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The determinants of domestic and foreign bond bias[☆]

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ABSTRACT

This paper studies the determinants of the domestic and the foreign bond biases and their evolution over time using aggregate bond allocation data from CPIS. Our results show that the home bias is prevalent across all countries, despite the decreasing of the domestic bias in most countries in the 1997–2009 period. We find that the domestic bond bias is lower in countries with higher economic development, higher restrictions on foreign capital transactions, more developed bond markets, higher familiarity, and higher efficiency of the judicial system. When investing overseas, investors also prefer to allocate their investments in countries with higher economic development, lower restrictions on capital flows, more developed bond markets, stronger judicial systems, and higher past returns. Additionally, we find that familiarity (i.e. geographic proximity, common language, and bilateral trade) is a major determinant to decrease the foreign bias. Finally, there is no evidence that investors' bond allocations are explained by diversification opportunities as proxied by bond markets correlations.

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1. Introduction

Financial globalization and the enlarged access to financial markets have provided expanding opportunities for investors to diversify their portfolios across the world. The international version of the CAPM model (Sharpe, 1964; Lintner, 1965) implies that investors should diversify their portfolios. Investors should hold securities from countries around the world in proportion to their weight

in the world market capitalization. Accordingly, an investor should only hold domestic assets in his portfolio in proportion to his country share of the world market capitalization.

Several authors have shown that cross-border diversification of equity portfolios tends to offer potential gains to investors (e.g., Grubel, 1968; DeSantis and Gerard, 1997; Shapiro, 1999). The potential diversification benefits of incorporating foreign bonds in an investor portfolio have also been studied by some authors (e.g., Levy and Lerman, 1988; Levich and Thomas, 1993). Cross-border bond positions are one of the fundamental assumptions in portfolio diversification models. A substantial number of economic and financial models assumes that investors can and do take a position not only in domestic bonds but also in international bonds (e.g., Branson and Henderson, 1985; Lane, 2001). Bonds cross-border trading is also fundamental to sustain consumption smoothing and risk sharing models (e.g., Obstfeld, 1994; Lewis, 1996).

Globalization is expected to lead to an increase in capital mobility and foreign security investments in order to exploit benefits. However, domestic assets usually represent a disproportionately large part of the investors' portfolios. Investors do not fully take advantage of such diversification opportunities around the world. The weight of foreign assets held by investors is much smaller than the theoretical predictions. This phenomenon is called home bias and has puzzled the financial economics literature over the past decades. The domestic bias reflects the extent to which investors overweight home markets in their portfolios, while the foreign bias, introduced by Chan et al. (2005), reflects the extent to which investors underweight or overweight foreign markets.

The literature has been trying to provide theoretical explanations for the lack of international diversification of investors' portfolios. Despite the importance of bonds in portfolio diversification models, past studies have focused essentially on equity portfolios; see Lewis (1999), Karolyi and Stulz (2003), and Sercu and Vanpée (2007) for a survey of the literature on equity home bias. Research on the home bond bias is rather limited. Tesar and Werner (1995) study on international portfolio investment in Canada, Germany, Japan, the U.K. and the U.S., during the 1970–1990 period, shows that cross-border bond positions are relatively small and that home bias appears in bonds as well as in equities, further intensifying the home bias puzzle. Burger and Warnock (2003) examine U.S. investors' international bond portfolios across 50 countries. Their results indicate that despite the significant home bias in U.S. investors' bond portfolios, portfolio weights are greater in countries that present more open capital accounts and whose bond returns are less correlated with U.S. returns, indicating that investors care about diversification. The authors also conclude that the U.S. investor positions in foreign bonds denominated in U.S. dollars are substantially higher than their positions in local currency bond markets. Sorensen et al. (2007) find that the international home bias in bond and equity holdings around the world declined during the late 1990s at the same time as international risk sharing significantly increased. Foreign asset holdings clearly help countries obtaining macroeconomic income and consumption smoothing, and the impact of foreign bond holdings seems to be stronger than the impact of foreign equity holdings. They also find that countries with less home bias have a propensity to obtain more risk sharing in international markets. Lane (2006) studies the bilateral composition of international bond portfolios for the euro area and the individual EMU member countries. His results show that EMU member countries disproportionately invest in one another relative to other country pairs, supporting euro-area bias, and suggesting that financial regionalization is the leading force underlying financial globalization. These findings are broadly consistent with those of De Santis and Gerard (2006) and De Santis and Lührmann (2009) supporting regional financial integration in the euro-area. Fidora et al. (2006) study the importance of real exchange rate volatility in explaining cross-country differences in home bias and they find that bond home bias is more pronounced than equity home bias. This is consistent with their Markowitz-type international CAPM hypothesis, that financial assets with lower underlying volatility should exhibit a larger home bias.

In this paper, we study the domestic bond bias and the foreign bond bias around the world using CPIS data in the 1997–2009 period. We make substantial contributions to the bias literature. First, we believe that this is the first study on domestic and foreign bond biases to use a worldwide sample. Our comprehensive dataset includes holdings of all types of investors from 42 countries around the world. Second, our sample period has been characterized by some important financial events that may contribute to alter both the domestic and foreign bond biases across countries. The launching of the

Euro in 1999 may have affected the size of cross-border investments. The creation of the Economic and Monetary Union (EMU) is expected to have contributed to an increasing financial integration and, therefore, might have decreased the home bond bias. The 2002 and particularly the 2007 financial crisis have imposed significant hardships on investors and have undermined their confidence in the financial markets and in the economic and financial institutions. Many investors may have re-balanced their portfolios and this is expected to have had some impact on cross-border capital flows. By considering data for the 1997–2009 period, we are able to examine the evolution of both domestic and foreign biases across time and to investigate whether there are changes in the determinants of these biases. Based on the existent literature on the equity home bias, we propose a set of variables classified into six groups – economic and financial development, capital controls, familiarity, investor protection, and other variables, including past returns and the correlation of returns – to explain the determinants of both the domestic bond bias and the foreign bond bias.

Our results show that the home bias prevails across all countries in our sample, despite the decreasing of the domestic bias in most countries over the 1997–2009 period. Our results also show that the domestic bias is lower in countries with higher economic development, stronger restrictions on foreign capital transactions, more developed bond markets, higher familiarity, proxied by common language and geographic distance, and greater efficiency of the judicial system. Countries with lower correlation with the rest of the world present a higher level of domestic bias. Results on foreign bond bias show that investors prefer to allocate their investments in countries with stronger economic development, lower restrictions on foreign capital transactions, more developed markets and more efficient judicial systems. Familiarity is a major determinant of the foreign bias – geographic proximity, the sharing of a common language and higher bilateral trade are strong determinants that decrease the foreign bias. Additionally, we find that higher past returns reduce the foreign bias and results on returns correlation indicate that investors do not adequately diversify their portfolios when investing abroad.

The next section describes the data and how we calculate the domestic bias and the foreign bias measures. Section 3 discusses the determinants of the domestic and the foreign bond biases. Section 4 provides and discusses the main empirical results. Additional tests and robustness checks are presented in Section 5. Section 6 concludes.

2. Data and descriptive statistics

2.1. Bond holdings data

Cross country bond holdings are obtained from the International Monetary Fund's (IMF) Coordinated Portfolio Investment Survey (CPIS). Starting in 1997, this survey reports data from a large number of countries around the world on foreign portfolio asset holdings by residence of the issuer. These data are divided into equity, long-term debt securities, and short-term debt securities. Long-term debt securities cover instruments such as bonds and debentures that have an original term to maturity of more than one year. For brevity, we use the term bonds for long-term debt securities. Short-term debt securities include treasury bills, commercial paper, and bankers' acceptances. These instruments are traded at a discount and have an original term to maturity of one year or less. Both, long-term and short-term debt securities, usually give the holder the right to fixed income or a predetermined variable income. The first version of the survey was conducted in 1997 and covered only 29 source countries, but the more recent includes 75 source countries, including some offshore and financial centers. We use data from 42 countries (due to the limited availability of explanatory variables), as origin and destination countries, for 1997, and 2001–2009.[1]

Data on the size of the bond markets are from the Bank for International Settlements (*BIS*). *BIS* data cover domestic and international securities statistics published in the annex tables of the *BIS* Quarterly Review.

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[1] CPIS does not report data for the 1998–2000 period. Data are available at http://www.imf.org/external/np/sta/pi/datarsl.htm.

2.2. Statistics on country bond holdings

The portfolio share for each country in each year, $w_{ij,t}$, is calculated as foreign bond holdings of origin country i in destination country j, $ASSETS_{ij}$, relative to country i's total holdings of foreign as well as domestic bonds, $ASSETS_{i,t}^{tot} = \sum_{j=1}^{N} ASSETS_{ji,t}$:

$$w_{ij,t} = \frac{ASSETS_{ij,t}}{ASSETS_{i,t}^{tot}}. \tag{1}$$

Because CPIS data do not include domestic bond securities but only foreign bond securities, $ASSETS_{i,t}^{tot}$ is not directly available. Origin country i's total bond holdings are calculated as follows:

$$ASSETS_{i,t}^{tot} = MV_{i,t} - \sum_{j=1, j \neq i}^{N} LIAB_{ij,t} + \sum_{J=1, j \neq i}^{N} ASSETS_{ij,t} \tag{2}$$

where $\sum_{j=1, j \neq i}^{N} LIAB_{ij,t}$ is the sum of all bond liabilities of the rest of the world held in country i, and $\sum_{j=1, j \neq i}^{N} ASSETS_{ij,t}$ is the sum of all foreign assets held in the rest of the world, and $MV_{i,t}$ is the market value of local-currency bonds issued in the domestic market, foreign-currency bonds, and bonds issued in the global market (international bonds). To determine the amount of local-currency bonds that are placed in the domestic market we use data on long-term debt from Table 16A of *BIS* Quarterly Review. Data on international debt securities is from Table 14B. This table does not include information on Brady bonds, which is obtained from Datastream. Our aim is to analyze portfolio allocations and we therefore want to determine the size of the tradable bond market (the float) and not the size of the entire bond market. We follow the Burger and Warnock (2003) approach by subtracting government agencies' holdings of their own government's bonds.[2] As this information is not available across a wide range of countries, they excluded central bank holdings of their own government's bonds. These data are available for a large number of countries in the International Financial Statistics (line 12a). Burger and Warnock (2003) have shown that this float adjustment only affects local currency issuance. By adopting this methodology we assume that governments do not hold their own foreign-currency-denominated bonds.

