How Important are Foreign Ownership Linkages for International Stock Returns?

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Abstract

We show how a stock return factor model can be described by measures of distance between stocks along the country, industry, and ownership dimensions. Our ownership return measure summarizes the combined return habitat of institutional owners. Empirically, we find that the ownership return is of similar economic importance in explaining international stock returns as country and industry factors, and is not explained by omitted fundamentals or wealth effects. Habitat effects switch around ADR/GDR listings, are strongest for mutual funds, and are driven by common ownership changes across stocks but not common fund flows. The ownership return has important practical implications for asset managers with regards to international portfolio diversification.

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The traditional finance view suggests that stock returns are mainly driven by their underlying fundamentals proxied by industry and country affiliations.[1] However, there is growing evidence that investor demand can affect security prices beyond the effect of fundamentals (Shleifer (1986), Coval and Stafford (2007), Cohen, Diether, and Malloy (2007)),[2] For example, Greenwood (2005 and 2008), and Kumar and Lee (2006), and Boyer (2011) demonstrate that a demand-based view can explain substantial price comovement and even dislocations.

The objective of our paper is to extend this growing literature by creating a summary measure to systematically quantify the effect that institutional ownership linkages have on international stock returns. Using a distance measure, we obtain not only country and industry factors, but also an ownership return measure that captures the distance between stock returns according to their ownership structure. By developing a specific ownership linkage measure and demonstrating that its economic importance in explaining stock return variation is similar to traditional country and industry effects, our paper provides important evidence on how global investments connect stock returns.

Our work is motivated by behavioral theory. In the setting of Barberis and Shleifer (2003) or more explicitly Barberis, Shleifer, and Wurgler (2005), stocks comove because investors with certain demand-based preferences for certain common characteristics create comovements in returns when they experience similar changes in views within their investment habitat. In Daniel, Hirshleifer, and Subrahmanyan (2001) overconfident investors create covariation when they react to events in a common manner. In both cases, prices comove based on the common demand of the

[1] Papers analyzing country and industry sources of variation include Roll (1992), Heston and Rouwenhorst (1994), Griffin and Karolyi (1998), Carrieri, Errunza, and Sarkissian (2004), and Bekaert, Hodrick, and Zhang (2009).
[2] Grinblatt and Han (2005), Han and Wang (2007), Frazzini and Lamont (2008), Sun (2008), Andrade, Chang, and Seasholes (2008), Greenwood and Nagel (2009), Hirshleifer and Jiang (2010), and Lou (2010) provide evidence that non-informative demand can cause price comovement and dislocations.

owners.[3] We build upon this literature by creating a summary measure of the investor influences on stock prices.

To this end, we show how a factor model can be thought of as measuring the distance between stocks along the country, industry, and ownership dimension. As detailed in the following section, we show how value-weighted country and industry portfolios can be interpreted as reflecting the distance of a stock to all other stocks in terms of country and industry characteristics. When we apply this approach to the more complex ownership structure of stocks, we derive an ownership return measure that captures the value-weighted distance of a stock from all other stocks. In particular, our ownership measure captures the differences with regard to which institutions are holding them, the weight of the stock in an institution's portfolio, and the fraction of market capitalization that a fund is invested in a particular stock. In the framework of Barberis, Shleifer, and Wurgler (2005), the ownership return is a summary measure of a stock's institutional habitat return.

The resulting empirical factor model of stock returns augments a traditional country-industry factor model with the ownership return measure. For better identification originating from a more dispersed ownership structure, the empirical implementation of the ownership return is based only on foreign stocks, and thus the ownership return that we refer to is technically a foreign ownership return.[4] We test this parsimonious model using weekly, monthly, and quarterly return data, as well as detailed holding data from the LionShares Holdings database for 8,791 firms domiciled outside of the United States.

[3] This motivation leads Hirshleifer and Jiang (2010) to construct a misvaluation factor that captures sizeable covariation in returns.

[4] We focus on variation due to ownership returns outside of a country because ownership returns within a country are highly correlated with the local market return, making the interpretation more difficult. Nevertheless, we also show similar effects for domestic ownership returns.

We document that the foreign ownership return is economically important for driving cross-sectional variation in returns. For stocks with more than five percent foreign ownership, a one percent increase in the ownership return is associated with an economically large 0.395 percent increase in a firm's stock return, even after controlling for the movements of local market and industry portfolios. In time-series analyses, we use the approach of Bekaert, Hodrick, and Zhang (2009) and find that the covariation in returns attributable to the ownership return is of similar importance to the industry and country factors. The ownership return captures considerable covariation beyond the local market, global market, and industry returns. We also calculate a non-ownership return where each stock in a stock's ownership return is replaced with a stock with matching country, industry, and size characteristics, but with no ownership linkage. This non-ownership return is completely unrelated to stock returns, indicating that ownership is not capturing unobserved country/industry fundamentals.[5]

Having established the importance of ownership for stock returns, we provide additional insights into the drivers of the ownership return. In particular, we use a quasi-natural experiment, which is the shift in the investment habitat around an American Depository Receipt (ADR) or Global Depository Receipt (GDR) listing date. Consistent with the ownership linkage relation being driven by the owners, we find that cross-listed stocks become more highly correlated with their new owners' ownership return following the listing, particularly for stocks that experience a large increase in foreign ownership. The covariation of a stock shifts in a manner consistent with the shift in habitat.

We also examine if there is one particular group of investors that drives the habitat return or if it is a summary measure across various habitats. We find that the ownership return is mostly

[5] The role of the ownership return is also not explained by stock liquidity levels, the level of foreign ownership, market integration channels, nor even the change of ownership itself.

driven by mutual funds and (to a lesser extent) hedge funds, while pension funds and insurance companies are not important. The ownership returns effects are not driven just by high or low momentum funds, funds with large or small flows, or high active share. The ownership return effect is largest for global funds that invest across regions, although it is still significant for country and regional funds. This evidence supports the derivation of the ownership return as a measure that summarizes the returns of primarily mutual fund investors that invest across many diverse habitats. We also classify stocks into low, medium, and high ownership linkage and find that ownership changes in a stock are most closely related to those stocks with the most similar ownership habitat. Return covariation is also the strongest for stocks with the most common ownership habitat.

The effect of ownership returns on stock returns could be contemporaneous or occur with a lag. Our empirical results suggest that the ownership return has predictive power primarily over the next couple of weeks, but not at monthly or quarterly horizons. Thus, it appears that common comovement in ownership returns happens relatively quickly and does not lead to easily detectable longer-term cross-autocorrelations.

The common changes in ownership can be discretionary choices or induced by correlated investor flows. An example of discretionary choices is the model of Daniel, Hirshleifer, and Subrahmanyam (2001), where overconfident investors cause covariation as they misinterpret signals arising from economic factors. After performing a decomposition of investor weights, we find that flow is not an important driver of our average comovement in ownership weights. However, the changes of a stockholder's holdings in other securities in the investment habitat are important for explaining changes in institutional ownership. These findings indicate that the weight changes are primarily discretionary rather than flow induced.

Finally, we briefly examine the practical diversification implications of our findings. Institutions can increase diversification by avoiding stocks with high ownership return linkages. If a fund adds a security with a high ownership linkage to its portfolio, the average covariation of that security with the fund portfolio is 79 percent higher than if the fund were to add a security with a low ownership linkage. While the level of foreign ownership is also important, the magnitude of ownership linkages is economically larger. Since investors hoping to obtain diversification cannot easily escape the effects of other foreign investors in a firm's investment habitat, the effect of ownership habitat transcends country and industry boundaries.

Our work is motivated by a growing literature that points to the relevance of stock ownership for explaining comovement in international equities.[6] In a domestic context, Anton and Polk (2010) show that covariation between stock pairs is related to their common ownership which can be used to predict short-term reversals. Greenwood and Thesmar (2011) show that U.S. mutual funds with highly correlated fund flows exhibit higher volatility and correlations.[7] Internationally, Jotikasthira, Lundblad, and Ramadorai (2012) find that mutual fund flows from domestic markets can drive emerging market returns, and Hau and Lai (2012) provide evidence of fire sales pressuring prices by examining losses due to financial firms during the financial crisis. Interestingly, the fund flow channel emphasized in most previous studies is not the driver of our findings. More gen-

[6] Papers examining the behavior of international investing at the fund level include Kaminsky, Lyons, and Schmukler (2004), Chan, Covrig, and Ng (2005), Broner, Gelos, and Reinhart (2006), Ferreira and Matos (2008 and 2009), Covrig, Fontaine, Jimenez-Garces, and Seasholes (2010), and Hau and Rey (2009). Faias, Ferreira, Matos, and Santa-Clara (2011) examine the country/industry diversification issue for various levels of foreign ownership that we also examine in conjunction with the ownership return in Section 5. The importance of capital flows at the market level is examined by Froot, O'Connell, and Seasholes (2001), Bekaert, Harvey, and Lumsdaine (2002), Froot and Ramadorai (2008), and Bekaert and Wang (2010), among others, who conclude that global betas are linked to financial openness.

[7] Frazzini and Lamont (2008) and Lou (2011) find domestic evidence of flows moving prices. Ellul, Jotikasthira, and Lundblad (2011) find fire sales in the bond market. Calomiris, Love, and Peria (2011) argue that negative global equity returns during the financial crisis are related to price pressure as proxied for by previous turnover.

erally, our paper builds upon this literature by creating a new summary measure of demand-based pricing and demonstrates its wide scale economic importance.

Section 1 shows how country, industry, and ownership returns can be viewed in a parsimonious framework as measuring the distance between stocks. Section 2 describes the empirical implementation of constructing the ownership return and discusses our data sources. Section 3 provides cross-sectional and time-series evidence of the economic and statistical importance of the ownership return. It also provides evidence that it is not capturing omitted fundamentals, and show results for the domestic ownership return. Section 4 offers further insights into the drivers of institutional ownership returns by looking at stocks that list an ADR/GDR, analyzing different types of owners, forced vs. discretionary ownership changes, wealth effects and return dynamics. Section 5 discusses diversification implications. Our conclusions are presented in Section 6.

1 Ownership Channels and Testable Implications

In this section we show how country, industry, and ownership returns can be viewed in a common framework as different measures of stock return distance.[8]

1.1 Fundamentals and Ownership Linkage through Habitat

Building on evidence for demand-based pricing, Barberis, Shleifer, and Wurgler (2005) (hereto forth, BSW) formalize a 'habitat' view of comovement where investors trade in a limited set of stocks. If investors in a habitat have certain views, they push the prices of stocks in their habitat up and down together. BSW show in their equation (4) that returns of a stock *i* are driven by two components:

[8] We examine covariation of realized returns. In the international asset pricing literature, local and global factors depend on the degree of integration/segmentation [Stulz (1981a), Errunza and Losq (1985), Dumas, Lewis and Osambela (2011)]. This literature is surveyed in Bekaert and Harvey (2003) and Karolyi and Stulz (2003).

$$R_{i,t} = CF_{i,t} + \Delta u_{Y,t} \text{ where } i \in Y \quad (1)$$

The first driver of variations in returns is news about cash flows ($CF_{i,t}$), which are often captured along the lines of country and industry memberships in the international finance literature.[9] BSW define the second component, $\Delta u_{Y,t}$, as the part of the return of a stock that is affected by the demand of specific investors in a habitat *Y* due to "risk aversion, sentiment, or liquidity." The return on a habitat is the return of all the stocks traded in that group. For stocks that are held by multiple investors, the habitat return is a weighted average of the habitats in which the investors trade, i.e. a measure of the return of the portfolios of institutional owners. As we show in the following sections, this habitat return is a measure of ownership linkage that has similar underpinnings as country and industry returns in terms of measuring the distance between stocks.

