

Portfolio Selection of German Investors: On the Causes of Home-biased Investment Decisions

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Real-world portfolio composition is often far from being mean-variance optimal. One of the phenomena documented in investment portfolios is the home-bias effect, that is, investors hold a higher-than-optimal portion of domestic assets. Analyzing hand-collected data from annual reports of German mutual funds, we find strong evidence for home-biased portfolio selection in the years 2000–2003. Besides this we document a “Europe bias,” that is, equities from European countries are strongly overrepresented. Furthermore, bounded rationality of private investors appears to drive suboptimal portfolio selection. The behavior and skill of mutual fund managers seems not to influence the overall home bias.

Keywords: International portfolio diversification, Home bias, Domestic bias, Portfolio choice, Mutual funds

INTRODUCTION

Portfolio selection has been in the focus of financial research for at least half a century. Most of this research regards a portfolio that is diversified according to mean-variance optimization as being an optimal investment decision. Real-world portfolio composition, however, is often far from being mean-variance optimal. One of the deviations widely discovered in investment portfolios is the so-called home-bias effect, meaning that investors hold a higher-than-optimal portion of domestic assets. As shown in our literature review, a conclusive explanation for this effect has not yet been found. Hence it has been labeled home bias “puzzle.” Sometimes it is also referred to as home asset bias or equity home bias depending on the analyzed asset class, or it is called domestic (asset) bias. A consumption home bias could be discovered on a more macroeconomic level.¹ In our analysis of German mutual fund investment behavior we apply the term home bias as expression of a higher-than-optimal portion of domestic equities in an equity portfolio unless explicitly expressed otherwise.

The phenomenon that both professional and individual investors hold too small portions of their wealth in foreign assets has been documented in the finance literature at

least since Levy and Sarnat [1970], Lessard [1973, 1976], and Solnik [1974]. Many authors, including French and Poterba [1990, 1991], Tesar and Werner [1992, 1994, 1995], and Cooper and Kaplanis [1994], show this preference for domestic over foreign assets for investors in several countries. Hence, home-biased investment behavior is a global phenomenon. The monetary consequences, however, are immense. Investors who apply such a suboptimal degree of international diversification suffer from both, a lower rate of return and a higher risk (see, e.g., Lewis [1999], Jeske [2001], and French and Poterba [1990, 1991]). For Germany, these effects have been calculated by Maurer and Mertz [2000], von Nitzsch and Stotz [2005] and Gerke, Mager, and Röhrs [2005].

A closer examination of the literature reveals three main explanations for the home-bias effect: (1) transaction costs, (2) hedging possibilities and omitted assets, and (3) information asymmetries. In the literature review we show that only theories based on information asymmetries find sufficient empirical support. A general overview of the investment decision of German mutual funds and of private investors' direct investment that is based on German Central Bank data shows that both mutual fund portfolios and private investors' portfolios exhibit a considerable bias towards domestic assets. From this starting point, we closely analyze the portfolio composition of 102 mutual funds that are actively managed by the five biggest German mutual fund companies over the period 2000–2003. Here, we employ data extracted from the annual reports of these funds resulting in a sample that

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represents more than 75% of Germany's mutual fund landscape (in value terms).

We contribute to the literature by focusing on the question whether the home bias is a result of the behavior and the skills of fund managers or of the demand of private investors who invest in the mutual fund. Therefore, we do not only determine the portfolio composition of the aggregated mutual fund portfolios, but we also divide our data set into three subsamples according to the size of the funds, and we distinguish between funds with geographic investment focus and those without. The rationale behind this procedure is that fund size is an indicator for the demand for a certain fund and that at least funds without geographic investment focus, that is, funds with global investment strategies and funds that focus on certain industries, should on average show the fund managers' ability to provide adequate diversification. In addition to calculating the portfolio weightings of domestic and foreign equities, we analyze the portfolio composition with regard to the portions invested in equities from the 11 largest countries and – in a second step – in equities from Eastern and from Western European countries.

Analyzing the entire sample yields strong evidence for considerable mutual fund home bias and a significant bias towards equities from further European countries. Given our findings, these effects are particularly strong in very large funds, while medium-size and small funds seem to be less biased, which indicates that private investors particularly demand funds with excess weight on German equities. Furthermore, fund managers' skill and willingness to adequately diversify is confirmed by the result that funds without geographic investment focus on average, despite being actively managed, do not exhibit home-biased investment behavior.

The paper is organized as follows. Section 2 provides a literature review with main focus on explanations for home-biased investment behavior. Our empirical analysis is presented and discussed in Section 3. Section 4 summarizes the key aspects and concludes our analysis.

LITERATURE REVIEW

Numerous explanations of the home bias have been proposed in the finance literature since the first studies were conducted. According to the categorization in Oehler et al. [2007], these theories relate the home bias to one of three factors: (1) transaction costs, (2) hedging possibilities and omitted assets, or (3) information asymmetries.

The first approach of explaining home-biased investment portfolios regards transaction costs as main reason for deviations from mean-variance optimal portfolios. When the costs of acquiring and holding foreign equities are sufficiently higher than they are for domestic securities, then investors should optimally keep their wealth at home. Direct transaction costs and other costs associated with international diversification, for example, foreign taxes, information gathering costs, and costs resulting from institutional

barriers to trade assets, reduce the expected returns on foreign assets relative to domestic assets, and hence, the gains from diversifying abroad. As shown by, for example, French and Poterba [1990, 1991], Tesar and Werner [1992, 1994, 1995], Cooper and Kaplanis [1994], Lewis [1999], Coen [2001], and Glassman and Riddick [2001] empirical support for this explanation attempt is generally poor. Moreover, recent deregulation and liberalization of asset markets should then diminish the home bias. However, differences in legal frameworks concerning, for example, accounting systems, corporate governance, restrictive investment regulations, or investor protection persist and can likely explain at least part of the home bias. This idea is supported by the findings of, for example, Rowland [1999], Dahlquist et al. [2003], Giannetti and Koskinen [2003], and Chan, Covrig and Ng [2005].²

Another set of explanations for the home bias stems from the argument that domestic assets provide a better hedge for home country-specific risks. First, hedging possibilities arise when the purchasing power parity (PPP) does not hold. Stulz [1981] and Adler and Dumas [1983] present models incorporating deviations from PPP and inflation risk in which investors demand assets to hedge domestic inflation. However, by showing that very low levels of risk aversion would be necessary to account for inflation hedging as a plausible explanation for the home bias effect, Cooper and Kaplanis [1994] cast doubt on this argumentation. Second, hedging possibilities arise from the country-specific risks of non-traded and of traded wealth that is omitted when forming the portfolio to be analyzed. These omitted assets often include human capital and real estate as well as treasury and corporate bonds. Generally, the extent of the error introduced by an omitted asset is primarily a function of its additional diversification effect in the portfolio.