Table 1 shows the distribution of the 42 countries' bond holding allocations averaged across our sample period (origin countries in columns and destination countries in rows).[3] The second row of the table contains the total market value of each country, and the third row contains the market value of holdings, both in billions of dollars. The second column also includes the countries' bond total market value weight in the world market portfolio.

The U.S. market represents by far the highest percentage of the world total market value (41.27%). Japan and Germany have the second and third highest share of the world total market value, 14.21% and 6.65%, respectively, while France, Italy, and the U.K. represent only a little more than 5% each. Overall, these six countries account for approximately 80% of the world total market value.

To emphasize the weight of domestic securities in portfolio holdings, the cells containing the percentage of bond holdings in the domestic market are in bold face. By comparing the countries' domestic holdings with the countries' world total market value weight, one can immediately see that the domestic bias is present in all countries included in our sample. The U.S. holdings in domestic bonds represent approximately 96% of the bonds' portfolio. As financial centers, Ireland (10.87%) and Hong Kong (20.11%), are the countries with the lowest investment in domestic bonds, but the weight of these countries in the world total market value is rather small (1.28% and 0.17%, respectively). Results (not reported) show that, from 1997 to 2009, the weight of the domestic securities in bond holdings decreases for a large number of countries, although remaining much larger than the world

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[2] In equity portfolios literature the float market is calculated by excluding the securities held by insiders (see, e.g., Dahlquist et al., 2003; Ferreira and Miguel, 2007).

[3] Accurate data are not available for Israel and Switzerland.

Table 1
Average debt allocation by country.

	Market weight	AR	AU	AT	BE	BR	CA	CL	CO	CZ	DK	FI	FR	DE	GR	HK
Total market value		103.7	651.1	407.6	462.4	485.6	1109.1	44.6	44.2	42.2	467.2	139.8	2640.3	3221.4	211.9	84.7
Market value of holdings ($billions)		108.5	633.5	428.9	560.7	378.8	1209.2	62.9	44.4	42.3	505.3	93.1	2541.8	3275.2	199.1	169.4
Argentina, AR	0.21	**93.24**	0.00	0.07	0.03	0.00	0.01	0.06	0.01	0.00	0.09	0.00	0.03	0.03	0.00	0.00
Australia, AU	1.34	0.00	**92.10**	0.26	0.32	0.00	0.14	0.02	0.02	0.20	0.03	0.42	0.35	0.19	0.05	10.63
Austria, AT	0.84	0.02	0.03	**61.01**	1.11	0.13	0.01	0.01	0.01	0.95	0.14	2.46	0.95	1.55	0.51	0.42
Belgium, BE	0.96	0.00	0.03	0.68	**48.66**	0.00	0.01	0.03	0.01	0.25	0.21	2.09	1.38	0.47	0.04	0.16
Brazil, BR	1.00	0.16	0.00	0.12	0.02	**99.52**	0.09	0.33	0.04	0.00	0.12	0.01	0.06	0.08	0.02	0.02
Canada, CA	2.29	0.00	0.07	0.34	0.36	0.00	**94.86**	0.06	0.05	0.13	0.17	0.30	0.48	0.29	0.02	3.04
Chile, CL	0.09	0.02	0.00	0.01	0.00	0.00	0.00	**92.16**	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.04
Colombia, CO	0.09	0.00	0.00	0.02	0.00	0.00	0.00	0.03	**94.02**	0.00	0.05	0.00	0.00	0.01	0.00	0.00
Czech Republic, CZ	0.09	0.00	0.00	0.20	0.06	0.00	0.00	0.00	0.00	**75.87**	0.01	0.05	0.01	0.05	0.01	NA
Denmark, DK	0.96	0.00	0.03	0.75	0.74	0.04	0.01	0.00	0.01	0.06	**83.67**	2.93	0.22	0.40	0.03	0.49
Finland, FI	0.29	0.00	0.01	0.39	0.40	0.00	0.00	0.02	0.00	0.04	0.35	**20.84**	0.42	0.31	0.03	0.31
France, FR	5.45	0.00	0.10	2.78	5.77	0.01	0.15	0.15	0.08	1.93	1.15	12.16	**60.06**	2.75	1.14	3.08
Germany, DE	6.65	0.09	0.47	10.63	6.09	0.01	0.22	1.32	0.24	3.41	3.99	14.29	5.43	**74.87**	1.96	4.36
Greece, GR	0.44	0.00	0.00	1.28	1.99	0.00	0.01	0.00	0.00	1.21	0.13	1.59	1.16	0.75	**79.28**	0.07
Hong Kong, HK	0.17	0.00	0.07	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.02	0.00	0.00	**20.11**
Hungary, HU	0.13	0.00	0.00	0.73	0.12	0.00	0.00	0.01	0.00	0.62	0.04	0.14	0.04	0.23	0.06	0.01
Indonesia, ID	0.08	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.07
Ireland, IE	1.28	0.00	0.01	1.29	2.01	0.00	0.09	0.01	0.02	0.76	0.58	2.70	1.35	1.59	0.31	1.11
Israel, IL	0.02	0.00	0.00	0.04	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00
Italy, IT	5.37	0.01	0.11	2.70	8.69	0.00	0.03	0.04	0.02	1.38	0.64	5.68	5.71	3.39	0.58	0.50
Japan, JP	14.21	0.00	0.29	0.14	0.19	0.00	0.08	0.33	0.02	0.00	0.16	0.08	0.76	0.24	0.01	2.44
Malaysia, MY	0.25	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.01	0.02	0.01	0.00	1.60
Netherlands, NL	3.24	0.00	0.42	3.13	6.55	0.00	0.09	0.03	0.16	3.24	0.60	7.50	4.55	3.19	0.72	4.01
New Zealand, NZ	0.05	0.00	0.09	0.01	0.02	0.00	0.02	0.00	0.01	0.00	0.00	0.02	0.02	0.01	0.00	0.21
Norway, NO	0.38	0.00	0.03	0.25	0.13	0.00	0.03	0.00	0.03	0.17	0.36	1.00	0.14	0.24	0.02	1.13
Pakistan, PK	0.05	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Philippines, PH	0.12	0.00	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.06	0.01	0.02	0.01	0.00	0.40
Poland, PL	0.24	0.00	0.01	0.64	0.09	0.00	0.01	0.01	0.00	1.12	0.06	0.27	0.06	0.19	0.25	0.01
Portugal, PT	0.36	0.00	0.01	0.31	1.12	0.00	0.00	0.01	0.00	0.25	0.04	0.63	0.93	0.57	0.11	0.10
Romania, RO	0.01	0.00	0.00	0.08	0.00	NA	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.02	0.24	0.00
Russia, RU	0.12	0.00	0.00	0.12	0.00	0.00	0.01	0.00	0.00	0.06	0.09	0.05	0.02	0.03	0.11	0.02
Singapore, SG	0.19	0.00	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.00	1.50
South Africa, ZA	0.20	0.00	0.00	0.06	0.01	0.00	0.00	0.00	0.00	0.03	0.04	0.01	0.04	0.04	0.01	0.01
South Korea, KR	1.48	0.00	0.01	0.06	0.04	0.08	0.01	0.01	0.00	0.00	0.01	0.03	0.11	0.03	0.01	3.99
Spain, ES	2.90	0.01	0.08	1.37	3.52	0.05	0.05	0.05	0.03	0.47	0.57	6.07	4.00	3.16	0.23	0.32
Sweden, SE	0.85	0.00	0.03	0.38	0.42	0.00	0.03	0.06	0.06	0.20	1.41	6.61	0.43	0.42	0.04	0.95
Switzerland, CH	0.43	0.00	0.01	0.07	0.07	0.01	0.01	0.04	0.01	0.00	0.02	0.16	0.04	0.09	0.10	0.27
Thailand, TH	0.17	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.26
Turkey, TR	0.31	0.00	0.00	0.09	0.04	0.00	0.00	0.00	0.00	0.01	0.07	0.02	0.02	0.09	0.15	0.00
United Kingdom, GB	5.21	0.01	0.88	2.08	2.27	0.01	0.22	0.27	0.22	1.63	0.93	4.86	3.10	2.11	6.86	9.25
United States, US	41.27	5.06	3.53	3.08	4.06	0.08	3.37	4.07	4.83	2.05	2.68	3.90	3.81	2.38	1.60	21.72
Venezuela, VE	0.19	0.00	0.00	0.03	0.02	0.00	0.01	0.01	0.00	0.00	0.06	0.01	0.01	0.02	0.01	0.00
Other countries		1.36	1.53	4.73	5.07	0.03	0.39	0.85	0.09	3.97	1.40	3.05	4.23	0.17	5.48	7.34

Table 1 (*Continued*)

