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Abstract: We analyze foreigners' and domestic institutional investors' positions in U.S. equities. Controlling for many factors, we uncover a common preference for large firms and firms that are diversified internationally. The domestic preference for internationally diversified firms implies that investors might obtain substantial international diversification by investing at home. Using an international factor model, we show that exposure to foreign equity markets is indeed greater for domestic firms that are more diversified internationally, suggesting that at least some of the home-grown foreign exposure translates into international diversification benefits. After accounting for home-grown foreign exposure, the share of 'foreign' equities in investors' portfolios nearly doubles, reducing (but not eliminating) the observed home bias.

JEL Classification: G11, G15, G3
Keywords: home bias, international portfolio allocation, foreign exposure

1. Introduction

The home bias in asset holdings is one of the least contentious empirical findings in international finance. The international capital asset pricing model (CAPM), based on traditional portfolio theory developed by Sharpe (1964) and Lintner (1965), predicts that mean-variance optimizing investors should hold the world market portfolio of risky assets.[1] As of end 2003 this would imply that investors, regardless of their domicile, should have a 44 percent weight on U.S. equities and a 56 percent weight on the equities of other countries. Distortions in international equity markets imply departures from the perfect financial markets of Sharpe and Lintner, so we expect to observe home bias, i.e., actual foreign allocations that are smaller than those predicted by the international CAPM. But the extent of the gap between the benchmark international CAPM prediction and actual portfolio holdings is striking. As of end 2003, U.S. equities comprise only 9 percent of foreigners' equity portfolios, and the share of foreign equities in U.S. portfolios is similarly low at only 15 percent.

We argue in this paper that the degree of home bias is overestimated. In our increasingly globalized world, investors can obtain substantial foreign exposure by holding the equities of domestic firms. Moreover, given that investor protection regulations vary across countries (La Porta et al., 2000), international exposure through domestic multinationals (MNCs) might be preferable to direct foreign holdings. For example, rather than investing in the equity of the Pasig-based Universal Robina Corp, U.S. investors could obtain foreign exposure through Procter & Gamble (P&G), a Cincinnati-based firm with substantial operations in the Philippines.

In this paper, we analyze as of two points in time—March 2000 and December 1994—the security-level U.S. equity holdings of domestic institutions (obtained from SEC Form 13-f data) and,

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[1] The theory pertains to all risky assets, but in practice data limitations have compelled most researchers to focus on equities. Burger and Warnock (2004) and Buch, Driscoll, and Ostergaard (2004) analyze the home bias in bond and bank portfolios, respectively.

for the first time in the literature, foreigners (obtained from comprehensive benchmark surveys). In this analysis we follow the lead of Dahlquist and Robertsson (2001), who studied Swedish equities. We find, as the Dahlquist and Robertsson study did, that domestic institutions and foreigners share a common preference for large firms. More importantly, we also uncover a common preference for U.S. firms that themselves are diversified internationally, even after controlling for many factors that have been found to influence investment decisions. That is, both U.S. institutions and foreigners (who are also likely institutions) reveal a distinct preference for U.S. firms with global operations.[2]

These portfolio regressions motivate us to rethink how holdings of "foreign" equities are typically calculated. The domestic preference for firms that themselves are internationally diversified implies that U.S. investors have substantial claims on cash flows that originate from non-U.S. operations. Similarly, foreigners could have substantial claims on the U.S. through firms based in their home countries. Reported statistics on international equity positions are not designed to capture these indirect foreign holdings.

It is not immediately clear how one should compute the foreign exposure obtained from holding domestic MNCs. One way is to reconsider the notion of *country* and redefine the term *foreign*. A firm's country is typically defined by the residence of its corporate headquarters— P&G, because it is headquartered in Cincinnati, is a U.S. firm—but one could also define a firm's country by the location in which it operates. For some firms, the two definitions would produce identical country attributions. For example, Potomac Electric is headquartered and operates solely

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[2] This preference does not appear to owe to familiarity. Specifically, we include in our regressions an indicator variable, whether the firm's output is tradable, that is designed to capture familiarity; in no specification do we find evidence that, controlling for other factors, domestic institutions or foreigners prefer "tradable" firms.

in the Washington DC area. But other firms would be residents of many countries in a way determined by the distribution of their operations around the world. P&G, with about half of its sales originating from U.S. operations, would still be a primarily U.S. firm, but would also be part Filipino, part Argentinian, and a bit of the other 67 countries in which it operates.

In that vein, one estimate of the dollar value of foreign exposure gained by investing in domestic firms—which we call home-grown foreign exposure—is produced by summing, across each U.S. firm, the product of U.S. investors' holdings of its equity and the percent of its sales that originates from foreign operations. This estimate requires firm-level data on holdings of domestic equities, which we form by subtracting foreigners' holdings (obtained from the same benchmark survey utilized in the first half of the paper) from market capitalization. We calculate the sum to be $3.5 trillion as of March 2000, which, when added to the $2 trillion reported in published measures of U.S. investors' holdings of foreign equities, increases the share of "foreign" equities in U.S. investors' equity portfolios to 36%, a sharp increase from the officially reported 13%.

However, $3.5 trillion likely overstates the dollar value of foreign exposure obtained through these domestic firms and should be considered an upper bound estimate. Returns are largely determined in an equity's primary trading market (Chan, Hahmad, and Lau, 2003; Grammig, Melvin, Schlag, 2003), so from a returns-perspective P&G will look like an NYSE-based equity. Thus, the diversification benefit P&G provides U.S. investors is not simply given by the extent of its foreign operations. To account for this, we use an international factor model, similar to that in Griffin (2002), to calculate for each firm the extent to which its foreign beta varies with the amount of its foreign operations. The factor model suggests that more refined estimates of home-grown

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foreign exposure range from one quarter to one half of the $3.5 trillion.[3] Adding this to direct

holdings of foreign equities puts the share of foreign equities in U.S. investors' portfolios at about

20 percent, substantially greater that the traditionally reported 13 percent. Home bias still exists,

but it appears to be much less than standard data would suggest.[4]

The paper proceeds as follows. The next section describes the data sets on foreign and U.S.

institutional holdings of U.S. equities and shows that both foreigners and domestic institutions reveal

a preference for global firms. Section 3 then quantifies the home-grown foreign exposure that

investors obtain through holdings of domestic equities. Section 4 concludes.

2. The Preferences of Domestic Institutions and Foreigners

In this section we analyze the preferences of domestic institutions and foreigners as they are

revealed in the composition of their U.S. equity portfolios. Similar to the Dahlquist and Robertsson

(2001) study of Swedish equities, this analysis can be seen as encompassing country-level studies

of foreigners' holdings—such as the investigations of foreigners' positions in Japan (Kang and

Stulz, 1997) and Finland (Grinblatt and Keloharju, 2001)—and studies of the preferences of

domestic institutions (Falkenstein, 1996; Gompers and Metrick, 2000).

