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Bilateral Home Bias: New Perspective, new Findings

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1. Introduction

While it is generally agreed that international diversification improves portfolio performance, many countries hold puzzling low levels of foreign assets. The difference between optimal and observed (far too low) foreign holdings is known as the home bias puzzle (see French & Poterba, 1991). The academic literature has proposed several possible explanations for the home bias puzzle. The prime targets were transaction costs such as fees, commissions and higher spreads (see Glassman & Riddick, 2001; Tesar & Werner, 1995; Warnock, 2001) and direct barriers to international investment (see Black, 1974; Errunza & Losq, 1985; Stulz, 1981). Evidence in Tesar & Werner (1995) and more recently Glassman & Riddick (2001) and Warnock (2001), however, rules out transaction cost as an important driver of the equity home bias. Moreover, the home bias puzzle persists even in times when most direct obstacles to foreign investment have disappeared. Important contributions focus on differences in the amount and quality of information between domestic and foreign stocks (see Brennan & Cao, 1997; Gehrig, 1993; Veldkamp & Van Nieuwerburgh, 2006), on hedging of non-traded goods consumption as a motive for holding domestic securities (see Adler & Dumas, 1983; Cooper & Kaplanis, 1994; Stockman & Dellas, 1989), and more recently on psychological or behavioral factors (see Coval & Moskowitz, 1999; Grinblatt & Keloharju, 2000; Huberman, 2001). However, also these alternative explanations do not fully account for the observed home bias in international financial markets (see Ahearne et al., 2004, among others).

A relatively new surge in cross-border equity holdings works towards narrowing the gap and the documented decline in home bias (see Baele et al., 2007) suggests that countries are taking steps towards optimizing their international equity portfolios.

Until recently, available data only allowed for a comparison between domestic equity holdings and (aggregated) rest-of-the-world foreign holdings. The International Monetary Fund's Coordinated Portfolio Investment Survey (CPIS) collects information regarding the foreign equity holdings of 74 countries and territories, detailed by issuing country. Fidora et al. (2007) use this database available for the years 1997, 2001, 2002 and 2003 in order to compute bilateral home bias and show the contribution of real exchange volatility to explaining the well-known preference for local assets.

This chapter combines the (increasingly extensive) CPIS database for the period 2001-2009 to compute bilateral home bias together with a new perspective on optimal investment "benchmarks" in order to explore the dynamics of bilateral home bias and the importance of

the host market performance. This first such exploratory exercise uncovers the phenomenon of "partner bias" (i.e. consistent overinvestment in specific target countries, regardless of market performance considerations) and suggest several hypotheses for further study.

A prime issue when measuring home bias, as the deviation from optimal international investment, is the choice of "benchmark", i.e. the "correct" mix of domestic and foreign equity. Traditionally, in the home bias literature it is assumed that the optimal portfolio weights equal each country's share in the world market capitalization. This result is valid only to the extent that the generating model, the International Capital Asset Pricing Model (I-CAPM) is an accurate description of the returns data. If this is the case, the I-CAPM investor should hold the market portfolio. Each country is expected therefore not to hold a larger proportion of domestic assets than its own share in the world market. At the same time, the optimal portfolio weights in foreign equity of all other countries are given by their respective market shares. No country raises to the challenge.

Given the rather strict assumptions of the I-CAPM, it is natural to question the validity of its investment prediction. The alternative to the I-CAPM optimal portfolio weights, the so-called 'model-based' approach was until recently, a pure 'data-based' approach (see Pástor, 2000). Discarding completely the I-CAPM assumption, purely 'data-based' optimal weights are calculated in a standard mean-variance framework using the sample moments of the return data. However, the sample mean and variance of asset returns are notoriously unreliable estimates of the true expected returns and variance (see Britten-Jones, 1994; Jenske, 2001; Merton, 1980). The resulting optimal weights take extreme and volatile values, of little use as optimal investment "benchmarks". Thus, the wide use of the 'model-based' approach is not necessarily evidence for the pertinence of the I-CAPM but more for the lack of a viable alternative.

Alternatives to the debatable I-CAPM prediction have been recently made possible, through the Bayesian portfolio selection framework developed by Pástor & Stambaugh (2000), Pástor (2000) and the Multi-Prior volatility correction method of Garlappi et al. (2007) that provide different sets of optimal portfolio weights and consequently, alternative measures of home bias. Pástor (2000) investigates to what extent optimal portfolio weights vary with various degrees of mistrust in the asset pricing model. In this Bayesian framework, the investor is neither forced to accept unconditionally the pricing relation nor discard it completely in favor of the data. As the degree of scepticism about the model grows, the resulting optimal weights move away from those implied by the 'model-based' approach to those obtained from the 'data-based' approach. While this methodology typically produces weights that are much more stable over time compared to the 'data-based' approach, its reliance on sample data for higher levels of model uncertainty means, however, that extreme and volatile weights cannot be ruled out. This can be addressed by applying the volatility correction technique developed by Garlappi et al. (2007). Their methodology introduces estimation risk in the standard mean variance framework by restricting the expected return for each asset to lie within a specified confidence interval around its estimated value, rather than treating the point estimate as the only possible value, i.e. they allow for multiple priors.

