

Foreign Exposure through Domestic Equities

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Abstract

We show that U.S. investors obtain substantial foreign exposure through their holdings of domestic equities. Domestic multinationals, in particular, provide significant foreign exposure. We also find that, although the average U.S. investor is less tilted toward domestic multinationals, the institutional investors do overweight domestic firms that are more internationally oriented. ‘Indirect’ foreign holdings through domestic multinationals are shown to be substantial; combining them with reported data on international positions almost doubles U.S. investors’ total ‘foreign’ holdings. Our findings indicate that the home bias is not as severe as assessments based on reported international investment statistics suggest.

Keywords: home bias, international portfolio allocation, multinationals

JEL-Classification: G11, G15, G3

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1. Introduction

Holdings-based analyses of the equity home bias typically proceed by computing the size of the foreign equity portfolio and comparing that to some benchmark allocation from, for example, an international CAPM. To the extent that actual foreign holdings are smaller than the benchmark would suggest, this is called the home bias.¹ As an example, one representation of U.S. investors' home bias is that in 2000 when non-U.S. equities were roughly half of the global equity market, they had a much smaller (12 percent) weight in U.S. investors' equity portfolios.

In this study, we focus on one simple but important point that has been overlooked by much of the existing home bias literature: investors can and do obtain substantial foreign exposure through domestic firms.² Extant holdings-based home bias analysis assumes that domestic holdings are purely domestic. We shed some light on this assumption by addressing three questions. First, do U.S. investors over- or underweight internationally oriented domestic firms? Second, do internationally oriented domestic firms provide more foreign exposure than pure domestic firms? Finally, how does taking into account firm-level U.S. holdings, the extent of a firm's foreign operations, and foreign exposure affect the interpretation of U.S. home bias?

Our aggregate statistics of all U.S. investors' holdings of U.S. equities suggest that overall U.S. investors actually underweight internationally oriented domestic firms. That is, controlling for size and many other factors, U.S. investors' holdings are relatively smaller in U.S. firms with more foreign operations. Further analysis, however, shows that this result is driven by the holdings of insiders and a residual group that we call "other" (a group that

¹ See, among many others, French and Poterba (1991), Tesar and Werner (1995), Ahearne, Grier, and Warnock (2004), Dahlquist, Pinkowitz, Stulz, and Williamson (2003), and Kho, Stulz, and Warnock (2009). Theoretical work on home bias also often begins by noting the empirical fact that investors underweight foreign securities; see, for example, Stulz (2005) and van Nieuwerberg and Veldkamp (2005).

² This point has been made in another way by Rowland and Tesar (2004), which has a quite different focus, using mean-variance spanning tests to examine the diversification potential of multinational firms.

includes retail investors). In contrast, the largest and most sophisticated group of U.S. investors—domestic institutions—shows a distinct preference for U.S. firms that have foreign operations (multinational corporations, or MNCs).

Regardless of whether different types of domestic investors over- or underweight internationally oriented domestic firms, we show that each dollar invested in such a firm translates into some foreign exposure. One gauge of these “indirect foreign holdings”—the total dollar value of international diversification U.S. investors obtain through domestic MNCs—could be formed by assuming that exposure is given by the geography of cash flows. If so, each dollar of a U.S. MNC’s sales that originates from foreign operations would translate into a dollar of foreign exposure for U.S. investors. Such a one-for-one calculation would show that in addition to the \$2 trillion in officially measured foreign holdings, U.S. investors had claims on another \$3.5 trillion in cash flows that originate from abroad.

Nonetheless, foreign exposure can come from a number of firm-, market-, and country-level attributes, not just from the geography of the firm’s cash flows, so every dollar of foreign sales will not necessarily translate into one dollar of foreign exposure. Thus, we assess the relationship between (a proxy for) the geography of cash flows and foreign exposure. We find that, the more internationally oriented an MNC is (as measured by the extent of its foreign operations), the greater is its exposure to foreign markets (that is, the more sensitive are its returns to foreign markets). The relationship is not one-to-one, but is more like two-to-one, suggesting that the \$3.5 trillion in holdings of foreign-originated cash flows should be scaled down by a factor of two. This still implies substantial indirect foreign holdings that are roughly the same magnitude as officially reported foreign holdings. When added to the roughly \$2 trillion in officially reported foreign holdings, indirect holdings increase the amount of foreign equities in U.S. investors’ portfolios to 21 percent, almost double the reported 12 percent.

Our findings suggest that the home bias is in fact less severe than previously documented. U.S. investors have claims on substantial cash flows that originate abroad, and these claims do provide increased exposure to foreign markets. This avenue of international diversification has been overlooked by the literature because reported statistics on international equity positions are not designed to capture the indirect foreign holdings we highlight. U.S. investors have claims on foreign operations—both of U.S. MNCs and foreign firms—that greatly exceed reported portfolio equity holdings, implying that the home bias is much less severe than indicated by reported statistics on foreign equity holdings.

