Equity Home Bias Puzzle Revisited*

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Abstract

This paper attempts to prove that the existence of systemic risk is pertinent to portfolio selction, as well as to the equity home bias puzzle in international finance. If the systemic risks from home country to the global financial system are high, domestic investors will have less incentives to reap the diversification benefits from investing in other countries, even if they do not face any explicit or implicit barriers. Empirical works in this paper consist of two parts: the country-level home bias part and the country pair-level bilateral foreign bias part. Main findings are twofold. On one hand, we find that in the long-run, if a country is more systemically important to the global financial system, it will show a higher degree of equity home bias, ceteris paribus. On the other hand, there is a clearly U-shape relationship between systemic risk contributions and home bias level within each country. It means that the home bias level in certain country decreases in the first as it becomes more integrated into the global market. However, if its systemic importance to the whole system continues to rise, its home bias level will increase after a certain degree. Based on these findings, we argue that home bias is more of a normal than a puzzle.

1 Introduction

Finance theory tells us that the global investors should hold a internationally diversified market portfolio, if there are no particular barriers preventing them from doing this. According to the international capital asset pricing model (CAPM), the weight of each country's domestic holdings should be equal to its relative market capitalization share in the world. However, in reality, most investors hold nearly all of their wealth in the domestic market: the US investors mainly hold the US securities, the Australian investors largely possess the assets of Australia, and this pattern applies for almost every country in this planet. This under-diversification phenomenon is documented as *equity home bias puzzle* in the literature (French and Poterba, 1991; Coeurdacier and Rey, 2013; Cooper, Sercu, and Vanpee, 2013).

There are many possible explanations for this well-known puzzle, and we will review them briefly in the following section. We agree that a group of factors, instead of a single one, should be responsible for the formation of this behavior. However, our paper attempts to prove that fundamentally speaking, equity home bias puzzle is the result of rational choices. The reason why current portfolio theory does not fit the data is that it heavily relies on the concept of correlation, which measures the extent to which two variables are linearly related, in a *symmetric* way. When the estimated correlations of returns across different markets are low, we jump to the conclusion that there are considerable benefits from full risk diversification. However, the international financial markets are highly *asymmetric*, especially in the tail dependency: a certain group of countries are individually systemic, which means that they are so interconnected that they can generate significant negative effects to others, instead of the other way around. For instance, if the US market collapses, contagion effects will be very high among many other countries including Australia. However, if the Australian market itself is in distress due to unexpected domestic shocks, it is highly possible that it will bring a much less harm to the whole financial system, compared to that of the US. In this way, despite that correlation can measure the relations between each pair of countries, it cannot reflect the fact that this correlation is *directional.*

Throughout this paper, we attempt to prove that this neglected characteristic of international financial market may alter the optimal portfolio selection for a global investor. Our empirical works consist of two parts: the country-level home bias part and the country pair-level bilateral foreign bias part. In each part, we implement both cross sectional and panel regressions, as the former is a convenient way to evaluate the long-run influences of systemic risks on home bias and foreign bias across economies, and the latter can make full advantage of the within-estimators in panel regression to estimate the effects of systemic risks on equity home bias and foreign bias in each country. However, these baseline regressions are flawed in several aspects. First, cross-sectional regressions are criticized for omitted variables bias and many unobserved factors cannot be controlled. Second, the main problem with panel analysis lies in endogeneity and inconsistent estimated results. We are aware of these questions and try to address the first problem by implementing model uncertainty check to see the effects of systemic risks in all the model specification possibilities and to address the second problem by implementing the reverse causality test.

Our findings are twofold. First, in the long-run, if a country is more systemically important to the whole financial system, it will show a higher degree of equity home bias, ceteris paribus. In other words, if the systemic risks from home country to foreign countries are high, domestic investors will have less incentives to reap the diversification benefits, even when there is zero informational asymmetry and trading cost. This is because when the domestic markets are going through a bad time, foreign markets would also be heavily affected and lose their risk diversification roles. In that sense, systemic risk is highly pertinent to international portfolio selection, and is likely to be the key factors that explains home bias puzzle. Second, there is a clearly U-shape relationship between systemic risk contributions and home bias level within each country. It means that the home bias level in certain country decreases in the first as it becomes more integrated into the global market. However, if its systemic importance to the whole system continues to rise, its home bias level will increase after a certain degree. Based on these findings, we argue that home bias is more of a normal than a puzzle. All the empirical results in this paper prove that systemic risk is the key determinant of the equity home bias. However, this aspect does not gain enough attention in current literature. To the best of our knowledge, our paper is the first one to highlight the key role of systemic risks in international portfolio selection and the equity home bias. Our empirical findings in this paper will have important implications for both portfolio management and corporate finance.

The rest of this paper is organized as follows. Section 2 provides a brief literature review and Section 3 describes our data sources and variable construction methods. Section 4 presents the baseline regression results, as well as the robustness check. We also deal with the model uncertainty and reversed causality issues in this section. Finally Section 5 concludes.

2 Literature Review

2.1 Current explanations for equity home bias puzzle

The phenomenon of home bias is perennial. Since the seminal work of French and Poterba (1991), voluminous studies have attempted to understand this puzzle. The current explanations mainly consist of four categories, which are hedging domestic risks, trading costs, information asymmetry, and behavioral biases. However, each of them is challenged in many other studies, thus leading to few consensuses on this topic. Generally speaking, equity home bias remains a puzzle (Lewis, 1999). We briefly state our opinions towards each of these explanations here, and interested readers can refer to Coeurdacier and Rey (2013) and Cooper et al. (2013) for a more comprehensive review.

The first branch of literature tries to explain this puzzle from a macroeconomic perspective. Typically, it views home bias as a rational outcome of hedging motives, i.e. hedging against home-specific risks such as inflation risks, real exchange rate risks and non-tradable income risks. Although this approach works well in terms of theoretical models[1], its explanatory power crucially

[1]Coeurdacier and Rey (2013) introduce the recent developments in open economic financial macroeconomics, which incorporates the investor's portfolio choices in the benchmark two-country/two-good general equilibrium model. By

depends on one vital assumption: domestic equity returns are positively correlated with inflation, real exchange rate or non-tradable income. Meanwhile, the magnitudes of these home-specific risks should be large enough to match the observed levels of home bias. However, this assumption is rather controversial, and rejected by many empirical studies. For instance, Fama (1981) and Cooper and Kaplanis (1994) have documented a significantly negative relation between domestic equity returns and inflation. Additionally, van Wincoop and Warnock (2010) find that the estimated correlation between excess equity returns and the real exchange rate is too low, compared with the level required to explain this puzzle. Similar conclusion is also found in Fidora, Fratzscher, and Thimann (2007). Although these authors do agree that the real exchange rate volatility is a key factor behind the bilateral portfolio bias, they notice that this factor only explains a small percentage of variations.[2] As to those explanations related to non-tradable income risks, Baxter and Jermann (1997) put forward perhaps the most influential criticism. They argue that the presence of this non-tradable income risk actually makes the equity home bias puzzle much worse. As labor and capital incomes are highly correlated, investors should hold never hold any domestic equities, in order to hedge the human capital risk.[3] Therefore, although this approach is theoretically appealing, which means this approach can generate the investor's tendency of home-biased investment under general equilibrium framework, it massively relies on the existence of considerable home-specific risks, thus contradicting with the real data and lowering its credibility to a large extent.

In contrast, the second class of explanations considers the actual frictions in international financial market. This approach normally uses institutional factors in trading costs or limitations in laws to explain this notable puzzle. Examples are capital controls (Kho, Stulz, and Warnock, 2009), different tax burdens and transaction costs to domestic and foreign investors (Domowitz, Glen, and Madhavan, 2001; Mishra and Ratti, 2013), political risks (Pinkowitz, Stulz, and Williamson, 2003), and so on. However, we highly doubt that these institutional facts remains to be the most important factor until today. Our arguments develop in the following aspects. First, from a time series perspective, after decades of globalization, the level of full diversification across different countries remains low. According to Figure 1, where we use the world CAPM as our benchmark, the world average actual holding of foreign equities is only 19.20% of the optimal one in 2001, and it has just reached 28.21% in 2012. After years of financial integration, the home bias pattern remains persistent. The rapid financial liberalization and globalization in this period does not come along with fast reduction in equity home bias level. Second, from a cross-sectional view, financial frictions can hardly explain this home bias puzzle. For many developed countries, their financial markets have been fully open since 1970s. However, based on Figure 1, the actual holding of foreign equities in these developed countries is still less than 50 percent of the optimal. Third, the real data does

using the approach of "zero-order portfolios", they derive that the equilibrium portfolio consists of three parts: a pure diversification term, the hedging term of nontradable income risk, and the hedging term of real exchange rate risk.

[2]In our data, domestic equity returns are also negatively related to domestic inflation and positively linked with real exchange rate appreciation.

[3]Pesenti and van Wincoop (2002) and Massa and Simonov (2006) express the similar idea. They suggest that hedging the risk of non-tradable income is only a minor explanation of home bias puzzle.

not support this transaction-costs-based explanation. For instance, several excellent works such as Tesar and Werner (1995) and Warnock (2002) have shown that the turnover of foreign holdings is actually comparable with or even faster than that of the domestic ones. Based on this finding, they argue that we can hardly believe that the transaction costs are an explanation for the home bias puzzle. Fourth, in order to explain the recognized level of home bias, the transaction costs needed are high. Jeske (2001) concludes that the implicit costs on foreign assets should range from 150 to 700 basis points across countries. Consistently, Glassman and Riddick (2001) measure the required transaction costs to be at least 1% per month. Last, Coeurdacier (2009) and van Wincoop and Warnock (2010) have linked the portfolio home bias with the consumption home bias, and they show that introducing trade costs is not sufficient to explain the two puzzles simultaneously.

Informational asymmetry is another popular explanation, which focuses on the different information sets for domestic and foreign equities. Earlier works such as Gehrig (1993) and Brennan and Cao (1997), have successfully developed a rational noisy signal model, where domestic investors perceive more precise signals than foreign investors. Recently, many studies attempt to explain the home bias puzzle by introducing an endogenous information acquisition process (Ni, 2009; Barron and Ni, 2008), which can generate the asymmetric information and thus explain the differences in home bias across different managers. In our perspective, although many studies have empirically shown that informational frictions significantly contribute to equity home bias (Bekaert and Wang, 2009; Chan, Covrig, and Ng, 2005; Grinblatt and Keloharju, 2001; Portes and Rey, 2005), this approach has two vital shortcomings. First of all, the implication of the information asymmetry explanation is that domestic investors should outperform foreigner investors, but it has not been supported in empirical evidences. For instance, Grinblatt and Keloharju (2001) and Huang and Shiu (2009) find that foreign investors outperform domestic investors. Second, the empirical methodologies used in many related literature are quite problematic. Empirically, geographical distance, culture proximity such as language and colonial history, and economic proximity such as phone rates and bilateral trade are usually used to capture information asymmetries. However, it is hard to obtain accurate estimation for these indicators, because when we introduce these variables into the regression, we cannot control for country fixed effect. If unobserved country fixed-effect does exist, it will lead to biased estimation results (Acemoglu, Johnson, Robinson, and Yared, 2008).

The fourth explanation is behavioral-based. In order to unravel this puzzle, it brings up some psychological factors such as overconfidence (French and Poterba, 1991), overoptimism(Shiller, Kon-Ya, and Tsutsui, 1991), familiarity (Bonser-Neal, Brauer, Neal, and Wheatley, 1990; Heath and Tversky, 1991; Huberman, 2001; Karlsson and Nordn, 2007), limited processing capabilities (Magi, 2009), and even patriotism (Morse and Shive, 2011). The first drawback of this approach is that it needs a large magnitude of overconfidence or other psychological factors to explain the observed degree of the home bias level. Second, the problem with behavioral explanation lies in its consistency in the long run. Assuming not all investors are irrational and the optimal portfolio is international diversification, then there should be some investors realize the benefits of investing in foreign markets. After observing their success, the other irrational investors influenced by psychological motions would follow up to take the advantage. Thus the behavioral explanation cannot hold persistently in the long term.

2.2 Related literature

Our finding in this paper differs from all the explanations mentioned above. Our hypothesis does not rely on the existence of home-specific factors, nor do we use irrationality or market frictions to account for the under-diversification phenomenon in the international financial market. In contrast, we identify the influences of systemic risks on portfolio selection. If the systemic risks from home country to the whole financial system are high, domestic investors have less incentives to reap the diversification benefits from other countries, even if they do not face any explicit or implicit barriers. Our work is related to several branches of literature. The first is related to our key explanatory variable in this paper, systemic risk. After the great financial crisis of 2007, there is an increasing number of literature that focuses on the study of this concept, both theoretically and empirically. Theoretical works mainly focus on providing a formal framework to understand the nature of systemic risk (Acharya, 2009; Allen, Babus, and Carletti, 2012; Brunnermeier and Cheridito, 2014; Brunnermeier and Sannikov, 2015; Korinek, 2011). As for empirical works, Giglio, Kelly, and Pruitt (2016) focus on an interesting question of how systemic risk and financial market distress affect the distribution of shocks to real economic activity. Zhou (2010) studies the relation between the size of a financial institution and its systemic importance. In contrast to our conventional thinking, he conclude that size should not be considered as a proxy of systemic importance, and the so-called "too big to fail" is not always valid. Another important work, which is also closely related to ours, is Battistini, Pagano, and Simonelli (2013). One of their main findings in the paper is that the increasing home bias of the sovereign debt portfolios in Europe is significantly related to the country-related and systemic components in sovereign yield differentials.

Few papers recognize the link between systemic risks and international equity diversification, the second branch of literature presents several exemptions. Das and Uppal (2004) develops a parsimonious model with multivariate system of jump-diffusion processes to capture the property that returns on international equities are characterized by jumps occurring at the same time across countries, leading to fat-tailed and negatively skewed return distributions. They calibrate the data to two models, one that incorporates systemic risk and the other that ignores it, and document that systemic risk reduces the gains from diversification and penalized investors for holding levered positions. Their conclusion is that the portfolio implications of systemic crises are limited. However, as pointed out in Kole, Koedijk, and Verbeek (2006), their approach implies that a systemic crisis is a short-lived event that is hardly persistent, which is in contrast with recent crises and their aftermaths that lasted long time. Thus Kole et al. (2006) combine regime switching models with Merton-style (Merton, 1969) portfolio construction and captures persistence of crises, which shows that incorporating systemic crises greatly affects asset allocation decisions and the costs of ignoring them is substantial. If a crisis is taken into account, the investor allocates less to risky assets, and particularly less to the crisis prone emerging markets. Though these two papers emphasize systemic risk, its defined as the risk from infrequent events that are highly correlated across a large number of assets, which is in fact another expression of return correlation but not the asymmetric impact characterized in this paper.

The third branch directly draws upon some factors similar to the concept of systemic risk, in order to elucidate equity home bias puzzle. Campbell and Krussl (2007) investigates the effects of downside risk by modelling the investors optimal portfolio allocation using a mean-downside risk optimization model. They find that, contrary to mean-variance portfolio analysis, investors concerned with downside risk tend to hold a larger proportion of their portfolio in domestic equities with increasing aversion to risk. Downside risk is closely related to systemic risk, but the explanation in Campbell and Krussl (2007) is more behavior based and they associate downside risk with the degree of confidence in optimal portfolio allocation. Moreover, the asymmetric property is not mentioned in their paper and their empirical evidences is limited in nine developed countries. Bekaert and Wang (2009) revisits the determinants of home bias and foreign investment bias. They propose a novel determinant, the difference between industrial structures as a proxy for potential diversification benefits, but its explanatory variance is very low. The difference between industrial structures can be a factor affecting systemic risks among countries, but the measurement in their paper is again symmetric, not able to capture the unequal influence of countries with different financial impacts.