This methodology is also applied directly to returns data for a large set of countries to obtain volatility corrected 'data-based' benchmarks for optimal weights and alternative to the I-CAPM market share weights. This innovative perspective on optimal investment "benchmarks" results not only in alternative values of home bias, but also facilitates a deeper understanding of the international investment decision. A mean-variance investor might be more attracted by gains from investing in well performing markets (based on available data

on asset returns) than by the wisdom of the I-CAPM. In this case, and especially in the bilateral framework made possible by the CPIS data, the compelling performance of home versus host markets might be instrumental in explaining the investors' international portfolio decisions.
The purpose of the present exercise is therefore to provide a first exploration of the above hypothesis using country data on returns and bilateral foreign holdings. The 'data-based' and (to a certain extent) the Bayesian approaches allow for alternative rankings of the countries' attractiveness as well-performing investment destinations, compared to the I-CAPM prediction. More specifically, this approach makes it possible to distinguish the countries whose performance (from a mean-variance perspective) allows them to optimally "hold in" more domestic capital and conversely, which countries "deserve" a higher share of foreign capital. By comparing the Bayesian and 'data-based' sets of optimal weights with observed bilateral allocations, we can infer whether home bias is essentially affected by the relative performance the home versus host country.
The patterns uncovered by this first look into the dynamics of home bias across country pairs start with the first documenting of a phenomenon uncovered here: the existence of a partner bias, driven possibly by geographical closeness and cultural or historical ties. The partner bias is exhibited by both developed and emerging markets and endures across years where market performance suggests suboptimality of such a strategy. Secondly, there are noticeable differences from developed to emerging countries with respect to the adequacy of their equity investment strategies, in favor of the former. The converse of the proximity hypothesis also appears true, as countries that are less developed and/or further apart are consistently more home biased. Last but not least, this chapter raises the question of a possible crisis effect (eroding the process of market integration) that, together with the dynamics of bilateral home bias warrant further study.
The remainder of this chapter is organized as follows. Section 2 reviews the three alternative decision frameworks provided to the investors and discusses the chosen measure for bilateral home bias and section 3 presents data issues arising from the use of the Coordinated Portfolio Investment Survey (CPIS). The main patterns apparent within the bilateral home bias data are introduced in section 4, while section 5 concludes by reviewing the initial findings and the agenda for future research in this field.

2. Optimal portfolio weights and home bias measures

This section gives a brief presentation of three alternative frameworks available to a mean-variance investor to compute his optimal portfolio weights: (1) the traditional I-CAPM framework of Lintner (1965), which is the overwhelming choice in the home bias literature; (2) the Bayesian framework developed by Pástor (2000) and (3) the Multi-Prior framework of Garlappi et al. (2007).[1]

2.1 Three alternatives for the mean-variance investor

An investor making his portfolio decision under the mean-variance framework of Markowitz (1952) and Sharpe (1963) chooses to divide his investment budget across the available assets such that the ensuing portfolio gives the highest expected returns for his acceptable level of risk. When short sales are allowed and a budget constraint is enforced, the investor's maximization problem has an analytical solution expressed as a function of the mean and

[1] For more detailed discussion and an application of these techniques to the home bias problem, see Baele et al. (2007).

variance of excess returns. Under strict assumptions, the I-CAPM provides a clear portfolio decision to the mean-variance investor. The I-CAPM is valid in a perfectly integrated world, where the law of one price holds universally and markets clear (total wealth is equal to total value of securities). The world market portfolio can then be defined as the sum of all individual portfolios weighted by the positions held by mean-variance investors. The portfolio implication of the CAPM is that the average mean-variance investor holds the market portfolio (Lintner, 1965). In an international setting, the optimal investment weights of a country according to this so-called 'model-based' approach, are given by the relative shares of domestic and foreign equities in the world market capitalization. This implies that the optimal portfolio weights are given by the relative shares of each country in the world market and regardless of his domestic market, the average investor should hold about 40% of his budget in US stocks, 10% in stocks of Japan and respectively UK, 5% in French stocks and less in the other equity markets according to their relative weights. The home bias literature follows these assumptions and compares domestic and foreign holdings to show the well-known preference to domestic assets.
The I-CAPM results in the well-known linear beta relationship between risk premium on the domestic portfolio and the expected excess return on the world market benchmark [2]:

$$E(r_d) - r_f = \beta \left[E(r_w) - r_f \right], \tag{1}$$

where r_d is the real return on the domestic market portfolio, r_f is the risk free rate, $\beta \equiv \frac{cov(r_w, r_d)}{var(r_w)}$ is the world market beta of the domestic market and r_w is the return on the world market portfolio. The empirical counterpart of equation 1 is given by

