Imperfect Financial Integration and Asymmetric Information: Competing Explanations of the Home Bias Puzzle?*

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Abstract

This paper shows that imperfect financial integration and informational asymmetries are not competing theories but rather complementing ideas to a single explanation of the home bias puzzle. We develop a rational expectations model of asset prices with investors that face informational constraints and find that informational advantages arise endogenously as a response to small financial frictions. We also present empirical evidence that (i) international financial frictions are correlated to observed patterns of US investors' attention and that (ii) the attention US investors allocate to foreign stocks helps explain home bias towards those countries, even after controlling for financial integration levels.

Keywords: Home bias, Rational inattention, Financial integration, Asymmetric information.

JEL Codes: F30, D82, G11.

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1 Introduction

In this paper, we argue that imperfect financial integration and informational asymmetries are not competing theories, but rather complementing ideas to a single explanation of the home bias puzzle. Empirical evidence that investors hold a significantly larger share of domestic equities in their portfolios than justified by diversification theories – known as home equity bias – remains elusive since it was raised by French and Poterba (1991) and Tesar and Werner (1995).[1]

Initially, lack of perfect financial integration was a generally accepted explanation, as in Black (1974) and Stulz (1981). In fact, many studies presented empirical evidence that foreign investors indeed face higher tax burdens, higher transaction costs, and greater government regulation than their domestic peers.[2] However, the financial globalization process experienced during the nineties significantly reduced, although did not eliminate, the amount of institutional and monetary barriers imposed on international investments. Therefore, in order to explain the remaining high levels of observed home equity bias, models which solely rely on financial frictions have to assume the presence of unrealistic transaction costs or tax disadvantages.[3] This concern led researchers to search for alternative explanations.

One alternative set of explanations which has attracted considerable attention in international finance literature assumes that there are informational asymmetries between domestic and foreign investors.[4,5] The popularity of such models was grounded in more general work which suggested that domestic fund managers or investors possess an informational advantage when investing in local markets.[6] However, exponential progress observed in the information technology sector in the past decade has allowed local information to be accessed globally in essentially real time and at a very low cost. Therefore, assumptions about the degree of informational immobility that have to be made in order to generate the current levels of home bias seem implausibly high.

Van Nieuwerburgh and Veldkamp (2009) and Mondria and Wu (2010) address this issue by showing that the interaction between portfolio and attention allocation choices substantially amplifies small initial informational advantages.[7] However, their simulations still rely on the presence of exogenously imposed initial informational asymmetries between home and foreign investors. Although the assumed asymmetries are small, some still argue that they are hard to justify in a world in which institutional investors have enough resources to eliminate any initial informational disadvantage (for example, by hiring foreign analysts or consultants).

We show that informational advantages may arise endogenously as a response to the presence of small financial frictions, even if initial information is assumed to be symmetric. This result implies that imperfect financial integration and informational asymmetries are not necessarily competing theories, but rather complementing ingredients of a single explanation of the home equity bias puzzle. More specifically, we develop a model of endogenous attention allocation that builds on Peng and Xiong (2006), Van Nieuwerburgh and Veldkamp (2009), and Mondria and Wu (2010). The key assumption is the idea that agents have a limited capacity to process information, as Sims (2003, 2006) developed and formalized. Imperfect international financial integration imposes small transaction costs or tax disadvantages on holdings of foreign assets, which leads investors to tilt their portfolios towards domestic assets. Because local assets now represent a larger share of investors' portfolios, investors naturally process more information about local assets, thus endogenously generating a small informational advantage. This small endogenous informational advantage is then magnified into large informational asymmetries and large levels of home bias through feedback between portfolio and attention allocation choices: as domestic investors become better informed about domestic assets, they optimally decide to hold even more of such assets and, therefore, process even more information about them. It is important to emphasize our differences and similarities with Van Nieuwerburgh and Veldkamp (2009) and Mondria and Wu (2010). Unlike previous papers, informational advantages arise endogenously in our model, even when initial information is assumed to be symmetric. This feature is essential in linking both information- and financial frictions-based explanations of home bias. The amplification mechanism which magnifies the small endogenous advantage into significant information asymmetries, however, is the same as in those two papers.

A numerical exercise with reasonable parameters of our model show that transaction costs or tax disadvantages that would reduce a domestic investor's excess return on its foreign asset holdings by just 10% can generate a home bias as high as 70% or 80% once information capacity constraints are taken into account. A simple calculation can help better understand how small a 10% reduction in excess returns of foreign assets represents. According to the annual survey of US residents' holdings of foreign assets, the United Kingdom has been by far the largest country in US residents' portfolios.[8] The annual return on the FTSE 100 in 2006 was 10.71%.[9] The annualized average of the monthly Fed Funds rate, our proxy for the risk free bond, was 4.96% during the same year. These numbers yield an annualized excess return of 5.75%. A transaction cost of 10% of the excess return would represent 0.58% a.a., or less than five basis points per month. Hence, less than five basis points per month can generate a home bias as high as 70% to 80%! If we bear in mind that financial frictions not only represent monetary trading costs and taxes, but also all types of institutional barriers associated with cross-border equity holdings, then a monthly transaction cost of five basis points is not an unreasonably high number.

We also present empirical evidence supporting our model's main predictions. Following Mondria et al. (2010), Da et al. (2010), and Mondria and Wu (2011), we rely upon Internet search data to construct a proxy for the attention US investors allocate to financial assets. For each country in our sample, we download from Google Insights for Search the traffic volume of queries originated in the US for information regarding foreign stock markets. Our empirical results confirm that financial frictions do correlate with US investors' observed attention allocated patterns. Additionally, the attention US investors allocate to foreign stocks helps explain US investors' home bias towards those countries, even after controlling for each economy's financial integration level. These results are robust to the use of three alternative measures of financial integration: a qualitative measure of foreign ownership/investment restrictions, the Chinn-Ito *de jure* index, and the Lane-Milesi-Ferretti *de facto* index.

The idea that attention allocation amplifies small financial frictions is consistent with empirical evidence on the large impact of the euro (Lane, 2006, and Coeurdacier and Martin, 2009) and the puzzling effect of distance in the financial gravity equations reported by Portes and Rey (2005). However, there are also alternative channels of home bias where small financial frictions are magnified. For example, in Martin and Rey (2004) and Coeurdacier and Guibaud (2006), the interaction of small financial frictions with elasticity of substitution between assets may also generate large levels of home bias.[10]

The remainder of the paper is organized as follows. Section 2 describes the model setup and its solution. Section 3 gives a numerical exercise where a small financial friction generates a large home bias. Section 4 describes the dataset. Section 5 explains the empirical strategy. Section 6 presents the estimation results, and section 7 concludes.

2 Model Setup

This model introduces heterogeneity among investors to Mondria (2010) in order to study the interaction between the optimal risk factor choice with the optimal asset holdings of each type of investor. The economy consists of two countries and is populated by a continuum of investors of measure one: half of them live in the home country and half live in the foreign country. Investors can hold three different types of assets: a riskless asset that pays R units of consumption good, a home risky asset, and a foreign risky asset.

Home and foreign investors have the same prior beliefs about the asset payoffs, which signifies that there is no information asymmetry in their prior information sets. However, due to imperfect financial integration, cross-border equity ownership is subject to an additional cost, θ, where $\theta > 0$. The two risky assets are independently and normally distributed, with the vector of prior expected net payoffs (net of the cross-border equity holding cost) denoted by $\tilde{R}$. The prior expected net payoffs of investor i when holding asset j is given by $\tilde{r}_{ij} \sim N\left(\bar{r}_{ij}, \sigma_{rj}^2\right)$, i.e., the prior beliefs of home investors are $\tilde{r}_{hh} \sim N\left(\bar{r}_h, \sigma_{rh}^2\right)$ and $\tilde{r}_{hf} \sim N\left(\bar{r}_f - \theta, \sigma_{rf}^2\right)$, and the prior beliefs of foreign investors are $\tilde{r}_{fh} \sim N\left(\bar{r}_h - \theta, \sigma_{rh}^2\right)$ and $\tilde{r}_{ff} \sim N\left(\bar{r}_f, \sigma_{rf}^2\right)$. Let $\bar{R}_h$ and Σ_R denote the mean vector and the diagonal variance-covariance matrix of the prior beliefs about the net asset payoffs of a home investor, $\tilde{R}_h = (\tilde{r}_{hh}, \tilde{r}_{hf})'$. Let $\bar{R}_f$ and Σ_R denote the mean vector and the diagonal variance-covariance matrix of the prior beliefs about the net asset payoffs of a foreign investor, $\tilde{R}_f = (\tilde{r}_{fh}, \tilde{r}_{ff})'$. Each risky asset has a noisy supply given by $\tilde{z}_j \sim N\left(\bar{z}_j, \sigma_{z,j}^2\right)$, this to avoid perfectly revealing prices. Let $\bar{Z}$ and Σ_Z denote the mean vector and the diagonal covariance matrix of the vector of net supply, $\tilde{Z} = (\tilde{z}_1, \tilde{z}_2)'$.