The paper proceeds as follows. The next section describes the data that allow us to compute U.S. domestic investors' holdings of U.S. equities. Section 3 presents empirical results on domestic investors' preferences. Section 4 analyzes the relationship between foreign exposure and foreign operations. Section 5 discusses the implications for the home bias. Section 6 concludes.

2. The Underlying Holdings Data

Ownership in this study is defined as holdings by investor type j divided by the market capitalization of firm i as of end-March 2000.³ The reason for the somewhat dated sample is that our analysis is possible because of a detailed dataset of *foreigners'* holdings of U.S. stocks that comes from a comprehensive benchmark survey conducted by the U.S. Treasury Department and the Federal Reserve System as of March 2000. The security-level foreign holdings data allow us to compute domestic holdings of U.S. stocks. Specifically, to compute U.S. domestic investors' holdings of U.S. equities, we subtract foreigners' holdings from the market capitalization of the firm.

³ Ownership defined this way, when limited to one source country and one time period, is observationally equivalent to more exact home bias measures. See Ammer, Holland, Smith, and Warnock (2011) for a detailed discussion.

The confidential benchmark survey data on foreigners' holdings of U.S. equities 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 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 held by foreigners 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.⁴

We divide domestic ownership into three main types of U.S. investors: institutional, insiders, and a residual group that we call other (which includes retail investors). 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 first quarter of 2000 to correspond with our survey data of foreigners' holdings. Gompers and Metrick (2001), among others, have analyzed the 13-F data and provide a complete description. Data on insiders' holdings is obtained from Worldscope's "Closely Held" variable, a variable that has been used to measure insider holdings.⁵ Our residual, after accounting for the holdings of foreigners, domestic institutions, and insiders, is all other investors. This will include, for example, individual investors' retail

⁴ A detailed description of the data collection methodology, as well as publicly available data from the 2000 survey, is in Treasury Department et al. (2002), available at www.treas.gov/tic/fpis.html. For a primer on the survey, see Grierer, Lee, and Warnock (2001). Full-blown benchmark surveys are conducted roughly every five years.

⁵ See, for example, Dahlquist, Pinkowitz, Stulz, and Williamson (2003) and Kho, Stulz and Warnock (2009).

accounts, so we sometimes refer to these holdings as retail. Note, though, that individuals' holdings through mutual funds and retirement accounts will be captured in the domestic institutions variable.

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 the benchmark survey date. That leaves us with 5,980 firms. To guard against data errors, we 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.⁶ We omit 544 firms with possible data errors; specifically, these are firms for which foreign plus domestic institutional plus insider holdings exceeds 100 percent of market capitalization. In multivariate regressions, we use data on firm characteristics from CompuStat, which reduces our sample to 4,633. We then gather data on the amount of a firm's sales that originates 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. Our final working sample includes 3,846 firms.

The median U.S. firm has ownership that is 96.6 percent domestic, with a breakdown of 35 percent by insiders, 24.3 percent by institutions, and 23.9 percent by other domestic investors (top portion of Table 1). Value-weighted averages present a slightly different picture. Ninety-one percent of U.S. stock market capitalization is held by domestic investors, with domestic institutions holding by far the greatest portion (53 percent of overall market capitalization). The discrepancy between equally weighted and value-weighted averages evident in the top half of Table 1 is a size effect that we control for in the next section: domestic institutions (and foreigners) prefer the larger firms.

⁶ To assist in the editing of the benchmark survey, 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.

3. What Type of Firms Have Greater Domestic Ownership?

In this section we assess what firm characteristics attract greater domestic ownership. We control for many attributes examined in the existing literature, as well as a measure of the degree of the firm's internationalization.

3.1. Explanatory Variables

We include several explanatory variables that have been identified in the cross-border and domestic holdings literature. Kang and Stulz (1997) and Dahlquist and Robertsson (2001) provide a short list of factors that foreigners might prefer; since one minus foreign holdings is domestic holdings, these can also inform our study. 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:⁷

Size: log market capitalization as of the March 31, 2000 survey date;

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;

Volatility: the standard deviation of the residual;⁸

Tradable: an indicator variable set equal to one if the firm has any exports; and

⁷ All explanatory variables are from CompuStat, with the exception of *Foreign Sales* and *Tradable*, which are from Worldscope, and returns-based variables, which are computed from CRSP data on returns.

⁸ Volatility is computed from a market model that is estimated using monthly returns over the preceding four-year period. Because it requires four years of returns data, it is available only for a smaller sample of firms.

