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1.0 Introduction

Throughout the time investors have exhibited a preference to holding domestic securities in portfolios despite the known benefits of diversification into foreign equities. This phenomenon is known as home bias.

The objective of this research paper is to investigate the changes within home bias over the period 2001 - 2016 in the world's 30 largest economies based on GDP and relative economic openness. We do not wish to explain the changes in HB, but rather document them and assess which market or economic characteristic are associated with the changes. By using previous research and the ICAMP principles, we have chosen several factors that we believe will impact HB.

We wish to contribute to the existing research by focusing particularly on the financial openness to foreign investment and its significance on the cross-border diversification in developed and emerging markets. By investigating the changing over time, we wish to help shed light on subsequent changes in international portfolio allocation.

2.0 Background and litterateur

International portfolio diversification aims to improve the returns of a portfolio as well as reduce risk as shown by De Santis and Gerard (1997). Grubel (1968) derived the efficient portfolio from the international stock markets as they suggested that international diversification is the best way to improve the returns of a portfolio through reaching their highest expected return as well as low portfolio variance.

French and Poterba (1991) where one of the first to provide evidence of home bias, and their study are of great importance among the number of studies that documented home bias. Home bias was particularly prominent in the 1970's and 1980's, however recent research shows that the home bias has been declining (Amadi A. A, 2004). Home bias, or the equity home bias puzzle, are still a commonly researched topic and there are many possible explanations for why home bias occurs and why the equity home bias is declining. Some of the most prominent explanations for home bias are asymmetric information, cost and barriers, and domestic hedging purposes. In later studies have researches also studied new possible factors as globalization, familiarity, and economic and financial openness. There is however little research that can attribute high enough statistical significance to fully explain home bias.

Asymmetric information is potentially one of the most researched topics in regard to home bias. French and Poterba (1991) reported that investors hold a disproportionate share of domestic assets in their equity portfolios, suggesting that investors expect returns in their domestic markets to be higher than in other markets. They state that if there is differential information in the market, then risk-averse investors will prefer the investments to which they have higher information, and invest more domestically. Investors will according to Huberman (2001) ignore the basic principles of portfolio theory to invest in things that are familiar to them.

Several studies have concluded that information asymmetry is a significant factor in explaining home bias, however it is not enough to explain the equity home bias in its entirety. Nieuwerburgh and Veldkamp (2009) argue that home

bias appear because investors that invest in their home assets can better predict the payoff compared to what foreigners can. They found that local investors received a higher profit where there was asymmetric information. Coval and Moskowitz (1999) suggests that asymmetric information between nonlocal and local investors may affect the investments geographically, and they show that portfolios of domestic stocks is preferable for investors that want to invest close to home. Barron and Ni (2008) used a rational expectation model where information acquisitions are endogenous and portfolio managers differ in size of the initial portfolio, to investigate asymmetric information and how it affects equity home bias. They found that when the portfolio size increases, the gains to acquiring information on foreign asset also increase along with the portfolio size, thus reducing the home bias compared to what can be seen in smaller portfolios.

There are several costs and barriers associated with making a foreign investment. These are most prominently associated with transactions, information costs, various tax treatments across domestic and foreign portfolio income and government restrictions on foreign investments through capital controls or various legal framework. Tesar and Werner (1995) found that the variable transaction cost is an unlikely explanation for home bias. Mishra and Ratti (2013) construct a tax credit variable for foreign taxes paid on dividends, and this variable is found to be significant in reducing home bias. They also found that an increase in home bias could be offset by a higher foreign tax rate. Ahearne, Griever and Warnock (2004) suggest that information costs is an important factor behind the home bias phenomenon. Merton (1987) computed a model that suggested that information costs might affect investor behavior, investors believed that the riskiness of having stock they do not now is very high compared to hold stocks they already know.