1.2 Derivation of Factor Model with Country, Industry and Ownership Return

A factor model can be interpreted as a metric of linking returns of one stock to all other stocks through a distance measure.[10]

1.2.1 Country and Industry Factor Model

In the case of country and industry factors, a simple way of measuring distance is by the binomial metric of either zero or one. Assume that we have a set of stocks $i = 1, 2, \ldots, N$. For the country dimension, we consider whether the company of a stock is incorporated in a country l or not ($l = 1$ to L). In particular, for each stock we consider a L by 1 vector q_i^C whose lth element is indicator variable $q_{i,l}^C$ that takes the value 1 if a stock is in country l and zero otherwise. The linkage between

[9] It is important to note that variation related to cash flow news need not be entirely rational. Indeed, in Daniel, Hirshleifer, and Subrahmanyan (2001) trading mistakes are systematically correlated with economic fundamentals. This would also include fundamental shifts in discount rates that affect countries and industries.

[10] We thank an anonymous referee for detailed suggestions on the derivation of the factors. The derivation here closely follows his/her outline.

two stocks *i* and *j* by country membership can then be captured by the Manhattan distance between two vectors q_i^C and q_j^C:[11]

$$d^C(i,j) = \frac{1}{2}\sum_{l=1}^{L}\left|q_{i,l}^C - q_{j,l}^C\right| \tag{2}$$

Scaling by 2, which is the maximum distance between two stocks, yields $d^C(i,j) = 1$ for stocks in different countries and $d^C(i,j) = 0$ for stocks in the same country.

Similarly, we utilize a vector for a stock that describes whether a stock is in an industry *p* or not, i.e. *p*th element of the vector q_i^I takes the value 1 if stock *i* is in industry *p* and zero otherwise (*p* = 1 to *P*). The distance $d^I(i,j)$ between two stocks *i* and *j* by industry membership is then defined as scaled Manhattan distance between two vectors q_i^I and q_j^I:

$$d^I(i,j) = \frac{1}{2}\sum_{p=1}^{P}\left|q_{i,p}^I - q_{j,p}^I\right| \tag{3}$$

The distance between two stocks *i* and *j* is 1 for stocks in different industries and zero for stocks in the same industry. A proximity vector *X(i)* for stock *i* is then defined as one minus the stacked distances with respect to all other stocks:

$$\boldsymbol{X}(i) = \begin{bmatrix} 1 - d(i,1) \\ 1 - d(i,2) \\ \vdots \\ 1 - d(i,N) \end{bmatrix} \tag{4}$$

A stock return vector *R* for all *N* stocks is similarly defined as the stacked returns of all other stocks:

[11] While there exist many possible distance metrics, the following derivation makes use of the Manhattan distance (a different version of the Euclidean distance) because it provides particularly intuitive interpretations. As detailed below, we combine this metric with market capitalization weights in order to obtain economically meaningful measures of stock linkages along the country, industry and ownership dimension.

$$\boldsymbol{R}_t = \begin{bmatrix} R_{1t} \\ R_{2t} \\ \vdots \\ R_{Nt} \end{bmatrix} \tag{5}$$

A common risk factor $F(i)_t$ with respect to a distance metric d is the set of OLS coefficients in a regression of the return vector R on a stock's proximity vector:

$$\boldsymbol{R}_t = F(i)_t \boldsymbol{X}(i) + \epsilon \tag{6}$$

Thus, the return factor $F(i)_t$ minimizes (for every stock i) the quadratic deviation between the stock's proximity vector to all other stocks $X(i)$ and their stock return R_t. In the context of country and industry dimensions, X takes values of one for stocks in the same country (industry), and, thus, $F(i)$ is the equally-weighted return of stocks in the same country (industry). However, value-weighted portfolios are often more common, and regressions have typically been estimated using weighted least squares based on stock market capitalization weights (e.g. Heston and Rouwenhorst (1994)). Using the country and industry distance metrics d^C and d^I and the respective proximity vectors X^C and X^I, the country and industry factors are simply the value-weighted mean country or industry returns:

$$\begin{aligned} F^C(i)_t &= [\boldsymbol{X}^C(i)'\Omega^M(i)^{-1}\boldsymbol{X}^C(i)]^{-1}\boldsymbol{X}^C(i)'\Omega^M(i)^{-1}\boldsymbol{R}_t \\ &= \sum_j m^C_{i,j}\left(1 - d^C(i,j)\right)R_{j,t} = R^C_t(i) \end{aligned} \tag{7}$$

$$\begin{aligned} F^I(i)_t &= [\boldsymbol{X}^I(i)'\Omega^M(i)^{-1}\boldsymbol{X}^I(i)]^{-1}\boldsymbol{X}^I(i)'\Omega^M(i)^{-1}\boldsymbol{R}_t \\ &= \sum_j m^I_{i,j}\left(1 - d^I(i,j)\right)R_{j,t} = R^I_t(i) \end{aligned} \tag{8}$$

where $\Omega^M(i)^{-1} = \begin{bmatrix} M_1 & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & M_N \end{bmatrix}$ is a diagonal matrix with market capitalizations of all firms in the world. The market capitalization weights for country and industry factors are $m^C_{i,j} = \frac{X^C(i)_j M_j}{\sum_j X^C(i)_j M_j}$ and $m^I_{i,j} = \frac{X^I(i)_j M_j}{\sum_j X^I(i)_j M_j}$, respectively.

The expressions for $R^C_t(i)$ and $R^I_t(i)$ effectively capture the market capitalization weighted return of stocks conditional on them being in the same country or industry (i.e. their distance being zero). Note that for the country and industry dimension, the distance metric is either zero or one, and every stock is only part of exactly one country and industry portfolio.[12]

A linear two factor model with just country and industry factors can then be specified as

$$R_{it} = \beta^C F^C(i)_t + \beta^I F^I(i)_t + \epsilon = \beta^C R^C_t(i) + \beta^I R^I_t(i) + \epsilon \quad (9)$$

where β^C and β^I are the loadings on the country and industry factors.

1.2.2 Ownership Return

A similar approach as for country and industry factors can be applied to capture the ownership linkages between stocks as a result of investor habitat. In particular, how stock *i* is held by all funds *k* = 1 to *K* can be described by a *K* by 1 vector whose *k*th element is indicator variable $q^O_{i,k}$ that take the value 1 if stock *i* is held by fund *k* and zero otherwise. The distance $d^O(i,j)$ between two stocks *i* and *j* along the ownership dimension can be measured by the scaled Manhattan distance between vectors q^O_i and q^O_j:

$$d^O(i,j) = \frac{1}{s_{i,j}} \sum_{k=1}^{K} \left| q^O_{i,k} - q^O_{j,k} \right| \quad (10)$$

[12] Since every stock is only part of exactly one country (industry) portfolio, we do not need a subindex *l* (*p*) for the weight $m^C_{i,j}$ ($m^I_{i,j}$).

where $s_{i,j}$ is the number of funds holding either stock *i* or stock *j*. Scaling by $s_{i,j}$ yields $d^O(i,j) = 1$ where all owners are different, and $d^O(i,j) = 0$ for stocks where all owners are the same. For all other cases with partial overlap of the owners, $d^O(i,j)$ takes values between 0 and 1. The distance measure $d^O(i,j)$ can be interpreted as the percentage of owners that are different between stocks *i* and *j*. We define the proximity metric to be 1 minus the distance metric: $x^O(i,j) = 1 - d^O(i,j)$. Stacking the proximity metrics for a stock *i* with regard to all other stocks yields the proximity vector $X^O(i)$.

In addition to the ownership distance metric, the ownership return should capture the combined effect of all ownership-linked securities in a value-weighted fashion. To do so, we consider two weights: 1) the percentage $w_{i,k}$ of market capitalization of stock *i* held by institution *k* and 2) percentage $v_{k,j}$ of institution *k*'s equity portfolio that is invested in stock *j*. Both weights are constructed from data available at the previous quarter end. The market value weights *w* and *v* measure the relative strength of the linkages of stocks *i* and *j* with a fund *k*. Portfolio theory suggests that stocks with a larger portfolio weight *v* are more important for portfolio return and risk. In addition, the fraction *w* captures the extent to which stock *i* is owned by fund *k*, and represents the importance of fund *k* to stock *i*. The product of the two weights $w_{i,k}v_{k,j}$ summarizes how strong the linkage is between the two stocks via institution *k*. The linkage between the two stocks can be represented with the sum of the products across all institutions, $\sum_{k=1}^{K} w_{ik}v_{kj}$.

The ownership weights $h_{i,j}$ of stock i with regards to all other stocks can be summarized in the diagonal weighting matrix $\Omega^{O}(i)^{-1} = \begin{bmatrix} h_{i,1} & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & h_{i,N} \end{bmatrix}$. Using this weighting matrix and the proximity matrix X^{O} yields the ownership return as:[13]

$$\begin{aligned} F^{O}(i)_t &= [\boldsymbol{X}^{O}(i)'\Omega^{O}(i)^{-1}\boldsymbol{X}^{O}(i)]^{-1}\boldsymbol{X}^{O}(i)'\Omega^{O}(i)^{-1}\boldsymbol{R_t} \\ &= \frac{1}{C}\sum_{j=1}^{N}\left(1 - d_{O,i,j}\right)\sum_{k=1}^{K} w_{i,k}v_{k,j}R_{j,t} = R_t^{O}(i) \end{aligned} \tag{11}$$

Thus, the ownership return captures institutional ownership linkage via the number (fraction) of common owners, but also the size of the stock holdings and corresponding significance of the ownership linked stocks. Note that in contrast to country and industry factors, the ownership return is stock-specific and in this sense is not a "factor" in the traditional asset pricing sense. The weights and the distance are measured at the end of the last quarter, while the returns are measured over the course of the current period.[14]

For additional intuition of how the ownership return reflects habitat, consider a stock that is held by owners who only trade stocks in one habitat. The ownership return will have zero distance to all other stocks in the habitat. Thus, $R^{O}{}_{i}$ reflects the market capitalization weighted average return of all stocks in the habitat and corresponds to the notion of what BSW refer to as the return on stocks in the habitat. When a stock is traded by investors in two habitats, $R^{O}{}_{i}$ is a value-weighted combination of the two habitat returns. Such intuition generalized across multiple habitats demonstrates how the ownership return is a summary measure of the habitats in which the stock trades.

[13] The number of stocks is N and $C = \boldsymbol{X}^{O}(i)'\Omega^{O}(i)^{-1}\boldsymbol{X}^{O}(i) = \sum_{j=1}^{N}\left(1 - d_{O,i,j}\right)^{2}\sum_{k=1}^{K} w_{i,k}v_{k,j}$. Yet in the empirical implementation we use $C' = \sum_{j=1}^{N}\left(1 - d_{O,i,j}\right)\sum_{k=1}^{K} w_{i,k}v_{k,j}$ so that the weights of $R_{j,t}$ sum to 1.

[14] Note that for all distance metrics (country, industry, ownership), the distance of a stock with itself is always 0.

We can now augment the simple two factor model with country and industry factors to incorporate the three measures of distance by adding the ownership return:

$$R_{it} = \beta^C R^C(i)_t + \beta^I R^I(i)_t + \beta^O R^O(i)_t + \epsilon. \quad (12)$$

In the setting of BSW, $\beta^O F^O(i)$ reflects the habitat component of a stock return, while country and industry portfolios $\beta^C F^C(i) + \beta^I F^I(i)$ capture fundamentals (cash flows). We will explicitly address the potential concern that the ownership return may simply capture omitted fundamentals in our empirical work.

2 Empirical Implementation and Data

2.1 Constructing the Foreign Ownership Return

In the empirical implementation, we construct an ownership return that equals:

$$R_t^O(i) = \sum_{j=1}^{N} \left(1 - d_{i,j}^O\right) \sum_{k=1}^{K} w_{i,k} v_{k,j} R_{j,t} \quad (13)$$

We exclude stock *i* from its country, industry and ownership portfolios to avoid a mechanical relation. To allow the ownership returns of different stocks to be comparable, we impose the normalization that $\sum_{j=1}^{N}\left(1 - d_{i,j}^O\right)\sum_{k=1}^{K} w_{i,k} v_{k,j} = 1$, i.e. the observed ownership weights sum up to one. This makes it easier to interpret our results since foreign ownership returns of different stocks will be comparable.