In fact, the majority of empirical studies have only analyzed international equity holdings and thus the equity home bias. Very few papers, for example, Tesar and Werner [1992] and Oehler et al. [2007], include bonds and mutual fund shares. Few other studies investigate whether incorporating human capital in the international portfolio generates a home bias (see Brainard and Tobin [1992], Bottazzi, Pesenti, and van Wincoop [1996], Baxter and Jerman [1997], and Coen [2001]). Investors with exogenously fixed human capital holdings whose returns vary with shocks to labor income might benefit from equities as a hedge against human capital risk. Most studies, however, show that the returns on human capital and the returns on domestic equities (and further financial capital) are highly positively correlated. Hence, the exposure to human capital risk even increases the disadvantages (in terms of total risk and/or of return) of home-biased investment behavior. Or, in the words of Lewis [1999, 597]: "The desire to hedge non-tradables risk may even imply that domestic investors should increase their holdings of foreign equities, thus deepening the puzzle." Only Bottazzi, Pesenti, and van Wincoop [1996] observe negative correlations between the returns on human capital and equity,

thus supporting the home bias. A third source for hedging possibilities emanates from domestic companies with internationally diversified operations. However, as pointed out by Jacquillat and Solnik [1978], Heston and Roewenhorst [1994], and Lewis [1999], the movement of stock returns of multinationals is closely related to their national markets, multinationals hardly provide better diversification than the domestic market.

The third stream of explanations for home-biased portfolio selection is based on asymmetric information and its consequences such as adjustments to perceived risk and asymmetric expectations. The theoretical models of, for example, Gehrig [1993], Brennan and Cao [1997], and Kang and Stulz [1997] assume that domestic investors have access to superior information about payoffs in the domestic market and, hence, exhibit a higher demand for domestic assets. Despite Jeske's [2001] argument that it would theoretically require an unrealistically large reduction of domestic risk to explain the home bias with asymmetrically distributed information, empirical findings such as those by Kang and Stulz [1997] support this notion. Kang and Stulz [1997] show that foreign investors in Japan do not hold the Japanese market portfolio but prefer large and well-known companies. They state, as one reason for this, the difference between the theoretically correctly adjusted figures and the perceived risk in reality.

This deviation, that is, adjusting the perceived risk of foreign assets upwards or of domestic assets downwards, is mirrored in the results of other studies. Shiller, Kon-ya and Tsutsui [1991] and French and Poterba [1991] show that domestic investors tend to be more optimistic about domestic market returns than foreign investors are. Lütje and Menkhoff [2004] report similar results for German fund managers. Van Nieuwerburgh and Veldkamp [2004a] point out that the assumption of information being tradable and easy to acquire is flawed. If investors have asymmetric prior beliefs and a limited learning capacity that is allocated before the actual investment decisions, they will not necessarily acquire foreign information. Furthermore, van Nieuwerburgh and Veldkamp [2004b] show more generally that increasing returns to scale in learning (by exploiting increasing returns to specialization) drive under-diversification. Holding more of an asset (e.g., a domestic asset) increases the value of learning about it. Learning more about this asset, in turn, makes it less risky and more desirable to hold. Hence, an investor will tend to invest relatively more in such (domestic) assets (see also Gehrig [1993]).

Overall, theories based on an adjustment to perceived risk constitute the more behavioral explanations for the home bias, and assume – implicitly or explicitly – bounded rationality in the sense of Simon [1955, 1956]. Supporting this, Heath and Tversky [1991] show empirically that when having to choose between two identical games with the same probability, economic agents perceive the game they know less as being riskier, indicating the necessity of an ambiguity premium as proposed by Kahn and Sarin [1988], and Weber

[1990]. Kilka [1998] suggests, while extending the approach of Heath and Tversky, that investors' home bias is driven by the perception of competence and (illusionary) control. Here, the competence effect means that investors feel skillful or knowledgeable about domestic assets.³

Such behavioral phenomena are considered as driving force not only of investments in domestic assets, but also of observed investments in firms which are geographically proximate to the investor. Recent empirical studies, for example, Coval and Moskowitz [1999], Grinblatt and Keloharju [2001], Kumar [2004], and Goetzmann and Kumar [2004], document a "home bias at home." This regional bias was first explained by Fellner and Maciejovsky [2003] who show that social identity, that is, social forces, triggered by group affiliations drives under-diversified and domestically biased portfolios. Supporting this idea, Lauterbach and Reisman [2004] argue that investors prefer domestic assets to mimic the economic fortunes and welfare of their neighbors, countrymen, and social reference group – an approach that also explains the patriotism in portfolio allocation reported from the United States by Morse and Shive [2003]. Massa and Simonov [2004] show that familiarity and perceived competence might also be reasons for investments in stocks closely related to an investor's non-financial income.

Our discussion of the literature on the home bias shows that the most empirically supported set of explanations is based on asymmetric information, whereas theories based on transaction costs and hedging possibilities have found little empirical support to date. Behavioral approaches based on bounded rationality and perceived risk adjustment are particularly appealing as they illustrate the competence effect and the issue of social identity – factors that have been shown empirically to influence the behavior of both individual and institutional investors.

ANALYSIS OF GERMAN MUTUAL FUND HOME BIAS

An Overview of Investment Decisions of German Investors

As shown in the literature review, home bias and related phenomena in portfolio selection have found considerable reflection in the finance literature. A satisfactory explanation with regard to the causation of this effect has not yet been revealed. Although a home bias has been documented for German portfolios by some of the above mentioned studies, they do not provide a detailed analysis of this situation. Only a few studies focus on the analysis of German individual and institutional investors' behavior. Despite some recent attempt by Maurer and Mertz [2000], Lütje and Menkhoff [2004], and – with a focus on the equity market – by von Nitzsch and Stotz [2005] and Gerke, Mager, and Röhrs [2005], determinants and extent of the home bias in German portfolio selection are not yet fully understood.

TABLE 1
Foreign Portfolio Proportions of Mutual Funds.