The result of Chang, Covrig, & Ng (2005) suggests that familiarity variables and the stock-market development exhibit significantly, but asymmetric, effect on foreign investors over- and under-weight in the foreign market and domestic investors under- and over-weight in the local market. Ferreira & Miguel (2011) found that in countries with more developed bond markets and in countries

with fewer restrictions on transactions, is there a lower domestic bias. They show that when countries are more economically developed does this result in lower domestic bias and that domestic bias is higher when investors don't take advantage of international diversification opportunities. They also state that familiarity variables play an important role in explaining foreign bias. Familiarity variables are bilateral trade, common language and geographical proximity. Coeurdacier & Gourinchas (2016) focus on risk related to non-financial wealth, they concluded that since financial and non-financial returns are positively correlated should home equity positions be interested in foreign equity.

Sercu and Vanpée (2007) suggest that a domestic asset is a better hedge for inflation risk and domestic consumption risk. They believe that domestic assets are more likely to generally follow the domestic market performance, and supporting underweighted investors in respect to international diversification. The study identifies four home-country specific risk; inflation risk, real exchange rate risk, domestic consumption risk and risk from non-tradable wealth.

The evidence for hedging domestic risk is not very consistent as Cooper and Kaplanis (1994), tested whether inflation hedging or direct observable costs of international investments are a possible reason for home bias in equity portfolios. The empirical evidence states that for the implications to be true the investors need to have low levels of risk aversion and there have to exist a negative correlation between equity returns and domestic inflation. Mishra (2015) concludes that finding country-specific idiosyncratic risk has a positive impact on home bias, and roles that have a significant matter on decrease in home bias is foreign listing, natural resources rents and institutional quality.

Boukouras & Koufopoulos (2011) show that there is a positive correlation between financial openness and government size, and Mondria & Wu (2010) show that financial openness result in decrease in home bias.

3.0 Methodology

3.0.1 Measuring home bias

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

$$HB_i = 1 - \frac{Acutual_i}{Optimal_i}$$

There are two main approaches to equity home bias studies; a return based approach and a model based approach. The two models give different benchmark weights and therefore the measures of the home bias will differ greatly depending on which approach is preferred.

In our research we will utilize the model approach and that the ICAPM holds. We assume that the world is fully integrated, PPP holds and the market equilibrium is achieved when all investors hold the world market portfolio. Each country portfolio is weighted by its market capitalization and we will use the MSCI ACWI index as our proxy for the world portfolio.

Our measure of home bias will be the difference between the actual holdings and the optimal holdings of the domestic equity and the share of domestic equity in the world market portfolio.

Our actual holdings are:

$$Actual_i = \frac{Foreign\ equity\ asset_i}{Foreign\ equity\ asset_i + Market\ capitalization\ n_i - Foreign\ equity\ liability\ y_i}$$

Equity home bias is then:

$$EHB_i = 1 - \frac{Share\ of\ foreign\ equity\ in\ country\ i\ equity\ holdings}{Share\ of\ foreign\ equity\ in\ the\ world\ market\ portfolio}$$

3.0.2 Portfolio weights and degree of underweight

The degree of underweight or misallocation in a country allows us to potentially capture the portfolio rebalancing in the subsequent period. The larger deviation from the optimal weights, the larger incentive to rebalance portfolio. The rebalancing of a portfolio consists of an active and passive component, where passive component is a result from differential returns and the active component is due to trades from investors.

The total change in portfolio weights is computed with the following formula and includes both the passive and active components.

$$\Delta w^{T}_{ck,t} = w_{ck,t} - w_{ck,t-1}$$

In order to split these apart we will utilize the method adopted by De Santis and Gerard (2009) when measuring portfolio weights. They measure the actual portfolio weights as:

$$w_{ck,t} = \frac{Inv_{ck,t}}{\Sigma_k Inv_{c,k,t}}$$

where Inv ck,t is the US dollar amount invested by country c in country k financial assets at time t. De Santis and Gerard (2009) found that the change in the portfolio allocation as a result of active investment can be stated as follows:

$$\Delta w^{A}_{ck,t} = w_{ck,t} - w_{ck,t-1}\frac{(1+r_c)}{\Sigma_k\left(1+w_{ck,t-1}r^{c}_{k,t}\right)} = w_{ck,t} - w_{ck,t-1}\frac{\left(1+r^{c}_{k,t}\right)}{\left(1+r^{c}_{Pc,t}\right)},$$