It can be advantageous for the empirical analysis to divide the ownership return into a part due to foreign stocks that investors hold, and a part due to domestic stocks.[15] Since the foreign ownership return comes from a diverse set of countries, it leads to clear identification, whereas the

[15] Note that we distinguish between foreign and domestic relative to the country of incorporation of stock *i* and not the location of institution *k* owning the stock.

domestic ownership return can be highly correlated with the return on the local market. Hence, we focus on the foreign ownership return in most of the paper, but for robustness also examine the domestic ownership return.

The ownership return captures the composition of the holdings of the owners of a stock, but not the level of foreign institutional ownership. We expect that the ownership return is more important for stocks where the holders represent a large fraction of the shares. Therefore, we focus on examining securities with more than five percent foreign ownership. The ownership return can be constructed for higher frequencies than the quarterly changes in ownership by combining previous quarter's holdings weights with the updated weekly and monthly stock returns.[16]

2.2 Data Sources

Our international institutional holdings are from FactSet/LionShares. We follow many of Ferreira and Matos (2008) data cleaning procedures augmented with other standard checks for 13f filings as described in Section A of the Internet Appendix. We obtain the historical LionShares database that is free from survivorship bias. FactSet/LionShares do not provide detailed disclosure of their sources, but they do use data from public filings obtained in various countries supplemented by companies' annual reports. Their coverage appears to be lacking in capital originating outside of the United States. Wei (2011) finds that the United States and the United Kingdom account for slightly over 70 percent of LionShares' non-domestic capital.

LionShares contains two main databases: the aggregate institutional filings (similar to 13f in the United States), and the mutual fund database (similar to N-CSR mutual fund filings in the

[16] It is interesting to think of the possible role played by measurement error. The returns not involving country and industry returns are easily measured, whereas the ownership return depends on knowing ownership, which is often incompletely measured or updated infrequently. Such effect will lead to more error in estimating foreign ownership returns, decreasing the power of our tests and biasing results against the significance of the ownership return.

United States). To maximize data coverage, we use the institutional database as our primary database but add additional ownership information from the fund database if the parent institution's holdings are not in the institutional ownership database.

Table IA 1 in the Internet Appendix details the frequency of coverage by database for the final sample and shows that 48 percent is annual, 32 percent biannual, and 14 percent quarterly. While most of the data in the United States is reported quarterly, in most other countries biannual and annual data is the norm. Table IA 2 details the number of institutions and mutual funds in the database through time and shows that the sample grows rapidly from 2001 to 2005.

For returns and market value data, we use Thomson Financial's Datastream total return indices and market values. In order to have a common currency to compute global returns, we download data in local currency and convert it into U.S. dollars using exchange rates from Datastream. We use filters for common equity as well as reversion and extreme return filters to smooth potential data errors as described with other details in Section A of the Internet Appendix. To ensure that our results are not driven by infrequent trading, we require stocks to trade on at least 30 percent of the days in the previous year.[17]

Table IA 3 shows that overall our sample includes a total of 13,101 firms, 8,791 of which are from outside of the United States. Our main tests focus on stocks with more than five percent foreign ownership. Table IA 3 indicates that this sample is tilted toward large stocks but still captures many stocks in the bottom three size bins.

[17] The percentage of zero returns is the main measure of liquidity used by Bekaert, Harvey, and Lundblad (2007). This measure is similar to Lesmond, Ogden, and Trzcinka (1999)'s transactions costs measure, but is less subject to estimation problems. Higher trading filters of 50 and 75 percent yield similar results.

3 Cross-sectional and Time-series Importance of Ownership Returns

To examine the economic and statistical importance of the ownership return, we first evaluate the ownership returns with cross-sectional and time-series tests.

3.1 Cross-sectional Regressions

Table 1 reports results from cross-sectional Fama-MacBeth (1973) regressions for quarterly frequencies for all non-U.S. stocks with more than five percent foreign ownership. In the univariate specification, we find that a one percent increase in contemporaneous ownership returns is associated with a 56 basis point increase in a stock's return. In order to control for the expected local and global cost of capital changes due to both returns and betas, we use prior estimated betas times the contemporaneous local or global stock return movement. After controlling for the local and global cost of capital, a one percent increase in the ownership return is associated with a 0.364 percent return increase. After controlling for industry returns in addition to the local and global cost of capital, a one percent increase in the ownership return is associated with a 0.311 percent return increase.

3.2 Time-series Regressions

We now turn to examining the explanatory power of the ownership return using the time-series approach of Bekaert, Hodrick, and Zhang (2009), which is advantageous in that we can control for multiple forms of risk in the standard time-series regression framework. In order for the coefficient estimates to vary fully across stocks, we estimate regressions at the weekly frequency with individual stock level data and then aggregate the coefficients. For stocks with more than five percent foreign ownership, Panel A of Table 2 shows the regressions estimates over the most recent three year period from 2006 to the first quarter of 2009 (results in other sub-periods are similar).

We first examine the importance of the ownership return beyond the local market return. The average coefficient on the ownership return (Specification (3)) is 0.279. A coefficient of 0.279 indicates that a weekly stock return increases by twenty basis points when the ownership return increases by 100 basis points, even after controlling for variation in the local market. This coefficient is similar in size to that of the world market return (0.175 in Specification (2)) or global industry return (0.238 in specification (4)).[18] Comparing the incremental adjusted R^2 in specifications (2)-(4) to specification (1) shows that the incremental explanatory power of the ownership return is higher than that of the world return, but not quite as large as that of the global industry return. Regressions (6) and (7) show similarly large coefficients and incremental explanatory power on the ownership return, over and above the local market, global market, and industry factors. This indicates that the importance of ownership is not attributable to fundamentals proxied for by global market or industry returns.

We now turn to a more formal evaluation of the various models. Bekaert, Hodrick, and Zhang (2009) convincingly argue that comparing models with the mean squared error of correlations is appropriate for examining which model best characterizes the covariance matrix of returns.[19] We follow their procedures, except that we use individual stocks rather than portfolios.[20] We follow Bekaert, Hodrick, and Zhang (2009) and estimate the regressions over six-month periods to allow for possible time-variation. Bootstrapped *p*-values are computed following their procedure where we bootstrap from the time-series of our MSEs to compute an empirical distribution.

[18] Because the global market and the foreign ownership return are highly correlated, when both terms are included, the global market coefficients are often negative (specification (6)).

[19] The approach involves determining which model provides the best fit for the sample covariance structure. If a factor model is true, the common factors should explain as much as possible of the sample covariance matrix and the residual covariance components should be small. To compare the performance of alternative models, one can use a mean squared error criterion, which is the time series mean of a weighted average of squared errors.

[20] In the context of standard asset pricing tests, Ang, Liu, and Schwartz (2010) propose that using individual stocks is more efficient than using portfolios.

Panel B shows that the MSE with only the local market is 0.038, whereas it improves to 0.025 when the ownership return is added. Interestingly, the improvement due to adding the global industry or world market return to the local market factor is extremely similar (MSEs of 0.026 and 0.025). Other specifications examine the incremental improvement from adding the ownership return onto other models without the factor and find that the ownership return leads to smaller MSEs than using a model with the global market or industry returns.

3.3 Omitted Fundamentals

Institutional shareholders may specialize in country and industry characteristics beyond what linear country and industry classifications can capture. Thus, we create a non-ownership return that has the exact same country, industry, and size composition as our ownership return, except that we sever the ownership link. BSW also show that the returns of stocks outside the habitat (non-index stocks in their case) are less important for returns, which has a similar economic rationale as our non-ownership return.

The results reported in Table 3 (specification (1)) show that the coefficient on the non-ownership return is close to zero. We repeat this process with two-digit SIC industries that are potentially more precise. We also perform the analysis where we always pick the largest non-ownership stock within the country-industry bucket to ensure the non-ownership return is of similar or larger size composition. Alternatively, we combine the industry and large stocks analysis. All of the coefficients on these alternative non-ownership returns in specifications (1)-(5) are close to zero, indicating that ownership returns are not simply proxying for stocks of similar country and industry characteristics. We also perform various draws of creating the non-ownership return by creating 200 simulated datasets of non-ownership returns. The simulation regression coefficients

have a mean of 0.0034 and range from 0.0018 to 0.061 (Panel A of Table IA 4), which is never anywhere close to that of the actual ownership return of 0.56 (in Table 1).

Recall that the ownership return is a foreign ownership return constructed as a summary measure of a stock's owners' returns from their holdings outside of the country of origin of the stock. However, we can also examine, with more caution, the stock's owners' returns from their holdings in the same country as the stock. We call this return the 'domestic ownership return.'[21] Examining the domestic ownership return provides a holdout sample to examine the robustness of the foreign ownership return. The domestic ownership return has an average correlation of 0.786 with the local market return, which makes controlling for the local market return important. Even with the local market return and foreign market returns in the cross-sectional regression, Table 3 shows that a one percent increase in the domestic ownership return is associated with a 0.598 percent increase in a firm's stock return. We find foreign ownership return remain significant in affecting stock returns even after controlling for domestic ownership returns.

As documented in the Appendix, we consider whether the importance of the ownership return can be explained by industrial country vs. emerging market stocks, large vs. small stocks, or the liquid vs. illiquid stocks. None of these issues are driving the findings.

4 Drivers of the Ownership Return

4.1 An ADR/GDR test

BSW and Greenwood (2005) use index additions and deletions to examine whether a shift in investor demand or investor habitat (from habitat Y to Z) leads to changes in stock comovement as predicted by the habitat hypothesis. In an international setting, Foerster and Karolyi (1999) show

[21] In constructing the domestic ownership return, we make the simplifying assumption that the ownership distance is the same for all firms domiciled in the same country.

that the ownership composition of a stock often shifts around the listing of an ADR/GDR. If the explanatory power of the ownership return is driven by investor habitat and not some omitted firm characteristic that ownership proxies for, then stock returns should become more correlated with the new ownership structure after the ADR/GDR listing.

In order to keep the same comparison set of stock returns to form the ownership return, we use the same ownership return weights in forming the ownership return both pre- and post-listing. The weights are the average ownership weights in the year after the listing. If the ownership composition shifts around the listing date, then following a similar intuition as BSW, stock returns should be more strongly related to the ownership return that reflects the new ownership structure post-listing as compared to pre-listing. We estimate pooled regressions in a framework similar to Foerster and Karolyi (1999) except that we add the ownership return variable.

Table 4 shows that the ownership return is significant both before and after the listing, but the size of the coefficient increases substantially after the ADR listing as predicted. As one would expect, the increase in the ownership beta is stronger for stocks that experience an increase in the level of foreign ownership along with the ADR listing: in fact the coefficient is more than double. The result is robust to controlling for local and U.S. market returns (specifications (2) and (3)) and subsumes the increase in global betas documented by Foerster and Karolyi (1999). Shifts in ownership linkage betas in conjunction with shifts in ownership composition around ADR listing dates suggest that the ownership return relation is driven by ownership habitat.

4.2 Types of Owners

While the ownership return is constructed as a summary measure of investor habitat, it may be the case that certain habitats or investor groups drive its importance. Therefore, we examine whether

the ownership return relation varies across different subgroup of owners.[22] In particular, we classify institutions by type, by fund flows, by level of active shares, and by momentum exposure. In each case, institutions are sorted into several groups, we compute foreign ownership returns separately for each of these groups, and we compare the Fama-MacBeth regression coefficients across groups.

First, we divide institutions into hedge funds and mutual funds (independent) vs. banks, insurance companies, and pension funds (grey), following Ferreira and Matos (2008). Mutual funds and hedge funds are often more active in their views, but they are also subject to capital flows. In contrast, grey institutions like banks, insurance companies or pension funds primarily trade for their own accounts. For each stock, we compute foreign ownership returns for the two groups of institutions separately.

Specification (1) in Table 5 shows the baseline result that a stock's return is related to its foreign ownership return. Specification (2) shows that the foreign ownership return of mutual funds and hedge funds is related to stock returns, whereas the foreign ownership return of banks, insurance companies, and pension funds is not. In specification (3), we see that between mutual funds and hedge funds, the relation is significantly stronger for the 3,796 mutual funds than for the 1,185 hedge funds, suggesting that it is mutual fund ownership that is driving the ownership return effect. In other words, the habitat formed by mutual funds is the main driver of cross-sectional return variations of stock returns compared to other types of institutions.