Foreign Sales: the percent of a firm's sales that are derived from foreign operations.

Larger firms (*Size*), those in a major index (*S&P 500*), and those that are traded more often (*Turnover*) are more familiar to investors. Control variables are intended to capture a range of investor preferences. 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 rather than paid out as dividends) or low book-to-market. *Momentum* will provide an indication of whether these types of investors can be characterized as momentum traders. *Leverage* is included as a measure of long-term financial health.

We include two 'international' variables. *Tradable*, in the spirit of Coval and Moskowitz (1999), is another proxy for familiarity; in the simplest sense, if its product can travel across borders, the firm is familiar to more people. One should note the distinction between *Foreign Sales*, which refers to sales from foreign operations, and *Tradable*, which refers to the exports stemming from U.S.-based production. Of the firms in our main regressions, about one-third have foreign operations (i.e., have a positive value for *Foreign Sales*); of those, only 377 also export from U.S.-based operations (i.e., have a value of one for *Tradable*). To describe the distinction another way, *Foreign Sales* concerns where the firm's production is located, while *Tradable* depicts whether its product crosses national borders.

Summary statistics for all explanatory variables are presented in the bottom portion of Table 1. In our full sample of 3,846 firms, the median firm is a growth firm (book-to-market of 0.51) that pays no dividends, is not in the S&P 500, and produces a tradable good but does not have foreign operations. It has a market capitalization of \$171 million ($= e^{4.96}$), a turnover rate of 0.84, liabilities that are 115 percent of its equity, and 12-month returns of 4 percent. In the slightly smaller sample (due to data availability), the median firm had a residual variance

(calculated over a 48-month period) of 0.14. Simple bivariate correlations are presented in Table 2.

3.2. Empirical Results

Table 3 shows our multivariate regressions of ownership by each type of investor. Panel A includes the full sample of firms, while the number of firms in Panel B is somewhat smaller because those regressions include *Volatility*. We also estimated (but do not report) similar regressions using 1994 data. To highlight results that appear to be robust over time, in Table 3 we show in bold any coefficient that is significant in both the 2000 and 1994 samples.

Firms with greater domestic holdings are those that are smaller, less liquid, high dividend yields, and less foreign sales (column 1). For the most part, this is expected, as many studies have shown that *foreigners* prefer large liquid international firms,⁹ so domestic investors should reveal preferences for the opposite traits. The results in Panel B are very similar, with the additional variable (*Volatility*) being negative and significant and one other variable (*Book-Mkt*) becoming significant for all domestic investors.

We look further into different types of domestic investors. Domestic institutions (Panel A, column 2) have a preference for large stocks that are not in an index, have high book-to-market, low past returns, and low leverage and are of firms with high foreign sales. When also controlling for volatility (Panel B), turnover becomes positive and significant and yield becomes negative and significant. Many, but not all, of these results are also found in the Gompers and Metrick (2001) study of domestic institutions' preferences. The novel result here is the preference for domestic MNCs by domestic institutions. The largest (institutional holdings are 53% of the holdings in our sample) and most sophisticated group of domestic

⁹ See Kang and Stulz (1997), Dahlquist and Robertsson (2001), and many other studies.

investors overweight the more internationally oriented U.S. stocks. Aggregate numbers masquerade this effect due to the role played by other investors, but domestic institutions do pursue international diversification through domestic MNCs.

Stocks that are held to a greater extent by the residual other investors (which includes retail investors) tend to be small, liquid, in a major index, volatile, high yield, highly leveraged, and do not have foreign sales (column 3 of Panels A and B). Many of these same attributes are found in the Dahlquist and Robertsson (2001) analysis of individual investors in Sweden. Barber and Odean (2000) find that U.S. retail investors tilt their portfolios toward small, liquid stocks.

Stocks held to a greater extent by insiders (column 4 of Panels A and B) are small, illiquid, not in an index, pay low dividends and have low leverage. Firms with extensive insider holdings are more likely to have poor expected corporate governance (Lins, 2003) and hence tend to attract less outside investment and, thus, have smaller market capitalization and less liquidity.¹⁰ To the extent that closely held firms extract private benefits to control, such firms may also be less willing to pay out cash dividends (Kalcheva and Lins, 2007).

Summing up, in this section we have provided a security-level analysis of the U.S. holdings of all major types of investors.¹¹ Many of the results are consistent with findings in the existing literature. One novel result, though, is that the largest and most sophisticated group of U.S. investors, domestic institutions, shows a preference for domestic firms that are more internationally oriented. This in turn suggests that U.S. investors might be more exposed to foreign markets than previously thought. But do more foreign sales translate into increased foreign exposure? We address that question next.

