importance of country effects in asset allocation versus industry effects.

Figures 3 and 4 present the results for HR and factor model, respectively. In either case, the top panel presents country effects, the middle panel presents industry effects, and the bottom panel presents the ratio between country and industry effects, i.e., the relative importance of country versus industry. The dash-dot line represents the first quartile of institutional ownership and the dashed line represents the fourth quartile of institutional ownership for the HR and FM models. The figure shows that the ratio of country to industry effects in the first quartile is always greater than one, whereas the opposite happens in the fourth quartile of institutional ownership. In addition, Table 4 presents the mean values for the factor model for each quartile. The magnitude of industry effects are about the same

across quartiles, but clearly there is a drop in magnitude of countries effects as institutional investors are more relevant in the proportion of firms' shareholders. As a consequence, there is a decreasing pattern in terms of the importance of country effects in stocks with higher institutional ownership.

There are two main conclusions. There is a clear difference in the relative importance of country versus industry effects across stocks with different levels of institutional ownership. As institutional investors hold proportionately more shares of a firm, the more relevant industry effects are. Second, industry effects are more relevant than country effects for firms chosen in the top quartile of institutional ownership. Therefore, institutional ownership is an important determinant of the cross-sectional importance of country versus industry effects in stock return variation.

4.2 Cross-border Holdings: Domestic versus Foreign

We now try to understand the influence of cross-border holdings in country versus industry effects. We provide a more detailed explanation of the impact of institutional investors by breaking down institutional ownership into two types of investors: domestic and foreign institutional investors.[12]

We analyze the dataset from different angles. First, we form groups by total institutional ownership and then sort by domestic and foreign institutional ownership. Second, we form groups by total institutional ownership and then it is sorted by domestic and foreign ownership simultaneously. Third, and inverting the previous process, we form groups by domestic or foreign institutional and then sort by institutional ownership. We only show results for the extreme groups, the first and fourth quartiles. These two different sorting procedures to analyze the dataset provide groups which hold different stocks and each category holds a different mix of total, domestic, and foreign institutional ownership.

[12]Gonnard, Kim, and Ynesta (2008) remark the importance of foreigners in the world financial market: "Financial assets are becoming increasingly global in scope: in 2005 about 40% of the financial assets are issued by non-residents whereas the share was around 13% in 1995."

Table 5 shows the decomposition of the sample into different slices of domestic and foreign ownership. Panel A presents results for all firms present in the sample. We form quartiles either in domestic institutional ownership or foreign institutional ownership. At first glance, the results may seem surprising but the characteristics of each quartile should be first understood. The bottom and top quartiles of firms in domestic institutional ownership present similar foreign institutional ownership magnitudes (5.6%), but quite distinct magnitudes of domestic institutional ownership (0.1% vs. 67.5%). This implies a distinct level of total institutional ownership (5.7% vs. 73.3%). The relevancy of country vs. industry is posted in the last column of the table. The bottom quartile is, on average, 2.00 whereas the top quartile is 0.95. We may infer that for the same level of foreign institutional ownership, when total institutional ownership increases, the more relevant are industry effects. However, when forming quartiles on foreign institutional ownership, this same result does not apply. The reason is that in the top quartile the magnitude of foreign institutional ownership increases substantially relatively to the bottom quartile, but domestic and total also rise. The conclusion is then for this component, that as more foreign institutions hold a stock, more industry effects are relevant (1.28 for top quartile against 1.73 for bottom quartile).

The next step is to separate firms into two buckets, lowest and highest total institutional ownership. Panel B presents results for the firms in the bottom quartile on total institutional ownership. The results are mixed, mostly because they are not significant due to the narrow difference present in characterizing each quartile in this subsample. Total, domestic, and foreign magnitudes are very low which makes the difference not significantly important.

Panel C presents results for the firms in the top quartile on total institutional ownership. The results shed some light on what is happening. It should not be concluded that industry effects are the most relevant for any group of firms with high institutional ownership. What should be stressed in this analysis is that industry against geographical relevance depends on the trade-off between domestic and foreign proportions on total insti-

tutional ownership. Both bottom and top quartile on foreign institutional ownership present approximate values of total institutional ownership (66.9% for bottom quartile and 75.5% for top quartile). However, they present contrasting values of foreign institutional ownership (1.0% for bottom quartile and 32.2% for top quartile). The industry effect is clearly more relevant when more institutional foreigners hold the stocks, i.e., for the top quartile the foreign institutional ownership magnitude is 32.2% which implies a ratio of 0.91, whereas for the bottom quartile on the foreign institutional ownership, the magnitude of foreign institutional ownership is only 1.0% and implies a ratio of 1.59. This also happens when restricting on domestic institutional ownership. As more foreign institutional ownership is present in the quartile, i.e., when the bottom quartile on domestic institutional ownership holds a magnitude of foreign institutional ownership of 26.3% and top quartile on domestic institutional ownership holds a magnitude of only 4.6%, the more relevant are the industry effects (ratio of 1.08 against 2.74).

We next analyze the same information, but we sort first on either domestic or foreign institutional ownership and only then we sort on total institutional ownership. Table 6 presents the results. Panel A of this table shows the results for firms in the bottom quartile of domestic institutional ownership and then bottom and top quartiles on total institutional ownership. The first group shows almost none total institutional ownership (0.1%) versus a group with the average total institutional ownership (19.3%), but almost all conveyed by foreign institutions. The group with more foreign institutional ownership has a ratio of country versus industry of 1.63 which compares to a ratio of 1.90. The conclusion is that the group with more foreign institutions has less country dominance, given that domestic institutional ownership is residual. However, industry effects do not dominate for the top quartile since total institutional ownership is only of the same magnitude as the mean total institutional ownership.

Panel B shows the same figures for the firms in the top quartile of domestic institutional ownership. When we then sort on the total institutional ownership, the conclusion is

not straightforward. In fact, there are more dominant country effects for the top quartile on institutional ownership since it has a ratio between country and industry of 1.59 whereas the bottom quartile has a ratio of only 1.25. However, the proportion of domestic institutional ownership to total institutional ownership in the bottom quartile is 94% and this proportion is similar in the top quartile, 91%. Therefore, domestic institutions dominate these two buckets and makes country effects more important. The importance of country effects is also expected given the huge domestic institutional ownership in the top quartile (90.5%) whereas in the bottom quartile is only 38.7%.