Year	Equities and equity mutual funds	Bonds and bond mutual funds	Equities and bonds and all mutual funds
Panel A: Mutual funds sold to private investors			
1990	22*	72	64
1995	29	48	41
2000	70	59	67
2006	64	60	68
Panel B: Mutual funds sold to (financial) institutions and firms			
1990	n.a.	n.a.	18
1995	21	12	17
2000	76	35	53
2006	83	69	72

We analyze the portion of foreign investments for mutual funds which are sold to private investors (Panel A) and those sold to (financial) institutions and firms (Panel B) from 1990–2006 based on German Central Bank data. Column 1 shows the foreign share for mutual funds which mainly invest in equities (more than 50% of the funds' assets). Column 2 provides results for funds that mainly invest in bonds and Column 3 reports the overall results for the foreign share of all mutual funds bought by private investors. The benchmark amounts to 95% for equities, 85% for bonds, and (when using major countries and/or assuming a specific level of risk aversion) 70–80% for both kinds of securities. All values in percent. The abbreviation n.a. denotes years for which data were not available from the official statistical report.

*Including mixed funds (where equities comprise more than 50% of total fund assets).

As shown by Oehler et al. [2007], the extent of the home bias is significantly reduced in recent years for both individual and institutional investors when compared to the levels in the 1990s. As shown in Table 1 with data from the German Central Bank (Deutsche Bundesbank [1991a–2007a, 1991b–2005b]), German equity mutual funds sold to private investors (Panel A) held slightly above 20% of their portfolios in foreign equities and equity mutual funds in 1990. Compared to a benchmark of 95% for the foreign portion in equity portfolios, it has to be recognized that the extent of the home bias was immense. In 2006, however, the actually invested foreign portion represented 64% in these portfolios. The foreign portion in German bond mutual funds sold to private investors stagnated at a level of about 60–70%.

Mutual funds sold to institutional investors (Panel B) exhibit an even greater home bias in the 1990s with a foreign portion of slightly above 20% and 10% in equity and bond funds, respectively. These funds, however, strongly optimize their portfolios to foreign portions of more than 80% for equity funds and nearly 70% for bond funds in 2006. Such optimization has not taken place in German private investors' direct investments, as reported in Table 2. Over the whole period since the beginning of the 1990s, the foreign share has hardly exceeded 20% irrespective of the type of investment (bond or equity). Even when using only the major countries and/or assuming a specific level of risk aversion resulting in foreign benchmark weights of approximately 20–30% as

TABLE 2
Foreign Portfolio Proportions of Private Investors' Direct Investments.

Year	Equities	Bonds	Mutual fund shares	Equities and bonds	All securities
1990	n.a.	19	n.a.	n.a.	16
1995	n.a.	8	n.a.	n.a.	15
2000	n.a.	11	n.a.	n.a.	25
2004	20	18	36	19	27

We analyze the proportion of foreign investments for private investors' direct investments, held in their securities accounts at financial intermediaries (including the Central Bank) from 1990–2004 based on German Central Bank data. Column 1 shows the foreign share for equities. Columns 2 and 3 report the same results for bonds and mutual fund shares, respectively. Column 4 presents combined results for equities and bonds, while the figures in Column 5 incorporate all three types of securities. Note that for the years 1990, 1995, and 2000 some data are not available from the statistical reports and that the last available year is 2004. The benchmark amounts to 95% for equities, 85% for bonds, and (when using major countries and/or assuming a specific level of risk aversion) 70 to 80% for both kinds of securities. All values in percent. The abbreviation n.a. denotes years for which data were not available from the official statistical report.

proposed by Tesar and Werner [1992], Statman [1999], and Amadi [2004], it has to be concluded that the investments of German investors are still home biased. Although we do not have any information concerning the portfolio composition of the foreign mutual funds that private investors invest in, that is, to which extent these funds have an investment focus on German equities, we have to conclude from the results reported in Table 2 that the proportion in neither of the categories can offset the home-biased holdings in any other category or the home-biased mutual fund portfolios reported in Panel A of Table 1.

Keeping in mind these trends and developments we take a more detailed look at the home bias of German mutual funds that are sold to private investors. Following the extant literature we focus on the *equity* home bias and therefore discuss funds which mainly invest in equities (> 50% of assets).

Data and Methodology

Data Set

Our data set is constructed from information contained in the annual reports of German mutual funds for the years 2000–2003. We only include funds in our analysis that invest more than 50% of their total assets in equities. This restriction allows us to construct and apply a meaningful benchmark (see below) and it facilitates a comparison of our results to prior findings in the literature which, as mentioned above, generally focuses on equities. In view of the multitude of German mutual funds, we limit our analysis to the five largest German mutual fund companies with regard to funds sold to private investors, that is, Activest (since 2006 part of Pioneer

Investment), Allianz Global Investors, DekaBank, DWS Investment, and Union Investment, and we include only mutual funds whose assets exceed €100 million in each year of our sample period. The reason for applying the latter limitation is the existence of a large number of relatively small funds (in terms of assets) that only represent a tiny share of the mutual fund market, and hence, will not significantly change our results. Moreover, small amounts of assets induce a barrier on the possibility to diversify internationally, for example, through costly information acquisition, and therefore would introduce a bias into our results.

These criteria leave us with a data sample that contains 408 annual reports (102 mutual funds over the entire period of 4 years). From these reports we hand-collect the market value of the equity securities of every company included in the fund. In addition, each such company is assigned its country of incorporation. However, some companies emanate from international mergers or have expanded their activities to a number of countries (see the remarks on multinational firms in the literature review). Hence, it is difficult to identify a single criterion that unambiguously defines which country each of the companies has to be assigned to. In order not to be caught in this trap, we use the country of incorporation or – in case this country could not be identified – the country the company is headquartered in. The fact that not all of the funds follow the same fiscal year, that is, reporting dates are spread over nearly all months in a given year, however, does not create great problems. To make the mutual fund data comparable with our benchmark we center all mutual fund data around the same point in time of each year.

Finally, we collect data on total investments, bank deposits, and total net assets for each fund. Despite the above described restrictions on the funds to be included, our data set covers more than 75% of total assets in the German mutual fund market when compared to statistics provided by the German Central Bank (Deutsche Bundesbank [2004a]). Out of the average total net assets, security investments and bank deposits (cash holdings) represent 93.4–94.7% and 4.9–6.4%, respectively. Out of the security holdings, the portion that is invested in other assets than equity, however, equals or is smaller than one percent. This is why we only analyze the equity holdings.