3 Data and Variables

3.1 Variable Construction

3.1.1 Measures of equity home bias. We follow Mishra (2015) in measuring home bias. Although we adopt various empirical method to estimate the home bias level, the general framework remains the same. Home bias for each country, $HB_{i,t}$, is defined as the relative difference between its actual weight of foreign holdings and optimal foreign weights:

$$HB_{i,t} = 1 - \frac{\omega_{actual,i,t}}{\omega_{optimal,i,t}} \tag{1}$$

Throughout the paper, i and t refers to country and year, respectively. In Equation (1), $\omega_{actual,i,t}$ means the actual weight of foreign holdings in country i, and $\omega_{optimal,i,t}$ represents the country i's optimal weight of foreign holdings derived from theoretical models. Therefore, the constructed home bias index is a country-year level variable, and it ranges from 0 to 1 with higher value representing larger degree of home bias: a value of 1 means that investors only hold domestic assets and a value of 0 means the actual weight equals that of the optimal. Following the conventional approach (Mishra, 2015; Baele, Pungulescu, and Horst, 2007), we implement some adjustments when actual foreign weight is larger than optimal weight, in order to obtain the comparable results:

$$HB_{i,t} = \frac{min(|\omega_{optimal,i,t}|, \omega_{actual,i,t})}{sign(\omega_{optimal,i,t})max(|\omega_{optimal,i,t}|, \omega_{actual,i,t})} - 1$$

Then we introduce our workable methods to measure the actual weight and optimal weight of foreign holdings. In this paper, actual foreign holding is computed as the ratio of foreign equity asset to total equity holdings. The former is represented by the reported portfolio investment assets by economy of nonresident issuer in terms of equity and investment fund shares. At the same time, the latter is obtained as the difference between foreign equity assets and liabilities, plus the domestic market capitalization. In short, the calculation process can be shown in Equation (2). All data used are obtained from the Coordinated Portfolio Investment Survey (CPIS) database conducted by International Monetary Fund (IMF).

$$\omega_{actual,i,t} = \frac{Foreign\ Equity\ Asset_{i,t}}{Foreign\ Equity\ Asset_{i,t} + Market\ Capitalization_{i,t} - Foreign\ Equity\ Liability_{i,t}} \tag{2}$$

The denominator in Equation (1), the optimal weight of foreign holding, is much more difficult to measure precisely. Following Mishra (2015) and Cooper et al. (2013), we adopt three different approaches, including the international capital asset pricing model, classical mean-variance portfolio model and minimum variance portfolio model. Each of the three approaches has its flaws. The weakness of International CAPM approach lies in the ambiguous empirical validity of International CAPM model. At the same time, the problem with the mean-variance portfolio model is that the historical average of ex post return series has proven to be a bad proxy for ex ante expected return. In addition, this method can result in extreme and volatile equity positions (Merton, 1980). As for the minimum variance portfolio model, its plausibility is largely dependent on the assumption of extremely high risk aversion. Only under this strict assumption, an investor only cares for the variance of his portfolio. To address these concerns, we employ all the three measurement in regression to show the robustness of our findings. As shown in Figures **??** to **??**, as well as the descriptive analysis section, various approaches will lead to different estimated levels of home biases for the same country. However, the correlations among these estimations are high, and our major conclusions are robust to the choice of certain estimation approach.

International capital asset pricing model (CAPM) International CAPM works for a ideal frictionless global market, which predicts that the homogenous investors who face the identical investment opportunities will hold the same world market portfolio. Therefore, in this framework, the optimal weight of foreign holding should be equal to the share of foreign equities in the world market portfolio, which is shown in the following formulation:

$$\omega_{optimal,ICAMP,i,t} = 1 - \frac{Market\ Capitalization_{i,t}}{World\ Market\ Capitalization_t} \tag{3}$$

Again, the data used in this approach is mainly from the CPIS database.

Classical mean-variance portfolio model The classical mean-variance model is proposed by Markowitz (1952), and it has been central to modern finance theory since then. Under this framework, we assume that the investors know exactly the true means and variances of equity returns, a risk-free rate is available and short sales are allowed at zero cost. Then, the optimal weight of foreign holding can be derived by solving the utility maximization problem, which is presented as in Equation (4).

$$\omega_{optimal,MV,i,t} = \frac{\Omega^(-1)\mu}{1'\Omega^(-1)\mu} \tag{4}$$

Here, μ is the vector of expected excess returns over risk-free asset, Ω is the covariance matrix and 1 is a unity column vector. Thus, in order to compute the optimal weight by using this approach, we have to estimate expected excess returns and return covariance based on historical data. The excess returns for each country are calculated as the difference between Morgan Stanley Capital International (MSCI) weekly total return index and weekly Treasury bill rate. In addition, the foreign excess return is computed from the weekly total return index of MSCI's All Country World Index (ACWI) excluding each home country. After that, Ω is calculated as the covariance matrix of the domestic and foreign excess return. Our return data series are all obtained from *Datastream*, and the Treasury bill data is from *Ibbotson and Associates*.

Minimum variance portfolio model According to Mishra (2015), minimum variance portfolio is the leftmost portfolio of the mean variance efficient frontier. Its fundamental idea is the same as that of the mean-variance portfolio model, but it relies solely on estimates of variances, thus is less vulnerable to estimation error than mean-variance portfolios. The optimal portfolios based on minimum variance portfolio model are said to be optimal for investors with infinite risk aversion and ignore expected return. The optimal portfolio weights can be expressed as in the following equation:

$$\omega_{optimal,MIN,i,t} = \frac{\Omega^(-1)I}{I'\Omega^(-1)I} \tag{5}$$

In Equation (5), the definition and calculation of Ω, as well the data used for measurement, are the same as those described in mean-variance portfolio model. I here is the unit column vector.

3.1.2 Measures of foreign bias. The previous measurements of home bias level is rather coarse, and it may lead to imprecise inference due to the large measurement errors. In order to alleviate that concerns, we also provide the empirical results by using foregin bias measures. Following Bekaert and Wang (2009), foreign bias $FB_{i,j,t}$ is defined as:

$$FB_{i,j,t} = \begin{cases} \frac{\omega_{optimal,i,j,t} - \omega_{actual,i,j,t}}{\omega_{optimal,i,j,t}} & if\ \omega_{actual,i,j,t} \leq \omega_{optimal,i,j,t} \\ \frac{\omega_{optimal,i,j,t} - \omega_{actual,i,j,t}}{1 - \omega_{optimal,i,j,t}} & if\ \omega_{actual,i,j,t} > \omega_{optimal,i,j,t} \end{cases} \tag{6}$$

Similarly, $\omega_{optimal,i,j,t}$ represents the optimal weight of country j's investment in country i at year t, and $\omega_{actual,i,j,t}$ is the actual weight of country j's investment in country i at year t. This is a bilateral measurement, and we use it as a alternative way to prove the robustness of our conclusion.

The actual weight is computed as country j's investment in country i as a share of j's total foreign holdings. Similar to home bias measurement, we measure foreign bias level in three different ways. The first is based on International CAPM, the optimal weight of country j's investment in country i should be equal to country i's share of market capitalization in world total market capitalization:

$$X_{ICAPM,i,j,t} = \frac{Market\ Capitalization_{j,t}}{World\ Market\ Capitalization_t} \tag{7}$$

The second one is measured by adopting mean-variance approach. The computation process is similar to that in home bias measurement, but now the optimal portfolio weight is an $N \times 1$ vector using the excess returns and their covariance matrix of N equity markets. The optimal weight here is calculated by using information from all the N equity markets, instead of a 2×1 equity series that consist of home country and the rest of the world.

As for the min-variance approach, we simply compute the covariance matrix of excess returns in N equity markets, and then we can calculate the optimal weight by using the same method. The rationale for this approach lies in the extremely high risk aversion assumption.

3.1.3 Measures of systemic risk. As a matter of fact, currently there is no consensus regarding either the concept or measurement of systemic risk,[4] However, there indeed are various ways to measure the interconnectedness among countries and financial institutions in the literature. For example, Adrian and Brunnermeier (Forthcoming) propose a systemic risk indicator, $\Delta CoVaR$, to measure the change in the value-at-risk of the financial system conditional on an institution being under distress relative to its median state. This method is now widely used in many other works (Adams, Fss, and Gropp, 2014; Gauthier, Lehar, and Souissi, 2012; Hautsch, Schaumburg, and Schienle, 2015; Wong and Fong, 2011). In contrast, Billio, Getmansky, Lo, and Pelizzon (2012) propose a systemic risk measure that relies on the important concepts of Granger causality and principal components. At the same time, Huang et al. (2012), Giglio (2014), and Kleinow and Moreira (2016) develop various econometric methods to obtain systemic risk information from credit default swap (CDS) prices. At the same time, Brownlees and Engle (2016) and Acharya, Engle, and Richardson (2012) develop the *SRISK* measure which calculates the capital shortfall of individual institution, conditional on the case of market in stress. Additionally, the influential paper of Acharya, Pedersen, Philippon, and Richardson (2010) help us better understand systemic

[4]Smaga (2014) and Huang, Zhou, and Zhu (2012) provide a comprehensive analysis of the concept and measurement of systemic risk.

risks and provide a very simple approach to measure financial institutions contribution to systemic risks.

Based on the availability of the cross-country data, we adopt four different measures of systemic risk in this paper. Two of them are the systemic risk indexes based on principal components analysis and Granger-causality tests, which are proposed by Billio et al. (2012). In addition to these two, we also use several institution-specific measures to capture an individual bank's contribution or sensitivity to economy-wide systemic risks. These measures include $\Delta CoVaR$ from Adrian and Brunnermeier (Forthcoming), and marginal expected shortfall (MES) from Acharya et al. (2010).

We prefer to the Granger causality and the $\Delta CoVaR$ approaches, because these two can measure the directionality of systemic risk. To investigate the dynamic propagation of shocks to the system, it is very important to measure not only the degree of the connectedness between financial institutions, but also the directionality of such relationship. We briefly explain these four measures used in the paper.

Linear Granger causality Our first measurement of systemic risk is a Granger-causality measure of connectedness based on the concept of Granger causality, which relies on the relative forecasting power of two different series. We follow the work of Billio et al. (2012) to capture the lagged propagation of return spillovers in the financial system. To be more specific, we first define the following indicator of causality:

$$(j \to i) = \begin{cases} 1 & j \textit{ Granger cause } i \\ 0 & \textit{otherwise} \end{cases}$$

By definition, we say that $(j \to j) = 0$. Then we can calculate the degree of Granger causality in the whole financial system S as follows:

$$DGC = \frac{1}{N\left(N-1\right)} \sum_{i=1}^{N} \sum_{j \neq i} \left(j \to i\right)$$

To assess the systemic important of single country, we define the following simple $\#OUT$ counting measures, where S denotes the global financial system:

$$\#OUT : \left(j \to S\right)|_{DGC \geq K} = \frac{1}{N-1} \sum_{i \neq j} \left(j \to i\right)|_{DGC \geq K}$$

Here N is the number of countries included in our sample, and K represents a threshold which is well above normal sampling variation, which is determined by the Monte Carlo simulation procedures. $\#OUT_i$ measures the number of countries that are significantly Granger caused by country i. Therefore, our first systemic risk measurement is the adjusted version of this $\#OUT_i$ measure:

$$SRisk_{GC,i,t} = \frac{\#OUT_{i,t}}{N-1} \tag{8}$$

CoVaR Here we briefly introduce the reduced-form measure of systemic risk, $\Delta CoVaR$, proposed by Adrian and Brunnermeier (Forthcoming). In their original work, they use this approach to measure the tail dependency between one certain financial institution and the whole financial system. This so-called $CoVaR$ means the VaR of the whole financial system conditional on this individual institution is in a particular state. Therefore, the systemic risk measure, $\Delta CoVaR$ is then defined as the difference between the $CoVaR$ conditional on the distress of an institution, and the $CoVaR$ conditional on the median state of this institution. We extend this approach to the international financial markets, in order to measure the systemic risk contributions of a country to the whole global financial system.

It is worth noting that this $CoVaR$ measurement, as well as the linear Granger causality approach mentioned before, is directional. Reversing the conditional shifts the focus of the question, which is quite helpful to our bilateral country regression that investigates the determinants of foreign bias. According to Adrian and Brunnermeier (Forthcoming), the systemic risk of country i can be estimated via the following equation:

$$SRisk_{CoVaR,i,j} = \Delta CoVaR_q^{j|i} = CoVaR_q^{j|X^i=VaR_q^i} - CoVaR_q^{j|X^i=VaR_{50}^i} \tag{9}$$

By definition, $CoVaR_q^{j|C(X^i)}$ measures the VaR of country j conditional on the situation that country i is at its certain state of $C\left(X^i\right)$. Therefore, $\Delta CoVaR_q^{j|i}$ is also a measure of the tail dependency between two random series. We follow the original work of Adrian and Brunnermeier (Forthcoming) and estimate the coefficients via quantile regression. We use the following indicators as our state variables: (1) the difference between the return of MSCI world index and the three-month US treasury bills; (2) the yield spread between the 10-year and three-month US Treasuries; (3) the difference between the weighted average spread of the one-year interbank interest rates of certain country and the one-year US Treasury yield; (4) the yield spread between the three-month general collateral repo rate and the three-month US Treasury rate; and also (5) the average daily appreciation of the spot exchange rate. All data are obtained from *Bloomberg* and *Datastream.*

Marginal Shortfall Expected Here we adopt the method in Acharya (2009) and Acharya et al. (2010) and use Marginal shortfall expected (MSE) to measure each country's expected contribution to a systemic crisis. According to their work, MES is estimated as follows:

$$SRisk_{MES,i,t} = MES_{i,t} = \frac{1}{n}\sum_{m} r_{m,i,t} \tag{10}$$

Here n refers to the number of trading days at year t, and m represent the 5% worst days for the whole global financial system in given year. We compute the average return on any country i for these days.

Principal components We directly follow the work of Billio et al. (2012) to use principal component analysis to estimate the correlation among asset returns across countries. In their framework, the systemic risk contribution of country i can be measured as follows:

$$SRisk_{PC,i,n} = \frac{1}{2} \frac{\sigma_i^2}{\sigma_S^2} \frac{\partial \sigma_S^2}{\partial \sigma_i^2} \bigg|_{h_n \geq H} \tag{11}$$

In the formulation above, σ_i^2 and σ_S^2 denote variance of equity returns in country i and the whole financial system, respectively. h_n here presents the degree of the interconnectedness of the whole financial system. H is a prespecified threshold in our paper. Therefore, this approach actually measures the exposure of country i to the whole system given a strong common component across the equity returns of all the countries.

3.1.4 Control variables.

Corresponding to the different categories of current explanations, though their major explanatory abilities are doubted, we still control these variables to see if they have significant contribution to home bias puzzle and compare their relative importance with that of systemic risks. In this section, we show the constructions of these variables in details, while the data sources are described in Table A.1.

Hedging domestic risks The exchange rate risks and inflation risks are captured by real exchange rate volatility and inflation rate. Following Bekaert and Wang (2009), real exchange rate volatility is defined as the standard deviation of monthly real exchange rate changes during the past 12 months, where real exchange rate is the inflation adjusted nominal exchange rate[5], and real exchange rate change is calculated as the ratio of real exchange rate of the current month to that of last month. Inflation rate is simply the annual percentage change of CPI. The data is retrieved from IMF International Financial Statistics (IFS) database.

For nontradable income risks, we follow Pesenti and van Wincoop (2002) and choose the growth rate of nontradables consumption per capita as the control variable. In this paper, nontradables categories are defined as housing, water, electricity, gas and other fuels, health, transport, communication, recreation and culture, education, restaurants and hotels and miscellaneous goods and services, according to individual consumption expenditure of households from the National Accounts Official Country Database.

Trading costs Various variables are used in the literature to proxy frictions in institution. First, the extent of frictions are likely to be negatively correlated with the financial market development, thus we proxy equity market development with the two widely used indicators (e.g. Chan et al., 2005; Baele et al., 2007; Bekaert and Wang, 2009, among others): stock market capitalization, and turnover ratio. The first one is defined as the market capitalization as a percentage of GDP from Global Financial Development Database (GFDD) and the second is the value of domestic shares traded divided by their market capitalization from World Development Indicators (WDI).

