Portfolio Concentration and Performance of Institutional Investors Worldwide

Nicole Choi
University of Wyoming
1000 E. University Ave.
Laramie, WY 82071 USA
nchoi@uwyo.edu

Mark Fedenia
University of Wisconsin-Madison
4298 Grainger Hall
Madison, WI 53715 USA
mfedenia@wisc.edu

Hilla Skiba (corresponding author)
University of Wyoming
1000 E. University Ave.
Laramie, WY 82071 USA
307-766-4199
hskiba@uwyo.edu

Tatyana Sokolyk
Brock University
500 Glenridge Ave
St. Catharines, ON L2S3A1 Canada
tsokolyk@brocku.ca

Abstract:
Using data on security holdings of 10,771 institutional investors from 72 different countries, we test whether concentrated investment strategies result in superior abnormal returns to institutional investors. We examine three measures of portfolio concentration: home country, foreign country, and industry concentration and show that portfolio concentration leads to higher abnormal returns of institutional investors worldwide. The study shows that, in contrast to the traditional asset pricing theory, concentrated investment strategies in international markets can be underdiversified but optimal. Results suggest that investors rationally choose to overweight certain markets and industries because of information advantage from specialization and economies of scale.

Keywords: international investments, institutional investors, information advantage, home bias, diversification, industry concentration

JEL: F3, G1
1. Introduction

Traditional portfolio theory predicts that investors’ portfolios should be diversified (see, e.g., Markowitz, 1952). However, empirical studies document that investors often concentrate their holdings in a few markets and securities. French and Poterba (1991), for example, show that investors are more likely to concentrate their holdings in home countries, i.e., exhibit “home bias”. Furthermore, Chan, Covrig, and Ng (2005) document that the relatively small shares of portfolios allocated abroad are often concentrated in just a few foreign countries. These findings refute the implications about investor behavior developed in traditional asset-pricing models and suggest that investors do not take advantage of international diversification opportunities.

In contrast to the traditional asset pricing theory, another strand of theoretical literature argues that portfolios can be underdiversified but optimal if they are based on information advantage (see Merton, 1987; Gehrig, 1993; Levy and Livingston, 1995; and, more recently, Van Nieuwerburgh and Veldkamp, 2009, 2010). According to Van Nieuwerburgh and Veldkamp (2009), investors first choose which assets to learn about and then decide which assets to hold. Investors earn excess returns from knowing information other investors do not know. Thus, it is in the best interest of the investors to make their information set as different as possible from the information set of an average investor. When investors have initial information advantage about some assets, they specialize in learning even more about these assets. Learning amplifies information asymmetry, allowing investors to earn greater excess returns.

While prior studies do not explore empirical implications of information advantage theory in international investments setting, several studies on the performance of US mutual funds present evidence consistent with the information advantage argument. Specifically, these studies document that portfolio concentration strategies of mutual fund managers result in better
portfolio performance. Kacperczyk, Sialm, and Zheng (2005), for example, show that mutual fund managers create value by concentrating their portfolios in a few industries. Coval and Moskowitz (2001) show that mutual funds with holdings concentrated in locally headquartered firms outperform geographically diversified funds. The analysis in these studies, however, is limited to the analysis of mutual fund managers in the US and does not provide any evidence on performance implications of concentrated investment strategies in international markets.

This study contributes to the existing literature on international investments by examining performance of institutional investors worldwide. We test the information advantage theory of Van Nieuwerburgh and Veldkamp (2009) by analyzing performance of 10,771 institutional investors from 72 different countries. We examine whether concentrated investment strategies result in higher abnormal returns to these institutional investors. The study focuses on three measures of portfolio concentration: home country, foreign country, and industry concentration. We hypothesize that if observed portfolio concentration across these different dimensions is a rational choice attributed to information advantage, subsequently it should be associated with better investors’ performance. To the best of our knowledge, we are the first to test the information advantage theory by examining asset allocations and performance of institutional investors worldwide.

Our findings can be summarized as follows. We find strong support for the information advantage theory by documenting that concentrated investment strategies are associated with higher abnormal returns of institutional investors worldwide. Results show that institutional investors with higher industry and higher country, especially foreign country, concentration exhibit better overall portfolio performance. Furthermore, higher concentration in a given country and in industries of that country results in better performance of the part of the portfolio
allocated to that country. These results hold when we examine alternative measures of portfolio performance and when we exclude mutual funds and US investors (since mutual funds and US institutions represent a large portion of the sample). Overall, our findings suggest that concentrated investment strategies (e.g., home bias, foreign and industry underdiversification) can be optimal if they are based on information advantage.

This study contributes to the existing literature in several ways. The extensive dataset of security holdings by global institutional investors allows us to compute several different measures of portfolio concentration and examine performance of different types of institutional investors worldwide. Our analysis of portfolio concentration at country level contributes to the literature on home bias and international underdiversification. The analysis of industry concentration extends the existing literature on US mutual funds and performs the analysis for different types of institutional investors worldwide. While it is well documented that investors prefer to concentrate their portfolios in home securities and in a few foreign markets, this study is the first to examine the link between performance and market/industry concentration in an international setting. We show that, in contrast to the traditional asset pricing theory, concentrated investment strategies in international markets can be optimal, providing empirical support for the information advantage theory. Furthermore, we apply a straightforward method of computing portfolio concentration that is intuitive and can be applied to calculate portfolio concentration across other dimensions. Our concentration measures indicate the portion of the portfolio that should be reallocated to achieve a perfect degree of diversification across global markets and industries. Finally, we analyze the performance of the overall portfolio and the part of the portfolio invested in a target country. Thus, we are able to trace whether portfolio concentration in a given target market (home or foreign) results in better aggregate portfolio
performance and in better performance of the part of the portfolio that is most likely to benefit from the information advantage.

The rest of the paper is organized as follows. Section 2 reviews the related literature and develops hypothesis. Sections 3 and 4, respectively, discuss our data and methodology. Section 5 presents the results, and Section 6 concludes.

2. Literature review and hypothesis development

2.1. Country concentration: Home bias and international underdiversification

Traditional asset pricing theory predicts that investors diversify across domestic and foreign markets to maximize portfolio efficiency (e.g., Markowitz, 1952; Levy and Sarnat, 1970). In contrast, empirical studies demonstrate that home-country portfolio allocations exceed and international allocations fall short of benchmark weights based on each country’s market capitalization. The preference of investors for holding home-country securities has become known as “home bias” and has been studied extensively in the finance literature since the seminal work by French and Poterba (1991).¹ Other studies have shown that home bias is widespread across developed and developing countries (see Chan, Covrig, and Ng, 2005). While several studies posit that investors can benefit from international diversification (e.g., Grubel, 1968; Levy and Sarnat, 1970; Grauer and Hakansson, 1987; among others), the observed patterns in portfolio allocations suggest that investors, on average, do not take advantage of international diversification opportunities.

¹ See Lewis (1999) and Karolyi and Stulz (2003) for reviews of the literature on home bias.
2.2. Information advantage theory

Theories based on information advantage predict that optimal portfolios can be underdiversified. Merton (1987) argues that each investor knows only about a subset of available assets. Optimal portfolios contain only a set of securities known to the investors because information costs of learning about unknown assets can be substantial. Gehrig (1993) develops a rational expectations model where home bias emerges when investors are better informed about domestic than about foreign securities. Due to informational differences, foreign investments appear more risky, and investors rationally bias their portfolios towards less risky home securities. Levy and Livingston (1995) show in a mean-variance framework that fund managers with superior information hold relatively concentrated rather than well-diversified portfolios.

More recently, Van Nieuwerburgh and Veldkamp (2009, 2010) develop a model of rational investors making a choice regarding information acquisition prior to forming portfolios. In contrast to prior models, the authors show that investors can learn about foreign markets and unfamiliar firms, but they choose not to due to comparative advantage in the initial information asymmetry. The authors consider learning and investment choices jointly and demonstrate that as investors specialize and learn more about assets in which they have initial comparative information advantage, they hold more of these assets, and the information asymmetry amplifies. Investors profit from the information asymmetry; thus, investors with prior information advantage about a given asset rationally choose to specialize in learning more about that asset. The authors conclude that the “optimal portfolio tilts the world market portfolio towards home assets” (page 1,189). They state that the information advantage theory matches the empirical patterns of local and industry bias, foreign investments, and portfolio performance – the patterns that we analyze in this paper. In the case of home bias, for example, the initial information of
home investors about home assets is slightly more precise than that of foreign investors. Thus, investors rationally choose to learn more about home rather than foreign securities and decide to hold more of home assets. This home-biased strategy is more profitable than international diversification due to comparative advantage and specialization in what investors already know. The empirical implication of this theory is that concentrated portfolios, formed on information advantage, are more profitable than well-diversified portfolios.

2.3. Concentrated investment strategies and investors’ performance

Several one-country empirical studies provide evidence consistent with the information advantage theory. Primarily, these studies show that concentrated (i.e., underdiversified) investment strategies lead to better performance. Kacperczyk, Sialm, and Zheng (2005) examine the relation between industry concentration and performance of actively managed US mutual funds. They find that industry-concentrated funds outperform other funds on a risk-adjusted basis. Brands, Brown, and Gallagher (2005), in the Australian market, document a positive relation between fund performance and portfolio concentration, measured as a deviation in portfolio weights held in stocks, industries, and sectors from the underlying index or market portfolio. Ivković and Weisbenner (2005) document that an average US household generates an additional 3.2% annual return from its local holdings, suggesting that local investors are getting an advantage from local knowledge. Similarly, Coval and Moskowitz (2001) show that money managers earn a substantial abnormal return from investing in locally headquartered firms.

In an international setting, the empirical evidence on information advantage theory has been mixed. Bhargava, Gallo, and Swanson (2001) evaluate the performance of 114 international equity managers and show that, on average, these managers do not outperform Morgan Stanley
Capital International (MSCI) World benchmark index. However, certain geographic asset allocations and equity-style allocation decisions enhance fund performance. In a more comprehensive international-performance study, Thomas, Warnock, and Wongswan (2006) investigate the performance of US international investment portfolios over 25 years in 44 countries. They document that US investors achieve significantly higher Sharpe ratios, especially since 1990, relative to global benchmarks. The authors attribute this result to the successful exploitation of public information, preference for cross-listed and well-governed firms, and selling of past winners instead of return-chasing strategies.

Several other studies compare domestic and foreign investors’ performance and provide some support for the information advantage theory. Dvořák (2005) shows that in the Indonesian market, domestic clients of global brokerages earn higher profits than foreign clients, suggesting that local information and global expertise lead to higher profits. Choe, Kho, and Stulz (2005) show that, in the Korean market, domestic investors have an edge in trading domestic stocks and attribute it to the lower transaction costs of domestic fund managers. In a cross-country study, Hau (2001) investigates trading profits earned on the German Security Exchange by 756 professional traders located in eight European countries. He finds that traders located outside of Germany, in non-German-speaking cities, have lower trading profits, though the results are not statistically significant. In a study of US holdings, Shukla and van Inwegen (2006) find that UK mutual funds under-perform US mutual funds in US stocks and attribute this performance differential to information disadvantage.

A more recent study by Ferreira, Matos, and Pereira (2009) presents evidence inconsistent with the idea that local information advantage is associated with better performance. Using a large sample of equity mutual funds from 29 countries, the authors find that foreign
managers actually outperform domestic managers. Furthermore, the foreign advantage is negatively related to information availability and market transparency. It is less pronounced during bear markets, in less developed countries, countries with lower investor protection, in smaller securities, and in securities followed by fewer analysts.

2.4. Hypothesis development

Extending these theoretical and empirical studies, we form our hypothesis on portfolio concentration and investors’ performance. We hypothesize that institutional investors with more focused investment strategies, i.e., more concentrated investment portfolios, perform better than institutional investors with more diversified portfolios. The intuition is that institutional investors with greater portfolio concentration benefit from information advantage, due to initial information asymmetry, specialization and economies of scale in information acquisition and processing. We hypothesize that focused investment strategies result in underdiversified but mean-variance efficient portfolios. Formally, the testable hypothesis states:

\[ H_0: \text{Investor's portfolio concentration is positively related to the investor's performance.} \]

We use three measures of portfolio concentration: home bias, foreign country concentration, and industry concentration. To test the hypothesis, we examine the institutional investor’s aggregate portfolio performance and the performance of the part of the portfolio concentrated in a given target market. Portfolio concentration and performance measures are described in Section 4 of the paper.
3. Data

We use quarterly institutional holdings data from the FactSet (formerly LionShares) database, which contains detailed information for approximately 13,000 institutional investors from 110 different countries. Using various publicly available sources of information, FactSet collects holdings’ data on institutional investors with greater than 10% of total net assets invested in listed equities. The database covers companies with a market capitalization of more than 50 million US dollars and accounts for all institutional holdings equal to or larger than 0.1% of the company’s issued shares.