Panel C sorts firms in the top quartile of foreign institutional ownership into bottom and top total institutional ownership. The results resemble the conclusions extracted from Panel A. The bottom quartile has the same magnitudes for institutional ownership (0.1%) as in Panel A and this implies a similar ratio between country and industry effects as in Panel A (1.85). The top quartile holds more total institutional ownership than Panel A and this implies a ratio of 1.40 against the one in the Panel A.

Panel D shows the results for bottom and top quartiles on total institutional ownership after constraining for the firms in the top quartile of foreign institutional ownership. If total institutional ownership (11.2%) is much less than the average institutional ownership, and although foreign (9.7%) being much greater than domestic institutional ownership (1.4%), countries are more important in explaining returns variation (ratio is 1.92). But restricting on the top quartile of total institutional ownership, and as foreign institutional ownership (24.6%) is an important part of the high total institutional ownership (90.4%), this means that industry effects are clearly the most important (ratio is 0.95).

The hypothesis that considering high total institutional ownership is enough to say that industry effects are more relevant than country effects is more complex than what initially may have been thought. The proportion of foreigners is the solution to this problem. When domestic investors are the most relevant part of the institutional shareholders, even

when total institutional ownership is close to 100%, country effects are still more important. But as long as foreign institutional ownership is proportionately high enough for a high institutional ownership, then industry effects become more relevant.

4.3 Size and Institutional Ownership

Gompers and Metrick (2001) show that institutional ownership is highly correlated with size, in particular, market capitalization. This then may imply that our results follow not directly from an institutional ownership phenomenon, but a size effect. To address this issue, we design three different approaches.

The first approach is based on Sias and Starks (1997a, 1997b). We double sort the sample using size and institutional ownership. Hence, for each month we form quartiles on the market capitalization and then sort firms by total institutional ownership within each size quartile. The Panel A of Table 7 shows the results for the bottom and top quartiles on size. For firms on the top quartile of market capitalization, the industry effects become more relevant since the ratio decreases achieving a mean value of 1.24. The top two quartiles also attain mean ratios less than one. Comparing to the firms on the bottom quartile of market capitalization, the values are not completely different although more flat. The overall ratio magnitudes between the two quartiles on market capitalization are similar. So, our conclusion is that even after controlling for size, the results hold. In fact, industry effects become even more relevant.

The second approach is based on Nagel (2005). First, we perform a logit transformation of total institutional ownership IO

$$logit(IO) = \ln\left(\frac{IO}{1-IO}\right)$$

where values of total institutional ownership below 0.0001 are replaced by 0.0001 and above 0.9999 are replaced by 0.9999. We regress $logit(IO)$ on $\ln Size$ and squared $\ln Size$ for each

month

$$logit(IO_{i,t}) = a_t + b_t \ln Size_{i,t} + c_t(\ln Size)^2 + e_{i,t}$$

We use the residuals of each regression, denoted by residual institutional ownership, to sort firms on. The Panel B of Table 7 shows again that the previous conclusions still hold. The values are close to the original ones. The bottom quartile has a ratio of 1.83 and the top quartile has a ratio between country and industry effects of 0.78. Size has again no effect on the overall conclusion that total institutional ownership explains the dominance of country or industry.

The third approach is to sort on size, i.e., market capitalization instead of total institutional ownership. If results would come from size, then we would expect similar values for the ratio. This is not what happens. In fact, from Panel C of Table 7 we see that the magnitudes between quartiles is not significantly different. In addition, there is always a relevancy for country effects with first and third quartiles having similar values.

From these three different approaches, we can state that size does not impact our previous conclusions. So it is institutional ownership that explains if country or industry matters for stock returns comovement rather than an indirect effect through size.

5 Portfolio Diversification Implications

This section provides a different way to look at the results found using a non-parametric method. We explore the benefits of portfolio diversification using different strategies, mainly the difference between geographical and industrial allocation. We use the same framework as in Heston and Rouwenhorst (1995), Ferreira and Ferreira (2006) and Goetzmann and Kumar (2008) to compute the risk reduction that can be accomplished through alternative diversification alternatives relative to the average asset.

We compute the correlation between firms within industry (country), which allows to compute the correlation of firms across countries (industries). We take the mean correlation across all industries (countries) to get the mean correlation of countries (industries). We use only firms with complete observations in the last 60 months of the sample. We only consider industries or countries with at least 10 firms. To sort by total institutional ownership we use the past month value of total institutional ownership.

The diversification ratio for the alternative strategies is given by the portfolio variance relative to the average asset variance using equal weights:

$$\frac{Var\left(\sum_{i=1}^{N} R_i\right)}{\frac{1}{N}\sum_{i=1}^{N} Var(R_i)} = \frac{1}{N} + \frac{N-1}{N}\frac{\overline{Cov(R_i, R_j)}}{\overline{Var(R_i)}} = \frac{1}{N} + \frac{N-1}{N}\overline{Corr(R_i, R_j)}$$

where N denotes the number of assets and the upper bars denote averages. This equation tells us that the reduction can come from two sources, either by increasing the number of stocks, N, or by decreasing the mean correlation between firms, $\overline{Corr}$.

Figure 5 plots the average variance reduction of each strategy against the number of stocks in the portfolio. The first conclusion is that for the whole sample of firms and when building portfolios, it is more important to be geographically diversified than to be industrially diversified. As the number of stocks becomes larger, the geographical portfolio variance becomes 18% of the average variance of the securities in the portfolio, whereas the industrial portfolio variance is 32% of the average variance of the securities in the portfolio. As before, we also analyze the results for the bottom and top quartiles on total institutional ownership. The conclusions support our previous findings. When restricted to stocks on the bottom quartile of total institutional ownership, the results are the same. Geographical diversification is more effective, but this is not the case when we look at stocks in the top quartile of total institutional ownership. We find that industrial diversification in the portfolio of stocks with higher IO is more effective. We also confirm the importance of foreign institutions. Figure 6 presents the average variance reduction as before but now only

for the top quartile on total institutional ownership. For either case, industrial allocation allows to achieve more benefits from portfolio formation, since the increment is bigger for the group with more foreign institutions (for the case of 20 stocks, the bottom quartile on foreign institutional ownership achieves a difference of 3.9% against a difference of 6.2% for the top quartile on foreign institutional ownership).

6 Conclusions

We provide a comprehensive cross-sectional study of the importance of geographic versus sector allocation in the 2001–2007 period. We test the hypothesis that stocks with different type of shareholders display distinct main forces that drive the way stocks vary and comove. One such important group of shareholders are institutions. Industrial allocation is more relevant in stocks with a higher presence of institutional investors, although the dominant effect is still geographical for the majority of the stocks. In particular, industrial allocation even becomes the most important effect among stocks in the top quartile of institutional ownership.