$$r_d - r_f = \alpha + \beta \left(r_w - r_f \right) + \varepsilon, \tag{2}$$

where α and ε are respectively the intercept and the error term. The I-CAPM is considered valid if estimates of the intercept, $\hat{\alpha}$ are zero.
The debate of the validity of the I-CAPM, naturally casts a shadow on the results of home bias computed as the deviation of actual portfolio weights from world market shares. The traditional alternative to using the I-CAPM predictions about optimal weights would have been to plug in the sample mean and variance of a time series of asset returns in the analytical solution to the mean-variance maximization problem. Notoriously noisy (see Merton, 1980), the expected returns estimated by the sample mean perturb the final results for "optimal" weights into chaotic predictions alternating heavy short sales with large long positions in any given asset. The home bias literature's choice for the world market shares as optimal portfolio weights is rather a reaction to the lack of merit of the data alternative rather than an endorsement of the I-CAPM as the data generating model. Recent developments in the portfolio selection literature allow smoothing of the 'data-based' solution into relevant investment guidelines. Pástor (2000) uses a Bayesian updating approach by which optimal weights are the result of combining the initial prediction of the I-CAPM with 'data-based' information in amounts depending on the investor's degree of mistrust in the validity of the model. In this framework, when there is mistrust in the I-CAPM, the data becomes informative and is involved in the portfolio allocation decision. The degree of trust (i.e. the belief that the intercept $\hat{\alpha}$ is zero) is expressed in values of the standard errors of the intercept

[2] This model makes the additional assumption that currency risk is not priced. See De Santis & Gérard (2006) and Fidora et al. (2007) for an analysis of exchange rate risk on home bias measures.

σ_α. A small value indicates a strong belief that the theoretical model is valid and results in optimal portfolio weights that closely correspond to the 'model based' approach. A higher value involves data to a larger extent in the computation of optimal weights leading thus to a different set of optimal weights and brings us closer to the results of the 'data based' approach. Full mistrust in the model (i.e. $\sigma_\alpha \to \infty$) coincides with the 'data based' optimal weights. This Bayesian interpretation is an insightful reconciliation of the 'model' and 'data-based' approaches. For instance, a nonzero value for $\hat{\alpha}$, even if insignificant according to a standard t-test (and therefore failing to reject the I-CAPM), could become instrumental in explaining why observed allocations deviate from the model prescriptions.

The larger the mistrust in the I-CAPM results in a stronger reliance on data in order to obtain optimal portfolio weights which makes the investment prediction all the more vulnerable to data volatility. This can be corrected to a certain extent by applying the Multi-Prior technique of Garlappi et al. (2007). Garlappi et al. (2007) extend the mean-variance optimization problem by incorporating the investor's aversion to uncertainty over the estimate of expected returns. This changes the standard mean-variance problem in two ways: (1) it binds the expected returns to a confidence interval around their estimate, thus taking into account the eventual estimation error and (2) it allows the investor to minimize over the choice of expected returns, thus manifesting its aversion to uncertainty. The result of this extended mean-variance optimization is to obtain considerably smoother optimal portfolio weights using only time series of data.

By applying these techniques, the relative market performance as embodied in the data on asset returns can be meaningfully used in the portfolio decision.

This chapter computes and compares three sets of optimal weights: (1) I-CAPM weights (i.e. relative world market shares); (2) weights obtained by combining the I-CAPM with available returns data using the Bayesian updating technique of Pástor (2000)[3] and further corrected by Multi-Prior technique of Garlappi et al. (2007) and (3) weights obtained from available returns data smoothed by directly applying the same Multi-Prior volatility correction of Garlappi et al. (2007).

2.2 Bilateral home bias measure

The measure of bilateral home bias results from the relative difference between actual and optimal holdings of country j equity by country i:

$$HB_{ij} = \frac{OPT_j - ACT_{ij}}{max\left(|OPT_j|, |ACT_{ij}|\right)}, \tag{3}$$

where HB_{ij} represents the bilateral home bias of country i with respect to host country j, OPT_j is the optimal portfolio weight of destination country j computed under one of the three frameworks presented in Section 2.1 and ACT_{ij} measures the actual holdings by country i of equity issued in country j.

Virtually all the literature on home bias, limited by data availability contents itself with comparing domestic with foreign (rest-of-the-world) holdings. Without exception, this aggregate perspective shows that the actual and optimal weights are positive and actual

[3] The degree of mistrust in the model - used to determine the degree to which the data is used to update the prior belief in the I-CAPM - is chosen based on the standard errors of the intercept in the I-CAPM regression.

weights are lower than optimal weights. In this case, equation 3 becomes the well-known formula:

$$HB_i = 1 - \frac{ACT_i}{OPT_i}, \tag{4}$$

where ACT_i is the actual share of foreign holdings in country i's portfolio and OPT_i, its optimal foreign equity investment. This measure is therefore bound between 0 (when actual holdings are optimal) and 1 (when the country is fully invested in domestic equity).

This chapter uses recently available data on actual holdings (from the Coordinated Portfolio Investment Survey conducted by the International Monetary Fund) in order to take the analysis of home bias to the bilateral level and applies the techniques outlined in Section 2.1 to compute three sets of optimal weights. In this perspective, both actual and optimal weights can be negative (short sales being allowed) and countries may be overinvested in some of their investment destinations. If equation 4 were applied here, the (much lower) optimal weights in the denominator might result in extreme values for home bias that are practically irrelevant for subsequent analysis. Equation 3 redefines the formula for computing home bias in such cases, maintaining therefore the scale of the resulting home bias. In their paper linking home bias to exchange rate volatility, Fidora et al. (2007) make the same choice when computing bilateral home bias.

3. Data issues

The current exercise on bilateral home bias is made possible by the initiative of the International Monetary Fund (IMF) to conduct the Coordinated Portfolio Investment Survey (CPIS) in which 74 economies volunteer information about the geographical distribution of their foreign assets. The first trial was successfully conducted in 1997 and starting with 2001, the CPIS takes place every year. This chapter uses the 9 years of data on cross-border stocks available since 2001.