Where DwA ck,t is the active change, rc k,t is the return on investment k denominated in country c's currency and rc Pc,t is the total return on country c'

foreign portfolio. The passive component can then be found as the difference between the total change and the active change:

$$\Delta w^{P}_{ck,t} = \Delta \mathrm{w}^{T}_{ck,t} - \Delta w^{A}_{ck,t} = w_{ck,t-1}\frac{\left(1 + r^{c}_{k,t}\right)}{\left(1 + r^{c}_{Pc,t}\right)} - W_{ck,t-1}$$

We have defined the measurement of home bias as the difference from the actual and optimal foreign holdings. Similarly the difference between the actual weights and optimal weights can reveal the misallocation in the destination country. The initial degree of misallocation from the optimal weights can be computed as follows:

$DW_{ck,t} = w'_{ck,t} - w_{ck,t}$

Where DW ck,t is the degree of underweight. w* is the optimal share and wck,t is the actual shares invested. We will include the degree of underweight in our regression as an independent variable as portfolio-rebalancing takes place correct the degree of misallocation and is one of the rational investment decision made by investors. There is some studies attempting to measure the benefits from degree of underweight and holding a higher domestic weights (e.g., Seasholes and Zhu, 2010). These attempt have found little systematic evidence that such outperformance by local investors actually occur and we assume that the rational investor will rebalance his portfolio in order to achieve full diversification and optimal portfolio weights.

3.0.3 Marginal diversification benefits

De Santis and Gerard (2009) states that by constructing international portfolios of unrelated countries assets, can they diversify security risk. By using the foreign investment portfolio variance and increase or decrease their position in a particular asset can they compute the marginal impact of portfolio risk. By doing so do they use the following formula for the foreign investment portfolio variance:

$$\sigma^{2}_{P,t} = w'_{c,t}\Sigma_{c,t}w_{c,t}$$

Where W(c,t) is the actual vector of weight for the k foreign assets and c is the investing country c's perspective.

To present the measure of marginal diversification benefit (DB) does they use an interpretation of the relationship between portfolio variance and weight invested in foreign assets. Specifically, the decrease in portfolio variance for a marginal increase in the weight invested in asset k. The interpretation is as follows:

$$DB_{ck,t} = -\frac{\partial}{\partial w_{ck,t}}\left[W'_{c,t}\Sigma_{c,t}W_{c,t}\right] = -2\Sigma_{l=1}^{K} w_{cl,t}\sigma_{lk,t}$$

Where marginal diversification benefits (DB) is measured by adding asset k to investor c's position. We believe that the diversification benefits are going to be positively correlated with the changes that occur in portfolio weights.

3.0.4 Asset returns and lagged returns

We will include both returns and lagged returns as explanatory variables, in order to test the relationship of lagged returns and subsequent international portfolio reallocation. We expect that lagged returns has a positive relationship with a change in portfolio weights suggesting that institutional investors engage in "trend chasing" or positive feedback trading where investors increase their foreign holdings when foreign markets outperform the local market. This positive relationship has been shown extensively in previous research such as Bohn and Tesar (1996), Froot et al. (2001) and Brennan and Chao's (1997).

3.0.5 Currency risk

To account for the currency risk or elimination of currency risk by the EMU we will include a dummy variable that will account for this impact. De Santis and Gerard (2009) found a significant increase in cross-border diversification among European countries due to this elimination of risk. The dummy variable will equal 1 when both country c and k are of the same currency.