We also tackle the fact that institutions origin contributes to explain these results. The growing importance of globalization over the last decades have affected the way institutions invested. We analyze the effects of stocks which are hold by more foreign institutions. We conclude that these makes the explanation more clear. The answer is not only related to the level of institutional ownership, but also to the breakdown between domestic and foreign institutional ownership. When more institutions hold the firm's shares and an important fraction of them are foreign, then it is when industrial allocation is most important.

This suggests policy implications in terms of analysts distribution and portfolio allocation designs. We argue that investment banks should organize themselves in different ways according to the asset under question. Analysts and asset allocation should be distributed according to sectors over the global scale when studying stocks held by a large proportion of institutions, in particular, when foreign institutions are more relevant. Otherwise, and for

the majority of the cases, country specialization should be the clear choice.

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Figure 1
The evolution of institutional ownership

This figure presents the evolution of total institutional ownership, domestic institutional ownership, and foreign institutional ownership across all firms for each month of the sample. Total (domestic, foreign) institutional ownership corresponds to the sum of all holdings of all (domestic, foreign) institutions in a firm's stock divided by the market capitalization at the end of each calendar year and set to zero if a stock is not held by any institution in the database. We assume that these three variables are held constant within each year for each firm. The whole sample is represented in the top panel. Middle and bottom panels restrict the sample to bottom and top quartiles formed on total institutional ownership. The values presented are arithmetic means. Numbers in percentage points.

