

Foreign and Domestic Investments in Global Bond Markets

Introduction

Despite the pivotal role of commercial banks in the financial systems of Asian economies, equity and bond markets in Asia have grown rapidly in past decades. Well-functioning financial markets contribute to economic growth by improving resource allocation, reducing transaction and agency costs, channeling capital resources, ameliorating risk sharing, and boosting innovation.¹² As a complement to bank loans, a deep and liquid bond market plays a salient role in financing budget deficits, infrastructure investments, and private sector projects. The development of bond markets benefits Asian economic growth by providing long-term financing while diversifying banking sector risks and mitigating duration and currency mismatches.

However, challenges have emerged to Asian bond markets development, including a lack of liquidity, inactive institutional participation, and less favorable investor profiles (Plummer and Click 2005). The active participation of institutions facilitates market liquidity and depth, and enhances market efficiency by incorporating information into bond prices via trading. According to the International Monetary Fund (IMF) (2005), in many emerging Asian markets, domestic institutions trade passively in bond markets by adopting a buy-and-hold trading strategy, which leads to less liquidity in the market. More foreign investor participation would improve market liquidity in emerging markets (Peiris 2010). Foreign participation in local currency bond markets has also been found to lower interest rates in the United States (US) (Warnock and Warnock 2009) and emerging markets (Peiris 2010). A lack of foreign participation in bond markets tends to increase an economy's dependence on foreign currency debt (Burger and Warnock 2007), which exacerbates currency mismatch risk. In addition to foreign participation, a balanced investor profile consisting of investors with diversified mandates, especially investors

with long-term investment horizons, helps mitigate risks arising from duration mismatches and increases market resilience to external shocks.

As global financial integration deepens, foreign participation in financial markets may become a channel for risk transmission. According to Belke and Rees (2014), bond yields in emerging markets are affected by external factors, which weakens the effectiveness of domestic monetary policy. During the low-interest-rate era following the global financial crisis, emerging bond markets attracted global investors seeking higher returns, which on the one hand lowered bond yields but at the same time posed risks to capital flow volatility. Thus, understanding the determinants of the investment decisions of foreign and domestic investors in bond markets fosters further development of emerging bond markets and facilitates financial stability in emerging economies.

This study extends existing knowledge on the drivers of foreign investment in global financial markets with new evidence and policy implications on bond market development. First, this study adds to the literature on international portfolio allocation. It has been widely established that investors benefit from global risk sharing and diversification (Lintner 1965). However, extant literature documents that investors do not seem to purely seek better returns worldwide as implied in the "Feldstein–Horioka puzzle" (Feldstein and Horioka 1980), which suggests that constraints to global capital flows include explicit trading barriers such as capital controls, different tax treatment, and transaction fees, as well as implicit trading barriers such as information asymmetry, and exchange rate and regulatory risks. Despite that many explicit barriers have been gradually lifted amid deepening global financial integration, investment biases persist in global capital markets due to various deadweight costs arising from remaining market frictions (French and

¹² See, among others, Greenwood and Jovanovic (1990), King and Levine (1993), Bencivenga and Smith (1993), Levine (1997), Rajan and Zingales (1998), Aghion et al. (2005), and Greenwood et al. (2010).

Poterba 1991, Lewis 1999, Chan et al. 2005, Horioka et al. 2016).

While the majority of empirical evidence on international investment decisions concentrates on equity markets,¹³ relatively less is known about the determinants of investment behavior in global bond markets.¹⁴ With their rapid expansion and ameliorated liquidity and transparency in recent decades (Bunda et al. 2009, McGuire and Schrijvers 2006), emerging bond markets have become more important in global portfolio allocation due to an improved risk–return profile. Hence, up-to-date evidence of factors influencing investment decisions in bond markets will improve the understanding of the investment preferences of global investors.

Extant evidence on investment decisions in bond markets show that bond market risk and return attributes significantly influence home bias (Fidora et al. 2007, Kim et al. 2014) and foreign bias (Burger and Warnock 2007; Burger, Warnock, and Warnock 2012; Horioka et al. 2016) in bond markets. This study joins the extant literature by comparing foreign and domestic investor preferences toward risk–return profiles in global bond markets. By highlighting key factors that lead to discrepancies in their bond investment patterns, this study addresses the following research questions: (i) What attracts foreign investments in global bond markets? (ii) What factors significantly drive discrepancies in the different portfolio decisions of foreign and domestic investors? By addressing the above questions, this research extends Fidora et al. (2007) and Kim et al. (2014) with novel evidence on how foreign investors react to risk–return attributes in global bond markets and adds to Burger and Warnock (2007); Burger, Warnock, and Warnock (2012); and Horioka et al. (2016) a new angle that compares the investment behavior of foreign and domestic investors in global bond markets. In addition, this study provides a useful reference for policy makers on guiding investment behavior and improving their investor profile in order to promote bond market development.