Four time periods occur during the operation of the market. In the first period, traders are endowed with an initial wealth, W_{i0}, and limited information processing capacity, κ. In the second period, investors decide their optimal attention allocation between the two countries. This decision involves choosing the form of their private signal, and allocating their limited information processing capacity to analyze both stock markets. In the third period, each investor decides the optimal asset holdings, $X_i = (x_{i1}, x_{i2})'$, given the observation of a private signal, which depends on the amount of information processed about each stock market and the price, which is public information. In the last period, agents consume the payoff of their portfolio.

2.1 Information Processing

Investors optimally decide how much information they want to process about each risky asset. The more information processed about one asset payoff, the greater the reduction in its uncertainty. However, investors are subject to an information processing constraint, which restricts the amount of information they can process.

Investors choose their optimal private signal among the following type of signals

$$\tilde{Y}_i = C_i \tilde{R} + \tilde{\varepsilon}_i \text{ where } \tilde{\varepsilon}_i \sim N(0, \Sigma_i), \tag{1}$$

where C_i is any $k \times 2$ matrix, $\tilde{\varepsilon}_i$ is independent of $\tilde{R}$, $\tilde{\varepsilon}_i$ is independent of $\tilde{\varepsilon}_k$ for $i \neq k$, and Σ_i is the variance-covariance matrix of $\tilde{\varepsilon}_i$. The matrix of weights in the private signal, C_i, and the variance-covariance matrix of the error term, Σ_i, are optimally chosen by investors. The private signal provides information about linear combinations of asset payoffs, and is incorporated into the investor's beliefs through rational Bayesian updating.

Following Sims (2003, 2006), the information processing constraint is given by

$$H\left(\tilde{R}\right) - H\left(\tilde{R} \mid \tilde{Y}_i\right) \leq \kappa, \tag{2}$$

where $H\left(\tilde{R}\right)$ is the entropy of the asset payoffs, or equivalently[11]

$$\ln \left| Var(\tilde{R}) \right| - \ln \left| Var\left(\tilde{R} \mid \tilde{Y}_i\right) \right| \leq 2\kappa. \tag{3}$$

This constraint restricts the amount of information contained in the private signal.

Investors with absolute risk tolerance parameter ρ maximize their preference for early resolution of uncertainty introduced by Kreps and Porteus (1978)[12]

$$U_i = E\left\{ -\ln E\left[\exp\left(-\frac{W_i'}{\rho} \right) \mid \tilde{Y}_i, \tilde{P} \right] \right\}, \tag{4}$$

subject to the budget constraint

$$W_i' = W_{i0} R + X_i' (\tilde{R} - R\tilde{P}), \tag{5}$$

where W_{i0} is the initial wealth of agent i, $X_i = (x_{i1}, x_{i2})'$ is the asset holdings vector of agent

i, $\tilde{R}$ is the vector of risky asset payoffs, and $\tilde{P}$ is the price vector of the risky assets. The market clearing conditions are given by $\int_0^1 X_i di = \tilde{Z}$.

Investors devote their limited attention to process information about the asset payoffs. After choosing the form of the private signal, investors decide the amount of information they want to process about each stock market. Then, investors incorporate the information from their optimally chosen private signal, $\tilde{Y}_i$, and the price into their beliefs through Bayesian updating. After investors derive their posterior beliefs about the asset payoffs, they decide their optimal asset holdings.

2.2 Solution

As in Mondria (2010), the model is solved using backward induction. First, each agent chooses the risky asset demand for any attention allocation. Second, given optimal asset holdings as function of attention allocation, each agent chooses the optimal attention allocation.

2.2.1 Optimal Asset Holdings

In the third period, after observing private signals and asset prices, investors derive their posterior beliefs about the asset payoffs and choose their optimal asset holdings

$$X_i\left(\tilde{Y}_i, \tilde{P}\right) = \rho Var\left[\tilde{R} \mid \tilde{Y}_i, \tilde{P}\right]^{-1} E\left[\tilde{R} - R\tilde{P} \mid \tilde{Y}_i, \tilde{P}\right]. \tag{6}$$

As in Admati (1985), the rational expectations equilibrium price is found by aggregating these asset demands and imposing the market clearing conditions.

Proposition 1 *There exists a unique linear rational expectations equilibrium price, $\tilde{P}$, that depends on both market aggregates, where*

$$\tilde{P} = A_0 + A_1\tilde{R} - A_2\tilde{Z}, \text{ with } A_2 \text{ nonsingular.} \tag{7}$$

The optimal asset holdings by an investor i are given by

$$X_i\left(\tilde{Y}_i, \tilde{P}\right) = G_{0i} + G_{1i}\tilde{Y}_i - G_{2i}\tilde{P}. \tag{8}$$

Expressions for A_0, A_1, A_2, G_0, G_1, and G_2 are given in the appendix.

2.2.2 Optimal Attention Allocation

In the second period, investors decide the form of the private signal and the amount of information they want to process for each market.

Proposition 2 *If there are no financial frictions, $\theta = 0$, and the following parameter condition $\Delta > 0$, where Δ is defined in the appendix, is satisfied, then there exists a unique linear symmetric equilibrium. In this equilibrium, all investors allocate their attention to learn about one linear combination of asset payoffs and there is no home bias.*

Absent of financial frictions, under a parameter condition, there exists an equilibrium where all investors decide to process the same type of information, and there is no home bias. In this equilibrium, each investor allocates all the limited capacity, κ, to learn about one linear combination of asset payoffs. Hence, C_i is a 1×2 matrix. Since investors are interested in processing information about their diversified portfolio, they choose to observe a linear combination of asset payoffs as a private signal. As pointed out by Sims (2003, 2006), as long as investors are interested in holding both types of assets, they have incentives to observe a linear combination of the asset payoffs. Since the matrix of weights, $C_i = (c_{ih}, c_{if})$, is 1×2, the variance-covariance matrix of the error term, Σ_i^{-1}, is a scalar. Given that investors only care about the relative weight that each risky asset has in the private signal, we normalize the matrix of weights as follows: $c_{ih} = 1$ or $C_i = (1, c_{if})$.

Proposition 3 *If there are financial frictions, $\theta > 0$, domestic investors optimally process more information about domestic assets than do foreign investors.*

If there are financial frictions, then different types of investors choose different private signals. In particular, investors optimally decide to specialize in processing information about assets that are generating uncertainty in their portfolio. Intuitively, the higher the asset holdings of domestic assets, the higher the incentives to process information about domestic assets.

3 Home Equity Bias

We run a numerical example in order to show the home bias generated by optimal investment specialization.[13] Home and foreign assets have expected payoffs of 3 and standard deviation of prior beliefs of 20%, as in Yuan (2005) and Van Nieuwerburgh and Veldkamp (2009). Investors pay 10% of their final expected payoff in order to invest in foreign assets. Following Ahearne et al. (2004), home bias is defined as

$$Home\ Bias = 1 - \frac{Share\ of\ foreign\ equities\ in\ US\ Portfolio}{Share\ of\ foreign\ equities\ in\ World\ Portfolio}. \tag{9}$$

As we can see in Figure 1, the optimal level of specialization generates a magnified home bias when the information processing capacity, κ, is higher than zero, and there are small financial frictions. Small financial frictions endogenously generate an initial information advantage in domestic assets which is magnified through the interaction between portfolio and information choice.

If there are small costs of investing in foreign assets, investors tilt their portfolio towards domestic assets. Consequently, investors optimally choose to observe a private signal with a higher weight in the domestic asset. This leads investors to hold even more domestic assets, which then provides them with further incentives to process even more information about domestic assets. Hence, the initial endogenous information asymmetry generated by financial frictions is magnified through the interaction of the asset holdings and attention allocation decision. As a result, small financial frictions endogenously generate a large information advantage in domestic assets, which in turn leads to a large home bias. In the optimal level of specialization, home bias may reach 70% or 80%, magnitudes compatible to those currently observed for the US. The home bias with optimal specialization is a bit lower than that with full specialization because investors are interested in diversifying their portfolio. As long as investors hold foreign assets, it is optimal for them to process at least some information about foreign markets since they generate uncertainty in their optimal portfolio. In the full specialization environment, investors are holding foreign assets, but are not processing any information about them. We can also see in Figure 1 that the amount of home bias generated by the financial friction itself is small.

[**Insert Figure 1 about here**]

Figure 2 shows a plot of home bias generated by different frictional costs for a given capacity to process information. As expected, the higher the frictional cost of investing abroad, the greater the home bias. Intuitively, the higher the cost of investing in foreign assets, the larger the initial tilt to domestic assets in the portfolio, and the higher the resulting endogenous information asymmetry.