[5]For countries other than U.S., we define the nominal exchange rate as national currency per U.S. dollar. For U.S., its defined as the relative to Germany. In country pair regressions, the corresponding nominal exchange rate is expressed as the amount of foreign countrys currency per unit of home countrys currency.

Second, to gauge the possible effects of institutional frictions, we control financial openness, tax burdens of foreign investment, institution quality and legal frameworks. Financial openness is captured by the capital market openness indicator in Chinn and Ito (2008). It measures governments policy stance toward capital account liberalization concerning both the existence and severity of restrictions, and ranges from 0 to 1 with higher scores representing more openness. We obtain this data series from Hiro Ito's website.[6] Besides, an equity market openness indicator is constructed following Edison and Warnock (2003) and Bekaert and Wang (2009), which is defined as the investable index, i.e. the market capitalization not subjected to foreign ownership restrictions, divided by the global index. The data comes from S&P Emerging Market Indices.

Tax burden is proxy by the withholding taxes on dividends to non-resident investors following French and Poterba (1991) and Chan et al. (2005). In their paper, a higher tax rate may imply larger home bias. The average withholding tax data is obtained from Chan et al. (2005). Same to Bekaert and Wang (2009), we define institution quality as the average value of law and order, corruption and bureaucratic quality indices of the Political Risk Index of International Country Risk Guide (ICRG). As to legal frameworks, we first control the insider trading laws prosecution dummy created by Bhattacharya and Daouk (2002), which equals to 1 if insider trading law in stock market existed and had been prosecuted the first time by the end of 1999, then we also control the legal origin of each country indicating British, French, German, Scandinavian or Socialist origin of legal system.

Information frictions and familiarity Information frictions and behavioral explanations are very important in determining home bias as shown in many studies. Psychological factors such like overconfidence, overoptimism and patriotism are difficult to gauge at country level and theyre often investigated in individual portfolio selection analysis. Meanwhile, familiarity are easier to be interpreted between countries and it's generally mixed with information friction explanations. Thus the information and familiarity variables in this paper include the distance between two countries calculated using latitudes and longitudes of the most important cities/agglomerations in terms of population, the common language dummy taking the value of 1 if the two countries share a common official language and 0 otherwise, the number of internet users per 100 people, the number of bank branches overseas, the bilateral trade variable constructed as the ratio of total import and export between the two countries relative to the home countrys total imports and exports as well the trade openness defined as the ratio of total imports and exports to GDP, and bilateral foreign direct stock investment constructed as the ratio of total inward and outward between the two countries relative to the home countrys total inward and outward as well as the foreign direct stock investment for each country defined as the ratio of total inward and outward to GDP.

Other control variables In addition, following many studies (Bekaert and Wang, 2009; Chan et al., 2005), we also control for the effects of equity return correlation, past 1-year average return

[6] http://web.pdx.edu/ ito/Chinn-Ito_website.htm

and current year average return. Return correlation is a proxy for the diversification potential, computed as the monthly market return correlation over the past two year. Current average return and past average return are added to control the possible “return-chasing” behavior of investors (Bohn and Tesar, 1996; Grinblatt and Keloharju, 2001). Besides, we control industrial difference defined as the average of differences in industrial market capitalization weight (between the country and world average for home bias analysis and between country-pairs for foreign bias analysis), where industrial market capitalization data comes from *Datastream*. Inspired by Kole et al. (2006), we also control a crisis dummy that takes a value of 1 if the country is experiencing a banking crisis in that year. The banking crisis data for each country comes from Reinhart and Rogoff (2009). Besides, GDP per capita, total population, and the region information, are also controlled in our regression.

3.2 Descriptive analysis

Table 1 presents the average home bias measures in three different approaches for each country, in which Column (1) is based on traditional ICAPM approach, column (2) the mean-variance approach and column (3) the minimum-variance approach. There're notable changes in values across different approaches, but the relative comparison is similar. The least home biased country among these 42 economies is Netherlands, while India and Turkey are the two countries with least internationally diversified portfolios: the home bias measures of Netherlands amount to 0.364, 0.143 and 0.306 respectively for traditional ICAPM, mean-variance and minimum-variance approaches, while home bias measures of India and Turkey are all close to 1 in three approaches. The world average home bias for ICAPM, mean-variance and minimum-variance approaches are 0.771, 0.525 and 0.748 respectively. And the correlation matrix shown in Table 3 show that the three home bias measures are highly correlated with each other.

Similarly, Table 2 presents the average foreign bias measures for each country in three approaches. The least home biased country against individual foreign countries is United States according to traditional ICAPM approach and Pakistan according to mean-variance and minimum-variance approach. But the most domestically biased country against individual foreign countries is Colombia in all three approaches. The world average foreign bias for ICAPM, mean-variance and minimum-variance approaches are 0.605, 0.321 and 0.290 respectively. In measuring foreign bias, the difference between traditional ICAPM methods and other two methods is larger, which is also reflected in smaller values of correlation coefficients shown in Table 3, despite that they are still significantly correlated at 1% level.

Table 4 presents the statistical summary for explanatory variables. Additionally, in Table 5 and 6, we illustrate the correlations between control variables and home bias, as well as foreign bias measures. We can see that domestic risks (represented by Exchange rate risk, Inflation risk and Nontradable income risk), population and GDP growth rate are mainly positively correlated with home bias. Meanwhile, institution qualities, financial market development (represented by Market capitalization, Turnover ratio, Capital market openness, Equity market openness, Withholding tax, Institution quality and Insider trading laws prosecution), information symmetry (represented by Distance, Common language, Internet, Bank branches, Trade Openness and FDI), market return correlation, banking crisis and GDP per capita are negatively correlated with home bias. Based on the unreported correlation matrix for these control variables, we do not see serious collinearlities among these indicators.

4 Empirics

In this section, we provide empirical evidences to support our hypothesis that systemic risk is the key determinant of equity home bias. Our works mainly consist of two parts: the country-level home bias part and the country pair-level bilateral foreign bias part. In each part, cross sectional and panel regressions are both conducted, as cross-sectional analysis is a convenient way to evaluate the long-run influences of systemic risks across economies, and the conventional within-estimator of panel regression is helpful to identify the effects within each country. Section 4.1 and 4.2 present the empirical methodology and results for cross-sectional and panel home bias analysis, and Section 4.3 presents that for bilateral foreign bias analysis.

It should be noticed that these baseline regressions are flawed in several aspects. First, cross-sectional regressions are criticized for omitted variables bias and many unobserved factors cannot be controlled. More importantly, since we have collected a large number of control variables, it is hard to decide which one of them should be added into the regression functions. This model uncertainty issue should be carefully dealt with, since it has been found vital in any cross-country regression (Levine and Renelt, 1992). Second, the main problem with panel analysis lies in endogeneity issues. We are aware of these questions and try to address the first problem by implementing model uncertainty check to see the effects of systemic risks in all the model specification possibilities, and to address the second problem by implementing the reverse causality test. These robustness checks are presented in Section 4.4 to 4.6.

4.1 Systemic risk and Country-level Home bias: cross-sectional analysis

Table 7 summarize our baseline results of cross-sectional analysis. The benchmark regression function for cross-sectional analysis is shown as follows:

$$HB_i = const + \alpha SRisk_i + \beta X_i + \varepsilon_i \tag{12}$$

In Equation (12), HB_i is the home bias measurement described in Section 3.1.1, and $SRisk_i$ is our mainly interested variable proxy for systemic risk in country i. Here presented is the results using the home bias measurement calculated by mean-variance approach and systemic risk indicator calculated by Granger causality method. The results using other approaches to measure home bias and systemic risks, which can be found in the online appendix, are very similar and confirm the robustness of our analysis. X_i represents a bunch of the selected control variables. We use different combinations of control variables in the baseline regression, according to their classifications in the literature.

In Table 7, column (1) only include some basic control variables: systemic risk index, country i's geographical region, GDP per capita and total population. In column (2), we include three more variables following Bekaert and Wang (2009): market return correlation, industrial difference and banking crisis index. To compare our proposed systemic risk indicator with other explanatory variables used in the literature, we additionally add proxies for domestic exchange risks, inflation risks and nontradable income risks in column (3), proxies for institutional impediments and trading costs including market capitalization, turnover ratio, capital market openness, institutional quality, insider trading laws, and legal origins in column (4), and proxies for informational frictions and familiarity including distance, common language, internet, bank branches, trade openness, and FDI in column (5). All standard errors are clustered by country throughout this paper.[7]

Three findings are worth noticing from Table 7. First, the estimated coefficients of systemic risk remain positively significant across all the five columns as expected based on our hypothesis. It shows that if a country is more systemically important to the whole financial system, it will show a higher degree of equity home bias. For countries with large systemic risks, when domestic markets are experiencing a bad time, foreign markets would also be heavily affected and thus cannot function as a diversification buffer. As a result, equity home bias would increase. Second, the coefficients of systemic risk vary a lot, this is due to different control variable selections and reflects the potential model uncertainty problem. Thus its very important to isolate the effects of model specification on coefficient estimation and refer to the mean coefficient and significance rate in model uncertainty check in Section 4.5. Third, in contrast with the persistent significance of systemic risk, other control variables are insignificant in most specifications, except region and FDI in the last column. Although each of these variables included here is found to be a important explanatory variable in some studies, its significance disappears after we control for the effects of systemic risk. This strengthens the great explanatory power of systemic risk.

4.2 Systemic risk and Country-level Home bias: panel analysis

In addition to the cross-sectional analysis, we also implement the panel analysis. The benchmark panel regression is shown as in the following equation, where we can control unobserved country fixed effects and year fixed effects represented by μ_i and δ_t:

$$HB_{i,t} = \alpha_{0,i} + \alpha SRisk_{i,t} + \beta X_{i,t} + \mu_i + \delta_t + \varepsilon_{it} \tag{13}$$

Empirical results are summarized in Table 8. Again, standard errors are clustered by country. The different combinations of control variables are similar to cross-section analysis. Column (1)

[7] According to Bekaert and Wang (2009), we should explore several cross-sectional clustering strategies in the empirical analysis. Therefore, we also use heteroscedasticity robust standard errors without clustering, and standard errors clustered by target country, to see if different estimations of standard errors will change our results. However, our main conclusion remains unchanged.

shows the panel regression by using some basic control variables, including country i's GDP per capita and total population in year t. In column (3), we add more control variables such as market return correlation, industrial difference, banking crisis index, equity return in past year and current year. In order to compare our proposed systemic risk indicator with other explanatory variables used in the literature, we control for the effects of other groups of variables in columns (5), (7) and (9). In column (5), we add three indicators proxy for hedging risks, which are exchange rate risk, inflation risk and nontradable income risk. In column (7), we attempt to control for the effects of institutional impediments, including market capitalization, turnover ratio and capital market openness. Column (9) presents the empirical results by adding variables proxy for informational frictions and familiarity, including internet, bank branches, trade openness, and FDI. But here the column numbers are doubled as the even columns are the results of dynamic panel regressions by adding the lag of home bias measure to control its potential persistence. In order to compare with those regressions without any lagged dependent variable, we also run the two-way fixed effects for those including the lagged home bias.[8]

Interestingly, the coefficients of systemic risk in Table 8 are significantly negative, which seems contradictory with the cross-sectional analysis. However, when we add the square term of systemic risks in the model, the results in Table 9 illustrate a clear U-shape relationship between systemic risks and home bias. It means that within individual country, the home bias level first decreases as the its systemic risk contribution raises in the global market, but then the home bias level increases as its systemic importance keeps to rise. One possible explanation is that, systemic risks are correlated with the degree of financial integration. Then in the earlier stage of development, the rise of systemic risks is often the result of deeper financial integration with the global financial market. The diversification costs decline rapidly, but the diversification benefits remain high. Thus the increased systemic importance in the global market induce domestic investors to hold foreign equities at this time. However, if the country's effects continue to rise, the decreased diversification benefits overtakes the effects of financial integration, resulting in increased home bias in the long run. This is also consistent with the results in the previous cross-sectional analysis.

Besides, compared with that in cross-sectional regressions, the variation of the coefficients of systemic risk here is much smaller, as unobserved country and year fixed effects are controlled in panel regression. Again, the explanatory power of other control variables cannot match that of our proposed systemic risk.

4.3 Systemic risk and Foreign bias

In this section we investigate the home bias puzzle at bilateral level. We use variants of the following model specification for cross-sectional and panel analysis respectively:

[8] Since our time span is rather short (12 years), we also adopt the GMM approach to constrain the situation when the unobserved panel-level effects are correlated with the lagged dependent variable and make our inference biased Mishra (2015). However, the major conclusions do not change

$$FB_{i,j} = const + \alpha SRisk_{i,j} + \beta SRisk_j + \gamma X_i + \lambda X_j + \eta Y_{i,j} + \varepsilon_i \tag{14}$$

$$FB_{i,j,t} = c + \alpha SRisk_{i,j,t} + \gamma X_{i,t} + \lambda X_{j,t} + \eta Y_{i,j,t} + \mu_{i,j} + \delta_t + \varepsilon_{i,j,t} \tag{15}$$

In the regressions above, $FB_{i,j,t}$ and $FB_{i,j}$ are the observed home bias level for country pair (i, j). We adjust the systemic risk indicator as $SRisk_{i,j} = \frac{\ln(1+SRisk_i)}{\ln(1+SRisk_j)}$, in order to add it into the bilateral regression function. It should be noted that the adjusted systemic risk indicator here is relative and directional. A positive number indicates that home country can generate larger spillover effects to the target country, compared with the other way around. In addition, a larger positive number of this adjusted systemic risk indicator means that as to country j, country i is more systemically important than other countries.

As shown in Equation (14), in addition to our adjusted systemic risk indicator, we also control for the effects of home country characteristics X_i, target country characteristics X_j, and also some variables capturing the bilateral relations between home and target country $Y_{i,j}$. Table 10 presents the results for cross-sectional analysis in foreign bias. Similarly, in addition to the systemic risk indicator, column (1) only include some basic control variables, such as GDP per capita, GDP growth rate and total population in both home and target countries. In column (2), we include market return correlation and industrial difference between home and target countries, as well as the banking crisis index. In column (3), we add variables proxy for domestic exchange risks, inflation risks and nontradable income risks in home and target countries. In column (4), we include the market capitalization, turnover ratio, and capital market openness information in bilateral countries. We also add the institution quality in target country here. Additionally, we control for the effects of distance, common language, bank branches, bilateral trade and FDI in column (5).

Panel regression function in Equation Equation (15) is similar to that of cross-sectional regression. In the panel regression function, the explanatory variables here include time-varying variables capturing target country characteristics $X_{j,t}$, time-varying variables capturing holder country characteristics $X_{i,t}$, and the bilateral variables between the target and country countries $Y_{i,j,t}$. Besides, time-invariant country-pair fixed effect and year fixed effect are added to capture those unobserved country pair characteristics and year effects. In both regressions, the standard errors are clustered by country-pair. Empirical results are summarized in Table 11 for panel analysis. The only difference between the even columns and the corresponding odd columns is that we add the lag of home bias measure to control its potential persistence.

Two important conclusions stand out, based on Table 10 and Table 11. First, the empirical relationship between systemic risk and home bias is similar to what we have found in country-level home bias analysis. The larger systemic risk country i have on country j, its relative portfolio allocation in country j is more biased towards domestic market. As we can see from both tables, this conclusion is very consistent across different control variables combinations in both cross-sectional and panel regressions. The bilateral data in foreign bias analysis provides more micro evidences to establish the positive relationship between systemic risks and equity home bias. Second, different from what we have seen in the home bias analysis, a lot of control variables have shown their explanatory power in the foreign bias regressions. For instance, we find that the GDP growth rate in target country, return correlation, and also most informational asymmetry variables are significantly related to the foreign bias level. However, the estimated coefficients are not all as expected. The negative sign of return correlation indicates that if the equity return series in two countries are more correlated, the foreign bias level will be lower. The same conclusion comes to the results of distance. All these outcomes indicate that more works need to be done in the future.