¹⁰ Demsetz and Lehn (1985) found that firms with concentrated ownership are smaller and have higher volatility. For insiders, we find that volatility is significant in 2000 (Table 3, Panel B) but not in 1994.

¹¹ The reader can infer foreigners' preferences, as they are the opposite sign of "All domestic investors". That is, in our Panel A sample foreigners prefer U.S. firms that are large, liquid, growth (specifically, have a low dividend yield), and internationally oriented. In the slightly smaller Panel B sample, add to those characteristics high book-to-market and high volatility.

4. Do Domestic MNCs Provide More Exposure to Foreign Markets?

We now turn to the main exercise of the paper: ascertaining how much international exposure U.S. investors obtain through their ownership of domestic equities. We tackle this in two steps. First, in this section we show that U.S. firms that are more international have greater exposure to foreign markets. Then in Section 5 we provide a sense of the economic significance of this finding.

Existing evidence indicates that MNC returns tend to co-move mostly with the firm's home market (Jacquillat and Solnik, 1978) and 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, Hameed, and Lau, 2003; Grammig, Melvin, Schlag, 2003). While these results suggest that U.S. MNCs' returns will be driven primarily by U.S. returns, they do not preclude a scenario in which MNCs provide incrementally more foreign exposure.

To examine this we adopt methods from the extensive literature on exchange rate exposure and first calculate for each firm a foreign beta, the relationship between the firm's returns and foreign equity returns. For example, Dominguez and Tesar (2006) measure exchange rate exposure as

$$r_{i,t} = a_i + \beta_{i,1}r_{m,t} + \beta_{i,2}\Delta s_t + \varepsilon_{i,t} \quad (1)$$

where r_i is firm i 's stock returns, r_m is the return on the market portfolio, Δs is the change in an appropriately measured exchange rate, and $\beta_{i,2}$ is the marginal exposure of the firm's returns to exchange rate changes (marginal because it is after conditioning on the market return). We estimate a similar equation but with exposure measured with respect to foreign equity returns rather than exchange rate changes:

$$r_{i,t} = a_i + \beta_{i,US} r_{US,t} + \beta_{i,F} r_{F,t} + \varepsilon_{i,t} \quad (2)$$

where $\beta_{i,US}$ and $\beta_{i,F}$ are the domestic and foreign betas, respectively; r_{US} is the return on the U.S market portfolio; and r_F is returns on a foreign equity index.

As in the exchange rate exposure literature, we must decide on an appropriate foreign index. In their exchange rate exposure study, Dominguez and Tesar (2006) use both a trade-weighted exchange rate and bilateral rates. We essentially follow this strategy by utilizing industry-level trade weights to form firm-specific foreign equity indexes. It would, of course, be much easier to use a market-capitalization-based weighting scheme, which would allow us to use 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.¹²

Specifically, to construct firm-specific foreign equity indices we utilize the industry-specific trade weights developed in Goldberg (2004).¹³ Goldberg (2004) creates industry exchange rate indices based on trade weights for the thirty U.S. industries listed in Table 4. For our purposes we use the by-country by-industry weights underlying the Goldberg (2004) index; that is, we use the weight of each foreign country in each sector's international trade. The weights for industries' trade with the Euro area, Japan, emerging Asia, and Latin America are given in Table 4, as are correlations of returns formed using the industry trade

¹² 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. Of course, the ideal weighting scheme would be the proportion of *market value* represented by the MNC's 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.

¹³ The industry-specific trade weights have been used 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, 2005).

weights and MSCI returns. For each industry, the country weights based on international trade differ from the country weights in the MSCI World ex U.S. index. However, as the table shows, some have a similar mix between developed and emerging markets. For example, Tobacco and Chemicals are both 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 U.S. index. In contrast, Apparel and Leather are both heavily weighted toward the emerging markets; as expected, their correlations with the MSCI World ex U.S. are somewhat lower. Overall, these industry-specific weights differ from MSCI weights and should more accurately represent the countries in which the firm conducts business.

Table 5 (Panel A) presents average results from the international market model for the full sample of firms as well as four portfolios sorted by the extent of foreign operations, as measured by *Foreign Sales*, the portion of sales that originate from foreign operations.¹⁴ The table shows that, across all firms for which 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 U.S. firms owe predominantly to U.S. factors. This is consistent with the findings of Jacquillat and Solnik (1978), Chan, Hameed, and Lau (2003) and Grammig, Melvin, Schlag (2003). Focusing on the subsamples of different degrees of foreign sales, we see no apparent relationship between *domestic* betas and foreign sales. In contrast, the importance of the foreign factor increases with foreign sales. The average foreign beta for firms with no foreign operations is only 0.142, but it increases to 0.322 for firms with 25 to 50 percent foreign sales, and is 0.468 for U.S. firms with sales that are primarily from foreign operations.