[**Insert Figure 2 about here**]

4 Data

This section describes our panel dataset, which includes annual observations from 2004 to 2009 (unless otherwise noted) and for the following 48 foreign markets: Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Czech Republic, Denmark, Egypt, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Korea, Malaysia, Mexico, Morocco, Netherlands, New Zealand, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Russia, Singapore, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Thailand, Turkey, United Kingdom, and Venezuela. First, we explain how we map attention allocation and financial frictions from our theoretical model to the empirical proxies employed in the regression analysis. We then discuss how we measure US investors' home bias towards individual countries, and finally describe other additional control variables included in the dataset. Table 1 presents summary statistics.

4.1 Attention Allocation

In our theoretical model, attention allocation corresponds to the cognitive resources devoted to the search and processing of information which is, in turn, useful in forecasting the future behavior of financial variables. According to Madden (2003), the Internet has been a long established source for acquiring financial information. Findings based on daily tracking surveys on Americans' use of the Internet reveal that "42% of Internet users have used the Internet to get financial information such as stock quotes or mortgage rates as of September 2002" and that "those most likely to do financial searches online have higher household incomes and higher levels of education." Such evidence has led an increasing number of papers to rely upon Internet search data to construct proxies for the amount of attention investors allocate to financial assets.[14] In this paper, we follow these studies and measure the degree of attention US investors allocate to foreign equity markets by the volume of Google searches towards those countries stock exchanges.

For each country in our sample, we download from Google Insights for Search the monthly search volume index (SVI) for terms containing a combination of country name, country demonym, and city in which the stock exchange is located, all followed by the word "stock." For example, for Canada we download Google SVI for the term "Canada stock + Canadian stock + Toronto stock", and similarly for Australia "Australia stock + Australian stock + Sydney stock." Moreover, since Google Insights for Search is able to use IP address information to identify the location of its users, we filter the data so that only searches which originated in the US are accounted for.

Google SVI for a particular term represents the search traffic for that term relative to the total number of searches on Google at a given location and time period. Hence, a decrease in Google SVI does not necessarily imply a reduction in the absolute number of search queries for that particular term, but certainly a reduction of its popularity. Google Insights for Search limits each consultation to five terms at a time and also normalizes the results by assigning a value of 100 to the highest search traffic recorded in the downloaded sample. Therefore, when downloading our data we repeat one country in all consultations so that we are able renormalize the results in a way that the final data reflects the relative popularity among all countries in our sample.[15]

[**Insert Table 1 about here**]

Table 1 presents summary statistics for each country in our sample. The top five countries which on average received most attention from US investors are Canada, India, the United Kingdom, China, and Japan. We can also see that there is significant variation, not only across country, but on the time series dimension as well. Figure 3 presents the cross-sectional average for each year in our sample, and reveals that foreign stock markets on average attracted the most attention from US investors during the most volatile years for financial markets, 2007 and 2008. However, not all countries follow that pattern: one notable exception is Greece, which has an attention allocation peak in 2010, the year of their own debt crisis.

[**Insert Figure 3 about here**]

4.2 Financial Integration

Imperfect financial integration refers to all types of explicit or implicit barriers which discourage or restrict the presence of foreign investors in domestic markets. These barriers may be imposed by policy makers, or may arise as side effects from institutional constraints. Our theoretical model shows that even if such financial frictions are small, they generate distortions in attention allocation decisions which result in more significant levels of home equity bias. In our theoretical model, lack of perfect financial integration is represented by a cross-border equity ownership cost. This additional cost may be translated as a direct tax levied on foreign investors, but other non-tariff interpretations may also apply. For example, additional costs arise indirectly from the higher levels of bureaucracy or regulatory controls foreign investors face. Therefore, our empirical tests rely on a set of proxies for financial integration broad enough to encompass the whole range of potential frictions which may be imposed on cross-border equity flows. These are:

i. Foreign ownership/investment restrictions: a qualitative measure of restrictions on foreign investments based on two questions in the Global Competitiveness Report: "Foreign ownership of companies in your country is rare, limited to minority stakes and often prohibited in key sectors (= 1) or prevalent and encouraged (= 7)", and "In your country, rules governing foreign direct investment are damaging and discourage foreign direct investment (= 1) or beneficial and encourage foreign direct investment (= 7)" (source: Gwartney et al., 2010, which only includes data up to 2008);

ii. Chinn-Ito index: a *de jure* measure of capital controls constructed as the standardized principal component of four binary dummy variables reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER): (1) the presence of multiple exchange rates, (2) the existence of restrictions on current account transactions, (3) the existence of restrictions on the capital account transactions, and (4) the requirement of the surrender of export proceeds (source: Chinn and Ito, 2006, 2008);

iii. Lane-Milesi-Ferretti index: a *de facto* measure of financial openness, calculated as the sum of a country's stocks in external assets and liabilities normalized by its GDP (source: Lane and Milesi-Ferretti, 2007). Unfortunately, availability of this data is limited to 2007.

Each of the three financial integration variables has its own advantages and disadvantages. For instance, the foreign ownership/investment restrictions measure is a qualitative variable and hence, both its strength and its weakness rely on the possibility (or inevitability) of value judgment. The Chinn-Ito index provides a less subjective quantification of financial integration, but shares the same problems of other *de jure* variables: it is an assessment of the presence of barriers, but not of their efficacy. The Lane-Milesi-Ferretti index gauges the degree of efficacy of regulatory restrictions: when financial investors find ways to circumvent capital controls, rendering them innocuous, the increase in financial trade volume is captured by the *de facto* index. However, because this variable is not a direct measure of the existence of pre-determined financial frictions but rather of their economic effects on another variable, endogeneity becomes a serious concern.

It is important to note, though, that we will present empirical evidence supporting our model's predictions regardless of which financial integration variable we use. Finally, all variables are defined so that higher values reflect greater degrees of financial integration.

4.3 Home Bias

We measure US investors' home bias towards individual countries following the Ahearne et al. (2004) methodology described in equation (9). A country's share in the US equity portfolio is calculated using data from the US Treasury *International Capital System* and its share in the world portfolio is calculated using market capitalization data from the World Bank's *World Development Indicators* database.

4.4 Additional Controls

We use six series from the World Bank's *World Development indicators*: total land area (in square kilometers) and total population as proxies for physical mass; GDP and market capitalization of listed companies (both in constant 2000 US$) as measures of economic size;

and number of procedures required to enforce a contract as an indicator of the quality of institutions.

We also obtain a measure of trade integration from The Economic Freedom of the World report. Using data from the WTO's *World Tariff Profiles*, the report calculates the unweighted mean of tariff rates for each country, and then maps these into a zero-to-10 rating. Countries which do not impose tariffs are assigned a rating of 10, and as the mean tariff rate approaches 50% ratings decline towards zero.

Using the CIA's *World Factbook*, we construct four dummy variables. The first is language, which identifies English speaking countries. The other three identify whether a country's legal system is based upon any of the following three basic systems: common, civil, and religious law. We construct one additional dummy variable, using IRS's *Publication 901 (04/2011)*, to identify countries with which the US has an income tax treaty. Finally, we complete our dataset with a measure of geographical distance (in miles) between a country's capital and Washington DC.

5 Empirical Strategy

Our empirical strategy consists of two parts. First, we test whether the attention US investors allocate to an individual country is related to the degree of financial integration of its economy:

$$attention_{i,t} = \beta_0 + \beta_1 integration_{i,t} + \overrightarrow{\beta}_2 additional\ controls_{i,t} + \varepsilon_{i,t}. \tag{10}$$

If the main prediction of our model is correct, then we should expect each of our three measures of financial integration to have a positive and significant effect on attention allocation. Equation (10) also includes other determinants of attention allocation besides financial integration. It is reasonable to hypothesize that search traffic, as measured by Google SVI, should increase towards countries which are culturally more familiar or are larger either in terms of population, territorial or economic size. Hence, we also include in the list of regressors distance and language as proxies for cultural proximity and population, land area, and GDP as proxies for country size.

The second part of our empirical strategy checks whether the attention US investors allocate to a foreign stock market helps explain US investors' home bias towards the same country, even after controlling for that economy's level of financial integration. That is:

$$home\ bias_{i,t} = \gamma_0 + \gamma_1 attention_{i,t} + \gamma_2 integration_{i,t} + \overrightarrow{\gamma}_3 additional\ controls_{i,t} + \upsilon_{i,t}. \quad (11)$$

Equation (11) has home bias as the dependent variable and both attention allocation and financial integration as explanatory variables. Moreover, this equation includes the following additional determinants for home bias: cultural proximity (language and distance); physical and economic mass (population, GDP, and market capitalization); and quality of institutions (number of procedures to enforce a contract).