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[3] The ideal weighting scheme to measure the foreign exposure obtained through a U.S. MNC
would be the proportion of *market value* represented by its non-U.S. operations and sales (Agmon and
Lessard, 1977). But firms do not regularly report profits and losses by location, so such a measure is not
knowable to a researcher. Our adjustment factor is consistent with estimates from the Brooks and del
Negro (2004) factor model.

[4] Our findings are related to those of Errunza, Hogan, and Hung (1999) and Rowland and Tesar
(2001), who show that it is possible to mimic the returns of many foreign markets by investing in some
constellation of U.S. MNCs. We address a similar issue but by using our portfolio *holdings* data to
quantify the dollar amount of home-grown foreign exposure.

2.1 Dependent Variables and Sample Selection

Following Gompers and Metrick (2000) and Falkenstein (1996), we define ownership as holdings divided by market capitalization as of the dates of the two benchmark surveys, end-March 2000 and end-December 1994. Specifically, let subscript i denote a U.S. firm and superscript F or I denote foreign or institutional investors. Define Own_i^F as the dollar amount of foreigners' holdings of firm i's equity (H_i^F) divided by firm i's market capitalization ($MCap_i$):

$$Own_i^F = \frac{H_i^F}{MCap_i} \tag{1}$$

Ownership by domestic institutional investors, Own_i^I, is similarly defined. In a cross-sectional study such as ours, variations in these ownership measures are observationally equivalent to variations in deviations from a market-capitalization-weighted portfolio. For example, let foreigners' deviations from a market-capitalization-weighted U.S. equity portfolio, ω_i^F, be defined as follows:

$$\omega_i^F = \frac{H_i^F / H^F}{MCap_i / MCap_W} \tag{2}$$

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where H^F and $MCap_W$ are foreigners' total equity holdings and world market capitalization, respectively. For each firm i, ω_i^F is just Own_i^F divided by a constant, $H^F / MCap_W$. Thus, our regressions can be interpreted as identifying factors associated with deviations from a market-capitalization-weighted benchmark such as the international CAPM.

Data on foreigners' holdings of U.S. stocks are from comprehensive benchmark surveys conducted by the U.S. Treasury Department and the Federal Reserve System as of December 1994 and March 2000. The data are confidential and are collected from two types of reporters: issuers of securities and, because issuers typically do not have information on the ultimate owner of their securities, U.S. custodians that manage the safekeeping of U.S. securities for foreigners. Custodians—primarily banks but also some broker-dealers—are the main source of information, reporting 87 percent of the market value of foreign holdings of U.S. long-term securities measured on the 2000 survey; all U.S. custodians that held at least $20 million in U.S. securities for foreigners were required to submit survey data. Reporting on the survey is mandatory, and penalties may be imposed for noncompliance. Because most U.S. securities are in the possession of U.S. custodians for safekeeping and all significant U.S. custodians were included in the surveys, the survey data are the most comprehensive available.[5]

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[5] The surveys provide high quality, security-level data, but they have two drawbacks. First, the data collection technique does not permit identification of the type of foreign investor beyond whether the investor is a government or a private entity. Since governments do not typically hold other countries' equities, we can assume the foreign holdings in our sample are those of private investors. Moreover, it is likely that the representative foreign investor is an institution, but there is no concrete evidence supporting this. Second, the country attribution of foreign investment in U.S. securities is far from perfect, precluding an analysis of, say, Germans' investment patterns in U.S. equities. The distortion in country attribution in the survey is caused by instances in which multiple custodians are involved in the safekeeping of a security. For example, a resident of Germany may buy a U.S. security and place this security in the custody of a Swiss bank. To facilitate settlement and custody operations, the Swiss bank

For data on the holdings of domestic institutional investors—banks, brokers, insurance companies, mutual funds, and pensions—we rely on the Spectrum database. The Spectrum data are compiled from SEC 13-F filings, which institutions with greater than $100 million of securities under discretionary management are required to submit. The 13-F filings are quarterly; we use data on the two quarters that correspond with our survey data of foreigners' holdings, fourth quarter 1994 and first quarter 2000. Gompers and Metrick (2001), among others, have analyzed the 13-F data and provide a complete description.

To be included in our study, we require a firm to be listed on NYSE, Amex, or Nasdaq and have market capitalization data in CRSP as of a survey date. That leaves us with 5,980 firms for 2000 and 5,533 firms for 1994. To guard against data errors, we further require that the market capitalization from CRSP differs by no more than 20 percent from data provided through the benchmark survey, when available. That eliminated 163 firms in 2000 and 220 in 1994.[6] Foreign and institutional ownership that in sum exceeds 100 percent of the outstanding shares indicates a data error; this criterion eliminates no firms in 2000 and 67 in 1994. In multivariate regressions, we use data on firm characteristics from CompuStat, which reduces our sample to 5,330 firms in 2000 and 4,690 in 1994, comparable to the 5,199 firms in the end-1996 sample in Gompers and Metrick

will then normally employ a U.S.-resident custodian bank to act as its foreign subcustodian for this security. When portfolio surveys are conducted, the legal authority to collect information extends only to U.S.-resident entities. The U.S. resident bank acting as the subcustodian of the Swiss bank will report this security on the survey, but this U.S. bank will typically know only that it is holding this security on behalf of a Swiss bank and will report this security as Swiss held. Because of this custodial center bias, we do not use information on the residence of the foreign investor in our empirical work. A detailed description of the methodology, as well as results from the latest survey, are in Treasury Department et al. (2002), available at www.treas.gov/tic/fpis.html. For a primer on the surveys, see Griever, Lee, and Warnock (2001).

[6] To assist in the editing of the benchmark surveys, the U.S. government purchases vendor data on prices, shares outstanding, and market capitalization. Not every record contains this information, however, so we cannot make this comparison with CRSP for every security.

(2001). We then gather data on the amount of a firm's sales that originate from foreign operations from Worldscope, because it has greater coverage for this variable than Compustat's Geography file; including foreign sales reduces our sample by 787 firms in 2000 and 1,907 firms in 1994.[7] Our final working samples in the years 2000 and 1994 are 4,543 and 2,783, respectively.

2.2 Explanatory Variables

We focus on two variables, *Tradable* and *Foreign Sales*. As in Coval and Moskowitz (1999), *Tradable*, an indicator variable set equal to one if the firm has any exports, is a proxy for familiarity.[8] In the simplest sense, if its product can travel, the firm is familiar to more people. *Foreign Sales*, the percent of a firm's sales that are derived from foreign operations, captures any preference for multinationals. From the perspective of foreigners, *Foreign Sales* might also proxy for information; foreigners likely have better quality information about the "nearby" U.S. firms with foreign operations.