To compile a complete holdings’ profile for each institutional investor, FactSet contacts mutual fund associations and regulatory authorities in each country. For example, for equities traded in the US, various mandatory reports (e.g., 13-F, N-Q, N-CSR, and 485BPOS) are used to collect ownership data, but where regulatory filings fall short, portfolio reports are obtained either from the fund’s website or by direct contact with the fund company or its distributors. For equities traded outside of the US, FactSet gathers data from similar regulatory filings, company reports and announcements, and industry directories. The database provides detailed information on each individual security that is held by each institutional investor in any given quarter, including the number of shares and the market value of each security in the investor’s portfolio. In addition, FactSet contains detailed data on the investor’s domicile country, security’s country of exchange, and many other investor and security characteristics.²

² Prior studies, e.g., Li, Moshirian, Pham, and Zein (2006), Ferreira and Matos (2008), and Ferreira, Matos, and Pereira (2009) use a subset of FactSet data that we study here. Ferreira and Matos (2008) provide an extensive set of summary statistics and explain in great detail comprehensiveness and limitations of the database.
We use quarterly filings of institutional holdings from the last quarter of 1999 to the first quarter of 2010. Following FactSet’s classification, we use the location of the institution’s main operations to define the institution’s domicile country and we refer to it as “home country”. We define institutional holdings as “domestic”, if the institution’s domicile country is the same as the security’s country of exchange. We define institutional holdings as “foreign”, if the institution’s domicile country is different from the security’s country of exchange. Since the focus of our study is on international investments, we only keep institutions that own at least one foreign security in their portfolio for a given quarter. This also eliminates institutions that are restricted from owning assets in foreign markets. In addition, we only keep institutions with at least 50% of their holdings in equities. To study the performance of institutional investors, we merge the security-level holdings’ data to the security’s price data in FactSet. FactSet’s holdings data are reported at the aggregate firm level and, where applicable, at the portfolio level inside each firm. We analyze portfolio holdings, not aggregate holdings of the investment firm. We refer to these portfolios as “institutions” or “institutional investors”.

Table 1 presents the sample distribution by the investor’s home country (Panel A) and by target country (Panel B). Panel A shows that virtually all parts of the world are represented in our sample, with wide representation from developed and emerging markets. Altogether, the sample consists of 10,771 institutional investors. About 40% of the sample, 4,262 institutions, are institutional investors from the US, followed by 890 institutions from the United Kingdom, and 889 from Canada. Other less researched countries are also represented in the sample; for

---

3 We also use the security’s country of domicile as an alternative way to define “home country”. The results are unaffected by the definition.
example, the sample includes 251 institutions from South Africa, 183 from India, 130 from Taiwan, and 57 from Brazil. Panel A also shows time-series median of the total value of assets under management (in billions of US dollars) by all institutional investors domiciled in each country. The total market value of assets of US institutional investors is $8.607 trillion US dollars, which is the highest among all institutions in our sample, followed by $1.313 trillion US dollars for UK investors, and by $375 billion US dollars for Canadian investors.

Panel B shows each target country’s average share of the world market capitalization during the time period of our study. The percentage of float shares is calculated by dividing the total market value of investable, or “float” shares of each country by the aggregate market value of float shares from our sample countries. The percentage of total shares is calculated by dividing the total market capitalization of each country by the aggregate market capitalization of every country in our sample. Total market value and total float share values are from Worldscope as of the end of 2012. Panel B shows that about 40% of the investable world market capitalization consists of the securities listed in the US market, followed by almost nine percent in United Kingdom (8.68%), 8.39% in Japan, and 7.23% in China.

[Insert Table 1 here]

4. Methodology

4.1. Performance analysis at the institutional portfolio level

4.1.1. Portfolio performance measure

To test our hypothesis, we first conduct the analysis at the institution’s overall portfolio level, using portfolio excess return as a measure of performance. Portfolio excess return, Ret_{t,q}, is calculated as the value-weighted return of the securities held by the institution over a given
quarter less the global risk-free rate over the same quarter, obtained from Kenneth French’s data library.\textsuperscript{4} Value-weighted quarterly returns are compounded using split-adjusted monthly returns for three consecutive months surrounding the reporting month \((Ret_{t-1,t+1})\).\textsuperscript{5} We analyze whether institutional investors who concentrate their portfolios in a few markets and industries achieve better portfolio performance than globally/industry diversified investors.

We examine three measures of portfolio concentration: home bias, foreign concentration, and global industry concentration (each measure discussed below). We conjecture that coefficients on these portfolio concentration measures should take a positive sign if institutional investors with more concentrated portfolios outperform investors with more diversified portfolios due to information advantage from the initial information asymmetry and specialization in a given set of securities. In all of our regressions we also control for the institution’s portfolio size and systematic risk. \textit{Portfolio Size} is measured as the natural logarithm of the institution’s market value of equity in quarter \(q\). \textit{Market Premium} is the market return in quarter \(q\) less the global risk-free rate in the same quarter. Market return equals to global market return, obtained from Kenneth French’s data library, when evaluating overall portfolio performance and it equals to each country’s equally weighted market return, based on securities’

\textsuperscript{4} Kenneth French’s Data Library: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

\textsuperscript{5} The portfolio return is the return to the hypothetical portfolio that consists of the securities reported by the institution. We compute the return to portfolio of securities leading up to the reporting month (month \(t\)) from two months prior \((Ret_{t-2,})\) and three months following the reporting month \((Ret_{t+1,t+3})\) as a robustness check. We believe that the way we compute the hypothetical returns eliminates survivorship bias from the sample.
return data for that country, when evaluating performance in the target country (home or foreign). Securities’ return data are obtained from FactSet.

We also examine whether the results on concentration measures hold once we control for additional dimensions of systematic risk. We do this by including size ($SMB_q$), value ($HML_q$), and momentum ($UMD_q$) global factors in the analysis. These factors have been used in prior studies to explain the variation in international stock returns (see Fama and French, 2010, 2012; Ferreira, Matos, and Pereira, 2009; Hou, Karolyi, and Kho, 2011). $SMB_q$ is the difference between the returns on a diversified portfolio of small and large stocks over quarter $q$; $HML_q$ is the difference between the returns of value and growth stocks over quarter $q$; and $UMD_q$ is the difference between the returns on winners and losers over quarter $q$. Data on the global factors are also from Kenneth French’s data library.

### 4.1.2. Portfolio concentration measures

This section describes three portfolio concentration measures used in this study: Home Bias, Foreign Concentration, and Global Industry Concentration. Appendix provides numerical examples of each measure.

**Home Bias**

For each institutional investor, we calculate portfolio *Home Bias* as the difference between the actual portfolio weight of the institution’s holdings in the home country and the expected portfolio allocation to the home country. To calculate the actual portfolio weight of the home country, we compute a quarterly portfolio weight of stock holdings in the home country.
divided by the total value of the institution’s aggregate portfolio in a given quarter. Actual portfolio weight of the home country, Home Weight, is formally defined as:

$$Home \ Weight_{i,q} = \frac{P_{i,I,q}}{\sum_{I \in J} P_{i,I,q}}$$ (1)

where $P_{i,I,q}$ is the total market value of all securities held by institution $i$ in the home country $I$ in quarter $q$. The denominator is the total value of institution $i$’s aggregate portfolio invested in $J$ countries, including the investor’s home country $I$, in quarter $q$.

Expected portfolio allocation to investor $i$’s home country in quarter $q$ is based on country $I$’s share of the world market capitalization reported by WorldScope. According to the traditional asset pricing theory, the portion of the portfolio invested in a given country should equal to the country’s world capitalization weight. For example, since US market float capitalization accounts for about 40% (Panel B in Table 1) of the aggregate world market capitalization during our sample period, investors worldwide should hold 40% of their overall portfolios in US stocks and invest the remaining 60% in the securities of other countries. Formally, Home Bias for institutional investor $i$ in quarter $q$, is calculated as:

$$Home \ Bias_{i,q} = Home \ Weight_{i,q} - \frac{MV_{I,q}}{\sum_{I \in J} MV_{J,q}}$$ (2)

---

6 We use both the securities’ total market capitalization and “float based” or “investable” market capitalization to calculate the expected allocation. Since float based capitalization is typically used in international studies, we report the results using float based computation.
where $Home\ Weight_{i,q}$ is defined in Eq. (1), $MV_{i,q}$ is the total market value of institution $i$’s home country $I$ in quarter $q$, and the denominator of the second term on the right-hand side is the aggregate world market capitalization in quarter $q$. $Home\ Bias$ measure captures under/overweighting of institution $i$’s home country $I$ relative to the share of country $I$ in the aggregate world market capitalization. Higher $Home\ Bias$ value indicates that the investor’s portfolio is more overweighted in the investor’s home country.

**Foreign Concentration**

We then compute $Foreign\ Concentration$ measure for each institutional investor. In contrast to $Home\ Bias$, which indicates the under- or overweight of the institution’s home country in the institution’s aggregate portfolio, $Foreign\ Concentration$ measure indicates whether or not the investor’s foreign share of the portfolio is well-diversified across foreign markets. The traditional asset pricing theory suggests that portfolio weight allocated to a given foreign country should equal to that country’s share of the world market capitalization. In practice, investors worldwide tend to concentrate their portfolios only in a few foreign markets. We conjecture that investors may choose to concentrate their holdings in a few foreign markets if learning about a narrow set of assets generates information advantage. If there is information advantage to focusing and specializing in a few foreign markets, then portfolios concentrated in a few foreign markets should outperform portfolios that are well-diversified across foreign markets. In contrast, the traditional asset pricing theory predicts that well-diversified portfolios outperform concentrated portfolios.

To calculate $Foreign\ Concentration$ measure, we first compute each institution’s $Foreign\ Bias$ in each foreign country that is available for investment, and then aggregate $Foreign\ Bias$
across all countries, excluding the institution’s home country. We take the following two steps to calculate Foreign Bias. First, we calculate Foreign Weight as:

\[
Foreign Weight_{i,J,q} = \frac{p_{i,J,q}}{\sum_{l \in J} p_{i,J,q}},
\]

where \( p_{i,J,q} \) is the total market value of the securities held by institution \( i \), listed in country \( J \) in quarter \( q \). The denominator is the total market value of the securities held by institution \( i \) in \( J \) countries, excluding the investor’s home country \( I \) in quarter \( q \).\(^7\)

We then calculate Foreign Bias, similar to the Home Bias in Eq. (2), as follows:

\[
Foreign Bias_{i,J,q} = Foreign Weight_{i,J,q} - \frac{MV_{J,q}}{\sum_{l \in J} MV_{J,q}},
\]

where \( Foreign Weight_{i,J,q} \) is the actual allocation to the foreign market \( J \) in investor \( i \)'s portfolio in quarter \( q \), calculated in Eq. (3), and the second term on the right-hand side is the expected portfolio allocation to country \( J \), calculated according to the country’s world capitalization

\(^7\) Since the extant literature documents a large home bias in the investors’ portfolios, scaling by the total value of foreign holdings rather than by the total value of overall portfolio captures the investor’s concentration in the foreign markets more precisely. We believe that computing foreign bias without the home market is an improvement to the way prior literature (e.g., Chan, Covrig, and Ng, 2005) computes foreign underdiversification because it allows us to focus on the foreign country weights independent of home bias. Foreign bias computed including the home market results in a foreign bias measure that is highly correlated with home bias. For robustness, we also compute Global Concentration measure, which includes home country \( I \) and uses total portfolio weights. The Global Concentration is highly correlated with home bias, and produces results quantitatively similar to the home bias results. Therefore, we omit the regressions with Global Concentration from the paper for brevity.
weight, excluding investor $i$’s home country $I$. This *Foreign Bias* measure indicates whether the investor over/underweights country $J$ in quarter $q$ relative to country $J$’s share of the world market capitalization in quarter $q$, excluding the investor’s home country $I$. The foreign bias measure is computed for all available target markets, even if investor $i$’s actual investment in country $J$ is zero.\(^8\)

To estimate the degree of investor’s concentration in foreign markets, we calculate *Foreign Concentration* by aggregating *Foreign Bias* from Eq. (4) across all available foreign countries. The resulting *Foreign Concentration* measure is:

\[
\text{Foreign Concentration}_{i,q} = \sum_{J} \left| \frac{\text{Foreign Bias}_{i,J,q}}{2} \right|.
\]  \(\text{(5)}\)

This measure can be interpreted as the fraction of the institution’s foreign holdings that should be reallocated across foreign countries to achieve perfect foreign diversification. It is zero for portfolios with allocations in foreign countries made exactly in line with countries’ market capitalization weights, thus, for perfectly diversified portfolios. A measure greater than zero indicates the portfolio is not perfectly diversified across foreign countries but instead is concentrated in a few foreign countries. The upper bound of the measure is 1.0, meaning that 100% of the institution’s foreign holdings should be reallocated across foreign markets.\(^9\)

---

\(^8\) We define the set of “available” target markets based on a positive float weight according to WorldScope. Additionally, we require a presence of at least one foreign institutional investor before including target market $J$ in our analysis.