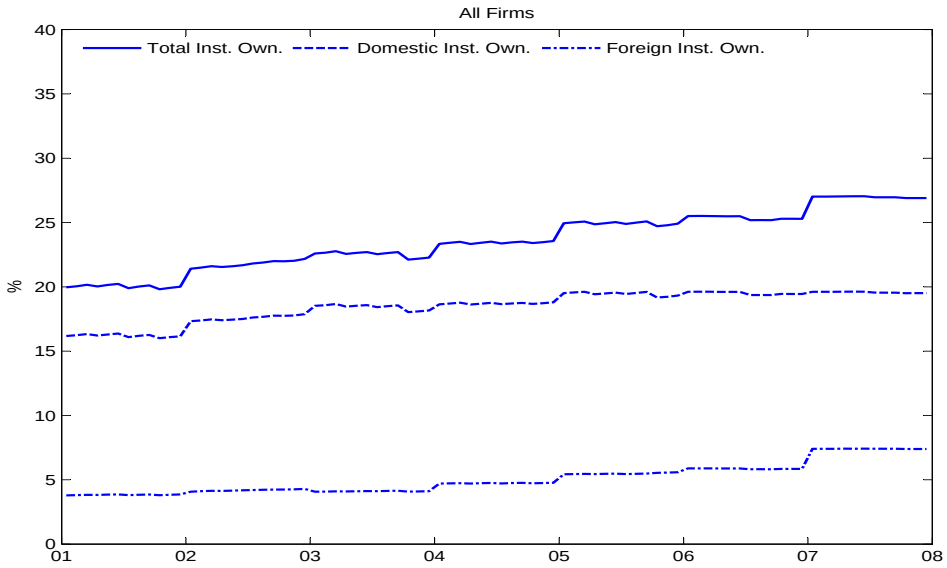

Figure 1 (Cont')
The evolution of institutional ownership

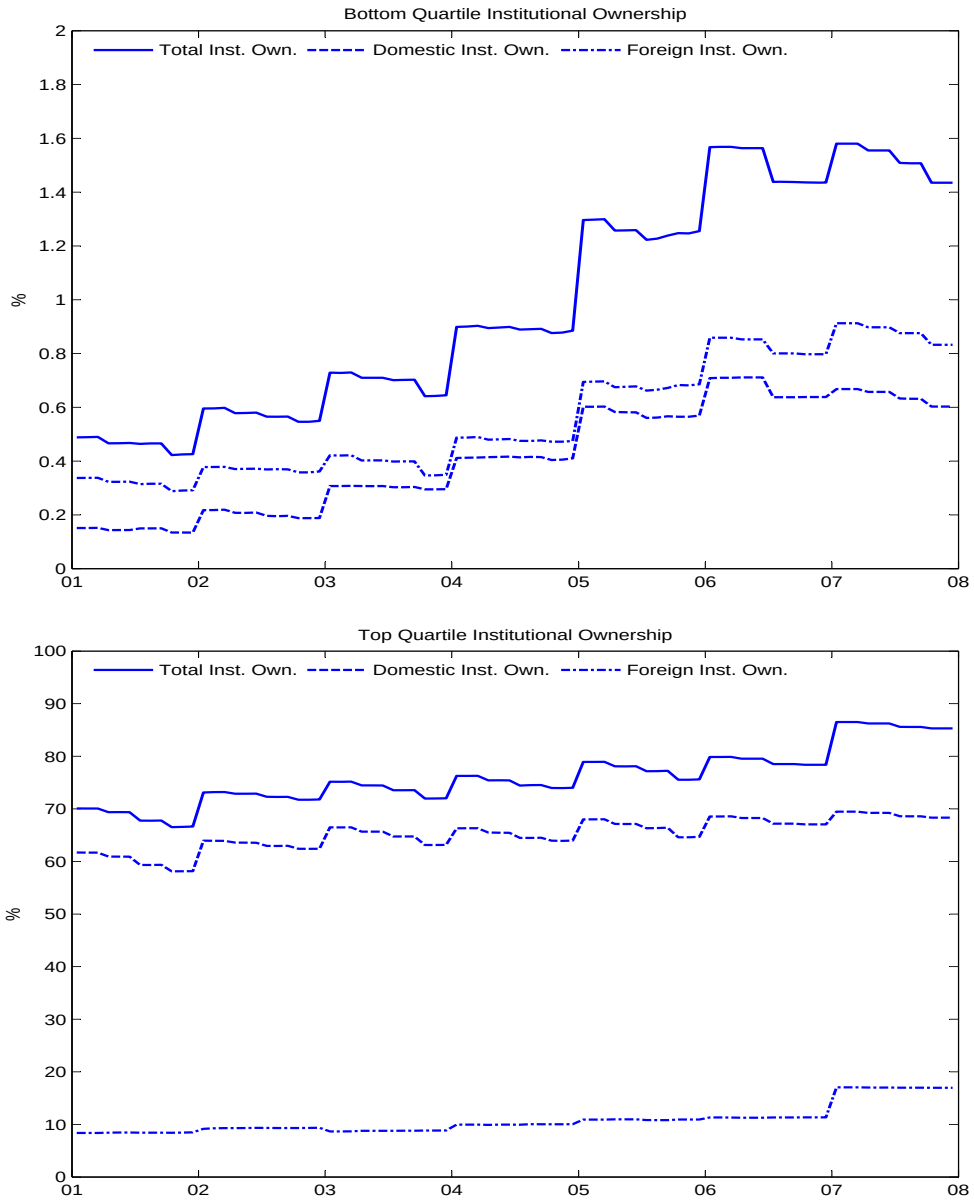

Figure 2
Country and industry effects for institutional ownership

This figure presents country MAD (top panel), industry MAD (middle panel), and respective ratio (bottom panel) for the last 12-month rolling estimates for the HR model presented in Section 3.1, and country STD (top graph), industry STD (middle graph), and respective ratio (bottom graph) for the last 12-month rolling estimates for the Factor Model presented in Section 3.2. The first two panels present annualized numbers in percentage points.

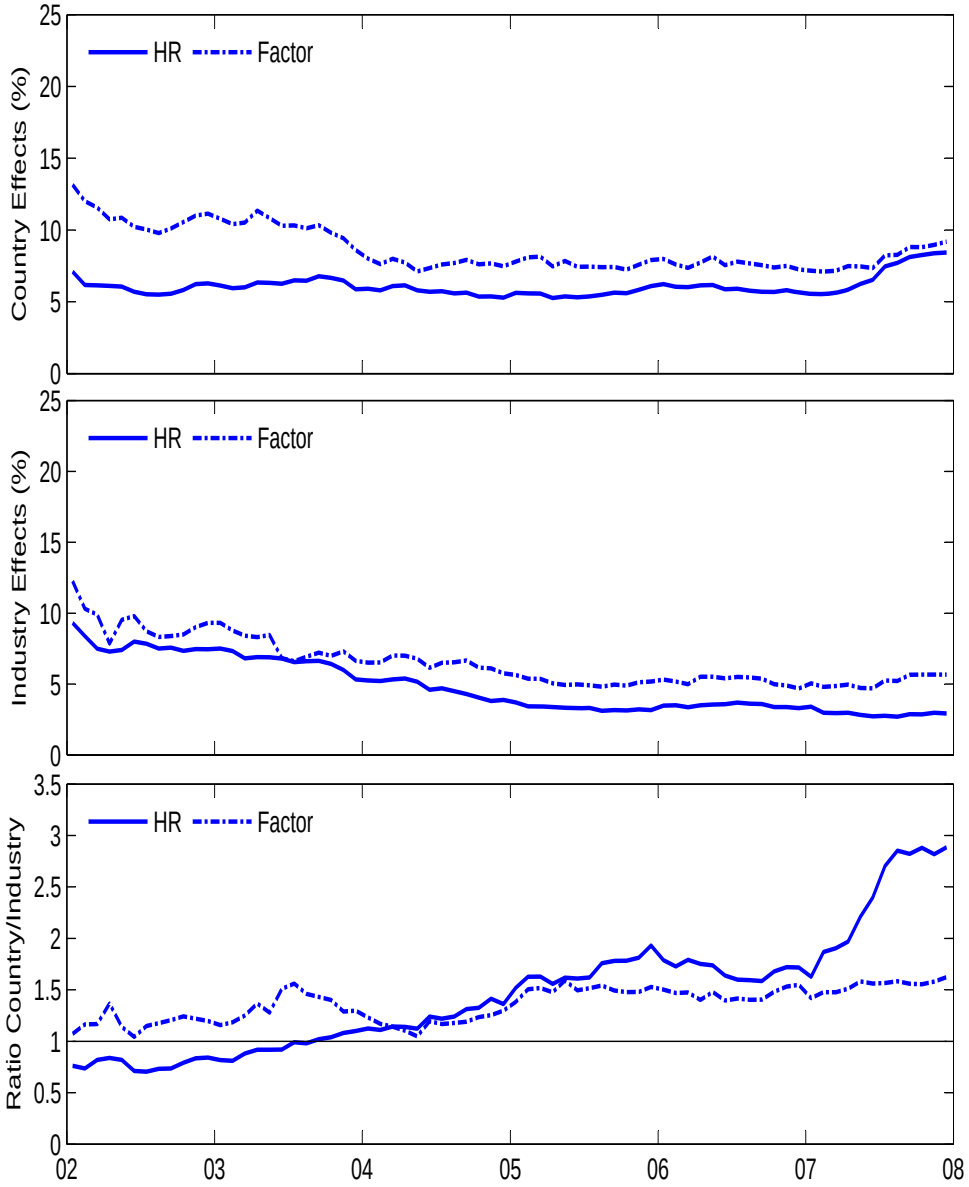

Figure 3
Country and industry effects for bottom and top quartiles on institutional ownership – HR model

This figure presents country MAD (top panel), industry MAD (middle panel), and respective ratio (bottom panel) for the last 12-month rolling estimates for the HR model present in Section 3.1 for the bottom and top quartiles on total institutional ownership. The first two panels present annualized numbers in percentage points.