Using a sample from 41 bond markets during the period 2010–2015, we find evidence that foreign investors overweigh markets with better risk–return profiles. In

particular, foreign investors chase return momentum and avoid high return volatilities. This is not necessarily true for domestic investors. Further evidence suggests that the return–chasing behavior of foreign investors is more pronounced in emerging bond markets than in developed bond markets. There is also evidence that foreign participation significantly increased when sovereign ratings improve and that markets with fewer capital controls tend to be overweighed by global foreign investors. These results imply the importance of integration and economic soundness in attracting greater foreign participation in bond markets. Given that foreign participation contributes to liquidity and market efficiency in emerging markets, our evidence suggests that capital account openness will contribute to bond market development by improving the investor profile and enhancing market depth. Meanwhile, the return–chasing behavior of foreign investors in emerging bond markets highlights the importance of sound public finances to not only maintain good credit ratings but also to improve the risk–return profile in emerging markets.

This research is organized as follows. Section 2 reviews the related literature on international portfolio allocation. Section 3 outlines the empirical research design and data sources. Evidence on the determinants of investment behavior in bond markets is discussed in section 4. Conclusions and potential policy implications are summarized in section 5.

Literature Review

In a world where capital has perfect global mobility, rational investors will chase assets that offer higher returns. According to Feldstein and Horioka (1980), investors' return–chasing behavior will theoretically lead to a weak correlation between domestic saving and the investment rate, although empirical evidence does not support this argument. This phenomenon is known as the Feldstein–Horioka puzzle. Consistently, the “home bias” literature documents that despite the benefits of global diversification and risk sharing, investors are widely found to allocate international markets inappropriately by overweighing domestic markets in their international portfolios (French and Poterba 1991, Lewis 1999).¹⁵

¹³ See, among others, Dahlquist and Robertsson 2001; Dahlquist et al. 2003; Edison and Warnock 2004; Faruquee et al. 2004; Ahearne et al. 2004; Chan et al. 2005; Aggarwal et al. 2005; Covrig, Lau, and Ng 2006; Ferreira and Matos 2008; and Kho et al. 2009.

¹⁴ See, among others, Burger and Warnock (2007), Fidora et al. (2007), and Horioka et al. (2016).

¹⁵ Global investors do not allocate international portfolios in the same way as predicated in the international version of the asset pricing model (Levy and Sarnat 1970, Solnik 1974).

Chan et al. (2005) developed an international assets allocation model and showed that various deadweight costs arising from market friction erode the expected returns on overseas investments and lead to investment biases in either domestic (home bias) or some foreign (foreign bias) markets. Empirical evidence from global equity markets suggests that deadweight costs caused by explicit trading barriers such as capital controls and tax treatment, as well as implicit barriers such as information asymmetry and investor protections, contribute to investment biases worldwide.¹⁶

Even though global bond market capitalization is much larger than equity market capitalization, and assets with lower volatility (e.g., bonds) tend to exhibit more pronounced home bias than assets with higher volatility (e.g., equities) (Fidora et al. 2007), extant empirical evidence on the composition of international asset portfolios mainly focuses on equity markets. Compared to research on equity markets, relatively less evidence has been produced to understand global bond portfolio allocation and the preferences of bond market investors.

Among the literature on investment behavior in global bond markets, a group of studies focus on how risk–return factors drive investment bias. Evidence on domestic bias includes Fidora et al. (2007) and Kim et al. (2014). Fidora et al. (2007) examine the role of real exchange rate volatility on global bond and equity portfolio decisions. They show that real exchange rate volatility significantly explains home bias in global financial markets and that reduced real exchange rate volatility helps decrease home bias, especially for bond portfolios. Kim et al. (2014) investigate foreign investment in global bond and stock markets and find that market performance has a more pronounced impact than macroeconomic factors on home biases in both bond and equity markets. Other researchers look at foreign biases. Burger and Warnock (2007) investigate US investors' bond holdings in 40 global markets and find that they do not diversify holdings well and avoid emerging bond markets with unfavorable risk–return profiles, such as higher variance and negative skewness, that are related to unstable macroeconomic conditions. Burger, Warnock, and Warnock (2012) analyze factors that attracted US investors in emerging local currency bond markets in 2006 and 2008, and find that US investors overweight markets with higher returns, positive skewness, and

better openness features. They imply that various types of risks stemming from economic, political, and market factors limit global risk sharing and financial integration. Horioka et al. (2016) examine foreign holdings in Asian bond markets and find that foreign investors value higher risk-adjusted returns and lower exchange rate risk when investing in Asian bond markets.

Other studies focus on social factors and examine how various deadweight costs in the form of different social factors shape investors' portfolio decisions in bond markets. For example, there are studies investigating investor behavior with regard to factors such as familiarity (Ferreira and Miguel 2011); patriotism, culture, and domestic creditor protection (Pradkhan 2016a, 2016b); and political constraints and instability (Eichler and Plaga 2017).

Given the increasing size of bond markets and improving risk–return profiles in global bond markets, more knowledge needs to be produced to understand possible determinants that could differentiate between foreign and domestic investor preferences. Such knowledge would be especially helpful to policy makers in improving investor profiles in individual markets. Foreign and domestic investors may have different preferences in terms of investment horizon, risk appetite, and mandates. Knowledge that depicts how they behave differently in the bond market could shed light on policy developments that encourage certain types of investors toward a more desirable investor profile.