In specification (4), we split institutions into two groups by sorting on their portfolio return loadings on the Fama-French global momentum factor.[23] Again we compute foreign ownership

[22] We thank an anonymous referee for this suggestion.
[23] We regress the past 24 months' institutional returns on the Fama-French global momentum factor to obtain the momentum loadings. High (low) momentum funds are institutions whose factor loading is above (below) the median.

returns separately for each of the two groups. Specification (4) documents the ownership return coefficients for high vs. low momentum funds. The result shows that habitat formed by high momentum funds is economically and statistically more important than that formed by low momentum funds. While the difference between the two coefficients is significant, the ownership return of low momentum funds is also significantly associated with stock returns.

Funds with low net flows may engage mostly in regular (discretionary) rebalancing activities, while funds with large inflows or outflows will have to make (forced) net new purchases/sales. To investigate this effect, we split the ownership return for each stock into two components based on funds with net flows in the top or bottom quartiles across institutions (high flows), and funds in the middle two quartiles (low flows). Specification (5) shows that the ownership return coefficient for high-flow institutions is larger than that for low-flow institutions, though the difference is not statistically significant.

We also investigate whether activeness of portfolio allocation is related to the extent the ownership return is associated with stock returns. We construct active shares for each fund in a similar fashion as Cremers and Petajisto (2009) and sort institutions into those that are above the median active share (high active share) and below the median active share (low active share).[24] Specification (6) shows the results for funds with high active share vs. low active share. While both ownership return coefficients are significant, we find that the ownership return coefficient for institutions with high active share is more tightly estimated than that from lower active share institutions. However, estimated coefficients sizes are similar, and the difference is not statistically significant.

[24] We use a market capitalization weighted index constructed for each geographical region and the world using the stocks in our data sample. For regional funds (as defined in the text), we rank institutions according to their active shares relative to the regional market capitalization-weighted benchmark. For global funds (also defined in the text), we rank institutions according to their active share relative to the global market capitalization-weighted benchmark.

Finally, we classify funds as global, regional, or country funds based on their holdings.[25] In Specifications (7) and (8), we find that foreign ownership returns of global institutions are much more important in affecting a stock's returns than those from regional or country-specific institutions.

These results show that the ownership return effects are mostly due to independent institutions like hedge and mutual funds, momentum funds, and global funds. While our flow partition suggests that it is not just high flow funds that have ownership linkages, the importance of flows can be separately re-examined for all funds, which we do in the following section.

4.3 Forced vs. Discretionary Ownership Changes

Similar to our analysis with returns, we now seek to learn what drives common shifts in ownership. To this end, we construct a variable that captures the change of holdings of foreign stocks connected to stock *i* through the same owners, analogous to the construction of the ownership return:

$$\Delta Holdings\ Connected\ Stocks_{i,t} = \sum_{k=1}^{K} w_{i,k,t-1} \left(\sum_{j=1}^{N} v_{k,j,t-1} \Delta Holdings_{j,t} \right) \qquad (14)$$

where $w_{i,k}$ is the percentage of market capitalization of stock *i* held by institution *k*, $v_{k,j}$ is the percentage of institution *k*'s equity portfolio that is invested in stock *j*, and $\Delta Holdings_{j,t} = Holdings_{j,t} - Holdings_{j,t-1} = \sum_k Holdings_{j,k,t} - \sum_k Holdings_{j,k,t-1}$. Ownership changes of connected stocks can be thought of as the change of ownership that would occur for stock *i* if it exhibited similar changes in ownership as other linked stocks in the combined habitat.

[25] We calculate for each fund the percentage of its holdings that are in a country and a region in a quarter. If the maximum average percentage of the holdings in a country over the previous 12 quarters is more than 90% of the fund's total holdings, the fund is classified as a country fund. Otherwise, if the maximum average percentage in a region is more than 80%, it is a region fund. Otherwise, it is a global fund. Depending on country, region, or global classification, the respective monthly country, region, or global index return is selected for a fund in the following quarter.

The habitat hypothesis suggests that investors buy and sell stocks within a habitat at the same time, but this could be due to various mechanisms. One mechanism for these common movements is flows, while active shifts in views through common ownership is another. Consequently, we decompose the stock-level change of holdings into three components: change of holdings of foreign connected stocks, fund flows, and a residual term. By construction, the residual term is closely related to change in ownership.

In order to capture the effect of fund flows, we construct a measure of the change of holdings of a stock as a result of flows to funds ($\Delta Holdings\ Flows_{i,t}$). This variable measures the change of holdings that would have occurred had funds passively adjusted their holdings according to their flows:

$$\Delta Holdings\ Flows_{i,t} = \sum_{k=1}^{K} Holdings_{i,k,t-1} Flow_{k,t}, \tag{15}$$

where $Holdings_{i,k,t-1}$ is the percentage of market capitalization of stock i held by fund k in the previous period. Fund flows are defined following the standard approach in the literature, i.e. quarterly fund flows are inferred as the difference between total net assets and what assets would have been if they had simply grown passively:

$$Flow_{k,t} = \frac{TNA_{k,t} - TNA_{k,t-1}(1 + R_{k,t})}{TNA_{k,t-1}} \tag{16}$$

where $R_{k,t}$ is the return of fund k during quarter t, and $TNA_{k,t}$ is the total net asset value at the end of quarter t.[26]

[26] Our definition of fund flow represents the dollar growth of a fund that is due to new investments at the end of the quarter. When we turn to the LionShares data where we do not have TNA, we approximate this with the total equity positions. We apply $Flow_{k,t}$ for fund k proportionally to fund k's holding of stock i using the previous quarter's weights to obtain $Flow_{i,k,t}$. We then aggregate the components across funds to create changes in the position in stock i due to fund flow and returns in habitat.

Table 6 presents results of cross-sectional regressions with changes of holdings. The decomposition shows the effect of the various components on changes of holdings and returns. In particular, the first specification in Panel A regresses a stock's change in holdings on the changes of holdings of foreign connected stocks. The change of holdings in the foreign habitat is strongly related to the change in ownership (coefficient of 0.398). This indicates that stock ownership changes with changes of ownership of other stocks in a firm's habitat. In contrast, changes in holdings due to fund flow are insignificant in their relation to changes of holdings (specifications (2)-(4)).

Specifications (5) and (6) show results of a counter-factual experiment where the change of holdings of foreign related stocks is replaced by the change of holdings of unrelated stocks. In Specification (5), the change of holdings in the foreign habitat is constructed by replacing the change of holding of each foreign related stock by the change of holdings of the largest unrelated stock in the same country and industry as the related stock. In Specification (6), the change of holding of each foreign related stock is replaced by the average change of holdings of all unrelated stocks in the same country and industry. We find that the change of holding of a stock is only related to the change of holdings of related stocks, but not the change of holdings of unrelated stocks. Overall, Table 6 Panel A indicates that the patterns of stocks moving together in an investment habitat are primarily due to institutions investing in stocks in the same habitat. Such patterns are not primarily driven by, and are largely distinct from, those of fund flows.

In Panel B of Table 6, we split the change in ownership variable as a function of the degree of connectedness of related stocks. Specifically, we split the stocks that have common foreign ownership with a particular stock into three groups, depending on whether the stocks have low, medium, or high levels of common ownership. We then compute an aggregate change of holdings

for each group. Specifications (1) through (5) show that changes in ownership of a stock vary strongly with those of stocks with high common ownership, but not with stocks with medium or low common ownership.

For comparison, we also split the ownership return into three parts as a function of the degree of connectedness of related stocks. The habitat hypothesis suggests that stocks co-move particularly with connected stocks that share high common ownership. Specifications (6) and (7) show that stocks with the highest level of common ownership move together, this is not the case for stocks with low levels of common ownership or unrelated stocks. Overall, the results in Table 6 are consistent with investor habitat driving common movement in institutional ownership and stock returns.

4.4 Wealth Effects

A possible alternative interpretation to habitat investing is that the ownership return captures wealth effects of investors. In particular, a simple implication of portfolio rebalancing that plays a role in many models is that if stock prices increase in one group of securities, investors may want to diversify away from this group and increase their holdings in other securities.[27] Therefore, we perform an institution-level analysis in order to investigate wealth effects. Suppose two of Samsung's shareholders, Capital World Investors and New York Retirement Funds, have very different fund returns. For example, Capital World Investors might experience high returns on its holdings, while the New York Retirement Fund has low returns. A wealth effect implies that Capital World

[27] See for example equation 4 in Bohn and Tesar (1996), equation 6 in Griffin, Nardari, and Stulz (2004), Figure 5 in Goldstein and Pauzner (2004), and page 1412 in Kyle and Xiong (2001). For example, Goldstein and Pauzner (2004) propose that when an international investor's domestic holdings decrease, she has lower wealth and is more likely to sell her foreign holdings.

Investors will increase its holding in Samsung, whereas the New York Retirement Fund will hold its position constant or sell.

We estimate cross-sectional regressions where the dependent variable is the quarterly ownership change for each existing institutional holding of fund. If wealth effects are important, institutions with high fund returns should be increasing their holdings in a stock. However, the regression results show that the contemporaneous institutional returns are statistically and economically unrelated to an institution's change in holdings (Panel A of Table 7). This result is independent on whether we measure the fund performance based on all stocks (specifications (2) and (5)) or just foreign stocks (specifications (1) and (4)), whether the fund return is contemporaneous or lagged, or whether we consider new or existing holders. In other words, institutions that experience the largest returns on their holdings are not generally increasing their institutional holdings in the stocks they already hold.

Another way to investigate the role of a wealth effect as a driver of the ownership return is to exploit the fact that the wealth of the investor may be tied to his home country returns.[28] Suppose we have an Asian country fund domiciled in the United States. Given the prevalence of the well-documented home bias in equity market investing, a U.S. investor in a fund domiciled in the United States has much of his wealth tied up in the U.S. market. Hence, the U.S. stock market return may be a proxy for his wealth effect, since a wealth shock to the end investors might engender significant rebalancing and hence spillover significantly to a country through the fund's flows.

Similar to our ownership return, we compute an institutional owner's home market return that is based on the country where the institution is domiciled (which may be different from the country where the capital is deployed). The home market returns are calculated as the weighted

[28] We thank an anonymous referee for suggesting this test.

sum of index returns of the home country where the funds are incorporated, where the weights are based on the relative size of the funds' holdings in the stock.

Results of cross-sectional regressions investigating this form of the wealth effect are shown in Panel B of Table 7. The owners' home market return has some ability to explain returns in the presence of the ownership return (specification (1)) or local market returns (specification (2)). Nevertheless, the owners' home return is no longer significant once local market returns and foreign ownership returns are controlled for (specification (3)). Adding industry returns as additional control in specifications (4) and (5) does not alter this conclusion. Most importantly, specifications (1), (3), and (5) show that the importance of the ownership return is unaffected by the owners' home market return.

Wealth effect theories are often related to contagion and point to the effects of ownership mattering more in periods of extreme stress, which suggests potential asymmetries surrounding negative returns and particularly in periods of crisis. To investigate this prediction, we estimate weekly Fama-MacBeth cross-sectional regressions and average the coefficients over rolling 26-week periods. Figure IA 1 plots the coefficients over the January 2000 to March 2009 period. Industry and ownership coefficients are of similar magnitude and are relatively stable. The coefficients are never below zero and range between 0.10 and slightly over 0.60. Hence, our results are consistent with Bekaert, Ehrmann, Fratzscher, and Mehl (2012) as they find little economic evidence of excess comovement during the financial crisis. Overall, our findings indicate that changes in institutional holdings are affected by changes in a stock's habitat but not wealth effects.

4.5 Return Dynamics

If the ownership return is primarily driven by shifts in views of asset managers, then one wonders whether these shifts happen simultaneously, or if they are driven by managers shifting views over

longer time periods. Our analysis so far has primarily focused on contemporaneous relations, whereas it is an empirical question whether these return movements happen simultaneously or possibly also with a delay. To this end, Panel A of Table 8 shows the results of regressions of stock returns on current and lagged ownership returns in alternatively weekly, monthly and quarterly frequency. We find that stock returns are significantly related to ownership returns from the past week up to the past month. Such lag effects are consistent with institutions pushing up the prices of stocks they hold within their habitat. We examine the ownership returns effect for small, medium and large stocks, and find the results to be qualitatively similar among all three groups.