	Market weight	HU	ID	*IE*	IL	IT	JP	MY	*NL*	NZ	*NO*	PK	PH	PL	PT	RO
Total market value		63.0	39.0	621.1	7.3	2599.5	6880.3	121.9	1568.2	26.3	184.8	25.2	56.0	116.8	173.4	3.3
Market value of holdings ($billions)		56.1	21.2	727.9	−11.6	2730.0	6624.3	103.9	1644.2	34.8	266.4	24.2	49.5	108.0	162.9	2.7
Argentina, AR	0.21	0.00	0.00	0.05	NA	0.21	0.03	0.00	0.04	0.00	0.03	NA	0.03	0.00	0.02	0.00
Australia, AU	1.34	0.02	0.06	1.06	NA	0.06	0.49	0.05	0.17	1.54	0.83	NA	0.14	0.00	0.18	0.00
Austria, AT	0.84	0.10	0.00	1.32	NA	0.27	0.15	0.01	0.75	0.01	0.87	NA	NA	0.06	0.52	4.80
Belgium, BE	0.96	0.03	0.00	1.17	NA	0.25	0.19	0.00	1.22	0.02	0.46	NA	NA	0.00	0.56	0.09
Brazil, BR	1.00	0.03	0.08	0.14	NA	0.13	0.06	0.00	0.07	0.01	0.02	NA	0.02	0.00	0.57	0.00
Canada, CA	2.29	0.00	0.04	2.21	NA	0.07	0.40	0.01	0.14	0.24	1.37	NA	0.06	0.03	0.06	0.00
Chile, CL	0.09	0.00	0.00	0.01	NA	0.00	0.00	0.00	0.01	0.00	0.01	NA	NA	0.00	0.00	0.00
Colombia, CO	0.09	0.00	0.00	0.03	NA	0.01	0.01	0.00	0.02	0.00	0.00	NA	NA	0.00	0.00	0.00
Czech Republic, CZ	0.09	0.01	0.00	0.07	NA	0.00	0.00	0.00	0.02	0.00	0.02	NA	NA	0.00	0.02	0.00
Denmark, DK	0.96	0.00	0.03	0.62	NA	0.05	0.11	0.00	0.23	0.04	2.25	NA	NA	0.03	0.20	0.30
Finland, FI	0.29	0.00	0.01	0.62	NA	0.07	0.08	0.01	0.20	0.09	0.53	NA	NA	0.00	0.13	0.00
France, FR	5.45	0.09	0.06	5.41	NA	1.93	1.20	0.09	3.66	0.28	3.48	NA	0.07	0.07	4.08	0.79
Germany, DE	6.65	0.20	0.16	10.35	NA	2.81	1.89	0.08	7.26	0.62	10.93	NA	0.09	0.31	6.86	4.74
Greece, GR	0.44	0.00	0.00	1.22	NA	0.37	0.07	0.00	0.63	0.02	0.77	NA	0.01	0.00	0.89	0.73
Hong Kong, HK	0.17	0.00	0.21	0.07	NA	0.01	0.02	0.03	0.01	NA	0.02	0.00	0.17	0.00	0.00	0.00
Hungary, HU	0.13	**98.56**	0.00	0.19	NA	0.01	0.02	0.00	0.04	0.00	0.05	NA	NA	0.15	0.05	0.39
Indonesia, ID	0.08	0.00	**94.06**	0.01	NA	0.00	0.01	0.04	0.02	0.00	0.00	NA	0.01	0.00	0.00	0.00
Ireland, IE	1.28	0.10	0.02	**10.87**	NA	0.50	0.42	0.08	0.47	0.02	0.94	NA	0.02	0.05	6.41	0.61
Israel, IL	0.02	0.00	0.00	0.00	**NA**	0.00	0.01	0.00	0.00	0.00	0.01	NA	NA	0.00	0.00	0.00
Italy, IT	5.37	0.01	0.07	11.24	NA	**83.34**	0.69	0.01	3.30	0.16	3.72	NA	0.00	0.05	2.94	0.43
Japan, JP	14.21	0.00	0.04	2.03	NA	0.06	**78.91**	0.01	0.23	0.83	3.41	NA	0.02	0.00	0.03	0.00
Malaysia, MY	0.25	0.00	0.01	0.01	NA	0.00	0.03	**98.14**	0.09	0.00	0.02	NA	0.04	0.00	0.00	0.00
Netherlands, NL	3.24	0.24	0.79	3.18	NA	1.83	0.77	0.09	**70.37**	0.52	2.15	NA	0.12	0.23	3.99	1.03
New Zealand, NZ	0.05	0.00	0.36	0.11	NA	0.00	0.04	0.00	0.00	**84.11**	0.07	NA	NA	0.00	0.01	0.00
Norway, NO	0.38	0.00	0.00	0.41	NA	0.03	0.19	0.01	0.07	0.24	**42.21**	NA	0.01	0.01	0.12	0.69
Pakistan, PK	0.05	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	**99.97**	0.00	0.00	0.00	0.00
Philippines, PH	0.12	0.00	0.03	0.10	NA	0.01	0.02	0.04	0.03	NA	0.08	NA	**95.16**	0.00	0.00	0.00
Poland, PL	0.24	0.01	0.00	0.29	NA	0.01	0.03	0.00	0.09	0.00	0.06	NA	NA	**97.00**	0.05	0.22
Portugal, PT	0.36	0.00	0.00	0.91	NA	0.19	0.03	0.00	0.21	0.11	0.52	NA	NA	0.00	**51.24**	0.00
Romania, RO	0.01	0.00	0.00	0.01	NA	0.01	0.00	0.00	0.01	0.00	0.00	NA	NA	0.00	0.00	**80.53**
Russia, RU	0.12	0.05	0.00	0.10	NA	0.04	0.01	0.00	0.06	0.00	0.05	NA	0.05	0.00	0.01	0.00
Singapore, SG	0.19	0.00	0.37	0.03	NA	0.00	0.03	0.09	0.02	NA	0.13	NA	0.38	0.00	0.00	0.00
South Africa, ZA	0.20	0.00	0.00	0.11	NA	0.01	0.02	0.01	0.02	0.00	0.01	NA	0.01	0.00	0.00	0.00
South Korea, KR	1.48	0.01	0.02	0.23	NA	0.00	0.10	0.17	0.03	0.14	0.08	NA	0.12	0.00	0.02	0.00
Spain, ES	2.90	0.00	0.00	4.77	NA	0.56	0.26	0.00	1.86	0.13	3.45	NA	0.03	0.01	2.96	0.17
Sweden, SE	0.85	0.01	0.00	1.05	NA	0.14	0.29	0.01	0.29	0.18	2.36	NA	0.06	0.00	0.33	0.15
Switzerland, CH	0.43	0.01	0.05	0.27	NA	0.02	0.03	0.02	0.04	0.07	0.28	NA	0.06	0.00	0.08	0.00
Thailand, TH	0.17	0.00	0.00	0.01	NA	0.00	0.01	0.03	0.00	0.00	0.00	NA	0.03	0.00	0.00	0.00
Turkey, TR	0.31	0.01	0.00	0.03	NA	0.05	0.02	0.00	0.07	0.00	0.00	NA	NA	0.01	0.02	0.00
United Kingdom, GB	5.21	0.07	0.54	14.41	NA	1.02	1.21	0.21	1.60	1.63	4.55	0.00	0.45	0.14	3.21	3.01
United States, US	41.27	0.33	0.99	18.23	NA	2.15	6.72	0.30	4.75	6.80	11.11	NA	2.48	0.92	3.06	0.78
Venezuela, VE	0.19	0.00	0.00	0.05	NA	0.03	0.00	0.00	0.03	0.00	0.00	NA	0.02	0.00	0.01	0.00
Other countries		0.07	2.02	6.98	NA	3.72	5.43	0.43	1.93	2.19	3.13	0.03	0.35	0.93	11.37	0.52

	Market weight	RU	SG	ZA	KR	ES	SE	CH	TH	TR	GB	US	VE
Total market value		57.8	90.2	95.0	717.5	1402.1	410.2	208.6	84.4	150.9	2523.7	19984.2	91.3
Market value of holdings ($billions)		2.5	109.2	97.0	624.2	1327.2	473.4	155.3	63.9	132.4	2400.5	21211.6	90.7
Argentina, AR	0.21	0.00	0.00	NA	0.02	0.07	0.00	NA	0.00	0.00	0.12	0.04	0.15
Australia, AU	1.34	0.01	5.48	0.00	0.03	0.18	0.22	NA	0.13	0.00	1.01	0.19	0.00
Austria, AT	0.84	0.06	0.25	0.00	0.00	0.22	0.13	NA	0.02	0.01	0.36	0.02	0.01
Belgium, BE	0.96	0.00	0.12	0.00	0.01	0.50	0.19	NA	0.02	0.00	0.35	0.02	0.00
Brazil, BR	1.00	0.00	0.08	0.32	0.01	0.15	0.00	NA	0.00	0.02	0.24	0.08	0.03
Canada, CA	2.29	0.04	0.92	0.01	0.02	0.11	0.13	NA	0.02	0.00	0.90	0.67	0.00
Chile, CL	0.09	0.00	0.00	NA	0.00	0.01	0.00	NA	0.01	0.00	0.02	0.03	0.00
Colombia, CO	0.09	0.00	0.00	NA	0.01	0.01	0.00	NA	0.00	0.00	0.04	0.02	0.00
Czech Republic, CZ	0.09	−0.06	0.00	NA	0.00	0.00	0.00	NA	0.00	0.00	0.04	0.00	0.00
Denmark, DK	0.96	0.00	0.38	0.02	0.00	0.12	1.03	NA	0.00	0.00	0.52	0.04	0.00
Finland, FI	0.29	0.02	0.18	0.02	0.00	0.12	0.60	NA	0.00	0.02	0.25	0.02	0.00
France, FR	5.45	0.22	2.08	0.01	0.16	3.21	0.97	NA	0.06	0.04	2.32	0.19	0.01
Germany, DE	6.65	2.16	4.29	0.07	0.05	3.94	2.28	NA	0.20	0.14	3.99	0.27	0.04
Greece, GR	0.44	0.00	0.07	0.00	0.00	0.20	0.10	NA	0.00	0.01	0.46	0.01	0.00
Hong Kong, HK	0.17	−0.01	1.69	0.00	0.12	0.00	0.00	NA	0.05	0.00	0.17	0.01	0.00
Hungary, HU	0.13	−0.13	0.00	0.00	0.01	0.02	0.00	NA	0.00	0.00	0.09	0.00	0.00
Indonesia, ID	0.08	0.00	1.33	0.00	0.06	0.00	0.00	NA	0.01	0.00	0.03	0.01	0.00
Ireland, IE	1.28	−3.30	0.91	0.05	0.06	0.69	0.26	NA	0.07	0.00	1.73	0.07	0.00
Israel, IL	0.02	0.00	0.01	0.00	0.00	0.00	0.00	NA	0.05	0.00	0.05	0.05	0.00
Italy, IT	5.37	0.05	0.88	0.02	0.01	3.86	0.63	NA	0.01	0.01	3.75	0.08	0.01
Japan, JP	14.21	0.01	2.11	0.03	0.05	0.04	0.31	NA	0.02	0.00	1.85	0.16	0.00
Malaysia, MY	0.25	0.00	2.19	0.00	0.07	0.00	0.00	NA	0.04	0.00	0.10	0.02	0.00
Netherlands, NL	3.24	−0.26	1.64	0.07	0.11	3.13	0.71	NA	0.06	0.12	2.91	0.24	0.10
New Zealand, NZ	0.05	0.00	0.28	0.00	0.00	0.01	0.01	NA	0.02	0.00	0.09	0.02	0.00
Norway, NO	0.38	0.00	0.39	0.00	0.01	0.10	0.49	NA	0.00	0.01	0.32	0.04	0.00
Pakistan, PK	0.05	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00
Philippines, PH	0.12	0.00	0.54	NA	0.03	0.00	0.01	NA	0.01	0.00	0.06	0.02	0.00
Poland, PL	0.24	0.06	0.04	0.02	0.00	0.01	0.03	NA	0.00	0.00	0.14	0.01	0.00
Portugal, PT	0.36	0.00	0.19	0.00	0.00	0.31	0.03	NA	0.00	0.02	0.31	0.00	0.01
Romania, RO	0.01	0.00	0.00	NA	0.00	0.00	0.00	NA	0.00	0.00	0.02	0.00	0.00
Russia, RU	0.12	**78.88**	0.04	0.00	0.05	0.00	0.01	NA	0.01	0.01	0.30	0.03	0.00
Singapore, SG	0.19	0.00	**41.61**	0.01	0.03	0.00	0.00	NA	0.13	0.00	0.14	0.02	0.00
South Africa, ZA	0.20	0.00	0.15	**97.71**	0.00	0.00	0.00	NA	0.07	0.00	0.20	0.01	0.00
South Korea, KR	1.48	0.00	3.88	0.00	**96.54**	0.01	0.00	NA	0.95	0.00	0.25	0.04	0.00
Spain, ES	2.90	0.01	0.82	0.00	0.00	**72.91**	0.58	NA	0.01	0.00	1.38	0.06	0.00
Sweden, SE	0.85	0.01	0.35	0.00	0.01	0.21	**85.18**	NA	0.03	0.00	0.71	0.08	0.02
Switzerland, CH	0.43	0.00	0.08	0.02	0.03	0.12	0.05	**NA**	0.01	0.01	0.24	0.01	0.14
Thailand, TH	0.17	0.00	0.57	NA	0.04	0.00	0.00	NA	**96.32**	0.00	0.02	0.01	0.00
Turkey, TR	0.31	0.03	0.00	NA	0.01	0.01	0.00	NA	0.00	**99.19**	0.13	0.01	0.00
United Kingdom, GB	5.21	0.64	3.81	0.78	0.25	2.34	1.77	NA	0.25	0.19	**53.06**	0.70	0.11
United States, U.S.	41.27	15.92	14.29	0.83	1.67	2.12	3.68	NA	1.03	0.18	12.43	**95.66**	4.63
Venezuela, VE	0.19	0.00	0.00	0.00	0.00	0.01	0.00	NA	0.00	0.00	0.08	0.02	**93.69**
Other countries		5.64	8.34	0.02	0.50	5.25	0.59	NA	0.38	0.01	8.82	1.01	1.04

