# Measures of Equity Home Bias Puzzle

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Abstract

The paper develops measures of home bias for 48 countries over the period 2001 to 2011 by employing various models: International Capital Asset Pricing Model (ICAPM), Mean-Variance, Minimum-Variance, Bayes-Stein, Bayesian and Multi-Prior. ICAPM country portfolio weights are computed relative to world market capitalization. Bayesian models allow for various degrees of mis-trust in the ICAPM model. Multi-Prior restricts the expected return for each asset to lie within specified confidence interval around its estimated value. Mean-Variance computes optimal weights by sample estimates of mean and covariance matrix of sample return. Bayes-Stein shrinks each asset's historical mean return toward the return of the Minimum Variance Portfolio and improves precision associated with estimating the expected return of each asset. The paper finds that foreign listing, idiosyncratic risk, beta, inflation, natural resources rents, size, global financial crisis and institutional quality has significant impact on home bias. There are policy implications associated with home bias.

Keywords: Home Bias, ICAPM, Mean-Variance, Bayes-Stein, Bayesian, Multi-Prior

JEL classification: F39; G11; G15

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## Measures of Equity Home Bias Puzzle

### 1 Introduction

There is a body of literature on equity home bias[1] that focuses on the fact that investors are found to hold disproportionately large share of their wealth in domestic portfolios as compared to predictions of standard portfolio theory. In the home bias studies, the actual portfolio holdings are compared to a benchmark. Depending upon the benchmark weights, there are two main approaches to home bias studies, i.e. model based approach and return based approach. In the model based, International Capital Asset Pricing Model (ICAPM), benchmark is characterized by the weight of a country in the world market capitalization. The ICAPM approach ignores returns. The data based approach uses time series of returns and computes benchmark weights from a mean-variance optimization[2]. Sample estimates of mean and covariance matrix of asset returns is used to compute optimal weights in a mean-variance framework. The optimal weights lead to extreme positions and fluctuate substantially over time[3]. The data based approach ignores the asset pricing model[4]. These two approaches give different benchmark weights and accordingly, home bias measures are quite different. Bayesian framework considers both, ICAPM asset pricing approach and mean-variance data based approach. It is based on investors' degree of confidence in the model based approach. As the degree of scepticism about the model grows, the portfolio weights move away from those implied by the model-based to those obtained from data based approach.

[1] See Uppal (1992), Lewis (1999), Karoyli and Stulz (2003) and Sercu and Vanpee (2012) for a review on home bias literature.
[2] Hasan and Simaan (2000) show that home bias is consistent with rational mean-variance portfolio choice.
[3] See Best and Grauer (1991) and Litterman (2003) for problems in mean-variance optimal portfolios. Chopra and Ziemba (1993) state that errors in estimating returns are over 10 times as costly as errors in estimating variances, and over 20 times as costly as errors in estimating covariances.
[4] See Sharpe (1966) and Lintner (1966) for explanation of capital asset pricing model.

This paper develops measures of home bias for a sample 48 countries[5] by employing various models i.e. ICAPM, Mean-Variance, Minimum-Variance, Bayes Stein, Bayesian and Multi Prior. First, the paper makes a methodological contribution to the existing literature on home bias by developing measures of home bias that take into account scepticism of investors in the ICAPM model. Pastor (2000) approaches portfolio selection in a Bayesian framework that incorporates a prior belief in an asset pricing model. Pastor and Stambaugh (2000) investigate the portfolio choices of mean-variance-optimizing investors who use sample evidence to update prior beliefs centered on either risk-based or characterstic based pricing models. Jenske (2001) raises the awareness of a number of empirical and theoretical issues concerning home bias in equity holdings. He states that US has the lowest home bias among all industrialized nations, contrary to people's belief that home bias in US is more severe than in other countries. Li (2004) examines the role of investors' perception of foreign investment risk on their portfolio choices. Asgharian and Hansson (2006) determine to what extent the estimated expected returns on European equity indices will be affected by different degrees of prior confidence in the ICAPM. They find a strong home bias in most countries, which cannot be explained by any degree of disbelief in the ICAPM.

Second, the paper makes a methodological contribution by developing home bias measures based on Multi-Prior model's volatility correction technique introduced by Garlappi et al (2007). The Bayesian decision maker is neutral to uncertainty (Knight, 1921). The Bayesian portfolio weights are more stable than data-based approach; however, there may still be extreme and volatile weights. Garlappi et al (2007) restricts the expected return for each asset to lie within specified confidence interval around its estimated value.

[5] Sample of countries are Argentina, Australia, Austria, Belgium, Brazil, Canada, China, Colombia, Czech Republic, Denmark, Egypt, Finland, France, Germany, Greece, Honk Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Malaysia, Mexico, Morocco, Netherlands, New Zealand, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Russia, Singapore, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, Thailand, Turkey, UK, US, Venezuela.

Third, the paper develops home bias measures based on shrinkage estimation models that minimize the impact of estimation error by shrinking the sample mean toward minimum variance portfolio. Stein (1955) and Berger (1974) develop the idea of shrinking the sample mean toward a common value and state that shrinkage estimators achieve uniformly lower risk than the MLE estimator. Markowitz mean-variance approach tends to perform poorly out-of-sample. The Bayes-Stein shrinkage estimators improve out-of-sample performance as compared to Markowitz mean-variance optimization. Shrinking each asset's historical mean return toward the return of the Minimum Variance Portfolio improves precision associated with estimating the expected return of each asset. The improved estimation of expected returns results in improved out-of-sample performance. Gorman and Jorgensen (2002) estimate the expected return and covariance parameters using the traditional Markowitz approach and the Bayes-Stein shrinkage algorithm. They state that the theorized gains to international diversification appear difficult to capture in practice and hence, investors exhibiting a strong home bias are not necessarily acting irrationally. Herold and Maurer (2003) state that a substantial home bias can be explained when a US investor has a strong belief in the global mean-variance efficiency of the US market portfolio. Ledoit and Wolf (2003) propose a shrinkage estimator to account for extra-market covariance without having to specify an arbitrary multifactor structure. Wang (2005) applies a shrinkage approach to examine the empirical implications of aversion to model uncertainty. Zellner (2010) states that shrinkage estimators can improve estimation of individual parameters and forecasts of individual future outcomes.

Fourth, the paper contributes to the literature on financial integration by investigating the determinants of home bias for various measures. In a dynamic panel setting over the period 2001 to 2011, I relate the various measures of home bias to a set of control variables (trade, beta, idiosyncratic risk, inflation, natural resources rents, size, institutional quality, global financial crisis). Empirical estimation employs Arellano-Bover/Blundell-Bond linear dynamic panel-data methods to control for endogenous variables and for tests of robustness of results. Baele et al. (2007) investigate to what extent ongoing integration has eroded the equity home bias. To measure home bias, they compare observed foreign asset holdings of 25 markets with optimal weights obtained from five benchmark models. They find that for many countries, home bias decreases sharply at the end of the 1990s, a development they link to time varying globalization and regional integration.

Fifth, the paper takes into account the period of global financial crisis during which cross border equity holdings fell significantly in 2008 and then recovered (only partly) in 2009. I find that foreign listing, beta, natural resources rents, institutional quality and global financial crisis have negative and significant effect on measures of home bias. Idiosyncratic risk, inflation and size have positive impact on home bias. Trade exhibits mixed results.

The next section discusses literature review. Section 3 discusses various home bias and optimal portfolio weight models. Section 4 describes data, variables and summary statistics. Section 5 discusses validity of ICAPM and home bias measures. Section 6 discusses methodology and empirical results and finally section 7 concludes.

## 2 Literature Review

The literature on home bias revolves around different motives of investors, including information asymmetries, behavioural biases, hedging motives and explicit barriers to international investment. Several research papers have considered the effect of indirect barriers, such as information asymmetries, on equity investment and home bias. Merton (1987) develops a model where investors hold stocks that they know. In this model, investors believe that the risk of stocks they do not know is extremely high. Accordingly, the investors may overweight domestic stocks. French and Poterba (1991) use a simple model of investor preferences and behaviour to show that current portfolio patterns imply that investors in each nation expect returns in their domestic equity market to be several hundred basis points higher than returns in other markets. Gehrig (1993) develops a noisy rational expectations model where, even in equilibrium, investors remain incompletely informed. He shows that the domestic bias arises when investors are an average better informed about domestic stocks. Tesar and Werner (1995) states that first, there is a strong evidence of a home bias in national investment portfolios despite the potential gains from international diversification. Baxter and Jermann (1997) state that despite the growing integration of international financial markets, investors do not diversify internationally to any significant extent. Coval and Moskowitz (1999) state that portfolios of domestic stocks exhibit a preference of investing close to home. Huberman (2001) states that shareholders of a Regional Bell Operating Company (RBOC) tend to live in the area which it serves, and an RBOC's customers tend to hold its shares rather than other RBOCs' equity. People invest in the familiar while often ignoring the principles of portfolio theory. Ivkovic and Weisbenner (2005) find that households exhibit a strong preference for local investments. They state that the average household generates an additional annualized return of 3.2% from its local holdings relative to its nonlocal holdings, suggesting that local investors can exploit local knowledge. Portes et al. (2001) use a gravity model to explain international transactions in financial assets and find that information asymmetries are responsible for the strong negative relationship between asset trade (corporate equities, corporate bonds, and government bonds) and distance. Li et al. (2004) find that by explicit introducing information and transaction costs into their consumption based asset pricing model, the heterogeneity of cross border holdings and home bias puzzle can be explained. Portes and Rey (2005) find that the geography of information is the main determinant of the pattern of international transactions, while there is weak support for diversification motive. Chan et al. (2005) find robust evidence that mutual funds, in aggregate, allocate a disproportionately larger fraction of investment to domestic stocks. Campbell and Kraussl (2007) state that due to greater downside risk, investors may think globally, but instead act locally and their model's results provide an alternative view of the home bias puzzle. Barron and Ni (2008) link the degree of home bias across portfolio managers to portfolio size. Nieuwerburgh and Veldkamp (2009) state that investors profit more from knowing information others do not know and learning amplifies information asymmetry. Mondria and Wu (2010) state that home bias increases with information capacity and decreases with financial openness. Coeurdacier and Rey (2013) review various explanations of home bias puzzle highlighting recent developments in macroeconomic modelling that incorporate international portfolio choices in standard two-country general equilibrium models.

Coen (2001) and Pesenti and Wincoop (2002) focus on non-tradables effect on home bias. Strong and Xu (2003), Suh (2005) and Lutje and Menkhoff (2007) focus on behavioral explanation of home bias. There are some papers that link corporate governance and home bias (Dahlquist et al., 2003; Kho et al., 2009). There are some studies on explicit barriers to international investment[6] including Black (1974), Stulz (1981a), Cooper and Kaplanis (1986), Cooper and Kaplanis (1994), Glassman and Riddick (2001), Moor et al (2010) and Mishra and Ratti (2013).

## 3. Home Bias Measure and Optimal Portfolio Weight Models

### 3.1 Home Bias Measure

Home bias is a situation where an investor holds far too high a share of their wealth in domestic equities compared with the optimal share predicted by the theory of portfolio choice. Home bias is the relative difference between actual foreign holdings of a country and optimal foreign weights.