Empirical Design

Research Method

Dependent Variables

In the spirit of Dahlquist and Robertsson (2001) and Chan, Covrig, and Ng (2005), this study defines foreign (domestic) bias (FB [DB]) as the deviation of a market's weight in the aggregate foreign (domestic) investment portfolio from the market's weight in the world bond portfolio, which is calculated as follows:

$$FB_{i,t} = \log\left(\frac{w_{i,t}^{FI}}{w_{i,t}^M}\right), \text{ and } DB_{i,t} = \log\left(\frac{w_{i,t}^{DI}}{w_{i,t}^M}\right), \quad (1)$$

¹⁶ See, among others, Faruqee et al. 2004, Ahearne et al. 2004, Aggarwal et al. 2005, Chan et al. 2005, Ferreira and Matos 2008, and Kho et al. 2009.

where $w_{i,t}^{FI}$, $w_{i,t}^{DI}$, and $w_{i,t}^M$ denote the weights of market i 's foreign investors' global portfolio, domestic investors' global portfolio, and world bond market portfolio, respectively, at time t . Since a market's weight in the global portfolio reflects the relative importance of an individual market in the global market, while its weight in the foreign (domestic) global portfolio captures the actual proportion that foreign (domestic) investors allocate to it relative to its benchmark size. Thus, foreign (domestic) investment bias reflects the relative preference of foreign (domestic) investors toward a particular bond market.

Independent Variables

According to extant literature, factors that may influence foreign investment in domestic financial markets fall into several categories: asset risk–return profile, currency risks, financial development, and macroeconomic stability. In this study, we group these factors into two aspects capturing investor mandates and the market-level environment.

Investor mandates. Trading strategies and investment mandates shape investment behavior. The literature has documented that historical performance affects investors' portfolio decisions. Investors tend to choose assets with strong historical performance (Grinblatt and Keloharju 2001, Edison and Warnock 2004, and Ferreira and Matos 2008). Existing literature also shows that the riskiness of assets affects investment decisions. Del Guercio (1996) suggests that the “prudent-man rule” affects the investment behavior of institutions such as banks and mutual funds. Gompers and Metrick (2001) indicate that institutional investors bear the legal role of fiduciaries and avoid risky assets due to such motives. Covrig, Lau, and Ng (2006) find that foreign and domestic mutual funds prefer stocks with low return variability. In bond market investments, Burger and Warnock (2007) and Burger, Warnock, and Warnock (2012) find that bond risk–return characteristics significantly affect US investor preferences. Fidora et al. (2007) and Horioka et al. (2016) show that exchange rate volatility is a significant factor contributing to home bias and foreign investment in bond markets, respectively.

In empirical tests, we capture momentum-seeking by following Edison and Warnock (2004) and measure return level (RMEAN) as the average monthly return

on a bond market index during the past 12 months. We address the prudent-man's rule in institutional investment decisions with measures of volatility and skewness of bond returns. This study calculates the return volatility (RVOL) and skewness (RSKE) as the standard deviation and skewness of monthly returns on bond indexes over the past 12 months. To account for currency risk, we follow Fidora et al. (2007) and construct effective real exchange rate volatility (FXVOL) as the standard deviation of the monthly effective real exchange rate during the past 12 months. To further consider the role of less frequent large swings in exchange rate movements, we also account for exchange rate skewness (FXSKE) in individual markets using skewness of monthly percentage changes of real effective exchange rates during the past 12 months.

Market investment environment. Well-developed financial markets offer more investment instruments, less investment controls, and better liquidity, thus making these markets more accessible to investors. Macroeconomic stability means an economy has sound economic fundamentals and a good public debt management situation. Greater macroeconomic stability facilitates an improved risk–return profile for debt instruments as well as a robust currency. To depict the investment environment in bonds, this study follows existing literature and considers the following aspects: financial development and macroeconomic stability.

Market depth and liquidity matter for investors, especially institutional investors who trade in relatively large volumes (Tesar and Werner 1995). To maintain a liquid trading environment, financial markets need to reach a certain minimum efficient scale. Empirical research commonly adopts market size and trading turnover as proxies for liquidity (Edison and Warnock 2004; Ahearne, Grier, and Warnock 2004; Dahlquist and Robertsson 2001; Tesar and Werner 1995). Empirically, due to the limited availability of data on trading volume, this study gauges market depth using bond market size (SIZE), which is measured as the natural logarithm of the aggregated value of outstanding bonds in a bond market as of the end of the year. In addition to capturing market depth, market size is also found to play multiple roles in affecting investment behavior. Greater market size can imply greater information availability (Edison and Warnock 2004) and better corporate governance quality (Kho, Stulz, and

Warnock 2009). Eichengreen and Luengaruemitchai (2004) document that the size of Asian bond markets is positively related to a stronger institutional environment and a competitive banking sector. Thus, the inclusion of market size also captures institutional quality and financial development.