This table presents the average distribution of 42 countries' debt holding allocations in percentage for the 1997–2009 period (origin countries in columns and destination countries in rows). Cells containing the percentage of bond holdings in the domestic market are in bold face. The second row contains the total market value of each country, and the third row contains the market value of holdings of each country, both in billions of dollars. The second column presents the countries' bond market capitalization weight (in percentage) in the world market portfolio.

Table 2
Average debt allocation by region.

	Market weight	EMU	Europe non-EMU	North America	Asia-Pacific	Emerging
Total market value	48,418.0	13,447.8	3794.5	21,093.3	7854.5	2227.9
Market value of holdings (U.S. $billions)	49,485.5	13,691.0	3800.8	22,420.8	7675.1	1897.8
EMU	27.77	**87.62**	14.33	0.97	5.57	0.73
Europe non-EMU	7.84	3.72	**66.29**	0.83	2.01	0.30
North America	43.57	4.14	9.67	**96.43**	7.25	1.64
Asia-Pacific	16.22	0.64	2.40	0.39	**78.14**	0.14
Emerging	4.60	0.69	1.34	0.40	1.93	**96.71**
Other countries	–	3.19	5.98	0.98	5.11	0.49

This table presents the average distribution of five regions' (EMU, Europe non-EMU, North America, Asia-Pacific and Emerging Countries – countries not included is these regions are classified in other countries) debt holding allocations in percentage for the period 1997–2009 (origin regions in columns and destination regions in rows). Cells containing the percentage of bond holdings in the domestic market are in bold face. The second row contains the market capitalization of each region, and the third row contains the market value of holdings, both in billions of dollars. The second column presents the regions' bond market capitalization weight in the world market portfolio.

market capitalization of each country. This indicates a decreasing in the home bond bias. There is also evidence that investors underweight foreign markets in their bond portfolios. The cells not in bold face in Table 1 represent the allocations (in percentage) of bond holdings in the remaining 41 countries. The values are usually much smaller than the market value weight of the corresponding countries. We find evidence that there is both domestic bias and foreign bias in bond portfolios, despite the potential gains from cross-border diversification reported in the literature.

Table 2 shows the average debt allocation by region in the 1997–2009 period.

The North American countries represent approximately 44% of the total market weight (mostly represented by the U.S. market, as mentioned above), while the EMU countries account for nearly 28% of the total market weight. Asia-Pacific markets' weight is about 16%, Europe non-EMU countries represent about 8%, and the emerging countries account for 4.6% of the total market weight. Investors from Europe non-EMU countries are the ones that invest less in their own region, while investors from the emerging countries and from North America are the ones that invest most.

2.3. Statistics on domestic bias and foreign bias

Domestic bias measures the extent to which investors overweight home bond markets in their portfolios, while foreign bias reflects the extent to which investors underweight (or overweight) foreign bond markets. We follow Chan et al. (2005) approach to calculate the domestic bias and the foreign bias.

As previously mentioned, the weight of domestic stocks in bond holdings for a certain country tends to be much higher than the world market weight of that country. The domestic bias for a certain origin country i ($DBIAS_i$) is the extent to which the bond holdings in the domestic market of country i deviate from the holdings of country i in the world market portfolio. $DBIAS_i$ is calculated as the log ratio of the share of country i' bond holdings in the domestic market (w_{ii}) to the world market weight of country i (w_i^*):

$$DBIAS_i = \log\left(\frac{w_{ii}}{w_i^*}\right).$$

(3)

If country i exhibits domestic bias, $DBIAS_i$ is positive.

The foreign bias for a certain origin country i ($FBIAS_i$) is the extent to which domestic investors underweight (or overweight) foreign bond markets in their bond holdings.

$FBIAS_{ij}$ is calculated as the log ratio of (w_{ij}) to (w_j^*):

$$FBIAS_{ij} = \log \left(\frac{w_{ij}}{w_j^*} \right), \qquad \text{for } i \neq j \tag{4}$$

where w_{ij} is the weight of origin country i' bond holdings in destination country j, and w_j^* is the world market weight of country j. The more investors of a country i underweight a certain country j in their portfolios, the higher the foreign bias of country i will be and hence the more negative the $FBIAS_{ij}$ will be.

We can intuitively establish a relationship between the domestic bias and the foreign bias. When domestic bias increases, it means that domestic investors over-invest in local bonds and, consequently, on average, investors must under-invest in foreign bonds. Less investment made in foreign bonds results in a higher level of foreign bias.

Table 3 shows the average domestic bond bias and the average foreign bond bias for the period 1997–2009. The average foreign bias in an origin country i ($FBIAS_i$) is calculated by averaging $FBIAS_{ij}$ across all the remaining countries.

The U.S., Japan and the U.K. have the lowest average domestic bias, while Romania, Pakistan and New Zealand have the highest. Ireland, Russia and Singapore have the lowest average foreign bond bias, while Pakistan, Brazil, and Turkey have the highest. Table 3 also shows the difference between the domestic bias in 2009 and 1997, and the difference between the foreign bias in 2009 and 1997, in columns two and four, respectively.[4] By comparing the domestic bias in 2009 and 1997 we show that the domestic bias has decreased over time in most countries in our sample. In 30 countries out of 42 countries the domestic bias has decreased. Argentina, Canada, Chile, Japan, New Zealand, Pakistan, Philippines, South Africa, Sweden, and the U.S. are the countries where the domestic bias has increased. Despite the decreasing in the domestic bias, the foreign bias has increased in 24 countries (the difference is negative because $FBIAS_i$ is more negative). This shows that although investors invest proportionally less in domestic bonds they still do not allocate their overseas investment according to the countries' market weight in the world total market value.

3. Determinants of domestic bias and foreign bias

We aim to explain how the domestic bias and the foreign bias vary across countries and what are the determinants of this variation. Based on the existing literature (Chan et al., 2005; Burger and Warnock, 2003), we propose a set of predetermined variables, as drivers of the domestic and the foreign biases. These variables are classified into six groups: (i) economic development, (ii) capital control, (iii) bond market development, (iv) familiarity, (v) investor protection, and (vi) other variables. Table 4 presents the explanatory variables averaged across time by country for the period 1997–2009.

3.1. Economic development

We believe that a country's level of economic development can influence the level of domestic and foreign investment. The economic development can help lower the deadweight cost for foreign investors much more than for domestic investors. Thus, fewer domestic investors hold domestic bonds, and more foreign investors are attracted to invest in developed countries and (both $DBIAS_i$ and $FBIAS_i$ decrease).

Lane and Milesi-Ferreti (2008) provide a systematic analysis of bilateral, origin and destination factors driving portfolio investment across countries. The authors find a strong correlation between bilateral equity investment and the underlying patterns of trade in goods and services. They also show that the scale of aggregate foreign equity asset and liability holdings is larger for richer countries and countries with more developed stock markets.

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[4] In 1997 CPIS does not report data for Brazil, Colombia, Czech Republic, Germany, Greece, Hong Kong, Hungary, Indonesia, Pakistan, Philippines, Poland, Romania, Russia, South Africa, and Turkey. For that reason, in these countries, we calculate the difference for both, the domestic bias and the foreign bias, between 2009 and 2001.

Table 3
Average domestic bond bias and average foreign bond bias.