[6] See Solnik (1974), Adler and Dumas (1983), Stulz (1981b) for international asset pricing models.

$$HB_i = 1 - \frac{Actual_i}{Optimal_i} \quad (1)$$

An actual foreign holding is ratio of foreign equity holdings of a country and total equity holdings. The total equity holding comprises of both, foreign and domestic equity holdings. The domestic equity holding is difference between the country's total market capitalization and foreign equity liabilities.

$$Actual_i = \frac{Foreign\ \ Equity\ \ Asset_i}{Foreign\ \ Equity\ \ Asset_i + Market\ \ Capitalization_i - Foreign\ \ Equity\ \ Liability_i} \quad (2)$$

Optimal portfolio weights are calculated by employing various methodologies including classical mean-variance, international capital asset pricing model, minimum variance portfolio, Bayes-Stein shrinkage portfolio model, Bayesian portfolio model, Multi-Prior portfolio model. Home bias measure takes values between 0 and 1, in case when actual foreign weight is lower than optimal portfolio weight. Home bias measure takes value 0 when actual and optimal portfolio weights are equal and value 1 when the investors hold only domestic assets.

In case when actual foreign weight is greater than optimal portfolio weight, I employ the following measure of home bias:

$$HB_i = \frac{\min(|\, Optimal_i \mid Actual_i)}{sign(Optimal_i)\max(|\, Optimal_i \mid Actual_i)} - 1 \quad (3)$$

The above home bias measure takes into account the case of overinvestment abroad (negative home bias).

### 3.2 Optimal Portfolio Weight Models

#### 3.2.1 Classical Mean-Variance Portfolio Model:

In the classical Markowitz (1952), mean-variance model; investor maximizes expected utility

$$\max_{w} w'\mu - \frac{\gamma}{2} w'\Sigma w \quad (4)$$

where $w$ is the optimal portfolio of $N$ risky assets, $\mu$ is the $N$ - vector of expected excess returns over the risk-free asset, $\Sigma$ is the $N$ x $N$ covariance matrix, $\gamma$ is the risk aversion parameter. Under the assumption $w'1_N = 1$, when a risk-free rate is available and chosen as the zero-beta portfolio and when short sales are allowed,

$$w^* = \frac{\Sigma^{-1}\mu}{1_N{}' \Sigma^{-1}\mu} \quad (5)$$

The computation of $w^*$ involves the expected excess returns and covariance matrix of returns. Expected returns are difficult to estimate. In computation of weights in (5), the expected excess returns are based on historical data. Merton (1980) states that expected return estimates based on historical data are very unreliable due to high volatility of returns. Michaud (1989) states that mean variance optimization significantly overweights (underweights) those securities that have large (small) estimated returns, negative (positive) correlations and small (large) variances. These securities are the ones most likely to have large estimation errors. Portfolio weights in (5) tend to be extreme and volatile[7] in the classical mean variance data based approach. Britten-Jones (1999) finds that the sampling error in estimates of the weights of a global mean-variance efficient portfolio is large.

### 3.2.2 Minimum Variance Portfolio

The minimum variance portfolio is leftmost portfolio of the mean variance efficient frontier and it has a unique property that security weights are independent of expected returns on the individual securities. Suppose there are $N$ assets having a variance-covariance matrix $\Sigma$. The minimum variance portfolio weight as per Merton (1973) is

[7] See Hodges and Brealey (1978), Jenske (2001) for mean variance optimal portfolios.

$$w = \frac{I.\sum^{-1}}{I.\sum^{-1}.I'} \quad (6)$$

where $\sum$ is variance-covariance matrix of returns, $I$ is a N-dimensional vector of 1.

### 3.2.3 Bayes-Stein Shrinkage Portfolio Model

In the Bayes-Stein shrinkage approach, the sample mean is shrunk to mean of the minimum-variance portfolio[8]. Jorion (1985) shrinks the sample averages toward a common mean as proposed by Stein (1955) and finds that the out-of-sample performance of the optimal portfolio is substantially increased. Jorion (1986) presents a simple empirical Bayes estimator that should outperform the sample mean in the context of a portfolio. Based on simulation analysis, he finds that Bayes-Stein estimators provide significant gains in portfolio selection problem.

The Bayes-Stein estimate of expected return is

$$E[R_{BS}] = (1-\psi).\overline{R} + \psi..R_{MIN}.I \quad (7)$$

The Bayes-Stein variance-covariance matrix is

$$\sum_{BS} = \sum.\left(1+\frac{1}{T+\lambda}\right) + \frac{\lambda}{T(T+1+\lambda)}.\frac{I.I'}{I'\sum^{-1} I} \quad (8)$$

where $\overline{R}$ is the vector of historical mean returns, $R_{MIN}$ is the minimum variance portfolio return, $\sum$ is the variance covariance matrix based on historical returns, $I$ is vector of ones.

$\lambda$ is computed as

$$\lambda = \frac{(N+2)(T+2)}{(\overline{R}-R_{MIN}.I)\sum^{-1}.(\overline{R}-R_{MIN}.I)(T-N-2)} \quad (9)$$

where $N$ is the number of return observations, $T$ is the number of domestic market portfolios.

The shrinkage factor[9] $\psi$ is

[8] Zellner and Chetty (1965) utilize a Bayesian approach to analyse several prediction and decision problems associated with normal regression models.

[9] The shrinkage approach states that a Bayesian investor, facing uncertainty about an asset-pricing model, assigns a weight between the unrestricted estimate and the estimate restricted by the asset-pricing model. The weight is the shrinkage factor (Wang, 2005).

$$\psi = \lambda / T + \lambda \quad (10)$$

### 3.2.4 International Capital Asset Pricing Model

The traditional international capital asset pricing model (ICAPM) predicts that an investor should hold equities from a country as per that country's share of world market capitalization (Lintner, 1965). ICAPM is model based approach.

$$R_D - R_F = \beta + \beta_D (R_w - R_F) + \varepsilon \quad (11)$$

where $R_D$ is the return on the domestic market portfolio, $R_F$ is the risk-free rate, $R_w$ is the return on the world market portfolio, $\beta_D$ is world beta of the domestic market, $\beta$ is the intercept and $\varepsilon$ is the error term.

The ICAPM model is valid if the estimates of the intercept $\hat{\beta}$, are zero. An intercept different from zero, even if insignificant will lead to mis-trust in the prediction of ICAPM.

### 3.2.5 Bayesian Mean-Variance Portfolio Model

$$y_i = \beta_1 + \beta_2 x_{i2} + \ldots\ldots\ldots\ldots\ldots\ldots\ldots + \beta_k x_{ik} + \varepsilon_i \quad (12)$$

where $y$ and $\varepsilon$ are $N\ X\ 1$ vectors, $\beta$ is $k\ X\ 1$ vector, $X$ is $N\ X\ k$ matrix.

In the matrix notation,

$$y = X\beta + \varepsilon \quad (13)$$

The ICAPM is valid if the estimates of the intercept, $\hat{\beta}$, are zero and an investor fully trusts ICAPM. The degree of trust is expressed in values of standard errors of the intercept $\sigma_\beta$. A small value of $\sigma_\beta$ indicates a strong belief that ICAPM model is valid and optimal portfolio weights are closer to those of ICAPM. A higher value of $\sigma_\beta$ indicates a dis-belief in the model based ICAPM approach and portfolio weights are closer to data-based mean variance approach. Full mis-trust in the model results in optimal weights that correspond to data-based optimal weights.

**(i) The Prior**

In the Bayesian analysis, there is prior (non-data) belief in the model i.e. the belief in a zero intercept and no mispricing. The prior is updated using returns data to a certain extent depending on the chosen degree of mistrust in the model. The sample mispricing $\beta$, is shrunk accordingly towards the prior mean of $\beta$ to obtain the posterior mean of $\beta$.

I use a natural conjugate prior,[10]

$$p(\beta, h) = p(\beta)p(h) \tag{14}$$

where $p(\beta, h)$ is a Normal density and $p(h)$ is a Gamma density.

$$p(\beta) = \frac{1}{(2\pi)^{\frac{k}{2}}} |\underline{V}|^{-\frac{1}{2}} \exp\left[-\frac{1}{2}(\beta - \underline{\beta})' \underline{V}^{-1}(\beta - \underline{\beta})\right] \tag{15}$$

$$p(h) = c_G^{-1} h^{\frac{\underline{\nu}-2}{2}} \exp\left(-\frac{h\underline{\nu}}{2\underline{s}^{-2}}\right) \tag{16}$$

where $\underline{V}$ is a $k\ X\ k$ is a positive definite prior covariance matrix, $\underline{\nu}$ is degrees of freedom, $\underline{s}^2$ is standard error, error precision $h = \frac{1}{\sigma^2}$, $c_G$ is integrating constant for the Gamma probability density function.

**(ii) The Posterior**

The posterior is proportional to prior times the likelihood.

$$p(\beta, h|y) \alpha \left\{ \exp\left[-\frac{1}{2}\left\{h(y - X\beta)'(y - X\beta) + (\beta - \underline{\beta})' \underline{V}^{-1}(\beta - \underline{\beta})\right\}\right]\right\} h^{\frac{N+\underline{\nu}-2}{2}} \exp\left[-\frac{h\underline{\nu}}{2\underline{s}^{-2}}\right] \tag{17}$$

Upon performing calculations,

$$p(\beta, h|y) \alpha \exp\left[-\frac{1}{2}(\beta - \overline{\beta})' \overline{V}^{-1}(\beta - \overline{\beta})\right] \tag{18}$$

$$\beta \mid y, h \sim N(\overline{\beta}, \overline{V}) \tag{19}$$

From (17) as a function of $h$,

$$p(h \mid y, \beta)\ \alpha\ h^{\frac{N+\underline{\nu}-2}{2}} \exp\left[-\frac{h}{2}\left\{(y - X\beta)'(y - X\beta) + \underline{\nu s}^2\right\}\right] \tag{20}$$

[10] Refer Koop (2003) for details.

$h \mid y, \beta \sim G\left(\bar{s}^{-2}, \bar{\nu}\right)$ (21)

where $\bar{\nu} = N + \underline{\nu}$ (22)

and $\bar{s}^{-2} = \frac{(y - X\beta)'(y - X\beta) + \underline{\nu}\underline{s}^2}{\bar{\nu}}$ (23)

Posterior simulator called the Gibbs sampler uses conditional posteriors (19) and (21) to produce random draws, $\beta^{(s)}$ and $h^{(s)}$ for s=1,2................S, which can be averaged to produce estimates of posterior properties.

**(iii) The Gibbs Sampler**

Let $\theta$ be a $p$ - vector of parameters and $p(y \mid \theta)$, $p(\theta)$ and $p(\theta \mid y)$ are the likelihood, prior and posterior, respectively.

The Gibbs sampler involves the following steps:

(i) Choose a starting value, $\theta^{(0)}$.

For $s = 1, .................S$:

(ii) Take a random draw, $\theta_{(1)}^{(s)}$ from $p\left(\theta_{(1)} \mid y, \theta_{(2)}^{(s-1)}, \theta_{(3)}^{(s-1)}, .............., \theta_{(B)}^{(s-1)}\right)$.