We also include control variables that regularly appear in the empirical literature on the equity holdings of domestic institutions and foreigners. Kang and Stulz (1997) and Dahlquist and Robertsson (2001) provide a short list of factors that foreigners might prefer. The studies of Falkenstein (1996) and Gompers and Metrick (2001) provide factors that influence the composition of domestic institutions' investments in U.S. equities. Similar to these studies, we include the following variables:[9]

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[7] Our results do not hinge on whether we treat firms that have no foreign sales data as having zero foreign sales, or discarding them as we do in our regression analysis.

[8] We thank a referee for suggesting this variable.

[9] All explanatory variables are from CompuStat, with the exception of *Foreign Sales* and *Tradable*, which are from Worldscope, and returns-based variable, which are computed from CRSP data on returns.

Size: log market capitalization as of the survey date (March 2000 or December 1994)

S&P 500: an indicator variable set equal to one if the equity is in the S&P 500 index

Turnover: the value of trading over the previous 12 months over market capitalization

Dividend Yield: dividend per share over the year-end market price

Book-to-market: the book value per share over the year-end market price

Momentum: cumulative monthly returns over the preceding one-year period

Leverage: the ratio of total debt to total equity

Beta: the systematic risk of a stock

Volatility: the standard deviation of the residual

Beta and volatility are computed from a market model that is estimated using monthly returns over the preceding four-year period.

The control variables are intended to capture a range of investor preferences. *Size* and *S&P 500* can proxy for familiarity; investors, be they domestic or foreign, are likely to be more familiar with firms that are large or in a well-known index. The *S&P 500* dummy could also be important if institutions or foreigners attempt to mimic the index, and *Size* could be important to institutional investors, who can be large relative to the size of many stocks.[10] Prudential considerations might prompt some institutions to prefer firms that pay dividends and have low volatility (Del Guercio, 1996). Investors who prefer growth firms might show an affinity for stocks with low dividends (as revenues are plowed back into the firm) or low book-to-market. The predicted sign of *Beta* is ambiguous; Kang and Stulz (1997) note that in the presence of proportional barriers to investment

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[10] CalPERs, for example, has a U.S. equity portfolio of $63 billion, greater than the total market capitalization of almost every firm in our sample.

foreigners should hold high beta stocks, but such barriers should not pertain to the U.S. market. *Momentum* will provide an indication of whether investors can be characterized as momentum traders. *Leverage* is included as a measure of long-term financial health.

2.3 Empirical Results

Summary statistics for all variables are presented in Table 1. In our full sample of 4,543 firms, the median firm is a growth firm (book-to-market of 0.49) that pays no dividends; is not in the S&P 500; has 4 percent foreign ownership and 29 percent of its shares held by U.S. institutions; and does not produce a tradable good or have foreign operations.[11] It also has a market capitalization of $171 million (= $e^{5.14}$); a turnover rate of 0.86; and liabilities that are 115 percent of its equity. In the slightly smaller samples (due to data availability), the median firm had 12-month returns of 5 percent with a beta and residual variance (calculated over a 48-month period) of 0.84 and 0.14, respectively.

In our multivariate regressions we also include industry dummies to capture any industry-specific preferences by foreigners and institutions. Table 2 shows ownership in the Campbell (1996) industry groups. Foreign ownership is highest in Basic Industry (8 percent) and Services (7 percent), while domestic institutional ownership is highest in Petroleum (42 percent) and Transportation (40 percent). The financial (FIRE) and construction sectors attract the least foreign ownership; domestic institutions also hold the least in FIRE.

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[11] Note that while the minimum investment by foreigners or institutional investors rounds to zero percent, there are only 8 firms in our sample for which foreign or institutional holdings are truly zero.

The first two columns of Table 3 indicate that Own_i^F and Own_i^I are both positively related to size, liquidity, S&P inclusion, beta, and foreign sales, and negatively related to book-to-market and leverage. In contrast, they differ in their relations to volatility, dividends, tradable, and momentum; foreign holdings are greater in firms with higher volatility, lower dividends, and greater past returns, whereas domestic institutional ownership is greater in firms that paid higher dividends and had less volatile returns (consistent with the prudential considerations of Del Guercio (1996)), but is unrelated to past returns.

Interestingly, the simple correlations in Table 3 suggest that domestic institutions shy away from firms that produce a tradable good. This could be construed as implying that professional investors are not swayed by a familiarity with the firm's project. Of course, one should not read too much into these bivariate relationships. For example, in this sample book-to-market is negatively correlated with size, so the negative relationship between book-to-market and foreign ownership might owe to a size preference. Multivariate regressions, to which we next turn, should disentangle these effects.

Table 4 shows our multivariate regressions of ownership by foreign investors (left panels) and domestic institutional investors (right panels) for our samples in 2000 and 1994. We first report results of regressions that include a parsimonious set of variables and maximum sample size (4,543 firms in columns 1 and 5) before adding CRSP returns variables with less coverage. In some cases, the preferences revealed by these regressions change across samples. For example, controlling for size and the other listed factors, foreigners showed a preference for S&P500 firms in 2000 but not in 1994. However, some characteristics come through strongly in all regressions; for these variables, the coefficient estimates are bolded. For example, the regressions reveal a preference by foreign

investors for high growth, high risk U.S. firms about which they have sufficient information; specifically, foreigners prefer U.S. firms that are large, liquid, pay low dividends, have volatile returns, and have high foreign sales. The right-panel regressions show that domestic institutional investors show consistent preferences for firms that are large, not in the S&P500 and have high book-to-market, less volatile returns (perhaps for prudential reasons), and high foreign sales.[12]

Our regressions indicate a common preference for internationally diversified firms, which extends results from the Dahlquist and Robertsson (2001) study of Swedish equities in which size was the only common preference.[13] We note, however, that while both *Foreign Sales* and *Size* are statistically significant (at the 10% level) in all specifications, their economic impacts are markedly different for foreign and domestic institutional investors. Table 5 shows the impact on ownership of a move from each characteristic's 25th percentile value to its 75th percentile value. The economic importance of size is very large on both foreign and domestic institutional ownership. Moving from the 25th percentile of size to the 75th percentile increases foreign ownership by 1.1 percentage points, a substantial amount given the median foreign ownership of 4 percent, and domestic institutional ownership by 23 percentage points (compared to median ownership of 29 percent). In contrast, compared to median ownership, the impact of foreign sales is clearly more important for foreign ownership (0.6 percentage points) than domestic institutional (0.6 percentage points).

Finally, we note that domestic investors' preference for MNCs, even after controlling for size and many other characteristics, could be considered surprising, especially given the many papers

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[12] The unconditional correlations in Table 3 show that domestic institutional investors' holdings are indeed positively related to S&P inclusion. Table 4 shows, however, that after controlling for size there is no evidence of a positive index inclusion effect.