For the global currency risk where country c and k does not have the same currency we will extract the implied forward-looking currency risk from currency options. Research shows that high currency risk may affect the incentives to diversify internationally and we will therefore include this is our regression. We expect a positive relationship between the volatility of the exchange rate and the home bias.

3.0.6 Public listings

Ahearne, Griever and Warcnock (2004) research suggests that a greater amount of foreign firms listed in the domestic market could cause a greater foreign diversification, reducing the home bias as information about the companies is more accessible and cost of information is lower. The percentage share of foreign firms listed is therefore an independent variable in our regression, the measure of public listing is credited to Mishra (2008) and Amandi (2004).

$$Precentage\ of\ foreign\ firms\ listed\ in\ domestic\ market = \frac{Number\ of\ foreign\ firms\ litsted}{Total\ firms\ listed\ in\ the\ domesic\ market}$$

The variables mentioned so far are included primarily as control variables, meaning that we find them significantly important and must be included in our regression due to their strong empirical and theoretical support. They do not however, exhibited a significant change that can help investigate and shed light on the change in the home bias from 2001-2016.

3.0.7 Financial and Economic development

The most common measurement of size of an economy is the total GDP. In order to account for the size bias argued by Barron and Ni (2008) we are including GDP as an explanatory independent variable. Real GDP has previously shows to have significant negative effect on equity home bias. Financial development is most commonly measured as the total equity market cap to real GDP and will also be included as a variable.

3.0.8 Economic openness

Economic openness is most commonly measured as the ratio of exports plus imports over total GDP. As shown by Bekaert and Wang (2009) and Lane and Milesi-Ferretti (2003), a higher degree of economic openness should lead to lower bias due to fewer capital controls in the countries and their research suggest that this variable significantly impacted international diversification over the last decade. We expect there to be a positive relationship between economic openness.

3.0.9 Financial openness

In order to account for financial openness, we will use two different measures in a similar fashion as in Bekaert et al. (2009) where one focuses entirely on capital account and the other solely on equity markets.

The first measurement based entirely on the capital market is compiled by Quinn (1997) and Toyoda (2008) and is based on information from the IMF where a value of 1 indicates full capital openness and 0 indices closed capital markets.

The 2nd measure is based solely on the capital market and is measured by the ratio of market capitalization of the S&P investable to the S&P global indices in each country, where a ratio of one means that all the stocks in the local market is available to foreign investors. This is based on the research of Bekaert (1995) and Edison and Warnock (2003). The measure uses the S&P global stock index as a proxy for the local stock market and the investable index corrects the market cap for foreign ownership restrictions Bekaert et al. (2009).

We expect both measures, run in different regressions as they are correlated, to have a positive relationship, as increased financial openness should lead to increased international diversification.

3.0.10 Segmentation

The percentage share of emerging markets in the world capitalization is another explanatory variable that has changed substantially over the last decade as a result of the liberation of certain financial markets. A large amount of capital has over the last couple of years gone into emerging markets. Odier et al (1995) looked at the returns for newly emerging markets and compared them to developed markets and found that there were increased returns in investing in the emerging markets but at a higher risk. One of their key findings was that gains expected from international diversification on newly emerging markets is more beneficial than investing primarily in developed markets, further contributing to increased international diversification.

Trade and financial openness can be view as a proxy for globalization and main determinants behind today's market segmentation as shown by previous research, however Bekaert et. al (2009) suggests that a country's political risk profile, stock market development and corporate credit spreads are also significant when explaining the variation in segmentation which in turn is affecting international portfolio allocation. They introduce a new measure of segmentation that is the absolute differential between local and global valuation ratios. They suggest in their research that segmentation will decrease when discount rates and growth opportunities become global, meaning that as the world becomes more globalized, segmentation will diminish. We will utilize their measurement of segmentation and expect there to be a negative relationship between segmentation and international portfolio diversification.

3.0.11 The empirical specification

HB is the dependent variable and indicates the measurement of home bias.