(iii) Take a random draw, $\theta_{(2)}^{(s)}$ from $p\left(\theta_{(2)} \mid y, \theta_{(1)}^{(s)}, \theta_{(3)}^{(s-1)}, .............., \theta_{(B)}^{(s-1)}\right)$.

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(iii) Take a random draw, $\theta_{(B)}^{(s)}$ from $p\left(\theta_{(B)} \mid y, \theta_{(1)}^{(s)}, \theta_{(2)}^{(s)}, .............., \theta_{(B-1)}^{(s)}\right)$.

Following the above steps will yield a set of $S$ draws, $\theta^{(s)}$ for $s = 1, .............S$. Drop the first $S_0$ of these to eliminate the effect of $\theta^{(0)}$ and average the remaining draws to create estimates of posterior. In our empirical estimation, I discard an initial $S_0 = 1000$ burn-in replications and include $S_1 = 10000$ replications.

Gibbs sampling provides a function $\hat{g}s_1$,

$$\hat{g}s_1 = \frac{1}{S_1} \sum_{s=S_0+1}^{S} g\left(\theta^{(s)}\right) \quad (24)$$

As $S_1$ goes to infinity, $\hat{g}s_1$ converges to $E[g(\theta)| y]$.

**(iv) Prediction and Optimal weights**

The predictive density is calculated as

$$p(y^* \mid y) = \iint p(y^* \mid y, \beta, h) p(\beta, h \mid y) d\beta dh \qquad (25)$$

I employ different degrees of mistrust in the ICAPM by employing different standard errors of intercept and compute optimal weights.

The Bayesian mean-variance optimal weights are computed as:

$$w^* = \frac{\Sigma^{*-1} \mu^*}{1_N{}' \Sigma^{*-1} \mu^*} \qquad (26)$$

where $\mu^*$ is predictive mean and $\Sigma^{*-1}$ is variance obtained from Bayesian approach.

**3.2.6 Bayesian Multi-Prior Approach**

Garlappi et al (2007) impose an additional constraint on the mean-variance portfolio optimization that restricts the expected return for each asset to lie within a specified confidence interval of its estimated value, and introduce an additional minimization over the set of possible expected returns subject to the additional constraint.

Upon imposing above restrictions, the mean variance model becomes

$$\max_{w} \ \min_{\mu} \ w'\mu - \frac{\gamma}{2} w' \Sigma w \qquad (27)$$

subject to $f(\mu, \hat{\mu}, \Sigma) \leq \varepsilon$ (28)

and $w' 1_N = 1$ (29)

In equation (28), $f(.)$ is a vector-valued function that characterizes the constraint and $\varepsilon$ is a vector of constants the reflects both the investor’s ambiguity and his aversion to ambiguity.

The optimal portfolio is given by,

$$w^* = \frac{\sigma_p^*}{\sqrt{\chi} + \gamma \sigma_p^*} \Sigma^{-1} \left[ \hat{\mu} - \frac{1}{A} \left( B - \frac{\sqrt{\chi} + \gamma \sigma_P^*}{\sigma_P^*} \right) 1_N \right] \qquad (30)$$

where

$$\chi = \varepsilon \frac{(T-1)N}{T(T-N)} \quad (31)$$

$T$ is the number of observations in our sample and $N$ is the number of assets.

$$A = 1_N^T \Sigma^{-1} 1_N \quad (32)$$

$$B = \hat{\mu}' \Sigma^{-1} 1_N \quad (33)$$

$$C = \hat{\mu}' \Sigma^{-1} \hat{\mu} \quad (34)$$

$\sigma_p^*$ is positive real root obtained from the following equation,

$$A\gamma^2\sigma_p^4 + 2A\gamma\sqrt{\chi}\sigma_p^3 + \left(A\chi - AC + B^2 - \gamma^2\right)\sigma_p^2 - 2\gamma\sqrt{\chi}\sigma_p - \chi = 0 \quad (35)$$

The optimal portfolio of an investor who is averse to parameter uncertainty can also be written as

$$w_{AA}(\varepsilon) = \phi_{AA}(\varepsilon) w_{MIN} + [1 - \phi_{AA}(\varepsilon)] w_{MV} \quad (36)$$

where

$$\phi_{AA}(\varepsilon) = \frac{\sqrt{\varepsilon \frac{(T-1)N}{T(T-N)}}}{\gamma\sigma_p^* + \sqrt{\varepsilon \frac{(T-1)N}{T(T-N)}}} \quad (37)$$

$$w_{MIN} = \frac{1}{A} \Sigma^{-1} 1_N \quad (38)$$

$w_{MIN}$ is the minimum variance portfolio weights.

$$w_{MV} = \frac{1}{\gamma} \Sigma^{-1} \left(\mu' - \hat{\mu}_0 1_N\right) \quad (39)$$

$w_{MV}$ is the mean-variance portfolio weights formed using maximum likelihood estimates of expected return.

The optimal portfolio of an investor who is averse to parameter uncertainty[11] can also be written as

$$w_{AA}(\varepsilon) = \phi_{AA}(\varepsilon) w_{MIN} + [1 - \phi_{AA}(\varepsilon)] w_{BS} \quad (40)$$

where

$w_{BS}$ is the Bayes Stein portfolio weights.

[11] Wang (2005) employs a shrinkage approach to examine the empirical implications of aversion to model uncertainty.

## 4. Data and Variables

### 4.1 Data

I employ weekly MSCI US $ denominated returns for 48 countries and world market over the period from January 1997 to December 2011. The weekly risk-free rate is treasury bill rate from Ibbotson and Associates Inc[12]. I calculate actual portfolio weights based on foreign portfolio assets and liabilities reported in IMF's Coordinated Portfolio Investment Survey (CPIS) dataset[13]. In 1992, International Monetary Fund (IMF) published the Report on the Measurement of International Capital Flows (the Godeaux Report), which evaluates the statistical practices related to the measurement of international capital flows and addresses the principal sources of statistical discrepancies in the component categories of capital account in the global balance of payments. Based on the Godeaux Report, the IMF has conducted the first coordinated portfolio investment survey (CPIS) in 1997, in which 29 countries participated. CPIS reports (in US currency) data on foreign portfolio asset holdings (divided into equity, long term debt, and short term debt) by the residence of the issuer. CPIS exchanges bilateral data among participating and other countries, which enables participating countries to improve their statistics on non-resident holdings of their portfolio investment liabilities and associated financial flows and investment income data. IMF has conducted second CPIS in 2001 and then regularly on annual basis. CPIS data has few caveats. The data collection approach varies by country; whether to conduct the survey at the aggregate or security-by-security level, whether to survey end investors or custodians and whether to make participation in the survey compulsory or mandatory. CPIS does not address issue of third country holdings, particularly with regard to financial centres including Ireland. CPIS does

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[12] Weekly treasury bill rate is from http://mba.tuck.darmouth.edu/pages/faculty/ken.french/data_library.html

[13] Previous studies (Brennan and Cao 1997; Chuhan et al. 1998; Cooper and Kaplanis 1994; Tesar and Werner 1995; Bekaert and Harvey 2000; Portes et al. 2001; Portes and Rey 2005) have used US capital flows data. Warnock and Cleaver (2003) and Warnock (2002) show that capital flows data are ill-suited to estimate bilateral holdings because they track the flow of money between countries, and the foreign country identified in flows data is that of the transactor or intermediary, not the issuer of security. Capital flows data will produce incorrect estimates when intermediary and issuer countries differ.

not provide a currency breakdown and does not identify domestic security holdings. A number of countries do not participate in CPIS including China, Peru and Morocco[14]. I estimate the domestic equity holdings of a country by differencing market capitalization and equity liabilities. Market capitalization data is from Standard and Poor's (2012).

**4.2 Variables that influence home bias:**

I employ determinants of home bias from standard literature. Trade is sum of exports and imports of goods and services measured as a share of gross domestic product. Lane and Milesi-Ferreti (2008) states that bilateral equity investment is strongly correlated with the underlying patterns of trade in goods and services. Trade is expected to have a negative impact on home bias. Foreign listing is percent share of global stock market that is listed on source country's stock exchanges (either directly or has issued public debt in the source country). Ahearne et al (2004) state that foreign countries whose firms do not alleviate information costs by opting into the US regulatory environment are more severely underweighted in US equity portfolios. Foreign listing is expected to have a negative impact on home bias. Beta is end of year global market betas estimated from weekly data. Idiosyncratic risk is variance of residuals from the ICAPM regressions. This represents country specific risk and home bias is expected to increase with the level of idiosyncratic risk. Global Financial Crisis is a dummy=1 during and after global financial crisis (2007 to 2011) otherwise 0 (2001 to 2006)[15]. Inflation is annual percentage change in consumer price index. Inflation hinders international risk sharing and causes home bias to rise. Natural Resources Rents is the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral

[14] Data on foreign equity asset and liability holdings for China (2006-2011), Peru (2005-2011) and Morocco (2005-2011) from IMF's International Investment Position. IIP is a balance sheet of a country's annual financial assets and liabilities.

[15] During global financial crisis, cross border equity holdings fell quite significantly during 2008 and then recovered (only partly) in 2009. For example, UK foreign equity holdings were US $ 1508710 million in 2007, US $ 824018.5 million in 2008 and US $ 1079254 million in 2009. US equity holdings abroad were US $ 5247983 million in 2007, US $ 2748428 million in 2008, and US$ 3995298 million in 2009.

rents, and forest rents measured as a share of gross domestic product. An increase in natural resources rents leads to an increase in cross border investment and thus a decrease in home bias. Size is log value of a country's market share of world market capitalization. Size is expected to have a positive impact on home bias as investors' local market share of world market capitalization increases. Institutional Quality is government effectiveness[16] indicator which captures perceptions of the quality of civil services, public services, independence from political pressures and credibility of government's commitment to such policies. Kho et al (2009) state that poor governance leads to concentrated insider ownership, so that governance improvements make it possible for corporate ownership to become more dispersed and for the home bias to fall. Institutional Quality is expected to have a negative impact on home bias. Appendix Table A.1 illustrates the data sources of variables.

### 4.3 Summary statistics and correlation

Table 1 illustrates summary statistics. The traditional home bias measure ranges from 0.402 to 0.998. The home bias measure has a mean of 0.785, Trade (0.798) and Foreign Listing (1.026). Table 2 presents the correlation matrix for variables used in the paper. Trade, Foreign Listing, Beta and Institutional Quality have negative correlation with home bias measure. Idiosyncratic Risk and Inflation variables have positive correlation with home bias measure. The correlation matrix does not indicate serious correlation among variables.