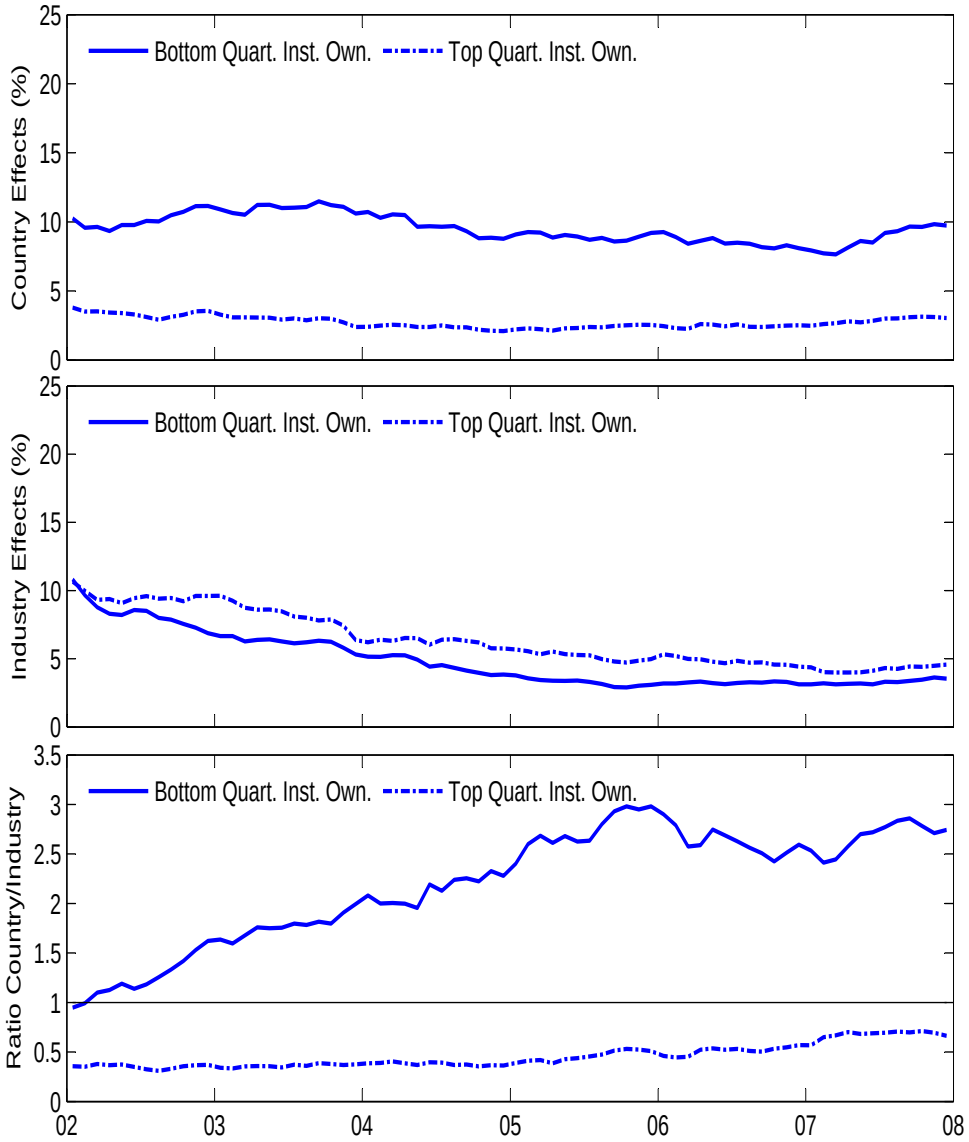

Figure 4
Country and industry effects for bottom and top quartiles on institutional ownership – Factor model

This figure presents country STD (top panel), industry STD (middle panel), and respective ratio (bottom panel) for the last 12-month rolling estimates for the Factor Model present in Section 3.2 for the bottom and top quartiles on total institutional ownership. The first two panels present annualized numbers in percentage points.

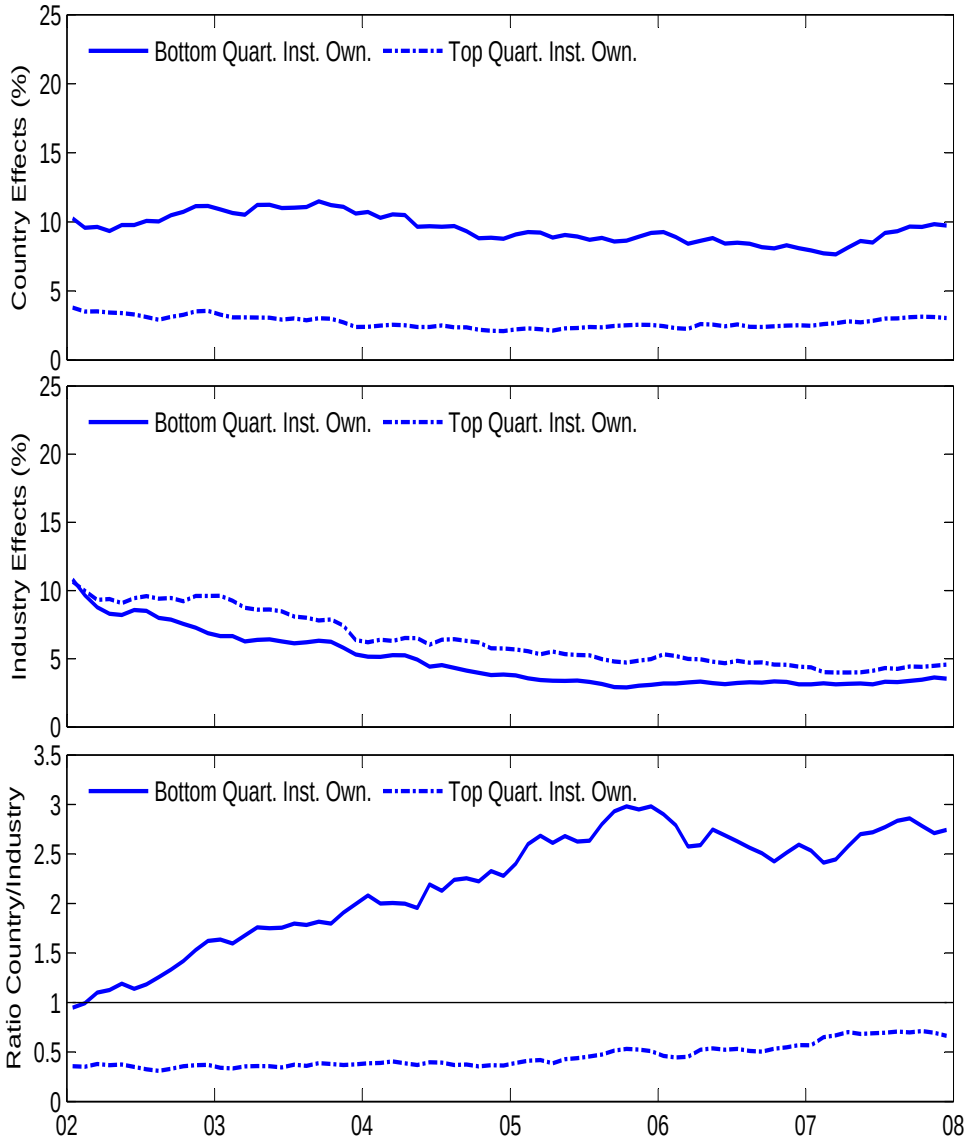

Figure 5
Diversification benefits by institutional ownership

This figure presents the portfolio variance relative to the average asset variance using equal weights for either a geographical (country) or either a industrial strategy. Results presented for the whole sample (top panel), the bottom (middle panel) and top (bottom panel) quartiles on total institutional ownership. Covariances and variances are computed using the last 60 months of data. Numbers in percentage points.