A well-functioning financial market also features more mature financial institutions such as banks and brokers serving as market makers (Eichengreen and Luengaruemitchai 2004), which facilitates better liquidity and improves market efficiency. In empirical tests, we measure financial market development (FINDEV) as the natural logarithm of the financial development indicator constructed in Svirydenka (2016). This financial development index comprehensively covers financial market depth, accessibility, and efficiency, and the level of financial institution development. The index ranges between 0 (less developed) to 1 (well developed).

There is evidence that explicit investment barriers in the form of capital controls significantly shape foreign portfolio investment decisions (Chan et al. 2005). Following Chan et al. (2005), we use the index on capital flow controls (OPENNESS) constructed by the Economic Freedom Network. Empirically, we construct OPENNESS as the natural logarithm of the capital control index from Table 4Dii of the Economic Freedom Network, where a higher score indicates that an economy imposes fewer restrictions on capital flows. The lowest score of 0 and the highest score of 10 indicate full capital controls and a fully open capital account, respectively.

To quantify macroeconomic stability and outlooks, we employ S&P Global's sovereign ratings on foreign and local currency government bonds (RATING) to proxy for macroeconomic fundamentals. A higher rating indicates a more stable economic outlook. Empirically, we allocate numeric scores to S&P Global's 23 sovereign bond rating levels, with the highest score of 22 representing AAA, which is the highest investment grade, and 0 representing D, which is default. We take the simple average of foreign and local currency government bond ratings to capture the average level of macroeconomic stability.

Empirical Model Estimations

To identify the determinants of foreign and domestic bond investment biases (FB and DB), the following model was estimated:

$$Bias_{i,t} = \alpha + \beta X_{i,t} + \gamma Dummy + \varepsilon_{i,t} \quad (2)$$

where $Bias_{i,t}$ is the market level investment biases (FB and DB) for market i at time t , $X_{i,t}$ is the vector of market attributes and investor mandate variables, and $dummy$ is the vector of time- and market-fixed effects to reflect information that is not captured by the independent variables. This study estimates the model specifications using panel-fixed effects, with clustered standard errors at the market level.¹⁷ We also use systematic generalized method of moments (GMM) to account for possible endogeneity concerns.

Sample Construction

We collect year-end, cross-border portfolio holdings in debt securities from the International Monetary Fund's Coordinated Portfolio Investment Survey (CPIS).¹⁸ We identify the source markets and destination markets of bond portfolio investments to obtain the aggregated bond investments into and out of each market. To avoid the influence of the global financial crisis on international investment behavior, our sample covers the period 2010–2015. The outstanding amount of debt securities issued by all domestic entities is collected from Table C1 of the Bank for International Settlements (BIS) debt securities statistics (DEBT_SEC2), which contains data on the aggregated amount of outstanding international and domestic debt securities. For markets that do not report aggregated outstanding debt securities, we sum the outstanding amounts of foreign and domestic debt securities. Real effective exchange rates are also collected from BIS. Sovereign bond ratings from S&P Global are collected from Bloomberg. The index on capital controls is from Table 4Dii constructed by the Economic Freedom Network. Monthly returns on local bond markets are collected from the JP Morgan GBI Aggregate Diversified Index and Emerging Market Bond Index Global Diversified via Bloomberg. The financial development indicator is collected from

¹⁷ Hausman tests give different results for different model specifications, thus we use fixed-effect estimations and report random-effect estimations as robustness checks.

¹⁸ The IMF's CPIS covers year-end global holdings in debt instruments from 2001 to 2015. Since data on June holdings are only available since 2013, we only include year-end holdings to keep record frequency consistent. The database is accessible at <http://data.imf.org/?sk=B981B4E3-4E58-467E-9B90-9DE0C3367363>

Svirydzienka (2016). After matching all the variables, we get a final panel dataset consisting of 241 observations covering 41 bond markets for the period 2010–2015. Our sample is reasonably representative. The 41 target markets receive 86.7% of total foreign holdings from the 88 reporting markets in the CPIS and the aggregated bond market size of the 41 sample markets account for 95.3% of the global bond market size.

Table 24 reports summary statistics of foreign and domestic biases in our sample across markets and years. We first compare our statistics with Kim et al. (2014) since we use the same data sources. In general, the home bias measures in our sample are very comparable to those in Kim et al. (2014). Panel A shows that in terms of mean foreign bias, most developed bond markets are overweighed by foreign investors with a foreign bias higher than 0, while emerging bond markets are underweighed by foreign investors. Compared to developed bond markets, most emerging bond markets, especially those in Latin America and emerging Asia, are generally underweighed. Among these markets, the People's Republic of China's bond market has the lowest foreign investment bias, largely driven by its relatively large bond market size and limited access for foreign investors. In contrast to emerging Latin America and Asia, emerging European bond markets are generally not underweighed by foreign investors, which probably reflects better financial integration in the eurozone. In contrast, home bias is still pervasive in global bond markets, with all mean domestic biases higher than 0. Panel B depicts foreign and domestic biases across sample years. On average, home bias is still prevalent in global bond markets after years of globalization and integration, while foreign bias seems to increase during the review period, indicating that foreign investors are becoming more willing to invest in global bond markets.