¹⁴ To estimate the international market model we use 48 months (April 1996 to March 2000) of returns data. Not all firms in our sample have sufficient returns data; we omit firms with less than 36 months of returns data, leaving us with 2,852 firms.

The results in Panel A show a monotonic increase in foreign beta with respect to foreign sales. In Panel B we examine this more formally. Specifically, we estimate the relationship between foreign sales and foreign beta, γ_{FS} , by:

$$\hat{\beta}_{i,F} = \kappa + \gamma_{FS} \text{ForeignSales}_i + \zeta_i \quad (3)$$

where *ForeignSales* is the proportion of a firm's sales that originates from foreign operations. In estimating (3) we utilize weighted least squares, with weights that are the inverse of the standard error of each $\hat{\beta}_{i,F}$. The coefficient estimate of γ_{FS} of 0.49 (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 we investigate whether the estimate owes to a difference between firms with no foreign operations and those with some foreign operations. It does not; the coefficient ($\gamma_{FS}=0.53$) is very similar for firms with positive foreign sales.

We note that the estimate of γ_{FS} 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 (3) might be biased. A one-step approach alleviates this issue. Specifically, we also present (in Panel C) results from a pooled fixed-effects panel model that encompasses both (2) and (3):

$$r_{i,t} = a_i + \beta_{i,US} r_{US,t} + (\beta_{0,F} + \beta_{1,F} \text{ForeignSales}_i) r_{F,t} + \eta_{i,t} \quad (4)$$

We restrict estimation to include only those firms for which *ForeignSales* 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 *ForeignSales* and r_F is positive and highly significant. This indicates that, as in Panel A and B, as foreign sales increase, so does the foreign beta. Moreover, the magnitude of the coefficient ($\beta_{I,F} = 0.46$) is nearly identical to the estimate of γ_{FS} in Panel B.¹⁵

Overall, the results in Table 5 indicate that MNC returns depend primarily on the domestic market returns, as in Jacquillat and Solnik (1978) and consistent with Chan, Hameed, and Lau (2003) and Grammig, Melvin, Schlag (2003), but also that foreign exposure increases with the degree of internationalization of domestic multinationals. Our regressions in Panels B and C indicate that, for every one percentage point of foreign sales, the firm's foreign beta increases about a half of that.

5. Implications for the Home Bias

We have established that MNCs provide U.S. investors indirect exposure to foreign markets. This suggests that the home bias is less severe than previously thought. In this section we provide additional insight into the home bias by depicting the economic significance of this finding by calculating the non-U.S. claims U.S. investors have through their holdings of domestic MNCs.

One way to calculate indirect foreign holdings is to assume that the geography of cash flows represents the extent to which the firm is international and, hence, determines the extent of foreign exposure. For example, Procter & Gamble (P&G)—a U.S. firm because its corporate headquarters are in Cincinnati—has physical operations in almost 70 countries around the world. While P&G (like other firms) does not report the extent to which its market value originates in foreign countries, it does report the extent to which its *sales* originate from

¹⁵ The results, which are nearly identical for the full sample, are consistent with the results in Brooks and del Negro (2006), who estimate international exposure over a different sample period.

operations located abroad. About half of its sales originate from U.S. operations, with the other half distributed in the Philippines, Argentina, and the 67 other countries in which it operates. If we assume these foreign sales translate one-for-one to foreign exposure, we could estimate the extent of indirect foreign holdings as just U.S. holdings in firm i times the portion of firm i 's sales that originate from foreign operations. Doing so would yield an estimate of indirect foreign holdings through domestic MNCs of \$3.5 trillion as of March 2000.

But we showed in the previous section that foreign sales do not translate one-for-one into foreign exposure, so such an estimate is almost surely too high.¹⁶ A better estimate utilizes the estimated relationship between foreign beta and foreign sales ($\hat{\gamma}_{FS}$). From Table 5, $\hat{\gamma}_{FS}$ is roughly 0.5 for firms with positive foreign operations. Thus, we estimate indirect foreign holdings by multiplying domestic holdings not by the weight of foreign sales, but by *ForeignSales* times $\hat{\gamma}_{FS}$:

$$\text{IndirectForeignHoldings} = \sum_{i=1}^N \text{USHoldings}_i \times \text{ForeignSales}_i \times \hat{\gamma}_{FS} \quad (5)$$

where, for firm i , *USHoldings* is the dollar amount of U.S. investors' holdings of the firm and *ForeignSales* is the percent of its sales that originate from foreign operations. Summing the product of these two variables (scaled by 0.5, the estimate of γ_{FS}) across all N U.S. firms produces our estimate of \$1,766 billion in indirect foreign holdings (Table 6, Row 1).¹⁷

¹⁶ Note that while \$3.5 trillion is likely too high, it is also in some sense conservative in that we assume zero foreign operations for the firms in our sample that do not have foreign operations data in Worldscope and for all firms not in our sample.