[13] This does not necessarily mean that *all* other groups of investors show a significant aversion to firms with high foreign sales. We cannot say much about the positions of other investors because they are a diverse group consisting of, among others, individuals, insiders, and hedge funds.

that conclude that corporate international diversification is value destroying.[14] But it is consistent

with an intriguing "safe diversification" hypothesis. Specifically, investors might prefer to obtain

foreign exposure through firms from countries with strong shareholder protections (in this case, the

US). For example, the large institutional investor, CalPERS, will not invest in Universal Robina

because shareholder protections in the Philippines are not strong enough for it to make its

permissible country list. But CalPERS obtains at least some exposure to the Philippine market

through its holdings in P&G equity, which amount to $600 million. Foreign investors could also

be driven by this motive. In particular, to some extent foreign investment in the equity of U.S. firms

originates in different countries than are U.S. firms' foreign operations, suggesting that foreigners

might hold multinationals to get exposure to other foreign markets. Specifically, Table 6, which

shows the country distributions of holdings of U.S. equities by foreign investors and U.S. direct

investment abroad, indicates that a disproportionate amount of U.S. firms' foreign activity is in

emerging markets (21 percent). Foreign exposure through multinationals could be preferred to

direct foreign holdings if investor protection regulations are weak or weakly enforced in some

countries, as suggested by the work of La Porta et al. (2000).

In the next section we estimate the extent to which reported data on foreign equity holdings

should be modified to take into account "safe diversification" or, more generally, home-grown

foreign exposure.

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[14] See, for example, Denis, Denis, and Yost (2002). The surveys of Fatemi (1984) and Bodnar,
Tang, and Weintrop (2003) indicate that this is the subject of considerable debate.

3. Home-Grown Foreign Exposure and the Home Bias

In this section we attempt to ascertain how much international diversification is obtained through domestic investors' holdings of domestic multinationals. We begin by showing that the foreign exposure that a domestic firm provides U.S. investors increases with the share of its sales that originates abroad. We then attempt to quantify the dollar amount of home-grown foreign exposure.

3.1 The Exposure of Domestic Firms to Foreign Equity Markets

Recent evidence indicates that a security's returns are determined primarily by the market in which the security trades, rather than by the location of the firm's operations (Chan, Hahmad, and Lau, 2003); Grammig, Melvin, Schlag, 2003). In light of this, it is conceivable that firms with more extensive foreign operations do not provide investors with greater international diversification benefits. In this subsection, to ascertain the extent to which foreign factors influence the returns of U.S. equities, we first calculate each firm's foreign beta by estimating an international market model and then show how foreign betas vary with foreign sales.

To compute firm i's foreign beta ($\beta_{i,F}$), we follow Griffin (2002) and estimate an international market model with two components, a U.S. factor and a foreign factor. Specifically, for each stock in our sample, we estimate the following international market model using 48 months (April 1996 to March 2000) of returns data:[15]

$$r_{i,t} = a_i + \beta_{i,US}r_{US,t} + \beta_{i,F}r_{F,t} + \epsilon_{i,t} \tag{3}$$

where r_i is firm i's stock returns, r_{US} is the return on a CRSP value-weighted U.S. equity portfolio, r_F is the return on a foreign equity portfolio, and $\beta_{i,US}$ is firm i's domestic beta.

A crucial choice in this analysis is the weighting scheme for the foreign factor. The easiest weighting scheme would be derived from data on market capitalizations, enabling the use of a readily available equity index such as the MSCI World ex US. However, this choice is inappropriate for a particular firm if the distribution of its foreign operations across countries differs greatly from the distribution of world equity market capitalization. A better weighting scheme would be derived from firm-specific information, perhaps on the distribution of the firm's foreign sales across countries. For example, consider a U.S. firm that has substantial exposure to Latin America. Professional investors know this and purchase its equity as one way to obtain this exposure. In this case, a conventional foreign equity index, such as the MSCI World ex US, which has a weighting on Latin America of 2 to 3 percent, would not likely uncover the foreign exposure obtained through this firm. Because firm-level data on the distribution of operations across foreign countries are not available to us, we rely on the next best alternative, industry-specific trade weights developed in Goldberg (2004). As shown in the appendix, these industry-specific weights differ from MSCI weights, but should more accurately represent the countries in which the firm conducts business.[16]

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[16] See the appendix for further details on the industry-specific trade weights, which have been used by others to form trade-weighted exchange rates that have been applied to studies of the effect of exchange rates on corporate profits (Goldberg, 2004) and of firms' exchange rate exposure (Ihrig and Prior, 2003). For our purposes, weights of foreign operations might be preferable, but we cannot use BEA's publicly available data on U.S. firms' operations by country by industry because in many cases it is withheld for disclosure reasons.

Table 7 (Panel A) presents average results from the international market model estimates for the full sample of firms as well as four portfolios sorted by the extent of foreign sales. The table shows that, across all firms for which data on foreign sales and at least three years of returns are available, the average domestic beta (0.757) is much larger than the average foreign beta (0.215), indicating that the returns of these U.S. firms owe predominantly to U.S. factors. The importance of the foreign factor, however, increases with foreign sales: The average foreign beta for firms with no foreign sales is only 0.142, but is 0.468 for firms with sales that originate primarily in foreign countries. In contrast, there is no apparent relationship between domestic betas and foreign sales.

To form an estimate of the dollar value of home-grown foreign exposure, we need a rule-of-thumb estimate of the relationship between foreign sales and foreign beta. To obtain this estimate we use weighted least squares, with weights that are the inverse of the standard error of each $\hat{\beta}_{i,F}$, to estimate the following model:

$$\hat{\beta}_{i,F} = \kappa + \gamma_{FS}ForeignSales_i + \zeta_i \tag{4}$$

The coefficient estimate of $\gamma=0.490$ (Panel B) indicates that firms with 10 percent greater foreign sales have foreign betas that are 0.049 higher, consistent with the results in Panel A. As a robustness check—and because in the next subsection we will apply our estimate of γ to calculate the "foreign" holdings multinationals provide—we investigate whether this result owes to a difference between firms with no foreign sales and those with some foreign sales. It does not; the coefficient (0.533) is very similar for firms with positive foreign sales.

Our estimate of γ in Panel B comes from a two-step approach that utilizes generated regressors (the $\hat{\beta}_{i,F}$) in the second step. To the extent that the first step does not produce estimates that are independent across firms, the standard errors in (4) might be biased. A one-step approach alleviates this issue. Specifically, in Panel C we present results from a pooled fixed-effects panel model that encompasses both (2) and (4):

$$r_{i,t} = a_i + \beta_{i,US}r_{US,t} + (\beta_{0,F} + \beta_{1,F}\mathit{ForeignSales}_i)r_{F,t} + \eta_{i,t} \tag{5}$$

We restrict estimation to include only those firms for which Foreign Sales is positive, because these are the relevant firms for our calculations of home-grown foreign exposure. The coefficient on what becomes an interaction term of Foreign Sales and r_F is positive and highly significant, indicating that as in Panel A and B as foreign sales increases so does the foreign beta.[17] However, the magnitude of $\beta_{0,F} + \beta_{1,F}\mathit{ForeignSales}_i$, with Foreign Sales evaluated at the sample average of 30%, is 0.26, somewhat less than the estimate of γ in Panel B.