To get a clear picture of how investment biases have evolved during the past decade, we calculate foreign and domestic biases for both developed and emerging markets in **Figure 32**. Based on the BIS classification of economic development status and regional location, we depict the evolution of foreign and domestic biases in developed and emerging markets in **Figure 33a**. While the home bias persists worldwide, home biases in developed markets are generally lower than in emerging markets. As global financial integration has deepened in recent decades, the whole world in general witnessed a slight decline in home bias in bond markets. At the same time,

developed markets are largely invested in by global foreign investors compared to emerging markets, which are underweighed in foreign investor portfolios relative to their scale. While foreign bias remains stable in developed markets, foreign bias in emerging markets picked up after the global financial crisis, indicating that global investors were seeking higher returns in emerging markets during the easy money era.

To take a closer look at trends at the regional level, we break down developed and emerging markets into three subregions: the Americas, Asia and the Pacific, and Europe. **Figures 33b** and **33c** show the investment biases of emerging and developed markets across different subregions, respectively. As shown in **Figure 33b**, while home bias levels in emerging markets in all three subregions are quite close to each other and present a similar decreasing trend, emerging markets exhibit different foreign bias patterns across subregions.

First, emerging European markets are fairly weighed by global investors. Before the global financial crisis, emerging European markets were overweighed by foreign investors. Foreign bias decreased to a fair level during the global financial crisis and slightly picked up again after 2011. Overall, European emerging bond markets are overweighed by foreign investors due to deepened financial integration within the eurozone. Second, emerging Latin America was overweighed before the global financial crisis and experienced a sell-off during the crisis. Foreign bias gradually increased after the global financial crisis and now emerging Latin American bond markets' weight in foreign investor portfolios is close to their relative size. Third, emerging Asian bond markets have generally been underweighed compared to their relative size in past decades. Foreign investors reduced investments during the global financial crisis and resumed investments during the post-crisis period. The underweighing of emerging Asian bond markets in global investor portfolios is partially driven by capital control measures adopted in some Asian markets.

Figure 33c shows interesting patterns for developed markets across subregions. A positive foreign bias in developed European markets serves as evidence of deepened financial integration. Developed markets in the Americas have lower home bias levels, while developed Asia and the Pacific markets have the highest home bias levels along with a clear decreasing trend during the review period. However, both developed Americas and

Table 24: Summary Statistics of Foreign and Domestic Biases in Global Bond Markets

Panel A. Foreign and Domestic Biases across Markets

Developed Markets	Foreign Bias Mean	Domestic Bias Mean	Developing Markets	Foreign Bias Mean	Domestic Bias Mean
Austria	0.92	4.82	Argentina	-0.41	6.38
Belgium	0.78	4.63	Brazil	-0.80	3.82
Canada	0.38	3.82	Chile	-0.23	6.37
Denmark	0.03	4.46	China, People's Republic of	-1.81	3.02
Finland	1.07	4.96	Hungary	0.69	6.74
France	0.58	2.57	India	-0.68	4.97
Germany	0.62	2.59	Indonesia	0.57	6.32
Greece	0.24	5.40	Israel	-0.46	5.88
Hong Kong, China	-0.22	4.85	Malaysia	-0.02	5.58
Ireland	0.82	3.50	Mexico	0.17	4.86
Italy	0.39	3.08	Philippines	0.21	6.60
Japan	-1.92	1.81	Poland	0.46	5.78
Korea, Republic of	-0.70	4.16	Russian Federation	-0.59	5.31
Luxembourg	1.34	2.33	South Africa	-0.08	5.99
Netherlands	1.10	3.03	Thailand	-1.05	5.73
New Zealand	0.95	6.73	Turkey	0.36	5.83
Norway	0.77	4.40	Venezuela	0.64	7.28
Portugal	0.48	5.18			
Singapore	0.09	4.79			
Spain	0.46	3.60			
Sweden	0.93	4.51			
Switzerland	0.41	4.38			
United Kingdom	0.35	2.39			
United States	-0.68	0.95			

Notes: Market classification based on Bank for International Settlements' database. This table lists the detailed summary statistics of foreign and domestic investment biases in bond markets across 41 global markets. Foreign and domestic biases are defined as the deviations of a market's weight in the aggregate foreign and domestic bond investment portfolios from the market's weight in the world bond portfolio. The calculation is conducted using the following formulas for foreign and domestic bias, respectively:

$$FB_{i,t} = \log\left(\frac{W_{i,t}^{FI}}{W_{i,t}^W}\right) \text{ and } DB_{i,t} = \log\left(\frac{W_{i,t}^{DI}}{W_{i,t}^M}\right)$$

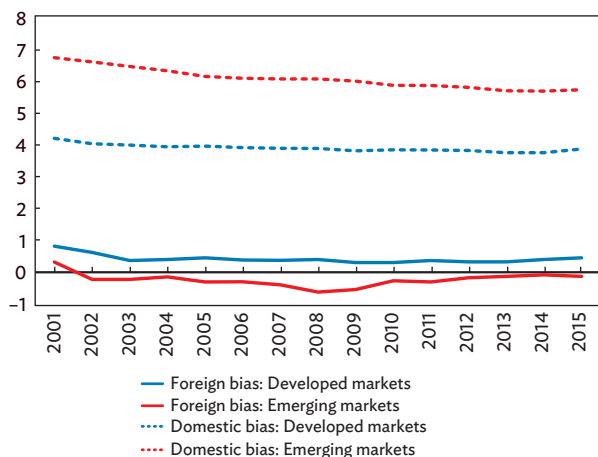
Sources: Authors' calculations using IMF and BIS databases.