Country	Domestic bias		Foreign bias	
	Average (1997/2009)	2009–1997	Average (1997/2009)	2009–1997
Argentina	6.03	1.44	−2.41	−1.37
Australia	4.30	−0.59	−2.62	−1.28
Austria	4.31	−0.49	−1.19	−0.34
Belgium	3.88	−0.21	−2.14	−0.55
Brazil	4.64	−0.19	−6.81	1.14
Canada	3.71	0.19	−3.97	0.68
Chile	6.86	0.50	−2.06	−1.18
Colombia	6.99	−0.16	−3.82	−0.78
Czech Republic	6.91	−0.90	−1.71	−1.58
Denmark	4.47	−0.14	−2.08	1.35
Finland	4.17	−0.55	−0.69	0.78
France	2.42	−0.58	−1.76	0.45
Germany	2.41	−0.21	−1.60	−0.03
Greece	5.25	−0.85	−2.26	0.52
Hong Kong	4.42	−0.72	−0.82	−1.98
Hungary	6.72	−0.68	−4.36	−1.28
Indonesia	7.16	−0.98	−2.63	−2.58
Ireland	4.31	−0.92	−0.41	−0.12
Israel	NA	NA	NA	NA
Italy	2.76	−0.09	−2.68	−0.13
Japan	1.70	0.10	−2.19	−0.25
Malaysia	5.98	−0.12	−3.40	−1.97
Netherlands	3.13	−0.60	−1.67	0.16
New Zealand	7.31	0.41	−1.71	−1.14
Norway	4.69	−0.70	−1.00	−0.69
Pakistan	7.52	0.38	−8.26	−1.59
Philippines	6.70	0.03	−3.06	0.11
Poland	6.09	−0.51	−1.75	1.00
Portugal	5.04	−1.06	−0.98	0.54
Romania	9.46	−0.64	−1.47	5.75
Russia	6.50	−0.94	−0.62	0.80
Singapore	5.38	−1.36	−0.64	0.20
South Africa	6.22	0.42	−5.11	−1.05
South Korea	4.23	−0.69	−3.70	−2.26
Spain	3.43	−1.22	−2.28	1.00
Sweden	4.60	0.26	−3.01	0.34
Switzerland	NA	NA	NA	NA
Thailand	6.43	−1.12	−1.43	−2.33
Turkey	5.83	−0.28	−5.66	1.80
United Kingdom	2.38	−0.46	−0.69	−1.05
United States	0.82	0.16	−2.84	−0.44
Venezuela	6.39	−0.20	−2.91	−3.67

This table presents the distribution of average domestic bias and average foreign bias in an origin country, and the difference between the domestic bias in 2009 and 1997 and the difference between the foreign bias in 2009 and 1997 across the 42 countries for the period 1997–2009. The domestic bias for a certain origin country i ($DBIAS_i$) is the extent to which the bond holdings in the domestic market of country i deviate from the holdings of country i in the world market portfolio. $DBIAS_i$ is calculated as the log ratio of the share of country i' bond holdings in the domestic market (w_{ii}) to the world market capitalization weight of country i (w_i^*). The foreign bias is the extent to which domestic investors underweight (or overweight) foreign bond markets in their bond holdings. $FBIAS_{ij}$ is calculated as the log ratio of (w_{ij}) to (w_j^*), where w_{ij} is the weight of origin country i' bond holdings in destination country j, and w_j^* is the world market weight of country j. The average foreign bias in an origin country i is calculated by averaging $FBIAS_{ij}$ across all the remaining countries.

We consider a set of three different variables to capture economic development: gross domestic product per capita (*GDPC*) in U.S. dollars; the real growth rate in gross domestic product (*RGDP*); and the country credit rating (*CREDIT*). *GDPC* and *RGDP* data is from the World Development Indicators (WDI) database. Country credit rating (*CREDIT*) is based on Standard & Poor's (S&P) ratings on long-term sovereign debt. We translate S&P long-term rating notations into a numeric score that ranges

Table 4
Average explanatory variables by country.

Country	Economic development			Capital control	Bond market development		Familiarity		Investor protection		Other variables	
	GDP per capita	Real GDP growth (%)	Country credit rating	Capital flow restrictions	Market capitalization of listed bonds (% of GDP)	Emerging market dummy	Common language dummy (average)	Distance (kilometers average)	Efficiency	Legal system dummy	Past three-years return (%)	Return correlation (average)
Argentina	10,380	4.12	15	4.06	39.36	1	0.0976	11,772	6.0	0	−9.36	0.22
Australia	30,399	2.05	1	3.52	105.86	0	0.1951	13,369	10.0	1	61.07	0.50
Austria	31,980	1.75	1	5.60	29.45	0	0.0976	5161	9.5	0	61.41	0.62
Belgium	30,628	1.71	2	7.40	65.70	0	0.1220	5284	9.5	0	54.34	0.56
Brazil	8,130	2.28	13	3.34	46.45	1	0.0244	10,395	5.8	0	91.00	0.29
Canada	32,112	1.65	1	7.76	106.03	0	0.2439	8271	9.3	1	60.35	0.45
Chile	11,202	3.52	5	6.55	100.73	1	0.0976	12,156	7.3	0	48.62	0.49
Colombia	6,994	2.49	9	1.55	25.02	1	0.0976	10,486	7.3	0	83.44	0.38
Czech Republic	19,104	3.14	5	4.79	25.81	1	0.0000	5147	NA	NA	81.10	0.50
Denmark	31,848	1.31	1	8.08	60.96	0	0.0000	5209	10.0	0	54.93	0.56
Finland	29,094	3.29	1	5.39	101.69	0	0.0244	5390	10.0	0	55.47	0.56
France	28,323	1.11	1	6.65	74.79	0	0.0732	5361	8.0	0	53.30	0.56
Germany	29,760	1.33	1	6.97	44.86	0	0.0732	5156	9.0	0	52.62	0.56
Greece	23,084	3.44	6	5.60	52.23	0.1	0.0000	5495	7.0	0	58.89	0.60
Hong Kong	32,788	4.02	2	8.63	384.40	0	0.1951	8301	10.0	1	31.26	0.58
Hungary	15,476	3.78	6	5.99	26.57	1	0.0244	5183	NA	NA	32.22	0.41
Indonesia	3,065	3.73	12	1.06	24.34	1	0.0000	10,122	2.5	0	NA	0.46
Ireland	34,750	4.08	1	8.28	56.29	0	0.1951	5601	8.8	1	54.32	0.57
Israel	23,130	1.15	5	7.02	73.61	1	0.0000	5910	10.0	1	NA	NA
Italy	27,646	0.53	3	8.08	40.43	0	0.0244	5,386	6.8	0	56.68	0.56
Japan	28,759	1.17	3	6.83	74.51	0	0.0000	9261	10.0	0	23.27	0.28
Malaysia	10,980	3.46	6	1.56	128.57	0.1	0.0000	9367	9.0	1	59.96	0.50
Netherlands	33,251	1.97	1	9.29	100.29	0	0.0244	5273	10.0	0	52.85	0.56
New Zealand	24,054	1.23	1	8.36	38.23	0	0.1951	14,663	10.0	1	65.91	0.48
Norway	42,756	2.15	1	6.23	52.31	0	0.0000	5348	10.0	0	NA	NA
Pakistan	2,016	1.66	2	1.04	24.65	1	0.0000	6972	5.0	1	−29.36	0.37
Philippines	2,734	2.88	9	1.64	44.97	1	0.0000	9637	4.8	0	69.53	0
Poland	12,875	4.84	6	2.45	22.92	1	0.0000	5175	NA	NA	50.15	0.46
Portugal	19,989	1.21	3	6.25	39.68	0	0.0244	6081	5.5	0	57.01	0.59
Romania	8,913	4.46	10	4.94	12.78	1	0.0000	5,316	NA	NA	NA	NA
Russia	11,038	5.92	8	2.82	54.09	1	0.0732	5490	NA	NA	103.95	0.35
Singapore	39,719	3.76	1	6.96	170.88	0	0.1951	9568	10.0	1	8.57	−0.01
South Africa	8,104	2.39	7	1.04	193.48	1	0.1951	9269	6.0	1	67.75	0.45
South Korea	20,896	3.89	4	2.98	54.83	1	0.0000	8743	6.0	0	31.21	0.42
Spain	25,566	1.93	1	5.62	79.47	0	0.0976	5809	6.3	0	55.10	0.57
Sweden	31,369	2.20	1	5.40	102.74	0	0.0244	5315	10.0	0	24.32	0

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Table 4 (*Continued*)

Country	Economic development			Capital control	Bond market development		Familiarity		Investor protection		Other variables	
	GDP per capita	Real GDP growth (%)	Country credit rating	Capital flow restrictions	Market capitalization of listed bonds (% of GDP)	Emerging market dummy	Common language dummy (average)	Distance (kilometers average)	Efficiency	Legal system dummy	Past three-years return (%)	Return correlation (average)
Switzerland	35,546	1.31	1	6.92	235.78	0	0.1463	5292	10.0	0	NA	NA
Thailand	6,247	2.60	7	1.60	51.23	1	0.0000	8815	3.3	1	36.55	0
Turkey	9,759	3.62	13	1.92	27.51	1	0.0000	5577	4.0	0	89.24	0.27
United Kingdom	30,365	2.03	1	8.76	131.37	0	0.1951	5391	10.0	1	43.57	0.46
United States	39,296	1.55	1	6.84	129.18	0	0.1951	8632	10.0	1	35.39	0.40
Venezuela	9,659	3.23	14	4.69	6.12	0.6	0.0976	9870	6.5	0	77.60	0.26

This table presents country level explanatory variables averaged by country in the 1997–2009 period. There are six sets of explanatory variables: (1) economic development variables, including *GDP* per capita (*GDPC*), real *GDP* growth (*RGDP*), and country credit rating (*CREDIT*); (2) capital control variables, that include capital flows restrictions (*RFLOW*); (3) bond market development variables, including bond market capitalization scaled by *GDP* (*SIZE*), and emerging market dummy variable (*DUMEMG*); (4) familiarity variables, including average of common language dummy variable (*DUMLANG*), and the distance between country capitals, measured in kilometers (*DIST*); (5) investor protection variables, including efficiency of the judicial system (*EFFICIENCY*), and legal system dummy variable (*DUMLEGAL*); (6) other variables, including past three-years return (*RET*3), and correlation between returns of two countries (*CORR*).

from 1 for AAA notation to 22 for D notation. *CREDIT* is expected to predict the risk, and therefore affect portfolio allocations. But this variable also summarizes and complements the information contained in other macroeconomic variables (see Cantor and Packer, 1996; Ammer, 1998).