Panel B examines the results from regressing the stock returns of the next one to four months on the current period ownership return. Even after controlling for stock returns in month *t*, stock returns from month *t-6* to *t-1*, and industry portfolio returns, current ownership returns still have some predictability for stock returns over the next month. This is again consistent with the hypothesis that institutions drive the prices of stocks in their habitat. At the same time, the predictive effects in both panels are not large and dissipate rather quickly. We imagine that they would be difficult to trade on in real time.

5 Diversification Implications

While our results are focused on linking the ownership return to stock returns, we briefly explore in this section the diversification implications for ownership linkages. A simple but useful practical diagnostic is to compare the return covariance of firms within a population relative to the return variance of a representative firm. Solnik (1974) uses this to compare the power of portfolio diversification in the United States and internationally. Panel A of Table 9 shows that for stocks with no foreign ownership the average correlation is 0.103, but for stocks with more than five percent for-

eign ownership the average correlation is 0.21. In Figure 1, we graph the covariances as a fraction of the average variance. For stocks with no foreign ownership, the global limit of diversification is 7.1 percent of individual stock variance, whereas for stocks with more than five percent foreign ownership the limit is 18.8 percent. These findings show the importance of the level of foreign ownership, a finding recently confirmed by Faias, Ferreira, Matos, and Santa-Clara (2011).

To gauge similar implications for ownership linkages captured by the ownership return, we take the perspective of a fund manager looking to diversify into non-U.S. stocks that he does not already hold in his portfolio. In order to focus on the set of stocks that fund managers typically select, we require the level of foreign ownership in these stocks to exceed five percent. For each of the stocks meeting these requirements, we regress its foreign ownership return on the return of each fund, using weekly returns over the prior two-year rolling window. We call the estimated slope coefficient of this regression the ownership beta of a stock with respect to the fund. The ownership beta is a measure of how closely the return of a fund covaries with the return on the foreign holdings of other funds that hold a particular security.

For the year subsequent to the estimation period of the ownership betas, we regress the stock return on the fund return separately for each stock and fund. We call the estimated slope coefficient of this regression the fund beta of a stock with respect to the fund. It is a measure of how strongly a stock covaries with a given fund's portfolio, or its diversification potential for the fund.

With the ownership betas and fund betas in hand, we sort all stocks into four groups each year according to their ownership betas (<0.5, 0.5-0.75, 0.75-1, >1) and calculate the average fund beta of each group. To preserve proper weighting at the fund and country level, we first average the fund betas across stocks by fund, country, year, and ownership beta bin. Subsequently, we average across funds, across countries, and then across years for each ownership beta bin. Fund betas

are related to prior estimated ownership betas and are of large size. Panel B of Table 9 shows that the average fund beta is 0.478, 0.626, 0.765, and 0.880 as one moves from low to high ownership betas.[29] If a fund manager adds a security with a high ownership beta to his fund, the average fund beta is 1.84 times (0.880/0.478) what the average fund beta is for a stock with a low ownership linkage.

A remaining issue is that it seems probable that the level of foreign ownership is related to the strength of the ownership linkage, i.e. the ownership beta. To address this issue we sort stocks into bins both according to the level of foreign ownership as well as their ownership betas. In particular, we define five levels of foreign ownership (0, 0-1, 1-5, 5-15, and >15 percent) and sort stocks within each group into bins based on their ownership beta (<0.5, 0.5-0.75, 0.75-1, >1). Panel C of Table 9 shows the average fund beta according to both a stock's level of foreign ownership as well as its ownership beta. For stocks with zero foreign ownership, the average fund beta is 0.49, but for stocks with more than 15 percent foreign ownership the average fund beta is 0.74 or 1.51 times (0.74/0.49) the average fund beta of the stocks in the zero foreign ownership group. For stocks with low ownership linkage to a fund the average fund beta is 0.44, whereas for stocks with high ownership linkage the fund beta averages 0.79, or 1.79 times as much (0.79/0.44). This indicates that a stock with high ownership linkages will have considerably less diversification benefits for portfolio managers, even after controlling for the level of foreign ownership. Our findings indicate that both ownership linkages and the level of foreign ownership are economically important factors to consider in international diversification.

[29] Because of computational considerations, we randomly draw 1,000 of our 6,698 institutions to consider in the analysis in Panel B and C of Table 9. The analysis is computationally intensive because of the high dimensionality of the combined analysis of all permutations of the time-series data of these 6,698 institutions with the time-series stock return and ownership return data of 9,095 non-U.S. stocks.

6 Conclusion

The traditional view of international stock market comovement suggests that stock returns move together to the extent that their economic drivers are similar. In the international finance literature, this debate has been cast in terms of two components of economic fundamentals, namely industry and country factors. Motivated by Froot and Dabora (1999), Chan, Hameed, and Lau (2003), and Foerster and Karolyi (1999) who show in different contexts that covariation is related to a firm's investor clientele associated with its listing location, we develop a new, parsimonious measure of ownership linkages and document its pervasiveness and importance. Fama and French (2012) find that local factors are relatively more important than global ones, but Karolyi and Wu (2012) show that the degree to which a stock is global depends on the cross-listed trading venue. In a broadly consistent manner, we find that a more explicit measure of ownership linkages can explain return variation beyond local and global factors.

We derive an ownership return that is the value-weighted and ownership proximity adjusted average of all foreign stocks held by common shareholders. This ownership return is of similar economic importance as country and industry fundamentals, and it is not proxying for omitted fundamentals, wealth effects or investment style. Consistent with investor habitat, the ownership return is more important after ADR/GDR listings, it is stronger for mutual funds, and it is driven by common ownership changes across stocks, but not common fund flows. More specifically, heterogeneous investors with different market perceptions influence stock returns as their holdings and preferences for stocks in an investment locale fluctuate in ways that transcend borders.

Our results have important practical implications to investors. Stocks with an ownership return similar to a portfolio manager's existing portfolio provide considerably less diversification benefits compared to stocks with an unrelated ownership return. Thus, international fund managers

should pay close attention both to the level of foreign ownership and to whether a stock is held by unrelated or competing shareholders. We believe these findings have broad academic and practical relevance for a variety of domestic and international portfolio and risk management applications, and more research is needed to further understand the important role of financial institutions in international financial markets.

Appendix

Robustness checks

In Table A1, we examine the ownership return effects on small and large stocks, actively traded stocks and non-actively traded stocks, and on industrial and emerging market stocks. Table A1 shows the regression results where we regress quarterly returns on the ownership return for different regression samples based on domicile market development, market capitalization, and liquidity levels. We first run regression separately for the sample of stocks in developed markets and emerging markets. We then run regression based on the stocks' market capitalization buckets (small, medium and large) in the previous quarter. Stocks that are below the 40^{th} percentile stocks are classified as Small, the next 30 percent are classified as Medium, and the rest as Large. Finally, we divide stocks into liquid vs. illiquid according to the percentage of non-zero return days in the previous year. We use the median value of the percentage of zero returns to divide stocks into the two groups. In all specifications, we find that stock returns are significantly related to the ownership return.

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Table 1: Cross-Sectional Regressions with Ownership Return

The table shows the results of Fama-MacBeth regressions of quarterly stock returns on an intercept (not reported), the foreign institutional ownership return (Ownership Return), expected returns from a CAPM with local and world market index and global industry index returns excluding the industry in the local market (Industry). Local Beta and World Beta are first estimated from rolling regressions using past two-year returns, where the returns of each stock is regressed on the returns on the value-weighted local country market index, and the returns of the MSCI world market index: $R_{jt} = \alpha_j + \beta_L R_{L,t} + \beta_W R_{MSCI,t} + \varepsilon_{jt}$. The Local Beta is then multiplied with the contemporaneous local market return (Local Beta × Local Market), and the World Beta is multiplied with the contemporaneous MSCI world market return (World Beta × World Market) to construct CAPM expected returns. The sample period is 01/01/2000-03/31/2009. The sample consists of non-U.S. stocks with at least 30% non-zero trading days in the previous year as well as at least 5% lagged foreign institutional ownership. It reports the average coefficients, associated *t*-statistics, as well as the average adjusted R^2. Standard errors are corrected with the Newey-West (1987) procedure with 3 lags. Ownership data is from LionShares, and return data for individual stocks, market indices, and industry indices is from Datastream.

	(1)	(2)	(3)	(4)
Ownership Return	0.560	0.364	0.468	0.311
	(9.15)	(9.25)	(9.74)	(8.87)
Local Beta × Local Market		0.790		0.773
		(18.96)		(17.69)
World Beta × World Market		-0.199		0.239
		(-0.25)		(0.59)
Industry			0.443	0.334
			(11.57)	(8.47)
Adjusted R^2	0.019	0.123	0.048	0.137
Number of Observations	87,045	65,519	86,914	65,515
Number of Firms	2,353	1,985	2,349	1,985

Table 2: Time-Series Regressions with Ownership Return

The table shows the results of time-series regressions of weekly stock returns on an intercept (not reported), the local market index excluding own stock (Local Market), the foreign institutional ownership return (Ownership Return), the world market index excluding the local market (World Market), global industry index returns excluding the industry in the local market (Industry), as well as local and global zero-investment portfolios based on market-to-book (HML), market capitalization (SMB), and momentum (WML). The sample period is 01/01/2000-03/31/2009. The sample consists of non-U.S. stocks with at least 30% non-zero trading days in the previous year as well as at least 5% lagged foreign institutional ownership. The regression models are as follows:

(1) $R_{jt} = \alpha_j + \beta_j R_{LocalMarket,t} + \varepsilon_{jt}$

(2) $R_{jt} = \alpha_j + \beta_j R_{LocalMarket,t} + \chi_j R_{WorldMarket,t} + \varepsilon_{jt}$

(3) $R_{jt} = \alpha_j + \beta_j R_{LocalMarket,t} + \delta_j R_{Ownership,t} + \varepsilon_{jt}$

(4) $R_{jt} = \alpha_j + \beta_j R_{LocalMarket,t} + \phi_j R_{Industry,t} + \varepsilon_{jt}$

(5) $R_{jt} = \alpha_j + \beta_j R_{LocalMarket,t} + \chi_j R_{WorldMarket,t} + \phi_j R_{Industry,t} + \varepsilon_{jt}$

(6) $R_{jt} = \alpha_j + \beta_j R_{LocalMarket,t} + \chi_j R_{WorldMarket,t} + \delta_j R_{Ownership,t} + \varepsilon_{jt}$

(7) $R_{jt} = \alpha_j + \beta_j R_{LocalMarket,t} + \chi_j R_{WorldMarket,t} + \delta_j R_{Ownership,t} + \phi_j R_{Industry,t} + \varepsilon_{jt}$

The table reports the mean coefficients and adjusted R^2 across firms, as well as the number of firms. Panels A shows results for the sub-period 2006Q1-2009Q1. Results for all sub-periods are reported in Internet Appendix Table IA 5. Panel B shows the average Mean Squared Error (MSE) of correlations following Bekaert, Hodrick, and Zhang (2009) for each of the models (1)-(7) as well as the difference in the MSE. Tests of significance of differences in MSE are based on bootstrapped standard errors using 1,000 randomly drawn samples with replacement. Ownership data is from LionShares. Return data for individual stocks, market indices, and industry indices is from Datastream.