## 5. Validity of ICAPM and Home Bias Measures

### 5.1 Validity of ICAPM

Previous studies employ traditional home bias measure based on the ICAPM[17]. The traditional model based ICAPM, predicts that an investor should hold equities from a country as per that country's share of world market capitalization. In this section, I test the credibility of model by conducting tests of ICAPM model for each country. Table 3 illustrates the OLS

[16] World Bank's Worldwide Governance Indicator (www.govindicators.org).
[17] Ahearne et al (2005), Mishra and Ratti (2013) and others.

regressions results for equation (11)[18]. I find that alphas are not statistically different from zeros in all countries except Egypt, Hungary, Japan, Korea, Morocco, Portugal, South Africa, Sri Lanka and Thailand. I cannot reject ICAPM for 41 out of 49 countries. Alphas are positive and insignificant in 27 countries. Positive alphas make domestic investment more attractive to domestic investors who have incomplete trust in the ICAPM and lead to lower equity home bias measures. 12 countries have negative and insignificant alphas indicating investors to take a domestic position that is lower than the country's weight in the global market portfolio. Standard errors of alphas range from 0.106 (US) to 1.12 (Russia). In the Bayesian approach, I take standard errors on the alphas as degree of mistrust in the ICAPM. A high degree of mistrust implies the optimal weights will deviate more from ICAPM, towards data based mean variance framework. In the following section, I present the home bias measures using various approaches.

### 5.2 Home Bias Measures

Table 4 illustrates the average home bias measures (2001 to 2011) using various approaches i.e. ICAPM; classical Mean-Variance; Minimum-Variance; Bayes-Stein; Bayesian for various standard errors of alpha intercept (country specific standard errors , 0.1, 0.5, 1.12); Multi-Prior correction to data based approach; Multi-Prior correction to bayes-stein approach and Multi-Prior correction to Bayesian approach for various standard errors of alpha intercept (country specific standard errors , 0.1, 0.5, 1.12)[19]. In column (1), ICAPM home bias measure indicates that some countries are found to exhibit very high home bias: Turkey (0.998); Philippines, India, Indonesia (0.997); Russia (0.996); Pakistan (0.995) and others. High home bias is indicative of the fact that investors predominantly invest in domestic markets. Some countries are found to exhibit lower home bias including Austria

[18] I use weekly data from January 3, 1996 to December 25, 1996 for each country to compute the Bayesian prior information.
[19] I allow short sales in models.

(0.39), Belgium (0.459), Denmark (0.553), Finland (0.487), Germany (0.537), Italy (0.482), Norway (0.428), Portugal (0.516), Sweden (0.556), Switzerland (0.575) and UK (0.527).

The data-based Mean-Variance approach (column (2)) leads to a substantial reduction in measure of home bias as compared to ICAPM. The average home bias in the ICAPM approach is 0.76 as compared to 0.54 in the data-based Mean-Variance approach. Belgium's home bias measure is 0.12. Austria and Germany have home bias measures below 0.20. Canada, Denmark, Italy, New Zealand, Spain, Sweden, Switzerland and UK have home bias measures below 0.30.

Column (3) illustrates the Minimum-Variance home bias measure in which individual security weights are independent of expected returns. Column (5) illustrates the Bayes-Stein home bias measures. In most cases, Bayes-Stein home bias measures are lower than ICAPM home bias measures.

I use Bayesian approach to allow for a degree of mistrust in the ICAPM. The Bayesian home bias measures are computed using squares of standard error of the estimates of intercepts reported in Table 2. I employ several levels of squares of standard errors of the estimates of intercepts (Table 2): country specific standard errors, minimum standard error ( $\sigma_\alpha$ =0.1) for US, maximum standard error ( $\sigma_\alpha$ =1.12) corresponding to Russia and intermediate standard error ( $\sigma_\alpha$ =0.5). Columns (7), (9), (11), (13) illustrate home bias measures for various levels of standard errors of intercepts: country specific, $\sigma_\alpha$ =0.1, $\sigma_\alpha$ =0.5 and $\sigma_\alpha$ =1.12. Bayesian estimates may lead to occasionally unstable portfolio weights and home bias measures. I apply Multi-Prior approach of Garlappi et al (2007) to account for volatility correction in weights estimated by Bayesian approach. Columns (8), (10), (12), (14) illustrate home bias measures for various levels of standard errors: country specific, $\sigma_\alpha$ =0.1, $\sigma_\alpha$ =0.5 and $\sigma_\alpha$ =1.12. I also use Multi-Prior approach of Garlappi et al (2007) to impose an additional constraint on the mean-variance portfolio optimization that restricts the expected return for each asset to lie within a specified confidence interval of its estimated value, and introduce an additional minimization over the set of possible expected returns subject to the additional constraint. Column (4) computes Multi-Prior return based home bias measures for an investor who is averse to parameter uncertainty and whose optimal portfolio weights are based on Minimum-Variance and Mean-Variance as per equation (36). Column (6) computes Multi-Prior return based home bias measures for an investor who is averse to parameter uncertainty and whose optimal portfolio weights are based on Minimum-Variance and Mean-Variance as per equation (40).

Figures 1 plots the home bias measures for Finland[20]. ICAPM home bias measure has higher values as compared to Minimum-Variance, Bayes-Stein, Bayesian and Multi-Prior home bias measures. In 2009, home bias measures are lower. During global financial crisis, Finland's cross border equity holdings fell quite significantly during 2008 and then recovered (only partly) in 2009. Finland foreign equity holdings were US $ 122448 million in 2007, US $ 62213 million in 2008 and US $ 96249 million. For some emerging economies like Argentina, Brazil, Egypt, Hungary, India, Indonesia, Israel, Malaysia, Pakistan, Philippines, Russia, Thailand, Turkey, Colombia, China, Peru and Venezuela, home bias is extreme and not affected by the way it is measured.

## 6. Econometric Issues and Empirical Results

### 6.1 Econometric Issues

To deal with basic problems of endogenity between variables the regression equation will be based on the Arellano-Bover/Blundell-Bond linear dynamic panel-data estimation. In these models, the unobserved panel level effects are correlated with the lagged dependent variables, making standard estimators inconsistent.

[20] Home bias measure plots for the remaining 47 countries are available from author.

$$y_{it} = \delta y_{i,t-1} + x_{it}^{'}\beta + u_{it} \qquad i = 1,........,N \qquad t = 2,............T \qquad (41)$$

where $y_{it}$ is home bias measure, $\delta$ is a scalar, $x_{it}^{'}$ is a $1 \times K$ vector of explanatory variables and $\beta$ is a $K \times 1$ vector of parameters to be estimated. The error term $u_{it}$ is composed of an unobserved effect and time-invariant effect $\mu_i$ and random disturbance term $v_{it}$.

Arellano Bond (1991) derive a one-step and two-step GMM estimators using moment conditions in which lagged levels of the dependent and predetermined variables are instruments for the differenced equations[21]. Blundell and Bond (1998) show that the lagged-level instruments in the Arellano-Bond estimator become weak as the autoregressive process becomes too persistent or the ratio of the variance of the panel-level effect to the variance of the idiosyncratic error becomes too large. Linear dynamic panel data models include p lags of the dependent variable on covariates and contain unobserved panel level effects, fixed or random. Arellano and Bover (1995) develop a framework for efficient instrumental variable estimators of random effects models with information in levels which can accommodate predetermined variables. Building on the work of Arellano and Bover (1995), Blundell and Bond (1998) propose a system estimator that uses moment conditions in which lagged differences are used as instruments for the level equation in addition to the moment conditions of lagged levels as instruments for the differenced equation. This estimator is designed for datasets with many panels and few periods. The method assumes that there is no autocorrelation in the idiosyncratic errors and requires the initial condition that the panel-level effects be uncorrelated with the first difference of the first observation of the dependent variable.

### 6.2 Empirical Results

Results from estimating versions of equation (41) by Arellano-Bover/Blundell-Bond linear dynamic panel-data method with lags (1) and AR(2) tests are reported for 2001-2011 in

[21] See Anderson and Hsiao (1982) and Holtz et al (1988) for earlier works on GMM.

Tables 5, 6 and 7. Traditional home bias measure is the dependent variable in columns (1) to (6) and Bayes-Stein home bias measure is the dependent variable in columns (7) to (12) of Table 5. Trade appears to be negative and significant in columns (1) to (3) and (7) to (9). Investors are better able to attain accounting and regulatory information on foreign markets through trade. Investors may be inclined to hold the stocks of foreign companies with whose products they are most familiar. Foreign listing is negative and significant in all regressions. The reduction in information costs associated with foreign country's firms conforming to the source country's regulatory environment is an important determinant of the source country's equity bias towards foreign country. The result is in accordance with Ahearne et al. (2004). Beta is negative and significant in all regressions. An increase in average Beta by 10% leads to decrease in home bias by 5.62%. The result is in accordance with Baele et al. (2007). Idiosyncratic risk is positive and significant in all regressions implying higher home bias. Idiosyncratic risk is country specific risk and may not be compensated by higher expected returns. Investors may diversify globally to reduce idiosyncratic risk. Inflation appears to be positive and significant. Inflation may be an obstacle for international risk sharing and may deter investment from foreigners, thus implying higher home bias. Natural Resources Rents is negative and significant. An increase in natural resources rents leads to an increase in wealth and cross border investment and thus a decrease in home bias. An increase in Natural Resources Rents by 1% leads to a decrease in home bias by 0.94%. Size[22] variable is positive and significant implying that investors' local market share of world market capitalization increases, leading to higher home bias. Institutional Quality[23] is negative and significant

[22] I also employ log value of financial wealth of country as an alternative Size variable. Results are similar and available from author.

[23] I employ control of corruption from World Bank's Worldwide Governance Indicators (www.govindicators.org) as an alternative Institutional Quality variable. I also employ average value of governance indicators (voice and accountability, political stability, rule of law, regulatory quality, government effectiveness and control of corruption) from World Bank's Worldwide Governance Indicators (www.govindicators.org) as an alternative Institutional Quality variable. Results are similar and available from author.

indicating that countries with better corporate governance in place have greater holdings abroad and thus, exhibit lower home bias. The result is in accordance with Papaioannou (2009) who finds that institutional improvements are followed by significant increases in international finance. Contrary to the fact that during global financial crisis, cross border equity holdings fell quite significantly during 2008 and then recovered (only partly) in 2009; Global Financial Crisis dummy variable is negative and significant implying lower home bias. The Arellano-Bond test for serial correlation in the first differenced errors reported in the Table 5 indicates that there is no autocorrelation of second order.[24]

In Table 6, Bayesian (country standard error) home bias measure is the dependent variable in columns (1) to (6) and Bayesian (0.1 standard error) home bias is the dependent variable in columns (7) to (12). Results are similar to those reported in Table 5. Beta, Natural Resources Rents, Global Financial Crisis variables are negative and significant in all regressions. Idiosyncratic Risk, Size and Inflation variables are positive and significant in all regressions. Trade is negative and significant in columns (1) to (3) and columns (7) to (9). Foreign Listing is negative and significant in all columns except columns (3) and (9).

As robustness check on Table 5 and Table 6 results, Multi-Prior (data based) home bias measure is the dependent variable in columns (1) to (6) and Multi-Prior (country standard error) home bias is the dependent variable in columns (7) to (12) of Table 7. Results are similar to those in Tables 5 and 6. Overall, results indicate that foreign listing, idiosyncratic risk, beta, inflation, natural resources rents, size, global financial crisis and institutional quality has significant impact on home bias. Trade exhibits mixed results.