\(^9\) Theoretically, the upper bound on *Foreign Concentration* approaches 1. In our sample all target markets have non-zero market capitalization (the smallest float-based percentage share is 0.0017% for Bulgaria), so an investor with
Appendix provides some simple numeric examples of *Foreign Bias* and *Foreign Concentration* calculations and interpretations.

*Global Industry Concentration*

In addition to home and foreign markets portfolio concentrations, we examine portfolio industry concentration. Kacperczyk, Sialm, and Zheng (2005) document, using a sample of US mutual funds, that industry concentrated portfolios outperform industry diversified portfolios. They suggest that managers of industry concentrated funds possess some information advantage about industry performance. Extending their study, we examine whether industry concentration enhances investors’ performance in the sample of global institutional investors. To estimate portfolio industry concentration, we calculate *Global Industry Concentration* as the aggregate of the differences between institutions’ actual and expected allocations to a given industry. Similar to the calculation of the *Foreign Concentration* measure, we first calculate industry bias of each institutional investor in each available industry, defined based on the two-digit industry SIC code. We then aggregate these individual industry biases into one comprehensive portfolio level concentration measure. Formally, the *Global Industry Bias* is calculated as:

\[
Global\ Industry\ Bias_{i,SIC,q} = \frac{p_{i,SIC,q}}{\sum_{SIC} p_{i,SIC,q}} - \frac{MV_{SIC,q}}{\sum_{SIC} MV_{SIC,q}},
\]

where \(p_{i,SIC,q}\) is the market value of all securities held by institution \(i\) in quarter \(q\) that belong to a two-digit *SIC* industry. We scale this value by the total market value of institution’s holdings all his holdings in a very small market will have a measure close to 1 but not actually 1 (e.g., an investor whose entire foreign portfolio is invested in Bulgaria needs to reallocate 99.9983% of his investment).
across all industries in quarter $q$. If institution $i$ has zero investment in the two-digit $SIC$ in quarter $q$, the first term on the right-hand side is zero. The second term on the right-hand side is the expected allocation to the two-digit $SIC$ industry, calculated as the market value of all securities in a given industry in quarter $q$, divided by the total market value of securities across all industries in quarter $q$, i.e., the total world market capitalization in quarter $q$. We then aggregate the industry biases for each institution $i$ in each industry $SIC$ and calculate $Global Industry Concentration$ as:

$$Global Industry Concentration_{i,q} = \sum_{SIC} \left| \frac{Global Industry Bias_{i,SIC,q}}{2} \right|.$$  (7)

This measure can be interpreted as the fraction of the institution’s holdings that should be reallocated across industries to achieve perfect global industry diversification. It is zero for an investor with portfolio allocations in industries made exactly in line with industries’ market capitalization weights, thus, for a perfectly diversified portfolio. A measure greater than zero indicates the portfolio is not perfectly diversified across industries. The upper bound of the measure is 1.0 which suggests that 100% of the portfolio has to be reallocated to achieve perfect industry diversification (see footnote 9). The Appendix also provides some simple numeric examples of $Global Industry Concentration$ calculations and interpretations.

4.2. Performance analysis at the target market level

In addition to the overall portfolio performance, we examine the institution’s performance in the part of the portfolio concentrated in a given target market. According to the information advantage theory, investors benefit from specializing and concentrating their holdings in a few set of securities. We analyze if the investor’s concentration in a given country
enhances the investor’s performance in that country’s securities. In other words, we examine whether investors choose to concentrate their holdings in certain countries because they have some information advantage about securities’ payoffs in these countries, resulting in higher excess returns in the investments in the target market. This analysis complements the aggregate portfolio analysis and addresses the possibility that investors may achieve above-benchmark performance in countries where they concentrate their holdings, but the superior performance may not be evident when overall portfolio performance is considered. To test whether concentration in a given country enhances the investor’s performance in that country’s securities, we analyze if higher portfolio weight in country $J$ enhances institution $i$’s performance in country $J$’s securities. In addition, we analyze if high industry concentration in country $J$ enhances institution $i$’s performance in country $J$’s securities.

For these analyses, we compute excess returns for each institution $i$ in each country $J$ in which institution $i$ has holdings. The quarterly excess return in target country $J$ for each institutional investor $i$, $\text{Ret}_{i,J,q}$, is calculated as value-weighted return on the securities held by institution $i$ in country $J$ in quarter $q$, less the global risk-free rate over the same time period.\textsuperscript{10} The country concentration measure, $\text{Country Weight}_{i,J,q}$, equals to $\text{Home Weight}$ (Eq. (1)) when target country $J$ is the investor’s home country and equals to $\text{Foreign Weight}$ (Eq. (3)) when

\textsuperscript{10} Similar to the portfolio return, the market $J$ return is the return to the hypothetical portfolio that consists of the securities reported by the institution. We compute the return to market $J$ securities leading up to the reporting month and three months following the reporting month as a robustness check. We believe that the way we compute the hypothetical returns eliminates survivorship bias from the sample.
target country $J$ is a foreign country. The industry concentration measure in a given country is calculated as described below.

We start by calculating *Country Industry Bias* as the difference between the actual allocation of the institution’s holdings invested in a given industry in each country and the expected allocation to the industry in that country:

$$
Country \text{ Industry Bias}_{i,SIC,J,q} = \frac{p_{i,SIC,J,q}}{\sum_{SIC} p_{i,SIC,J,q}} - \frac{MV_{SIC,J,q}}{\sum_{SIC} MV_{SIC,J,q}},
$$

where $p_{i,SIC,J,q}$ is the total market value of investor $i$’s holdings in two-digit industry $SIC$ in country $J$ in quarter $q$, and $MV_{SIC,J,q}$ is the total market value of all securities classified in two-digit industry $SIC$ in country $J$ in quarter $q$. The denominator of the first term on the right-hand side is the total market value of institution $i$’s portfolio in quarter $q$ invested in country $J$ and the denominator of the second term on the right-hand side is the total market capitalization of country $J$ in quarter $q$. Following methodology described in Section 4.1.3, the *Country Industry Concentration* measure is calculated as:

$$
Country \text{ Industry Concentration}_{i,J,q} = \sum_{SIC} \left| \frac{Country \text{ Industry Bias}_{i,SIC,J,q}}{2} \right|.
$$

The interpretation of *Country Industry Concentration* is similar to that of *Global Industry Concentration*. It is the fraction of institution $i$’s portfolio that should be reallocated across different industries in country $J$ to achieve perfect industry diversification within country $J$.

4.3. Country and industry concentration measures: Summary statistics
Table 2 presents average values of *Home Bias, Foreign Concentration, and Global Industry Concentration* for the sample institutions. Panel A shows the measures by institution’s type and Panel B by institution’s style. As far as institution’s type, mutual funds are the most represented category (66.64% of the sample), followed by investment advisors (18.29%) and hedge funds (5.26%). All types of institutions overweight the home market quite heavily, with the average *Home Bias* measure of 0.412. Insurance funds overweight the home market the most (*Home Bias* = 0.624), while mutual funds overweight the home market the least (*Home Bias* = 0.384). Similarly, all institutions are heavily concentrated in a few foreign markets. The average *Foreign Concentration* measure of 0.648 indicates that almost 65% of institutions’ foreign holdings should be reallocated across foreign markets to achieve perfect diversification. Again, out of all institutions’ types, insurance funds are the most concentrated in the foreign markets (*Foreign Concentration* = 0.775), and mutual funds are the least concentrated in the foreign markets (*Foreign Concentration* = 0.628). All institutional investors are also heavily industry concentrated. The sample average *Global Industry Concentration* is 0.660 and ranges from 0.594 for pension funds/endowments to 0.810 for hedge funds. The measure shows that, on average, over 60% of the institutions’ portfolios in a given country should be reallocated across different industries.

Panel B breaks the sample by the investment style and shows that 28% of the institutions follow GARP (Growth At Reasonable Price) investment style, almost 26% label themselves as Value funds, and 20% follow Growth investment strategy. The *Home Bias* value ranges from 0.326 for Index funds to 0.556 for Aggressive Growth funds. *Foreign Concentration* is also the highest for the Aggressive Growth (0.794) and is the lowest for the GARP funds (0.588). All
investment style categories are heavily industry concentrated, with the Index funds having the lowest *Global Industry Concentration* measure of 0.502, and Deep Value the highest of 0.794.

[Insert Table 2 here]

Overall, sample description in Table 2 shows that institutions of different types and with different investment styles are heavily concentrated in home markets’ securities and in a few industries. The parts of the portfolios that are allocated to foreign countries are heavily concentrated in a few foreign countries. This evidence on a wide range of institutional investors worldwide complements prior evidence documented in a single- or a few-countries’ studies for selected types of institutional investors (e.g., mutual funds).

5. Results

5.1. Portfolio level performance

Table 3 presents the results of ordinary least squares (OLS) regressions of institution’s excess portfolio returns on portfolio concentration measures.

[Insert Table 3 here]

In specifications 1, 2, and 3, we examine individually our main explanatory variables: *Home Bias*, *Foreign Concentration*, and *Global Industry Concentration*, respectively. The coefficients on all three portfolio concentration measures are positive and significant at the 1% level, suggesting that institutional investors who concentrate their holdings in home country and in a few foreign countries and industries achieve better portfolio performance. In specification 4, we include all three measures of portfolio concentration simultaneously and show that the coefficients on all three portfolio concentration measures remain positive, even though the statistical significance of *Home Bias* measure drops to the 10% level. All four models control for
the size of the institution’s portfolio and the global market premium and include year, institution’s style and type fixed effects. To adjust for additional dimensions of systematic risk, in addition to the global market premium, we follow Fama and French (2012) and add global risk factors (SMB, HML, and UMD) in specification 5. The coefficients on Foreign Concentration and Global Industry Concentration remain positive and highly significant at the 1% level; however, the statistical significance of Home Bias drops below conventional levels.  

Overall, the results presented in Table 3 indicate that portfolios that are more concentrated in a few countries and industries perform better than portfolios that are more diversified across countries and industries. The result is particularly strong for portfolio concentration in foreign markets and industries. These findings suggest that investors have some information advantage when forming concentrated portfolios, which results in better portfolio performance at risk adjusted basis.

5.2. Performance in the target market

In this section, we examine performance of the part of the institutional investor’s portfolio concentrated in a given target market. We hypothesize that if portfolio concentration is based on information advantage, the investor’s concentration in a given country should result in better performance in that country’s securities. We examine the relation between the

11 However, in unreported results that replicate analysis of specification 1 with the four factor model, home bias is positive and statistically significant. This is true across the robustness checks in this paper. Home bias is consistently positive determinant of performance. However, when included simultaneously with the other two concentration measures, home bias in some cases loses its significance.
performance of each institutional investor in the target market and our three portfolio concentration measures. To measure the performance of each institutional investor in the target market we calculate excess returns for each institution $i$ in each country $J$ in which institution $i$ has holdings, as defined in Section 4.2.