Overall, the results in Table 7 indicate that investors do obtain increased international diversification benefits through U.S. firms that themselves are internationally diversified. A firm's returns depends primarily on the local market, so there is not a one-to-one relationship between foreign sales and foreign exposure, but home-grown foreign exposure is substantial. As a rule of thumb, our regressions in Panels B and C suggest that for every one percentage point of foreign

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[17] The results for the full sample are nearly identical.

sales, the firm's foreign beta increases about a quarter to half of that.[18] We use these rule-of-thumb

estimates in the next subsection in an attempt to quantify the dollar amount of home-grown foreign

exposure.

3.2 The Dollar Value of Home-Grown Foreign Exposure

We estimate the dollar value of home-grown foreign exposure by weighting the dollar value

of *all* U.S. investors' holdings of U.S. equities by the percent of each firm's sales that originate from

foreign operations. Because data on all U.S. investors' holdings of individual U.S. equities does not

exist, we form it by subtracting from firm *i*'s market capitalization the amount held by foreigners.

We start by biasing our estimate downward; for the firms in our sample that do not have

foreign sales data in Worldscope and for all firms not in our sample, we assume zero foreign sales.

After subtracting foreign holdings from firm market capitalization to get U.S. holdings, we weight

U.S. holdings of U.S.-based firms by the degree of internationalization—the percent of each firm's

sales that originates from foreign operations—to get an upper bound estimate of home-grown

foreign exposure of \$3,531 billion in March 2000 (Table 8). The models in Table 7 showed,

however, that foreign exposure does not increase one-for-one with foreign sales. Thus, we form

model-based estimates by multiplying domestic holdings not by the weight of foreign sales, but by

foreign sales times $\hat{\gamma}_{FS}$, which from equations (4) and (5) ranges from 0.26 to 0.53 for firms with

positive foreign sales. Our model-based estimates of the dollar value of home-grown foreign

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[18] Our rule-of-thumb adjustment is consistent with the results in Brooks and del Negro (2004).

exposure are therefore 0.26 to 0.53 times our upper bound estimate, or $918 billion to $1,882 billion.[19]

To gauge the importance of this magnitude, we also show in Table 8 the dollar value of U.S. investors' direct exposure to foreign equities. An upper bound estimate of this is the amount of foreign equities held by U.S. investors ($2,065 billion). But, as with U.S. equities, the returns of some of those foreign equities will owe to U.S. factors and thus provide less than complete diversification benefits to U.S. investors. A lower bound estimate of the direct foreign exposure, formed by subtracting all of the foreign firm's market capitalization attributable to foreign sales, is $1,334 billion.[20] Applying what we have learned from our model-based estimates of equations (4) and (5), more refined estimates would put direct foreign exposure at $1,870 billion to $1,970 billion, which assumes that 50 percent of the foreign sales of foreign firms originates in the United States and that foreign firm's have the same $\hat{\gamma}_{FS}$ of 0.26 to 0.53 that U.S. firms have (i.e., returns are predominately determined in their home market).

At roughly $1.9 trillion, foreign exposure through foreign equities (direct foreign exposure) represents 12 to 13 percent of U.S. investors' equity portfolios. The international diversification that U.S. investors gain through their holdings of U.S. multinationals is comparable; including home-

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[19] As a check of the reasonableness of our estimates, note that the Bureau of Economic Analysis estimate of the market value of U.S. firms' foreign operations ($2,817 billion) lies between our upper bound estimate and our best guess of home-grown foreign exposure.

[20] This lower bound estimate of direct foreign exposure is derived as follows. Data from Ammer, Holland, Smith, and Warnock (2004) indicate that U.S. holdings of foreign equities weighted by foreign sales anywhere (not just in the United States) totaled about $360 billion in 1997, or 35 percent of overall foreign holdings. If *all* of those sales were in the United States and the 35 percent rule still applied in 2000, $731 billion would be an appropriate estimate of the amount of U.S. investors' direct foreign holdings that owed to operations in the United States.

grown foreign exposure of $918 billion (or $1,882 billion) increases the foreign component of U.S. equity portfolios to 18 percent (or 25 percent using equation (4)).

To obtain a time series representation of this adjustment, as well as ascertain its implications for the home bias of other countries, we can apply rules of thumb that are consistent with the analysis in this section to published direct investment data.[21] While there are substantial data limitations, we can use data on reported stocks of foreign direct investment— the value of domestic firms' foreign operations—to provide a rough estimate of the implication of our analysis for home bias. The market value of U.S. firms' foreign operations was estimated by the Bureau of Economic Analysis (BEA) to be $2.8 trillion at end-1999 ; omitting foreigners' holdings of U.S. multinationals and allowing for the fact that the returns of U.S. multinationals are primarily determined by domestic forces brought our model-based estimate of home-grown foreign exposure to roughly half that. Thus, as a rule of thumb, we add one-half of reported direct investment stocks to reported foreign holdings. We also adjust reported equity holdings, downward by 10 percent, because investors hold some foreign firms that have a substantial presence in the domestic economy.

These adjustments produce the thin solid lines in Figures 1 and 2, which lie above the previously reported holdings (dashed lines). Even with our adjustments, cross-border holdings are far less than market-weighted allocations (thick solid lines). Including home-grown foreign exposure results in a home bias that is less severe than previously reported, but nonetheless still substantial.

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[21]Data availability precludes a rigorous study of the home-grown foreign exposure obtained by investors from other countries. Returns data are available across a wide range of non-U.S. firms, so it is possible to estimate an international factor model. But, to our knowledge, security-level data on domestic investors' holdings of domestic equities are available for only a handful of countries (and even those are not available to most researchers).

4. Conclusion

We analyze portfolios of U.S. equities and find that foreigners prefer large, liquid, internationally oriented firms, consistent with previous studies. Interestingly, we find that domestic institutions also have strong preferences for large, internationally diversified firms, implying that U.S. investors obtain substantial international diversification through their holdings of U.S. multinationals. This is confirmed using an international factor model that indicates that while U.S. factors are most important for the returns of U.S. firms, the influence of foreign factors increases with the extent of the firm's foreign sales. We use the relationship between foreign sales and foreign beta to inform our estimate of the dollar value of home-grown foreign exposure, the foreign exposure U.S. investors obtain by holding U.S. equities. The amount of home-grown foreign exposure is comparable (in dollar value) to direct foreign exposure (through holding foreign equities), implying that the international diversification of U.S. investors has been substantially underestimated.

Our results have implications for the literature on corporate international diversification. The question of whether it is advantageous for a firm to expand internationally spawned an entire literature on foreign direct investment that goes back to Kindelberger (1969), Caves (1971), and Dunning (1973). The debate on whether corporate international diversification is value enhancing, surveyed in Fatemi (1984) and Bodnar, Tang, and Weintrop (2003), has been going strong for three decades. Our study cannot settle this debate, but we do provide direct evidence that two important groups of investors recognize the value of foreign operations, a necessary (but not sufficient) condition for international diversification to be value enhancing (Agmon and Lessard, 1977).