Panel B. Foreign and Domestic Biases across Years

Year	N	Foreign Bias							Domestic Bias						
		mean	min	p25	p50	p75	max	std.	mean	min	p25	p50	p75	max	std.
2010	39	0.09	-2.31	-0.33	0.29	0.68	1.36	0.82	4.62	0.98	3.39	4.92	5.78	7.29	1.56
2011	39	0.16	-1.94	-0.31	0.37	0.64	1.53	0.77	4.63	0.99	3.29	4.99	5.91	7.19	1.58
2012	40	0.17	-1.98	-0.30	0.29	0.74	1.31	0.75	4.61	0.99	3.41	4.88	5.76	7.14	1.52
2013	41	0.14	-1.92	-0.24	0.31	0.70	1.32	0.71	4.57	0.96	3.58	4.74	5.75	7.25	1.51
2014	41	0.20	-1.77	-0.06	0.43	0.68	1.26	0.73	4.57	0.91	3.66	4.63	5.79	7.37	1.50
2015	41	0.24	-1.86	-0.10	0.49	0.73	1.26	0.75	4.66	0.88	3.81	4.63	5.82	7.43	1.48
Total	241	0.17	-2.31	-0.29	0.34	0.69	1.53	0.75	4.61	0.88	3.55	4.75	5.79	7.43	1.51

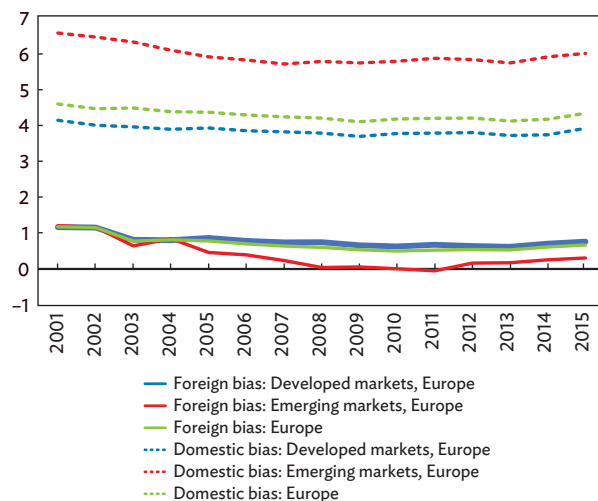
Note: This table lists the detailed summary statistics of foreign and domestic investment biases in bond markets across 6 sample years.
Sources: Authors' calculations using IMF and BIS databases.

Figure 32: The Evolution of Foreign and Domestic Biases in Global Bond Markets



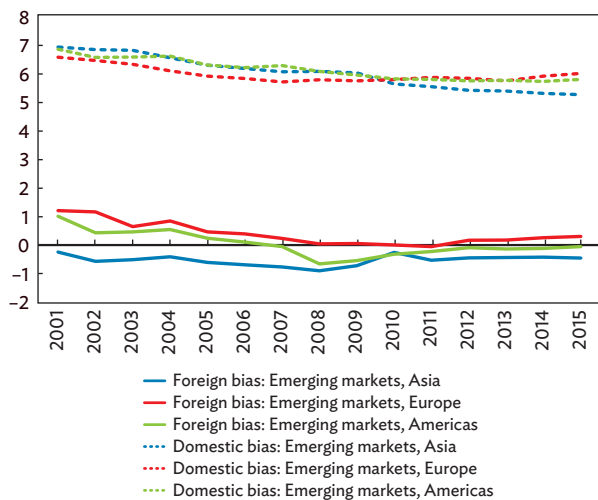
Sources: Authors' calculations using IMF and BIS databases.

Figure 33a: Investment Biases in Developed versus Emerging Markets



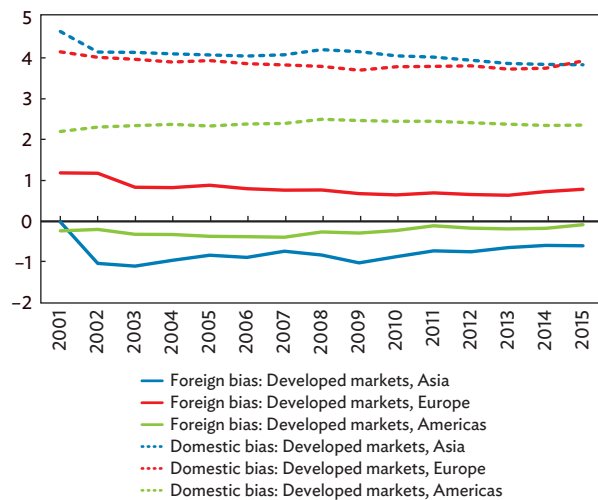
Sources: Authors' calculations using IMF and BIS databases.