Table 4 reports the results. Panel A presents findings for the institution’s performance in the institution’s home market, where the variable $Country Weight$, equals to $Home Weight$ (Eq. (1)). Panel B presents the results for investments outside of the institution’s domicile country, where $Country Weight$ equals to $Foreign Weight$ (Eq. (3)). The coefficient on $Country Weight$ should carry a positive sign if portfolio concentration in any particular target market (either foreign or home) improves the investor’s performance in that market. In addition to target market concentration, we examine the effect of industry concentration in a given target market by including $Country Industry Concentration$ variable defined in Section 4.2. If investors concentrate in a few industries in a given target market because of information advantage, the coefficient on $Country Industry Concentration$ should be positive. Similar to the analysis presented in Table 3, we perform panel OLS regressions and first include country (specification 1) and industry (specification 2) concentration measures individually and then combine two measures in specification 3. In all specifications we control for portfolio size and the target country $J$ market premium. In specification 4 we also add size, value, and momentum global risk factors. In addition to year, style, and type fixed effects, we also include country fixed effects (home country in Panel A; home and foreign country in Panel B) to account for any differences in legal environment, investor protection, and economic development across countries.

The results presented in Tables 4 show that $Country Weight$ is positive and highly significant in all specifications, indicating that increasing portfolio concentration in a given
target market (either home or foreign) results in better performance in the target market’s securities. The result holds when we include year and country fixed effects and when we include fixed effects for the institutional investor’s style and type.

[Insert Table 4 here]

In addition to country concentration, we examine the effect of \textit{Country Industry Concentration} (Eq. (9)) and expect a positive sign on this variable if concentrating in a given industry improves the investor’s performance. Extending prior findings for the US market in Kacperczyk, Sialm, and Zheng (2005), we show that industry concentration enhances performance of institutional investors globally. The coefficient on \textit{Country Industry Concentration} is positive and highly significant in all specifications suggesting that institutional investors who overweight certain industries in their home (Panel A) and foreign (Panel B) countries, as opposed to diversifying across industries, possess information advantage in these industries as they achieve better performance.

Again, the results are robust to including controls for year, home, and target country fixed effects, institution’s style and type, and Fama and French (2012) global risk factors. These results provide additional support for the findings presented above that concentrated portfolios are optimal due to information advantage from economies of scale and specialization.

\subsection*{5.3. Robustness Checks}

\subsubsection*{5.3.1 Alternative measure of abnormal returns}

In this section, we examine an alternative measure of the dependent variable used in the portfolio level performance analysis. Instead of using portfolio excess return as in Table 3, we
measure abnormal return (alpha (α)) of the institutional investor’s portfolio from the following regression as per Fama and French (2012):

\[
Ret_{i,q} = \alpha_i + \beta_i MP_q + \chi_i SMB_q + \delta_i HML_q + \gamma_i UMD_q + \epsilon_{i,q},
\]

(10)

where \( Ret_{i,q} \) is the portfolio excess return as described in section 4.1, \( MP_q \) is the global market premium, \( SMB_q \) is the global size factor, \( HML_q \) is the global book-to-market factor, and \( UMD_q \) is the global momentum factor, all obtained from Kenneth French’s data library.

Similar to the analysis presented in Table 3, we examine the relation between portfolio performance, measured as alpha from Eq. (10)\(^{12}\), and our three portfolio concentration measures: Home Bias, Foreign Concentration, and Global Industry Concentration. Portfolio Size, measured as the institution’s total market value of equity in quarter \( q \) is used as a control variable. We also include year and institution’s style and type fixed effects. The results are presented in Table 5.

[Insert Table 5 here]

---

\(^{12}\) In these robustness checks, we have explored several windows in measuring portfolios’ rolling alphas. The shortest time period in estimating alpha is two years (eight quarters) and the longest time period is over 10 years (40 quarters). Because we are dealing with quarterly observations of excess performance, the shorter time periods’ alphas have a high variance (although the mean and median are near zero, as expected). The accuracy of the alpha estimation improves when we use longer windows and therefore the robustness checks reported in this paper include alphas that are estimated using all available observations for each institution. The coefficients on portfolio concentration measures are, however, similar if we use alpha from these various rolling windows as the dependent variable.
Similar to the analysis described above, we first examine the effect of *Home Bias*, *Foreign Concentration*, and *Global Industry Concentration* individually (specifications 1, 2, and 3, respectively). In specification 4 we combine all three portfolio concentration measures. Results for this alternative measure of abnormal performance are consistent with those presented in Table 3. All three portfolio concentration measures are positive and significant at the 1% level when they are included separately. The coefficient on *Home Bias* remains positive but loses statistical significance once all concentration measures are examined simultaneously (specification 4). This analysis confirms our results with an alternative portfolio performance measure.

5.3.2. *Mutual funds vs. other types of institutional investors*

The sample examined in this study consists of different types of institutional investors; however, mutual funds dominate the sample. While we control for the institution’s type in all our regressions presented above, in this section we perform the analysis separately for mutual funds and for all other types of institutional investors. The purpose of this analysis is to examine whether the positive relation between portfolio concentration and performance is driven by mutual funds and cannot be generalized to other types of institutional investors. Table 6 presents the results of this analysis and replicates Tables 3 and 4 separately for mutual funds (MF) and for all other institutional investors (non-MF). Panel A presents the results of overall portfolio excess returns. Panels B and C present the results of excess returns in the home and foreign target markets, respectively. Similar to our prior analysis, the regressions are run by including portfolio concentration measures first individually and then simultaneously.

[Insert Table 6 here]
Overall, the results hold for mutual funds and for other types of institutional investors. In general, the evidence is consistent with the hypothesis that portfolio concentration in country and industry is beneficial for the performance of mutual funds and of other types of institutional investors.

5.3.3. Performance of non-US institutional investors

Another possibility is that the positive relation between portfolio concentration and investors’ performance documented above is driven by US investors. Institutional investors from the US comprise 40% of the sample. It is possible that only US investors benefit from concentrated investment strategies and information advantage due to better development of financial markets and other factors. Even though we control for country fixed effects in our prior regressions, in Table 7, we report the results of portfolio level performance (Panel A) and performance in the home (Panel B) and foreign (Panel C) target markets for the sample of non-US institutional investors. Results for non-US institutional investors are similar to the results for the entire sample of institutional investors. Portfolio concentration across industry or target country improves the performance of non-US institutional investors. These results confirm that the findings for country and industry concentration are not driven by the largest group of the investors (the US investors). These findings suggest that portfolio concentration across countries and industries results in better performance of institutional investors worldwide.

[Insert Table 7 here]

6. Conclusion
Prior empirical studies document that investors often pursue concentrated rather than diversified investment strategies. These findings refute the implications of traditional asset pricing theory that diversified portfolios are optimal and suggest that investors do not take advantage of international diversification opportunities. More recent theoretical studies (e.g., Gehrig 1993; Van Nieuwerburgh and Veldkamp 2009, 2010) argue that portfolios can be underdiversified but optimal if they are formed on information advantage.

Using data on security holdings of 10,771 institutional investors from 72 different countries, we test whether concentrated investment strategies result in superior abnormal returns to institutional investors worldwide. We examine three measures of portfolio concentration: home bias, foreign country concentration, and industry concentration; and we use two measures of institutional investors’ performance: overall portfolio performance and performance of the part of the portfolio invested in a target country. We find strong support for the information advantage theory with respect to all concentration measures. Results show that home country, foreign country, and industry focus lead to higher abnormal returns of institutional investors worldwide.

We contribute to the existing literature in several ways. First, we analyze the extensive dataset of security holdings by global institutional investors and compute several different measures of portfolio concentration and performance of institutional investors worldwide. Second, we introduce a method of computing portfolio concentration that is intuitive and straightforward and can be used to calculate portfolio concentration across other different dimensions. Finally, we analyze the performance of the overall portfolio and the part of the portfolio invested in a target country, examining whether portfolio concentration in a given target market or in a given industry results in better aggregate portfolio performance or in better
performance of the part of the portfolio that is more likely to benefit from the information advantage. Our study contributes to the literature on home bias and international underdiversification and extends the existing literature on industry concentration of US mutual funds.
References


Li, D., Moshirian, F., Pham, P., Zein, J., 2006. When financial institutions are large shareholders: The role of macro corporate governance environments, Journal of Finance 61, 2975-3007.


Table 1
Sample distribution by investor home country and target country

Table 1 reports sample distribution by institutional investor’s home country (Panel A) and by target country (Panel B). The sample consists of 10,771 institutions from 72 countries with allocations in 40,374 securities traded in 54 different countries. Panel A reports number of institutional investors (Number of Institutions), percentage relative to the total number of institutions in our sample (% of total), and time-series median, in billion US dollars, of total market values of all institutions’ holdings in each home country (Total MV USD bil.). Panel B reports percentage of investable market share (% of Float Shares) and percentage of total market share (% of Total Shares) of each target market relative to the total market capitalization of all countries in our sample. Investor home country is the location of the institution’s main operations; target country is the security’s country of exchange. Data are from the FactSet institutional quarterly holdings database from the last quarter of 1999 to the first quarter of 2010. Total shares and Float shares are from WorldScope as of the end of 2012.

(continues)
Table 1 (continued)