Methodology

We calculate the actual portion $w_{act,i,t}$ of each country i invested in by the funds in year t according to

$$w_{act,i,t} = \frac{\sum_j \sum_{k(i,j)} MV(E)_{i,j,k(i,j),t}}{\sum_i \sum_j \sum_{k(i,j)} MV(E)_{i,j,k(i,j),t}}. \quad (1)$$

For each country i , $MV(E)_{i,j,k(i,j),t}$ represents the market value in euros of the equities of company $k(i,j)$ in fund j in the respective year t . $t = 2000, \dots, 2003$; $j = 1, \dots, m$; $k(i,j) = 1, \dots, n$ where m is the number of different funds included and n is the number of different companies from the same

country i in fund j . We add up the fund-specific results over all funds j as we do not want to investigate individual funds but the German mutual fund universe as a whole. Consequently, we calculate $w_{act,i,t}$ by dividing the respective sum of the market values of the single stocks of companies from one country by the sum of the market values of all equities of the respective year. Subsequently, for each year t , $\sum_i w_{act,i,t} = 1$.

We use the market value in euros of the countries in the All Country Index of Morgan Stanley Capital International Inc. (MSCI) to derive the appropriate benchmark weights in an optimally internationally diversified portfolio. Obviously, when they invest outside the eurozone, German investors are exposed to currency risk. However, von Nitzsch and Stotz [2005] show that despite this currency risk an investment in the world market portfolio dominates home-biased portfolio investment with regard to return and risk. Furthermore, they show that investing in the world market portfolio and subsequently hedging currency risk even increases this dominance.

The benchmark weights $w_{bm,i,t}$ for our analysis are calculated according to

$$w_{bm,i,t} = \sum_{q=1}^4 w_{funds,q,t} * w_{msci,i,q,t}, \quad (2)$$

where

$$w_{funds,q,t} = \frac{\sum_i \sum_j \sum_{k(i,j)} MV(E)_{i,j,k(i,j),q,t}}{\sum_i \sum_j \sum_{k(i,j)} MV(E)_{i,j,k(i,j),t}} \quad (3)$$

represents for each year t the portion of the equities in all funds with a fiscal year ending in quarter q (numerator) compared to the sum of all equities in year t (denominator). Hence, for each year t , $\sum_q w_{funds,q,t} = 1$. For quarter q in year t , $w_{msci,i,q,t}$ represents the weight of country i in the respective quarterly MSCI All Country Index. In other words, we weight the quarterly MSCI weights by the equity value of the funds of the respective quarter. By summing up the product $w_{funds,q,t} * w_{msci,i,q,t}$ over the four quarters of one year we get the necessary country portions in the world stock market portfolio that is applied as benchmark portfolio in our analysis. Subsequently, for each year t , $\sum_i w_{bm,i,t} = 1$.

Given the values for $w_{act,i,t}$ and $w_{bm,i,t}$ we base our analysis on the difference

$$diff_{i,t} = w_{act,i,t} - w_{bm,i,t} \quad (4)$$

which describes the deviation of the actual weight of country i in the mutual funds portfolio from its weight in the benchmark portfolio. When $diff_{i,t} > 0$ ($diff_{i,t} < 0$), the respective country is overrepresented (underrepresented) in the actual portfolio. In every analysis below, we determine this difference for each year which gives us four values of this difference for each country.

To show whether the respective value of $diff_{i,t}$ lies indeed statistically significant above or below zero over the whole period of four years and is not only the result of fluctuation

we perform the non-parametric one-sided Wilcoxon test and the parametric one-sided t test. The former requires, compared to the parametric t test, less restrictive assumptions about the underlying distribution of the analyzed variables. In order to lessen the major disadvantages of non-parametric tests, that is, (1) the loss of the metric and numerical values of the calculated results as only the ranks and not the numerical values are used for the analysis, and (2) the loss of statistical power for small samples, we additionally perform traditional t tests. Combining both tests yields solid results for our analysis.

When comparing different groups of funds, e.g. different according to fund size, we also test the statistical significance of the difference between the deviations in one group from the country weights in the benchmark and the deviations in the other group(s) by performing the Wilcoxon-Mann test (U test) and the t test. To measure the overall deviation from the optimal portfolio composition, we report for each year t the variance $\sigma^2(\text{diff}_{i,t})$ of the deviations from the single benchmark weights for each group of funds. The higher this variance, the farther away is the actual portfolio from the world market portfolio composition. Regarding these variances, we perform a standard variance ratio test. Therefore, we analyze whether the variance in one group of funds (or in one year) is indeed different from the variance of another group (or the same group in another year).

With our data set we provide three different analyses. The first analysis uses the full sample of 102 funds and provides a general overview of the investment behavior of German mutual fund companies. With the results of this analysis, however, it is not possible to derive whether deviations from the benchmark portfolio are due to fund or fund manager characteristics or due to private investor demand. This is why for the second analysis we divide the sample into three size categories, large, medium and small, and for the third analysis we separate all funds without any geographic focus in their investment strategy from those which exhibit such a focus. By taking size into account we analyze whether or not smaller funds might be limited in their possibilities to form an adequately diversified portfolio due to limited power in the market. More importantly, we understand fund size as an indicator for investor demand, that is, the higher the demand for certain funds, the larger the funds will be. Taking into account whether the funds state a geographic focus allows us to show whether mutual fund managers are on average able to form adequately diversified portfolios. Overall, either group should reflect the portfolio weights in the world market portfolio. Based on this hypothesis differences in the extent of the deviation from the world market portfolio between these two groups indicate whether home bias of mutual funds is a question of manager skill or of higher demand of private investors for funds with a focus on German equities, that is, funds with an underdiversified portfolio.

Results

The Whole Sample

This first analysis is intended to give insight into the general investment behavior of German mutual fund companies and to show which countries are over- or underrepresented in the average mutual fund portfolio. Relative to the benchmark weights, we compare the share of German equities to that of equities from other major countries. To guarantee a meaningful analysis, we use a threshold share of one percent in the benchmark index as selection criterion. The shares of countries with a weight of less than one percent are grouped under a separate category entitled “Rest of the World” (ROW). The results are summarized in Tables 3 and 4. The first outcome of this analysis confirms the home-bias effect in Germany’s mutual fund industry over the sample period. The actual proportion of German equities in the portfolio is 14.7–17.7 percentage points above the benchmark level of around 4–5%. As shown in Panel A of Table 3, considerable excess weights can also be observed for France, for Great Britain, and for the Netherlands with about 4–5 percentage points, 2–4 points, and about 3 points above the benchmark, respectively. This investment behavior is balanced out by putting too little weight mainly on the United States, on Japan, and on Canada with about 12.2–23.2 points, about 4.1–7.7 points, and about 2 points below the benchmark, respectively.