While the value-added in information brought about by such detailed statistics is substantial, it has to be noticed that several possible bias are in-built in this database. If for instance, country A uses a broker company in country B in order to ultimately invest in a third country C, the database will not allow us to uncover country A's holdings of country C's equity. Also, participating economies may (and do) on occasion choose to withhold information on the amounts of their holdings.

Data on market index prices and market capitalization is obtained from Datastream. Monthly US$-denominated total returns have been computed for 58 of the 74 economies covered by the CPIS. Where available (34 cases) Datastream's total market indices have been used. The coverage starts in January 1973 for the more established markets and as late as 2006 for Uruguay and Luxembourg. The world market index has been computed as a weighted average of the available market indices at each point in time. In order to compute Bayesian and 'data-based' optimal weights every period, only the countries with 120 monthly observations of returns data available prior to the year-end observation, have been taken into consideration.

The risk-free rate is the one-month Treasury Bill rate from Ibbotson and Associates Inc., available on Kenneth French's website[4].

[4] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

4. Results and patterns

The available data collected results in the following coverage for bilateral home bias: 15,423 observations are obtained for the I-CAPM home bias, pairing each year between 48 and 58 investing countries and 53 to 58 destination countries, 13,054 observations for Bayesian home bias (48 to 58 investing countries and 33 to 49 destinations) and 13,385 observations for 'data-based' home bias (48 and 58 investing countries and 34 to 52 destinations). The differences in coverage across the three measures come from the different data requirements for their computation, specifically the availability of market capitalization figures and/or long enough series of asset returns data.

4.1 From home bias to partner bias

The bilateral nature of this database allows a particular refinement of the notion of home bias. While most previous studies are forced to an aggregate view that suggests invariably that countries underinvest with respect to the rest of the world, zooming in to the level of individual destination countries uncovers a non-negligible amount of instances of overinvestment (negative home bias). Apart from their traditional home bias, many countries exhibit exceeding preferences for some destination countries in their equity portfolios. Otherwise put, many countries are partner biased.

Figure 1 shows for the I-CAPM home bias that while underinvestment (positive home bias) remains the dominant pattern, the examples of overinvestment are systematic. For each year from 2001 to 2009, all available figures for bilateral home bias are arranged in ascending year, with visible increases in the share of negative observations from year to year. The instances of negative home bias account from 12 to 18% of observations in any given year.

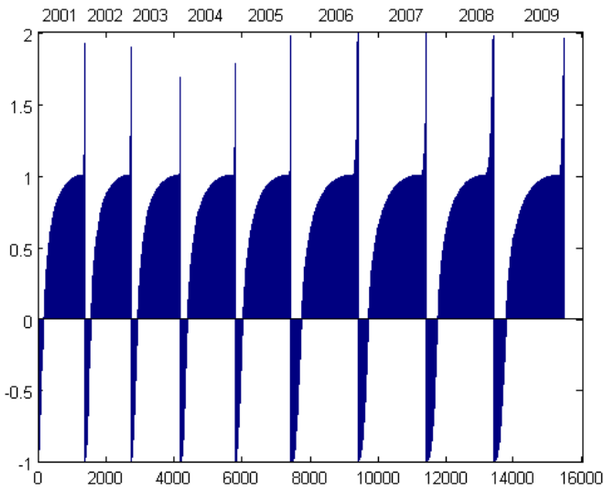

Fig. 1. I-CAPM Bilateral Home Bias
The figure shows bilateral home bias figures computed under the I-CAPM framework, arranged in ascending order for each year from 2001 to 2009.

When refining the I-CAPM optimal investment policy by taking into account the dynamics of asset returns, the amount of foreign holdings that exceed the optimal "benchmark" (from the Bayesian perspective) range from 50 to 65% of the observations (see Figure 2). However, the figure also suggests that the Bayesian framework is a more realistic representation of the

optimization decision of investors, a substantial part of the observations appear close to the optimal zero home bias.

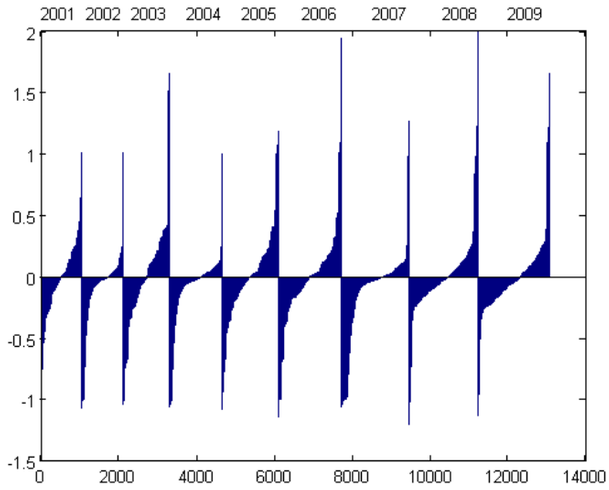

Fig. 2. Bayesian Bilateral Home Bias
The figure shows bilateral home bias figures computed under the Bayesian framework, arranged in ascending order for each year from 2001 to 2009.