Panel A: Distribution by investor’s home country

<table>
<thead>
<tr>
<th>Home Country</th>
<th>Number of Institutions</th>
<th>% of total</th>
<th>Total MV USD bil.</th>
<th>Home Country</th>
<th>Number of Institutions</th>
<th>% of total</th>
<th>Total MV USD bil.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>2</td>
<td>0.02</td>
<td>0.03</td>
<td>Malaysia</td>
<td>59</td>
<td>0.55</td>
<td>29.39</td>
</tr>
<tr>
<td>Australia</td>
<td>171</td>
<td>1.59</td>
<td>162.36</td>
<td>Mauritius</td>
<td>1</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Austria</td>
<td>59</td>
<td>0.55</td>
<td>6.96</td>
<td>Mexico</td>
<td>5</td>
<td>0.05</td>
<td>0.77</td>
</tr>
<tr>
<td>Belgium</td>
<td>55</td>
<td>0.51</td>
<td>46.48</td>
<td>Morocco</td>
<td>2</td>
<td>0.02</td>
<td>1.26</td>
</tr>
<tr>
<td>Bermuda</td>
<td>1</td>
<td>0.01</td>
<td>0.02</td>
<td>Namibia</td>
<td>6</td>
<td>0.06</td>
<td>0.13</td>
</tr>
<tr>
<td>Botswana</td>
<td>1</td>
<td>0.01</td>
<td>0.03</td>
<td>Netherlands</td>
<td>88</td>
<td>0.82</td>
<td>74.11</td>
</tr>
<tr>
<td>Brazil</td>
<td>57</td>
<td>0.53</td>
<td>3.97</td>
<td>New Zealand</td>
<td>14</td>
<td>0.13</td>
<td>5.75</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>2</td>
<td>0.02</td>
<td>0.01</td>
<td>Norway</td>
<td>79</td>
<td>0.73</td>
<td>108.16</td>
</tr>
<tr>
<td>Canada</td>
<td>889</td>
<td>8.25</td>
<td>374.94</td>
<td>Oman</td>
<td>2</td>
<td>0.02</td>
<td>0.03</td>
</tr>
<tr>
<td>Chile</td>
<td>15</td>
<td>0.14</td>
<td>4.10</td>
<td>Pakistan</td>
<td>17</td>
<td>0.16</td>
<td>0.11</td>
</tr>
<tr>
<td>China</td>
<td>28</td>
<td>0.26</td>
<td>6.17</td>
<td>Peru</td>
<td>1</td>
<td>0.01</td>
<td>0.88</td>
</tr>
<tr>
<td>Colombia</td>
<td>2</td>
<td>0.02</td>
<td>0.10</td>
<td>Philippines</td>
<td>4</td>
<td>0.04</td>
<td>0.56</td>
</tr>
<tr>
<td>Croatia</td>
<td>14</td>
<td>0.13</td>
<td>0.13</td>
<td>Poland</td>
<td>158</td>
<td>1.47</td>
<td>6.32</td>
</tr>
<tr>
<td>Cyprus</td>
<td>1</td>
<td>0.01</td>
<td>0.00</td>
<td>Portugal</td>
<td>91</td>
<td>0.84</td>
<td>4.26</td>
</tr>
<tr>
<td>Czech Rep.</td>
<td>10</td>
<td>0.09</td>
<td>0.57</td>
<td>Qatar</td>
<td>1</td>
<td>0.01</td>
<td>7.13</td>
</tr>
<tr>
<td>Denmark</td>
<td>80</td>
<td>0.74</td>
<td>38.72</td>
<td>Romania</td>
<td>11</td>
<td>0.10</td>
<td>0.27</td>
</tr>
<tr>
<td>Egypt</td>
<td>4</td>
<td>0.04</td>
<td>0.41</td>
<td>Russia</td>
<td>4</td>
<td>0.04</td>
<td>0.18</td>
</tr>
<tr>
<td>Estonia</td>
<td>6</td>
<td>0.06</td>
<td>0.41</td>
<td>Saudi Arabia</td>
<td>5</td>
<td>0.05</td>
<td>1.01</td>
</tr>
<tr>
<td>Finland</td>
<td>110</td>
<td>1.02</td>
<td>28.32</td>
<td>Singapore</td>
<td>130</td>
<td>1.21</td>
<td>80.21</td>
</tr>
<tr>
<td>France</td>
<td>489</td>
<td>4.54</td>
<td>204.88</td>
<td>Slovakia</td>
<td>1</td>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td>Germany</td>
<td>376</td>
<td>3.49</td>
<td>207.83</td>
<td>Slovenia</td>
<td>28</td>
<td>0.26</td>
<td>1.66</td>
</tr>
<tr>
<td>Greece</td>
<td>47</td>
<td>0.44</td>
<td>2.02</td>
<td>South Africa</td>
<td>251</td>
<td>2.33</td>
<td>59.57</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>198</td>
<td>1.84</td>
<td>59.95</td>
<td>South Korea</td>
<td>21</td>
<td>0.19</td>
<td>15.83</td>
</tr>
<tr>
<td>Hungary</td>
<td>10</td>
<td>0.09</td>
<td>0.66</td>
<td>Spain</td>
<td>515</td>
<td>4.78</td>
<td>30.82</td>
</tr>
<tr>
<td>Iceland</td>
<td>4</td>
<td>0.04</td>
<td>0.12</td>
<td>Sweden</td>
<td>163</td>
<td>1.51</td>
<td>155.64</td>
</tr>
<tr>
<td>India</td>
<td>183</td>
<td>1.70</td>
<td>28.23</td>
<td>Switzerland</td>
<td>336</td>
<td>3.12</td>
<td>83.29</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1</td>
<td>0.01</td>
<td>0.01</td>
<td>Taiwan</td>
<td>130</td>
<td>1.21</td>
<td>0.42</td>
</tr>
<tr>
<td>Ireland</td>
<td>57</td>
<td>0.53</td>
<td>50.61</td>
<td>Thailand</td>
<td>37</td>
<td>0.34</td>
<td>1.27</td>
</tr>
<tr>
<td>Israel</td>
<td>245</td>
<td>2.27</td>
<td>0.58</td>
<td>Trinidad &amp; Tobago</td>
<td>1</td>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td>Italy</td>
<td>183</td>
<td>1.70</td>
<td>36.87</td>
<td>Turkey</td>
<td>6</td>
<td>0.06</td>
<td>0.07</td>
</tr>
<tr>
<td>Japan</td>
<td>89</td>
<td>0.83</td>
<td>140.86</td>
<td>Ukraine</td>
<td>2</td>
<td>0.02</td>
<td>0.00</td>
</tr>
<tr>
<td>Jordan</td>
<td>2</td>
<td>0.02</td>
<td>0.72</td>
<td>UAE</td>
<td>20</td>
<td>0.19</td>
<td>7.58</td>
</tr>
<tr>
<td>Kuwait</td>
<td>5</td>
<td>0.05</td>
<td>13.00</td>
<td>United Kingdom</td>
<td>890</td>
<td>8.26</td>
<td>1,313.46</td>
</tr>
<tr>
<td>Latvia</td>
<td>1</td>
<td>0.01</td>
<td>0.03</td>
<td>United States</td>
<td>4,262</td>
<td>39.57</td>
<td>8,607.65</td>
</tr>
<tr>
<td>Lithuania</td>
<td>6</td>
<td>0.06</td>
<td>0.03</td>
<td>Vietnam</td>
<td>3</td>
<td>0.03</td>
<td>0.05</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>23</td>
<td>0.21</td>
<td>10.35</td>
<td>Zimbabwe</td>
<td>1</td>
<td>0.01</td>
<td>0.07</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10,771</strong></td>
<td><strong>100.00</strong></td>
<td><strong>12,028.44</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 1 (continued)

Panel B: Percentage market capitalization by target country

<table>
<thead>
<tr>
<th>Target Country</th>
<th>% of Float Shares</th>
<th>% of Total Shares</th>
<th>Target Country</th>
<th>% of Float Shares</th>
<th>% of Total Shares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>0.06</td>
<td>0.12</td>
<td>Lithuania</td>
<td>0.00</td>
<td>0.01</td>
</tr>
<tr>
<td>Australia</td>
<td>3.59</td>
<td>3.56</td>
<td>Malaysia</td>
<td>0.61</td>
<td>0.73</td>
</tr>
<tr>
<td>Austria</td>
<td>0.20</td>
<td>0.29</td>
<td>Mexico</td>
<td>0.36</td>
<td>0.46</td>
</tr>
<tr>
<td>Belgium</td>
<td>0.39</td>
<td>0.52</td>
<td>Morocco</td>
<td>0.03</td>
<td>0.06</td>
</tr>
<tr>
<td>Brazil</td>
<td>0.97</td>
<td>1.47</td>
<td>Netherlands</td>
<td>1.17</td>
<td>1.01</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>0.00</td>
<td>0.01</td>
<td>New Zealand</td>
<td>0.05</td>
<td>0.07</td>
</tr>
<tr>
<td>Canada</td>
<td>1.72</td>
<td>1.30</td>
<td>Norway</td>
<td>0.41</td>
<td>0.60</td>
</tr>
<tr>
<td>Chile</td>
<td>0.35</td>
<td>0.69</td>
<td>Pakistan</td>
<td>0.03</td>
<td>0.07</td>
</tr>
<tr>
<td>China</td>
<td>7.23</td>
<td>11.94</td>
<td>Peru</td>
<td>0.07</td>
<td>0.23</td>
</tr>
<tr>
<td>Colombia</td>
<td>0.02</td>
<td>0.03</td>
<td>Philippines</td>
<td>0.06</td>
<td>0.28</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>0.05</td>
<td>0.10</td>
<td>Poland</td>
<td>0.19</td>
<td>0.32</td>
</tr>
<tr>
<td>Denmark</td>
<td>0.48</td>
<td>0.51</td>
<td>Portugal</td>
<td>0.10</td>
<td>0.16</td>
</tr>
<tr>
<td>Egypt</td>
<td>0.01</td>
<td>0.03</td>
<td>Russia</td>
<td>0.32</td>
<td>0.60</td>
</tr>
<tr>
<td>Estonia</td>
<td>0.00</td>
<td>0.01</td>
<td>Singapore</td>
<td>0.73</td>
<td>1.05</td>
</tr>
<tr>
<td>Finland</td>
<td>0.57</td>
<td>0.50</td>
<td>Slovenia</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>France</td>
<td>2.94</td>
<td>3.29</td>
<td>South Africa</td>
<td>1.23</td>
<td>1.34</td>
</tr>
<tr>
<td>Germany</td>
<td>2.31</td>
<td>2.60</td>
<td>South Korea</td>
<td>1.41</td>
<td>1.49</td>
</tr>
<tr>
<td>Greece</td>
<td>0.11</td>
<td>0.30</td>
<td>Spain</td>
<td>0.92</td>
<td>1.13</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>2.22</td>
<td>3.85</td>
<td>Sweden</td>
<td>1.43</td>
<td>1.35</td>
</tr>
<tr>
<td>Hungary</td>
<td>0.04</td>
<td>0.04</td>
<td>Switzerland</td>
<td>3.50</td>
<td>2.91</td>
</tr>
<tr>
<td>India</td>
<td>2.05</td>
<td>3.38</td>
<td>Taiwan</td>
<td>2.27</td>
<td>2.13</td>
</tr>
<tr>
<td>Indonesia</td>
<td>0.37</td>
<td>0.78</td>
<td>Thailand</td>
<td>0.35</td>
<td>0.49</td>
</tr>
<tr>
<td>Ireland</td>
<td>0.65</td>
<td>0.49</td>
<td>Turkey</td>
<td>0.26</td>
<td>0.59</td>
</tr>
<tr>
<td>Israel</td>
<td>0.32</td>
<td>0.32</td>
<td>United Arab Emirates</td>
<td>0.03</td>
<td>0.05</td>
</tr>
<tr>
<td>Italy</td>
<td>0.43</td>
<td>0.50</td>
<td>United Kingdom</td>
<td>8.68</td>
<td>6.87</td>
</tr>
<tr>
<td>Japan</td>
<td>8.39</td>
<td>8.23</td>
<td>United States</td>
<td>40.30</td>
<td>31.07</td>
</tr>
<tr>
<td>Jordan</td>
<td>0.01</td>
<td>0.03</td>
<td>Vietnam</td>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.00</strong></td>
<td><strong>100.00</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2
Sample characteristics, all Institutions

Table 2 presents sample characteristics by institutional investor’s type (Panel A) and style (Panel B). The sample includes 10,771 institutional investors from 72 countries who have at least one investment outside of the institution’s home country. Data are from the FactSet institutional quarterly holdings database from the last quarter of 1999 to the first quarter of 2010. Home Bias is the difference between the actual portfolio weight of the institution’s holdings in the home country and the expected portfolio allocation to the home country (see Eq. (2)). Foreign Concentration is calculated following Eq. (5) and indicates the fraction of the institution’s foreign holdings that should be reallocated across foreign countries to achieve perfect foreign diversification. Global Industry Concentration is calculated following Eq. (7) and indicates the fraction of the institution’s portfolio that should be reallocated across different industries to achieve perfect industry diversification.

Panel A: Sample description by institution’s type

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of Institutions</th>
<th>Percent of Total (%)</th>
<th>Home Bias</th>
<th>Foreign Concentration</th>
<th>Global Industry Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banks</td>
<td>431</td>
<td>4.00</td>
<td>0.420</td>
<td>0.688</td>
<td>0.567</td>
</tr>
<tr>
<td>Hedge Fund</td>
<td>567</td>
<td>5.26</td>
<td>0.409</td>
<td>0.637</td>
<td>0.810</td>
</tr>
<tr>
<td>Insurance</td>
<td>297</td>
<td>2.76</td>
<td>0.624</td>
<td>0.775</td>
<td>0.635</td>
</tr>
<tr>
<td>Investment Advisor</td>
<td>1,970</td>
<td>18.29</td>
<td>0.480</td>
<td>0.688</td>
<td>0.670</td>
</tr>
<tr>
<td>Mutual Fund</td>
<td>7,178</td>
<td>66.64</td>
<td>0.384</td>
<td>0.628</td>
<td>0.655</td>
</tr>
<tr>
<td>Pension Fund/Endowment</td>
<td>271</td>
<td>2.52</td>
<td>0.423</td>
<td>0.665</td>
<td>0.594</td>
</tr>
<tr>
<td>Other</td>
<td>57</td>
<td>0.53</td>
<td>0.404</td>
<td>0.747</td>
<td>0.618</td>
</tr>
<tr>
<td>(Total) Average</td>
<td>(10,771)</td>
<td>(100.00)</td>
<td>0.412</td>
<td>0.648</td>
<td>0.660</td>
</tr>
</tbody>
</table>