Panel A: 2006Q1-2009Q1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ownership Return			0.279			0.533	0.473
Local Market	0.987	0.874	0.752	0.816	0.850	0.765	0.758
World Market		0.175			-0.170	-0.341	-0.593
Industry				0.238	0.338		0.310
Adjusted R^2	0.340	0.350	0.356	0.357	0.363	0.362	0.373
Number of Firms	3,125	3,125	3,125	3,125	3,125	3,125	3,125

(continued)

Table 2: Time-Series Regressions with Ownership Return (continued)

Panel B: MSE, 2000Q1-2009Q1

	Reg #	MSE	Reg #	MSE	Reg #	MSE
Incremental Contribution of the Ownership Return						
Base Model	(1)	0.036	(2)	0.025	(5)	0.021
Base Model with Ownership Return	(3)	0.025	(6)	0.023	(7)	0.019
Difference		0.011		0.002		0.002
p-value		<.0001		<.0001		<.0001
Incremental Contribution of the Industry Return						
Base Model	(1)	0.036	(2)	0.025	(6)	0.023
Base Model with Ownership Return	(4)	0.026	(5)	0.021	(7)	0.019
Difference		0.010		0.004		0.004
p-value		<.0001		<.0001		<.0001
Incremental Contribution of the World Return						
Base Model	(1)	0.036	(4)	0.026	(3)	0.025
Base Model with Ownership Return	(2)	0.025	(5)	0.021	(6)	0.023
Difference		0.011		0.005		0.002
p-value		<.0001		<.0001		<.0001

Table 3: Non-Ownership Return and Domestic Ownership Return

The table shows the results of Fama-MacBeth regressions of quarterly stock returns on the foreign ownership return and various control variables. In particular, returns are regressed on an intercept (not reported), the foreign institutional ownership return (Ownership Return), one of four alternative versions of a Non-Ownership return, the domestic ownership return, expected returns from a CAPM with local and world market index, and global industry index returns excluding the industry in the local market (Industry). For each stock, the Non-Ownership Return variable is constructed in a similar way as our ownership return except we use uniform ownership distance and we replace returns of the actual, ownership connected stocks with that of comparable stocks not held by any owner of the stock in question. We take two approaches in sampling comparable stocks. First, we take the average of stocks in the same country, industry, and size bucket. Second, because stocks which are less likely to be held by investors are typically smaller, we sample the largest stock in the same country and industry that is not owned by any existing shareholder. When there are fewer than five stocks in the country, industry, and size bucket not owned by any existing shareholder, which happens in 44% of the cases, we pick stocks from the same country bucket. The four alternative versions of the Non-Ownership return are based on either using the average return of all stocks in the same country and industry (based on 48 Fama French classifications) that are not held by any other institution owning the stock (Non-Ownership Return (Average Stock)), or by using the average return of all stocks in the same country and industry (based on 2-digit SIC code classifications) that are not held by any other institution owning the stock (Non-Ownership Return (Average Stock) (2-digit SIC)), or by using the return of the largest stock in the same country and industry (based on 48 Fama French classifications) that are not held by any other institution owning the stock (Non-Ownership Return (Largest Stock)), or by using the return of the largest stock in the same country and industry (based on 2-digit SIC code classifications) that are not held by any other institution owning the stock (Non-Ownership Return (Largest Stock) (2-digit SIC)). The Domestic Ownership Return is constructed using only domestic stocks and uniform ownership distance. Local Beta and World Beta are first estimated from rolling regressions using past two-year returns, where the return of each stock is regressed on the return on the value-weighted local country market index, and on the returns of the MSCI world market index: $R_{jt} = \alpha_j + \beta_L R_{L,t} + \beta_W R_{MSCI,t} + \varepsilon_{j,t}$. We estimate Local and Global Market Betas from rolling regressions using past two-year returns. The sample period is 01/01/2000-03/31/2009. The sample consists of non-U.S. stocks with at least 30% non-zero trading days in the previous year as well as at least 5% lagged foreign institutional ownership. The table reports the average coefficients, associated *t*-statistics, as well as the average adjusted R^2. Standard errors are corrected with the Newey-West (1987) procedure with 3 lags. Ownership data is from LionShares, and return data for individual stocks, market indices, and industry indices is from Datastream.

(continued)

Table 3: Non-Ownership Return and Domestic Ownership Return (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
Ownership Return					0.309	0.205
					(9.88)	(5.55)
Non-Ownership Ret (Avg. Stock)	0.019				-0.064	
	(0.51)				(-1.65)	
Non-Ownership Ret (Avg. Stock) (SIC2)		0.016				
		(0.41)				
Non-Ownership Ret (Largest Stock)			-0.023			
			(-0.72)			
Non-Ownership Ret (Largest Stock) (SIC2)				-0.010		
				(-0.22)		
Domestic Ownership Return						0.598
						(11.98)
Local Beta × Local Market	0.789	0.786	0.788	0.786	0.773	0.429
	(16.71)	(16.53)	(16.42)	(16.56)	(17.35)	(6.98)
World Beta × World Market	0.225	0.195	0.198	0.145	0.240	-0.127
	(0.55)	(0.45)	(0.45)	(0.31)	(0.62)	(-0.21)
Industry	0.350	0.350	0.350	0.349	0.334	0.328
	(8.15)	(8.12)	(8.07)	(8.16)	(8.48)	(9.39)
Adjusted R^2	0.133	0.132	0.132	0.132	0.138	0.157
Number of Observations	65,514	65,508	65,514	65,508	65,514	65,444
Number of Firms	1,985	1,985	1,985	1,985	1,985	1,983

Table 4: ADR and GDR Listing and Ownership Returns

The table shows the results of pooled regressions of weekly stock returns of companies that listed a depository receipt or other cross-listing on an intercept (not reported), the foreign institutional ownership return (Ownership Return), the return on the local market index excluding own stock (Local Market), and the return on the U.S. market index. All regressors are interacted with a dummy variable (ADR-Dummy) that takes the value 1 after the effective date of the ADR/GDR listing, and 0 otherwise. The sample period used is four quarters before and four quarters after the effective date, with the effective date between 01/01/2000-03/31/2009. The sample is limited to non-U.S. stocks. The table reports the coefficients, associated *t*-statistics, as well as the adjusted R^2. Results are shown separately for all firms, firms with an increase in foreign ownership, and firms with an increase in foreign ownership of more than 5%. The Ownership Return is calculated using average weights during the first year of the ADR/GDR listing. These fixed weights are used to calculate the Ownership Return before and after the listing. Ownership data is from LionShares, while data on returns for individual stocks and market indices is from Datastream. ADRs/GDRs are identified based on LionShares and Datastream information. Effective dates for ADRs/GDRs are identified through the Bank of New York website (http://www.adrbnymellon.com/dr_directory.jsp) as well as CRSP. We take the first listing date.

	All Firms			Firms with Increased Foreign Ownership			Firms with Increased Foreign Ownership of more than 5%		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Ownership Return		0.114	0.148		0.123	0.179		0.113	0.158
		(4.57)	(4.59)		(3.86)	(4.10)		(3.13)	(3.06)
Ownership Return × ADR-Dummy		0.055	0.081		0.110	0.151		0.129	0.223
		(1.67)	(1.87)		(2.61)	(2.63)		(2.78)	(3.38)
Local Market	1.028	0.994	0.996	1.058	1.019	1.021	1.056	1.025	1.025
	(58.65)	(52.80)	(52.77)	(47.78)	(42.62)	(42.67)	(46.32)	(40.98)	(40.99)
Local Market × ADR-Dummy	0.020	-0.012	-0.013	0.017	-0.032	-0.034	0.006	-0.056	-0.061
	(0.87)	(-0.46)	(-0.50)	(0.60)	(-1.00)	(-1.06)	(0.21)	(-1.69)	(-1.83)
U.S. Market	0.041		-0.053	0.039		-0.077	0.047		-0.055
	(1.64)		(-1.65)	(1.29)		(-1.85)	(1.44)		(-1.19)
U.S. Market × ADR-Dummy	0.021		-0.046	0.051		-0.076	0.035		-0.147
	(0.63)		(-1.04)	(1.21)		(-1.31)	(0.79)		(-2.33)
Adjusted R^2	0.235	0.236	0.236	0.246	0.249	0.249	0.274	0.277	0.278
Number of Observations	35,122			22,593			18,272		
Number of Firms	351			230			189		

Table 5: Cross-Sectional Regressions for Groups of Institutions

The table shows results of Fama-MacBeth regressions of quarterly stock returns on an intercept (not reported), alternative versions of the foreign institutional ownership return (Ownership Return), expected returns from a CAPM with local and world market index, and global industry index returns excluding the industry in the local market (Industry). There are 6,300 institutions with holdings information, of which 3,796 are mutual funds and investment advisors and 1,185 hedge fund are companies. Across specifications, ownership returns are constructed for different groups of institutions. In particular, institutions are split into two groups by different characteristics or certain type of institutions are selected: Specification (2) splits institutions into mutual and hedge funds vs. pension, banks, and insurance; specification (3) investigates mutual funds and hedge funds separately; specification (4) splits institutions into those with high momentum exposure vs. those with low momentum exposure; specification (5) splits institutions into those with high net fund flows vs. those with low net fund flows; specification (6) splits institutions into those with high active share vs. those with low active share; specifications (7) through (10) split institutions into country funds, regional funds and global funds (If the maximum average percentage of the holdings in a country over the previous 4 quarters is more than 90% of the funds' total holdings, the fund is classified as a country fund. Otherwise, if the maximum average percentage in a region is more than 80% it is a region fund. Otherwise it is a global fund.). The sample period is 01/01/2000-03/31/2009. The sample consists of non-U.S. stocks with at least 30% non-zero trading days in the previous year as well as at least 5% lagged foreign institutional ownership. The table reports the average coefficients and associated *t*-statistics, as well as the average adjusted R^2, the number of observations, and the average number of firms. Standard errors are corrected with the Newey-West (1987) procedure with 3 lags. Differences and associated *t*-statistics between the coefficients on the two ownership variables in each specification are reported in the bottom of the table. Ownership data is from LionShares, and return data for individual stocks, market indices, and industry indices is from Datastream.

(continued)

Table 5: Cross-Sectional Regressions with Groups of Institutions (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ownership Return	0.311							
	(8.22)							
Ownership Return for mutual funds and hedge funds		0.323						
		6.58)						
Ownership Return for mutual funds			0.416					
			(9.58)					
Ownership Return for hedge funds			0.123					
			(5.74)					
Ownership Return for pension funds, banks, insurance companies		0.090						
		(1.65)						
Ownership Return for high momentum funds				0.323				
				(7.74)				
Ownership Return for low momentum funds				0.158				
				(4.09)				
Ownership Return for high flow funds					0.214			
					(7.52)			
Ownership Return for low flow funds					0.162			
					(4.44)			
Ownership Return for funds with high active share						0.238		
						(12.0)		
Ownership Return for funds with low active share						0.236		
						(4.04)		
Ownership Return for global funds							0.437	0.348
							(11.42)	(8.27)
Ownership Return for regional funds								0.171
								(5.18)
Ownership Return for country funds							0.062	
							(3.22)	
Local Beta × Local Market	0.773	0.769	0.717	0.770	0.767	0.763	0.777	0.766
	(18.2)	(19.0)	(12.0)	(19.2)	(18.1)	(19.4)	(18.6)	(18.3)
World Beta × World Market	0.238	0.041	0.014	0.129	0.188	0.080	-0.240	0.101
	(0.56)	(0.07)	(0.02)	(0.28)	(0.38)	(0.14)	(-0.29)	(0.18)
Industry	0.335	0.330	0.398	0.335	0.330	0.331	0.336	0.332
	(7.76)	(7.81)	(9.79)	(8.25)	(7.80)	(8.30)	(8.14)	(7.98)
Adjusted R^2	0.136	0.145	0.168	0.145	0.142	0.144	0.149	0.144
Number of Observations	65,345	61,642	29,046	61,378	63,223	63,121	55,539	61,803
Number of Firms	1,980	1,868	880	1,860	1,916	1,913	1,683	1,873
Difference between coefficients of groups of institutions		0.233	0.294	0.165	0.052	0.002	0.375	0.177
		(2.53)	(5.52)	(2.46)	(1.01)	(0.04)	(10.2)	(2.99)

Table 6: Regressions with Changes of Holdings

The table shows results Fama-MacBeth regressions with changes in holdings of connected stocks and control variables. In particular, Panel A shows the results of regressions of changes in holdings on an intercept (not reported), the change of holdings of foreign connected stocks, the change of holding due to fund flows, the change of holding of unrelated stocks (alternatively, the largest and average unrelated stocks), expected returns from a CAPM with local and world market index, and global industry index returns excluding the industry in the local market (Industry). The change of holdings of foreign connected stocks is constructed in a similar way as the foreign ownership return. However, instead of using the returns of connected stocks, the weighted average of the change of holdings is used to construct the change of holdings of foreign connected stocks. The change of holdings of unrelated stocks is constructed using the change of holdings of stocks in the same country and industry that are not owned by any institution holding the stock. We construct two alternative versions of this variable. One uses the change of holding of the largest stock among stocks in the same country and industry that are not owned by any institution holding the stock. The other uses the average of the change of holdings of stocks in the same country and industry that are not owned by any institution holding the stock. Panel B shows the results of regressions of alternative changes in holdings and stock returns on the decompositions of changes of holdings and returns of connected foreign stocks. Change of holdings of connected foreign stocks in Panel A is decomposed into three components. For each stock, connected foreign stocks are sorted into three groups according to the level of common ownership linkage. For each group, the weighted average of the change of holdings is calculated. Similarly, the ownership return is decomposed according to the level of common ownership linkage of connected foreign stocks. Returns of unrelated foreign stocks are constructed in a similar way as the ownership return, but instead of using returns of connected stocks, it uses the average return of stocks that are in the same country and industry but not held by any owners of the stock. The sample period is 01/01/2000-03/31/2009. The sample consists of non-U.S. stocks with at least 30% non-zero trading days in the previous year as well as at least 5% lagged foreign institutional ownership. It reports the average coefficients, associated *t*-statistics, as well as the average adjusted R^2. Standard errors are corrected with the Newey-West (1987) procedure with 3 lags. Ownership data is from LionShares, and return data for individual stocks, market indices, and industry indices is from Datastream.