DW is the initial degree of underweight
DB is the diversification benefits
R is the asset allocation return
R (t-1) is the lagged asset allocation return
GDP is size of the country's economy measured by total GDP

CR is the currency risk

PL is the public listing

ED is the Economic development - GDP per capita

EO is the Economic openness

AdjFO is the Financial openness

Seg is the segmentation

εij: Indicates the margin of error

$$HB_{ck,t} = \alpha_0 + \alpha_1 DW_{ck,t-1} + \beta DB_{ck,t-1} + \theta_1 GDP + \theta_2 CR + \theta_3 PL + \theta_4 ED + \theta_5 EO + \theta_6 AdjFO + \theta_7 Seg + \delta_1 R_{k,t} + \delta_2 R_{k,t-1} + \varepsilon_{ij}$$

4.0 Data

This paper's primary data is from the coordinated portfolio investment survey (CPIS), which is collected by the IMF. The CPIS reports international portfolio positions disaggregated by regions and instruments, covering all major - equity, securities, bonds and notes and money market instruments, denominated in US dollars. The CPIS is estimated to cover approximately 90% of the world's international equity portfolios and 80% of the world's international bonds portfolios.

The CPIS dataset has the advantage of consistency due to the compilation of the data. The participants take the portfolio survey at the same time and provide a breakdown of their stock of portfolio investment asset by the country of residency of the non-resident issuer.

The CPIS data sets do have a few downsides. The data collection varies by country; especially with regards to whether the data is collected at the aggregate or security-by-security level, whether they survey end investors or custodians and whether the participation is mandatory or compulsory. CPIS also does not address the issue of third country holdings, particularly in financial centers such as Luxembourg, Bermuda and Ireland, which hold 13% of worldwide foreign investments. The total amount of these investment is greater than their total market cap of the offshore financial centers stock and bonds markets meaning that they server as agents for funds invested elsewhere. CPIS does not take this into account.

In this paper we will use the sample period from 2001-2016 for the 30 largest economies in the world with a sufficiently open equity market. This includes both developed and emerging economies.

In order to calculate the regression in our empirical specification we will use Datastream and the World Bank. We will use the MSCI ACWI Index as a proxy for the world market portfolio in order to obtain our optimal portfolio weights. Monthly equity returns for our forty-two sample countries from January 1994 until December 2012 refer to the Morgan Stanley International

Country Indices, also retrieved from Datastream. The risk-free rate is the 3-month US Treasury Bill rate and the world market return is peroxided by the return of the MSCI World Index. Data for each countries market cap is taken from the World Bank and the total market cap of foreign investable assets is taken from S&P/IFCI.

5.0 References

Ahearne, A. G., Griever, W. L., & Warnock, F. E. (2004). Information costs and home bias: an analysis of US holdings of foreign equities. *Journal of international economics, 62*(2), 313-336.

Amadi, A. A. (2004). Equity home bias: A disappearing phenomenon?

Baele, L., Pungulescu, C., & Ter Horst, J. (2007). Model uncertainty, financial market integration and the home bias puzzle. *Journal of international Money and Finance, 26*(4), 606-630.

Barron, J. M., & Ni, J. (2008). Endogenous asymmetric information and international equity home bias: the effects of portfolio size and information costs. *Journal of international Money and Finance, 27*(4), 617-635.

Bekaert, G., Harvey, C. R., Lundblad, C. T., & Siegel, S. (2011). What segments equity markets? *The Review of Financial Studies, 24*(12), 3841-3890.

Bekaert, G., & Wang, X. S. (2009). Home bias revisited.

Boukouras, A., & Koufopoulos, K. (2011). *Frictions to political competition and financial openness*. Retrieved from

Brennan, M. J., & Cao, H. H. (1997). International portfolio investment flows. *The Journal of Finance, 52*(5), 1851-1880.