4.4 Robustness check

To check the robustness of our empirical findings, we implement an array of additional tests. Generally speaking, those adjustments or modifications do not alter our main conclusion that systemic risk is one of the key determinants of equity home bias. Due to the limitations in length, we summarize all the results of robustness checks in our appendix. These additional tests are explained in details as follows.

First, we redo our home bias and foreign bias regressions by using alternative measures. As we explain in Section 3, there are many other home bias measures or systemic risk measures. Based on the previous descriptive analysis, there are notable differences among different methods. However, it shows that our main findings discussed in the basic section are not driven by the specific choice of measurement. Our results are quite robust, in both qualitative and quantitative meanings.

Second, we investigate whether the inclusion of global financial crisis drives our major conclusion. We split our full sample into pre-crisis period and after-crisis period. Based on the outcome, we find that our basic conclusions are robust to alternative changes of sample period.

Third, we use update our systemic risks measurements from using return series data of financial institutions, instead of the simple country composite return series. We identify those systemically important financial institutions by testing if it can generate considerable spillover effects to the global financial system. Then we construct the systemic risk indicator for each country by its relative number of systemically important financial institutions. This approach is more informative since it exploits the information from institutions, instead of the broad country. Our major conclusions do not change after we switch to this way of constructing our systemic risk indicators.

4.5 Model uncertainty in cross-sectional analysis

Model uncertainty is quite pervasive in empirical studies, and how robust are our empirical results to the changes in model specification remains to be a vital question in practice (Sala-I-Martin, Doppelhofer, and Miller, 2004). Previous empirical works that focus on the determinants of equity home bias, do not take care of this issue. For instance, Bekaert and Wang (2009) examine a large number of potential home bias determinants, but their choices of variables included in the regression are quite arbitrary, which makes their findings inconclusive. In this section, we investigate whether our basic conclusion holds after we consider all possible combinations of the controls. We limit our discussion to cross-sectional analysis. Model specification issues in cross-sectional are more important since it cannot control for unobserved individual effects or time years as the panel analysis does.

There are many econometric approaches that deal with the model uncertainty. In this paper we choose the approach proposed by Young (2009) and Young and Holsteen (Forthcoming). Generally speaking, this method proceeds in two steps. First, we choose our most interested variable, i.e. the systemic risk, and estimate the modelling distribution of estimates across all combinations of possible controls. As we can see in Table 12 and Table 13, the possible model specifications for home bias and foreign bias regressions are 1,048,576 and 262,144, respectively.[9] By running all possible models, we can evaluate the performance of our interested variable in a more convincing way. Second, we implement a model influence analysis showing how each model ingredient affects the estimated coefficient of systemic risk. Although the influence analysis cannot inform us the "true" model specification, it can show us the critical control variables that affect our major conclusion.

We begin with the cross-sectional analysis in using home bias as the dependent variable. Table 12 reports the model robustness results. Across the possible combinations of controls, the effects of systemic risk are 100% positive and 86 percent of the estimates are statistically significant. Normally, if the significance rate of certain variable is above 50%, we can say that it is likely to be a robust determinant of the dependent variable. Our model uncertainty test results show that systemic risk is highly possible to be one of the key explanatory variables for equity home bias. Figure 3 shows the distribution of estimates from all the possible models. The magnitude of estimated coefficient indeed varies a lot across different model specifications, which is consistent with our previous finding in the baseline cross-sectional analysis. However, as we can see from Figure 3, the most likely estimated coefficient for our systemic risk indicator is around 0.6. In addition, Table 12 also reports that the average number of estimated results for all possible regression models is 0.5898.

Then we turn to investigate how the introduction of a certain control variable changes the estimated coefficient of systemic risk. Table 14 shows the major results. Similar to the original work, the $\Delta\beta$ effect of controls is reported in order of absolute magnitude influence. To aid interpretation, we also report $\Delta\beta$ as a percent change in the estimate from the mean of the model distribution. Three control variables clearly stand out as most influential. The influence estimate for variable FDI shows that, all else equal, when controlling for FDI, the coefficient on systemic risk increases by 20.8%, which is a considerable number. Similarity, Controlling for market correlation also increases the effect size of systemic risk by nearly 16%. However, when we include the insider trading laws prosecution into the cross-sectional regression, the coefficient on systemic risk will decrease by 10%. These three variables are key to our empirical relationship between home bias and systemic risk in cross-sectional analysis. The other control variables have much less impact on the estimate and have little model influence.

[9]The reason why there is less number of combinations in foreign bias regression is that we require the coexistence of home and foreign indicator in the regression.

Same patterns hold for our foreign bias regression work. As shown in Table 13, after we run all the possible linear regression models, all the estimated coefficients of systemic risk are positive. Additionally, 95 percent of these estimates are statistically significant, which again proves that our baseline regression results are quite robust. Figure 4 shows the distribution of estimates for systemic risk from all the possible models. According to Table 13, the average number of coefficients is 0.2113.

As to the influential analysis in foreign bias regression, based on results in Table 15, we can clearly see that the inflation risks, market capitalization and bilateral FDI are three most important control variables to our regression. For instance, Ceteris paribus, when we control for the inflation effects, the coefficient on systemic risk decreases by 16.4%.

4.6 Endogeneity issues in panel analysis

Although previous results of the baseline regressions and several robustness checks are consistent with our hypotheses, we have to admit that the endogeneity issues may be serious in the regression. One normal source comes from the unobserved omitted variable bias. To address the issue of spurious correlation through the omission of relevant country-specific information, we implement the regressions with fixed effects specifications by exploiting the advantages of dynamic panel data.[10]

Another important source is reverse causality: for instance, a higher level of home bias or foreign bias may lead to the increase of systemic risk, instead of the other way around. This potential reverse causality issue may undermine our arguments on the relation between systemic risk and equity home bias. Therefore, we conduct the reverse causality through the Granger causality framework, in order to see whether our conclusion still holds after we consider the possible endogeneity issues. We only present and discuss the results that use home bias as dependent variable here. Results of dealing with endogeneity issues in foreign bias regression are shown in the appendix.

We implement the long-run panel Granger causality test to investigate whether there exists the reverse causality running from home bias to systemic risk. Following some previous literature (Attanasio, Picci, and Scorcu, 2000; Su and Yao, 2016), the basic equation estimated for systemic risk and home bias index is shown as the following specification:

$$SRisk_{i,t} = \alpha_{0,i} + \sum_{j=1}^{4} \alpha_j SRisk_{i,t-j} + \sum_{k=1}^{4} \beta_k HB_{i,t-k} + \delta_t + \varepsilon_{i,t} \tag{16}$$

In the equation above, β_k is our mainly interested variable, which is also called the standard within-estimator in the literature. We choose four lags here, in order to balance between the dynamics of dependent variable and the availability of the data. Following the corresponding literature(Attanasio et al., 2000; Su and Yao, 2016), we introduce both country and year fixed-effects. Two statistics are constructed to help us find out whether there is some Granger causality

[10]We also run the GMM-IV regression where we use the lagged systemic risk as our instrument variable. The results are shown in Table 18. Although it seems to be consistent with our hypothesis, it suffers from the problem of weak IV. Therefore, before we find any solutions to this issue, we do not think that this GMM-IV approach is suitable for solving the endogeneity issues here.

between these two variables. One is the sum of all β coefficients, which represents the short-run effects from home bias to systemic risk. The other is calculated as $\frac{\sum_{k=1}^{4}\beta_k}{1-\sum_{j=1}^{4}\alpha_j}$, which represents the corresponding long-run effects, after we take into consideration the self-persistence of the dependent variable. We calculate the corresponding p-values for both statistics.

The results are summarized in Table 17. The basic regression results are summarized in column (1). According to this table, we cannot observe any significant effects running from equity home bias to a country's systemic risk contribution in the whole financial system, in both the short-run and long-run meanings. To check the robustness of our empirical findings, we run an array of additional tests. In our basic model specification, the underlying assumption is that the size of the time span, as well as the number of economies in the cross section, is large enough. However, the time span of our sample may not be long enough. Therefore, it is highly possible that the empirical results in column (1) suffer from the well-known Nickell bias documented in the literature (Nickell, 1981). In order to alleviate that concern, we adopt the generalized method of moments (GMM) estimator developed by Arellano and Bond (1991) to deal with the potential effects of this bias. The results are shown in column (2). However, this change in estimation technique does not change our conclusion that there is no Granger causality from home bias level to systemic risk.

In column (3), we deal with the assumption of no country heterogeneity, so that now the coefficients of the dynamic model can differ in the cross-sectional dimension. We construct the mean-group estimators proposed by Pesaran and Smith (1995) and follow the corresponding statistical inferences to test whether this approach will alter our previous results. According to Table 17, there is only long-run effects running from home bias to systemic risk.

Last, we add a number of selected variables in the regression. In addition to the country and year fixed effect, we also include some basic control variables such as population and GDP per capita. The results are listed in columns (4) to (6) in Table 17. We can see that for the two-way fixed-effect and GMM estimations, our conclusion remains unchanged after we control some variables. However, the long-run effects from home bias to systemic risk in the mean-group estimation disappears after we control for the effects from other variables.

4.7 Predictions: home bias as a normal of international financial markets

The empirical evidences show that our explanation works well. Interestingly, following our explanations, equity home bias is more a normal than a puzzle. To clarify it, here we take the value of one minus market return correlation as a measurement of diversification benefit, by which a higher value representing larger benefits if diversify by holding more foreign portfolios. Besides, whether speak common language, distances with other countries, withholding tax, foreign bank branches, internet users, market capitalization, turnover ratio, institution quality, capital account openness and trade openness reflect the obstacles and costs of holding foreign equities. After transforming common language, capital account openness and institution quality by taking one minus their values and taking the reciprocal of the number of foreign bank branches, internet users, market capitalization, trade openness and turnover ratio, all these variables can be uniformly interpreted as larger value representing larger costs. Then we conduct principle component analysis retaining a maximum of 3 principal components and use the first components as a measure of diversification costs.

Figure 5 presents the movement of systemic risk, diversification benefit and diversification cost, where the left one is the result of all countries and the middle and right one corresponds to developing and developed countries respectively. First we can see that diversification cost is much higher in developing countries than developed countries mainly due to their less developed financial market and inferior institution quality, but diversification benefit is also higher in developing countries which can be attributed to their smaller return correlations with world equity market. Second, consistent with the regression results shown before, in developed countries, along with the rising in systemic risk, diversification cost drops in the beginning because of deeper financial integration, which may induce more foreign equity investment, however, later larger systemic risk also leads the diversification benefits to decrease thus in the long run home bias can be stronger. Third, for developing countries, the problem lies in the extremely high diversification cost and the decrease in systemic risk can only alternates the home bias to a small extent while an increase in systemic risk would worsen the home bias phenomenon. To sum up, the home bias remains in developed countries because of larger systemic risk and small diversification benefits along with it, while home bias remains in developing countries due to large diversification costs.

5 Conclusion

Various explanations in existing studies make equity home bias now less of a puzzle. By identifying the essential role of systemic risks, we see home bias more of a normal. It would not disappear along with the development in financial markets, institutional quality and information transmission. Instead, it is perennial.

By systemic risks, we mean the risk of one financial institutions problems spreading to the other or the whole system. In country level, it can be interpreted as the risk of one countrys financial market deterioration affecting other countries or the global financial system. For countries with larger systemic risks, they display stronger effects in international financial market and their close ties with the rest of the financial world make investing in foreign equity markets less attractive as it cannot buffer against bad times. This is confirmed by the empirical evidences in the paper, which demonstrate a positive relationship between systemic risks and equity home bias, especially in the long run. On the other hand, systemic risk is often correlated with financial integration. Countries less integrated into global financial markets are usually developing countries less able to invest in foreign markets and the collapse of their financial system may not badly shake other large economies, their low systemic risks combined with the severe impediments in investing overseas also give rise to their large equity home bias.

This paper presents a fresh viewpoint in home bias studies and may provide some new directions for future research. The effects of systemic risk on equity home bias may be more significant in financial institutions portfolio selection process and institution-level data can help clarify the specific transmission mechanisms. Also, it is helpful to model the portfolio selection of financial institutions by taking systemic risks into account, which constitutes micro-foundation for our hypothesis.

References

Acemoglu, D., S. Johnson, J. A. Robinson, and P. Yared. 2008. Income and Democracy. *American Economic Review* 98:808–842.

Acharya, V. V. 2009. A theory of systemic risk and design of prudential bank regulation. *Journal of Financial Stability* 5:224–255.

Acharya, V. V., R. E. Engle, and M. Richardson. 2012. Capital Shortfall: A New Approach to Ranking and Regulating Systemic Risks. *American Economic Review* 102:59–64.

Acharya, V. V., L. H. Pedersen, T. Philippon, and M. Richardson. 2010. Measuring Systemic Risk. Unpublished working paper.

Adams, Z., R. Fss, and R. Gropp. 2014. Spillover Effects among Financial Institutions: A State-Dependent Sensitivity Value-at-Risk Approach. *Journal of Financial and Quantitative Analysis* 49:575–598.

Adrian, T., and M. K. Brunnermeier. Forthcoming. CoVaR. *American Economic Review* .

Allen, F., A. Babus, and E. Carletti. 2012. Asset Commonality, Debt Maturity and Systemic Risk. *Journal of Financial Economics* 104:519–534.

Arellano, M., and S. Bond. 1991. Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *Review of Economic Studies* 58:277–297.

Attanasio, O. P., L. Picci, and A. E. Scorcu. 2000. Saving, Growth, and Investment: A Macroeconomic Analysis Using a Panel of Countries. *Review of Economics and Statistics* 82:182–211.

Baele, L., C. Pungulescu, and J. T. Horst. 2007. Model uncertainty, financial market integration and the home bias puzzle. *Journal of International Money and Finance* 26:606–630.

Barron, J. M., and J. Ni. 2008. Endogenous asymmetric information and international equity home bias: The effects of portfolio size and information costs. *Journal of International Money and Finance* 27:617–635.

Battistini, N., M. Pagano, and S. Simonelli. 2013. Systemic Risk and Home Bias in the Euro Area. European Commission Directorate-General for Economic and Financial Affairs Economic Papers.

Baxter, M., and U. J. Jermann. 1997. The International Diversification Puzzle Is Worse Than You Think. *American Economic Review* 87:170–180.

Bekaert, G., and X. S. Wang. 2009. Home Bias Revisited. Unpublished working paper.

Bhattacharya, U., and H. Daouk. 2002. The World Price of Insider Trading. *Journal of Finance* 57:75–108.

Billio, M., M. Getmansky, A. W. Lo, and L. Pelizzon. 2012. Econometric measures of connectedness and systemic risk in the finance and insurance sectors. *Journal of Financial Economics* 104:535–559.

Bohn, H., and L. L. Tesar. 1996. U.S. equity investment in foreign markets: portfolio rebalancing or return chasing? *American Economic Review Papers and Proceedings* 86:77–81.

Bonser-Neal, C., G. Brauer, R. Neal, and S. Wheatley. 1990. International Investment Restrictions and Closed-End Country Fund Prices. *Journal of Finance* 45:523–547.

Brennan, M. J., and H. H. Cao. 1997. International Portfolio Investment Flows. *Journal of Finance* 52:1851–1880.

Brownlees, C. T., and R. F. Engle. 2016. SRISK: A Conditional Capital Shortfall Measure of Systemic Risk. Unpublished working paper.

Brunnermeier, M. K., and P. Cheridito. 2014. Measuring and allocating systemic risk. Unpublished working paper.

Brunnermeier, M. K., and Y. Sannikov. 2015. International Credit Flows and Pecuniary Externalities. *American Economic Journal: Macroeconomics* 7:297–338.

Campbell, R. A., and R. Krussl. 2007. Revisiting the home bias puzzle: Downside equity risk. *Journal of International Money and Finance* 26:1239–1260.