Focusing only on market performance in deriving optimal portfolio weights under the 'data-based' framework, offers the most extreme view on home bias, with the largest values both on the negative and on the positive side. Figure 3 shows that few countries seem to follow an entirely data driven objective, as most of the observations fall far from 0. However, under this optimization framework as well, underinvestment is balanced by overinvestment and the share of negative figures ranges from 44 to 55%.
Having uncovered the phenomenon of partner bias, the following endeavours to extract a first set of hypotheses and patterns underlying it.

4.2 The importance of financial centers

The observation of a partner bias is linked to an important caveat present in this database, which is the particular importance of financial centers. Countries whose financial markets are actively intermediating cross-border capital flows, report foreign assets and liabilities in amounts disproportionate to their market capitalizations and/or the performance of their domestic asset returns. Some of the overinvesment observed in the data is bound to occur due to the presence of such markets, whose main activity is undergone on behalf of investors from (unidentifiable) third countries.
One way to determine whether the negative home bias is exclusively due to the presence of financial centers among the countries analyzed, is to identify the countries that appear as overinvestors or destinations of overinvestment in the majority of their bilateral relationships. Across the three measures of home bias, Ireland, a recognized financial center, appears to constantly overinvest in the equity of its partner countries (with the largest share - 60 to 70% - of negative positions in total investing observations). Together with other financial hubs such as Luxembourg and Bermuda, Ireland is also one of the preferred destinations for overinvestment. Other countries that also tend to be part of relationships with predominantly

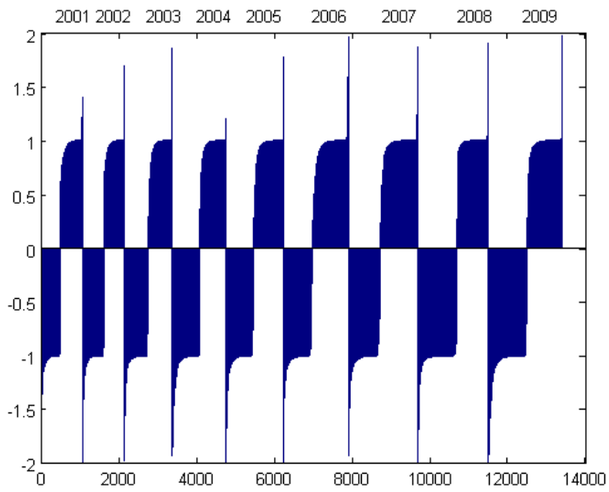

Fig. 3. 'Data-based' Bilateral Home Bias from 2001-2009
The figure shows bilateral home bias figures computed under the 'data-based' framework, arranged in ascending order for each year from 2001 to 2009.

negative home bias to some extent for possibly similar financial intermediation activities are Malaysia, The Netherlands, UK, Mauritius and Cyprus.
However, the presence of negative home bias is not an exclusive indication of financial intermediation. Countries like Colombia, Egypt, Norway are consistent overinvestors under at least one of the three optimality frameworks provided. Other countries too are overweighed in some foreign portfolios, especially when their market performance is taken into account. Bayesian and 'data-based' home bias measures suggest that many countries have not been a wise investment for the large majority of their partners: South Africa, Korea, Brazil, Indonesia, Latvia, Argentina, Hungary, Poland, Romania a.o.
Despite the (perturbing) effect of financial intermediation on the data, there are reasons to believe the data truly uncovered a previously undocumented phenomenon of partner bias.

4.3 Deviations from optimality and crisis effect

A second caveat to be taken into account due to the substantial negative home bias is that descriptive statistics of raw figures of bilateral home bias would result in the canceling out of positions of opposite signs. This situation occurs by default in all traditional studies of home bias that compare domestic and foreign holdings. For comparison, this section reports aggregate figures of bilateral home bias per investing as well as per destination country.
For a more accurate representation of bilateral home bias, the deviation from optimality is defined under the three measurement frameworks, first regarding each country's position as an investor:

$$DI_{it} = \sqrt{\frac{\Sigma_{j=\overline{1,n}} HB_{ijt}{}^2}{n}}, \tag{5}$$

where D_{it} represents for any year t, the deviation from optimality of bilateral home bias of investing country i averaged over the n available host countries j.

Similarly, DD_{jt} represents the deviation from optimality of bilateral home bias of destination country j, averaged over the m investing partners for any year t:

$$DD_{jt} = \sqrt{\frac{\Sigma_{i=\overline{1,m}} HB_{ijt}{}^2}{m}}. \tag{6}$$

Since the time frame includes the recent financial crisis, the sample is divided in three subperiods to observe possible differences occurring in the final subperiod which corresponds to the 2007-2009 crisis. Descriptive statistics are provided for averaged bilateral home bias and deviations from optimality for three subsamples: (1) the period 2001 - 2003, (2) the period 2004 - 2006 and (3) the financial crisis period, 2007 - 2009.
First, descriptive statistics for bilateral home bias and deviations from optimality are provided for data aggregated by investing countries. Table 1 provides results that would be comparable to aggregate home bias results discussed in previous literature. Consistent with Baele et al. (2007), for instance, the results suggest still a substantial I-CAPM home bias, corrected almost completely when data on asset returns is allowed to play a role in the investment decision. Bayesian and 'data-based' bilateral home bias are on average close to 0. However, the large ranges and standard deviations suggest especially for the I-CAPM and 'data-based' measures that in aggregation significant information has been lost through canceling out. The Bayesian measure, however, stands out as considerably smoother (lower range and standard deviation), suggesting that indeed a combination of the I-CAPM prediction and market performance is a better optimization framework.