We apply two different methodologies when estimating equations (10) and (11). First, we estimate each equation three times by OLS, each with an alternative measure of financial integration: foreign ownership/investment restrictions, Chinn-Ito *de jure* index, and Lane-Milesi-Ferretti *de facto* index. However, as we have discussed above, concerns regarding endogeneity bias may be raised when using the Lane-Milesi-Ferretti *de facto* index as a regressor, for it is an indirect measure of financial integration which gauges the intensity of barriers through their effects on another economic variable – financial transaction volume. Therefore, we also estimate equations (10) and (11) by 2SLS, using the legal system dummies – common, civil, and religious law – as candidates for instrumental variables. Note that since a country's legal system may be based on more than one of the basic systems (for example, the Norwegian legal system is based on both civil and common laws) there is no perfect multicolinearity between all three legal system dummies. The intuition behind the choice of legal system characteristics as potential instruments for financial integration is provided by La Porta et al. (1997, 1998).

The authors show that a country's legal system may be viewed as an "exogenous endowment," which is typically determined by historical conquest or colonization, and that differences in legal origin explain cross-sectional variation in financial development.[16]

One final comment regarding measurement error is necessary. Most variables used in our regressions are standard in the international finance literature, with the important exception of attention allocation. As described in the previous section, the variable we construct uses data from Google Insights for Search. Given Google's dominance as the most popular Internet search engine, we believe that our variable provides a reliable description of American Internet users' behavior, so that any remaining noise should be small, although non-negligible.[17] If the measurement error (arising, for instance, from the use of other available search engines) is random, then the estimated coefficients for equation (10) will be unbiased since attention allocation is used as the dependent variable. However, the coefficients associated with attention allocation in equation (11) will suffer from attenuation bias, making it more difficult for us to find a significant effect of attention allocation on home bias.

6 Estimation Output

6.1 From Financial Integration to Attention Allocation

Table 2 presents the estimation output of equation (10). The first three columns in the table refer to OLS regressions, each using a different measure of financial integration. We can see that regardless of which variable is used, OLS coefficients associated with financial integration are always positive and statistically significant. A one unit increase in foreign ownership/investment restrictions (which ranges from 2.49 to 9.37) and in the Chinn-Ito *de jure* index (which ranges from -1.58 to 2.48) increases attention allocation by 15.9% and 13.5%, respectively, while a 10% increase in the Lane-Milesi-Ferretti *de facto* index increases attention allocation by 2.05%. Regarding the proxies for cultural proximity, English speaking countries tend to receive 107.9% to 113.6% more attention from US investors, while geographical distance seems to have no significant influence on attention allocation. All estimated OLS coefficients associated with population and GDP are significant, ranging from 0.12 to 0.17 and from 0.66 to 0.71, respectively. The only OLS regression which renders a significant coefficient for land area is the one using foreign ownership/investment restrictions as measure of financial integration, in which case the estimated value is of 0.04.

[Insert Table 2 about here]

The fourth column in Table 2 re-estimates the specification of equation (10), which has the Lane-Milesi-Ferretti index as a regressor, but uses the 2SLS methodology. The Hansen-Sargan statistic, with a p-value of 47.6%, does not reject the validity of the three legal system dummies as instrumental variables. Three differences are noticeable when we compare the 2SLS coefficients with their OLS counterparts. First, there is more than a tenfold increase in the magnitude of the financial integration effect: a 10% increase in the Lane-Milesi-Ferretti index increases attention allocation by 28.5%. Second, the estimated coefficient associated with land area of 0.41 is significant at 5%. Finally, GDP ceases to be significant.

One could argue that financial integration explains attention allocation in our regressions only because the former would be a proxy for integration in other types of economic activities. For instance, friction in the goods market would be the true determinant of attention allocation, while friction in asset markets would be irrelevant. Indeed, cross-border frictions in goods and asset markets tend to be correlated. The correlation coefficients between our measure of trade integration and the financial integration variables are: 41.7% with respect to foreign ownership/investment restrictions, 60.9% with respect to the Chinn-Ito index, and 59.6% with respect to the (natural log of the) Lane-Milesi-Ferretti index. Under this alternative hypothesis, if we include other measures of economic integration as explanatory variables in equation (10), financial integration variables would render insignificant coefficients.

[Insert Table 3 about here]

Table 3 shows that this is not the case. Once we include income tax treaty and trade integration as additional regressors, estimated coefficients associated with all variables from our baseline model have similar values and significance. In other words, integration in asset markets is an important source of variation in attention allocation on its own. Nonetheless, empirical evidence suggests that integration in goods market also matters. The OLS coefficients associated with trade integration reveal that a one unit increase in the zero-to-10 trade integration rating has a positive and significant effect on attention allocation, ranging between 13.3% to 15.5%. Finally, according to the 2SLS regression, US investors tend to allocate 54.8% more attention towards countries with which the US has an income tax treaty.

6.2 From Attention Allocation to Home Bias

Table 4 presents the estimation output of equation (11). Once again, the first three columns in the table refer to OLS regressions, each using a different measure of financial integration, while the fourth column refers to the 2SLS regression, using the Lane-Milesi-Ferretti index as a regressor and legal system dummies as instruments. The estimation results reveal that coefficients associated with attention allocation always have a significant effect on home bias, regardless of the financial integration measure included as control, and also regardless of the methodology (OLS or 2SLS) employed. The estimated reduction in US home bias towards a country arising from a 10% increase in the attention US investors allocate towards that country's stock market ranges from 0.63% to 0.89%. On the other hand, the coefficient associated with financial integration is statistically significant only when foreign ownership/investment restrictions is used as a regressor.

[**Insert Table 4 about here**]

The coefficients associated with language and distance are always statistically significant, suggesting that home bias increases the less culturally similar a country is: English speaking countries usually experience a reduction of 12.2% to 15.3% in home bias and the effect of a 10% increase in geographical distance on home bias ranges from 2.27% to 2.79%. US home bias also decreases towards richer economies: a 10% increase in GDP has a negative and significant effect in all specifications, ranging from 1.17% to 1.57%. Estimates associated with the remaining explanatory variables are less robust: a 10% increase in population size increases home bias by 0.65% or 0.83% when foreign ownership/investment restrictions or the Chinn-Ito index are used, respectively; market capitalization is only statistically significant in the OLS estimation using the Lane-Milesi-Ferretti *de facto* index, but has the opposite-than-expected sign; and the number of procedures required to enforce a contract is only statistically significant in the 2SLS regression, with an estimated coefficient of 0.998.

We perform one additional exercise to illustrate the indirect amplification mechanism of the model. We re-estimate the first four equations of Table 4, ommitting attention allocation. Estimation output reported in the fifth and sixth columns suggest that the effect of financial integration is indeed overstated in the absence of the attention variable, at least when either foreign ownership/investment restrictions or the Chinn-Ito *de jure* index is used. In the former case, the magnitude of the coefficient associated with financial integration increases by 10% and remains statistically significant; and in the latter, the magnitude of the coefficient increases by 27% and becomes statistically significant. Finally, the last two columns of Table 4 show that when the Lane-Milesi-Ferretti *de facto* index is used as measure of financial integration, results remain practically unchanged.

7 Conclusion

This paper presents a rational expectations model of asset prices with rationally inattentive investors which generates large levels of home bias, due to the interaction between optimal attention allocation and optimal portfolio choice. The presence of a small exogenous transaction cost tilts portfolio holdings towards domestic asset, which in turn leads to an endogenous information asymmetry. Additionally, informational advantages regarding domestic assets feedback into a higher demand for such assets, reinforcing once again the greater incentive to process information about local assets. As a result, small imperfections in international financial integration can explain why investors allocate more attention and have most of their wealth invested locally. A numerical exercise, with reasonable parameters of our model, reveal that transaction costs or tax disadvantages that would reduce a domestic investor's excess return on its foreign asset holdings by just 10% can generate a home bias as high as 70% to 80%.

We have provided a simple model to characterize a new channel of home bias. The advantage of a simple model is that we can obtain closed form solutions and isolate the mechanism proposed. However, simplicity comes at the cost of not having a serious quantitative exercise by which to study the magnitude of the channel presented. There are several assumptions that must be simplified to have a proper calibration exercise: i) CARA preferences are very tractable theoretically, but are not realistic enough. In this model, investors have absolute demands for each risky asset which are independent of their wealth; ii) independent assets make the information processing decision easy to solve analytically, but prevents us from introducing a realistic covariance structure of asset returns; iii) a two-country model allows us to study bilateral channels of home bias, but it is difficult to infer if this channel will survive in a multi-country setting, with more assets and more diversification opportunities; iv) static models make it difficult to calibrate asset prices. Another complicating factor arises from the calibration of the inattention parameters. These issues are all beyond the scope of this paper and we leave them for future research. What we have done in this paper is to study the empirical implications of the model.

In order to test our model's main prediction, we combine Google SVI of queries originated in the US for information regarding foreign stock markets with three alternative measures of financial integration: a qualitative measure of foreign ownership/investment restrictions, the

Chinn-Ito *de jure* index, and the Lane-Milesi-Ferretti *de facto* index. Our empirical results confirm that economies with higher degrees of financial integration also receive higher levels of attention from US investors. Furthermore, the attention US investors allocate to a foreign stock market helps explain US investors' home bias towards those countries, even after controlling for each economy's financial integration level.