21

Finally, it must be noted that while our results suggest that typical measures overestimate the extent of home bias, even with our adjustments a substantial underweighting of foreign equities remains. We suspect this owes primarily to the lack of investor protection regulations in many countries and the fact that the typical shareholder in many countries is a large insider (La Porta et al., 1999). Foreigners' investment in U.S. equities is not restricted by U.S. laws, but because the typical non-U.S. country does not have an established class of equity shareholders, foreign investment in the U.S. is limited. Similarly, U.S. investors might fear investing in countries in which the rules are not designed to protect outside shareholders. Thus, if investor protection regulations are strengthened and more countries develop a class of equity shareholders, the home bias would likely decrease in both directions.

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Appendix: Notes on industry-specific returns

Our industry-specific returns use the industry weights developed in Goldberg (2004). For U.S. industries—20 two-digit manufacturing SIC codes and 10 non-manufacturing groupings (Business Services, Construction, Educational Services, Film and Tape Rental, Financial Services, Legal Services, Insurance, Passenger Fares, Installation and Repair Services, and Telecommunications)—Goldberg (2004) provides the weight of each foreign country in each sector's international trade and uses these time-varying weights to construct trade-weighted exchange rate indices.

We use the industry weights to construct equity indices. The weights for selected industries' trade with the euro area, Japan, Emerging Asia, and Latin America are given in the following table, as are correlations of returns formed using the industry trade weights and MSCI returns:

Selected Industry (SIC)	1996 Weights (%)				Returns Correlation	
	Euro area	Japan	Emerging Asia	Latin America	w/ MSCI World ex US	w/ MSCI US
Tobacco (21)	31	23	9	8	0.95	0.75
Chemicals (28)	28	11	14	12	0.92	0.79
Apparel (23)	8	10	37	30	0.74	0.71
Leather (31)	16	7	48	16	0.66	0.67
memo:						
MSCI World ex US	20	35	12	3		

Note: For illustration purposes, weights shown are as of December 1996. Correlations are computed using monthly returns for the period January 1995 - December 2000. To conserve space, we do not present the weights and correlations for the other 26 industries.

For each industry, the country weights based on international trade differ from the country weights in the MSCI World ex US index. However, as the table shows, some have a similar mix between developed and emerging markets. For example, the first two industries listed—Tobacco and Chemicals—are heavily weighted toward the euro area and Japan, as is the MSCI index. Not surprisingly, equity indices computed using country weights for these two industries are highly correlated (0.95 and 0.92, respectively) with the MSCI World ex US index. (For completeness, we also include the correlation with the MSCI US index.) In contrast, Apparel and Leather are heavily weighted toward the emerging markets; as expected, their correlations with the MSCI World ex US are somewhat lower.

Table 1
Basic Summary Statistics

The sample size for all variables is 4,543, with the exception of Beta and Volatility (N=3,742). Own^F and Own^I are foreign holdings and U.S. institutional holdings, respectively, divided by market capitalization. Size is the log of market capitalization. Turnover is the average of twelve months of shares traded divided by beginning of month shares outstanding. S&P is equal to one if the stock is in the S&P500 index, zero otherwise. Book-to-market is book value over market value. Yield is dividends paid over a one-year period over beginning of period price. Leverage is total liabilities divided by total equity. Momentum is the cumulative returns over the preceding year. Foreign Sales is the proportion of the firm's sales that are abroad. Tradable is equal to one if the firm exports its product, zero otherwise. Beta and Volatility are the systematic risk and residual variance from a market model calculated with monthly data for a four-year period. Book-to-market, dividend yield, leverage, and turnover are winsorized at the 1st and 99th percentiles. The value of each variable at its 25th, 50th, and 75th percentiles are presented in the columns labeled 25th, 50th, and 75th. Data are for 2000; statistics for 1994 are available upon request.

Variable	Mean	Std.Dev.	Min	25th	50th	75th	Max
Own^F	0.052	0.060	0.00	0.01	0.04	0.07	0.79
Own^I	0.331	0.250	0.00	0.11	0.29	0.53	0.96
Size	5.31	2.01	0.67	3.77	5.14	6.62	13.2
Turnover	1.53	1.77	0.01	0.42	0.86	1.87	9.48
S&P 500	0.076	0.266	0	0	0	0	1
Book-to-Market	0.740	1.03	-0.76	0.17	0.49	0.93	7.21
Yield	0.009	0.016	0	0.00	0.00	0.01	0.08
Leverage	2.74	4.72	-9.93	0.45	1.15	2.74	24.2
Momentum	0.674	2.04	-0.93	-0.23	0.05	0.72	34.2
Foreign Sales	0.124	0.204	0	0.00	0.00	0.20	1
Tradable	0.164	0.370	0	0	0	0	1
Beta	0.908	0.686	-4.14	0.46	0.84	1.27	6.27
Volatility	0.162	0.104	0.033	0.09	0.14	0.20	1.353

Table 2
Ownership by Industry

The table shows, for the industry groups defined in Campbell (1996), foreign and institutional ownership expressed as a percent of market capitalization.

Industry	N	Foreign Ownership	Institutional Ownership
Petroleum	141	4	42
FIRE	779	3	24
Consumer Durables	647	6	36
Basic Industry	395	8	38
Food/Tobacco	124	5	34
Construction	77	3	35
Capital Goods	561	5	35
Transportation	91	5	40
Utilities	243	5	36
Textiles/Trade	371	6	35
Services	824	7	32
Leisure	241	4	31
Unclassified	49	7	34
Total	4543	5	33

Table 3
Cross-Sectional Correlations

The table shows the March 2000 cross-sectional correlation between ownership and firm characteristics and for all pairs of these characteristics. P-values for the correlation coefficients are italics. Definitions are provided in Table 1.