## 7. Conclusion

In the home bias studies, the actual portfolio holdings are compared to a benchmark. Depending upon the benchmark weights, there are two main approaches to home bias studies,

[24] The moment conditions employed by the Arellano Bover/Blundell method are valid only if there is no serial correlation in the idiosyncratic error. The Arellano Bond test is a test for no autocorrelation in linear dynamic panel models. In our regressions results, there is no autocorrelation of second order.

i.e. model based approach and return based approach. These two approaches give different benchmark weights and accordingly, home bias measures are quite different. Bayesian framework considers both, ICAPM asset pricing approach and mean-variance data based approach. It is based on investors' degree of confidence in the model based approach.

This paper constructs measures of home bias for a sample 48 countries by employing various approaches i.e. model based ICAPM; data based Mean-Variance, Minimum-Variance; shrinkage based Bayes-Stein approach; Bayesian approach that reflects mistrust in ICAPM; and Multi-Prior approach which corrects uncertainty in sample estimates of returns and restricts the expected return for each asset to lie within a specified confidence interval of its estimated value.

I also investigate determinants of home bias for various measures. Paper finds that country specific idiosyncratic risk and inflation have positive and significant impact on home bias. Foreign listing, Natural Resources Rents and Institutional quality play significant role in decreasing home bias. I find mixed evidence of Trade having negative impact on home bias.

Findings have policy implications. Governments should promote cross border trade in goods and services which indirectly improve cross border asset trade. Governments should aim at well functioning legal systems, credible contract enforcement, well defined property rights, and good quality accounting standards to facilitate cross border portfolio investment. Policies should be devised to improve natural resources rents which indirectly promote cross border portfolio investment. Stock market regulation policies should aim at devising systems those promote investment through foreign listing. Policies should be devised so that foreign portfolio investment remains aligned with the on-going financial integration.

The paper finds that even if policy induced barriers to equity flows have been lifted, there remains substantial economic or market inherent barriers. These barriers tend to remain relevant and to affect the way in which financial systems operate and integrate, even if economic policy has reduced regulatory barriers to entry.

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**Appendix Table A.1:** Data sources of variables

| Variables | Description and data sources |
|---|---|
| Traditional home bias | Traditional home bias is absolute home bias measure computed as per the ICAPM model. Source: Coordinated Portfolio Investment Survey (CPIS), Author's own calculations. |
| Mean Variance home bias | Mean-Variance home bias computed based on the Mean-Variance approach. Source: CPIS, DataStream, Author's own calculations. |
| Minimum Variance home bias | Minimum Variance home bias computed as per the Minimum-Variance framework. Source: CPIS, DataStream, Author's own calculations. |
| Bayes-Stein home bias | Bayes-Stein home bias computed as per the Bayes-Stein model. Source: CPIS, DataStream, Author's own calculations. |
| Bayesian (country standard error) home bias | Bayesian (country standard error) home bias computed in Bayesian framework for prior country specific standard errors of alpha intercept in the ICAPM. Source: CPIS, DataStream Author's own calculations. |
| Bayesian (0.1 standard error) home bias | Bayesian (0.1 standard error) home bias computed in Bayesian framework for prior 0.1 standard errors of alpha intercept in the ICAPM. Source: CPIS, DataStream, Author's own calculations. |
| Bayesian (0.5 standard error) home bias | Bayesian (0.5 standard error) home bias computed in Bayesian framework for prior 0.5 standard errors of alpha intercept in the ICAPM. Source: CPIS, DataStream, Author's own calculations. |
| Bayesian (1.12 standard error) home bias | Bayesian (1.12 standard error) home bias computed in Bayesian framework for prior 1.12 standard errors of alpha intercept in the ICAPM. Source: CPIS, DataStream, Author's own calculations. |
| Multi-Prior (data based) home bias | Multi-Prior (data based) is multi prior correction as suggested by Garlappi et al (2007) for data based approach. Source: CPIS, DataStream, Author's own calculations. |
| Multi-Prior (Bayes-Stein) home bias | Multi-Prior (Bayes-Stein) is multi prior correction as suggested by Garlappi et al (2007) for Bayes-Stein approach. Source: CPIS, DataStream, Author's own calculations. |
| Multi-Prior (country standard error) home bias | Multi-Prior (country standard error) is multi prior correction as suggested by Garlappi et al (2007) in Bayesian framework for prior country specific standard errors of alpha intercept in the ICAPM. Source: CPIS, DataStream, Author's own calculations. |
| Multi-Prior (0.1 standard error) home bias | Multi-Prior (0.1 standard error) is multi prior correction as suggested by Garlappi et al (2007) in Bayesian framework for prior 0.1 standard errors of alpha intercept in the ICAPM. Source: CPIS, DataStream, Author's own calculations. |
| Multi-Prior (0.5 standard error) home bias | Multi-Prior (0.5 standard error) is multi prior correction as suggested by Garlappi et al (2007) in Bayesian framework for prior 0.5 standard errors of alpha intercept in the ICAPM. Source: CPIS, DataStream, Author's own calculations. |
| Multi-Prior (1.12 standard error) home bias | Multi-Prior (1.12 standard error) is multi prior correction as suggested by Garlappi et al (2007) in Bayesian framework for prior 1.12 standard errors of alpha intercept in the ICAPM. Source: CPIS, DataStream, Author's own calculations. |
| Trade | Trade is sum of exports and imports of goods and services measured as a share of gross domestic product. Source: World Bank Development Indicators, Author's own calculations. |
| Foreign listing | Foreign listing is percent share of global stock market that is listed on source country's stock exchanges (either directly or has issued public debt in the source country). Source: CPIS. Author's own calculations. |
| Beta | Annual global market beta's (estimated on cumulated samples of weekly return data). Source: DataStream. Author's own calculations. |
| Idiosyncratic risk | Idiosyncratic risk is variance of residuals from the ICAPM regressions. Source: DataStream. Author's own calculations. |
| Global financial crisis | Dummy=1 during and after global financial crisis (2007 to 2011) otherwise 0 (2001 to 2006). Source: Author's own calculations. |

| Variables | Description and data sources |
|---|---|
| Inflation | Inflation is measured by the consumer price index and reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. Source: World Bank Development Indicators. Author's own calculations. |
| Natural Resources Rents | Natural resources rents is the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents measured as a share of gross domestic product. Source: World Bank Development Indicators. Author's own calculations. |
| Size | Size is log value of country's market share of world market capitalization. Source: Standard & Poor's Global Stock Markets Factbook. Author's own calculations. |
| Institutional Quality | Institutional Quality is government effectiveness indicator which captures perceptions of the quality of civil services, public services, independence from political pressures and credibility of government's commitment to such policies. Source: World Bank's Worldwide Governance Indicators (www.govindicators.org). |

**Table 1:** Summary Statistics

| Variables | Observations | Mean | Standard Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Traditional home bias | 473 | 0.785 | 0.196 | 0.402 | 0.998 |
| Trade | 509 | 0.798 | 0.457 | 0.289 | 2.025 |
| Foreign listing | 452 | 1.026 | 1.674 | 0 | 5.931 |
| Beta | 521 | 0.844 | 0.309 | 0.210 | 1.370 |
| Idiosyncratic risk | 521 | 15.293 | 12.320 | 2.780 | 49.478 |
| Inflation | 480 | 3.987 | 4.859 | -4.480 | 54.400 |
| Natural resources rents | 499 | 0.051 | 0.075 | 0 | 0.479 |
| Size | 497 | -5.197 | 1.589 | -9.522 | -0.700 |
| Institutional quality | 521 | 0.864 | 0.908 | -1.189 | 2.429 |

**Note:** Traditional home bias is absolute home bias measure computed as per the ICAPM model. Trade is sum of exports and imports of goods and services measured as a share of gross domestic product. Foreign listing is percent share of global stock market that is listed on source country's stock exchanges (either directly or has issued public debt in the source country). Beta is annual global market beta's (estimated on cumulated samples of weekly return data). Idiosyncratic risk is variance of residuals from the ICAPM regressions. Inflation is measured by the consumer price index and reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. Natural resources rents is the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents measured as a share of gross domestic product. Size is log value of country's market share of world market capitalization. Institutional quality is government effectiveness indicator which captures perceptions of the quality of civil services, public services, independence from political pressures and credibility of government's commitment to such policies.

**Table 2:** Correlation

| | Traditional home bias | Trade | Foreign listing | Beta | Idiosyncratic risk | Inflation | Natural resources rents | Size | Institutional quality |
|---|---|---|---|---|---|---|---|---|---|
| Traditional home bias | 1 | | | | | | | | |
| Trade | -0.228 | 1 | | | | | | | |
| Foreign listing | -0.410 | -0.171 | 1 | | | | | | |
| Beta | -0.200 | -0.028 | 0.228 | 1 | | | | | |
| Idiosyncratic risk | 0.520 | -0.032 | -0.423 | 0.131 | 1 | | | | |
| Inflation | 0.384 | -0.217 | -0.272 | -0.053 | 0.427 | 1 | | | |
| Natural resources rents | 0.362 | -0.143 | -0.303 | -0.091 | 0.432 | 0.376 | 1 | | |
| Size | -0.194 | -0.178 | 0.439 | 0.442 | -0.335 | -0.287 | -0.114 | 1 | |
| Institutional quality | -0.543 | 0.330 | 0.416 | 0.258 | -0.423 | -0.412 | -0.443 | 0.408 | 1 |

**Note:** Traditional home bias is absolute home bias measure computed as per the ICAPM model. Trade is sum of exports and imports of goods and services measured as a share of gross domestic product. Foreign listing is percent share of global stock market that is listed on source country's stock exchanges (either directly or has issued public debt in the source country). Beta is annual global market beta's (estimated on cumulated samples of weekly return data). Idiosyncratic risk is variance of residuals from the ICAPM regressions. Inflation is measured by the consumer price index and reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. Natural resources rents is the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents measured as a share of gross domestic product. Size is log value of country's market share of world market capitalization. Institutional quality is government effectiveness indicator which captures perceptions of the quality of civil services, public services, independence from political pressures and credibility of government's commitment to such policies.