¹⁷ As a check of the reasonableness of our estimate, note that the Bureau of Economic Analysis estimate of the market value of U.S. firms' foreign operations is \$2,817 billion, which is greater than our estimate that takes

Reported U.S. holdings of foreign equities—\$2,074 billion or 12% of the U.S. equity portfolio—must also be adjusted, because some of those holdings represent claims on cash flows that originate from the U.S. operations of foreign MNCs. To estimate the amount of that adjustment, we turn to the security-level dataset of Ammer, Holland, Smith, and Warnock (2011), which indicates that U.S. holdings of foreign equities weighted by foreign operations anywhere (not just in the United States) totalled about \$360 billion in 1997, or 35 percent of overall foreign holdings. Assuming that half those operations were in the United States—a reasonable estimate given U.S. importance in world trade—suggests that in 1997 U.S. holdings of ‘foreign’ equities that were related to operations in the United States totalled \$180 billion. Applying similar calculus to 2000 data (i.e. 35 percent of foreign holdings are of foreign operations, of which half are in the United States) yields an estimate of U.S. holdings of foreign equities that are from U.S.-based cash flows of \$365 billion. Assuming that foreign firms have the same $\hat{\gamma}_{FS}$ of 0.5 that U.S. firms have (i.e., that returns are predominately determined in their home market), our adjustment is not the full \$365 billion but one-half of that, or \$183 billion. Subtracting this from the officially reported \$2,074 billion yields our estimate of adjusted foreign equity holdings—U.S. holdings of foreign firms, adjusted for those firms’ U.S. exposure—of \$1,891 billion (Row 2).

Summing indirect foreign holdings through U.S. MNCs and holdings of foreign equities adjusted for their U.S. exposure produces a total foreign content in U.S. equity portfolios of \$3.7 trillion (Row 3), substantially higher than the officially reported \$2.1 trillion. International exposure through domestic MNCs is substantial, and the foreign content in U.S. equity portfolios is almost double the amount suggested by published measures of U.S. investors’ holdings of foreign equities.

into account the relationship between foreign beta and foreign sales and less than our estimate that ignores foreign beta.

6. Conclusion

We analyze the foreign content of U.S. investors' holdings of U.S. equities. First, we find that while in aggregate U.S. investors appear to underweight U.S. firms that are more internationally oriented, the largest and most sophisticated U.S. investors—domestic institutions—overweight U.S. firms that derive more sales from foreign operations. Second, we show that a U.S. firm's foreign exposure—that is, the extent to which its stock returns vary with foreign stock returns—is indeed related to the extent of its sales that derive from foreign production. We use this relationship between foreign sales and foreign beta to form an estimate of indirect foreign holdings, the total dollar value of international diversification U.S. investors obtain through domestic MNCs. We find that including these indirect foreign holdings through domestic MNCs almost doubles the foreign content of U.S. investors' equity portfolios. Our findings imply that the home bias is less severe than previously documented.

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Table 1: Basic Summary Statistics

The sample size for all variables is 3,846, with the exception of Volatility (N=3,198). Domestic holdings are as of March 2000 and are expressed as a share of market capitalization. VWAvg is the value-weighted average of holdings. 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&P 500 index, zero otherwise. Book-Mkt 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. Volatility is the 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.

	Mean	Median	Std.Dev.	Min	Max	VWAvg
Domestic Holdings	0.951	0.964	0.056	0.235	1.000	0.912
Institutions	0.294	0.243	0.231	0.000	0.941	0.530
Insiders	0.279	0.239	0.215	0.000	0.962	0.277
Others	0.378	0.350	0.233	0.000	0.962	0.104
Size	5.190	4.960	2.030	0.668	13.20	
Turnover	1.520	0.840	1.790	0.010	9.480	
S&P	0.080	0.000	0.272	0.000	1.000	
Book-Mkt	0.761	0.510	1.040	-0.760	7.210	
Yield	0.009	0.000	0.017	0.000	0.080	
Leverage	2.880	1.150	4.800	-9.930	24.20	
Momentum	0.670	0.040	2.070	-0.930	34.20	
Foreign Sales	0.118	0.000	0.201	0.000	1.000	
Tradable	0.520	1.000	0.500	0.000	1.000	
Volatility	0.165	0.138	0.108	0.033	1.350	

Table 2: Cross Sectional Correlations

The table shows the cross-sectional correlation (with associated p-values) between domestic ownership and firm characteristics. Definitions are in Table 1.