	Own^F	Own^I	Size	Turnover	S&P	Beta	Vol	BM	Yield	Lev	Momentum	For.Sales
Own^I	0.118											
	0.000											
Size	0.190	0.626										
	0.000	*0.000*										
Turnover	0.327	0.041	0.202									
	0.000	*0.017*	*0.000*									
S&P	0.125	0.333	0.550	-0.031								
	0.000	*0.000*	*0.000*	*0.022*								
Beta	0.184	0.215	0.451	0.470	0.181							
	0.000	*0.000*	*0.000*	*0.000*	*0.000*							
Volatility	0.091	-0.260	-0.182	0.299	-0.097	0.077						
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*						
Book-to-Market	-0.082	-0.153	-0.288	-0.094	-0.101	-0.157	0.005					
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.688*					
Yield	-0.153	0.033	0.063	-0.226	0.120	-0.147	-0.143	0.161				
	0.000	*0.015*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*				
Leverage	-0.053	-0.049	-0.031	-0.060	0.015	-0.046	-0.041	0.028	0.084			
	0.000	*0.000*	*0.022*	*0.000*	*0.274*	*0.001*	*0.002*	*0.040*	*0.000*			
Momentum	0.141	0.003	0.167	0.320	-0.040	0.160	0.187	-0.149	-0.151	-0.072		
	0.000	*0.826*	*0.000*	*0.000*	*0.003*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*		
Foreign Sales	0.208	0.260	0.288	0.093	0.175	0.142	-0.035	-0.089	-0.086	-0.067	0.124	
	0.000	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.017*	*0.000*	*0.000*	*0.000*	*0.000*	
Tradable dummy	0.011	-0.030	-0.070	0.084	-0.045	0.055	0.123	-0.018	-0.093	-0.133	0.116	0.059
	0.429	*0.029*	*0.000*	*0.000*	*0.001*	*0.000*	*0.000*	*0.202*	*0.000*	*0.000*	*0.000*	*0.000*

Table 4
Determinants of Foreign and Institutional Ownership

Table 4 presents regression results where the dependent variable is the share of security i held by foreigners (columns 1 - 4) or by domestic institutions (columns 5 - 8) as of March 2000 or December 1994. Reported are parameter estimates, with p-values computed from robust standard errors in parentheses. Bold type indicates estimates that, for a type of investor, are significant at the 10 percent level and the same sign in all four specifications. Industry dummies corresponding to the Campbell (1996) grouping are included but not reported. See Table 1 for definitions of explanatory variables.

	Foreign Ownership				Institutional Ownership			
	2000		1994		2000		1994	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Size	**0.0022**	**0.0038**	**0.0071**	**0.0077**	**0.0909**	**0.0793**	**0.0832**	**0.0753**
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Turnover	**0.0095**	**0.0084**	**0.0072**	**0.0057**	-0.0095	0.0141	0.0319	0.0398
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	(0.000)	(0.000)	(0.000)	(0.000)
S&P	0.0193	0.0160	0.0006	0.0000	**-0.0666**	**-0.0792**	**-0.0510**	**-0.0479**
	(0.000)	(0.000)	(0.859)	(0.992)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Book-to-Market	0.0012	0.0018	0.0026	0.0029	**0.0212**	**0.0176**	**0.0092**	**0.0129**
	(0.199)	(0.087)	(0.006)	(0.009)	**(0.000)**	**(0.000)**	**(0.002)**	**(0.000)**
Yield	**-0.2931**	**-0.3309**	**-0.4641**	**-0.4292**	0.1908	-0.3986	-0.6783	-0.8779
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	(0.291)	(0.043)	(0.002)	(0.002)
Leverage	-0.0002	-0.0002	0.0002	0.0001	-0.0008	-0.0018	-0.0015	-0.0022
	(0.372)	(0.447)	(0.447)	(0.636)	(0.255)	(0.027)	(0.028)	(0.002)
Momentum	-0.0002	-0.0007	-0.0141	-0.0166	-0.0139	-0.0104	-0.0122	-0.0145
	(0.633)	(0.202)	(0.000)	(0.000)	(0.000)	(0.000)	(0.145)	(0.165)
Foreign Sales	**0.0343**	**0.0277**	**0.0364**	**0.0354**	**0.0497**	**0.0308**	**0.0423**	**0.0484**
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.002)**	**(0.062)**	**(0.062)**	**(0.042)**
Tradable dummy	-0.0058	-0.0047	0.0017	0.0011	-0.0009	-0.0051	-0.0027	-0.0072
	(0.038)	(0.058)	(0.519)	(0.713)	(0.803)	(0.514)	(0.783)	(0.503)
Beta		0.0007		0.0038		0.0292		0.0074
		(0.704)		(0.012)		(0.000)		(0.215)
Volatility		**0.0255**		**0.0391**		**-0.7174**		**-0.3023**
		(0.055)		**(0.000)**		**(0.000)**		**(0.096)**
N	4543	3742	2783	2214	4543	3742	2783	2214
Adjusted R^2	0.532	0.557	0.531	0.537	0.802	0.837	0.827	0.849

Table 5

The Impact of Characteristics on Foreign and Domestic Institutional Ownership

Impact is measured as the effect (in percentage points) on ownership of a shift from the characteristic's 25th percentile to its 75th percentile. Percentiles are given in Table 1. Impact is only computed for variables that are significant and the same sign in every Table 4 regression for a given type of investor. Average coefficient estimates from 2000 are used to calculate impact; blank cells indicate that the characteristic's coefficient is insignificantly different from zero in some regressions. For the S&P dummy, impact is defined as a shift from not included in the index to being included. Median ownership is 4 percent for foreigners and 29 percent for domestic institutions.

	Impact on Foreign Ownership	Impact on Institutional Ownership
Size	0.9	24.3
Turnover	1.3	2.1
S&P dummy		-7.3
Book-to-Market		1.5
Yield	-0.3	
Leverage		
Momentum		
Foreign Sales	0.6	0.8
Tradable dummy		
Beta		
Volatility	0.3	-7.9

Table 6

The Distribution of U.S. Direct Investment Abroad (USDIA)
and Foreigners' Holdings of U.S. Equities

USDIA is end-1999 data valued at historical cost from the Bureau of Economic Analysis; the data are available online at www.bea.gov/bea/di/di1usdbal.htm. Shown are percent of total USDIA and total foreigners' holdings of U.S. equities.

	USDIA	Foreigners' Holdings
Emerging Markets	21.4	6.1
Latin America	10.2	0.9
Emerging Asia	7.8	4.0
Other Emerging	3.2	1.2
Europe	50.4	57.9
Canada	9.8	10.2
Japan	4.5	8.5
Caribbean Financial Centers	10.7	10.5

Table 7

The Relationship between Foreign Exposure and Foreign Sales

Panel A shows the average regression results of the international factor model estimated for each stock over the period from April 1996 to March 2000:

$$r_{i,t} = a_i + \beta_{i,US} r_{US,t} + \beta_{i,F} r_{F,t} + \epsilon_{i,t}$$

where r_i is firm-specific stock returns, r_{US} is the return on a CRSP value-weighted US portfolio, and r_F is the return on a firm-specific foreign portfolio. The foreign portfolio uses a weighting scheme, discussed in the appendix, that is based on the Goldberg (2004) industry-specific trade weights. Standard errors are in parentheses; these are computed as $s(\cdot)/\sqrt{N}$, where $s(\cdot)$ is the cross-sectional standard deviation of the coefficient estimates and N is the sample size.

Panel B shows the coefficient estimates and standard errors (in parentheses) for the independent variables from cross-sectional weighted least squares regressions of the following form:

$$\hat{\beta}_{i,F} = \kappa + \gamma_1 ForeignSales_i + \zeta_i$$

where $\hat{\beta}_{i,F}$ is firm i's estimated foreign beta from the international model and the weights are the inverse of the standard error of $\hat{\beta}_{i,F}$.