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Notes

[1]Examples of portfolio diversification theories can be found in Levy and Sarnat (1970), Solnik (1974), and Lewis (1999).

[2]For empirical evidence regarding cross-border investment restrictions, see Bonser-Neal et al. (1990), Hardouvelis et al. (1994), Claessens and Rhee (1994), and Errunza and Losq (1985).

[3]For the puzzling time series evolution of home bias, see Ahearne et al. (2004) and Mondria and Wu (2010).

[4]For asymmetric information based explanations of home equity bias, see Gehrig (1993), Brennan and Cao (1997), Barron and Ni (2008), Van Nieuwerburgh and Veldkamp (2009) and Lundtofte (2009).

[5]Examples of other explanations for home equity bias puzzle are: familiarity in Huberman (2001), regret in Solnik (2008), overconfidence in Barber and Odean (2001, 2002) and Karlsson and Norden (2007), patriotism in Morse and Shive (2009), and "narrow framing" behavior in Magi (2009).

[6]See Kang and Stulz (1997), Coval and Moskowitz (1999), Hasan and Simaan (2000), Ahearne et al. (2004), Portes and Rey (2005), Chan et al. (2005), and Hau and Rey (2008)

[7]Empirical evidence of a two-way causality between home bias and attention allocation is presented in Mondria et al. (2010).

[8]The US Treasury, the Federal Reserve Bank of New York, and the Board of Governors of the Federal Reserve System jointly conduct an annual survey of U.S. residents' holdings of foreign assets.

[9]We use 2006 as benchmark since this is the last year in our sample which is not contaminated by the excess volatility from the financial crisis, which started in the United Kingdom in September 2007 with the run on Northern Rock.

[10]Lack of perfect financial integration is not a necessary condition for the existence of home

bias. In Engel and Matsumoto (2009), Heathcote and Perri (2008), and Coeurdacier et al. (2010), home bias arises in frictionless markets in the presence of hedging motives such as real exchange rate or non-tradable income risks (see Coeurdacier and Rey, 2011, for a survey).

[11]The entropy of a random variable is a measure of uncertainty used in electrical engineering and is derived from four reasonable axioms.

[12]For more information on these preferences see Van Nieuwerburgh and Veldkamp (2009) and Mondria (2010).

[13]The parameter values are the following $\sigma_{rh} = \sigma_{rf} = 0.2$, $\bar{r}_h = \bar{r}_f = 3$, $\sigma_{zh} = \sigma_{zf} = 20$, $\bar{z}_h = \bar{z}_f = 16$, $\rho = 1, \theta_h = 0.1\bar{r}_f$, $\theta_f = 0.1\bar{r}_h$. The results are robust to changes in all the parameters.

[14]Mondria et al. (2010) uses data from AOL search queries, Da et al. (2010) from Google Trends, and Mondria and Wu (2011) from Google Insights for Search.

[15]With a simple application of the "rule of three."

[16]For an example of legal system characteristics as instrumental variables, see Levine's (1998) study of the importance of financial development for economic growth.

[17]Google's dominance as the main Internet search engine tool is so well established that the word "google," used as a verb meaning "to search the Internet," was voted the Word of the Decade 2000-2009 by the American Dialect Society (see American Dialect Society, 2009).

A Appendix

A.1 Proof of Proposition 1

The objective function in the third period is a standard mean variance objective function. A closed form solution of a REE can be derived following Admati (1985). Equilibrium prices have the following form $\tilde{P} = A_0 + A_1\tilde{R} - A_2\tilde{Z}$, with A_2 nonsingular and

$$A_0 = \frac{\rho}{R}\left(\rho\Sigma_R^{-1} + \rho\Pi\Sigma_Z^{-1}\Pi + \Pi\right)^{-1}\left(\int_0^1 \Sigma_R^{-1}\bar{R}_i di + \Pi\Sigma_Z^{-1}\bar{Z}\right) \tag{12}$$

$$A_1 = \frac{1}{R}\left(\rho\Sigma_R^{-1} + \rho\Pi\Sigma_Z^{-1}\Pi + \Pi\right)^{-1}\left(\Pi + \rho\Pi\Sigma_Z^{-1}\Pi\right) \tag{13}$$

$$A_2 = \frac{1}{R}\left(\rho\Sigma_R^{-1} + \rho\Pi\Sigma_Z^{-1}\Pi + \Pi\right)^{-1}\left(I + \rho\Pi\Sigma_Z^{-1}\right) \tag{14}$$

Following Admati, we defined $\Pi = \int_0^1 \rho C_i'\Sigma_i^{-1}C_i di$ as the average precision matrix of the signals weighted by the risk tolerance coefficient. Intuitively, Π contains the average stock market information processed by the investors. The conditional distribution of $\tilde{R}$ given a private signal $\tilde{Y}_i$ and the equilibrium price vector $\tilde{P}$ is a multivariate normal with variance-covariance matrix

$$V_i = Var\left[\tilde{R} \mid \tilde{Y}_i, \tilde{P}\right] = \left(\Sigma_R^{-1} + \Pi\Sigma_Z^{-1}\Pi + C_i'\Sigma_i^{-1}C_i\right)^{-1} \tag{15}$$

The optimal asset holdings by an investor i, who observes the state of the world with a measurement error $\tilde{Y}_i$ and the equilibrium price vector $\tilde{P}$, are given by $X_i\left(\tilde{Y}_i, \tilde{P}\right) = G_{0i} + G_{1i}\tilde{Y}_i - G_{2i}\tilde{P}$ where

$$G_{1i} = \rho C_i'\Sigma_i^{-1} \tag{16}$$

$$G_{2i} = \rho R\left[(I + \rho\Pi\Sigma_Z^{-1})\Sigma_R^{-1} + C_i'\Sigma_i^{-1}C_i\right] \tag{17}$$

$$G_{0i} = \rho\left[\left(\Sigma_R^{-1}\bar{R}_i + \Pi\Sigma_Z^{-1}\bar{Z}\right) - \Pi\Sigma_Z^{-1}(I + \rho\Pi\Sigma_Z^{-1})^{-1}\left(\int_0^1 \Sigma_R^{-1}\bar{R}_i di + \Pi\Sigma_Z^{-1}\bar{Z}\right)\right] \tag{18}$$

A.2 Proof of Proposition 2

This proof follows closely the proof of Proposition 2 in Mondria (2010). First, following the same steps as in the proof of Lemma 1 in Mondria (2010), the objective function in the second period is given by

$$EU_i = \frac{W_{i0}R_f}{\rho} + \frac{1}{2}\left\{Tr\left(V_i^{-1}Q - I\right) + \bar{R}^{e\prime}V_i^{-1}\bar{R}^e\right\} \tag{19}$$

where I is the identity matrix, $\bar{R}^e = E\left[E\left[\tilde{R} \mid \tilde{Y}_i, \tilde{P}\right] - R_f \tilde{P}\right]$ is the expectation of the conditional expected excess returns and $Q = Var\left[\tilde{R} - R_f \tilde{P}\right] = Q = \Sigma_R + R_f^2 A_1 \Sigma_R A_1' - R_f A_1 \Sigma_R - R_f \Sigma_R A_1'$ is the variance of the excess returns. Second, following the same steps as in the proof of Lemma 2 in Mondria (2010), we show that investors choose to observe one linear combination of asset payoffs as a private signal. The variance-covariance matrix of the error term in the private signal, Σ_i, is normalized to be diagonal and the first column of the matrix of weights, C_i, is normalized to be a column of ones such that the matrix of weights is given by

$$C_i = \begin{pmatrix} 1 & c_{ihf} \\ 1 & c_{iff} \end{pmatrix} \tag{20}$$

Then, the investor's problem can be written as

$$\begin{aligned} \max_{\sigma_{ih}^{-1}, \sigma_{if}^{-1}} \frac{\rho}{2} \Big\{ & \left(\left(\bar{r}_{ih}^{e2} + Q_{hh}\right) + \left(\bar{r}_{if}^{e2} + Q_{ff}\right) c_{ihf}^2 + 2\left(\bar{r}_{ih}^e \bar{r}_{if}^e + Q_{hf}\right) c_{ihf}\right) \sigma_{ih}^{-2} + \\ & + \left(\left(\bar{r}_{ih}^{e2} + Q_{hh}\right) + \left(\bar{r}_{if}^{e2} + Q_{ff}\right) c_{iff}^2 + 2\left(\bar{r}_{ih}^e \bar{r}_{if}^e + Q_{hf}\right) c_{iff}\right) \sigma_{if}^{-2} \Big\} + \Omega \end{aligned} \tag{21}$$

where Ω is a constant, subject to the information constraint given in equation (3) that can be expressed by

$$\left(\sigma_{rh}^2 + c_{ihf}^2 \sigma_{rf}^2\right) \sigma_{ih}^{-2} + \left(\sigma_{rh}^2 + c_{iff}^2 \sigma_{rf}^2\right) \sigma_{if}^{-2} + \sigma_{rh}^2 \sigma_{rf}^2 (c_{iff}^2 - c_{ihf}^2)^2 \sigma_{ih}^{-2} \sigma_{if}^{-2} = \left(e^{2\kappa} - 1\right) \tag{22}$$