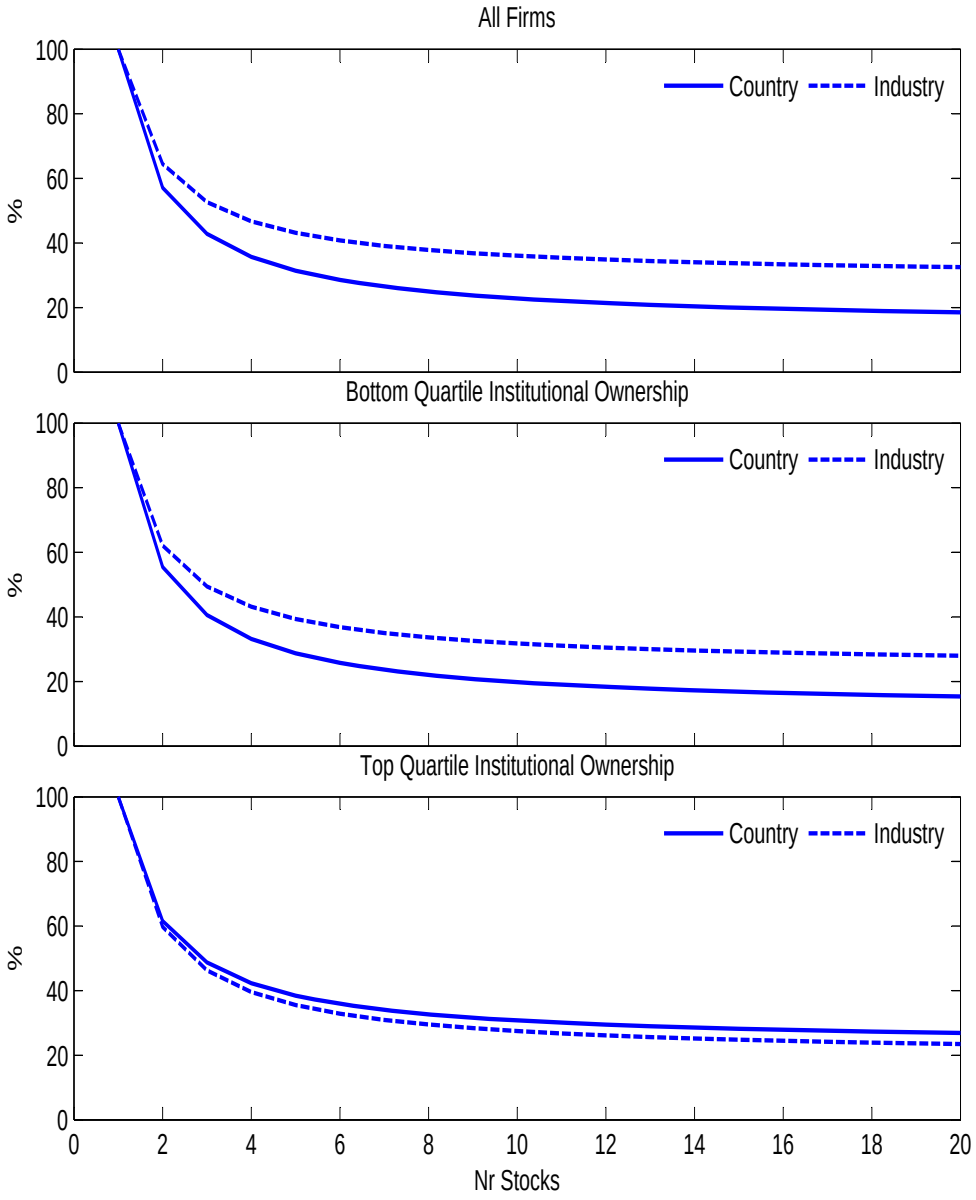

Figure 6
Foreign diversification benefits on top quartile of institutional ownership

This figure presents the portfolio variance relative to the average asset variance using equal weights for either a geographical (country) or either a industrial strategy. Results detail the top quartile on total institutional ownership by analyzing the bottom (IO4-FIO1) and top (IO4-FIO4) quartiles on foreign institutional ownership. Covariances and variances are computed using the last 60 months of data. Numbers in percentage points.