Figure 33b: Investment Biases in Emerging Markets



Sources: Authors' calculations using IMF and BIS databases.

Figure 33c: Investment Biases in Developed Markets



Sources: Authors' calculations using IMF and BIS databases.

the developed Asia and the Pacific have a negative foreign bias, partially because of the large size of these bond markets (especially the US and Japan) and their relatively low returns. Overall, home bias is still pervasive in global bond markets but shows a decreasing trend in certain markets. Foreign investors mostly under-weight bond markets outside of Europe, especially Asian bond markets.

Tables 25 and 26 list the summary statistics and pair-wise Pearson correlation coefficients of all key variables that are used in our sample, respectively.¹⁹ Table 26 suggests that most variables in our sample are not subject to multicollinearity.

¹⁹ Due to the limited availability of bond index returns, we only have 253 observations with return-related variables such as momentum, volatility, and skewness. We calculated the correlation matrix including these return-related variables using a smaller sample and there is no evidence that these variables are highly correlated. The alternative correlation matrix is available upon request.

Table 25: Summary Statistics for Key Variables

Variables	N	Mean	Min	p5	p10	p50	p90	p95	Max	Std.
FB	241	0.17	-2.31	-1.34	-0.81	0.34	1.00	1.12	1.53	0.75
DB	241	4.61	0.88	1.99	2.52	4.75	6.52	6.73	7.43	1.51
RMEAN	241	0.47	-7.20	-0.57	-0.31	0.46	1.28	1.74	3.74	0.95
RVOL	241	2.02	0.26	0.59	0.68	1.41	3.78	6.98	11.62	2.03
RSKE	241	0.07	-1.92	-1.11	-0.87	0.05	0.96	1.35	2.07	0.74
FXVOL	241	0.01	0	0.01	0.01	0.01	0.02	0.03	0.12	0.01
FXSKE	241	-0.07	-2.73	-1.34	-0.99	-0.02	0.81	0.99	2.24	0.77
SIZE	241	13.38	10.78	11.47	11.79	13.07	15.29	15.86	17.43	1.45
FinDev	241	-0.47	-1.57	-1.16	-0.98	-0.39	-0.16	-0.13	-0.03	0.32
OPENNESS	241	1.49	0	0.57	0.57	1.58	2.16	2.25	2.33	0.57
RATING	241	17.4	3	8	11.5	18.5	22	22	22	4.68

Notes: This table lists the summary statistics of key variables. The sample period is 2010–2015. Foreign and domestic biases (FB and DB, respectively) are defined as the deviations of a market's weight in the aggregate foreign and domestic bond investment portfolios from the market's weight in the world bond portfolio. RMEAN is the cumulative monthly return on the local bond market index during the past 12 months. RVOL and RSKE are the standard deviation and skewness of monthly returns on bond indexes during the past 12 months. SIZE is the natural logarithm of aggregated value of outstanding bonds in a bond market. FXVOL and FXSKE are the standard deviation and skewness of monthly real effective exchange rates changes during the past 12 months, respectively. FinDev is the natural logarithm of the financial development indicator constructed in Svrydzhenka (2016). OPENNESS is the natural logarithm of the capital control index from Table 4dii of the Economic Freedom Network. RATING is the average rating of foreign and local currency sovereign bonds from S&P Global Ratings.

Source: Authors' calculations.

Table 26: Correlation Matrix for Key Variables

Variables	FB	DB	RMEAN	RVOL	RSKE	FXVOL	FXSKE	SIZE	FinDev	OPENNESS	RATING
FB	1.000										
DB	0.136	1.000									
RMEAN	0.342	-0.885	1.000								
RVOL	0.055	0.105	-0.073	1.000							
RSKE	0.056	0.333	-0.289	0.098	1.000						
FXVOL	0.144	-0.074	0.138	0.051	-0.169	1.000					
FXSKE	-0.162	0.289	-0.350	0.002	0.245	-0.201	1.000				
SIZE	0.123	-0.125	0.176	0.005	0.064	0.178	-0.325	1.000			
FinDev	-0.301	-0.938	0.748	-0.105	-0.307	0.045	-0.237	0.076	1.000		
OPENNESS	0.004	-0.681	0.648	-0.151	-0.481	0.161	-0.364	0.213	0.587	1.000	
RATING	0.248	-0.397	0.493	-0.058	-0.243	0.149	-0.221	0.151	0.296	0.650	1.000

Note: This table reports Pearson correlation coefficients between each pair of variables. A total of 241 observations for the period 2010–2015 were used for the calculations.

Source: Authors' calculations.

Empirical Analysis

What determines foreign and domestic biases in global bond markets?

Table 27 reports the estimations of the impacts of various market attributes on foreign and domestic investment biases. In Panel A, we include bond return characteristics and currency risks. Columns 2 and 3 show that foreign investors display a significant preference toward bond markets with relatively higher returns and lower volatility:

a 1% increase in monthly bond index returns increases foreign bias by 0.025% and a 1% increase in bond index volatility decreases foreign bias by 0.032%. However, bond risk–return profiles do not have a significant impact on domestic investor biases. Furthermore, when foreign exchange risk is included in columns 4 and 5, neither foreign nor domestic investor investment preferences are significantly affected by currency risks.