Table 4 shows that different measures capture different aspects of economic development in each country. For instance, Norway, has the highest average *GDPC* ($42,756), while Russia ($11,038) is in the bottom third of our sample. On the other hand, Russia is the country with the highest average *RGDP* (5.92%), while Norway is classified twenty fourth in terms of average *RGDP* (2.15%). France long-term debt is rated at top AAA grade (1 after denominated into a numeric score) but its average *RGDP* (1.11%) is the last but one, exceeding only Italy.

3.2. Capital control

Despite the financial globalization and the enlarged access to financial markets, some countries still have restrictions on foreign investment and international capital flow. The Economic Freedom Network creates an index that measures the restrictions imposed by countries on capital flows (*RFLOW*), by assigning lower ratings to countries with more restrictions on foreign capital transactions, either for foreign investments made by local residents or for domestic investments made by foreigners.[5] This index ranging from zero to 10 is calculated based on the international capital controls reported by the International Monetary Fund, as the percentage of capital controls not levied in the country multiplied by 10. *RFLOW* varies from 1.04 in Pakistan and South Africa to 9.29 in Netherlands. Higher capital controls (lower index), will dissuade foreign investors from investing abroad and therefore foreign bias will increase (more negative *FBIAS*). *RFLOW* will also affect domestic bias as higher capital controls force domestic investors to over-invest in domestic bonds and so the domestic bias will also be higher.

3.3. Bond market development

A country's level of bond market development is expected to affect domestic and foreign investment. A more developed bond market attracts investors, not only because of its credibility but also because more developed bond markets have higher liquidity and lower transaction costs. Local bond market development will also attract global investors (Burger and Warnock, 2003). Burger and Warnock (2003) results show that U.S. investors moved out of smaller bond markets to more developed bond markets.

We consider two variables to measure bond market development. The first variable is the market value of listed bonds as a percentage of the country's *GDP*. This variable is a measure of the relative size of the bond market of each country (*SIZE*). Data is from the World Bank. We find considerable differences on *SIZE* across countries. Hong Kong is by far the country with the highest *SIZE* (384.40%), while Venezuela is the country with the lowest (6.12%). The second variable is a dummy variable (*DUMENG*) that equals one if it is an emerging market and zero otherwise. We follow the MSCI classification.[6]

3.4. Familiarity

The extent of international diversification may be due to investors being more or less familiar with foreign markets. Less informed investors tend to prefer domestic assets and so the domestic bias increases. Familiarity may be intended as a cheap source of information.

A considerable number of studies find strong evidence supporting familiarity or similarity factors as a significant determinant of foreign diversification. Massa and Simonov (2006) find that familiarity is not a behavioral bias but is information driven, more familiarity-based investment allows investors to earn higher returns than they would have otherwise earned if they had hedged. Amadi (2004) finds strong evidence supporting familiarity or similarity factors as a significant determinant of foreign

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[5] Data are obtained from the website: http://www.freetheworld.com.
[6] Greece, Malaysia, and Venezuela moved from emerging markets to developed markets in 2001, 1998, and 2006, respectively.

diversification. Berkel (2007) shows that while a home bias in equities can be observed for most country pairs including the U.S., there is a bilateral "friendship bias" for several other country pairs which share the same geographical region (in particular within the EMU). Her results indicate that capital mobility within the EMU is high compared to capital mobility within the OECD countries. Similarly, Bertaut and Kole (2004) find that country and regional fixed effects are important determinants of the degree of portfolio diversification. In some countries investors overweight equities from other countries with which they have close regional or political ties. For example, Nordic countries appear to overweight equities of other Nordic countries to an extent beyond what can be explained by trade shares, foreign cross-listings and by standard proxies for market liquidity, transactions costs, common language, and accounting disclosure. Grinblatt and Keloharju (2001) examine the behavior of Finnish and foreign investors in relation to firms operating in Finland. They find that Finnish investors are more likely to trade equities on firms that share the investors' same language and cultural background. Thus, Finnish investors whose native language is Swedish prefer to trade securities from companies in Finland that have annual reports in Swedish and Swedish-speaking CEOs. Coval and Moskowitz (1999) find that, within the U.S., mutual fund managers prefer investing in firms headquartered close to their home city. Kang et al. (1997) find that foreign investment in Japanese equities is concentrated in the largest firms as foreign investors have less information about small firms than local investors.

We introduce three proxies for familiarity. The first variable is a dummy variable, common language (*DUMLANG*), which equals one if an origin-destination country pair shares a common national or official language, and zero otherwise. Data are from the World Factbook 2010. The second variable is the distance between country capitals, measured in kilometers (*DIST*). Data on this variable are from http://www.nber.org/ wei. It is quite obvious that European countries have closest proximity when compared with the remaining countries. The Tesar and Werner (1995) study on the portfolio choices of Canadian and U.S. investors indicate that their investment decisions do not reflect pure diversification motives. The literature has shown that geographic proximity assumes great importance in the international portfolio allocation decision. Faruqee et al. (2004), using IMF data on international equity portfolio holdings, find that investors tend to hold more securities in geographically close countries, and they estimate that if the distance between two countries doubles, the cross-border equity positions are reduced by 68%. Campa and Fernandes (2006) study the determinants of the evolution of country and industry factors in world stock markets over the last three decades and they find that geography becomes less relevant to finance as capital market integration advance. Finally, the third variable is the amount of bilateral trade that includes imports and exports, in percentage (*TRADEB*). Data are from WDI. Lane and Milesi-Ferreti (2008) find that larger bilateral positions are associated with proxies for international proximity.

3.5. Investor protection

Investors' protection is an important determinant of portfolio diversification. Investors are reluctant to invest in markets where their rights are not well protected. Therefore, foreign investors will invest less (higher *FBIAS*) and more domestic investors will hold local bonds (higher *DBIAS*). La Porta et al. (1997) show that countries with poor investor protection have significantly smaller debt and equity markets. These countries are usually less developed countries, with less economic growth (see King and Levine, 1993; Levine and Zervos, 1998). Burger and Warnock (2003) find that countries with stronger institutions and better inflation performance have larger local currency bond markets. They also find evidence that investors move away from countries with poor credit ratings, and from those whose credit rating was subsequently downgraded.

We use two different investor protection variables from La Porta et al. (1997): the efficiency of the judicial system (*EFFICIENCY*); and a dummy variable that identifies the origin of the legal system (*DUMLEGAL*). *EFFICIENCY* has been developed by the country risk rating agency Business International Corporation and it gives the assessment of the "efficiency and integrity of the legal environment as it affects business, particularly foreign firms". It "may be taken to represent investors' assessments or conditions in the country in question". It ranges from zero to 10, with lower scores for lower efficiency levels. *EFFICIENCY* ranges from 2.5 in Indonesia to 10 in 14 countries (see Table 4). *DUMLEGAL* equals one if the legal origin is common law, and zero otherwise. The common law system includes the law

of England and those laws modeled on English laws, including the U.S., Canada, Australia, Singapore, and South Africa. When compared, common law provides the best legal protection to shareholders. The German and French civil law system afford the worst legal protections to investors. In our sample we have 13 countries based on the common law system. Best legal protection to investors' measures is associated with more developed markets.

3.6. Other variables

We also include two additional variables. The first variable is the past 3-years return (*RET*3). Brennen and Cao (1997) argue that investors are trend followers, investing in foreign markets when their returns are positive. Bohn and Tesar (1996) show that an important factor in determining the U.S. equity investment in foreign markets is the concept of return-chasing. The U.S. investment in a particular market is positively correlated with local capital gains and excess returns. Amadi (2004) finds that investors might be trend followers or return chasers, and that they are more likely to invest in foreign markets when their local markets underperform. Average returns by country are presented in Table 4.

The second variable is the correlation between returns of each pair of origin and destination countries (*CORR*). The correlation coefficient is a proxy for the diversification potential between each pair of countries. Lower correlation between country i and j is expected to lead to a smaller degree of $FBIAS_{ij}$ as investing abroad will diversify investors' portfolios. Accordingly, lower average correlation between country i and the rest of the world is also likely to decrease the degree of *DBIAS* as more domestic investors will invest overseas in order to diversify their portfolios. Correlation is calculated using three years' monthly historical bond returns computed from JP Morgan country-level bond indices.[7] Table 4 shows the average correlation by country.

4. Empirical results

In this section, we present the results of the domestic bias regressions and the foreign bias regressions on our set of previously described explanatory variables.

4.1. Domestic bias results

Table 5 shows the results of the domestic bias regressions on each of the six groups of explanatory variables. The second column presents the predicted signs of the coefficients, column three to eight present the regressions for each of the six predetermined groups of variables.

The economic development variables and the bond market development variables have the highest explanatory power, while the other variables have the lowest. As we would expect, higher economic development decreases the domestic bias. Countries with higher gross domestic product per capita (*GDPC*) have lower *DBIAS*. The capital control variable (*RFLOW*) is also significant and negatively related to the domestic bias. Lower ratings are associated with countries with more restrictions on foreign capital transactions and so domestic investors hold more domestic bonds. Both bond market development variables, *SIZE* and *DUMENG*, are significant and present the predicted signs, although *SIZE* only reaches significance at the 10% level. The size of the bond market is negatively related to the country's domestic bias, while emerging markets are associated with a larger *DBIAS*. Familiarity variables also play an important role in explaining *DBIAS*. *DUMLANG* is negative and significant, indicating that countries that share a common language have a smaller *DBIAS*, while geographical distance (*DIST*) increases *DBIAS*. The efficiency of the judicial system (*EFFICIENCY*) is negatively related to the domestic bias. Countries with a weak legal environment have less investment made by foreign investors and hence a higher percentage of domestic bonds is held by domestic investors. The correlation (*CORR*)

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[7] We use JP Morgan Government Bond Index (GBI) and JP Morgan Emerging Market Bond Index (EMBI) for developed and emerging markets, respectively.

Table 5

The determinants of the domestic bond bias.