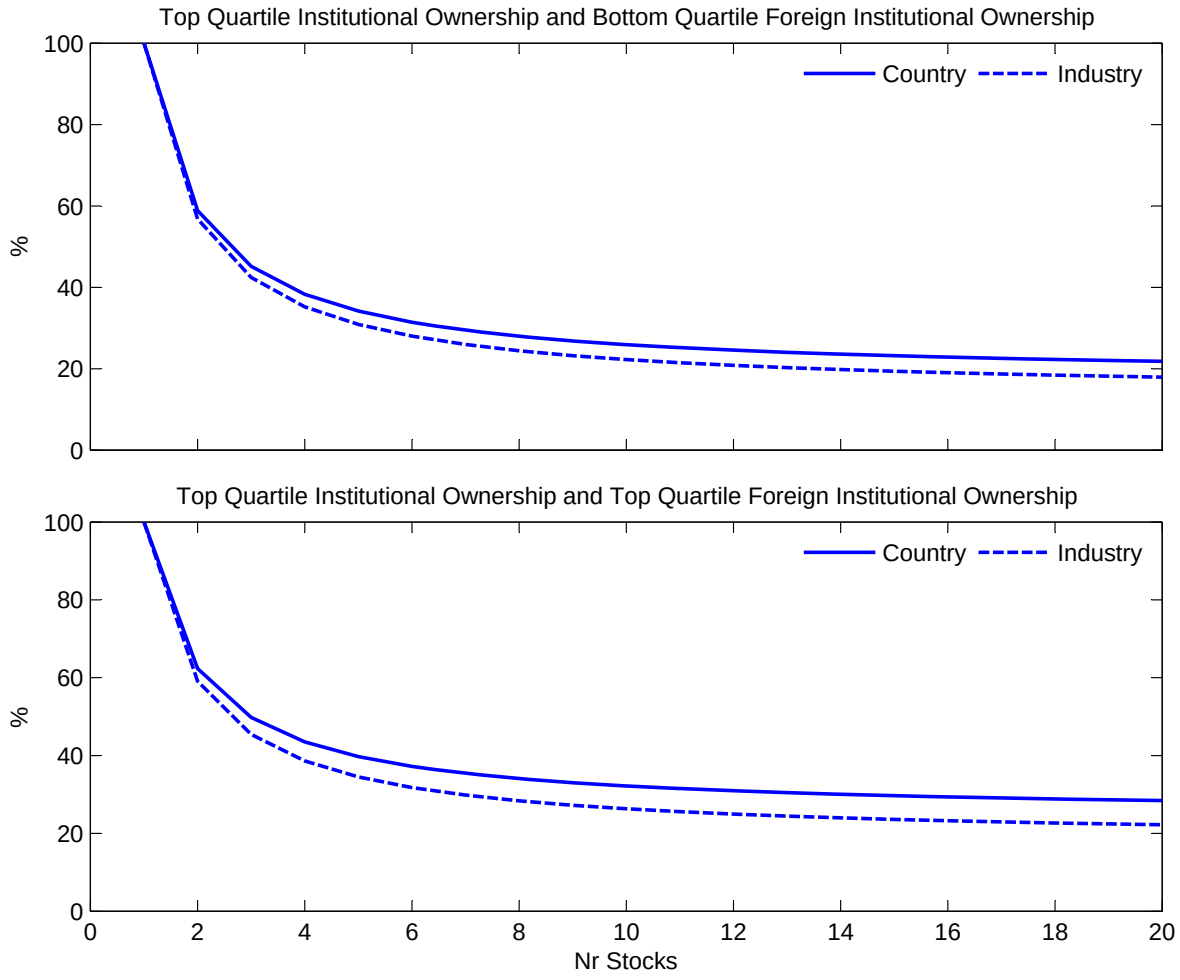

Table 1
Summary statistics by country

This table reports time-series mean of summary statistics by country. The variables analyzed are the number of industries, the number of firms, the proportion of total institutional ownership, the equally and value-weighted returns (in percentage points) and the relative market capitalization (in percentage points). The period under consideration is between January 2001 and December 2007.

	Nr	Nr	Inst.	Returns		Mkt.
	Ind.	Firms	Own.	Eq. Weig.	Val. Weig.	Cap.
Country	(#)	(#)	(%)	(%)	(%)	(%)
Argentina	9	23	6	1.57	1.60	0.10
Australia	17	329	6	1.99	2.15	1.83
Austria	15	55	8	1.92	2.69	0.25
Belgium	14	80	9	1.40	1.68	0.57
Brazil	16	75	13	3.39	3.65	0.47
Canada	17	640	27	2.07	2.13	2.94
Chile	14	59	4	1.85	2.03	0.23
China	17	135	11	3.14	3.94	0.54
Colombia	4	9	1	3.73	3.98	0.03
Czech Republic	7	10	6	3.21	3.54	0.07
Denmark	11	88	17	1.72	1.94	0.29
Egypt	7	20	3	3.18	3.87	0.09
Finland	14	101	19	1.72	1.46	0.66
France	17	450	11	1.31	1.43	5.53
Germany	16	424	13	0.89	1.58	3.47
Greece	15	77	5	1.21	1.91	0.34
Hong Kong	15	167	7	1.85	1.91	1.40
Hungary	6	9	11	1.98	1.82	0.03
India	13	129	7	3.07	3.37	0.58
Indonesia	13	49	6	2.90	4.23	0.10
Ireland	10	45	20	1.55	1.35	0.29
Israel	14	89	13	1.32	1.62	0.26
Italy	17	195	8	0.87	1.13	2.03
Japan	17	2,180	10	1.35	1.41	8.93

Table 1 (Cont')
Summary statistics by country

	Nr Ind.	Nr Firms	Inst. Own.	Returns		Mkt. Cap.
				Eq. Weig.	Val. Weig.	
Country	(#)	(#)	(%)	(%)	(%)	(%)
Luxembourg	4	17	10	1.60	1.52	0.09
Malaysia	17	279	3	1.24	1.84	0.52
Mexico	10	49	17	2.18	2.33	0.62
Morocco	6	12	1	1.91	2.18	0.05
Netherlands	13	78	18	1.30	1.44	1.17
New Zealand	13	48	4	2.06	2.09	0.09
Norway	13	123	16	1.85	2.46	0.43
Pakistan	7	19	1	3.16	3.05	0.04
Peru	6	9	4	3.44	4.14	0.01
Philippines	10	40	5	3.17	2.68	0.08
Poland	13	75	15	2.62	2.42	0.25
Portugal	7	34	8	1.44	1.36	0.23
Russia	11	50	6	4.22	4.82	1.56
Singapore	15	150	6	1.49	1.82	0.50
South Africa	13	73	11	2.28	2.79	0.41
South Korea	17	315	8	3.13	3.41	1.57
Spain	16	88	10	2.07	1.75	1.37
Sri Lanka	6	10	6	2.84	3.10	0.00
Sweden	16	236	21	1.42	1.70	1.05
Switzerland	15	144	15	0.97	0.93	1.61
Taiwan	14	306	5	1.56	1.92	1.45
Thailand	15	109	4	1.95	2.92	0.18
Turkey	16	84	5	3.01	3.46	0.31
United Kingdom	17	1,125	22	0.79	1.25	7.45
United States	17	4,527	45	1.62	1.08	47.90
Venezuela	3	5	10	2.28	2.94	0.01

Table 2
Summary statistics by industry

This table reports time-series mean of summary statistics by industry. The variables analyzed are the number of countries, the number of firms, the proportion of total institutional ownership, the equally and value-weighted returns (in percentage points) and the relative market capitalization (in percentage points). The period under consideration is between January 2001 and December 2007.

	Nr	Nr	Inst.	Returns		Mkt.
	Cou.	Firms	Own.	Eq. Weig.	Val. Weig.	Cap.
Industry	(#)	(#)	(%)	(%)	(%)	(%)
Food	46	564	19	1.87	1.37	3.73
Mines	30	369	20	3.41	3.30	1.53
Oil	34	390	28	2.45	2.20	8.05
Clothes	30	259	21	1.79	1.89	0.57
Durables	34	331	24	1.23	1.45	1.56
Chemicals	36	302	21	2.07	1.95	1.70
Cnsum	34	465	28	1.38	0.74	8.82
Construction	44	748	18	2.00	1.85	3.25
Steel	38	250	18	2.28	2.71	1.31
Fabricated products	21	106	27	1.82	2.35	0.26
Machinery	36	1,547	27	1.38	1.35	9.58
Cars	30	277	23	1.69	1.68	2.25
Transportation	37	500	24	2.07	1.69	3.17
Utilities	40	318	25	1.70	1.66	4.04
Retail	40	742	26	1.53	1.28	5.35
Financials	52	2,231	21	1.59	1.29	23.24
Other	47	4,049	24	1.36	1.44	21.59

Table 3
Summary statistics by institutional ownership

This table reports time-series mean of summary statistics by country. The variables analyzed are the number of countries, the number of industries, the number of firms, the proportion of total institutional ownership, domestic institutional ownership and foreign institutional ownership (in percentage points). The first row presents figures for firms with positive institutional ownership and the remaining rows present quartiles on total institutional ownership. The period under consideration is between January 2001 and December 2007.