The investor when optimizing takes as given the elements in the matrix Q, which are Q_{hh}, Q_{hf}, Q_{ff}, and $\bar{r}_{ih}^e, \bar{r}_{if}^e$. By the same argument as in the proof of Lemma 2 in Mondria (2010), this implies that investors choose to learn about one linear combination of asset payoffs. Third, following the same steps as in the proof of Proposition 2 in Mondria (2010), we characterize a linear symmetric rational expectations equilibrium private signal under a parameter condition. The information constraint can be written as

$$\Sigma_i^{-1} = \frac{\left(e^{2\kappa} - 1\right)}{\sigma_{rh}^2 + c_{if}^2 \sigma_{rf}^2} \tag{23}$$

Substituting the information constraint into the objective function, the optimization problem becomes

$$\max_{c_{if}} \frac{\left[\left(\bar{r}_{ih}^{e2}+Q_{hh}\right)+\left(\bar{r}_{if}^{e2}+Q_{ff}\right)c_{if}^{2}+2\left(\bar{r}_{ih}^{e}\bar{r}_{if}^{e}+Q_{hf}\right)c_{if}\right]\left(e^{2\kappa}-1\right)}{\sigma_{rh}^{2}+c_{if}^{2}\sigma_{rf}^{2}}+\Omega \tag{24}$$

where Ω is a constant. Infinitesimal investors have no effect on prices and take as given $\Omega, \bar{r}_{ih}^{e}, \bar{r}_{if}^{e}, Q_{hh}, Q_{hf}$ and Q_{ff} when optimizing. The local maximum is given by

$$c_{if}^{*}=\frac{\left[\sigma_{rh}^{2}\left(\bar{r}_{if}^{e2}+Q_{ff}\right)-\sigma_{rf}^{2}\left(\bar{r}_{ih}^{e2}+Q_{hh}\right)\right]+\sqrt{\left[\sigma_{rh}^{2}\left(\bar{r}_{if}^{e2}+Q_{ff}\right)-\sigma_{rf}^{2}\left(\bar{r}_{ih}^{e2}+Q_{hh}\right)\right]^{2}+4\sigma_{rh}^{2}\sigma_{rf}^{2}\left(\bar{r}_{ih}^{e}\bar{r}_{if}^{e}+Q_{hf}\right)^{2}}}{2\left[\sigma_{rf}^{2}\left(\bar{r}_{ih}^{e}\bar{r}_{if}^{e}+Q_{hf}\right)\right]} \tag{25}$$

Using the same steps as in the proof of Proposition 2 in Mondria (2010), one can show that there exists a fixed point $c_{if}=c_{f}^{*}$ to the local maximum given by

$$c_{f}^{*}=\frac{\left(\sigma_{rf}^{2}\sigma_{zf}^{2}+\sigma_{rf}^{2}\bar{z}_{f}^{2}-\sigma_{rh}^{2}\sigma_{zh}^{2}-\sigma_{rh}^{2}\bar{z}_{h}^{2}\right)+\sqrt{\left(\sigma_{rf}^{2}\sigma_{zf}^{2}+\sigma_{rf}^{2}\bar{z}_{f}^{2}-\sigma_{rh}^{2}\sigma_{zh}^{2}-\sigma_{rh}^{2}\bar{z}_{h}^{2}\right)^{2}+4\sigma_{rh}^{2}\sigma_{rf}^{2}\bar{z}_{h}^{2}\bar{z}_{f}^{2}}}{2\sigma_{rf}^{2}\bar{z}_{h}\bar{z}_{f}} \tag{26}$$

if the following parameter restriction is satisfied

$$\Delta=\left(\bar{r}_{h}^{e'}\bar{r}_{f}^{e'}+Q_{hf}^{\prime}\right)\geq 0 \tag{27}$$

where $\bar{r}_{h}^{e'}$ and $\bar{r}_{f}^{e'}$ are the expressions of the expected excess returns when all investors choose $c_{if}=c_{f}^{*}$; $Q_{hh}^{'}$, $Q_{hf}^{'}$ and $Q_{ff}^{'}$ are the elements of the variance-covariance matrix of excess returns when all investors choose $c_{if}=c_{f}^{*}$. The optimal precision of the error term in the private signal is given by equation (23) and in equilibrium the variance of the error term can be characterized as

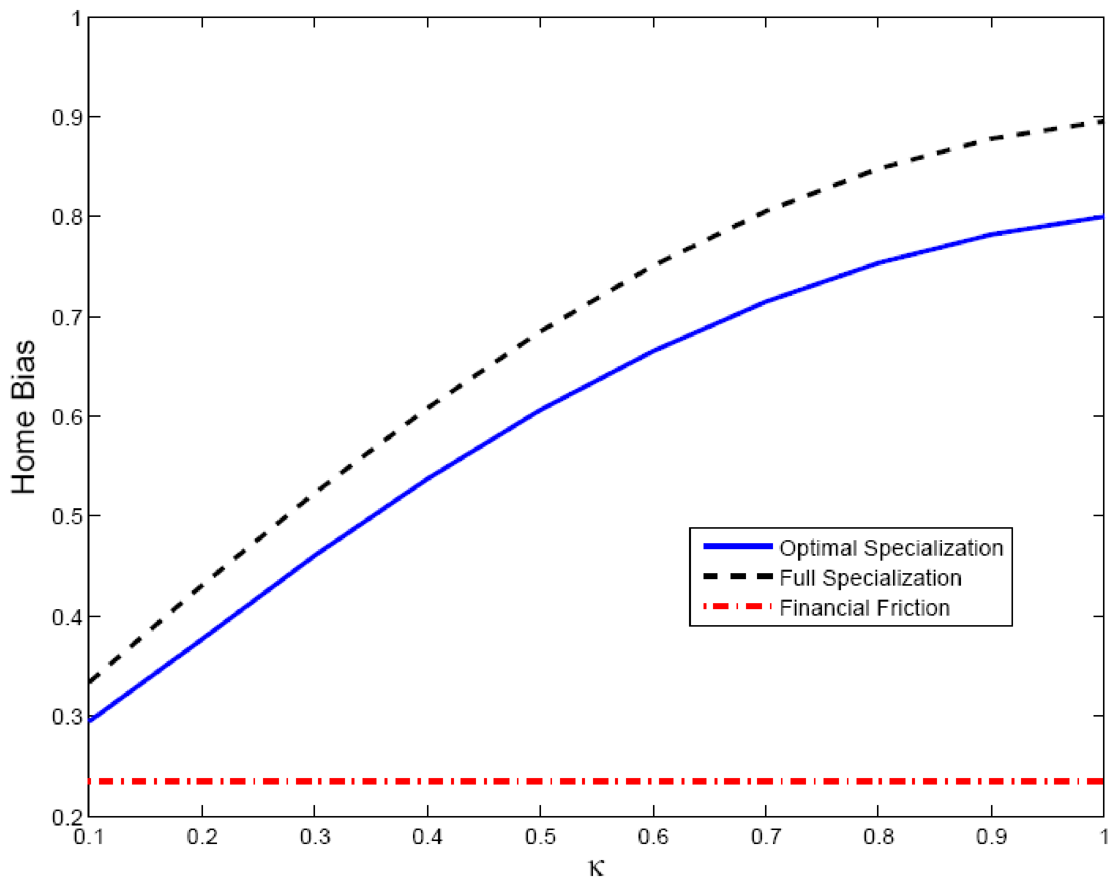
$$\Sigma^{*}=\frac{\sigma_{rh}^{2}+c_{f}^{*2}\sigma_{rf}^{2}}{\left(e^{2\kappa}-1\right)} \tag{28}$$

Therefore, if there are no financial frictions all investors are identical, have the same expected asset holdings and there is no home bias.