In particular the strong decrease in mutual funds’ U.S. equity holdings despite an increase in the benchmark proportion of U.S. equities, and the development of the share of the ROW during the period investigated deserve closer examination. Some of the strong increase in the difference of equities from the United States is due to the increase of about 6 points of the U.S. share in the benchmark portfolio from 2000 to 2001. The biggest part of this increase appears to stem from the decrease in the benchmark share of Japan in the same period. The difference between the actual and the benchmark weight, however, nearly doubles from –12 in 2000 to about –23 points in 2003. Not only is the increase in the benchmark weight not reflected in U.S. investments by the fund industry but also does the actual weight additionally decrease by 5 points from 2001 to 2002. The most convincing explanation for this development is based on investors fearing a further deterioration of the U.S. dollar relative to the Euro. Between the end of 2001 (€1 = \$0.886) and the end of 2002 (€1 = \$1.0481), the value of the U.S. dollar had already deteriorated by about 15% towards the Euro. To avoid further losses from changes in the Euro-dollar exchange rate, German investors reduced their U.S. dollar exposure by putting less money in funds that invested in U.S. stocks. Despite the decrease of the share of the ROW in the benchmark index, however, investors even increased the actual weight resulting in a significant reduction of the underrepresentation of small countries (in terms of market value) from –5.8 percentage points in 2000 to –1.6 points in the years 2002 and 2003. As the extent of the deviation from the benchmark

TABLE 3
Proportions of Equities Invested (full sample).

	2000		2001		2002		2003		Wilcoxon test/ <i>t</i> test
	$w_{bm,i,t}$	$diff_{i,t}$	$w_{bm,i,t}$	$diff_{i,t}$	$w_{bm,i,t}$	$diff_{i,t}$	$w_{bm,i,t}$	$diff_{i,t}$	
Panel A: Largest Countries									
Country <i>i</i>									
AU	1.33	−0.62	1.14	−0.66	1.21	−0.48	1.18	−0.60	*/***
CA	2.29	−1.70	2.05	−1.62	1.87	−1.52	2.45	−1.98	*/***
CH	3.06	0.90	3.51	0.56	3.01	2.40	2.54	2.01	*/**
DE	4.16	14.67	5.02	14.71	4.29	15.58	3.83	17.73	*/***
ES	1.15	0.87	1.46	1.27	1.29	0.78	1.24	1.57	*/***
FR	3.27	5.64	4.26	5.28	4.22	5.12	4.97	4.62	*/***
GB	9.04	1.58	10.18	2.37	9.57	3.70	8.87	2.48	*/***
IT	1.54	1.25	2.13	0.58	1.94	1.34	1.92	0.73	*/***
JP	14.83	−7.74	9.40	−4.05	11.17	−5.32	11.88	−4.70	*/***
NL	2.43	3.13	2.59	3.27	2.50	3.28	2.38	2.62	*/***
US	42.17	−12.18	47.98	−18.90	48.20	−23.24	47.26	−22.83	*/***
ROW	14.73	−5.80	10.28	−2.81	10.74	−1.63	11.48	−1.63	*/**
$\sigma^2(diff_{i,t})$		46.15		58.85		79.56		82.36	
Panel B: Europe									
Country/Group <i>i</i>									
DE	4.16	14.67	5.02	14.71	4.29	15.58	3.83	17.73	*/***
W.Eur.	24.00	15.48	28.40	13.46	26.38	16.70	26.25	13.11	*/***
E.Eur.	0.48	0.15	0.26	0.46	0.24	1.07	0.28	0.92	*/**
ROW	71.35	−30.29	66.32	−28.63	69.09	−33.35	69.64	−31.76	*/***
$\sigma^2(diff_{i,t})$		457.45		405.81		545.00		498.59	

We analyze the proportion of mutual fund assets invested in equities from different countries/country groups. We only include funds in our analysis that invest more than 50% of their total assets in equities. In addition, we limit our analysis to the five largest German mutual fund companies and include only mutual funds whose assets exceed €100 million in each year of our sample period. The determination of the size of the countries/country groups is based on their share of total market capitalization in the benchmark portfolio. For each year (2000–2003) the first column in the respective year provides the weight of the country/country group in the benchmark, that is, $w_{bm,i,t}$. The second column reports the percentage excess weight in the actual portfolio compared to the benchmark weight, that is, $diff_{i,t}$. Panel A reveals the portions invested in the eleven largest countries and the rest of the world. The countries are abbreviated as follows: AU=Australia, CA=Canada, CH=Switzerland, DE=Germany, ES=Spain, FR=France, GB=Great Britain, IT=Italy, JP=Japan, NL=Netherlands, US=United States of America, ROW=Rest of the World. Panel B shows the portions invested in equities from Germany (DE), Eastern Europe (E.Eur.), Western Europe (W.Eur.), and the Rest of the World (ROW). The benchmark weights are in percent; values for the differences are in percentage points. We use the nonparametric Wilcoxon test and the parametric *t* test to test whether over time $diff_{i,t}$ lies significantly above or below zero. We use ***, **, and * to denote significance at the 1%, 5% and 10% level, respectively.

weight is significant at least at the 10% level for every country, we can conclude that the average German mutual fund is constantly not as diversified as would be optimal.

Panel B of Table 3 summarizes the deviations from the world market portfolio from another perspective. We regroup the countries into the categories Western Europe (W.Eur.), Eastern Europe (E.Eur.) and Rest of the World (ROW). The share of Germany remains separate and, hence, unchanged. W.Eur. is formed by the countries of the EU15 without Germany, that is, Austria, Belgium, Denmark, Finland, France, Great Britain, Greece, Ireland, Italy, Luxemburg, the Netherlands, Portugal, Spain, and Sweden, plus Liechtenstein, Norway, and Switzerland. E.Eur. comprises all remaining European countries provided they are included in our data set, that is, Croatia, the Czech Republic, Estonia, Lithuania, Poland, Russia, Slovakia, Slovenia, and Ukraine. Any Eu-

ropean country not included in one of the above variables is neither included in the MSCI All Country Index nor were any of the mutual funds invested in that country. In this analysis, ROW combines all non-European countries.

This procedure reveals a further phenomenon. Not only are German mutual funds biased in favor of German equities but in addition also towards stocks from companies from other European countries. We call this phenomenon “Europe bias.” We argue that, compared to the benchmark portfolio, the excess weight on Western Europe (+13.1 to +16.7 percentage points without any clear upward or downward trend) arises from a shift of the strong bias towards German securities in the 1990s to a stronger focus on Western European countries at the end of the 1990s when the Euro was introduced and stock markets became increasingly integrated.