	Domestic	Size	Turnover	S&P	Book-Mkt	Yield	Leverage	Momentum	FgnSales	Tradable
Size	-0.2308 0.0000									
Turnover	-0.3738 0.0000	0.1944 0.0000								
S&P	-0.1577 0.0000	0.5839 0.0000	-0.0264 0.1021							
Book-Mkt	0.0980 0.0000	-0.3980 0.0000	-0.1814 0.0000	-0.1315 0.0000						
Yield	0.1886 0.0000	0.1098 0.0000	-0.2955 0.0000	0.1336 0.0000	0.0647 0.0001					
Leverage	0.1639 0.0000	-0.0129 0.4254	-0.2141 0.0000	0.0248 0.1246	0.0340 0.0351	0.2858 0.0000				
Momentum	-0.1518 0.0000	0.1712 0.0000	0.3531 0.0000	-0.0329 0.0412	-0.1945 0.0000	-0.1890 0.0000	-0.1663 0.0000			
Foreign Sales	-0.2420 0.0000	0.2935 0.0000	0.1240 0.0000	0.1876 0.0000	-0.0889 0.0000	-0.0881 0.0000	-0.1667 0.0000	0.1318 0.0000		
Tradable	-0.1170 0.0000	0.0091 0.5726	0.0128 0.4258	0.0641 0.0001	0.0459 0.0044	-0.1564 0.0000	-0.3002 0.0000	0.0881 0.0000	0.2250 0.0000	
Volatility	-0.2241 0.0000	-0.2023 0.0000	0.6020 0.0000	-0.2008 0.0000	-0.0356 0.0440	-0.4226 0.0000	-0.2572 0.0000	0.4224 0.0000	0.0310 0.0794	0.0999 0.0000

Table 3: Determinants of Domestic Ownership

This table presents regression results where the dependent variable is the share of U.S. equity i held as of March 2000 by domestic investors. See Table 1 for definitions of explanatory variables. Reported are parameter estimates, with the absolute values of t-stats computed from robust standard errors in parentheses. Constants are included but not reported. Significance at the 1%, 5%, and 10% levels are denoted by ***, **, and *, respectively. Coefficient estimates that are significant below and also significant in a 1994 sample (not tabulated) are reported in bold.

Panel A	All domestic investors	Institutions	Other	Insiders
Size	-0.002*** (4.16)	0.083*** (40.65)	-0.060*** (26.09)	-0.026*** (11.24)
Turnover	-0.010*** (12.75)	-0.008*** (4.82)	0.022*** (10.71)	-0.023*** (11.23)
S&P500	-0.021*** (7.29)	-0.027** (2.04)	0.098*** (7.95)	-0.093*** (8.17)
Book-Mkt	-0.001 (1.52)	0.024*** (8.47)	-0.019*** (5.19)	-0.006 (1.60)
Yield	0.328*** (6.30)	-0.059 (0.33)	3.155*** (12.58)	-2.768*** (12.67)
Leverage	0.001*** (4.06)	-0.004*** (6.43)	0.009*** (10.20)	-0.004*** (5.88)
Momentum	0.000 (0.49)	-0.012*** (7.96)	0.011*** (5.53)	0.002 (1.12)
Foreign Sales	-0.040*** (7.55)	0.093*** (5.65)	-0.089*** (5.08)	-0.044** (2.52)
Tradable	0.001 (0.49)	0.015** (2.02)	0.001 (0.14)	-0.015* (1.67)
Obs	3846	3846	3846	3846
R-squared	0.21	0.48	0.26	0.21

Panel B	All domestic investors	Institutions	Other	Insiders
Size	-0.004*** (7.10)	0.078*** (33.74)	-0.056*** (21.25)	-0.025*** (10.23)
Turnover	-0.008*** (10.20)	0.016*** (5.84)	0.020*** (6.96)	-0.044*** (13.66)
S&P500	-0.017*** (5.68)	-0.052*** (4.00)	0.089*** (6.88)	-0.054*** (4.65)
Book-Mkt	-0.002** (2.01)	0.021*** (7.44)	-0.023*** (5.33)	-0.000 (0.12)
Yield	0.344*** (8.96)	-0.857*** (4.46)	3.407*** (13.16)	-2.206*** (10.20)
Leverage	0.001*** (3.77)	-0.006*** (8.78)	0.009*** (10.07)	-0.003*** (3.93)
Momentum	0.001 (1.59)	-0.009*** (5.81)	0.007*** (3.14)	0.003 (1.56)
Foreign Sales	-0.038*** (6.66)	0.084*** (4.95)	-0.090*** (4.61)	-0.031* (1.77)
Tradable	0.001 (0.56)	0.010 (1.30)	0.003 (0.26)	-0.011 (1.20)
Volatility	-0.036*** (2.85)	-0.562*** (11.05)	0.197*** (3.50)	0.330*** (6.30)
Obs	3198	3198	3198	3198
R-squared	0.24	0.54	0.27	0.27