Chan, K., V. Covrig, and L. Ng. 2005. What Determines the Domestic Bias and Foreign Bias? Evidence from Mutual Fund Equity Allocations Worldwide. *Journal of Finance* 60:1495–1534.

Chinn, M. D., and H. Ito. 2008. A New Measure of Financial Openness. *Journal of Comparative Policy Analysis* 10:309–322.

Coeurdacier, N. 2009. Do trade costs in goods market lead to home bias in equities? *Journal of International Economics* 77:86–100.

Coeurdacier, N., and H. Rey. 2013. Home Bias in Open Economy Financial Macroeconomics. *Journal of Economic Literature* 51:63–115.

Cooper, I., and E. Kaplanis. 1994. Home Bias in Equity Portfolios, Inflation Hedging, and International Capital Market Equilibrium. *Review of Financial Studies* 7:45–60.

Cooper, I. A., P. Sercu, and R. Vanpee. 2013. The Equity Home Bias Puzzle: A Survey. *Foundations and Trends in Finance* 7:289–416.

Das, S. R., and R. Uppal. 2004. Systemic Risk and International Portfolio Choice. *Journal of Finance* 59:2809–2834.

Domowitz, I., J. Glen, and A. Madhavan. 2001. Liquidity, Volatility and Equity Trading Costs Across Countries and Over Time. *International Finance* 4:221–255.

Edison, H. J., and F. E. Warnock. 2003. A simple measure of the intensity of capital controls. *Journal of Empirical Finance* 10:81103.

Fama, E. F. 1981. Stock Returns, Real Activity, Inflation, and Money. *American Economic Review* 71:545–565.

Fidora, M., M. Fratzscher, and C. Thimann. 2007. Home bias in global bond and equity markets: The role of real exchange rate volatility. *Journal of International Money and Finance* 26:631–655.

French, K. R., and J. M. Poterba. 1991. Investor Diversification and International Equity Markets. *American Economic Review, Papers and Proceedings of the Hundred and Third Annual Meeting of the American Economic Association* 81:222–226.

Gauthier, C., A. Lehar, and M. Souissi. 2012. Macroprudential capital requirements and systemic risk. *Journal of Financial Intermediation* 21:594–618.

Gehrig, T. 1993. An Information Based Explanation of the Domestic Bias in International Equity Investment. *Scandinavian Journal of Economics* 95:97–109.

Giglio, S. 2014. Credit Default Swap Spreads and Systemic Financial Risk. Unpublished working paper.

Giglio, S., B. Kelly, and S. Pruitt. 2016. Systemic risk and the macroeconomy: An empirical evaluation. *Journal of Financial Economics* 119:457–471.

Grinblatt, M., and M. Keloharju. 2001. How Distance, Language, and Culture Influence Stockholdings and Trades. *Journal of Finance* 56:1053–1073.

Hautsch, N., J. Schaumburg, and M. Schienle. 2015. Financial Network Systemic Risk Contributions. *Review of Finance* 19:685–738.

Heath, C., and A. Tversky. 1991. Preference and belief: Ambiguity and competence in choice under uncertainty. *Journal of Risk and Uncertainty* 4:5–28.

Huang, R. D., and C.-Y. Shiu. 2009. Local Effects of Foreign Ownership in an Emerging Financial Market: Evidence from Qualified Foreign Institutional Investors in Taiwan. *Financial Management* 38:567–602.

Huang, X., H. Zhou, and H. Zhu. 2012. Systemic Risk Contributions. *Journal of Financial Services Research* 42:55–83.

Huberman, G. 2001. Familiarity Breeds Investment. *Review of Financial Studies* 14:659–680.

Jeske, K. 2001. Equity Home Bias: Can Information Cost Explain the Puzzle? *Economic Review* 86:31–42.

Karlsson, A., and L. Nordn. 2007. Home sweet home: Home bias and international diversification among individual investors. *Journal of Banking & Finance* 31:317–333.

Kho, B.-C., R. M. Stulz, and F. E. Warnock. 2009. Financial globalization, governance, and the evolution of the home bias. *Journal of Accounting Research* 47:597–635.

Kleinow, J., and F. Moreira. 2016. Systemic risk among European banks: A copula approach. *Journal of International Financial Markets, Institutions and Money* 42:27–42.

Kole, E., K. Koedijk, and M. Verbeek. 2006. Portfolio implications of systemic crises. *Journal of Banking & Finance* 30:2347–2369.

Korinek, A. 2011. Systemic Risk-Taking: Amplification Effects, Externalities, and Regulatory Responses. ECB Working Paper No. 1345.

Levine, R. E., and D. Renelt. 1992. A Sensitivity Analysis of Cross-Country Growth Regressions. *American Economic Review* 82:942–963.

Lewis, K. K. 1999. Trying to Explain Home Bias in Equities and Consumption. *Journal of Economic Literature* 37:571–608.

Magi, A. 2009. Portfolio choice, behavioral preferences and equity home bias. *The Quarterly Review of Economics and Finance* 49:501–520.

Markowitz, H. 1952. Portfolio Selection. *Journal of Finance* 7:77–91.

Massa, M., and A. Simonov. 2006. Hedging, Familiarity and Portfolio Choice. *Review of Financial Studies* 19:633–685.

Merton, R. C. 1969. Lifetime Portfolio Selection under Uncertainty: The Continuous-Time Case. *Review of Economics and Statistics* 51:247–257.

Merton, R. C. 1980. On estimating the expected return on the market: An exploratory investigation. *Journal of Financial Economics* 8:323–361.

Mishra, A. V. 2015. Measures of equity home bias puzzle. *Journal of Empirical Finance* 34:293–312.

Mishra, A. V., and R. A. Ratti. 2013. Home bias and cross border taxation. *Journal of International Money and Finance* 32:169–193.

Morse, A., and S. Shive. 2011. Patriotism in your portfolio. *Journal of Financial Markets* 14:411–440.

Ni, J. 2009. The effects of portfolio size on international equity home bias puzzle. *International Review of Economics & Finance* 18:469–478.

Nickell, S. 1981. Biases in Dynamic Models with Fixed Effects. *Econometrica* 49:1417–1426.

Pesaran, M., and R. Smith. 1995. Estimating Long-run Relationships from Dynamic Heterogeneous Panels. *Journal of Econometrics* 68:79–113.

Pesenti, P., and E. van Wincoop. 2002. Can Nontradables Generate Substantial Home Bias? *Journal of Money, Credit and Banking* 34:25–50.

Pinkowitz, L., R. M. Stulz, and R. Williamson. 2003. Corporate Governance and the Home Bias. *Journal of Financial and Quantitative Analysis* 38:87–110.

Portes, R., and H. Rey. 2005. The determinants of cross-border equity flows. *Journal of International Economics* 65:269–296.

Reinhart, C. M., and K. S. Rogoff. 2009. *This Time Is Different: Eight Centuries of Financial Folly.* Princeton University Press.

Sala-I-Martin, X., G. Doppelhofer, and R. I. Miller. 2004. Determinants of Long-Term Growth: A Bayesian Averaging of Classical Estimates (BACE) Approach. *American Economic Review* 94:813–835.

Shiller, R. J., F. Kon-Ya, and Y. Tsutsui. 1991. Investor behavior in the october 1987 stock market crash: The case of Japan. *Journal of the Japanese and International Economies* 5:1–13.

Smaga, P. 2014. The Concept of Systemic Risk. LSE Systemic Risk Centres Special Paper Series.

Su, D., and Y. Yao. 2016. Manufacturing as the key engine of economic growth for middle-income economies. ADBI working paper series No. 573.

Tesar, L. L., and I. M. Werner. 1995. Home bias and high turnover. *Journal of International Money and Finance* 14:467–492.

van Wincoop, E., and F. E. Warnock. 2010. Can trade costs in goods explain home bias in assets? *Journal of International Money and Finance* 29:1108–1123.

Warnock, F. E. 2002. Home bias and high turnover reconsidered. *Journal of International Money and Finance* 21:795–805.

Wong, A. Y.-T., and T. P. W. Fong. 2011. Analysing interconnectivity among economies. *Emerging Markets Review* 12:432–442.

Young, C. 2009. Model Uncertainty in Sociological Research: An Application to Religion and Economic Growth. *American Sociological Review* 74:380–397.

Young, C., and K. Holsteen. Forthcoming. Model Uncertainty and Robustness: A Computational Framework for Multimodel Analysis. *Sociological Methods & Research* .

Zhou, C. 2010. Are Banks Too Big to Fail? Measuring Systemic Importance of Financial Institutions. *International Journal of Central Banking* 6:205–250.

Figures and Tables

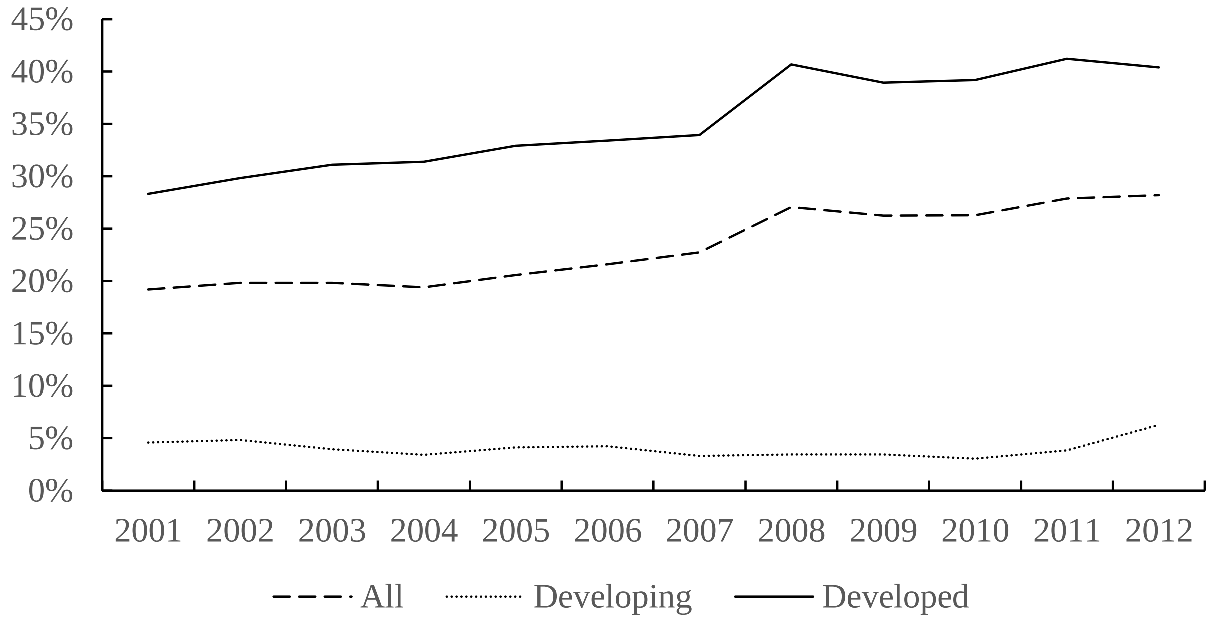

Figure 1. The world average ratio of actual to optimal holdings of the foreign equites