Panel B: Sample description by institution’s investment style

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of Institutions</th>
<th>Percent of Total (%)</th>
<th>Home Bias</th>
<th>Foreign Concentration</th>
<th>Global Industry Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggressive Growth</td>
<td>286</td>
<td>2.66</td>
<td>0.556</td>
<td>0.794</td>
<td>0.788</td>
</tr>
<tr>
<td>Deep Value</td>
<td>559</td>
<td>5.19</td>
<td>0.511</td>
<td>0.776</td>
<td>0.794</td>
</tr>
<tr>
<td>GARP</td>
<td>3,028</td>
<td>28.11</td>
<td>0.385</td>
<td>0.588</td>
<td>0.627</td>
</tr>
<tr>
<td>Growth</td>
<td>2,163</td>
<td>20.08</td>
<td>0.383</td>
<td>0.619</td>
<td>0.662</td>
</tr>
<tr>
<td>Index</td>
<td>230</td>
<td>2.14</td>
<td>0.326</td>
<td>0.629</td>
<td>0.502</td>
</tr>
<tr>
<td>Value</td>
<td>2,772</td>
<td>25.74</td>
<td>0.383</td>
<td>0.640</td>
<td>0.613</td>
</tr>
<tr>
<td>Yield</td>
<td>1,665</td>
<td>15.46</td>
<td>0.499</td>
<td>0.735</td>
<td>0.743</td>
</tr>
<tr>
<td>Not Specified</td>
<td>68</td>
<td>0.63</td>
<td>0.459</td>
<td>0.792</td>
<td>0.871</td>
</tr>
<tr>
<td>(Total) Average</td>
<td>(10,771)</td>
<td>(100.00)</td>
<td>0.412</td>
<td>0.648</td>
<td>0.660</td>
</tr>
</tbody>
</table>
Table 3 presents the results of Ordinary Least Squares Regressions (OLS) of portfolio excess returns. The sample consists of 10,771 institutional investors from 72 countries with at least one investment outside of the institution’s home country. The dependent variable is excess return, computed as the value weighted return to each institution’s securities in a given quarter less the global risk free rate over the same quarter, obtained from Kenneth French’s data library. The value weighted quarterly return is computed based on the consecutive 3-month security returns surrounding the reporting period ($Ret_{t,1+1}$). Home Bias is the difference between the actual portfolio weight of the institution’s holdings in the home country and the expected portfolio allocation to the home country (see Eq. (2)). Foreign Concentration is calculated following Eq. (5) and indicates the fraction of the institution’s foreign holdings that should be reallocated across foreign countries to achieve perfect foreign diversification. Global Industry Concentration is calculated following Eq. (7) and indicates the fraction of the institution’s holdings that should be reallocated across industries to achieve perfect global industry diversification. Portfolio Size is the institution’s total market value of equity in quarter $t$, in natural logarithm. Market Premium, SMB, HML, and UMD are four global systematic risk factors, obtained from Kenneth French’s data library. Fixed effects used in each specification are indicated below the coefficients. All regressions are run with holder-clustered standard errors. Robust $t$-statistics are reported in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Bias</td>
<td>0.0089***</td>
<td>0.0021*</td>
<td>0.0018</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[8.58]</td>
<td>[1.75]</td>
<td>[1.54]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign Concentration</td>
<td>0.0198***</td>
<td>0.0117***</td>
<td>0.0167***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[8.96]</td>
<td>[4.84]</td>
<td>[7.01]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Industry Concentration</td>
<td>0.0334***</td>
<td>0.0288***</td>
<td>0.0293***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[13.07]</td>
<td>[12.30]</td>
<td>[12.59]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portfolio Size</td>
<td>-0.0003***</td>
<td>0.0000</td>
<td>0.0007***</td>
<td>0.0007***</td>
<td>0.0012***</td>
</tr>
<tr>
<td></td>
<td>[-2.76]</td>
<td>[0.22]</td>
<td>[5.08]</td>
<td>[5.04]</td>
<td>[8.55]</td>
</tr>
<tr>
<td>Market Premium</td>
<td>0.7276***</td>
<td>0.7273***</td>
<td>0.7277***</td>
<td>0.7275***</td>
<td>0.7329***</td>
</tr>
<tr>
<td></td>
<td>[172.46]</td>
<td>[172.67]</td>
<td>[172.34]</td>
<td>[172.67]</td>
<td>[174.59]</td>
</tr>
<tr>
<td>SMB</td>
<td>-0.3869***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[-31.05]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HML</td>
<td>-1.0922***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[-78.57]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UMD</td>
<td>-0.4710***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[-84.20]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed Effects</td>
<td>Year Style Type</td>
<td>Year Style Type</td>
<td>Year Style Type</td>
<td>Year Style Type</td>
<td>Year Style Type</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>112,584</td>
<td>112,584</td>
<td>112,584</td>
<td>112,584</td>
<td>112,584</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.4522</td>
<td>0.4525</td>
<td>0.4534</td>
<td>0.4538</td>
<td>0.5295</td>
</tr>
</tbody>
</table>
Table 4
Portfolio concentration measures and institutional investors’ performance in the target market

Table 4 shows the results of OLS regressions examining institutional investors’ performance in home (Panel A) and foreign (Panel B) target markets. The sample consists of 10,771 institutional investors from 72 countries with at least one investment outside of the institution’s home country. The dependent variable is quarterly, value weighted return of the institutional investor in its home market securities (Panel A) and in the foreign market securities (Panel B) in excess of the global risk free rate over the same quarter, obtained from Kenneth French’s data library. The value weighted quarterly return is computed based on the consecutive 3-month security returns surrounding the reporting period (Ret_{t,1+1}).

*Country Weight* equals to *Home Weight* (Eq. (1)) in Panel A and equals to *Foreign Weight* (Eq. (3)) in Panel B. *Country Industry Concentration* is calculated following Eq. (9) and indicates the fraction of the institution’s portfolio that should be reallocated in a given country (home country in Panel A; foreign country in Panel B) to achieve perfect industry diversification in that country. *Portfolio Size* is the institution’s total market value of equity in quarter $t$, in natural logarithm. *Market Premium* is equal to weighted market return of a target market less the global risk free rate, obtained from Kenneth French’s data library. *SMB, HML, and UMD* are global systematic risk factors, obtained from Kenneth French’s data library. Fixed effects used in each specification are indicated below the coefficients. All regressions are run with home country-clustered standard errors. Robust $t$-statistics are reported in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

(continues)
Table 4 (continued)

<table>
<thead>
<tr>
<th></th>
<th>Panel A: Home market performance</th>
<th>Panel B: Foreign market performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Country Weight</td>
<td>0.0038*** [3.75]</td>
<td>0.0027*** [2.80]</td>
</tr>
<tr>
<td></td>
<td>0.0027*** [2.72]</td>
<td>0.0039*** [2.70]</td>
</tr>
<tr>
<td></td>
<td>0.0064*** [4.10]</td>
<td>0.0077*** [4.69]</td>
</tr>
<tr>
<td>Country Industry Concentration</td>
<td>0.0115*** [3.59]</td>
<td>0.0104*** [2.95]</td>
</tr>
<tr>
<td></td>
<td>0.0107*** [3.40]</td>
<td>0.0054*** [3.26]</td>
</tr>
<tr>
<td></td>
<td>0.0061*** [3.58]</td>
<td>0.0066*** [3.86]</td>
</tr>
<tr>
<td>Portfolio Size</td>
<td>-0.0005*** [-3.44]</td>
<td>-0.0001 [-1.29]</td>
</tr>
<tr>
<td></td>
<td>-0.0002* [-1.78]</td>
<td>-0.0001 [-0.37]</td>
</tr>
<tr>
<td></td>
<td>-0.0021 [-1.56]</td>
<td>-0.0006 [-0.36]</td>
</tr>
<tr>
<td></td>
<td>-0.0006 [0.41]</td>
<td>0.0007 [1.73]</td>
</tr>
<tr>
<td>Market Premium</td>
<td>0.9300*** [14.10]</td>
<td>0.9302*** [14.08]</td>
</tr>
<tr>
<td></td>
<td>0.9302*** [14.09]</td>
<td>0.9158*** [11.19]</td>
</tr>
<tr>
<td></td>
<td>0.9623*** [64.10]</td>
<td>0.9519*** [66.35]</td>
</tr>
<tr>
<td></td>
<td>0.9519*** [66.34]</td>
<td>0.9396*** [61.74]</td>
</tr>
<tr>
<td>SMB</td>
<td>-0.2972*** [-4.84]</td>
<td>-0.1753*** [-5.62]</td>
</tr>
<tr>
<td>HML</td>
<td>-0.3082*** [-3.65]</td>
<td>-0.1760*** [-7.27]</td>
</tr>
<tr>
<td>UMD</td>
<td>-0.1301** [-2.38]</td>
<td>-0.1078*** [-11.11]</td>
</tr>
<tr>
<td>Fixed Effects</td>
<td>Home Home Home Home Home</td>
<td>Home Home Home Home Home Home</td>
</tr>
<tr>
<td></td>
<td>Year Year Year Year Year Year</td>
<td>Target Target Target Target Target</td>
</tr>
<tr>
<td></td>
<td>Style Style Style Style Style</td>
<td>Style Style Style Style Style Style</td>
</tr>
<tr>
<td></td>
<td>Type Type Type Type Type Type</td>
<td>Type Type Type Type Type Type Type</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>112,584 112,584 112,584 112,584</td>
<td>1,184,360 1,128,619 1,128,619 1,128,619</td>
</tr>
<tr>
<td>Adjusted R^2</td>
<td>0.6169 0.6170 0.6171 0.6258</td>
<td>0.5044 0.5110 0.5110 0.5158</td>
</tr>
</tbody>
</table>

**Significance levels:**
- *p < 0.1
- **p < 0.05
- ***p < 0.01

This table presents the results of a regression analysis for both home and foreign market performance. The table includes coefficients for various factors such as country weight, country industry concentration, portfolio size, market premium, and fixed effects. The adjusted R^2 values indicate the proportion of variance explained by the model.
Table 5
Portfolio concentration measures and institutional investors’ abnormal portfolio performance

Table 5 presents the results of OLS regressions of portfolio abnormal returns. The sample consists of 10,771 institutional investors from 72 countries with at least one investment outside of the institution’s home country. The dependent variable is the portfolio’s abnormal return based on the regression of portfolio excess returns on Fama and French (2012) four global factors (see Eq. (10)). Home Bias is the difference between the actual portfolio weight of the institution’s holdings in the home country and the expected portfolio allocation to the home country (see Eq. (2)). Foreign Concentration is calculated following Eq. (5) and indicates the fraction of the institution’s foreign holdings that should be reallocated across foreign countries to achieve perfect foreign diversification. Global Industry Concentration is calculated following Eq. (7) and indicates the fraction of the institution’s holdings that should be reallocated across industries to achieve perfect global industry diversification. Portfolio Size is the institution’s total market value of equity in quarter $t$, in natural logarithm. Fixed effects used in each specification are indicated below the coefficients. All regressions are run with holder-clustered standard errors. Robust $t$-statistics are reported in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Bias</td>
<td>0.0087***</td>
<td>0.0002</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[5.86]</td>
<td>[0.12]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign Concentration</td>
<td>0.0268***</td>
<td>0.0232***</td>
<td>0.0235***</td>
<td>0.0160***</td>
</tr>
<tr>
<td></td>
<td>[11.85]</td>
<td>[8.53]</td>
<td>[8.67]</td>
<td>[5.81]</td>
</tr>
<tr>
<td>Global Industry Concentration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.0235***</td>
<td>0.0160***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[8.67]</td>
<td>[5.81]</td>
</tr>
<tr>
<td>Portfolio Size</td>
<td>-0.0002*</td>
<td>0.0002</td>
<td>0.0004***</td>
<td>0.0006***</td>
</tr>
<tr>
<td></td>
<td>[-1.67]</td>
<td>[1.19]</td>
<td>[2.57]</td>
<td>[3.37]</td>
</tr>
<tr>
<td>Fixed Effects</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
</tr>
<tr>
<td></td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
</tr>
<tr>
<td></td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>115,205</td>
<td>115,205</td>
<td>115,205</td>
<td>115,205</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.0100</td>
<td>0.0175</td>
<td>0.0121</td>
<td>0.0200</td>
</tr>
</tbody>
</table>
Table 6
Portfolio concentration and performance of mutual and non-mutual funds

Table 6 reports the results of OLS regressions of portfolio concentration measures and performance run separately for mutual fund and non-mutual fund institutional investors. Institution’s type is indicated as MF (mutual fund) or non-MF (non-mutual fund). Panel A presents the results for portfolio level performance. Panels B and C examine the institutions’ performance in the home and foreign target markets, respectively. Home Bias is the difference between the actual portfolio weight of the institution’s holdings in the home country and the expected portfolio allocation to the home country (see Eq. (2)). Foreign Concentration is calculated following Eq. (5) and indicates the fraction of the institution’s foreign holdings that should be reallocated across foreign countries to achieve perfect foreign diversification. Global Industry Concentration is calculated following Eq. (7) and indicates the fraction of the institution’s holdings that should be reallocated across industries to achieve perfect global industry diversification. Portfolio Size is the institution’s total market value of equity in quarter $t$, in natural logarithm. Market Premium is obtained from Kenneth French’s website when evaluating overall portfolio performance (Panel A) and calculated as equal weighted market return of a target market less global risk free rate when evaluating the target market performance (Panel B and C). Fixed effects used in each specification are indicated below the coefficients. Panel A’s regressions are run with holder-clustered standard errors; Panel B’s regressions are run with home country clustered errors; Panel C’s regressions are run with two-way (home country – target country) clustered errors. Robust $t$-statistics are reported in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