Table 4: Industry-specific Weights

Industry	1996 Weights (%)				Returns Correlations	
	Euro area	Japan	Emerging Asia	Latin America	w/ MSCI World exUS	w/ MSCI US
Manufacturing						
Food (20)	22	13	18	14	0.88	0.77
Tobacco (21)	31	23	9	8	0.95	0.75
Textile (22)	18	6	25	18	0.83	0.76
Apparel (23)	8	10	37	30	0.74	0.71
Lumber (24)	8	24	12	6	0.87	0.78
Furniture (25)	8	4	22	20	0.77	0.76
Paper (26)	14	7	13	12	0.84	0.80
Printing and publishing (27)	13	6	19	9	0.83	0.79
Chemicals (28)	28	11	14	12	0.92	0.79
Petroleum refining (29)	15	5	13	37	0.76	0.68
Rubber and plastic (30)	12	11	28	17	0.79	0.75
Leather (31)	16	7	48	16	0.66	0.67
Stone, clay, glass, concrete (32)	22	10	20	15	0.84	0.77
Primary metal (33)	12	7	11	18	0.85	0.78
Fabricated metal (34)	15	11	23	17	0.84	0.77
Machinery ex electrical (35)	18	17	29	10	0.87	0.76
Electrical (36)	9	16	38	17	0.82	0.73
Transportation equipment (37)	15	18	9	12	0.90	0.79
Scientific instruments (38)	24	25	18	10	0.92	0.76
Miscellaneous manufacturers (39)	16	11	38	7	0.76	0.71
Non-manufacturing						
Business	21	19	11	8	0.95	0.76
Construction, engineering, mining	9	8	47	16	0.80	0.69
Education	12	11	40	8	0.87	0.73
Film and tape rental	10	52	5	6	0.95	0.77
Financial	8	19	23	12	0.95	0.77
Insurance	22	19	7	4	0.95	0.79
Legal	22	26	12	4	0.96	0.76
Passenger fares	20	20	22	9	0.95	0.75
Installation, maintenance, repair	14	15	27	10	0.91	0.77
Telecom	5	15	19	34	0.83	0.71
Memo:						
MSCI WorldexUS	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. For complete details on the construction of the weights, see Goldberg (2004).

Table 5: The Relationship between Foreign Exposure and Foreign Operations

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:

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

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

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

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

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 p-values (in parentheses) from the following fixed effects panel regression restricted to firms with positive foreign operations:

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

Panel A	N	a	β_{US}	β_F	Adj. R ²
Full Sample	2852	0.019	0.757	0.215	0.088
Subsamples with Foreign Sales					
above 50%	266	0.020	0.795	0.468	0.118
between 25% and	558	0.018	0.781	0.322	0.119
between 0% and 25%	598	0.016	0.829	0.175	0.107
Zero	1430	0.021	0.711	0.142	0.059

Panel B	N	ForeignSales
Full Sample	2852	0.49 (0.000)
Subsample with Non-zero Foreign	1422	0.53 (0.000)

Panel C	$\beta_{0,F}$	$\beta_{1,F}$
1410	0.1191 (0.000)	0.46 (0.00)

Table 6: The International Equity Exposure of U.S. Investors

Data are as of March 2000. The size of the U.S. equity portfolio is calculated as U.S. market capitalization minus foreigners' holdings of U.S. stocks (from Treasury Department et al. (2002)) plus U.S. holdings of foreign stocks (constructed, using official data, as in Thomas, Warnock, and Wongswan (2006)). Indirect foreign holdings are calculated using equation (5), U.S. holdings times the percent of sales that is generated by foreign operations, scaled by the estimated relationship between foreign sales and foreign exposure from Table 5. For exposure through foreign equities, our adjustment to officially reported figures subtracts the market capitalization of U.S. holdings of foreign equities that owe to U.S. operations (assuming that 50 percent of non-U.S. firms' foreign operations are in the U.S.), again scaling by the estimated relationship between foreign sales and foreign exposure from Table 5. Total Foreign Holdings (Row 3) is the sum of Indirect Foreign Holdings (Row 2) and Adjusted Foreign Equity Holdings (Row 2).

	(\$ billions)	Portion of U.S. Equity Portfolio
(1) Indirect Foreign Holdings	1,766	
(2) Adjusted Foreign Equity Holdings	1,891	
Reported	2,074	12%
Adjustment to Reported	-183	
(3) Total Foreign Holdings	3,657	21%