Panel A: Connected and Unrelated Stocks

	(1)	(2)	(3)	(4)	(5)	(6)
Change of holding of connected foreign stocks	0.398		0.342	0.318		
	(4.21)		(4.17)	(4.16)		
Change of holding due to flow		0.090	0.081	0.081		
		(0.97)	(0.88)	(0.88)		
Change of holding of unrelated stocks (largest)					-0.065	
					(-1.55)	
Change of holding of unrelated stocks (average)						-0.066
						(-1.31)
Local Beta × Local Market				0.008		
				(2.77)		
World Beta × World Market				0.081		
				(1.16)		
Industry				0.016		
				(2.88)		
Adjusted R^2	0.006	0.036	0.039	0.044	0.002	0.002
Number of observations	65,349	65,299	65,141	65,137	64,133	64,133
Average number of observations	1,980	1,979	1,974	1,974	1,943	1,943

(continued)

Table 6: Regressions with Changes of Holdings (continued)

Panel B: Alternative Levels of Connectedness

	Change in Holdings					Returns	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Change of holding of connected foreign stocks (High)	0.236			0.233	0.273		
	(4.49)			(4.47)	(4.05)		
Change of holding of connected foreign stocks (Medium)		0.086		0.118	0.144		
		(1.00)		(1.35)	(1.51)		
Change of holding of connected foreign stocks (Low)			-0.109	-0.084	-0.215		
			(-1.43)	(-1.23)	(-2.74)		
Returns of connected foreign stocks (High)						0.741	0.338
						(6.75)	(6.48)
Returns of connected foreign stocks (Medium)						-0.410	-0.036
						(-1.86)	(-0.17)
Returns of connected foreign stocks (Low)						-0.230	-0.319
						(-2.87)	(-3.23)
Returns of unrelated foreign stocks (average)						-1.701	-0.550
						(-8.73)	(-2.71)
Local Beta × Local Market					0.005		0.728
					(1.81)		(15.21)
World Beta × World Market					-0.011		0.165
					(-0.91)		(0.34)
Industry					0.006		0.410
					(1.28)		(9.67)
Adjusted R^2	0.003	0.002	0.001	0.005	0.010	0.040	0.143
Number of Firms	1,991	1,991	1,991	1,991	1,582	2,053	1,598

Table 7: Wealth Effects

The table shows results of Fama-McBeth regressions of alternatively quarterly changes in holdings and stock returns on an intercept (not reported), variables capturing wealth effects and control variables. In particular, Panel A shows the results regressions of changes in holdings at the stock-fund level on the portfolio return of institutional owners, the lagged dependent variable, and portfolio weight deviations. The dependent variable is the change of holdings from the previous quarter to the current quarter of a stock by a fund. The regressors are the fund return (Owner Fund Return), the fund return in the previous quarter (Owner Fund Return (lagged)), the fund return on foreign holdings (Owner Fund Foreign Return), the fund return on foreign holdings in the previous quarter (Owner Fund Foreign Return (lagged)), the percentage change in holdings lagged by one quarter (i.e. the lagged dependent variable), and the previous quarter's fund holding of the stock as a percentage of fund's total assets minus the previous quarter's average percentage holdings of the fund across stocks in the fund (Stock Holdings (lagged) – Average Stock Holdings (lagged)). All variables are standardized. Specifications (1)-(3) are based on new and existing holders of a stock, while specifications (4)-(6) are based on existing holders only. Panel B shows regression results of stock returns on the home market return of foreign owners and other control variables. The regressors are the weighted average of the home market return of foreign institution (Owner's Home Market Return), the foreign ownership return (Ownership Return), the expected return from a CAPM with local and world market index, and the global industry index return excluding the industry in the local market (Industry). The sample period is 01/01/2000-03/31/2009. The sample is limited to non-U.S. stocks with at least 30% non-zero trading days in the previous year. The table reports the coefficients, associated *t*-statistics, as well as the average adjusted R^2. Ownership data is from LionShares. Returns data for individual stocks, market indices, and industry indices are from Datastream.

Panel A: Regressions with Changes in Holdings

	New and Existing Holders			Existing Holders		
	(1)	(2)	(3)	(4)	(5)	(6)
Owner Fund Foreign Return	0.050			0.062		
	(0.64)			(0.72)		
Owner Fund Foreign Return (lagged)	0.136			0.141		
	(1.50)			(1.39)		
Owner Fund Return		-0.005	-0.027		0.000	-0.024
		(-0.06)	(-0.28)		(0.00)	(-0.24)
Owner Fund Return (lagged)		0.080	0.054		0.081	0.065
		(0.80)	(0.51)		(0.73)	(0.58)
Percentage Change in Holdings (lagged)			0.035			0.036
			(6.89)			(6.99)
Stock Holdings (lagged) - Average Stock Holdings (lagged)						0.024
						(2.50)
Adjusted R^2	0.000	0.001	0.006	0.000	0.001	0.006
Number of Firms	2,150	2,184	2,150	2,150	2,184	2,184

(continued)

Table 7: Wealth Effects (continued)

Panel B: Regressions with Stock Returns

	(1)	(2)	(3)	(4)	(5)
Owner's Home Market Return	0.166	0.191	-0.041	0.151	0.002
	(2.01)	(3.05)	(-0.64)	(2.99)	(0.04)
Ownership Return	0.547		0.370		0.308
	(9.86)		(8.13)		(7.59)
Local Beta × Local Market		0.763	0.793	0.789	0.776
		(16.85)	(19.95)	(18.03)	(18.80)
World Beta × World Market			-0.194	0.192	0.248
			(-0.24)	(0.40)	(0.58)
Industry				0.348	0.330
				(7.61)	(7.78)
Adjusted R^2	0.0226	0.0921	0.1246	0.1325	0.1373
Number of Observations	86,522	65,287	65,287	65,283	65,283
Number of Firms	2,338	1,978	1,978	1,978	1,978

Table 8: Dynamic Return Patterns

The table shows the results of Fama-MacBeth regressions of weekly, monthly, quarterly stock returns on ownership returns. Panel A shows results from regressions of weekly, monthly, and quarterly returns on lagged ownership return, expected returns of CAPM for local and world market, and global industry index returns (Industry). Weekly sample is split into three groups of firms by size. We use 30th and 70th percentile cut off points in our sample of firms for the size groups. Panel B shows results from regressions of one to four period ahead returns in weekly, monthly, and quarterly frequency. Explanatory variables are ownership return, return, past six-period return, expected returns of CAPM for local and world market, and global industry index returns (Industry). The sample consists of non-U.S. stocks with at least 30% non-zero trading days in the previous year as well as at least 5% lagged foreign institutional ownership. The tables report the average coefficients and associated t-statistics, as well as the average adjusted R^2, the number of observations, and the average number of firms. Intercepts are not reported.

Panel A: Regressions with Lagged Ownership Returns

	Weekly				Monthly				Quarterly			
	All	Small	Medium	Large	All	Small	Medium	Large	All	Small	Medium	Large
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Ownership Return	0.222	0.149	0.203	0.322	0.288	0.228	0.262	0.380	0.356	0.218	0.257	0.622
	(14.77)	(6.46)	(10.79)	(12.15)	(9.87)	(4.84)	(6.04)	(5.64)	(7.36)	(2.90)	(2.52)	(4.55)
Ownership Return (lagged)	0.055	0.055	0.037	0.071	0.040	0.044	0.031	0.101	-0.006	-0.052	0.196	0.118
	(3.88)	(2.46)	(2.02)	(2.89)	(1.41)	(1.23)	(0.67)	(1.88)	(-0.09)	(-0.73)	(1.97)	(1.16)
Ownership Return (lagged, avg. of 2, 3, 4)	0.024	0.027	0.019	0.049	0.001	-0.028	0.028	0.060	0.073	0.004	0.070	0.227
	(2.77)	(2.16)	(1.59)	(3.63)	(0.06)	(-1.53)	(1.22)	(1.88)	(2.10)	(0.11)	(2.25)	(2.28)
Local Beta × Local Market	0.791	0.686	0.803	0.842	0.786	0.749	0.798	0.807	0.730	0.652	0.748	0.786
	(80.09)	(40.82)	(75.12)	(84.93)	(31.32)	(16.75)	(34.02)	(33.27)	(15.20)	(7.60)	(16.72)	(25.05)
World Beta × World Market	3.725	3.531	4.276	3.924	0.575	0.761	0.662	0.218	0.176	1.877	-1.273	-0.813
	(1.24)	(1.26)	(1.27)	(1.22)	(2.73)	(2.40)	(3.10)	(0.79)	(0.33)	(1.63)	(-0.74)	(-0.72)
Industry	0.257	0.172	0.214	0.351	0.333	0.296	0.247	0.424	0.361	0.329	0.316	0.413
	(26.01)	(7.56)	(19.00)	(32.67)	(13.91)	(5.77)	(8.17)	(20.73)	(7.88)	(3.39)	(6.11)	(9.34)
Adjusted R^2	0.122	0.068	0.138	0.212	0.134	0.085	0.147	0.220	0.139	0.099	0.141	0.237
Number of Observations	835,183	198,137	346,087	290,959	179,695	43,000	73,560	63,135	50,219	11,883	20,121	18,215
Number of Firms	1,942	461	805	677	1,815	434	743	638	1,522	360	610	552

(continued)

Table 8: Dynamic Return Patterns (continued)