	I-CAPM			**BAYESIAN**			**DATA**		
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
	2001 - 2003	2004 - 2006	2007 - 2009	2001 - 2003	2004 - 2006	2007 - 2009	2001 - 2003	2004 - 2006	2007 - 2009
Mean	0.61	0.58	0.58	-0.05	-0.05	-0.05	-0.05	0.04	-0.01
Median	0.69	0.73	0.67	-0.06	-0.06	-0.07	-0.25	0.09	0.17
Minimum	-0.62	-0.76	-0.66	-0.35	-0.58	-0.32	-1.30	-1.16	-1.08
Maximum	0.95	0.95	1.01	0.68	0.71	0.72	1.00	1.00	1.00
Standard Deviation	0.30	0.36	0.37	0.19	0.19	0.15	0.93	0.88	0.82

Table 1. Descriptive Statistics of Bilateral Home Bias of Investing Countries
This table shows descriptive statistics for bilateral home bias aggregated by investor countries, across the three measures: I-CAPM, Bayesian and 'data-based' home bias and three periods: (1) 2001 - 2003, (2) 2004 - 2006, (3) 2007 - 2009.

Table 2 presents the same descriptive statistics for deviations of optimality aggregated by investing countries. The results confirm the appropriateness of the Bayesian optimization framework. Consistent with results for aggregate home bias presented by Baele et al. (2007), at the bilateral level, as well, deviations from optimality under the Bayesian perspective are dramatically decreased (by as much as 70%). The 'data-based' optimization framework is consistently furthest from the actual decisions of investors, with its large positive and negative positions in bilateral home bias resulting in the largest deviations from optimality.
The only statistically significant difference for the crisis period occurs for the deviations from I-CAPM optimality, which suggests that the crisis might be associated with possibly lower foreign holdings, leading to higher home bias. Under the interpretation of Baele et al. (2007)

that present the home bias as a relevant proxy of market integration, this raises the hypothesis that the financial crisis acted as a deterrent of the process of market integration.

	I-CAPM			BAYESIAN			DATA		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	2001 - 2003	2004 - 2006	2007 - 2009	2001 - 2003	2004 - 2006	2007 - 2009	2001 - 2003	2004 - 2006	2007 - 2009
Mean	0.84	0.84	0.88	0.24	0.24	0.27	1.01	1.01	1.01
Median	0.84	0.84	0.89	0.23	0.22	0.25	1.00	1.00	1.00
Minimum	0.69	0.71	0.74	0.02	0.02	0.04	0.86	0.86	0.89
Maximum	0.97	0.94	1.03	0.64	0.93	0.80	1.39	1.15	1.16
Standard Deviation	0.06	0.05	0.06	0.13	0.16	0.15	0.09	0.06	0.04

Table 2. Descriptive Statistics of Deviations from Optimality of Bilateral Home Bias of Investing Countries
This table shows descriptive statistics for deviations from optimality aggregated by investor countries, across the three measures: I-CAPM, Bayesian and 'data-based' home bias and three periods: (1) 2001 - 2003, (2) 2004 - 2006, (3) 2007 - 2009.

Tables 3 and 4 provide the same descriptives for bilateral home bias and deviations from optimality, aggregated by destination countries. They present a similar picture, for the first time from the perspective of destination countries. In the case of the I-CAPM home bias, the larger ranges for deviations from optimality (compared to the ones reported for investing countries in Table 2) bring forth the idea that that some countries are preferred and others discriminated against, by most of their investing partners. These preferences act in direct breach of the asset pricing model. The statistics for deviations from Bayesian optimality, show that the deviations per destination countries, albeit higher, tend to be less volatile than the deviations of investing country home bias (with lower ranges and standard deviations during the three subperiods). This suggests that destination countries are chosen by most of their investing partner based on similar considerations regarding the performance of their stock returns. The deviations are consistently highest for the 'data-based' bilateral home bias, once again proving to be off-mark.
While at this stage the data only raises the hypothesis of a crisis effect (possibly deterring to some extent the previously documented phenomenon of market integration), with further analysis needed in order to settle the question, the dominant finding here remains the evidence that investors make an optimizing portfolio decision across a large number of foreign assets, in a manner not unlike the Bayesian updating methodology proposed by Pástor (2000).

4.4 Pairing and regional patterns

This section adds a first set of possible patterns and hypotheses regarding the bilateral home bias, extracted from examining the behavior of country pairs.
A first finding is that for both the I-CAPM and the Bayesian measures of home bias, a strongly significant positive correlation exists between the figures for the pairs Country A investing to Country B and reciprocally Country B investing to Country A. For the 'data-based' measure, the correlation is not statistically significant. It should be noted that the results for the 'data-based' measure (even after having applied the volatility correction mechanism of Garlappi et al. (2007) remain the least smooth. This suggestion of reciprocity in bilateral investment policies reinforces the idea of a partner bias, shared by pairs of countries and invites further analysis.