**Table 3:** ICAPM tests

| Country | Alpha | Standard Error of Alpha | Beta | Standard Error of Beta | $R^2$ (%) |
|---|---|---|---|---|---|
| Argentina | 0.097 | 0.452 | 1.018** | 0.388 | 12 |
| Australia | -0.001 | 0.256 | 0.875*** | 0.219 | 24 |
| Austria | -0.092 | 0.217 | 0.236 | 0.186 | 3 |
| Belgium | -0.008 | 0.171 | 0.548*** | 0.146 | 21 |
| Brazil | 0.437 | 0.333 | 0.537* | 0.286 | 6 |
| Canada | 0.230 | 0.154 | 0.975*** | 0.132 | 51 |
| China | 0.248 | 0.601 | 0.790 | 0.516 | 4 |
| Colombia | -0.052 | 0.394 | 0.722** | 0.338 | 8 |
| Czech Republic | 0.322 | 0.319 | 0.072 | 0.274 | 1 |
| Denmark | 0.178 | 0.156 | 0.295** | 0.134 | 8 |
| Egypt | 0.594* | 0.318 | -0.022* | 0.273 | 2 |
| Finland | 0.309 | 0.301 | 0.708*** | 0.258 | 13 |
| France | 0.114 | 0.170 | 0.825*** | 0.146 | 38 |
| Germany | 0.016 | 0.141 | 0.479*** | 0.121 | 23 |
| Greece | -0.053 | 0.270 | -0.260 | 0.232 | 2 |
| Hong Kong | 0.260 | 0.270 | 1.375*** | 0.232 | 41 |
| Hungary | 1.184* | 0.663 | 0.616 | 0.570 | 2 |
| India | -0.205 | 0.487 | 0.263 | 0.418 | 1 |
| Indonesia | 0.251 | 0.329 | 0.782*** | 0.282 | 13 |
| Ireland | 0.244 | 0.183 | 0.670*** | 0.157 | 27 |
| Israel | -0.347 | 0.314 | 1.166*** | 0.270 | 27 |
| Italy | -0.029 | 0.331 | 1.078*** | 0.285 | 22 |
| Japan | -0.545** | 0.217 | 0.802*** | 0.186 | 27 |
| Korea | -1.063** | 0.436 | 0.450 | 0.374 | 3 |
| Malaysia | 0.207 | 0.197 | 0.675*** | 0.169 | 24 |
| Mexico | 0.077 | 0.407 | 0.933** | 0.350 | 12 |
| Morocco | 0.430** | 0.178 | -0.238 | 0.153 | 5 |
| Netherland | 0.202 | 0.163 | 0.614*** | 0.140 | 28 |
| New Zealand | 0.086 | 0.318 | 0.454*** | 0.273 | 5 |
| Norway | 0.241 | 0.212 | 0.424** | 0.182 | 10 |
| Pakistan | -0.529 | 0.553 | 0.927* | 0.474 | 7 |
| Peru | -0.278 | 0.396 | 0.925*** | 0.340 | 13 |
| Philippines | 0.164 | 0.356 | 0.490 | 0.305 | 5 |
| Poland | 0.665 | 0.616 | 0.471 | 0.529 | 2 |
| Portugal | 0.446** | 0.191 | -0.245 | 0.164 | 4 |
| Russia | 1.450 | 1.120 | 1.621* | 0.962 | 5 |
| Singapore | -0.322 | 0.242 | 0.535** | 0.208 | 12 |
| South Africa | -0.606* | 0.348 | 0.407 | 0.299 | 4 |
| Spain | 0.408 | 0.246 | 0.574*** | 0.211 | 13 |
| Sri Lanka | -0.496* | 0.283 | 0.233 | 0.243 | 2 |
| Sweden | 0.335 | 0.266 | 0.956*** | 0.228 | 26 |
| Switzerland | -0.151 | 0.244 | 0.353* | 0.209 | 5 |
| Taiwan | 0.528 | 0.434 | 0.127 | 0.372 | 1 |
| Thailand | -1.133*** | 0.395 | 1.304*** | 0.339 | 23 |
| Turkey | 0.388 | 0.506 | 1.014** | 0.434 | 10 |
| UK | 0.178 | 0.153 | 0.647*** | 0.131 | 33 |
| US | 0.158 | 0.106 | 1.362*** | 0.091 | 81 |
| Venezuela | 1.057 | 0.782 | 0.964 | 0.672 | 4 |

**Note:** Ordinary least square regressions of excess domestic market weekly returns on a constant and excess world market weekly return. Alpha, standard error of alpha, beta, standard error of beta are reported. Unadjusted $R^2$ is goodness of fit. *,** and *** are significance levels at 1%, 5% and 10%, respectively.

**Table 4:** Home Bias Measures

| Country | ICAPM | Mean Variance | Minimum Variance | MPC1 | Bayes-Stein | MPC2 | Bayesian $\sigma_{\alpha}$ (country) | MPC $\sigma_{\alpha}$ (country) | Bayesian $\sigma_{\alpha}=0.1$ | MPC $\sigma_{\alpha}=0.1$ | Bayesian $\sigma_{\alpha}=0.5$ | MPC $\sigma_{\alpha}=0.5$ | Bayesian $\sigma_{\alpha}=1.12$ | MPC $\sigma_{\alpha}=1.12$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Argentina | 0.806 | 0.420 | 0.802 | 0.804 | 0.801 | 0.810 | 0.802 | 0.804 | 0.803 | 0.805 | 0.802 | 0.804 | 0.803 | 0.804 |
| Australia | 0.800 | 0.476 | 0.791 | 0.788 | 0.801 | 0.800 | 0.798 | 0.800 | 0.801 | 0.801 | 0.800 | 0.800 | 0.800 | 0.800 |
| Austria | 0.390 | 0.183 | 0.348 | 0.352 | 0.382 | 0.383 | 0.393 | 0.381 | 0.394 | 0.384 | 0.391 | 0.380 | 0.390 | 0.380 |
| Belgium | 0.459 | 0.126 | 0.485 | 0.493 | 0.452 | 0.474 | 0.452 | 0.451 | 0.453 | 0.454 | 0.451 | 0.451 | 0.452 | 0.451 |
| Brazil | 0.983 | 0.984 | 0.984 | 0.985 | 0.983 | 0.984 | 0.984 | 0.983 | 0.984 | 0.984 | 0.984 | 0.983 | 0.984 | 0.983 |
| Canada | 0.716 | 0.230 | 0.726 | 0.722 | 0.720 | 0.721 | 0.717 | 0.720 | 0.718 | 0.721 | 0.717 | 0.719 | 0.717 | 0.719 |
| China | 0.988 | 0.655 | 0.989 | 0.989 | 0.989 | 0.990 | 0.989 | 0.989 | 0.989 | 0.989 | 0.989 | 0.989 | 0.989 | 0.989 |
| Colombia | 0.970 | 0.787 | 0.968 | 0.968 | 0.969 | 0.969 | 0.969 | 0.969 | 0.969 | 0.969 | 0.969 | 0.969 | 0.969 | 0.969 |
| Czech Republic | 0.807 | 0.569 | 0.800 | 0.799 | 0.804 | 0.801 | 0.805 | 0.804 | 0.805 | 0.805 | 0.805 | 0.804 | 0.805 | 0.804 |
| Denmark | 0.553 | 0.259 | 0.513 | 0.503 | 0.548 | 0.534 | 0.546 | 0.546 | 0.547 | 0.548 | 0.546 | 0.545 | 0.546 | 0.545 |
| Egypt | 0.985 | 0.730 | 0.984 | 0.984 | 0.984 | 0.985 | 0.985 | 0.984 | 0.985 | 0.984 | 0.985 | 0.984 | 0.985 | 0.984 |
| Finland | 0.487 | 0.521 | 0.488 | 0.486 | 0.476 | 0.470 | 0.473 | 0.481 | 0.475 | 0.483 | 0.473 | 0.481 | 0.474 | 0.481 |
| France | 0.685 | 0.345 | 0.699 | 0.699 | 0.691 | 0.695 | 0.688 | 0.691 | 0.689 | 0.693 | 0.688 | 0.692 | 0.688 | 0.691 |
| Germany | 0.537 | 0.188 | 0.593 | 0.597 | 0.540 | 0.561 | 0.535 | 0.540 | 0.537 | 0.544 | 0.535 | 0.541 | 0.536 | 0.540 |
| Greece | 0.857 | 0.884 | 0.860 | 0.861 | 0.854 | 0.858 | 0.855 | 0.855 | 0.855 | 0.856 | 0.855 | 0.855 | 0.855 | 0.855 |
| Hong Kong | 0.710 | 0.486 | 0.716 | 0.715 | 0.711 | 0.720 | 0.709 | 0.711 | 0.710 | 0.712 | 0.709 | 0.711 | 0.710 | 0.711 |
| Hungary | 0.806 | 0.792 | 0.810 | 0.811 | 0.799 | 0.797 | 0.802 | 0.802 | 0.802 | 0.803 | 0.802 | 0.802 | 0.801 | 0.802 |
| India | 0.997 | 0.815 | 0.997 | 0.997 | 0.997 | 0.997 | 0.997 | 0.997 | 0.997 | 0.997 | 0.997 | 0.997 | 0.997 | 0.997 |
| Indonesia | 0.997 | 0.996 | 0.996 | 0.996 | 0.996 | 0.996 | 0.996 | 0.996 | 0.996 | 0.996 | 0.996 | 0.996 | 0.996 | 0.996 |
| Ireland | | | | | | | | | | | | | | |
| Israel | 0.874 | 0.872 | 0.867 | 0.866 | 0.871 | 0.869 | 0.872 | 0.871 | 0.872 | 0.872 | 0.871 | 0.871 | 0.871 | 0.871 |
| Italy | 0.482 | 0.213 | 0.480 | 0.486 | 0.479 | 0.485 | 0.476 | 0.480 | 0.478 | 0.483 | 0.477 | 0.480 | 0.476 | 0.480 |
| Japan | 0.851 | 0.518 | 0.844 | 0.846 | 0.862 | 0.863 | 0.861 | 0.861 | 0.861 | 0.862 | 0.861 | 0.861 | 0.861 | 0.861 |
| Korea | 0.939 | 0.759 | 0.941 | 0.941 | 0.938 | 0.938 | 0.939 | 0.939 | 0.939 | 0.939 | 0.938 | 0.939 | 0.938 | 0.939 |
| Malaysia | 0.964 | 0.921 | 0.963 | 0.963 | 0.964 | 0.965 | 0.964 | 0.964 | 0.964 | 0.964 | 0.964 | 0.964 | 0.964 | 0.964 |
| Mexico | 0.911 | 0.519 | 0.913 | 0.911 | 0.909 | 0.909 | 0.910 | 0.910 | 0.910 | 0.911 | 0.909 | 0.910 | 0.909 | 0.910 |
| Morocco | 0.989 | 0.703 | 0.985 | 0.985 | 0.988 | 0.988 | 0.989 | 0.988 | 0.989 | 0.988 | 0.989 | 0.988 | 0.989 | 0.988 |
| Netherland | -0.112 | -0.322 | -0.046 | -0.035 | -0.117 | -0.079 | -0.122 | -0.116 | -0.121 | -0.112 | -0.122 | -0.116 | -0.123 | -0.116 |
| Norway | 0.428 | 0.357 | 0.451 | 0.455 | 0.419 | 0.434 | 0.422 | 0.420 | 0.422 | 0.423 | 0.421 | 0.421 | 0.422 | 0.420 |
| New Zealand | 0.600 | 0.284 | 0.583 | 0.584 | 0.594 | 0.609 | 0.592 | 0.594 | 0.593 | 0.595 | 0.592 | 0.593 | 0.593 | 0.593 |
| Pakistan | 0.995 | 0.810 | 0.995 | 0.995 | 0.995 | 0.996 | 0.995 | 0.995 | 0.995 | 0.995 | 0.995 | 0.995 | 0.995 | 0.995 |