(continues)
Table 6 (continued)

**Panel A: Portfolio level performance**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Home Bias</strong></td>
<td>0.0143***</td>
<td>0.0056***</td>
<td></td>
<td></td>
<td>0.0091***</td>
<td>-0.0021</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[10.45]</td>
<td>[3.77]</td>
<td></td>
<td></td>
<td>[5.97]</td>
<td>[-1.23]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Foreign Concentration</strong></td>
<td></td>
<td></td>
<td>0.0191***</td>
<td>0.0210***</td>
<td></td>
<td>0.0054**</td>
<td>0.0164***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[8.10]</td>
<td>[6.11]</td>
<td></td>
<td>[2.00]</td>
<td>[4.67]</td>
<td></td>
</tr>
<tr>
<td><strong>Global Industry Concentration</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0372***</td>
<td>0.0291***</td>
<td>0.0315***</td>
<td>0.0239***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[13.44]</td>
<td>[7.40]</td>
<td>[11.15]</td>
<td>[7.03]</td>
</tr>
<tr>
<td><strong>Portfolio Size</strong></td>
<td>0.0000</td>
<td>-0.0004**</td>
<td>0.0003*</td>
<td>0.0000</td>
<td>0.0008***</td>
<td>0.0006**</td>
<td>0.0009***</td>
<td>0.0007***</td>
</tr>
<tr>
<td></td>
<td>[0.20]</td>
<td>[-2.36]</td>
<td>[1.68]</td>
<td>[-0.20]</td>
<td>[4.90]</td>
<td>[2.95]</td>
<td>[5.07]</td>
<td>[3.12]</td>
</tr>
<tr>
<td><strong>Market Premium</strong></td>
<td>0.7176***</td>
<td>0.7336***</td>
<td>0.7171***</td>
<td>0.7332***</td>
<td>0.7175***</td>
<td>0.7336***</td>
<td>0.7178***</td>
<td>0.7334***</td>
</tr>
<tr>
<td></td>
<td>[102.78]</td>
<td>[139.18]</td>
<td>[102.76]</td>
<td>[139.51]</td>
<td>[102.73]</td>
<td>[139.03]</td>
<td>[102.91]</td>
<td>[139.41]</td>
</tr>
<tr>
<td><strong>Institutions</strong></td>
<td>MF</td>
<td>non-MF</td>
<td>MF</td>
<td>non-MF</td>
<td>MF</td>
<td>non-MF</td>
<td>MF</td>
<td>non-MF</td>
</tr>
<tr>
<td>Fixed Effects</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
</tr>
<tr>
<td></td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
</tr>
<tr>
<td></td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
</tr>
<tr>
<td><strong>Number of Observations</strong></td>
<td>43,900</td>
<td>68,684</td>
<td>43,900</td>
<td>68,684</td>
<td>43,900</td>
<td>68,684</td>
<td>43,900</td>
<td>68,684</td>
</tr>
<tr>
<td><strong>Adjusted R^2</strong></td>
<td>0.4370</td>
<td>0.4633</td>
<td>0.4365</td>
<td>0.4641</td>
<td>0.4376</td>
<td>0.4644</td>
<td>0.4385</td>
<td>0.4648</td>
</tr>
</tbody>
</table>
Table 6 (continued)

Panel B: Home market performance

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Country Weight</strong></td>
<td>0.0051***</td>
<td>0.0026**</td>
<td>0.0034***</td>
<td>0.0018</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[4.54]</td>
<td>[2.22]</td>
<td>[2.93]</td>
<td>[1.60]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Country Industry</strong></td>
<td>0.0155***</td>
<td>0.0090**</td>
<td>0.0138***</td>
<td>0.0083**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concentration</td>
<td>[4.53]</td>
<td>[2.47]</td>
<td>[3.53]</td>
<td>[2.20]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Portfolio Size</strong></td>
<td>-0.0008***</td>
<td>-0.0004***</td>
<td>-0.0004*</td>
<td>-0.0001</td>
<td>-0.0005***</td>
<td>-0.0001</td>
</tr>
<tr>
<td></td>
<td>[-3.23]</td>
<td>[-3.24]</td>
<td>[-2.01]</td>
<td>[-0.42]</td>
<td>[-2.34]</td>
<td>[-0.58]</td>
</tr>
<tr>
<td><strong>Market Premium</strong></td>
<td>0.8833***</td>
<td>0.9636***</td>
<td>0.8837***</td>
<td>0.9637***</td>
<td>0.8836***</td>
<td>0.9637***</td>
</tr>
<tr>
<td></td>
<td>[9.26]</td>
<td>[23.28]</td>
<td>[9.24]</td>
<td>[23.25]</td>
<td>[9.24]</td>
<td>[23.25]</td>
</tr>
<tr>
<td><strong>Institutions</strong></td>
<td>MF</td>
<td>non-MF</td>
<td>MF</td>
<td>non-MF</td>
<td>MF</td>
<td>non-MF</td>
</tr>
<tr>
<td><strong>Fixed Effects</strong></td>
<td>Home</td>
<td>Home</td>
<td>Home</td>
<td>Home</td>
<td>Home</td>
<td>Home</td>
</tr>
<tr>
<td></td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
</tr>
<tr>
<td></td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
</tr>
<tr>
<td></td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
</tr>
<tr>
<td><strong>Number of Observations</strong></td>
<td>43,900</td>
<td>68,684</td>
<td>43,900</td>
<td>68,684</td>
<td>43,900</td>
<td>68,684</td>
</tr>
<tr>
<td><strong>Adjusted R^2</strong></td>
<td>0.6107</td>
<td>0.6221</td>
<td>0.6109</td>
<td>0.6222</td>
<td>0.6110</td>
<td>0.6222</td>
</tr>
</tbody>
</table>

Panel C: Foreign market performance

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Country Weight</strong></td>
<td>0.0000</td>
<td>0.0061***</td>
<td>0.0046</td>
<td>0.0077***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[-0.02]</td>
<td>[3.83]</td>
<td>[1.46]</td>
<td>[4.69]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Country Industry</strong></td>
<td>0.0085***</td>
<td>0.0036**</td>
<td>0.0091***</td>
<td>0.0043**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concentration</td>
<td>[3.26]</td>
<td>[2.54]</td>
<td>[3.35]</td>
<td>[3.00]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Portfolio Size</strong></td>
<td>-0.0039***</td>
<td>-0.0037**</td>
<td>-0.0019</td>
<td>-0.0031*</td>
<td>-0.0011</td>
<td>-0.0014</td>
</tr>
<tr>
<td></td>
<td>[-2.23]</td>
<td>[-2.45]</td>
<td>[-0.93]</td>
<td>[-1.83]</td>
<td>[-0.53]</td>
<td>[-0.81]</td>
</tr>
<tr>
<td><strong>Market Premium</strong></td>
<td>0.9547***</td>
<td>0.9665***</td>
<td>0.9424**</td>
<td>0.9572***</td>
<td>0.9423**</td>
<td>0.9572***</td>
</tr>
<tr>
<td></td>
<td>[49.76]</td>
<td>[73.41]</td>
<td>[51.41]</td>
<td>[76.00]</td>
<td>[51.41]</td>
<td>[75.99]</td>
</tr>
<tr>
<td><strong>Institutions</strong></td>
<td>MF</td>
<td>non-MF</td>
<td>MF</td>
<td>non-MF</td>
<td>MF</td>
<td>non-MF</td>
</tr>
<tr>
<td><strong>Fixed Effects</strong></td>
<td>Home</td>
<td>Home</td>
<td>Home</td>
<td>Home</td>
<td>Home</td>
<td>Home</td>
</tr>
<tr>
<td></td>
<td>Target</td>
<td>Target</td>
<td>Target</td>
<td>Target</td>
<td>Target</td>
<td>Target</td>
</tr>
<tr>
<td></td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
</tr>
<tr>
<td></td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
</tr>
<tr>
<td></td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
</tr>
<tr>
<td><strong>Number of Observations</strong></td>
<td>433,100</td>
<td>751,260</td>
<td>411,038</td>
<td>717,581</td>
<td>411,038</td>
<td>717,581</td>
</tr>
<tr>
<td><strong>Adjusted R^2</strong></td>
<td>0.4919</td>
<td>0.5119</td>
<td>0.4972</td>
<td>0.5192</td>
<td>0.4972</td>
<td>0.5192</td>
</tr>
</tbody>
</table>
Table 7
Portfolio concentration and performance of non-US institutional investors

Table 7 reports the results of OLS regressions for non-US institutional investors. Panel A presents the results for portfolio level performance where dependent variable is excess return, computed as quarterly value weighted return to each institution’s securities less the global risk free rate. Panels B and C examine performance in the home and foreign markets, respectively. The dependent variable is quarterly, value weighted return of the institutional investor in its home market securities (Panel B) and in the foreign market securities (Panel C) in excess of the global risk free rate over the same quarter. *Home Bias* is the difference between the actual portfolio weight of the institution’s holdings in the home country and the expected portfolio allocation to the home country (see Eq. (2)). *Foreign Concentration* is the fraction of the institution’s foreign holdings that should be reallocated across foreign countries to achieve perfect foreign diversification (see Eq. (5)). *Global Industry Concentration* indicates the fraction of the institution’s holdings that should be reallocated across industries to achieve perfect global industry diversification (see Eq. (7)). *Country Weight* equals to *Home Weight* (Eq. (1)) in Panel B and equals to *Foreign Weight* (Eq. (3)) in Panel C. *Country Industry Concentration* is calculated following Eq. (9) and indicates the fraction of the institution’s portfolio that should be reallocated in a given country (home country in Panel B; foreign country in Panel C) to achieve perfect industry diversification in that country. *Market Premium* is obtained from Kenneth French’s website when evaluating overall portfolio performance (Panel A) and calculated as equal weighted market return of a target market less global risk free rate when evaluating the target market performance (Panel B and C). *SMB*, *HML*, and *UMD* are global factors, obtained from Kenneth French’s data library. Fixed effects used in each specification are indicated below the coefficients. Panel A’s regressions are run with holder-clustered standard errors; Panel B’s regressions are run with home country clustered errors; Panel C’s regressions are run with two-way (home country – target country) clustered errors. Robust *t*-statistics are reported in brackets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

### Panel A: Portfolio level performance of non-US investors

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Bias</td>
<td>0.0164***</td>
<td>0.0097***</td>
<td>0.0097***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[11.15]</td>
<td>[5.19]</td>
<td>[5.18]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign Concentration</td>
<td>0.0240***</td>
<td>0.0031</td>
<td>0.0054*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[8.90]</td>
<td>[0.98]</td>
<td>[1.71]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Industry</td>
<td>0.0475***</td>
<td>0.0393***</td>
<td>0.0399***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concentration</td>
<td>[11.73]</td>
<td>[10.27]</td>
<td>[10.42]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portfolio Size</td>
<td>0.0006***</td>
<td>0.0008***</td>
<td>0.0018***</td>
<td>0.0016***</td>
<td>0.0021***</td>
</tr>
<tr>
<td></td>
<td>[3.59]</td>
<td>[4.66]</td>
<td>[8.58]</td>
<td>[7.63]</td>
<td>[9.85]</td>
</tr>
<tr>
<td>Market Premium</td>
<td>0.7482***</td>
<td>0.7477***</td>
<td>0.7477***</td>
<td>0.7480***</td>
<td>0.7047***</td>
</tr>
<tr>
<td></td>
<td>[112.04]</td>
<td>[112.02]</td>
<td>[111.99]</td>
<td>[112.18]</td>
<td>[107.37]</td>
</tr>
<tr>
<td>SMB</td>
<td>-0.1536***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[-8.29]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HML</td>
<td>-1.0756***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[-53.07]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UMD</td>
<td>-0.3474***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[-45.41]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed Effects</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
<td>Year</td>
</tr>
<tr>
<td></td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
<td>Style</td>
</tr>
<tr>
<td></td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>69,265</td>
<td>69,265</td>
<td>69,265</td>
<td>69,265</td>
<td>69,265</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.4212</td>
<td>0.4208</td>
<td>0.4223</td>
<td>0.4230</td>
<td>0.4708</td>
</tr>
</tbody>
</table>
### Table 7 (continued)