	I-CAPM			BAYESIAN			DATA		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	2001 - 2003	2004 - 2006	2007 - 2009	2001 - 2003	2004 - 2006	2007 - 2009	2001 - 2003	2004 - 2006	2007 - 2009
Mean	0.66	0.66	0.59	0.04	-0.01	-0.04	0.06	0.02	-0.11
Median	0.71	0.70	0.61	-0.03	-0.02	-0.04	-0.04	-0.02	-0.08
Minimum	-0.04	-0.16	-0.33	-0.23	-0.25	-0.35	-0.27	-0.31	-0.43
Maximum	1.19	1.26	1.34	1.54	0.49	0.45	1.00	0.66	0.36
Standard Deviation	0.24	0.27	0.30	0.31	0.13	0.12	0.28	0.20	0.14

Table 3. Descriptive Statistics of Bilateral Home Bias of Destination Countries
This table shows descriptive statistics for bilateral home bias aggregated by destination countries, across the three measures: I-CAPM, Bayesian and 'data-based' home bias and three periods: (1) 2001 - 2003, (2) 2004 - 2006, (3) 2007 - 2009.

	I-CAPM			BAYESIAN			DATA		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	2001 - 2003	2004 - 2006	2007 - 2009	2001 - 2003	2004 - 2006	2007 - 2009	2001 - 2003	2004 - 2006	2007 - 2009
Mean	0.85	0.86	0.88	0.30	0.38	0.35	1.01	1.01	1.00
Median	0.85	0.87	0.88	0.30	0.35	0.32	1.01	1.00	1.00
Minimum	0.48	0.48	0.54	0.15	0.21	0.21	0.93	0.95	0.78
Maximum	1.24	1.17	1.34	0.56	0.74	0.66	1.07	1.07	1.08
Standard Deviation	0.12	0.11	0.13	0.09	0.10	0.10	0.02	0.03	0.03

Table 4. Descriptive Statistics of Deviations from Optimality of Bilateral Home Bias of Destination Countries
This table shows descriptive statistics for deviations from optimality aggregated by investor countries, across the three measures: I-CAPM, Bayesian and 'data-based' home bias and three periods: (1) 2001 - 2003, (2) 2004 - 2006, (3) 2007 - 2009.

In order to gain more insight, the pairs of countries in the data are ranked according to the following criteria: (1) optimality of their foreign equity holdings; (2) consistent overinvestment (negative home bias) and (3) consistent underinvestment (home bias in the traditional acception).
For all three criteria, the pairs of countries that are, in any given year in the upper 10% are individually identified. The most relevant relationships are identified in the following.

4.4.1 Optimality of foreign holdings

The idea of reciprocity receives further support when investigating the pairs of countries that consistently appear in the top 10% of countries with low home bias. With respect to the I-CAPM home bias, the following pairs benefit reciprocally from (close to) optimal partner equity holdings: Austria - The Netherlands, Switzerland - Austria, Switzerland - Germany, Germany - France, Germany - The Netherlands, UK - The Netherlands, The Netherlands - Finland, France - The Netherlands, The Netherlands - Belgium. In other cases, consistent optimal investment behavior by the investing countries is not mimicked by the host countries. The most relevant examples involve the following pairs of investor to destination countries: Germany to Austria, Spain and Finland; France to Belgium, Finland, Spain and Italy; Finland

to Norway and Denmark; The Netherlands to Switzerland, Norway to Switzerland, UK and The Netherlands; Sweden to Denmark and Switzerland. A possible pattern suggests itself. Developed European markets that have long standing trading traditions and are geographically close, follow and achieve (close to optimal) diversification benefits.
With respect to the Bayesian home bias, the best performers make for a different pattern and suggestion. It seems that combining data with the I-CAPM prediction, vindicates the (lower) investment decisions of several developed countries with respect with some (recurrent) emerging countries. The (under)investments (under the I-CAPM framework) of Belgium, Canada, Switzerland, France, Greece, Japan, Germany and Singapore to Turkey, as well as of Germany, France, Denmark, Japan, The Netherlands, Norway, Belgium and Spain to Argentina appear now justified.
An all market performance driving factor of investment decision (under the 'data-based' framework), appears to justify (to some extent) several countries' decisions to underinvest (based on I-CAPM standards) to the larger host markets such as USA (with repeated lower deviations of Austria, Switzerland, Argentina, Australia, Canada, Germany, Denmark, Netherlands, Norway, New Zealand, Sweden, UK, Finland, Japan and Singapore) as well as the UK (whose assets have closer to optimal weights in the portfolios of Canada, Germany, Denmark, Finland, France, Ireland, Norway, Sweden, USA, South Africa, Austria, Belgium and Singapore).
The most important patterns uncovered with respect to the optimality of investment strategies are firstly, the possible reciprocity of investment strategies for countries that benefit from cultural, historical and/or geographical proximity and secondly, the fact that market performance appears to play a more important role in the investment decision when the destination is an emerging country.