	Predicted sign	Economic development		Capital control		Bond market		Familiarity		Investor protection		Other variables	
		Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat
CONSTANT		18.280***	(9.54)	7.211***	(20.31)	5.960***	(5.71)	−13.504*	(−1.87)	8.129***	(12.63)	4.730***	(8.22)
GDPC	−	−1.446***	(−6.96)										
RGDP	−	−0.834	(−1.50)										
CREDIT	+	0.018	(0.48)										
RFLOW	−			−0.301***	(−4.72)								
SIZE	−					−0.452*	(−1.81)						
DUMEMG	+					2.181***	(5.07)						
DUMLANG	−							−9.684**	(−2.57)				
DIST	+							2.200**	(2.67)				
EFFICIENCY	−									−0.428***	(−5.17)		
DUMLEGAL	−									0.687	(1.22)		
RET 3	−											0.921	(1.47)
CORR	+											−3.274***	(−2.77)
Adjusted R²		0.511		0.199		0.484		0.174		0.285		0.097	

This table presents the results of panel regressions of domestic bias ($DBIAS_i$) on country explanatory variables. $DBIAS_i$ is calculated as the log ratio of the share of country *i*' bond holdings in the domestic market (w_{ii}) to the world market capitalization weight of country *i* (w_i^*). We present six sets of explanatory variables: (1) economic development variables, including *GDP* per capita (*GDPC*), real *GDP* growth (*RGDP*), and country credit rating (*CREDIT*); (2) capital control variables, that include capital flows restrictions (*RFLOW*); (3) bond market development variables, including bond market capitalization scaled by *GDP* (*SIZE*), and emerging market dummy variable (*DUMEMG*); (4) familiarity variables, including average of the common language dummy variable (*DUMLANG*), and distance between country capitals, measured in kilometers (*DIST*); (5) investor protection variables, including efficiency of the judicial system index (*EFFICIENCY*), and legal system dummy variable (*DUMLEGAL*); (6) other variables, including past three-years' return (*RET*3), and average of return correlations (*CORR*). Time fixed effects are included. Robust *T*-statistics based on standard errors adjusted for heteroskedasticity using the White method are reported in parentheses.

* Significance at 10% level.

** Significance at 5% level.

*** Significance at 1% level.

coefficient is statistically significant and negative. The smaller the average correlation between country *i* and the rest of the world, the higher the investment made by local investors in domestic market (higher *DBIAS*). This is the opposite of what we would expect. According to our results, investors do not take advantage of international diversification opportunities. Overall, our results show that domestic bias is smaller in countries with higher economic development, lower restrictions on capital flows, more developed bond markets, higher familiarity, greater efficiency of the judicial system, and with returns more correlated with other countries.

4.2. Foreign bias results

Table 6 shows the results of the foreign bias regression. The second column presents the predicted signs of the coefficients, column three to eight present the regressions for each of the six predetermined groups of variables, and column nine presents the regression pooling all groups of variables.

Following Chan et al. (2005), we include an additional independent variable across all regressions, $INVDBIAS_j$, calculated as $(1 - DBIAS_j)$. This variable controls for the automatic impact of the domestic bias on the foreign bias. A higher level of domestic bias means that most investment is made locally and so a very small part remains for foreign investors.

As expected, we find a negative relation between *INVDBIAS* and *FBIAS*, i.e., an increase in the former variable leads to a significant decrease (less negative) in *FBIAS*, in all specifications. Familiarity variables present the maximum explanatory power, while investor protection variables present the lowest. Economic development variables are expected to be positively related to the foreign bias (i.e., the higher the economic development, the lower the *FBIAS*). Our results show that *FBIAS* decreases with higher *GDPC* (statistically significant at the 10% level) and higher country credit rating. We find a positive relation, between *FBIAS* and *RFLOW*, indicating that less restrictions on capital flow decrease *FBIAS*. The dummy variable *DUMENG* presents the predicted sign. Emerging markets present higher foreign bias, which confirms that investors prioritize developed markets when investing abroad. Our results show that familiarity is an important determinant of foreign diversification. All variables proxying for familiarity are statistically significant and present the predicted signs. Investors prefer to invest in countries that share the same language (higher *DUMLANG*), that are geographically closer (lower *DIST*), and that have higher amount of bilateral trades (higher *TRADEB*) with their own country. The efficiency of the judicial system (*EFFICIENCY*) is positive and statistically significant. As the efficiency of the legal environment increases, more investment is made by foreign investors, and hence the foreign bias decreases. Results on the other variables show that investors chase past returns. *RET*3 is positively related with *FBIAS* and significant at the 10% level. Therefore, past returns reduce the foreign bias. This is consistent with the findings in Bohn and Tesar (1996), Brennen and Cao (1997), and Amadi (2004). *CORR* coefficient is statistically significant and positively related to *FBIAS*. This is the opposite of we would expect. According to the traditional theory, and considering correlation coefficient as a proxy for the diversification potential between each pair of countries, when the correlation between two countries is low, investors from one country should increase their bond holdings in the other country in order to diversify their portfolios. Hence, the foreign bias would decrease. We find the opposite. Investors are not driven by diversification opportunities when investing abroad. Overall, our results show that foreign bias decreases with economic development, less restrictions on capital flows, higher bond markets development, greater familiarity, greater efficiency of the judicial system, higher past returns, and with returns more correlated with other countries.

5. Additional tests and robustness

5.1. Financial versus nonfinancial centers

Our sample contains a group of countries that are usually classified as financial centers. These countries concentrate a large amount of investment from all over the world due to their specific characteristics and this may influence our results. To analyze this possibility, we split the countries in financial and nonfinancial centers, and we calculate foreign bias regressions for both sub-samples. Countries classified as financial centers are: Hong Kong, Ireland, Japan, Singapore, Switzerland, the

Table 6
The determinants of the foreign bond bias.

	Predicted sign	Economic development		Capital control		Bond market development		Familiarity		Investor protection		Other variables		All variables	
		Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat
Constant		−6.234***	(−4.27)	−3.636***	(−10.27)	−2.998***	(−4.55)	7.380***	(2.95)	−3.890***	(−10.39)	−3.373***	(−9.65)	5.399**	(2.16)
INVDBIAS	−	−0.369***	(−8.71)	−0.277***	(−5.45)	−0.346***	(−7.01)	−0.422***	(−7.34)	−0.253***	(−4.59)	−0.250***	(−4.59)	−0.574***	(−10.99)
GDPC	+	0.295*	(1.79)											0.064	(0.38)
RGDP	+	0.454	(0.20)											−0.360	(−0.18)
CREDIT	−	−0.046**	(−2.23)											−0.013	(−0.55)
RFLOW	+			0.067***	(3.10)									−0.030	(−1.49)
SIZE	+					−0.048	(−0.51)							0.106	(1.56)
DUMEMG	−					−0.712***	(−3.79)							−0.232	(−0.89)
DUMLANG	+							3.039***	(5.81)					2.656**	(2.25)
DIST	−							−1.311***	(−4.85)					−1.252***	(−5.12)
TRADEB	+							0.074***	(7.30)					0.080***	(6.77)
EFFICIENCY	+									0.106***	(3.57)			0.044	(0.87)
DUMLEGAL	+									−0.089	(−0.47)			−0.143	(−0.58)
RET 3	+											0.226*	(1.87)	0.273*	(1.97)
CORR	−											1.568***	(3.62)	0.534**	(2.10)
Adjusted R²		0.034		0.028		0.032		0.056		0.020		0.026		0.062	

The dependent variable is the foreign bias ($FBIAS_{ij}$). The foreign bias for a certain origin country ($FBIAS_i$) is the extent to which domestic investors underweight (or overweight) foreign bond markets in their bond holdings. $FBIAS_{ij}$ is calculated as the log ratio of (w_{ij}) to (w_j^*), where w_{ij} is the weight of country i bond holdings in destination country j, and w_j^* is the world market weight of country j. There are six sets of explanatory variables: (1) economic development variables, including GDP per capita ($GDPC$), real GDP growth ($RGDP$), and country credit rating ($CREDIT$); (2) capital control variables, that include capital flows restrictions ($RFLOW$); (3) bond market development variables, including bond market capitalization scaled by GDP ($SIZE$), and emerging market dummy variable ($DUMEMG$); (4) familiarity variables, including average of common language dummy variable ($DUMLANG$), distance between country capitals, measured in kilometers ($DIST$), and the amount of bilateral trade, that includes imports and exports, in percentage ($TRADEB$); (5) investor protection variables, including efficiency of the judicial system ($EFFICIENCY$), and legal system dummy variable ($DUMLEGAL$); (6) other variables, including past three years return ($RET3$), and correlation between returns of two countries ($CORR$). All specifications include an additional independent variable, $INVDBIAS_j$, calculated as ($1 − DBIAS_j$) to allow control for the automatic impact of the domestic bias on the foreign bias. Time fixed effects are included. Robust T-statistics based on standard errors adjusted for heteroskedasticity using the White method are reported in parentheses.

* Significance at 10% level.
** Significance at 5% level.
*** Significance at 1% level.

Table 7
The determinants of the foreign bond bias – financial versus nonfinancial centers origin countries.