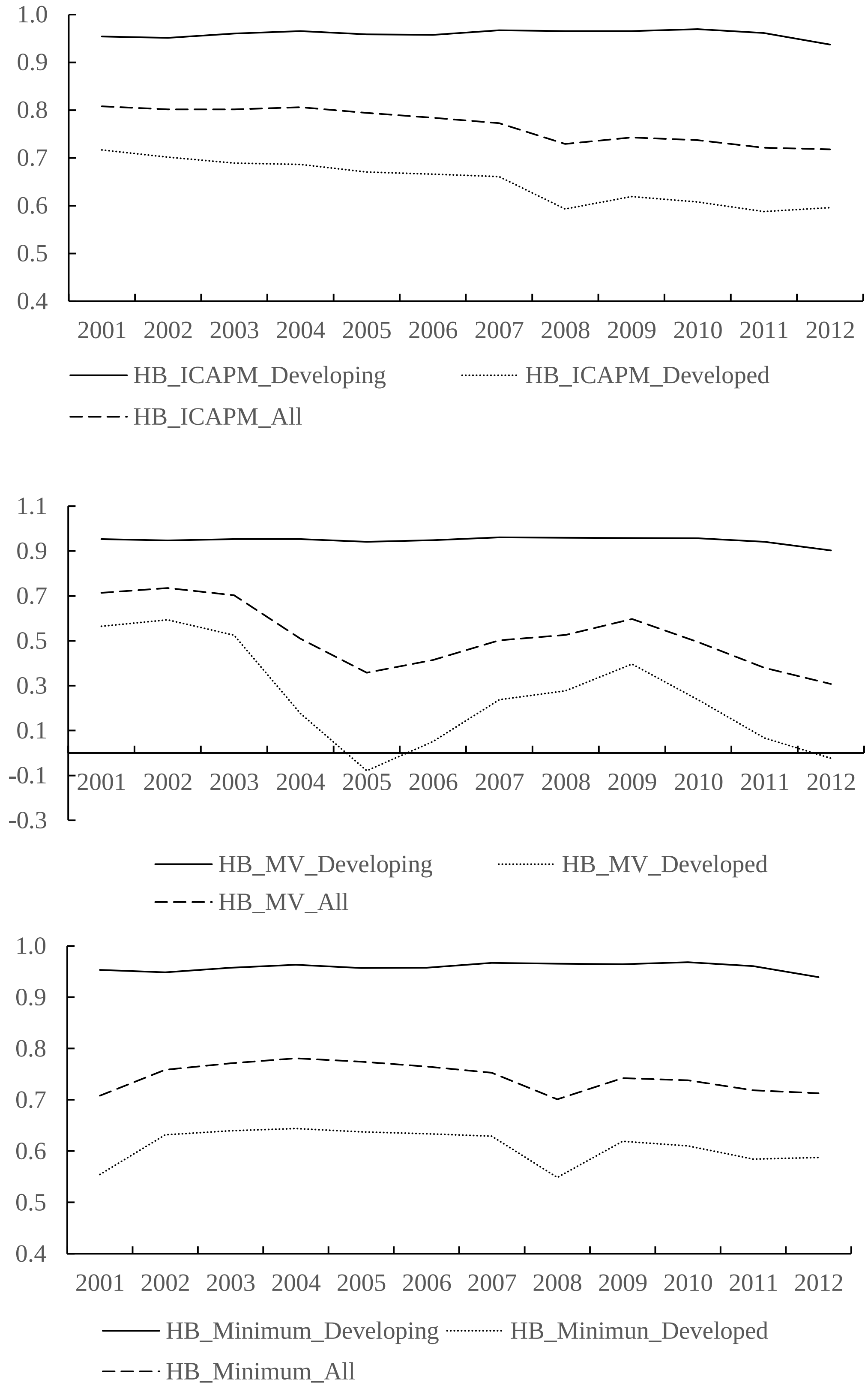

Figure 2. Home bias measurements

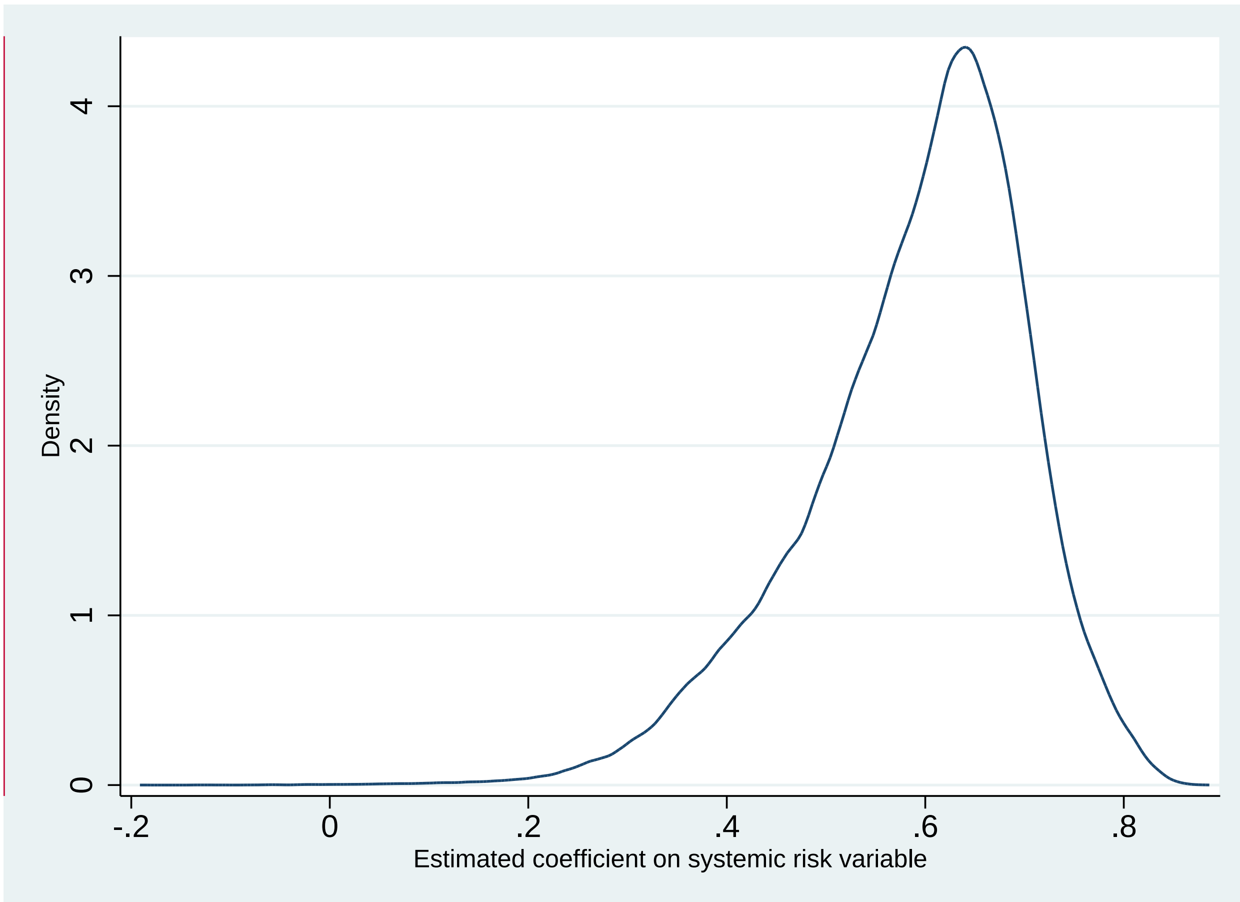

Figure 3. Modelling distribution for the systemic risk effects under different specifications: home bias

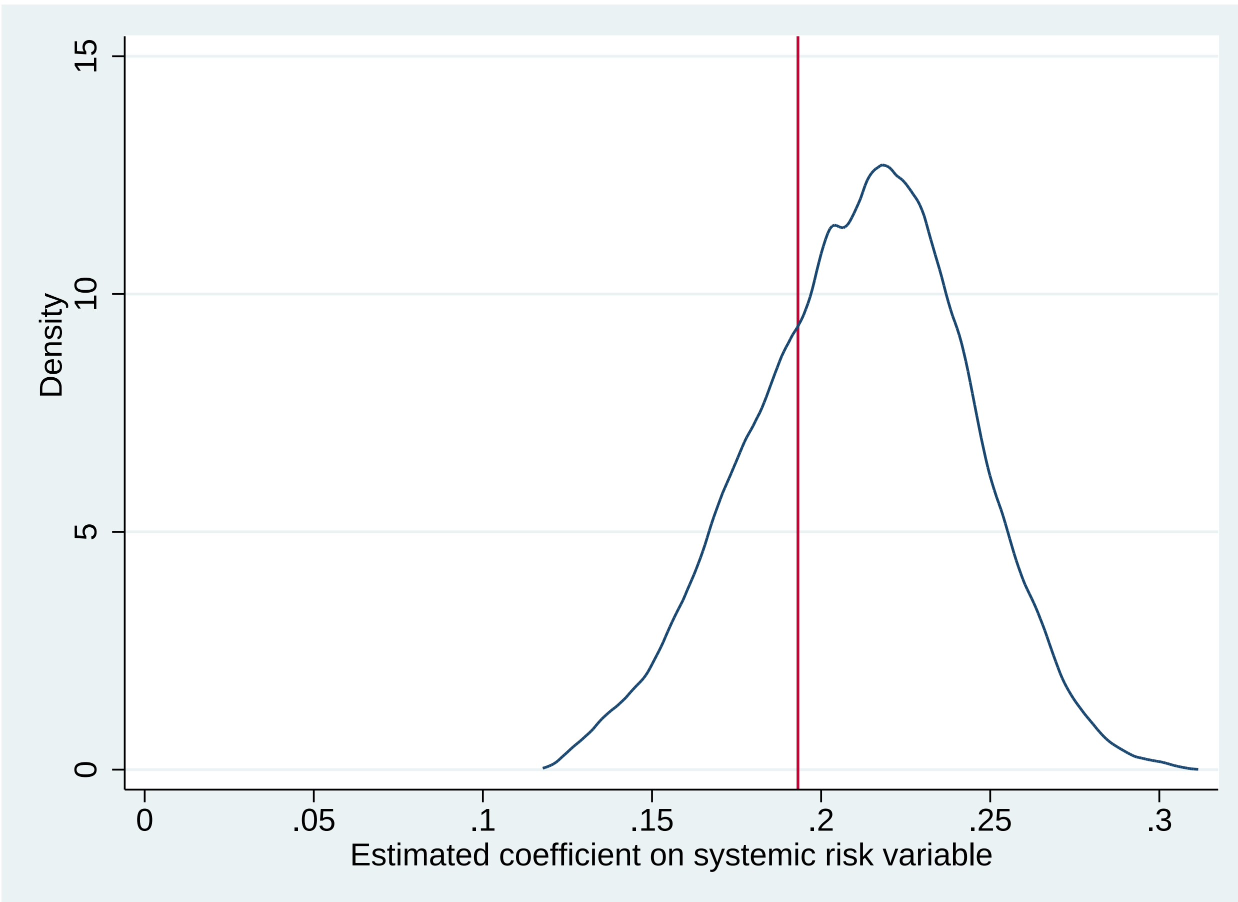

Figure 4. Modelling distribution for the systemic risk effects under different specifications: foreign bias

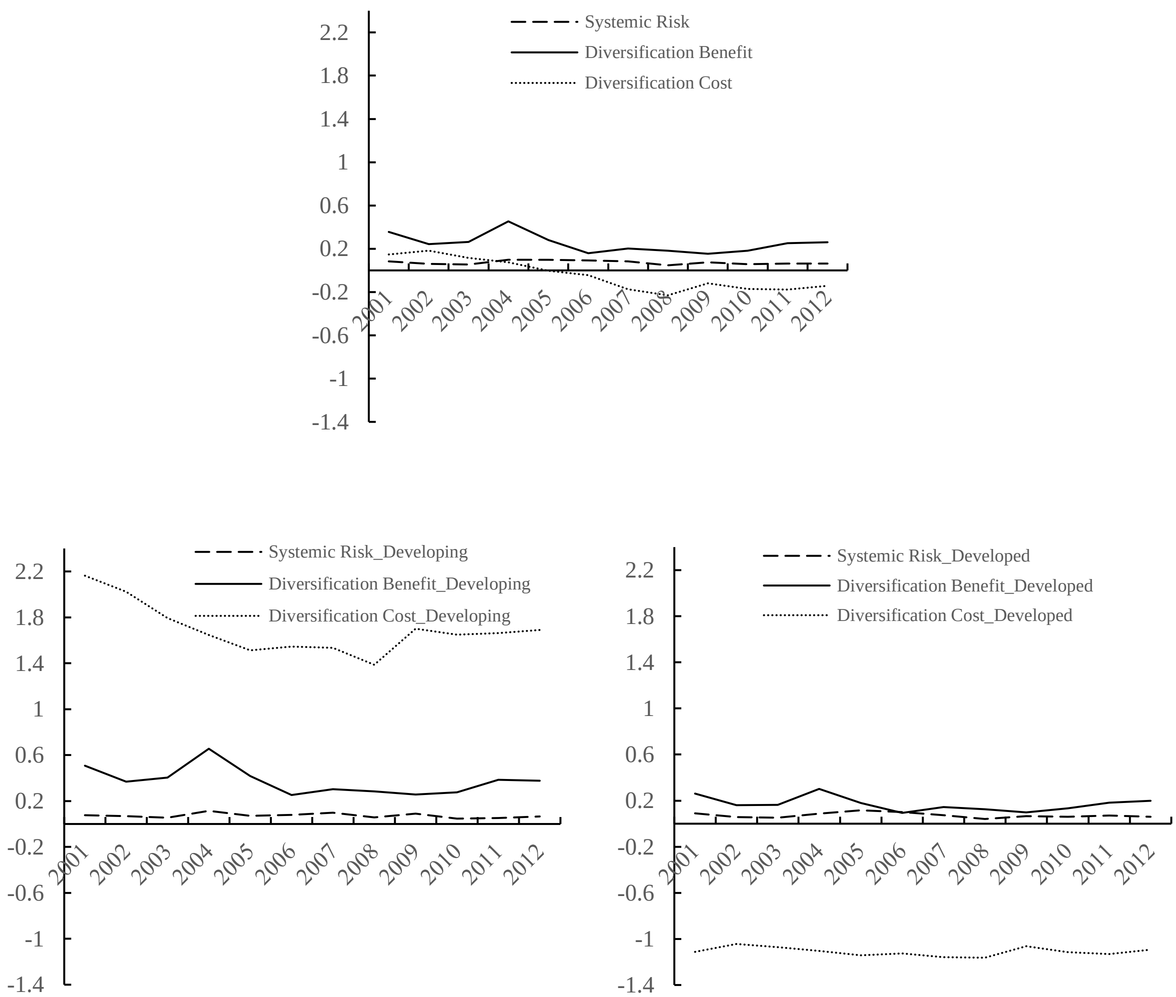

Figure 5. Diversification benefits, Diversification costs, and Systemic risk

Table 1. Home Bias Measures

Country	HB_ICAPM	HB_Mean Variance	HB_Min Variance
Argentina	0.797	0.802	0.803
Australia	0.800	0.778	0.775
Austria	0.492	-0.298	0.291
Belgium	0.457	-0.442	0.406
Brazil	0.988	0.988	0.989
Canada	0.719	0.770	0.758
Colombia	0.970	0.962	0.967
Czech Republic	0.809	0.741	0.792
Denmark	0.554	-0.508	0.395
Egypt	0.985	0.980	0.983
Finland	0.493	0.488	0.554
France	0.676	-0.379	0.747
Germany	0.531	0.118	0.657
Greece	0.881	0.840	0.877
Hong Kong	0.800	0.475	0.781
Hungary	0.794	0.791	0.818
India	0.999	0.999	0.999
Indonesia	0.997	0.996	0.997
Israel	0.872	0.766	0.850
Italy	0.520	-0.550	0.530
Japan	0.844	0.800	0.812
Malaysia	0.962	0.871	0.940
Mexico	0.989	0.985	0.990
Netherlands	0.340	-0.692	0.282
New Zealand	0.620	0.000	0.529
Norway	0.419	-0.148	0.383
Pakistan	0.996	0.995	0.995
Philippines	0.997	0.994	0.996
Poland	0.963	0.957	0.965
Portugal	0.495	-0.359	0.277
Russia	0.997	0.997	0.997
Singapore	0.608	-0.088	0.560
South Africa	0.871	0.830	0.882
South Korea	0.936	0.943	0.943
Spain	0.876	0.695	0.876
Sweden	0.550	0.562	0.673
Switzerland	0.578	0.464	0.444
Thailand	0.984	0.980	0.984
Turkey	0.999	0.999	0.999
United Kingdom	0.590	0.376	0.369
United States	0.679	0.608	0.578
Venezuela	0.965	0.961	0.962
All	0.771	0.525	0.748

Note: This table presents the average home bias for each country across all years. ICAPM measure is based on ICAPM framework, computed from annual data. Mean Variance and Minimum Variance are home bias measures as Mean-Variance model and Minimum-Variance model, computed from weekly data.

Table 2. Foreign Bias Measures

Home Country	FB_ICAPM	FB_Mean Variance	FB_Min Variance
Argentina	0.873	0.413	0.380
Australia	0.432	0.297	0.272
Austria	0.537	0.323	0.288
Belgium	0.666	0.365	0.330
Brazil	0.709	0.367	0.316
Canada	0.437	0.357	0.326
Colombia	0.908	0.434	0.408
Czech Republic	0.707	0.306	0.281
Denmark	0.347	0.308	0.278
Egypt	0.751	0.350	0.283
Finland	0.418	0.290	0.255
France	0.517	0.338	0.307
Germany	0.568	0.339	0.308
Greece	0.683	0.330	0.283
Hong Kong	0.816	0.352	0.318
Hungary	0.667	0.317	0.290
India	0.543	0.271	0.224
Indonesia	0.764	0.351	0.338
Israel	0.691	0.285	0.226
Italy	0.682	0.339	0.311
Japan	0.499	0.335	0.309
Malaysia	0.670	0.320	0.302
Mexico	0.780	0.306	0.294
Netherlands	0.405	0.343	0.318
New Zealand	0.508	0.254	0.229
Norway	0.372	0.320	0.292
Pakistan	0.716	0.047	0.050
Philippines	0.279	0.109	0.103
Poland	0.648	0.324	0.304
Portugal	0.690	0.360	0.320
Russia	0.826	0.389	0.363
Singapore	0.411	0.331	0.277
South Africa	0.873	0.373	0.339
South Korea	0.618	0.337	0.304
Spain	0.553	0.321	0.296
Sweden	0.515	0.341	0.307
Switzerland	0.601	0.339	0.314
Thailand	0.784	0.390	0.361
Turkey	0.785	0.353	0.313
United Kingdom	0.214	0.285	0.257
United States	0.146	0.287	0.259
Venezuela	0.814	0.268	0.243
All	0.605	0.321	0.290

Note: This table presents the average home bias for each country across all years. ICAPM measure is based on ICAPM framework, computed from annual data. Mean Variance and Minimum Variance are home bias measures as Mean-Variance model and Minimum-Variance model, computed from weekly data.

Table 3. Correlation between Different Measurement Approaches

Home bias	HB_ICAPM	HB_Mean Variance	HB_Minimum Variance
HB_ICAPM	1		
HB_Mean Variance	0.7809***	1	
HB_Minimum Variance	0.9014***	0.7384***	1
Foreign bias	**FB_ICAPM**	**FB_Mean Variance**	**FB_Minimum Variance**
FB_ICAPM	1		
FB_Mean Variance	0.3061***	1	
FB_Minimum Variance	0.2990***	0.8478***	1

Note: ***, **, * denote statistical significance at 1%, 5%, and 10%, respectively.