4.4.2 Negative home bias

In analyzing the negative observations for the I-CAPM home bias, further evidence adds to show the importance of financial centers in this data. The two consistent destinations of overinvestment are Bermuda (from Hong Kong, Singapore, USA, Ireland, South Africa, Austria, Bahrain, Brazil, Cyprus, Norway) and Luxembourg (from Belgium, Germany, Italy, Estonia, Hungary, Latvia, Iceland).
However, other pairs stand out for their consistent and reciprocal overinvestment. Estonia - Latvia, Czech Republic - Slovakia, Slovakia - Hungary. While these countries are small, they share not only a border but also historical and cultural ties that might explain why their partner equity weights exceed substantially the weight of the destination countries in the world market capitalization.
Financial centers are a relevant presence in the top 10% of overinvestment under the Bayesian framework, as well. Ireland appears as a dominant destination country for capital from Austria, Italy, Finland, UK, The Netherlands, Portugal and South Africa, followed by Switzerland with exceeding capital from Ireland, Germany, Denmark, The Netherlands, Norway, Sweden and Austria. Ireland is also a typical overinvestor, with preferred destinations being UK, Switzerland, Korea, Australia, Germany, Portugal, Brazil, Spain, The Netherlands, Belgium, Finland, Hong Kong, Sweden and Japan.
Reciprocity in overinvestment, a partner bias at work, is present here as well for the pairs Ireland - Italy, Finland - Sweden and Germany - Switzerland, with (excluding Ireland) clear implications of proximity driving investment and enduring even when confronted with (repeated) underperformance. The same hypothesis fits other bilateral relationships

consistently exhibiting overinvestment, such as those of: Estonia to Finland, Argentina to Brazil, Austria to Germany, New Zealand to Australia, Singapore to Hong Kong, Slovakia to Hungary, Belgium to France, France to Germany and to Spain, Cyprus to Greece, Portugal to Brazil and to Spain, Czech Republic and Slovakia to Austria, Belgium to The Netherlands.
A similar view emerges from the analysis of the 'data-based' negative home bias. Overinvestment persists from Denmark to Sweden, Finland to Sweden, Singapore to Hong Kong, Argentina to Brazil, Austria to Germany, Hungary to Poland, Ireland to Italy, Norway to Sweden, Belgium to Spain, France and The Netherlands, Germany to Spain, France and UK to Spain, Portugal to Brazil and Spain, Slovakia to Hungary, Chile to Brazil, Czech Republic to Ireland, Germany to France, Denmark to Finland.
When market performance considerations are dominant, Japan stands out as a consistently unwise destination from Australia, Austria, Canada, Switzerland, Germany, Denmark, Finland, France, Italy, The Netherlands, Norway, New Zealand, Singapore, Sweden and USA.

4.4.3 Positive home bias

The traditional view on home bias (represented by the positive observations in this data) shows on one hand a pattern of financial centers such as Bermuda and Luxembourg underinvesting in many of their counterparts, but also consistent underinvestment of some emerging countries with respect to larger, developed destination countries, such as Turkey to Sweden, Spain, France, Italy, Denmark, UK and USA; Argentina to Belgium; Bulgaria to Canada; Brazil to Japan and Thailand and Chile to Denmark, Hong Kong and Italy.
Under the Bayesian framework, USA (representing about 40% of the world market capitalization) stands out as the large destination that consistently receives comparatively too small weights in the portfolios of all its partners. Bermuda and Luxembourg continue to exhibit persistent home bias with respect to many partners, but also the pattern of inadequacy of emerging (or distant) countries' foreign holdings is maintained as for instance, in the cases of Argentina to Belgium, Australia to Belgium, Brazil to UK, Chile to UK, Cyprus to Russia.
The 'data-based' home bias provides further substantiation to the same claim, as countries further apart or less developed tend to exhibit higher home bias, as in the examples of Argentina to Belgium, Germany to Chile, Japan to Chile, Korea to Belgium, Brazil to Austria, Korea to Denmark.

5. Concluding remarks

This chapter provides a first analysis of the dynamics of bilateral home bias computed due to a recently available dataset covering 74 economies during the period 2001-2009. Disaggregating the well-documented phenomenon of home bias at the level of country pairs over time, uncovers several patterns and suggests hypotheses for further research. First, a partner bias (i.e. overinvestment, 'negative' home bias) appears to play an important role in the forming of international equity portfolios, driven possibly by geographical, cultural or historical proximity. Establishing causality remains the most important aim of subsequent research in this topic. A second pattern, regards a difference between emerging and developed countries in the optimality of their investment decisions, in favor of the former. Conversely pairs of countries that are less developed and further apart tend to exhibit higher bilateral home bias. Finally, the hypothesis of a crisis effect, in the sense of a possible temporary setback of the process of market integration deserves further analysis.

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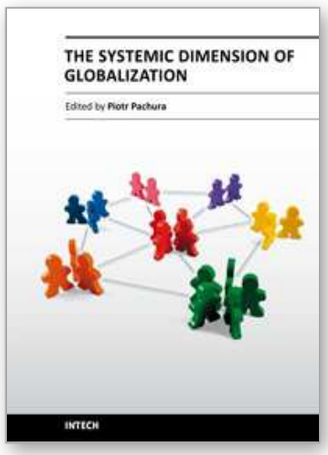

The Systemic Dimension of Globalization

Edited by Prof. Piotr Pachura

ISBN 978-953-307-384-2
Hard cover, 288 pages
Publisher InTech
Published online 01, August, 2011
Published in print edition August, 2011

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