	Predicted sign	Financial centers		Nonfinancial centers	
		Coeff	T-Stat	Coeff	T-Stat
Constant		−2.691	(−0.94)	7.591[**]	(2.68)
INVDBIAS	−	−0.283[***]	(−4.30)	−0.606[***]	(−10.14)
GDPC	+	−0.312	(−1.62)	0.139	(0.70)
RGDP	+	−2.116	(−0.97)	0.528	(0.22)
CREDIT	−	−0.087	(−1.39)	0.005	(0.19)
RFLOW	+	−0.009	(−0.50)	−0.033	(−1.36)
SIZE	+	0.196[**]	(2.81)	0.069	(0.83)
DUMEMG	−	−0.558	(−1.53)	−0.138	(−0.44)
DUMLANG	+	2.861	(1.43)	2.680[*]	(1.95)
DIST	−	0.182	(0.47)	−1.586[***]	(−6.50)
TRADEB	+	0.060[**]	(2.98)	0.081[***]	(6.30)
EFFICIENCY	+	0.118	(1.30)	0.024	(0.44)
DUMLEGAL	+	−0.409	(−1.11)	−0.055	(−0.18)
RET3	+	0.484[***]	(6.49)	0.196	(1.14)
CORR	−	0.335	(0.92)	0.455	(1.50)
Adjusted R^2		0.202		0.065	

The dependent variable is the foreign bias ($FBIAS_{ij}$). The foreign bias for a certain origin country ($FBIAS_i$) is the extent to which domestic investors underweight (or overweight) foreign bond markets in their bond holdings. $FBIAS_{ij}$ is calculated as the log ratio of (w_{ij}) to (w_j^*), where w_{ij} is the weight of country i bond holdings in destination country j, and w_j^* is the world market weight of country j. There are six sets of explanatory variables: (1) economic development variables, including *GDP* per capita (*GDPC*), real *GDP* growth (*RGDP*), and country credit rating (*CREDIT*); (2) capital control variables, that include capital flows restrictions (*RFLOW*); (3) bond market development variables, including bond market capitalization scaled by *GDP* (*SIZE*), and emerging market dummy variable (*DUMEMG*); (4) Familiarity variables, including average of common language dummy variable (*DUMLANG*), distance between country capitals, measured in kilometers (*DIST*percentage (*TRADEB*); (5) investor protection variables, including efficiency of the judicial system (*EFFICIENCY*), and legal system dummy variable (*DUMLEGAL*); (6) other variables, including past three-years return (*RET3*), and correlation between returns of two countries (*CORR*). All specifications include an additional independent variable, $INVDBIAS_j$, calculated as $(1 − DBIAS_j)$ to allow control for the automatic impact of the domestic bias on the foreign bias. Countries classified as financial centers are: Hong Kong, Ireland, Japan, Singapore, Switzerland, U.K., and U.S. Time fixed effects are included. Robust *T*-statistics based on standard errors adjusted for heteroskedasticity using the White method are reported in parentheses.

  [*] Significance at 10% level.
  [**] Significance at 5% level.
  [***] Significance at 1% level.

U.K., and the U.S. Table 7 presents results of the panel data regressions pooling our six groups of explanatory variables.

Interestingly, the size of the bond market reduces the *FBIAS* of the financial centers and has no impact in the nonfinancial centers. Familiarity is more relevant for investors of nonfinancial centers, while only investors of the financial centers are return-chasers. Our results indicate that investors of the financial centers are more sophisticated and support their investment decisions more on market indicators, while familiarity plays the most important role for investors of the nonfinancial centers as determinant of foreign diversification.

5.2. EMU versus non-EMU countries

Table 2 shows that EMU countries represent a considerable weight of the total market value of our sample and also shows that there are significant differences between the debt allocation for EMU and Europe non-EMU countries. Investors from EMU countries invest comparatively more in their own markets than investors from Europe non-EMU countries. As discussed previously, across the different regions, investors from Europe non-EMU countries are the ones that invest less in their own markets. The introduction of the Euro in 1999 is expected to have had an impact on how investors allocate their money and therefore in the home bond bias. De Santis and Lührmann (2009) and De Santis and

Table 8
The determinants of the foreign bond bias – EMU versus non-EMU countries origin countries.

	Predicted sign	EMU origin countries		Non-EMU origin countries	
		Coeff	T-Stat	Coeff	T-Stat
Constant		14.665***	(7.39)	5.431	(1.62)
INVDBIAS	−	−0.388***	(−13.46)	−0.350***	(−5.51)
GDPC	+	0.133	(0.97)	−0.494**	(−2.18)
RGDP	+	−1.632	(−0.76)	−3.458	(−0.74)
CREDIT	−	0.062***	(3.59)	−0.040	(−1.39)
RFLOW	+	0.023	(1.52)	−0.043	(−1.31)
SIZE	+	0.150**	(2.19)	0.026	(0.19)
DUMEMG	−	−1.511***	(−7.72)	−0.108	(−0.32)
DUMLANG	+	8.028***	(9.03)	2.727**	(1.97)
DIST	−	−2.196***	(−15.14)	−0.726**	(−2.44)
TRADEB	+	0.057***	(9.14)	0.055***	(5.37)
EFFICIENCY	+	−0.142***	(−4.87)	0.232***	(3.97)
DUMLEGAL	+	−1.164***	(−6.98)	−0.249	(−0.95)
RET3	+	0.358***	(2.60)	0.085	(0.36)
CORR	−	1.767***	(6.99)	0.573	(1.08)
Adjusted R^2		0.394		0.028	

The dependent variable is the foreign bias ($FBIAS_{ij}$). The foreign bias for a certain origin country ($FBIAS_i$) is the extent to which domestic investors underweight (or overweight) foreign bond markets in their bond holdings. $FBIAS_{ij}$ is calculated as the log ratio of (w_{ij}) to (w_j^*), where w_{ij} is the weight of country i bond holdings in destination country j, and w_j^* is the world market weight of country j. There are six sets of explanatory variables: (1) economic development variables, including *GDP* per capita (*GDPC*), real *GDP* growth (*RGDP*), and country credit rating (*CREDIT*); (2) capital control variables, that include capital flows restrictions (*RFLOW*); (3) bond market development variables, including bond market capitalization scaled by *GDP* (*SIZE*), and emerging market dummy variable (*DUMEMG*); (4) familiarity variables, including average of common language dummy variable (*DUMLANG*), distance between country capitals, measured in kilometers (*DIST*), and the amount of bilateral trade, that includes imports and exports, in percentage (*TRADEB*); (5) investor protection variables, including efficiency of judicial system index (*EFFICIENCY*), and legal system dummy variable (*DUMLEGAL*); (6) other variables, including past three-years' return (*RET3*), and correlation between returns of two countries (*CORR*). All specifications include an additional independent variable, $INVDBIAS_j$, calculated as (1 − $DBIAS_j$) to allow control for the automatic impact of the domestic bias on the foreign bias. EMU countries are Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain. Time fixed effects are included. Robust *T*-statistics based on standard errors adjusted for heteroskedasticity using the White method are reported in parentheses.
*Significance at 10% level.
** Significance at 5% level.
*** Significance at 1% level.

Gerard (2006) results support a regional financial integration in the euro-area. Thus, it is important to analyze the results in EMU and non-EMU origin countries separately. EMU countries include Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain. Table 8 presents the results of the foreign bias regressions pooling our six groups of explanatory variables.

The size of the bond market and the investment in more developed markets contribute to decrease the *FBIAS* in EMU countries, while results of non-EMU countries are not significant, although presenting the expected sign. As we would expect, familiarity variables are more important for EMU countries. Higher familiarity is associated with less foreign bias in both EMU and non-EMU countries but the coefficients and the *T*-statistics are much higher for the EMU countries. This confirms Amadi (2004) "friendship bias" within the EMU. Investor protection variables do not seem to be an obstacle for EMU investors when diversifying their portfolios. Results on past returns and correlation are mainly driven by EMU countries. Investors from the EMU area chase past returns and do not take diversification into account when investing abroad.

5.3. Robustness checks

In order to test the robustness of our results, we conduct further tests (results are not reported).
First, we use an alternative approach, proposed by Ahearne et al. (2004) to calculate the domestic bias and the foreign bias. $DBIAS_i$ is calculated as the ratio of the share of country i' bond holdings in

the domestic market (w_{ii}) to the world market weight of country i (w_i^*) minus one. *FBIAS$_{ij}$* is calculated as the relative weight of country i' bond holdings in destination country j (w_{ij}) to the world market weight of country j (w_j^*) minus one. Results on the domestic bias and the foreign bias regressions using this alternative approach are similar to those obtained following Chan et al. (2005) approach.

Second, we drop the U.S. from the sample to check whether our findings are driven by the large market weight of the U.S. (41.27% of the total market value, see Table 1). When we repeat the regressions excluding the U.S., our results remain unchanged. The extremely high weight of the U.S. in the total market value of our sample does not affect our results. Third, we address the concern that our results may be driven by some particular year or period, due to the specificity of our dataset or to market events occurred during the 1997–2009 period. The first version of the CPIS survey was conducted in 1997 and covered only 29 source countries. Additionally, some important events occurred during the sample period. The stock market downturn of 2002 (some say "stock market crash" or "the internet bubble bursting") and, particularly, the market crash in 2007 are expected to have an important impact on how investors allocate their portfolios domestically and internationally. We address this concern by introducing time fixed effects across our regressions to capture time variation in home bias unexplained by our control variables. Nevertheless, we additionally rerun our regressions excluding one year at the time: excluding 1997, excluding 2002, and excluding 2007; and splitting our sample into different subsamples: before 2002 and after 2002; and before 2007 and after 2007. We find that our results remain largely unchanged.

6. Conclusion

The goal of this study is to examine the evolution of the domestic bond bias and the foreign bond bias over the 1997–2009 period and to explain the determinants of both biases across countries. Based on the existent literature on the home equity bias, we consider economic and financial development, capital control, familiarity, investor protection, and other variables – that include past returns and the correlation of returns - as potential determinants of the domestic and foreign bond biases. Our results show that both the domestic bias and the foreign bias exist in bond markets worldwide, not only across countries but also across regions. Our results also show that the domestic bias has decreased in most countries from 1997 to 2007, while the foreign bias has increased in the majority of the countries in our sample.

Domestic bias results show that the domestic bond bias is lower in more economically developed countries - particularly in countries with higher *GDPC* – in countries with fewer restrictions on foreign capital transactions, and in countries with more developed bond markets. Familiarity and the efficiency of the judicial system also decrease the domestic bond bias. Domestic bias increases as the correlation between a certain country and the rest of the world decreases which indicates that investors do not take advantage of international diversification opportunities.

When investing abroad, investors prefer to allocate their investments in countries with higher economic development, lower restrictions on foreign capital transactions, more developed markets, and stronger efficiency of the judicial system. Familiarity variables (i.e., common language, geographical proximity and bilateral trade) play a very important role in explaining foreign bias. Countries that share a common language, that are geographically close, and that have a higher bilateral trade present a lower foreign bias. Higher past returns also decrease the foreign bias. Correlation results on foreign bias confirm the domestic bias results on diversification opportunities. We find a positive relation between correlation and foreign bias which means that the higher the correlation between the returns of the countries the lower the foreign bias. This is the opposite of the traditional theory. An increase in the correlation between countries should reduce the investment made by investors in foreign bonds and hence the foreign bias should increase. This indicates that investors do not take into account diversification opportunities when investing abroad.

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