Panel B: Horizon of Predictive Effects

	Weekly				Monthly				Quarterly			
	$R_{(t+1)}$	$R_{(t+2)}$	$R_{(t+3)}$	$R_{(t+4)}$	$R_{(t+1)}$	$R_{(t+2)}$	$R_{(t+3)}$	$R_{(t+4)}$	$R_{(t+1)}$	$R_{(t+2)}$	$R_{(t+3)}$	$R_{(t+4)}$
Ownership $Return_{(t)}$	0.042	0.023	0.026	0.022	0.076	0.009	0.006	0.002	0.013	0.083	-0.042	0.088
	(2.13)	(1.21)	(1.56)	(1.14)	(2.06)	(0.24)	(0.19)	(0.06)	(0.17)	(1.32)	(-0.77)	(0.99)
$Return_{(t)}$	-0.056	-0.006	-0.001	-0.004	-0.009	0.019	0.018	0.004	0.035	0.023	0.029	0.027
	(-14.97)	(-1.67)	(-0.42)	(-1.12)	(-1.19)	(2.60)	(1.93)	(0.64)	(2.00)	(1.60)	(2.28)	(1.66)
$Return_{(t-1,t-6)}$	-0.001	0.002	0.002	0.003	0.011	0.010	0.007	0.010				
	(-0.67)	(0.94)	(1.27)	(1.44)	(2.37)	(2.16)	(1.48)	(2.06)				
Local Beta × $Local\ Market_{(t)}$	0.022	0.012	0.025	0.013	0.017	-0.037	-0.012	-0.051	-0.082	0.065	0.086	-0.038
	(1.54)	(0.85)	(1.58)	(0.76)	(0.54)	(-1.28)	(-0.40)	(-2.08)	(-1.40)	(1.21)	(1.28)	(-1.14)
World Beta × $World\ Market_{(t)}$	2.211	2.324	4.740	-0.811	-0.471	0.330	0.938	-0.332	1.301	-0.987	0.045	-0.672
	(1.01)	(0.87)	(1.14)	(-1.40)	(-1.48)	(0.91)	(2.30)	(-0.71)	(0.81)	(-1.65)	(0.27)	(-1.64)
$Industry_{(t)}$	0.097	0.028	0.035	0.029	0.109	0.004	0.047	0.068	0.060	0.029	0.014	0.089
	(6.58)	(1.89)	(2.27)	(1.87)	(3.55)	(0.11)	(2.04)	(1.99)	(1.47)	(0.53)	(0.32)	(2.27)
Adjusted R^2	0.047	0.043	0.041	0.041	0.055	0.053	0.048	0.045	0.053	0.049	0.044	0.034
Number of Observations	826,467	823,502	820,537	817,572	169,171	166,354	163,537	160,301	62,549	59,083	55,543	51,934
Number of Firms	1,922	1,920	1,917	1,915	1,726	1,715	1,704	1,687	1,955	1,906	1,851	1,791

Table 9: Practical Implications of Ownership Linkage for Portfolio Diversification

The table shows results pertaining to the implications of the level of foreign institutional ownership as well as the extent of foreign ownership linkage for portfolio diversification. In particular, Panel A shows the effect of global portfolio diversification for alternative levels of foreign institutional ownership (FO) (0%, 0%-1%, 1%-5%, >5%) measured at the beginning of a three year period. To ensure an equal number of firms across bins for each country, year, and institutional ownership group, we restrict the number of firms to the smallest number of firms across institutional ownership groups. We compute the average stock return covariance and correlation between all pairs of stocks in a bin for each year and report the average across years. Panel B shows the effect of alternative levels of foreign institutional ownership by sorting firms by ownership return betas. For a randomly selected fund, ownership return betas are estimated over rolling two year windows over the years 2003-2009 for firms with at least 5% lagged foreign institutional ownership and not held by the fund. Over rolling two-year windows (always shifted by one year) we regress the foreign ownership return of each stock (not held by the institution) on the return of each LionShares institution: $R_{Ownership,i,t} = \alpha + \beta_{Ownership\ Beta} R_{Fund,t} + \varepsilon_t$. Subsequently, we sort the observations for each year into four groups based on the estimated ownership betas (<0.5, 0.5-0.75, 0.75-1, >1) and calculate the average beta of the stock return with the fund return (Fund Beta) in the next year: $R_{i,t} = \alpha + \beta_{Fund\ Beta} R_{Fund,t} + \varepsilon_t$. To compute averages which compare observations at the fund level, we first average by fund, country, year, and ownership beta bucket. Subsequently, we average across funds by country, year, and ownership beta bucket. We then average across countries by year and ownership beta bucket. Finally, we average across years by ownership beta bucket. The final averages are reported in Panel B and C. The *t*-statistics are computed from this last cross-country average. Panel B shows the average ownership beta and fund beta of stocks in each of the four ownership beta bins, as well as those of a high-low portfolio based on ownership betas, along with corresponding *t*-statistics. Panel C follows the procedure in Panel B except that it breaks down the results by both the lagged level of foreign institutional ownership (FO) and lagged ownership beta. It also shows averages across different groups, as well as values for high-low portfolios (based alternatively on FO betas or FO levels) and corresponding *t*-statistics. The sample consists of all non-U.S. stocks with data between 01/01/2000 and 03/31/2009 with at least 30% non-zero trading days in the previous year. Firms are also required to have at least 30 non-missing observations over the sample period. Panels B and C are based on random draws of 1,000 of our 6,698 funds. In Panels B and C firms are also required to have at least 30 non-missing observations in a rolling two-year window.

Panel A	FO=0%	0%<FO<1%	1%<FO<5%	5%<FO
Average Covariance	0.00058	0.00053	0.00062	0.00077
Average Correlation	0.103	0.128	0.162	0.21

Panel B	Ownership Beta bin					
	<0.5 (Low)	0.5-0.75	0.75-1	>1 (High)	High-Low	t-stat
Average Ownership Beta	0.376	0.645	0.864	1.096	0.719	
Average Fund Beta	0.478	0.626	0.765	0.880	0.402	7.0

Panel C	Ownership Beta bins						
FO Level	<0.5 (Low)	0.5-0.75	0.75-1	>1 (High)	Average	High-Low	t-stat
	Fund Betas						
0%	0.35	0.45	0.53	0.64	0.49	0.29	3.2
0%-1%	0.44	0.50	0.59	0.68	0.55	0.24	4.8
1%-5%	0.45	0.59	0.68	0.80	0.63	0.35	5.1
5%-15%	0.45	0.57	0.71	0.83	0.64	0.38	7.8
>15%	0.49	0.66	0.83	0.97	0.74	0.48	7.9
Average	0.44	0.55	0.67	0.79		0.32	10.5
High FO-Low FO	0.13	0.19	0.27	0.31	0.22		
t-stat	3.8	5.8	7.1	6.3	9.8		

Figure 1: Ownership Level and Portfolio Diversification

The figure shows the effect of global portfolio diversification for alternative levels of foreign institutional ownership (0%, 0%-1%, 1%-5%, >5%) measured at the beginning of a three year period. The sample consists of non-U.S. stocks with at least 30% non-zero trading days in the previous year. The sample period is 01/01/2000-03/31/2009. Firms are required to have at least 30 non-missing return observations. For each country, year, and institutional ownership groups, the number of firms is restricted to the smallest number of firms across institutional ownership groups that have the same number of stocks in each institutional ownership group. For each year the average variance and covariance is calculated for global diversification, as in Griffin and Karolyi (1998), and, subsequently, the average across years is calculated. Ownership data is from LionShares, while data on returns for individual stocks is from Datastream.

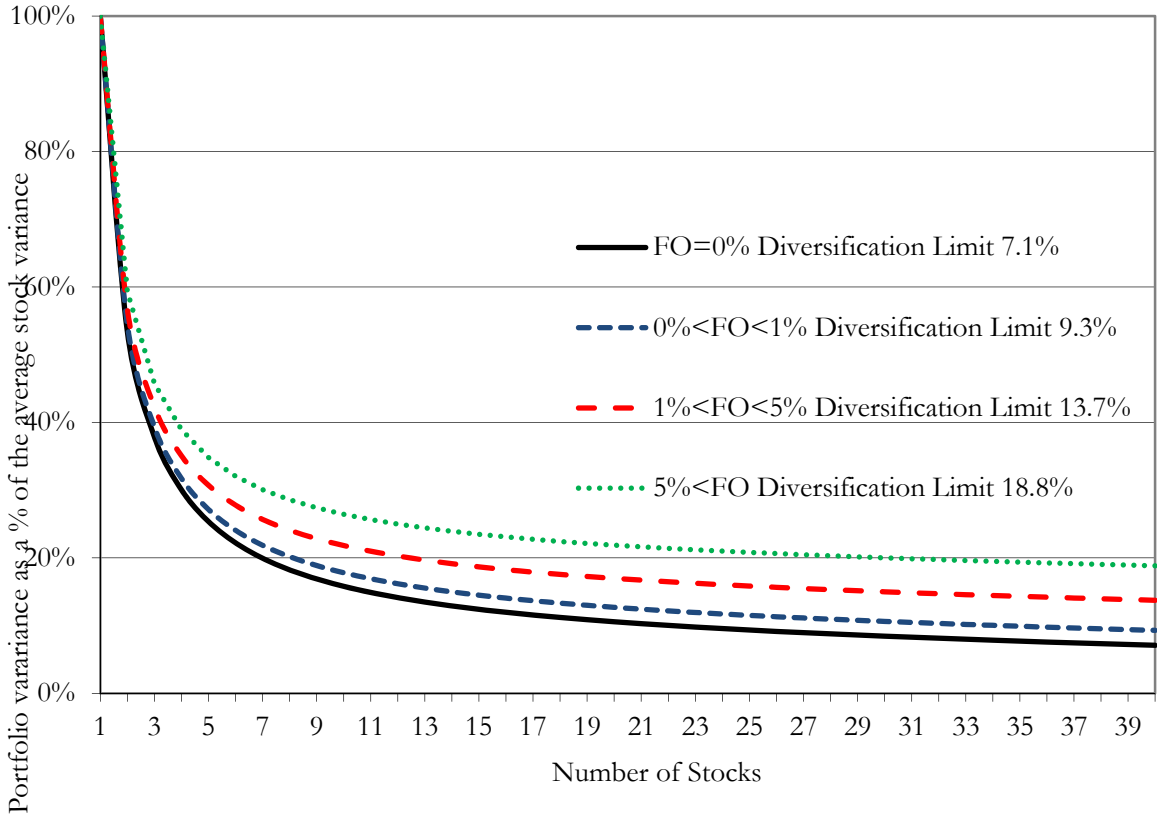

Table A1: Cross-Sectional Regressions with Ownership Returns

The table shows the results of Fama-MacBeth regressions of stock returns on an intercept (not reported), the foreign institutional ownership return (Ownership Return), the expected returns from a CAPM with local and world market index (Local Beta*Local Market and World Beta*World Market), and global industry index returns excluding the industry in the local market (Industry). The table shows results broken down by degree of market development (Emerging, Developed), market capitalization size (Small, Medium, Large), and trading activity (High, Medium, Low). Stocks are classified into emerging and developed markets based on the MSCI classification as of June 2006. Stocks are classified into market capitalization buckets on the basis of lagged market capitalization in U.S. dollars, where small is the bottom 40%, medium is the next 30%, and large is the top 40%. Stocks are classified according to trading activity on the basis of the number of trading days in the prior year as liquid (stocks with more trading days, i.e. top half) or illiquid (stocks with few trading days, i.e. bottom half). The sample consists of non-U.S. stocks with at least 30% non-zero trading days in the previous year as well as at least 5% lagged foreign institutional ownership. The sample period is 01/01/2000-03/31/2009. The table reports the average coefficients, associated *t*-statistics, as well as the average adjusted R_2. Standard errors are corrected with the Newey-West (1987) procedure with 3 lags. Ownership data and information on investment styles is from LionShares, while data on returns for individual stocks, market indices, and industry indices is from Datastream.

	Market Development		Market Capitalization			Trading	
	Emerging	Developed	Small	Medium	Large	Illiquid	Liquid
Ownership Return	0.128	0.354	0.210	0.259	0.524	0.225	0.440
	(2.59)	(4.78)	(5.80)	(2.84)	(4.80)	(8.03)	(9.11)
Local Beta × Local Market	0.806	0.662	0.778	0.754	0.811	0.758	0.786
	(23.52)	(7.27)	(11.91)	(18.88)	(31.79)	(16.71)	(15.60)
World Beta × World Market	-0.755	0.313	1.025	-1.216	-0.776	1.478	-0.750
	(-0.74)	(0.79)	(2.45)	(-0.80)	(-0.71)	(2.81)	(-0.77)
Industry	0.358	0.352	0.293	0.284	0.400	0.324	0.349
	(5.54)	(8.69)	(5.56)	(5.77)	(10.72)	(6.80)	(8.75)
Adjusted R^2	0.190	0.106	0.102	0.164	0.240	0.117	0.163
Number of Firms	605	1,380	795	596	595	986	999
Number of Observations	19,962	45,553	26,219	19,656	19,640	32,550	32,965