Table 4. Statistical Summary for Control Variables

Variable name	Mean	N	S.D.	Min	Max
Systemic risk: Granger causality	0.072	496	0.076	0	0.481
Systemic risk: CoVaR	-0.032	263	0.033	-0.134	0.035
Systemic risk: MES	-0.015	496	0.013	-0.074	0.017
Systemic risk: Principal component	1.2e-04	496	0.0047	7.78e-08	0.041
Exchange rate risk	17.109	496	103.201	0.008	1,470.334
Inflation risk	4.290	496	5.585	-3.545	68.532
Nontradable income risk	0.043	326	0.035	-0.068	0.151
Market capitalization	76.596	495	71.758	1.165	570.155
Turnover ratio	77.518	495	63.127	0.240	497.400
Capital market openness	0.757	496	0.320	0.000	1.000
Equity market openness	0.917	128	1.208	0.006	5.294
Withholding tax	15.109	496	3.629	10.400	24.400
Institution quality	0.697	496	0.204	0.197	1.000
Insider trading laws prosecution	0.744	496	0.437	0.000	1.000
Legal origin: British	0.306	496	0.461	0.000	1.000
Legal origin: French	0.379	496	0.486	0.000	1.000
Legal origin: Socialist	0.097	496	0.296	0.000	1.000
Legal origin: German	0.121	496	0.326	0.000	1.000
Legal origin: Scandinavian	0.097	496	0.296	0.000	1.000
Common language	0.099	496	0.098	0.000	0.303
Distance	7,378.639	496	2,659.267	4,921.079	14,863.175
Internet	47.518	496	27.411	0.839	94.650
Bank branches	1,088.097	496	3,346.260	16.000	20,218.000
Trade openness	87.476	496	76.363	20.258	449.993
FDI	0.482	496	0.542	0.000	3.851
Return correlation	0.751	493	0.176	0.127	0.982
Industrial Difference	0.061	496	0.018	0.020	0.119
Past year return	-0.036	492	0.036	-0.099	0.014
Current year return	-0.046	492	0.041	-0.138	0.014
Banking crisis	0.101	496	0.301	0.000	1.000
Population	0.101	496	0.301	0.000	1.000
GDP per capita	22,971.228	496	17,419.720	626.221	69,094.745
GDP growth rate	2.810	496	3.369	-10.894	18.287
GDP	1027.853	496	2253.734	78.070	14137.700

Table 5. Home Bias Measures and Control Variables Correlation

Variables	HB_ICAPM	HB_Mean Variance	HB_Min Variance
Exchange rate risk	0.1654*	0.1242*	0.1501*
Inflation risk	0.3634*	0.2785*	0.3301*
Nontradable income risk	0.4639*	0.2486*	0.3887*
Market capitalization	-0.0973*	-0.0434	-0.1083*
Turnover ratio	-0.1980*	-0.0970*	-0.1561*
Capital market openness	-0.6555*	-0.5211*	-0.6003*
Equity market openness	-0.0552	-0.0591	-0.0552
Withholding tax	0.6332*	0.4793*	0.5671*
Institution quality	-0.7438*	-0.5299*	-0.6867*
Insider trading laws prosecution	-0.2175*	-0.1046*	-0.1235*
Legal origin: British	0.1082*	0.1251*	0.0494
Legal origin: French	0.1341*	-0.0526	0.1326*
Legal origin: Socialist	0.1878*	0.1877*	0.1856*
Legal origin: German	-0.1582*	-0.0673	-0.1615*
Legal origin: Scandinavian	-0.4021*	-0.2223*	-0.3020*
Distance	0.3437*	0.2858*	0.2939*
Common language	0.0527	0.0845	0.0111
Internet	-0.7058*	-0.5077*	-0.5833*
Bank branches	-0.1436*	-0.0557	-0.1232*
Trade openness	-0.1772*	-0.2192*	-0.1566*
FDI	-0.6153*	-0.5058*	-0.5273*
Market Correlation	-0.5369*	-0.3931*	-0.4436*
Industrial Difference	0.0859	0.0967*	0.0801
Current Return	-0.065	-0.0097	-0.0012
Past Return	-0.0521	-0.1273*	0.0274
Banking Crisis	-0.1777*	-0.1093*	-0.1578*
Population	0.2799*	0.2204*	0.2490*
GDP per capita	-0.7966*	-0.5951*	-0.7235*
GDP growth	0.3879*	0.2431*	0.3371*

Note: the star * is presented when the correlation coefficients are significant at the 5% level or better.

Table 6. Foreign Bias Measures and Control Variables Correlation

Variable name	FB_ICAPM	FB_Mean Variance	FB_Min Variance
Exchange rate risk	-0.0079	0.0008	0.0028
Inflation risk: Foreign	0.1618*	0.0072	0.0063
Inflation risk: Home	0.1612*	0.1147*	0.1299*
Nontradable income risk: Foreign	-0.0910*	-0.0554*	-0.0006
Nontradable income risk: Home	-0.0042	0.0075	0.0171
Market capitalization: Foreign	-0.0470*	-0.1312*	-0.1458*
Market capitalization: Home	-0.0273*	-0.0029	-0.0041
Turnover ratio: Foreign	-0.1656*	-0.1265*	-0.1004*
Turnover ratio: Home	-0.1922*	-0.0315*	-0.0335*
Capital market openness: Foreign	-0.2525*	-0.1776*	-0.1477*
Capital market openness: Home	-0.2419*	-0.0232*	-0.0280*
Equity market openness: Foreign	-0.027	-0.1876*	-0.1176*
Equity market openness: Home	-0.0301	0.0016	-0.0037
Withholding tax: Foreign	0.2948*	0.1544*	0.1722*
Withholding tax: Home	0.2630*	0.0117	0.006
Institution quality: Foreign	-0.2423*	-0.0957*	-0.0946*
Institution quality: Home	-0.3319*	-0.0261*	-0.0247*
Insider trading laws prosecution: Foreign	-0.1957*	-0.1732*	-0.1074*
Insider trading laws prosecution: Home	-0.1533*	-0.0068	-0.0059
Legal origin: British Foreign	0.0720*	0.0837*	0.0685*
Legal origin: French Foreign	0.0420*	-0.0515*	-0.0429*
Legal origin: Socialist Foreign	-0.0124	0.0615*	0.0414*
Legal origin: German Foreign	-0.1161*	-0.0251*	-0.0147
Legal origin: Scandinavian Foreign	-0.0380*	-0.0769*	-0.0598*
Legal origin: British Home	-0.0942*	-0.0186*	-0.0201*
Legal origin: French Home	0.1464*	0.0243*	0.0214*
Legal origin: Socialist Home	0.1053*	0.002	0.0069
Legal origin: German Home	-0.0288*	0.0004	0.0021
Legal origin: Scandinavian Home	-0.1538*	-0.0124	-0.0125
Distance	0.3847*	0.1193*	0.0840*
Common language	-0.1806*	-0.0447*	-0.0596*
Internet: Foreign	-0.2108*	-0.1320*	-0.1355*
Internet: Home	-0.2614*	-0.0275*	-0.0429*
Bank branches	-0.0764*	-0.0401*	-0.0338*
Bilateral trade	-0.3940*	-0.2041*	-0.2020*
Export	-0.3104*	-0.1346*	-0.1321*
Import	-0.3138*	-0.1383*	-0.1386*
Bilateral FDI	-0.0336*	-0.0192	-0.0181
Return correlation	-0.3422*	-0.1750*	-0.1950*
Industrial Difference	0.0404*	0.0283*	0.0488*
Past year return: Foreign	0.013	-0.0097	-0.007
Past year return: Home	-0.0065	-0.0239*	-0.0022
Current year return: Foreign	-0.0200*	-0.0319*	-0.0023
Current year return: Home	0.0209*	-0.0018	-0.0068
Banking Crisis: Foreign	-0.0918*	-0.0553*	-0.0542*
Banking Crisis: Home	-0.0284*	-0.0012	-0.0061
Population: Foreign	0.0540*	0.0056	0.0320*
Population: Home	-0.0340*	-0.0131	-0.0158*
GDP per capita: Foreign	-0.2751*	-0.1501*	-0.1319*
GDP per capita: Home	-0.3171*	-0.0218*	-0.0224*
GDP growth: Foreign	0.1118*	-0.0131	0.0177*
GDP growth: Home	0.0662*	-0.0091	0.0004

Note: the star * is presented when the correlation coefficients are significant at the 5% level or better.

Table 7. Systemic risk and Home bias: baseline cross-sectional regression

	(1)	(2)	(3)	(4)	(5)
Systemic risk	0.21*	0.33**	0.59**	0.39*	0.33**
	(0.095)	(0.041)	(0.021)	(0.056)	(0.017)
log GDP per capita	-0.23***	-0.03	-0.04	-0.07	-0.08
	(0.001)	(0.734)	(0.890)	(0.429)	(0.651)
log Population	0.02	0.13*	0.17	0.08	0.08
	(0.731)	(0.071)	(0.247)	(0.302)	(0.357)
Region	-0.12**	-0.10*	-0.14*	-0.15**	-0.09
	(0.043)	(0.086)	(0.060)	(0.027)	(0.189)
Return correlation		-1.24*	-4.16	-1.08	-0.63
		(0.061)	(0.138)	(0.161)	(0.314)
Industrial Difference		3.39	1.55	2.66	3.79
		(0.459)	(0.819)	(0.693)	(0.415)
Banking crisis		-1.13	-0.86	-0.99	-0.88
		(0.119)	(0.433)	(0.174)	(0.334)
Turnover ratio				-0.00	
				(0.713)	
Market capitalization				0.00	
				(0.472)	
Capital market openness				-0.26	
				(0.210)	
Insider trading laws prosecution				0.21	
				(0.193)	
Legal origin: British				-0.40	
				(0.142)	
Legal origin: France				-0.48*	
				(0.074)	
Legal origin: German				-0.08	
				(0.740)	
Legal origin: Scandinavian				-0.43	
				(0.139)	
Inflation risk			-0.14		
			(0.281)		
Exchange rate risk			0.01		
			(0.243)		
Nontradable income risk			5.49		
			(0.525)		
Distance					-0.00
					(0.943)
Common language					0.15
					(0.795)
Internet					0.00
					(0.695)
Bank branches					0.00
					(0.755)
Trade openness					-0.00
					(0.514)
FDI					-0.49**
					(0.043)
Constant	2.67*	-0.34	1.80	1.34	0.55
	(0.085)	(0.856)	(0.656)	(0.543)	(0.829)
Observations	42	42	30	42	42
R-squared	0.48	0.59	0.66	0.71	0.66
Adj. R-squared	0.43	0.51	0.49	0.55	0.50

Table 8. Systemic risk and Home bias: baseline panel regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Systemic risk	-0.34***	-0.23*	-0.33**	-0.25*	-0.34*	-0.26	-0.32**	-0.23*	-0.32**	-0.22*
	(0.008)	(0.064)	(0.016)	(0.050)	(0.063)	(0.189)	(0.020)	(0.069)	(0.018)	(0.065)
lagged home bias		0.57***		0.58***		0.56***		0.58***		0.58***
		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)
log GDP per capita	0.76*	0.09	0.75	0.16	0.96	-0.25	0.65	0.13	0.81*	0.19
	(0.056)	(0.652)	(0.101)	(0.502)	(0.208)	(0.610)	(0.161)	(0.616)	(0.056)	(0.357)
log Population	1.08	0.40	1.08	0.27	1.83	0.38	1.33	0.48	0.64	-0.03
	(0.277)	(0.392)	(0.266)	(0.579)	(0.153)	(0.544)	(0.204)	(0.393)	(0.563)	(0.950)
Return correlation			-0.03	-0.28	0.23	0.04	-0.04	-0.30	-0.07	-0.30
			(0.924)	(0.192)	(0.715)	(0.920)	(0.910)	(0.196)	(0.814)	(0.140)
Industrial Difference			1.08	0.48	1.74	0.77	0.78	0.23	1.12	0.33
			(0.587)	(0.693)	(0.450)	(0.575)	(0.693)	(0.852)	(0.556)	(0.767)
Banking crisis			-0.03	-0.00	0.00	-0.01	-0.03	-0.02	-0.03	-0.02
			(0.681)	(0.913)	(1.000)	(0.920)	(0.657)	(0.735)	(0.686)	(0.717)
Past year return			-2.03	-1.14	-6.57	-1.90	-2.87	-1.93	-2.24	-0.97
			(0.556)	(0.594)	(0.402)	(0.670)	(0.421)	(0.393)	(0.507)	(0.626)
Current year return			-4.94	0.30	-6.75	1.34	-5.38	-0.21	-4.73	0.56
			(0.208)	(0.909)	(0.455)	(0.769)	(0.181)	(0.936)	(0.220)	(0.829)
Inflation risk					-0.00	0.00				
					(0.928)	(0.916)				
Exchange rate risk					-0.00**	-0.00**				
					(0.038)	(0.037)				
Nontradable income risk					-1.42	-0.75				
					(0.207)	(0.284)				
Turnover ratio							0.00	0.00*		
							(0.475)	(0.071)		
Market capitalization							0.00	0.00		
							(0.103)	(0.453)		
Capital market openness							0.15	0.10		
							(0.326)	(0.368)		
Internet									-0.00	0.00
									(0.856)	(0.436)
Trade openness									-0.00	-0.00
									(0.204)	(0.179)
FDI									0.01	0.04**
									(0.679)	(0.045)
Constant	-24.93	-7.41	-25.55	-5.68	-41.11	-3.68	-29.19	-9.19	-18.40	-0.69
	(0.185)	(0.381)	(0.171)	(0.513)	(0.110)	(0.744)	(0.142)	(0.354)	(0.384)	(0.946)
Country fixed-effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year fixed-effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	496	453	492	450	326	302	492	450	492	450
Number of countries included	42	42	42	42	30	30	42	42	42	42
Adj. R-squared	0.24	0.47	0.23	0.47	0.28	0.48	0.23	0.47	0.23	0.47

Table 9. Systemic risk and Home bias: a U-shape relation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Systemic risk	-1.17***	-0.91**	-1.20***	-0.94**	-1.38***	-1.20**	-1.26***	-1.02**	-1.25***	-0.91**
	(0.004)	(0.023)	(0.004)	(0.020)	(0.005)	(0.019)	(0.003)	(0.014)	(0.003)	(0.022)
Systemic risk: square term	2.17**	2.16*	2.24**	2.18*	2.52**	2.53*	2.49**	2.43**	2.41**	2.11*
	(0.034)	(0.054)	(0.035)	(0.052)	(0.029)	(0.064)	(0.017)	(0.037)	(0.028)	(0.057)
lagged home bias		0.58***		0.59***		0.56***		0.59***		0.59***
		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)
log GDP per capita	0.72*	0.05	0.76	0.19	1.05	-0.10	0.65	0.19	0.89**	0.28
	(0.086)	(0.818)	(0.114)	(0.465)	(0.178)	(0.864)	(0.177)	(0.498)	(0.038)	(0.203)
log Population	1.19	0.79	1.08	0.46	1.55	0.42	1.36	0.65	0.31	-0.11
	(0.318)	(0.191)	(0.367)	(0.478)	(0.272)	(0.632)	(0.287)	(0.355)	(0.842)	(0.896)
Return correlation			-0.16	-0.38*	-0.08	-0.16	-0.17	-0.42*	-0.22	-0.41*
			(0.548)	(0.091)	(0.880)	(0.754)	(0.550)	(0.080)	(0.383)	(0.062)
Industrial Difference			1.38	0.53	2.26	1.48	0.96	0.23	1.36	0.51
			(0.532)	(0.696)	(0.388)	(0.467)	(0.659)	(0.858)	(0.505)	(0.689)
Banking crisis			-0.02	-0.01	0.02	0.02	-0.02	-0.02	-0.02	-0.02
			(0.778)	(0.835)	(0.848)	(0.796)	(0.775)	(0.650)	(0.776)	(0.632)
Past year return			-1.53	0.28	-5.93	-1.38	-2.50	-0.91	-1.91	0.14
			(0.682)	(0.911)	(0.487)	(0.776)	(0.518)	(0.726)	(0.609)	(0.952)
Current year return			-3.89	3.16	-3.82	4.09	-4.52	2.62	-3.92	3.02
			(0.243)	(0.223)	(0.587)	(0.353)	(0.194)	(0.314)	(0.233)	(0.257)
Inflation risk					0.00	0.01				
					(0.988)	(0.574)				
Exchange rate risk					-0.00**	-0.00				
					(0.015)	(0.362)				
Nontradable income risk					-2.01**	-0.81				
					(0.033)	(0.333)				
Turnover ratio							0.00	0.00		
							(0.445)	(0.101)		
Market capitalization							0.00*	0.00		
							(0.081)	(0.470)		
Capital market openness							0.17	0.10		
							(0.301)	(0.333)		
Internet									-0.00	0.00
									(0.747)	(0.597)
Trade openness									-0.00*	-0.00
									(0.071)	(0.224)
FDI									0.03	0.05***
									(0.226)	(0.009)
Constant	-26.52	-13.63	-25.50	-8.93	-36.88	-5.68	-29.65	-12.54	-13.10	0.12
	(0.240)	(0.173)	(0.265)	(0.408)	(0.188)	(0.705)	(0.221)	(0.299)	(0.643)	(0.994)
Country fixed-effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year fixed-effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	437	358	433	355	297	253	433	355	433	355
Number of countries included	42	42	42	42	30	30	42	42	42	42
Adj. R-squared	0.24	0.47	0.23	0.47	0.29	0.47	0.23	0.47	0.24	0.48