TABLE 4
Variance Test (full sample).

	2000	2001	2002	2003
Panel A: Largest countries				
2000		0.6942	0.3802	0.3510
2001			0.6254	0.5864
2002				0.9552
2003				
Panel B: Europe				
2000		0.9236	0.8891	0.9455
2001			0.8142	0.8696
2002				0.9433
2003				

We test the significance of differences in the variance $\sigma^2(\text{diff}_{i,t})$ of the deviations with regard to the largest countries (Panel A) and with regard to the European countries/country groups (Panel B) between the stated years. The stated values denote the p-value for the standard variance ratio test. Significance of at least 10% is printed in **bold**.

Even more remarkable, however, is the increase in the share of equities from Eastern Europe. Despite the decrease in the respective benchmark weight by nearly 50% from 2000 to 2001 and the stagnation at this level through 2003, the actual share of E.Eur. in mutual funds approximately doubled over the same period, leading to a proportion of these equities that is four times as high as the respective share in the benchmark portfolio. Obviously, this result can be explained by strong economic growth prospects and by the development of the stock markets in Eastern European countries caused by the anticipation of the enlargement of the EU that created overly optimistic investors throughout Europe, and in particular in Germany – an economy that connects the “old” EU with the new member states.

The divergence of ROW from the world market share remains nearly constant at about –30 percentage points. This means that the changes in the shares of all non-European countries, for example, the United States and Japan, offset each other nearly perfectly. The proportion of assets that is invested in European equities (including Germany) is at or slightly above 60%, while investments in the Rest of the World, including the two largest economies, the United States and Japan, account for approximately 35–40%. According to the world market portfolio, these distributions should be nearly reversed. Again, all results are significant at least at the 10% level.

The extent of the deviation from the optimal portfolio structure as measured by $\sigma^2(\text{diff}_{i,t})$, however, is not only existent, but also increasing for Panel A in Table 3. We cannot report a clear trend of this deviation in Panel B. Table 4 shows the result of the standard variance ratio test that is performed to determine whether or not the reported variances differ between any two of the analyzed years at statistically significant levels. Despite the observed trend of an increasing overall deviation from the benchmark portfolio composition

with regard to the largest countries, none of our tests yields significance at the conventional levels.

The Influence of Fund Size

The extent of the home bias and of the Europe bias that is documented in the first analysis, however, is far too high as that it could be explained by actively managed asset allocation as previously proposed in the literature. This is why we provide the following analyses to find out whether the deviations from optimal diversification are due to fund characteristics, fund manager misbehavior or skill, or the demand of private investors.

The results of splitting our data set into three sub-samples according to fund size (in terms of total assets) are presented in Tables 5 and 6. By looking at the deviations from the benchmark weights of the eleven largest countries in Panel A of Table 5 it becomes clear that in single years the deviations differ between small, medium-size, and large funds. Over the whole period, however, many of the differences of the weights of single countries between small and medium-size funds are statistically insignificant. On the other hand, most of the differences of deviations from the country weights between small and large funds and between medium-size and large funds are significant. When looking from the European perspective (Panel B), again, the largest funds appear to strongly differ from small and medium-size funds. Looking at the variances (reported in Table 5) and the results of the variance ratio test (Table 6) reveals further insight.

From the variances of the three groups in the four years, we draw three main conclusions. First, in the years 2000 through 2002, the portfolio composition of medium-size funds is much closer to the composition of the world market portfolio than the composition of the small and the large funds. Second, this situation is somewhat different in 2003. While the variance in the large fund group remains high, the variance in the small fund group decreases dramatically and falls below the variance of the medium size fund group. These two results are supported by the results of the standard variance ratio tests provided in Table 6. Towards the year 2003, small and medium size funds face significant changes in portfolio composition as measured by the overall deviation from the benchmark portfolio. The changes in the variance in the large fund group remain insignificant. Over the years 2000–2002 the variance in the medium group is significantly lower than the variances of the small fund and the large fund group (for the large fund group not in 2000). The two latter groups do not differ significantly. In 2003, however, the only significant result for the comparison of the different size groups can be stated for the difference of the variance of the small fund group from the variance of the large fund group. Third – and as consequence of the first and second result – we conclude that this development is driven by an increased demand for suboptimal portfolios by private investors. Mutual funds that exhibit a considerable home bias and an overall strong

TABLE 6
Variance Test (subsamples according to fund size)

		small				medium				large			
		2000	2001	2002	2003	2000	2001	2002	2003	2000	2001	2002	2003
Panel A: Largest Countries													
small	2000		0,5156	0,5732	0,1567	0,0983				0,6864			
	2001			0,9303	0,0428		0,0112				0,5265		
	2002				0,0517			0,0025				0,9105	
	2003								0,2344				0,0605
medium	2000						0,7473	0,3280	0,1529	0,2046			
	2001							0,5088	0,0829		0,0490		
	2002								0,0194			0,0018	
	2003												0,4692
large	2000										0,6740	0,2838	0,3740
	2001											0,5105	0,6365
	2002												0,8518
	2003												
Panel B: Europe													
small	2000		0,9814	0,8179	0,6894	0,5995				0,6466			
	2001			0,8360	0,7064		0,1600				0,6344		
	2002				0,8643			0,2746				0,3636	
	2003								0,9018				0,3696
medium	2000						0,3392	0,4142	0,8020	0,3350			
	2001							0,8816	0,2366		0,0727		
	2002								0,2939			0,0617	
	2003												0,4348
large	2000										0,9952	0,8116	0,9556
	2001											0,8070	0,9509
	2002												0,8548
	2003												

We test the significance of differences in the variance $\sigma^2(diff_{i,t})$ of the deviations with regard to the largest countries (Panel A) and with regard to the European countries/country groups (Panel B) between the different subsamples according to fund size in each year and between the stated years. The stated values denote the p-value for the standard variance ratio test. Significance of at least 10% is printed in **bold**.

deviation from the world stock market portfolio are preferred by private investors and become more important. Better diversified funds, on the other side, become less important within the mutual fund market. These trends are clear for the results with regard to the largest countries (Panel A of Tables 5 and 6). From the European perspective (Panel B) many of the trends appear not to be statistically significant. This might be due to the high degree of aggregation into only four different country groups.