Chan, K., Covrig, V., & Ng, L. (2005). What determines the domestic bias and foreign bias? Evidence from mutual fund equity allocations worldwide. *The Journal of Finance, 60*(3), 1495-1534.

Coeurdacier, N., & Gourinchas, P.-O. (2016). When bonds matter: Home bias in goods and assets. *Journal of Monetary Economics, 82*, 119-137.

Cooper, I., & Kaplanis, E. (1994). Home bias in equity portfolios, inflation hedging, and international capital market equilibrium. *The Review of Financial Studies, 7*(1), 45-60.

Cooper, I. A., Sercu, P., & Vanpée, R. (2017). A Measure of Pure Home Bias. *Review of Finance*, rfx005.

Coval, J. D., & Moskowitz, T. J. (1999). Home bias at home: Local equity preference in domestic portfolios. *The Journal of Finance, 54*(6), 2045-2073.

De Santis, R. A., & Gerard, B. (2009). International portfolio reallocation: Diversification benefits and European monetary union. *European Economic Review, 53*(8), 1010-1027.

Ferreira, M. A., & Miguel, A. F. (2011). The determinants of domestic and foreign bond bias. *Journal of Multinational Financial Management, 21*(5), 279-300.

French, K. R., & Poterba, J. M. (1991). *Investor diversification and international equity markets*. Retrieved from

Froot, K. A., O'connell, P. G., & Seasholes, M. S. (2001). The portfolio flows of international investors. *Journal of financial economics, 59*(2), 151-193.

Goetzmann, W. N., & Kumar, A. (2008). Equity portfolio diversification. *Review of Finance*, 433-463.

Hau, H., & Rey, H. (2008). *Home bias at the fund level*. Retrieved from

Kang, J.-K. (1997). Why is there a home bias? An analysis of foreign portfolio equity ownership in Japan. *Journal of financial economics, 46*(1), 3-28.

Lane, P. R., & Milesi-Ferretti, G. M. (2003). International financial integration. *IMF staff papers, 50*(1), 82-113.

Merton, R. C. (1987). A simple model of capital market equilibrium with incomplete information. *The Journal of Finance, 42*(3), 483-510.

Mishra, A. V. (2008). Australia's equity home bias. *Australian Economic Papers, 47*(1), 53-73.

Mishra, A. V. (2015). Measures of equity home bias puzzle. *Journal of Empirical Finance, 34*, 293-312.

Mishra, A. V., & Ratti, R. A. (2013). Home bias and cross border taxation. *Journal of international Money and Finance, 32*, 169-193.

Mondria, J., & Wu, T. (2010). The puzzling evolution of the home bias, information processing and financial openness. *Journal of Economic Dynamics and Control, 34*(5), 875-896.

Odier, P., & Solnik, B. (1993). Lessons for international asset allocation. *Financial analysts journal, 49*(2), 63-77.

Portes, R., & Rey, H. (2005). The determinants of cross-border equity flows. *Journal of international economics, 65*(2), 269-296.

Sercu, P., & Vanpée, R. (2007). Home bias in international equity portfolios: A review.

Shore, S. H., & White, J. S. (2002). External habit formation and the home bias puzzle.

Solnik, B. H. (1995). Why not diversify internationally rather than domestically? *Financial analysts journal, 51*(1), 89-94.

Strong, N., & Xu, X. (2003). Understanding the equity home bias: Evidence from survey data. *The Review of Economics and Statistics, 85*(2), 307-312.

Sørensen, B. E., Wu, Y.-T., Yosha, O., & Zhu, Y. (2007). Home bias and international risk sharing: Twin puzzles separated at birth. *Journal of international Money and Finance, 26*(4), 587-605.

Tesar, L. L., & Werner, I. M. (1995). Home bias and high turnover. *Journal of international Money and Finance, 14*(4), 467-492.

Van Nieuwerburgh, S., & Veldkamp, L. (2009). Information immobility and the home bias puzzle. *The Journal of Finance, 64*(3), 1187-1215.