	Nr	Nr	Nr	Institutional Ownership		
	Cou.	Ind.	Firms	Total	Dom.	For.
	(#)	(#)	(#)	(%)	(%)	(%)
Positive Inst. Own.	46	17	11,784	27	21	6
Bottom Quartile	46	17	2,946	1	0	1
Quartile 2	45	17	2,946	7	4	3
Quartile 3	43	17	2,946	23	15	8
Top Quartile	28	17	2,946	76	65	11
Total	46	17	13,414	24	19	5

Table 4
Country and industry effects for the factor model

This table reports country effects, industry effects, and ratio between country and industry, for the factor model in section 3.2. The first row presents values for the whole sample, and the remaining rows represents the quartiles from low to top on institutional ownership. The period under consideration is between January 2001 and December 2007.

	Country Effects	Industry Effects	Country/ Industry
	(%)	(%)	
Total Institutional Ownership			
Bottom quartile	11.06	5.84	1.97
Quartile 2	10.40	5.97	1.83
Quartile 3	7.68	6.50	1.22
Top quartile	3.69	5.16	0.73
Total	8.68	6.50	1.37

Table 5
Country and industry effects breakdown

This table reports mean values for the number of countries, number of industries, number of firms, percentage of total institutional ownership, domestic institutional ownership, foreign institutional ownership, and the 12-month rolling window estimate of the ratio between country and industry effects using the factor model in Section 3.2. Panel A analyzes all firms in the sample, Panel B analyzes the firms in the bottom quartile of total institutional ownership, and Panel C analyzes the firms in the top quartile of total institutional ownership. Each panel presents a further breakdown by domestic and foreign institutional ownership. The period under consideration is between January 2001 and December 2007.

	Nr Cou.	Nr Ind.	Nr Firms	Inst. Own.			Country/ Industry
				Total	Dom.	For.	
	(#)	(#)	(#)	(%)	(%)	(%)	
Panel A: All firms							
Domestic Institutional Ownership							
Bottom Quart.	46	17	2,934	5.7	0.1	5.6	2.00
Top Quart.	12	17	2,934	73.3	67.5	5.7	0.95
Foreign Institutional Ownership							
Bottom Quart.	45	17	2,934	10.7	10.6	0.1	1.73
Top Quart.	44	17	2,934	41.0	23.0	18.0	1.28
Panel B: Firms in bottom quartile of total institutional ownership							
Domestic Institutional Ownership							
Bottom Quart.	43	17	944	0.8	0.0	0.8	2.56
Top Quart.	30	17	734	1.7	1.3	0.4	1.75
Foreign Institutional Ownership							
Bottom Quart.	40	17	734	0.6	0.6	0.0	1.84
Top Quart.	43	17	734	1.8	0.3	1.5	2.08
Panel C: Firms in top quartile of total institutional ownership							
Domestic Institutional Ownership							
Bottom Quart.	28	17	734	54.7	28.4	26.3	1.08
Top Quart.	4	17	734	98.6	94.0	4.6	2.74
Foreign Institutional Ownership							
Bottom Quart.	8	17	734	66.9	66.0	1.0	1.59
Top Quart.	28	17	734	75.5	43.3	32.2	0.91

Table 6
Country and industry effects breakdown

This table reports mean values for the number of countries, number of industries, number of firms, percentage of total institutional ownership, domestic institutional ownership, foreign institutional ownership, and the 12-month rolling window estimate of the ratio between country and industry effects using the factor model in Section 3.2. Panel A analyzes firms in the bottom quartile of domestic institutional ownership, Panel B analyzes the firms in the top quartile of domestic institutional ownership, Panel C analyzes firms in the bottom quartile of foreign institutional ownership, Panel D analyzes the firms in the top quartile of foreign institutional ownership. Each panel presents a further breakdown by total institutional ownership. The period under consideration is between January 2001 and December 2007.

	Nr	Nr	Nr	Inst. Own.			Country/
	Cou.	Ind.	Firms	Total	Dom.	For.	Industry
	(#)	(#)	(#)	(%)	(%)	(%)	
Panel A: Firms in bottom quartile of domestic institutional ownership							
Total Institutional Ownership							
Bottom Quart.	42	17	734	0.1	0.0	0.1	1.90
Top Quart.	40	17	734	19.3	0.1	19.3	1.63
Panel B: Firms in top quartile of domestic institutional ownership							
Total Institutional Ownership							
Bottom Quart.	12	17	734	41.2	38.7	2.5	1.25
Top Quart.	6	17	857	99.4	90.5	8.9	1.59
Panel C: Firms in bottom quartile of foreign institutional ownership							
Total Institutional Ownership							
Bottom Quart.	42	17	734	0.1	0.0	0.1	1.85
Top Quart.	15	17	734	34.9	34.8	0.1	1.40
Panel D: Firms in top quartile of foreign institutional ownership							
Total Institutional Ownership							
Bottom Quart.	43	17	734	11.2	1.4	9.7	1.92
Top Quart.	17	17	742	90.4	65.7	24.6	0.95

Table 7
Country vs. Industry Effects - size dimension

This table reports time-series mean ratio between country and industry effects, for the factor model in section 3.2. The four columns present values for the quartiles from low to top on institutional ownership and the last column presents values for the whole sample. The period under consideration is between January 2001 and December 2007.

Panel A					
	Institutional Ownership				
	Bottom Quart.	Quart.2	Quart.3	Top Quart.	Total
Top Quart. Mkt Cap	1.69	1.66	0.95	0.76	1.24
Bottom Quart. Mkt Cap	1.55	1.31	1.08	1.29	1.31
Panel B					
	Residual Institutional Ownership				
	Bottom Quart.	Quart.2	Quart.3	Top Quart.	Total
Residual Inst. Owner.	1.83	1.77	1.04	0.78	1.37
Panel C					
	Size (Mkt Cap)				
	Bottom Quart.	Quart.2	Quart.3	Top Quart.	Total
Mkt Cap	1.39	1.57	1.36	1.15	1.37