| Country | ICAPM | Mean Variance | Minimum Variance | MPC1 | Bayes Stein | MPC2 | Bayesian $\sigma_\alpha$ (country) | MPC $\sigma_\alpha$ (country) | Bayesian $\sigma_\alpha = 0.1$ | MPC $\sigma_\alpha = 0.1$ | Bayesian $\sigma_\alpha = 0.5$ | MPC $\sigma_\alpha = 0.5$ | Bayesian $\sigma_\alpha = 1.12$ | MPC $\sigma_\alpha = 1.12$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Peru | 0.825 | 0.581 | 0.818 | 0.818 | 0.821 | 0.812 | 0.823 | 0.822 | 0.823 | 0.823 | 0.823 | 0.822 | 0.822 | 0.822 |
| Philippines | 0.997 | 0.629 | 0.997 | 0.997 | 0.997 | 0.997 | 0.997 | 0.997 | 0.997 | 0.997 | 0.997 | 0.997 | 0.997 | 0.997 |
| Poland | 0.964 | 0.604 | 0.966 | 0.966 | 0.963 | 0.964 | 0.964 | 0.964 | 0.964 | 0.964 | 0.964 | 0.964 | 0.964 | 0.964 |
| Portugal | 0.516 | 0.324 | 0.461 | 0.467 | 0.509 | 0.505 | 0.511 | 0.509 | 0.512 | 0.511 | 0.512 | 0.508 | 0.512 | 0.508 |
| Russia | 0.996 | 0.997 | 0.996 | 0.997 | 0.996 | 0.996 | 0.997 | 0.996 | 0.997 | 0.996 | 0.997 | 0.996 | 0.997 | 0.996 |
| Singapore | 0.624 | 0.411 | 0.627 | 0.625 | 0.620 | 0.632 | 0.618 | 0.620 | 0.619 | 0.621 | 0.618 | 0.620 | 0.619 | 0.619 |
| South Africa | 0.875 | 0.670 | 0.880 | 0.882 | 0.873 | 0.880 | 0.875 | 0.874 | 0.875 | 0.875 | 0.874 | 0.874 | 0.875 | 0.874 |
| Spain | 0.871 | 0.281 | 0.878 | 0.875 | 0.872 | 0.874 | 0.871 | 0.872 | 0.872 | 0.873 | 0.871 | 0.872 | 0.871 | 0.872 |
| Sri Lanka | | | | | | | | | | | | | | |
| Sweden | 0.556 | 0.204 | 0.605 | 0.606 | 0.548 | 0.569 | 0.545 | 0.551 | 0.546 | 0.554 | 0.544 | 0.552 | 0.544 | 0.552 |
| Switzerland | 0.575 | 0.285 | 0.523 | 0.508 | 0.578 | 0.568 | 0.576 | 0.577 | 0.577 | 0.579 | 0.576 | 0.577 | 0.576 | 0.577 |
| Taiwan | 0.766 | 0.471 | 0.769 | 0.771 | 0.764 | 0.776 | 0.764 | 0.765 | 0.764 | 0.766 | 0.764 | 0.765 | 0.764 | 0.765 |
| Thailand | 0.983 | 0.977 | 0.984 | 0.984 | 0.983 | 0.984 | 0.983 | 0.983 | 0.983 | 0.983 | 0.983 | 0.983 | 0.983 | 0.983 |
| Turkey | 0.998 | 0.998 | 0.998 | 0.998 | 0.998 | 0.998 | 0.998 | 0.998 | 0.998 | 0.998 | 0.998 | 0.998 | 0.998 | 0.998 |
| UK | 0.527 | 0.298 | 0.452 | 0.464 | 0.546 | 0.534 | 0.542 | 0.544 | 0.543 | 0.546 | 0.543 | 0.544 | 0.542 | 0.544 |
| US | 0.700 | 0.638 | 0.760 | 0.760 | 0.809 | 0.801 | 0.803 | 0.807 | 0.804 | 0.808 | 0.804 | 0.807 | 0.803 | 0.807 |
| Venezuela | 0.958 | 0.738 | 0.956 | 0.957 | 0.957 | 0.960 | 0.958 | 0.957 | 0.958 | 0.957 | 0.958 | 0.957 | 0.958 | 0.957 |

**Note:** Home bias measures are average end of year home bias values over the years 2001 to 2011. ICAPM is average home bias measure computed in ICAPM framework. Mean Variance is average home bias computed in Mean-Variance framework. Minimum Variance is average home bias computed in Minimum-Variance model. Bayes Stein is average home bias computed using Bayes Stein shrinkage factor model. Bayesian $\sigma_\alpha$ (country) is average home bias measure computed in Bayesian framework for prior country specific standard errors ($\sigma_\alpha$ (country)) of alpha intercept in the ICAPM. Bayesian $\sigma_\alpha = 0.1$, Bayesian $\sigma_\alpha = 0.5$ and Bayesian $\sigma_\alpha = 1.12$ is average home bias measure computed in Bayesian framework for prior standard errors ($\sigma_\alpha = 0.1$), ($\sigma_\alpha = 0.5$) and ($\sigma_\alpha = 1.12$) of alpha intercept in the ICAPM, respectively. MPC1 is Multi-Prior Correction applied to Mean-Variance data based approach. MPC2 is Multi-Prior Correction applied to Bayes Stein approach. MPC $\sigma_\alpha$ (country) is average home bias measure computed in Multi-Prior framework for prior country specific standard errors ($\sigma_\alpha$ (country)) of alpha intercept in the ICAPM. MPC $\sigma_\alpha = 0.1$, MPC $\sigma_\alpha = 0.5$ and MPC $\sigma_\alpha = 1.12$ is average home bias measure computed in Multi-Prior framework for standard errors ($\sigma_\alpha = 0.1$), ($\sigma_\alpha = 0.5$) and ($\sigma_\alpha = 1.12$) of alpha intercept in the ICAPM, respectively. Ireland is financial centre. Foreign equity asset data not available for Sri Lanka.

**Table 5:** Traditional Home Bias and Bayestein Home Bias Results

| | Traditional Home Bias | | | | | | Bayes-Stein Home Bias | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| Trade | -0.251** | -0.357** | -0.187* | -0.097 | -0.024 | -0.048 | -0.259** | -0.370** | -0.195* | -0.101 | -0.027 | -0.049 |
| | (0.045) | (0.019) | (0.062) | (0.393) | (0.775) | (0.496) | (0.046) | (0.019) | (0.062) | (0.389) | (0.753) | (0.497) |
| Foreign listing | -0.158** | -0.168** | -0.133* | -0.228*** | -0.082** | -0.155** | -0.152* | -0.163* | -0.127 | -0.226*** | -0.077** | -0.151** |
| | (0.045) | (0.049) | (0.089) | (0.004) | (0.030) | (0.011) | (0.055) | (0.060) | (0.104) | (0.004) | (0.043) | (0.013) |
| Beta | -0.564*** | -0.566*** | -0.501** | -0.620*** | -0.396*** | -0.728*** | -0.573*** | -0.576*** | -0.509** | -0.631*** | -0.405*** | -0.741*** |
| | (0.005) | (0.008) | (0.010) | (0.001) | (0.001) | (0.003) | (0.005) | (0.008) | (0.010) | (0.000) | (0.001) | (0.002) |
| Idiosyncratic Risk | 0.011** | 0.011** | 0.012*** | 0.013*** | 0.017*** | 0.009** | 0.011** | 0.011** | 0.012*** | 0.013*** | 0.018*** | 0.009** |
| | (0.010) | (0.034) | (0.005) | (0.002) | (0.000) | (0.019) | (0.010) | (0.033) | (0.005) | (0.002) | (0.000) | (0.016) |
| Inflation | | 0.014* | | | | | | 0.014* | | | | |
| | | (0.075) | | | | | | (0.075) | | | | |
| Natural Resources Rents | | | -0.949* | | | | | | -0.953* | | | |
| | | | (0.085) | | | | | | (0.086) | | | |
| Size | | | | 0.157*** | 0.101*** | 0.164*** | | | | 0.163*** | 0.105*** | 0.171*** |
| | | | | (0.000) | (0.000) | (0.000) | | | | (0.000) | (0.000) | (0.000) |
| Global Financial Crisis | | | | | -0.033* | | | | | | -0.034* | |
| | | | | | (0.070) | | | | | | (0.061) | |
| Institutional Quality | | | | | | -0.162** | | | | | | -0.162** |
| | | | | | | (0.028) | | | | | | (0.027) |
| Observation | 415 | 400 | 415 | 415 | 412 | 415 | 415 | 400 | 415 | 415 | 412 | 415 |
| Wald $Chi^2$ | 138.61*** | 113.71*** | 111.85*** | 182.18*** | 214.88*** | 181.78*** | 139.67*** | 114.48*** | 114.41*** | 178.78*** | 214.36*** | 187.92*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Arellano Bond Test m1 | -1.375** | -1.437** | -1.373** | -1.247** | -1.996** | -1.237** | -1.385** | -1.452** | -1.379** | -1.250** | -1.962** | -1.238** |
| | (0.016) | (0.015) | (0.017) | (0.021) | (0.045) | (0.021) | (0.016) | (0.014) | (0.016) | (0.021) | (0.049) | (0.021) |
| Arellano Bond Test m2 | 1.274 | 1.355 | 1.288 | 1.210 | -1.759 | 1.213 | 1.279 | 1.363 | 1.291 | 1.211 | -1.755 | 1.213 |
| | (0.202) | (0.175) | (0.197) | (0.226) | (0.785) | (0.225) | (0.200) | (0.172) | (0.196) | (0.225) | (0.792) | (0.225) |

**Note:** Traditional home bias (column 1 to 6) and Bayes-Stein home bias (column 7 to 12) is dependent variable. Arellano-Bover/Blundell Bond Estimation with lags(1) and AR(2) tests. Arellano Bond test for no auto correlation. Lag value of traditional home bias is not reported. Lag value of Bayes-Stein home bias is not reported. Constant is not reported. P-values in brackets. Refer Appendix Table A.1 for definition of Traditional home bias, Bayes-Stein home bias, Trade, Foreign listing, Beta, Idiosyncratic Risk, Inflation, Natural Resources Rents, Size, Global Financial Crisis, Institutional Quality. ***,** and * represent significance level at 1, 5 and 10 percent, respectively.