A.3 Proof of Proposition 3

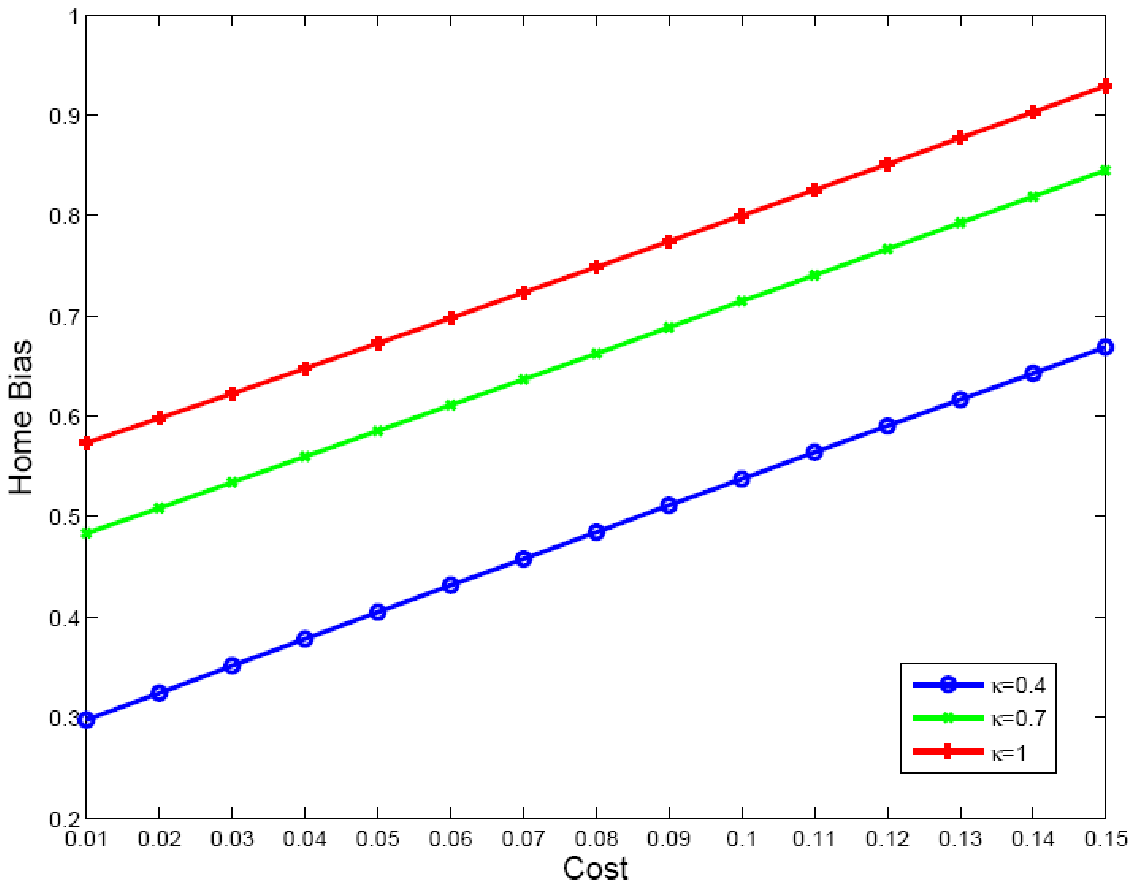
The optimal matrix of weights in the private signal, C_i, by an investor who takes as given the actions from the other investors, i.e., the investor takes as given $\bar{r}^e_{ih}, \bar{r}^e_{if}, Q_{hh}, Q_{hf}$ and Q_{ff}, is given by equation (25). The financial friction on foreign investments is given by the parameter θ. If $\theta = 0$, then there is no financial friction and all investors process the same information about both assets as shown in Proposition 2. However, when there is a financial friction on foreign investments, $\theta > 1$, an investor optimally processes more information about domestic assets due to $\frac{\partial c^*_{hf}}{\partial \theta} < 0$. In words, the higher the financial friction on foreign investments, the smaller the weight of foreign assets in the private signal and more information processed about domestic assets.

Figure 1: Home Bias and Capacity Constraint



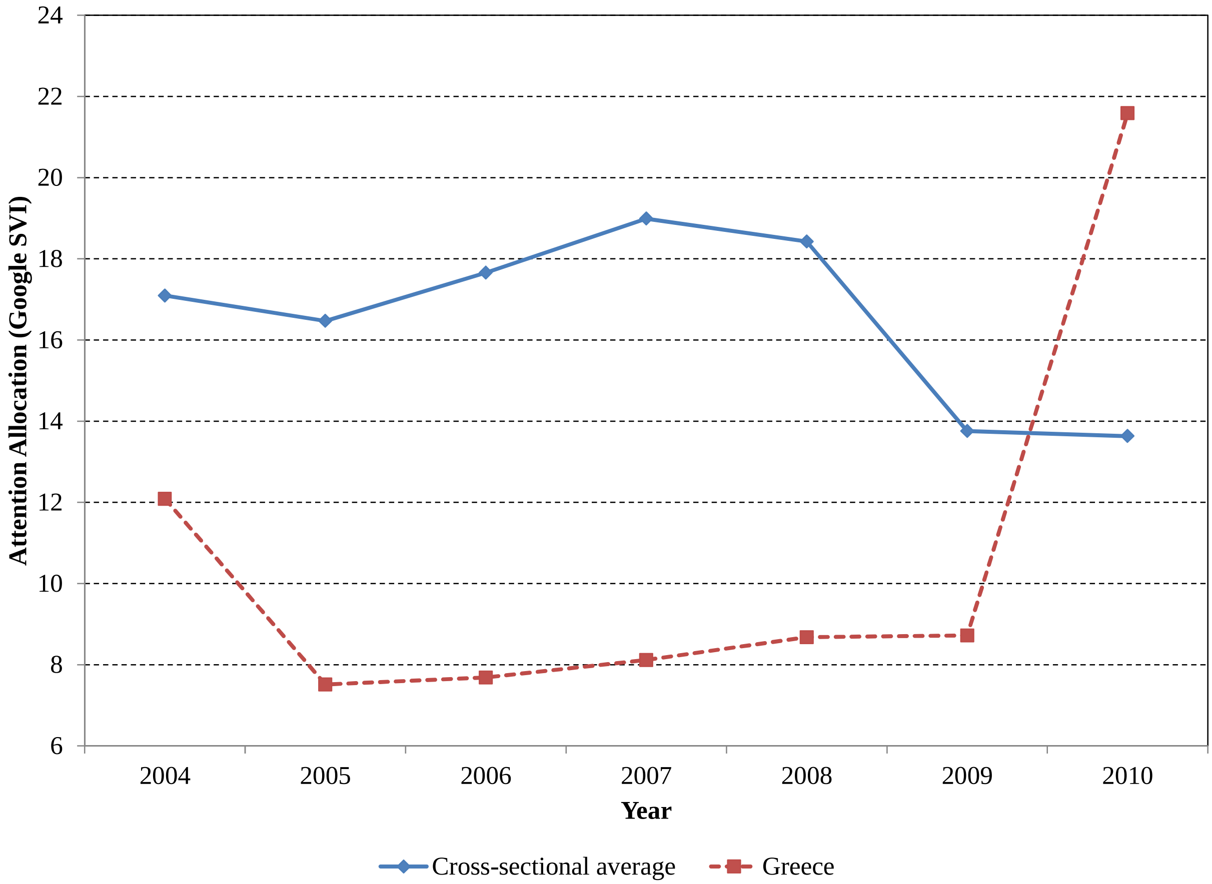
Note: Each line shows the home bias that would be generated by a cost of holding foreign assets equivalent to 10% of the foreign asset net expected payoff, under three different model assumptions. "Optimal Specialization" refers to home bias calculated in our model. "Full Specialization" refers to home bias when investors only process information about the home country. "Financial Friction" refers to home bias that would be generated if agents were not allowed to process information.

Figure 2: Home Bias and Financial Frictions



Note: Each line shows the home bias that would be generated by a cost of holding foreign assets ranging from 1% to 15% of the net expected foreign asset payoff for three different levels of information processing capacity.

Figure 3: Time-Series Evolution of Attention Allocation



Note: Cross-sectional average refers to the average attention allocation (Google SVI) received by all countries in our sample in a given year.

Table 1: Summary Statistics for Attention Allocation

Country	Mean	Standard Deviation	Coef. of Variation	Country	Mean	Standard Deviation	Coef. of Variation
Argentina	3.64	0.57	0.16	Jordan	6.92	1.86	0.27
Australia	29.97	4.63	0.15	Korea	13.56	2.11	0.16
Austria	3.18	0.15	0.05	Malaysia	3.72	0.83	0.22
Belgium	2.62	0.43	0.16	Mexico	20.30	1.61	0.08
Brazil	11.82	3.58	0.30	Morocco	0.94	0.58	0.61
Canada	97.72	19.95	0.20	Netherlands	7.69	0.55	0.07
Chile	3.43	0.58	0.17	New Zealand	5.83	0.59	0.10
China	83.94	36.82	0.44	Norway	6.29	1.10	0.17
Colombia	2.47	0.22	0.09	Pakistan	6.75	1.77	0.26
Czech Republic	1.90	0.48	0.25	Peru	2.70	1.26	0.47
Denmark	3.62	0.75	0.21	Philippines	7.48	1.54	0.21
Egypt	5.49	0.52	0.10	Poland	5.49	0.37	0.07
Finland	2.32	0.60	0.26	Portugal	1.46	0.61	0.42
France	27.12	2.27	0.08	Russia	18.58	8.30	0.45
Germany	22.96	2.65	0.12	Singapore	11.22	1.59	0.14
Greece	10.63	5.07	0.48	South Africa	5.75	1.13	0.20
Hong Kong	24.03	6.78	0.28	Spain	12.88	1.44	0.11
Hungary	2.10	0.56	0.26	Sri Lanka	1.69	0.55	0.32
India	96.92	23.73	0.24	Sweden	6.13	1.09	0.18
Indonesia	3.78	0.55	0.15	Switzerland	10.58	1.17	0.11
Ireland	13.28	1.26	0.09	Thailand	8.91	1.48	0.17
Israel	10.17	1.13	0.11	Turkey	16.07	3.77	0.23
Italy	12.41	0.75	0.06	United Kingdom	87.58	14.47	0.17
Japan	56.36	12.17	0.22	Venezuela	1.32	0.80	0.61

Note: Time-series average, standard deviation, and coefficient of variation for each country in our sample.