Table 10. Systemic risk and Foreign bias: cross-sectional regression

	(1)	(2)	(3)	(4)	(5)
Adj. Systemic risk	0.11*	0.10*	0.23***	0.11**	0.15**
	(0.059)	(0.064)	(0.002)	(0.050)	(0.038)
log population: home	-0.01	0.01	0.01	0.01	-0.00
	(0.351)	(0.591)	(0.630)	(0.294)	(0.939)
log population: foreign	-0.06***	-0.04***	-0.02*	-0.04***	-0.01
	(0.000)	(0.000)	(0.084)	(0.006)	(0.651)
log GDP per capita: home	-0.02*	0.02	0.05	0.03	0.02
	(0.088)	(0.132)	(0.250)	(0.143)	(0.404)
log GDP per capita: foreign	-0.13***	-0.08***	-0.24***	0.04**	-0.05***
	(0.000)	(0.000)	(0.000)	(0.028)	(0.009)
GDP growth rate: home	-0.00	-0.01	-0.01	-0.01	-0.01
	(0.990)	(0.272)	(0.578)	(0.312)	(0.537)
GDP growth rate: foreign	-0.03***	-0.04***	-0.02**	-0.04***	-0.04***
	(0.000)	(0.000)	(0.048)	(0.000)	(0.000)
Return correlation		-0.72***	-1.14***	-0.66***	-0.52***
		(0.000)	(0.000)	(0.000)	(0.000)
Industrial Difference		-0.00	-0.02	0.02	0.03
		(0.953)	(0.812)	(0.732)	(0.690)
Banking crisis: home		-0.10	-0.16	-0.03	-0.05
		(0.272)	(0.209)	(0.727)	(0.646)
Banking crisis: foreign		-0.15*	0.00	-0.11	-0.01
		(0.088)	(0.990)	(0.196)	(0.948)
Market capitalization: home				0.00*	
				(0.088)	
Market capitalization: foreign				-0.00***	
				(0.000)	
Turnover ratio: foreign				-0.00***	
				(0.001)	
Turnover ratio: home				-0.00	
				(0.185)	
Capital market openness: foreign				-0.46***	
				(0.000)	
Capital market openness: home				-0.03	
				(0.627)	
Institution quality: foreign				-0.04	
				(0.131)	
Inflation risk: home			0.03		
			(0.306)		
Inflation risk: foreign			-0.10***		
			(0.001)		
Exchange rate risk			-0.01		
			(0.342)		
Nontradable income risk: foreign			-1.69		
			(0.258)		
Nontradable income risk: home			-1.27		
			(0.350)		
Distance					0.00**
					(0.017)
Common language					-0.00
					(0.950)
Bank branches					-0.00**
					(0.040)
Bilateral trade					-0.01***
					(0.000)
Bilateral FDI					0.02
					(0.399)
Constant	3.10***	2.16***	3.76***	1.13**	1.23**
	(0.000)	(0.000)	(0.000)	(0.025)	(0.019)
Observations	1,644	1,643	862	1,642	1,060
R-squared	0.06	0.10	0.16	0.16	0.11
Adj. R-squared	0.06	0.10	0.14	0.15	0.09

Table 11. Systemic risk and Foreign bias: panel regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Adj. Systemic risk	0.02***	0.01*	0.02***	0.01	0.02**	0.01	0.02***	0.01*	0.03***	0.01*
	(0.003)	(0.107)	(0.002)	(0.102)	(0.010)	(0.307)	(0.001)	(0.081)	(0.000)	(0.066)
lagged foreign bias		0.44***		0.43***		0.42***		0.43***		0.38***
		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)
log population: home	-0.09	-0.05	-0.18	-0.10	-0.27	-0.16	-0.19	-0.08	-0.22	-0.07
	(0.663)	(0.748)	(0.401)	(0.499)	(0.371)	(0.435)	(0.374)	(0.563)	(0.446)	(0.711)
log population: foreign	-1.08***	-0.85***	-1.35***	-0.99***	-2.05***	-1.68***	-1.45***	-1.09***	-1.02***	-0.89***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
log GDP per capita: home	0.11	0.09	0.12	0.11*	0.10	0.10	0.14	0.10*	0.11	0.03
	(0.193)	(0.106)	(0.140)	(0.071)	(0.479)	(0.356)	(0.105)	(0.098)	(0.383)	(0.735)
log GDP per capita: foreign	-0.03	-0.05	-0.10	-0.06	-0.43***	-0.41***	-0.10	-0.10**	-0.11	-0.11*
	(0.616)	(0.323)	(0.117)	(0.189)	(0.000)	(0.000)	(0.146)	(0.038)	(0.252)	(0.080)
GDP growth rate: home	-0.00	0.00	-0.00	-0.00	0.00	0.00	-0.00	-0.00	0.00	0.00
	(0.804)	(0.983)	(0.828)	(0.967)	(0.740)	(0.379)	(0.751)	(0.944)	(0.447)	(0.626)
GDP growth rate: foreign	-0.01***	-0.00***	-0.01***	-0.00***	-0.02***	-0.01***	-0.01***	-0.00***	-0.01***	-0.00**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.010)
Return correlation			-0.22***	-0.14***	-0.35***	-0.28***	-0.22***	-0.11***	-0.16***	-0.10***
			(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.006)	(0.010)
Industrial Difference			-0.12***	-0.08***	-0.12***	-0.07***	-0.12***	-0.08***	-0.15***	-0.09***
			(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)
Banking crisis: home			-0.12***	-0.05***	-0.04***	-0.04***	-0.11***	-0.04***	-0.10***	-0.06***
			(0.000)	(0.000)	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Banking crisis: foreign			-0.01	-0.00	-0.00	0.00	-0.01	-0.00	-0.01	-0.01
			(0.441)	(0.550)	(0.899)	(0.899)	(0.439)	(0.516)	(0.534)	(0.524)
Inflation risk: home					-0.00	0.00				
					(0.685)	(0.558)				
Inflation risk: foreign					0.03***	0.01***				
					(0.000)	(0.000)				
Exchange rate risk					-0.00	-0.48				
					(0.811)	(0.297)				
Nontradable income risk: foreign					-0.51***	0.09				
					(0.003)	(0.542)				
Nontradable income risk: home					0.01	-0.02				
					(0.967)	(0.897)				
Market capitalization: home							-0.00	0.00		
							(0.605)	(0.215)		
Market capitalization: foreign							-0.00	0.00		
							(0.477)	(0.869)		
Turnover ratio: foreign							-0.00*	-0.00***		
							(0.069)	(0.000)		
Turnover ratio: home							-0.00	0.00		
							(0.764)	(0.734)		
Capital market openness: foreign							-0.06	-0.08***		
							(0.119)	(0.003)		
Capital market openness: home							-0.00	0.01		
							(0.984)	(0.890)		
Bilateral trade									-0.04***	-0.02***
									(0.000)	(0.005)
Bilateral FDI									-0.01	-0.01
									(0.321)	(0.163)
Constant	19.85***	15.20***	26.68***	18.70***	43.09***	34.40***	28.60***	20.58***	22.07***	17.90***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Country fixed-effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year fixed-effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	15,865	13,572	15,788	13,498	7,640	6,860	15,751	13,493	8,268	7,489
Number of countrypair included	1,644	1,565	1,643	1,560	860	815	1,641	1,560	1,059	1,021
Adj. R-squared	0.02	0.25	0.04	0.26	0.10	0.28	0.04	0.26	0.05	0.22

Table 12. Model Uncertainty in cross-sectional analysis: home bias and systemic risk

Linear Regression			
Variable of interest: Systemic risk			
Outcome variable: Home bias		Number of observations	30
Possible control terms:	20	Mean R^2	0.70
No. of models:	1,048,576	Multicollinearity	0.73
Model robustness statistics		**Significance testing**	
Mean coefficient:	0.5898	Sign stability:	100%
Sample SE:	0.2097	Significance rate:	86%
Modelling SE:	0.1120		
Total SE:	0.2378		
Robustness ratio:	2.4807	Positive:	100%
		Positive and Significant:	86%
		Negative:	0%
		Negative and Significant:	0%

Table 13. Model Uncertainty in cross-sectional analysis: foreign bias and systemic risk

Linear Regression			
Variable of interest: Systemic risk			
Outcome variable: Foreign bias		Number of observations	678
Possible control terms:	18	Mean R^2	0.11
No. of models:	262,144	Multicollinearity	0.29
Model robustness statistics		**Significance testing**	
Mean coefficient:	0.2113	Sign stability:	100%
Sample SE:	0.0818	Significance rate:	95%
Modelling SE:	0.0315		
Total SE:	0.0877		
Robustness ratio:	2.4099	Positive:	100%
		Positive and Significant:	95%
		Negative:	0%
		Negative and Significant:	0%

Table 14. Model Influence Results: home bias and systemic risk

	Marginal Effect of Variable Inclusion	Percent Change from mean coefficient
FDI	0.1229	20.8%
Return correlation	0.0923	15.6%
Insider trading laws prosecution	-0.0599	-10.1%
Exchange rate risk	0.0303	5.1%
Market capitalization	-0.0235	-4.0%
Trade openness	-0.0217	-3.7%
Turnover ratio	0.0198	3.4%
Internet	0.0189	3.2%
Bank branches	0.0180	3.1%
Region	0.0179	3.0%
GDP per capita	0.0142	2.4%
Common language	-0.0119	-2.0%
Industrial Difference	0.0107	1.8%
Banking crisis	-0.0088	-1.5%
GDP	0.0077	1.3%
Capital market openness	0.0074	1.3%
Inflation risk	0.0048	0.8%
Population	-0.0031	-0.5%
Nontradable income risk	0.0022	0.4%
Distance	-0.0018	-0.3%

Table 15. Model Influence Results: foreign bias and systemic risk

	Marginal Effect of Variable Inclusion	Percent Change from mean coefficient
Inflation risk	-0.0346	-16.4%
Market capitalization	-0.0237	-11.2%
Bilateral FDI	-0.0217	-10.3%
Population	0.0130	6.2%
Return correlation	0.0089	4.2%
Banking crisis	0.0082	3.9%
Trade openness	-0.0071	-3.4%
Exchange rate risk	0.0067	3.2%
Nontradable income risk	0.0056	2.7%
GDP growth rate	0.0048	2.3%
Insider trading laws prosecution: foreign	0.0036	1.7%
GDP per capita	0.0031	1.5%
Distance	-0.0029	-1.4%
Turnover ratio	-0.0025	-1.2%
Capital market openness	0.0011	0.5%
Industrial Difference	-0.0005	-0.2%
Common language	-0.0001	0.1%
Bank branches	0.0001	0.0%

Table 16. Model Uncertainty in cross-sectional analysis: home bias and systemic risk

Linear Regression

Dependent variable: home bias level

Variable of interest	Robustness ratio	Mean coefficient	Positive	Positive and Significant	Negative	Negative and Significant
log GDP	-0.1542	-5.7088	36%	0%	64%	1%
log GDP per capita	0.1454	5.3907	23%	0%	77%	3%
Population	0.1548	5.7339	73%	2%	27%	0%
Region	-0.9837	-0.1301	1%	0%	99%	1%
Return correlation	-0.7940	-2.5759	8%	0%	92%	11%
Industrial Difference	0.4319	0.2771	88%	0%	12%	0%
Banking crisis	-0.8328	-0.8956	3%	0%	97%	2%
inflation	-0.4937	-0.0925	18%	0%	82%	0%

Table 17. Reverse causality test

Home bias	(1) OLS	(2) GMM	(3) Pesaran and Smith (1995) mean-group	(4) OLS	(5) GMM	(6) Pesaran and Smith (1995) mean-group
short-run	0.103	-0.056	5.393	0.091	-0.141	6.776
	(0.307)	(0.679)	(0.544)	(0.490)	(0.385)	(0.544)
long-run	0.066	-0.051	4.172**	0.059	-0.127	-5.565
	(0.650)	(0.826)	(0.029)	(0.783)	(0.751)	(0.361)
obs	324	282	324	324	282	321
no. of countries	42	42	42	42	42	42
Control variable added	NO	NO	NO	YES	YES	YES

Table 18. Systemic risk and Home bias: GMM-IV regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Systemic risk	8.03***	3.98*	12.69**	4.22*	14.59*	2.46	14.97**	5.10*	15.21*	5.42
	(0.004)	(0.074)	(0.023)	(0.058)	(0.060)	(0.310)	(0.020)	(0.067)	(0.067)	(0.136)
lagged home bias		0.87***		0.86***		0.86***		0.83***		0.84***
		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)
log GDP per capita	-0.30***	-0.09**	-0.31*	-0.05	-0.50*	-0.09	-0.32	-0.07	-0.56**	-0.16
	(0.000)	(0.043)	(0.055)	(0.269)	(0.057)	(0.223)	(0.130)	(0.341)	(0.033)	(0.122)
log Population	0.01	-0.03	-0.02	-0.02	-0.19	-0.02	-0.06	-0.04	-0.01	-0.02
	(0.863)	(0.350)	(0.869)	(0.532)	(0.418)	(0.736)	(0.707)	(0.398)	(0.940)	(0.600)
Return correlation			-0.33	-0.29	0.15	-0.25	-0.18	-0.22	-0.13	-0.25
			(0.654)	(0.194)	(0.899)	(0.434)	(0.845)	(0.437)	(0.873)	(0.345)
Industrial Difference			3.44	0.12	-0.12	-0.73	6.68*	0.86	4.84	0.65
			(0.356)	(0.910)	(0.982)	(0.578)	(0.075)	(0.538)	(0.189)	(0.635)
Banking crisis			-0.26	-0.02	-0.23	-0.06	-0.15	-0.01	-0.16	-0.02
			(0.179)	(0.695)	(0.243)	(0.176)	(0.486)	(0.831)	(0.416)	(0.764)
Past year return			10.78	5.91	10.72	4.38	10.08	6.28	10.40	6.08
			(0.428)	(0.242)	(0.591)	(0.355)	(0.479)	(0.261)	(0.471)	(0.288)
Current year return			-13.75	0.20	-30.22	-0.22	-18.47	-1.31	-15.89	-1.73
			(0.227)	(0.963)	(0.164)	(0.969)	(0.151)	(0.793)	(0.263)	(0.753)
Inflation risk					-0.06	-0.01				
					(0.298)	(0.459)				
Exchange rate risk					0.01**	0.00				
					(0.026)	(0.291)				
Nontradable income risk					3.36	-0.29				
					(0.134)	(0.686)				
Turnover ratio							0.00	0.00		
							(0.280)	(0.209)		
Market capitalization							0.00***	0.00		
							(0.003)	(0.248)		
Capital market openness							-0.49	-0.14		
							(0.103)	(0.123)		
Internet									0.01*	0.01
									(0.068)	(0.103)
Trade openness									0.00	0.00
									(0.198)	(0.708)
FDI									-0.24**	-0.01
									(0.048)	(0.855)
Constant	2.53	1.14	2.94	0.83	7.49	1.33	3.41	1.24	3.87	1.38
	(0.125)	(0.206)	(0.340)	(0.345)	(0.175)	(0.359)	(0.383)	(0.322)	(0.238)	(0.219)
Observations	410	410	408	408	277	277	408	408	408	408
Adj. R-squared	0.68	0.67	0.66	0.65	0.76	0.74	0.58	0.56	0.54	0.52