Influence of the Geographic Focus

In the next part of our analysis we use one feature of the mutual funds in our sample that has not been used so far in this analysis. All funds that do not apply any geographic focus in their investment strategy are grouped together resulting in a subsample consisting of 43 funds. The remaining 59 funds with geographic focus represent the comparison group. We argue that funds with geographic focus primarily exist to satisfy the demand of investors who are willing to invest in mutual funds. On the other hand, the composition of funds without any geographic focus is more likely to

indicate whether fund managers are home biased because of bounded rationality. Despite the fact that every fund which by name (or at least by investment strategy) applies a geographic investment focus has to have a bias towards certain countries, the aggregated portfolio of all geographically focused funds should, according to optimal portfolio construction, not show any deviation from the world market portfolio. The latter should also hold true for the aggregated portfolio of funds without geographic investment focus although a single fund might exhibit some deviation from the world market portfolio due to some regional clusters of certain industries. Hence, we test whether the two groups show such deviation and, subsequently, whether or not there is significant difference between the group with and the group without geographically focused investment behavior. The results are presented in Tables 7 and 8.

Overall, funds without geographic investment focus do not show home-biased portfolio weights over the entire period with a maximum difference of the German portion of 2.44 percentage points above the benchmark in 2003. Although the results for most of the largest countries are statistically significant, the absolute value of the deviations, that is, the

TABLE 7
Proportions of Equities Invested (subsamples according to geographic focus)

	2000			2001			2002			2003			Wilcoxon/ <i>t</i> test geographic focus		Wilcoxon-Mann/ <i>t</i> test
	<i>diff</i> _{<i>i,t</i>} geographic focus			<i>diff</i> _{<i>i,t</i>} geographic focus			<i>diff</i> _{<i>i,t</i>} geographic focus			<i>diff</i> _{<i>i,t</i>} geographic focus					
	<i>w</i> _{<i>bm,i,t</i>}	without	with	<i>w</i> _{<i>bm,i,t</i>}	without	with	<i>w</i> _{<i>bm,i,t</i>}	without	with	<i>w</i> _{<i>bm,i,t</i>}	without	with	without	with	
Panel A: Largest Countries															
Country <i>i</i>															
AU	1.33	−0.07	−1.11	1.14	−0.34	−0.92	1.21	−0.07	−0.79	1.18	−0.30	−0.81	***	****	**/****
CA	2.29	−1.14	−2.20	2.05	−1.13	−2.01	1.87	−1.09	−1.83	2.45	−1.40	−2.38	****	****	**/****
CH	3.06	−0.45	2.10	3.51	−0.66	1.54	3.01	1.61	2.98	2.54	1.08	2.65	−/−	****	**/*
DE	4.16	2.15	25.75	5.02	0.83	25.85	4.29	2.08	25.46	3.83	2.44	28.16	****	****	**/****
ES	1.15	−0.19	1.81	1.46	−0.42	2.63	1.29	−0.19	1.49	1.24	−0.05	2.67	****	****	**/****
FR	3.27	1.19	9.58	4.26	0.48	9.13	4.22	1.14	8.04	4.97	0.97	7.11	****	****	**/****
GB	9.04	−0.07	3.04	10.18	−0.03	4.30	9.57	1.04	5.65	8.87	1.16	3.37	−/−	****	**/****
IT	1.54	−0.05	2.40	2.13	−0.78	1.67	1.94	−0.09	2.38	1.92	−0.46	1.55	*/*	****	**/****
JP	14.83	−9.08	−6.56	9.40	−3.98	−4.10	11.17	−4.59	−5.86	11.88	−4.47	−4.86	****	****	−/−
NL	2.43	0.36	5.59	2.59	−0.27	6.11	2.50	0.47	5.34	2.38	0.43	4.12	−/−	****	**/****
US	42.17	15.33	−36.54	47.98	11.31	−43.17	48.20	3.96	−43.18	47.26	5.07	−41.87	****	****	**/****
ROW	14.73	−8.00	−3.86	10.28	−5.02	−1.03	10.74	−4.27	0.31	11.48	−4.47	0.30	****	−/−	**/****
<i>σ</i> ² (<i>diff</i> _{<i>i,t</i>})		35.38	200.72		15.69	245.99		5.98	244.82		7.05	242.87			
Panel B: Europe															
Country/Group <i>i</i>															
DE	4.16	2.15	25.75	5.02	0.83	25.85	4.29	2.08	25.46	3.83	2.44	28.16	****	****	**/****
W.Eur.	24.00	1.33	28.00	28.40	−2.62	26.38	26.38	3.70	26.23	26.25	1.84	20.80	−/−	****	**/****
E.Eur.	0.48	−0.39	0.63	0.26	−0.15	0.96	0.24	0.16	1.74	0.28	0.09	1.49	−/−	****	**/****
ROW	71.35	−3.09	−54.38	66.32	1.95	−53.19	69.09	−5.94	−53.43	69.64	−4.37	−50.44	−/*	****	**/****
<i>σ</i> ² (<i>diff</i> _{<i>i,t</i>})		5.36	1468.21		3.79	1398.07		17.78	1398.01		9.48	1257.35			

We analyze the proportion of mutual fund assets invested in equities from different countries/country groups *i*. The full sample (102 funds) is divided into two subsamples according to whether or not a fund's annual report states a geographic focus: funds without geographic focus (43) and funds with geographic focus (59). For each year (2000 to 2003) the first column provides the weight of the country/country group in the benchmark. The second and third column report the excess weight in the actual portfolio of the funds without and with geographic focus compared to the benchmark weight, respectively. Panel A reveals the portions invested in the eleven largest countries and the rest of the world. The countries are abbreviated as follows: AU=Australia, CA=Canada, CH=Switzerland, DE=Germany, ES=Spain, FR=France, GB=Great Britain, IT=Italy, JP=Japan, NL=Netherlands, US=United States of America, ROW=Rest of the World. Panel B shows the portions invested in equities from Germany (DE), Eastern Europe (E.Eur.) and Western Europe (W.Eur.), and the rest of the world (ROW). The benchmark weights are in percent; values for the differences are in percentage points. We use the nonparametric Wilcoxon test and the parametric *t* test to test whether over time *diff_{i,t}* lies significantly above or below zero. We use the nonparametric Wilcoxon-Mann test (U test) and the parametric *t* test to test whether *diff_{i,t}* over the whole period significantly differs between the two groups. We use ***, **, and * to denote significance at the 1%, 5% and 10% level, respectively.

economic effect, is very small. This means that on average these portfolios come close to optimal international diversification. Deviations from the benchmark weights that appear to be somewhat larger – in terms of percentage points – are found in the proportions invested in stocks from companies incorporated in Japan, in the United States and in the Rest of the World. The respective deviations, however, decline over the period investigated. While the actual share of U.S. stocks in the full sample (see above) is smaller than the respective benchmark share, for funds without geographic focus this share is even larger than the benchmark. The difference, however, is declining. The development of the share of Japan and the Rest of the World are in line with our results from above.