Table 2: Determinants of Attention Allocation

	(2.1)	**(2.2)**	**(2.3)**	**(2.4)**
Estimation method:	OLS	OLS	OLS	2SLS
Dependent variable:	*Attention*	*Attention*	*Attention*	*Attention*
Financial integration	0.159***	0.135***	0.205**	2.854**
	(0.042)	(0.046)	(0.083)	(1.327)
Language	1.079***	1.121***	1.136***	0.877***
	(0.093)	(0.086)	(0.106)	(0.229)
Distance	-0.015	0.009	-0.047	-0.248
	(0.089)	(0.087)	(0.118)	(0.321)
Land area	0.041*	0.026	0.042	0.407**
	(0.023)	(0.022)	(0.027)	(0.201)
Population	0.123***	0.174***	0.155**	1.373**
	(0.043)	(0.052)	(0.062)	(0.576)
GDP	0.710***	0.661***	0.662***	-0.439
	(0.043)	(0.050)	(0.064)	(0.566)
Financial integration measure:	Foreign ownership/ investment restrictions	Chinn-Ito *de jure* index	Lane-Milesi-Ferretti *de facto* index	Lane-Milesi-Ferretti *de facto* index
Hansen-Sargan test of	-	-	-	1.485
overidentifying restrictions	-	-	-	(0.476)
Number of observations:	237	285	189	189
R^2	74.9%	74.5%	74.4%	68.0%

Note: Regressions based on annual panel data, which includes 48 countries. Sample period starts in 2004 and ends in 2008 for regression (2.1), in 2009 for regression (2.2), and in 2007 for regressions (2.3) and (2.4). White's robust standard errors are given in parenthesis under the coefficients, and p-value is given in parenthesis under the Hansen-Sargan statistics. All regressions include time dummy variables, which are not reported. For the 2SLS regression, uncentered-R^2 is reported. The symbols ***, **, and * denote that the individual coefficient is significant at the 1%, 5%, and 10% significance level, respectively. The following variables are in natural logs: attention, distance, land area, population, GDP, and the Lane-Milesi-Ferretti *de facto* index.

Table 3: Determinants of Attention Allocation and Other Types of Economic Integration

	(3.1)	(3.2)	(3.3)	(3.4)
Estimation method:	OLS	OLS	OLS	2SLS
Dependent variable:	*Attention*	*Attention*	*Attention*	*Attention*
Financial integration	0.141***	0.109**	0.197**	2.973*
	(0.044)	(0.053)	(0.079)	(1.702)
Language	1.112***	1.171***	1.175***	0.848***
	(0.090)	(0.089)	(0.103)	(0.260)
Distance	-0.085	-0.067	-0.132	-0.385
	(0.089)	(0.099)	(0.118)	(0.345)
Land area	0.048**	0.037	0.053*	0.443*
	(0.023)	(0.024)	(0.027)	(0.246)
Population	0.187***	0.222***	0.238***	1.440**
	(0.053)	(0.059)	(0.072)	(0.732)
GDP	0.645***	0.615***	0.582***	-0.495
	(0.053)	(0.057)	(0.073)	(0.692)
Income tax treaty	0.027	0.075	0.045	0.548*
	(0.129)	(0.126)	(0.143)	(0.302)
Trade integration	0.134*	0.133*	0.155*	0.046
	(0.069)	(0.077)	(0.082)	(0.149)
Financial integration measure:	Foreign ownership/ investment restrictions	Chinn-Ito *de jure* index	Lane-Milesi-Ferretti *de facto* index	Lane-Milesi-Ferretti *de facto* index
Hansen-Sargan test of	-	-	-	0.388
overidentifying restrictions	-	-	-	(0.824)
Number of observations:	237	237	189	189
R^2	75.4%	75.0%	75.1%	66.2%

Note: Regressions based on annual panel data, which includes 48 countries. Sample period starts in 2004 and ends in 2008 for regressions (3.1) and (3.2) and in 2007 for regressions (3.3) and (3.4). White's robust standard errors are given in parenthesis under the coefficients, and p-value is given in parenthesis under the Hansen-Sargan statistics. All regressions include time dummy variables, which are not reported. For the 2SLS regression, uncentered-R^2 is reported. The symbols ***, **, and * denote that the individual coefficient is significant at the 1%, 5%, and 10% significance level, respectively. The following variables are in natural logs: attention, distance, land area, population, GDP, and the Lane-Milesi-Ferretti *de facto* index.

Table 4: Determinants of Home Bias

	(4.1)	(4.2)	(4.3)	(4.4)	(4.5)	(4.6)	(4.7)	(4.8)
Estimation method:	OLS	OLS	OLS	2SLS	OLS	OLS	OLS	2SLS
Dependent variable:	*Home bias*	*Home bias*	*Home bias*	*Home bias*	*Home bias*	*Home bias*	*Home bias*	*Home bias*
Attention	-0.063*	-0.069*	-0.089*	-0.082*	-	-	-	-
	(0.037)	(0.037)	(0.047)	(0.048)	-	-	-	-
Financial integration	-0.072***	-0.022	-0.253*	0.103	-0.079***	-0.028*	-0.248*	0.173
	(0.020)	(0.015)	(0.135)	(0.260)	(0.023)	(0.016)	(0.134)	(0.283)
Language	-0.136**	-0.122**	-0.153**	-0.141*	-0.193**	-0.184**	-0.236**	-0.213*
	(0.064)	(0.060)	(0.072)	(0.075)	(0.086)	(0.082)	(0.102)	(0.109)
Distance	0.252***	0.227***	0.268***	0.279***	0.260***	0.235***	0.283***	0.296***
	(0.068)	(0.066)	(0.072)	(0.079)	(0.070)	(0.069)	(0.078)	(0.086)
Population	0.055**	0.083**	-0.029	0.094	0.043	0.067*	-0.042	0.104
	(0.025)	(0.034)	(0.061)	(0.099)	(0.029)	(0.038)	(0.067)	(0.107)
GDP	-0.157***	-0.140***	-0.143**	-0.117*	-0.174***	-0.156***	-0.155***	-0.122*
	(0.045)	(0.043)	(0.059)	(0.061)	(0.048)	(0.042)	(0.058)	(0.066)
Market capitalization	0.119	0.096	0.196*	0.090	0.095	0.072	0.150	0.029
	(0.072)	(0.060)	(0.115)	(0.141)	(0.061)	(0.051)	(0.096)	(0.125)
Enforce a contract	0.540	0.504	0.365	0.998**	0.523	0.501	0.369	1.118**
	(0.431)	(0.412)	(0.275)	(0.454)	(0.418)	(0.410)	(0.274)	(0.560)
Financial integration measure:	Foreign ownership/ investment restrictions	Chinn-Ito *de jure* index	Lane-Milesi-Ferretti *de facto* index	Lane-Milesi-Ferretti *de facto* index	Foreign ownership/ investment restrictions	Chinn-Ito *de jure* index	Lane-Milesi-Ferretti *de facto* index	Lane-Milesi-Ferretti *de facto* index
Hansen-Sargan test of	-	-	-	2.979	-	-	-	3.157
overidentifying restrictions	-	-	-	(0.226)	-	-	-	(0.206)
Number of observations:	234	281	188	188	237	284	191	191
R^2	32.2%	27.7%	36.1%	50.5%	31.7%	27.1%	34.8%	46.7%

Note: Regressions based on annual panel data, which includes 48 countries. Sample period starts in 2004 and ends in 2008 for regressions (4.1) and (4.5), in 2009 for regressions (4.2) and (4.6), and in 2007 for regressions (4.3), (4.4), (4.7), and (4.8). White's robust standard errors are given in parenthesis under the coefficients, and p-value is given in parenthesis under the Hansen-Sargan statistics. All regressions include time dummy variables, which are not reported. For the 2SLS regression, uncentered-R^2 is reported. The symbols ***, **, and * denote that the individual coefficient is significant at the 1%, 5%, and 10% significance level, respectively. The following variables are in natural logs: home bias, attention, distance, GDP per capita, market capitalization, and the Lane-Milesi-Ferretti *de facto* index.