Panel C shows selected coefficient estimates and standard errors (in parentheses) from the following fixed effects panel regression restricted to firms with positive foreign sales:

$$r_{i,t} = a_i + \beta_{i,US} r_{US,t} + (\beta_{0,F} + \beta_{1,F} ForeignSales_i) r_{F,t} + \eta_{i,t}$$

Panel A	N	|a|	β_{US}	β_F	Adj. R^2
Full Sample	2852	0.0193 (0.0004)	0.7573 (0.0209)	0.2147 (0.0206)	0.088
Subsamples with Foreign Sales					
above 50%	266	0.0204 (0.0012)	0.7947 (0.0632)	0.4679 (0.0562)	0.118
between 25% and 50%	558	0.0183 (0.0008)	0.7805 (0.0442)	0.3218 (0.0467)	0.119
between 0% and 25%	598	0.0165 (0.0006)	0.8293 (0.0413)	0.1752 (0.0398)	0.107
zero	1430	0.0206 (0.0006)	0.7111 (0.0317)	0.1424 (0.0309)	0.059

Panel B	N	Foreign Sales
Full Sample	2852	0.4905 (0.0935)
Subsample with non-zero Foreign Sales	1422	0.5332 (0.1269)

Panel C		$\beta_{0,F}$	$\beta_{1,F}$
	1410	0.1191 (0.0295)	0.0046 (0.0006)

Table 8
The International Equity Exposure of U.S. Investors

Data are as of March 2000. For home-grown foreign exposure, the upper bound estimate is computed as U.S. holdings (that part of the market capitalization not held by foreigners) times the percent of sales that is generated by foreign operations. The model based estimates utilize results in Panels B and C of Table 7 that each percentage point of foreign sales contributes 0.0026 to 0.0053 to foreign exposure. For direct exposure to foreign stocks, the upper bound estimate is U.S. investors' portfolio holdings of foreign equities as constructed by Thomas, Warnock, and Wongswan (2004); the lower bound estimate subtracts the market capitalization of U.S. holdings of foreign equities that *could* owe to U.S. operations; and the model based assumes that 50 percent of non-U.S. firms' foreign operations are in the US (and that the relationship between sales and foreign exposure is as in Table 7). The size of the US equity portfolio is calculated as US market capitalization minus foreigners' holdings of US stocks plus US holdings of foreign stocks.

Home-Grown Foreign Exposure

upper bound	$3531 billion	
model based	$918 billion - $1882 billion	

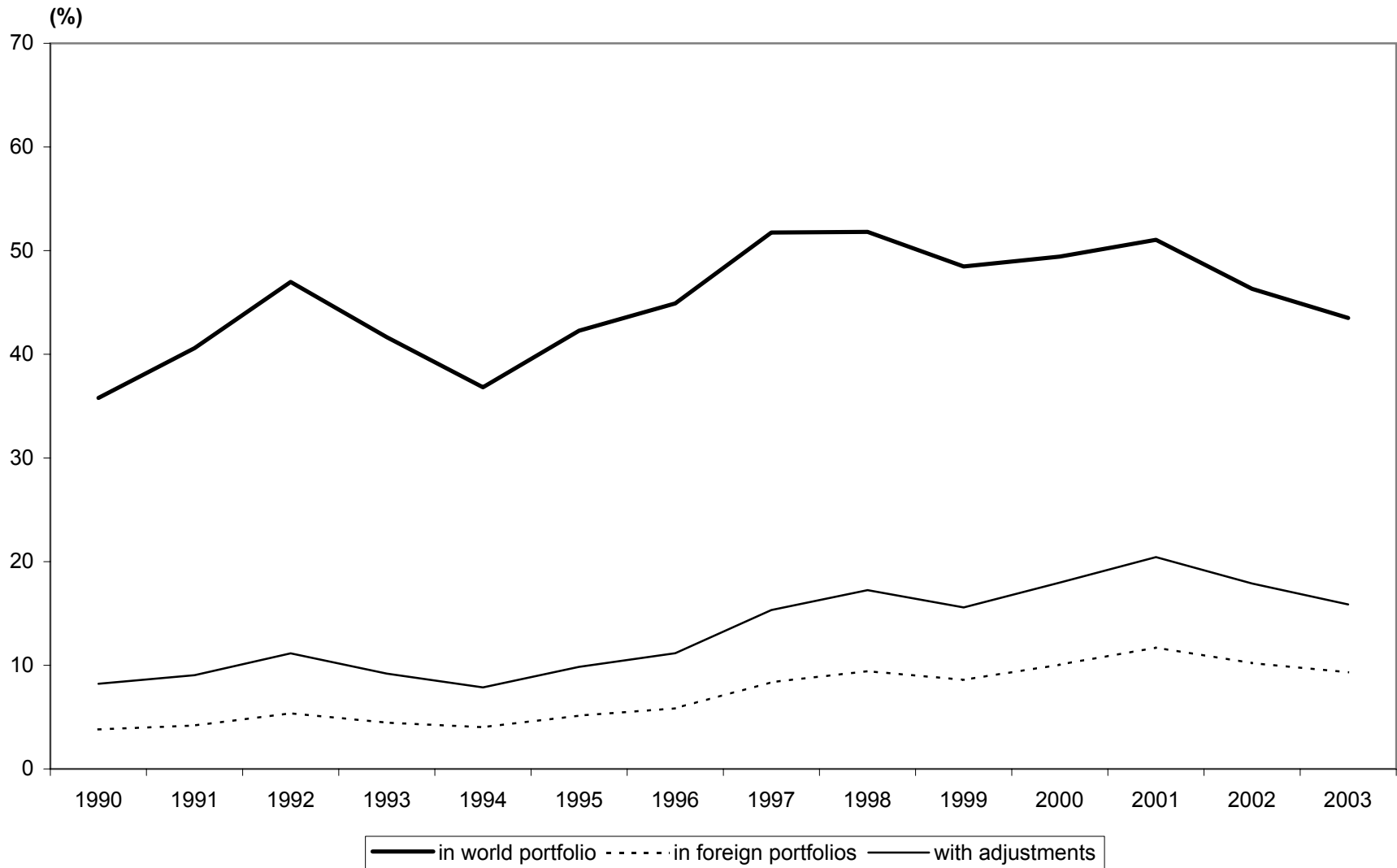Direct Exposure to Foreign Stocks

upper bound	$2065 billion	
lower bound	$1334 billion	
model based	$1870 billion - $1970 billion	

Total Exposure (model based) — % of US Equity Portfolio

		% of US Equity Portfolio
Direct only	$1870 billion - $1970 billion	12 - 13%
Direct and Home-Grown	$2788 billion - $3852 billion	18 - 25%

Figure 1
The Share of US Equities in World and Foreign Portfolios

Figure 2
The Share of Foreign Equities in World and US Portfolios

(%)

Legend: in world portfolio — — — in US portfolios ——— with adjustments