**Table 6:** Bayesian (country standard error) Home Bias and Bayesian (0.1 standard error) Home Bias Results

| | Bayesian (country standard error) | | | | | | Bayesian (0.1 standard error) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| Trade | -0.262** | -0.371** | -0.197* | -0.102 | -0.028 | -0.050 | -0.261** | -0.369** | -0.196* | -0.102 | -0.029 | -0.051 |
| | (0.042) | (0.019) | (0.058) | (0.384) | (0.742) | (0.491) | (0.043) | (0.019) | (0.059) | (0.384) | (0.734) | (0.482) |
| Foreign Listing | -0.151* | -0.162* | -0.126 | -0.226*** | -0.078** | -0.152** | -0.152* | -0.162* | -0.127 | -0.226*** | -0.078** | -0.152** |
| | (0.056) | (0.061) | (0.104) | (0.004) | (0.041) | (0.013) | (0.055) | (0.061) | (0.103) | (0.004) | (0.040) | (0.013) |
| Beta | -0.578*** | -0.580*** | -0.512** | -0.635*** | -0.412*** | -0.744*** | -0.579*** | -0.581*** | -0.513** | -0.637*** | -0.412*** | -0.745*** |
| | (0.005) | (0.008) | (0.010) | (0.000) | (0.001) | (0.002) | (0.005) | (0.008) | (0.010) | (0.001) | (0.001) | (0.002) |
| Idiosyncratic Risk | 0.011** | 0.011** | 0.012*** | 0.013*** | 0.018*** | 0.009** | 0.011** | 0.011** | 0.012*** | 0.013*** | 0.020*** | 0.009** |
| | (0.011) | (0.034) | (0.005) | (0.002) | (0.000) | (0.017) | (0.011) | (0.034) | (0.005) | (0.002) | (0.000) | (0.017) |
| Inflation | | 0.014* | | | | | | 0.014* | | | | |
| | | (0.076) | | | | | | (0.076) | | | | |
| Natural Resources Rents | | | -0.947* | | | | | | -0.951* | | | |
| | | | (0.087) | | | | | | (0.086) | | | |
| Size | | | | 0.169*** | 0.107*** | 0.171*** | | | | 0.173*** | 0.109*** | 0.182*** |
| | | | | (0.000) | (0.000) | (0.000) | | | | (0.000) | (0.000) | (0.000) |
| Global Financial Crisis | | | | | -0.034* | | | | | | -0.036* | |
| | | | | | (0.066) | | | | | | (0.067) | |
| Institutional Quality | | | | | | -0.163** | | | | | | -0.162** |
| | | | | | | (0.027) | | | | | | (0.027) |
| Observation | 415 | 400 | 415 | 415 | 412 | 415 | 415 | 400 | 415 | 415 | 412 | 415 |
| Wald $Chi^2$ | 138.05*** | 114.16*** | 115.05*** | 178.92*** | 214.39*** | 188.02*** | 135.83*** | 113.35*** | 114.01*** | 177.89*** | 212.68*** | 187.70*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Arellano Bond Test m1 | -1.384** | -1.448** | -1.378** | -1.250** | -1.979** | -1.237** | -1.385** | -1.448** | -1.379** | -1.250** | -1.991** | -1.238** |
| | (0.016) | (0.014) | (0.016) | (0.021) | (0.047) | (0.021) | (0.016) | (0.014) | (0.016) | (0.021) | (0.046) | (0.021) |
| Arellano Bond Test m2 | 1.279 | 1.361 | 1.290 | 1.212 | -1.760 | 1.213 | 1.280 | 1.362 | 1.292 | 1.212 | -1.752 | 1.214 |
| | (0.200) | (0.173) | (0.196) | (0.225) | (0.784) | (0.225) | (0.200) | (0.173) | (0.196) | (0.225) | (0.797) | (0.224) |

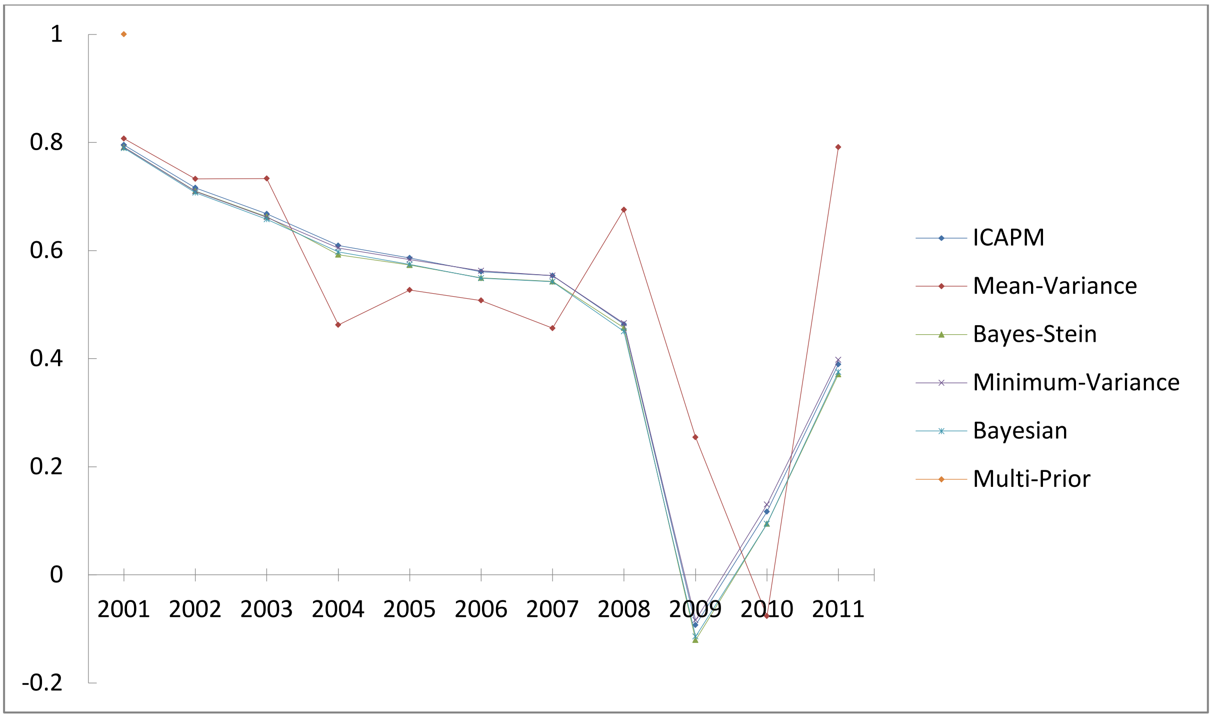
**Note:** Bayesian (country standard error) home bias (column 1 to 6) and Bayesian (0.1 standard error) home bias (column 7 to 12) is dependent variable. Arellano-Bover/Blundell Bond Estimation with lags(1) and AR(2) tests. Arellano Bond test for no auto correlation. Lag value of Bayesian (country standard error) home bias is not reported. Lag value of Bayesian (0.1 standard error) home bias is not reported. Constant is not reported. P-values in brackets. Refer Appendix Table A.1 for definition of Bayesian (country standard error) home bias, Bayesian (0.1 standard error) home bias, Trade, Foreign listing, Beta, Idiosyncratic Risk, Inflation, Natural Resources Rents, Size, Global Financial Crisis, Institutional Quality. ***,** and * represent significance level at 1, 5 and 10 percent, respectively.

**Table 7:** Multi-Prior (data based) Home Bias and Multi-Prior (country standard error) Home Bias Results

| | Multi-Prior (data based) | | | | | | Multi-Prior (country standard error) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| Trade | -0.224* | -0.331** | -0.183* | -0.074 | -0.010 | -0.041 | -0.260** | -0.370** | -0.196* | -0.100 | -0.027 | -0.050 |
| | (0.070) | (0.024) | (0.077) | (0.495) | (0.901) | (0.556) | (0.043) | (0.018) | (0.057) | (0.388) | (0.748) | (0.490) |
| Foreign Listing | -0.154** | -0.168** | -0.132* | -0.222*** | -0.075** | -0.151*** | -0.151* | -0.162* | -0.126 | -0.227*** | -0.078** | -0.151** |
| | (0.037) | (0.043) | (0.078) | (0.002) | (0.027) | (0.008) | (0.055) | (0.060) | (0.103) | (0.004) | (0.040) | (0.013) |
| Beta | -0.527*** | -0.529** | -0.470** | -0.588*** | -0.316*** | -0.689*** | -0.568*** | -0.571*** | -0.505** | -0.627*** | -0.402*** | -0.736*** |
| | (0.006) | (0.012) | (0.012) | (0.001) | (0.003) | (0.003) | (0.005) | (0.008) | (0.010) | (0.000) | (0.001) | (0.002) |
| Idiosyncratic Risk | 0.013*** | 0.013** | 0.012*** | 0.014*** | 0.017*** | 0.010** | 0.011** | 0.011** | 0.012*** | 0.013*** | 0.018*** | 0.009** |
| | (0.009) | (0.031) | (0.005) | (0.001) | (0.000) | (0.011) | (0.010) | (0.034) | (0.005) | (0.002) | (0.000) | (0.016) |
| Inflation | | 0.014* | | | | | | 0.014* | | | | |
| | | (0.075) | | | | | | (0.077) | | | | |
| Natural Resources Rents | | | -0.934* | | | | | | -0.950* | | | |
| | | | (0.086) | | | | | | (0.087) | | | |
| Size | | | | 0.159*** | 0.100*** | 0.166*** | | | | 0.164*** | 0.105*** | 0.171*** |
| | | | | (0.000) | (0.000) | (0.000) | | | | (0.000) | (0.000) | (0.000) |
| Global Financial Crisis | | | | | -0.044** | | | | | | -0.035* | |
| | | | | | (0.019) | | | | | | (0.057) | |
| Institutional Quality | | | | | | -0.150** | | | | | | -0.162** |
| | | | | | | (0.027) | | | | | | (0.028) |
| Observation | 415 | 400 | 415 | 415 | 412 | 415 | 415 | 400 | 415 | 415 | 412 | 415 |
| Wald $Chi^2$ | 108.29*** | 88.51*** | 80.71*** | 118.26*** | 142.55*** | 126.37*** | 138.43*** | 113.84*** | 113.61*** | 176.73*** | 211.92*** | 186.26*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Arellano Bond Test m1 | -1.397** | -1.477** | -1.406** | -1.262** | -1.927* | -1.255** | -1.385** | -1.451** | -1.380** | -1.250** | -1.976** | -1.238** |
| | (0.016) | (0.013) | (0.015) | (0.020) | (0.053) | (0.020) | (0.016) | (0.014) | (0.016) | (0.021) | (0.048) | (0.021) |
| Arellano Bond Test m2 | 1.296 | 1.398 | 1.325 | 1.228 | 1.777 | 1.234 | 1.281 | 1.365 | 1.293 | 1.213 | 1.758 | 1.214 |
| | (0.194) | (0.162) | (0.184) | (0.219) | (0.754) | (0.217) | (0.200) | (0.172) | (0.195) | (0.225) | (0.787) | (0.224) |

**Note:** Multi-Prior (data based) home bias (column 1 to 6) and Multi-Prior (country standard error) home bias (column 7 to 12) is dependent variable. Arellano-Bover/Blundell Bond Estimation with lags(1) and AR(2) tests. Arellano Bond test for no auto correlation. Lag value of Multi-Prior (data based) home bias is not reported. Lag value of Multi-Prior (country standard error) home bias is not reported. Constant is not reported. P-values in brackets. Refer Appendix Table A.1 for definition of Multi-Prior (data based) home bias, Multi-Prior (country standard error) home bias, Trade, Foreign listing, Beta, Idiosyncratic Risk, Inflation, Natural Resources Rents, Size, Global Financial Crisis, Institutional Quality. ***,** and * represent significance level at 1, 5 and 10 percent, respectively.

Figure1: Home Bias Measure: Finland




**Note:** ICAPM is the ICAPM model based measure of home bias. Mean-Variance is Mean-Variance data based measure of home bias. Bayes-Stein is Bayes-Stein measure of home bias. Minimum-Variance is Minimum-Variance measure of home bias. Bayesian is Bayesian (country standard error) measure of home bias and Multi-Prior is Garlappi et al (2007) Multi-Prior (country standard error) measure of home bias. **Source:** Author's own calculations.