<table>
<thead>
<tr>
<th></th>
<th>Panel B: Home market performance</th>
<th>Panel C: Foreign market performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Country Weight</td>
<td>0.0037**</td>
<td>0.0033**</td>
</tr>
<tr>
<td></td>
<td>[2.48]</td>
<td>[2.04]</td>
</tr>
<tr>
<td>Country Industry Concentration</td>
<td>0.0052*</td>
<td>0.0031</td>
</tr>
<tr>
<td></td>
<td>[1.94]</td>
<td>[1.04]</td>
</tr>
<tr>
<td>Size</td>
<td>-0.0003</td>
<td>-0.0001</td>
</tr>
<tr>
<td></td>
<td>[-1.63]</td>
<td>[-0.69]</td>
</tr>
<tr>
<td>Market Premium</td>
<td>0.8872***</td>
<td>0.8873***</td>
</tr>
<tr>
<td></td>
<td>[11.70]</td>
<td>[11.70]</td>
</tr>
<tr>
<td>Fixed Effects</td>
<td>Year</td>
<td>Year</td>
</tr>
<tr>
<td>Home Style Type</td>
<td>Year</td>
<td>Year</td>
</tr>
<tr>
<td></td>
<td>Home</td>
<td>Home</td>
</tr>
<tr>
<td></td>
<td>Style</td>
<td>Style</td>
</tr>
<tr>
<td></td>
<td>Type</td>
<td>Type</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>69,265</td>
<td>69,265</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.6156</td>
<td>0.6156</td>
</tr>
</tbody>
</table>
Appendix
Portfolio Concentration Measures: Computation and Examples

A.1. Foreign Concentration
To illustrate the computation of the Foreign Concentration measure (see Eq. (5)), let us assume that there are only five countries in the world (A, B, C, D, E) with equal market capitalization ($20 each, with world market capitalization of $100). Let us consider institutional investor $i$, with the total portfolio value of $100, invested in home and foreign securities. Country C is the investor’s home country.

As a starting point, we calculate actual and expected portfolio weights in each country relative to the overall portfolio value and the world market capitalization (including home and foreign investments and markets). Using these weights, we show the computation of the Global Concentration Measure in Eq. (A1) below. We then illustrate the computation of the Foreign Concentration measure in Eq. (A2), excluding the home market.

Dollar values of institution $i$’s holdings in each of the five countries are given in column (1) of Table A1. Actual Weight (column (3)) is the value of institution $i$’s holdings in each country divided by the total value of institution’s portfolio (home and foreign investments) and Expected Weight (column (4)) is the country’s market capitalization (column (2)) divided by the world market capitalization. Bias is calculated as the difference between actual and expected weights.

### Table A1.

<table>
<thead>
<tr>
<th>Country</th>
<th>Institution $i$’s holdings($)</th>
<th>Country Market Capitalization($)</th>
<th>Actual Weight</th>
<th>Expected Weight</th>
<th>Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>20</td>
<td>20</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2-0.2=0</td>
</tr>
<tr>
<td>B</td>
<td>0</td>
<td>20</td>
<td>0</td>
<td>0.2</td>
<td>0-0.2=-0.2</td>
</tr>
<tr>
<td>C (home)</td>
<td>40</td>
<td>20</td>
<td>0.4</td>
<td>0.2</td>
<td>0.4-0.2=0.2</td>
</tr>
<tr>
<td>D</td>
<td>10</td>
<td>20</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1-0.2=-0.1</td>
</tr>
<tr>
<td>E</td>
<td>30</td>
<td>20</td>
<td>0.3</td>
<td>0.2</td>
<td>0.3-0.2=0.1</td>
</tr>
<tr>
<td>Total</td>
<td>$100</td>
<td>$100</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Using the method similar to Eq. (5), we calculate Global Concentration measure as:

$$Global\ Concentration_i = \sum_{j=1}^{5} \left| \frac{Bias_{i,j}}{2} \right| = 0.3 \quad (A1)$$

The global concentration value of 0.3 indicates that, according to the traditional asset pricing theory, 30% of the institution’s entire portfolio presented in Table A1 should be reallocated to achieve perfect diversification across global markets. One solution would be to move 20% of the total portfolio value out of Country C and reinvest it in Country B and withdraw 10% of the total portfolio value from country E and invest it in Country D.

We now turn to the calculation of the Foreign Concentration measure. Since the majority of investors worldwide hold a large portion of their portfolios in the home market, the Global Concentration figure will be highly correlated with their home country holding weight. For example, for institution $i$ used above, the home weight is 0.4 and the Global Concentration is
0.3. This indicates the investor needs to reallocate 30% of his/her holdings, most of which are invested in the home country. To mitigate an issue of redundant metrics and to provide a better proxy for foreign concentration, we calculate *Foreign Concentration* measure, omitting the holdings in the home country from the total portfolio value and omitting the market capitalization of the home country from the world market capitalization. The process is illustrated in Table A2 and is described in Section 4.1.2 of the paper.

### Table A2.  
<table>
<thead>
<tr>
<th>Country</th>
<th>Institution i’s Holdings($)</th>
<th>Country Market Capitalization($)</th>
<th>Foreign Weight</th>
<th>Expected Weight</th>
<th>Foreign Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>20</td>
<td>20</td>
<td>0.333</td>
<td>0.25</td>
<td>0.333-0.25=.083</td>
</tr>
<tr>
<td>B</td>
<td>0</td>
<td>20</td>
<td>0</td>
<td>0.25</td>
<td>0-.25=-.25</td>
</tr>
<tr>
<td>C (Home)</td>
<td>excluded</td>
<td>excluded</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>10</td>
<td>20</td>
<td>0.167</td>
<td>0.25</td>
<td>0.167-.25=-.083</td>
</tr>
<tr>
<td>E</td>
<td>30</td>
<td>20</td>
<td>0.500</td>
<td>0.25</td>
<td>.5-.25=.25</td>
</tr>
<tr>
<td>Total</td>
<td>$60</td>
<td>$80</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

*Foreign Weight*, for each country, is defined according to Eq. (3). It is the value of institution i’s holdings in each foreign country, divided by the total value of the portfolio invested in foreign markets (excluding the home market). *Expected Weight* for each foreign country is calculated as the country’s market capitalization, divided by the world market capitalization, excluding the market capitalization of the home market. *Foreign Bias* is the difference between foreign weight and expected weight of each foreign country, defined in Eq. (4).

Using Eq. (5), *Foreign Concentration* is calculated as:

\[
\text{Foreign Concentration}_i = \frac{\sum_{j=1}^{J} \left| \text{Foreign Bias}_{i,j} \right|}{2} = 0.333
\]  

(A2)

The *Foreign Concentration* figure of 0.333 indicates that 1/3 of the foreign portfolio holdings should be reallocated across foreign markets to achieve perfect foreign diversification. A solution would be to move 8.33% of total foreign portfolio holdings out of Country A (which is now overweighed) and invest it in Country D (which is now underweighted) and withdraw 25% of total foreign portfolio holdings from Country E and reinvest it in Country B.

### A.2. Global and Country Industry Concentration Measures

In this section, we first illustrate calculations of *Global Industry Concentration* and then of *Country Industry Concentration* measures.

To calculate *Global Industry Concentration*, we include all institution’s holdings. To keep things simple, let us assume there are three countries (F, G, H) and five industries (1-5). Some industries are not present in all countries. Industry’s representation in each country and total market value and institution i’s holdings in each industry are reported in Table A3. All five industries are traded in Country F, and three out of five industries are available in Countries G and H. Columns (1), (2), and (3) report the dollar value of each industry represented in each country, and column (6) shows the dollar value of institution i’s holdings in each industry.
Table A3.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Country F</th>
<th>Country G</th>
<th>Country H</th>
<th>Industry’s Market Value ($)</th>
<th>Global Industry Weight</th>
<th>Institution i’s Holdings ($)</th>
<th>Actual Weight</th>
<th>Global Industry Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20</td>
<td>30</td>
<td>20</td>
<td>70</td>
<td>0.233</td>
<td>10</td>
<td>0.1</td>
<td>-0.133</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>0.067</td>
<td>40</td>
<td>0.4</td>
<td>0.333</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
<td>0</td>
<td>20</td>
<td>50</td>
<td>0.167</td>
<td>0</td>
<td>0</td>
<td>-0.167</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>20</td>
<td>0</td>
<td>30</td>
<td>0.1</td>
<td>50</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td>50</td>
<td>60</td>
<td>130</td>
<td>0.433</td>
<td>0</td>
<td>0</td>
<td>-0.433</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$100</strong></td>
<td><strong>$100</strong></td>
<td><strong>$100</strong></td>
<td><strong>$300</strong></td>
<td><strong>1</strong></td>
<td><strong>$100</strong></td>
<td><strong>1</strong></td>
<td></td>
</tr>
</tbody>
</table>

To calculate *Global Industry Concentration*, we first add market values of all industries that exist in the world market (column (4)) and calculate *Global Industry Weight* (column (5)) by dividing the market value of each industry by the world market capitalization ($300 in this example). *Actual Weight* (column (7)) is institution i’s portfolio weight invested in each industry. *Global Industry Bias* is calculated as the difference between the *Actual Weight* (column (7)) and the *Global Industry Weight* (column (5)), and *Global Industry Concentration* is calculated as:

\[
Global\ Industry\ Concentration_i = \frac{\sum_{SIC=i}^5 |Global\ Industry\ Bias_{i,SIC}|}{2} = 0.733
\]  

(A3)

The result indicates that 73.33% of institution i’s total holdings need to be reallocated across industries worldwide to achieve perfect global industry diversification. One possible solution would be to withdraw 33.33% of total portfolio holdings from Industry 2 and invest 13.33% of total portfolio holdings in Industry 1, 20% in Industry 5. In addition, withdraw 40% of portfolio from Industry 4 and invest 16.67% in Industry 3 and the rest (23.33%) in Industry 5.

To calculate *Country Industry Concentration*, we treat each country as separate markets and calculate Industry Concentration measure for each country. The process is illustrated in Table A4.

Table A4.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.2</td>
<td>-0.1</td>
<td>-0.2</td>
<td>-0.1</td>
</tr>
<tr>
<td>2</td>
<td>0.2</td>
<td>0</td>
<td>0.2</td>
<td>0.2</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>3</td>
<td>0.3</td>
<td>0</td>
<td>0.2</td>
<td>-0.3</td>
<td>0</td>
<td>-0.2</td>
</tr>
<tr>
<td>4</td>
<td>0.1</td>
<td>0.2</td>
<td>0</td>
<td>0.4</td>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>5</td>
<td>0.2</td>
<td>0.5</td>
<td>0.6</td>
<td>-0.2</td>
<td>-0.5</td>
<td>-0.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
<td><strong>1</strong></td>
</tr>
</tbody>
</table>

Industry Weight for each country (columns (1), (2) and (3)) are calculated based on market capitalization of industries in each country separately. For example, Industry 2 and 3 do not exist
in Country B so when calculating \textit{Industry Weight}, only the market capitalization of Industry 1, 4, 5 are summed as the denominator. \textit{Bias} for Country A, B, and C are calculated according to Eq. (8) and Country Industry Concentration for each country for institution $i$ are:

\[
\text{Country Industry Concentration}_{i,A} = \sum_{SIC=1}^{5} \left| \frac{\text{Country Industry Bias}_{i,SIC}}{2} \right| = .6, \quad (A4)
\]

\[
\text{Country Industry Concentration}_{i,B} = \sum_{SIC=1}^{3} \left| \frac{\text{Country Industry Bias}_{i,SIC}}{2} \right| = .7, \quad (A5)
\]

and

\[
\text{Country Industry Concentration}_{i,C} = \sum_{SIC=1}^{3} \left| \frac{\text{Country Industry Bias}_{i,SIC}}{2} \right| = .9. \quad (A6)
\]