The portions of the largest countries in the sub-sample of mutual funds with geographic focus, however, are strongly

home biased, indicating that this group of funds is strongly dominated by funds that mainly or exclusively invest in German stock companies. We conclude that this dominance is driven by investors who mainly demand funds with a focus on German stocks. Except for the weight of the Rest of the World, all country weights differ significantly (at least at the 10% level) from the benchmark weights. Furthermore, these results are supported by the fact that all differences (except for Japan) between the deviations of the two groups from the benchmark are highly significant. Panel B of Table 7, that is, the analysis of investments in European countries, confirms the above results.

The analysis of the overall deviation from optimal portfolio composition as measured by the variance of the deviations of the single weights from optimal weights supports these

TABLE 8
Variance Tests (subsamples according to geographic focus)

		without				with			
		2000	2001	2002	2003	2000	2001	2002	2003
Panel A: Largest Countries									
without	2000		0.1933	0.0065	0.0126	0.0077			
	2001			0.1246	0.1999		0.0001		
	2002				0.7905			0.0000	
	2003								0.0000
with	2000						0.7417	0.7476	0.7574
	2001							0.9938	0.9834
	2002								0.6168
	2003								
Panel B: Europe									
without	2000		0.7831	0.3513	0.6532	0.0000			
	2001			0.2368	0.4733		0.0005		
	2002				0.6168			0.0048	
	2003								0.0048
with	2000						0.9688	0.9688	0.9016
	2001							1.0000	0.9326
	2002								0.9326
	2003								

We test the significance of differences in the variance $\sigma^2(diff_{i,t})$ of the deviations with regard to the largest countries (Panel A) and with regard to the European countries/country groups (Panel B) between the different subsamples in each year and between the stated years. In particular, we analyze the difference between the variation of funds with and without a geographic focus. The stated values denote the p-value for the standard variance ratio test. Significance of at least 10% is printed in **bold**.

results (Table 7). The respective p-values for testing whether the variances in the two groups change over time and whether the variances are different among the groups are presented in Table 8. The results for the analyses of the weights of the largest countries and of the weights of the groups of European countries do not show great differences. The overall deviation of the group of funds with geographic focus from the benchmark portfolio does not change significantly over time. Within the group of funds without geographic focus, there seems to be some change from the year 2000 to the years 2002–2003. The extent of this change, however, is very small as shown by the results above. Furthermore, in each year, the variance of the group with geographic focus differs highly significantly from the variances of the group without such investment focus.

These results strongly support the already stated conclusion that the home bias in the German mutual fund industry is driven by the demand of investors buying shares of mutual funds rather than by biased institutional investors who are responsible for the portfolio composition of the funds. When investing in funds with a geographic focus, private investors prefer home-biased (and Europe-biased) funds over funds with a focus on other regions. As consequence, the group of funds with geographic focus is strongly home (and Europe) biased. Funds that have a global or an industry-oriented investment focus, however, show that mutual fund managers are able and willing to construct adequately diversified portfolios.

CONCLUSION

One phenomenon of decision making that is in the focus of research in financial economics is home-biased investment behavior. We contribute to this research by analyzing the portfolio composition of German mutual funds sold to private investors. Three different approaches to explain why investors hold a greater portion of domestic assets in their portfolio than would be appropriate in the sense of mean-variance analysis have been put forward in the literature: (1) higher direct transaction costs for holding and trading foreign assets and other costs of international diversification, (2) better hedging possibilities by domestic assets against home-country specific risks from non-traded wealth, and (3) asymmetrically distributed information and subsequent adjustments to perceived risk and asymmetric expectations. Within the latter framework, which finds – in contrast to the former two attempts – strong empirical support in the literature, we analyze a set of hand-collected data from the annual reports of German mutual funds.

Our results are fourfold. First, the average German mutual fund that is sold to private investors exhibits significant home-biased portfolio composition. Second, these funds invest higher-than-optimal portions in equities from other (in particular Western) European countries: they exhibit a “Europe bias.” Third, the largest funds seem to show higher home bias and stronger deviations from the world market portfolio than small (still above total assets of €100 million)

and medium-size funds. Fourth, a portfolio that consists only of funds with global investment strategies hardly exhibits home bias, whereas a portfolio of funds with geographically focused strategies strongly deviates from optimal portfolio composition. In particular the latter two results indicate that home bias and deviations from the world stock market portfolio are driven by private investor demand rather than by mutual fund managers. Hence, the former seem to suffer from bounded rational decision making. As explained in the literature review, this results in lower-than-optimal returns and higher-than-optimal risk.

Two aspects, however, shed some positive light on the situation. From the strong focus on European equities we can conclude that there is clear capital market integration across Europe, not only with regard to Western Europe, but also to Eastern Europe. This development is most probably due to the European Monetary System and its extension in recent years as well as due to strong growth prospects in Eastern Europe. On the other hand, the extent of the above discussed home bias is much lower than the levels reported in the general overview for the 1990s. The overall extent of the home bias, however, is much too large as that it could be grounded in actively managed asset allocation strategies. We argue that information is still asymmetrically distributed. The strongest information deficits appear to be with private investors. This continues to be the primary reason for the bounded rational behavior.

Given the current speed of technological advancement, however, it is likely that the reduction of information asymmetries (in terms of perceived costs) by cheaper and more efficient information and communication technologies has increased and will further increase the demand for international diversification. This should in particular affect private investors whose access to adequate information has been limited until recently. In this context Amadi [2004] explicitly point out the advent of the Internet. Pesenti and van Wincoop [2002] expect that the diffusion of a core set of international accounting standards and a more liberal regulatory environment worldwide as well as worldwide industrialization in the mutual funds sector through indirect international diversification from the funds' increasing foreign portfolio allocation are likely to reduce the home bias.

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NOTES

1. The interested reader will find more information about the consumption home bias in, for example, Lewis [1999] and Sorensen et al. [2005].
2. Another issue related to adjusting returns is to account for estimation risk because returns cannot be precisely measured. However, Jorion [1985] as well as Glassman and Riddick [1994] have found that estimation risk can explain only a small part of the home bias.
3. A summary can be found in Kilka and Weber [2000]. See also Graham, Harvey, and Huang [2005].

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