In Panel B, we include additional market developments and macroeconomic conditions. Higher returns on bond

Table 27: Determinants of Foreign and Domestic Biases

Panel A

Variables	Foreign Bias	Domestic Bias	Foreign Bias	Domestic Bias
<i>Risk-Return Profile</i>				
RMEAN	0.0248** (2.30)	0.0219 (1.34)	0.0247** (2.31)	0.0217 (1.34)
RVOL	-0.0320*** (-2.75)	0.00248 (0.13)	-0.0314*** (-2.77)	0.00336 (0.16)
RSKE	0.0064 (0.41)	-0.000625 (-0.04)	0.00857 (0.53)	0.00188 (0.12)
FXVOL			0.908 (0.89)	0.913 (1.03)
FXSKE			-0.00981 (-0.74)	-0.0126 (-1.17)
Observations	241	241	241	241
Number of Markets	41	41	41	41
Adjusted R-squared	0.195	0.042	0.194	0.041
Time-Fixed Effects	YES	YES	YES	YES
Market-Fixed Effects	YES	YES	YES	YES
F Value	6.84	5.53	5.69	5.08

Panel B

Variables	Foreign Bias	Domestic Bias	Foreign Bias	Domestic Bias
<i>Risk-Return Profile</i>				
RMEAN	0.0262** (2.67)	-0.00883 (-0.97)	0.0253*** (3.63)	-0.00869 (-0.92)
RVOL	-0.0356*** (-2.82)	-0.00213 (-0.17)	-0.0305*** (-2.79)	-0.00294 (-0.28)
RSKE	0.00183 (0.11)	0.0028 (0.30)	0.00849 (0.54)	0.00176 (0.23)
FXVOL	1.007 (0.91)	0.0466 (0.13)	0.978 (1.08)	0.0512 (0.15)
FXSKE	-0.00327 (-0.26)	-0.00251 (-0.33)	-0.0107 (-0.84)	-0.00135 (-0.16)
<i>Market Attributes</i>				
SIZE	-0.0462 (-0.44)	-0.652*** (-3.88)	-0.0918 (-0.89)	-0.645*** (-3.60)
FinDev	0.474 (0.80)	0.298 (1.21)	0.501 (0.98)	0.293 (1.24)
OPENNESS	0.323*** (3.08)	-0.0492 (-0.65)	0.311*** (2.92)	-0.0472 (-0.64)
Rating			0.0378** (2.57)	-0.00590 (-0.35)
Observations	241	241	241	241
Number of Markets	41	41	41	41
Adjusted R-squared	0.252	0.356	0.301	0.354
Time-Fixed Effects	YES	YES	YES	YES
Market-Fixed Effects	YES	YES	YES	YES
F Value	6.3	30.99	9.09	29.74

Notes: This table reports estimated impacts of different variables on foreign and domestic biases in global bond markets. The sample period is from 2010 to 2015. Dependent variables are foreign and domestic biases defined as the deviations of a market's weight in the aggregate foreign and domestic bond investment portfolios from the market's weight in the world bond portfolio. RMEAN is the cumulative monthly return on local bond market index during the past 12 months. RVOL and RSKE are the standard deviation and skewness of monthly returns on bond indexes during the past 12 months. SIZE is the natural logarithm of aggregated value of outstanding bonds in a bond market. FXVOL and FXSKE are the standard deviation and skewness of monthly real effective exchange rates changes during the past 12 months, respectively. FinDev is the natural logarithm of the financial development indicator constructed in Sviridzenka (2016). OPENNESS is the natural logarithm of capital control index from Table 4dii of the Economic Freedom Network. Rating is the average rating of foreign and local currency sovereign bonds from S&P Global Ratings. Models are estimated using panel-fixed effects by including time and market-fixed effects. T values are calculated from standard errors clustered at the market level. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' calculations.

market indexes and lower volatility of bond market returns consistently attract foreign investment, but domestic investors are not sensitive to these risk–return profiles in local markets. Still, foreign and domestic investors do not significantly respond to currency risks. In addition to risk–return profiles, there is interesting evidence from market developments and macroeconomic attributes. While bond market size may not have a significant impact on foreign investor decisions, domestic bias is generally lower in larger bond markets. This evidence suggests that smaller bond markets tend to be more domestically biased compared to larger ones. Meanwhile, markets with fewer capital flow restrictions (greater openness) intuitively encourage more foreign investment, but domestic investment is not affected much by domestic market openness. Finally, foreign investors care more about macroeconomic prospects and stability, which are captured by sovereign ratings, while domestic investors are relatively less sensitive to domestic macroeconomic conditions. Overall, this evidence implies that when the risk–return profile, market accessibility, and macroeconomic conditions improve, foreign investment increases. Moreover, larger bond markets tend to be less domestically biased.

Since some bond markets are offshore financial centers, the trading behavior of foreign and domestic investors in such markets may differ from that in common bond markets. Thus, to examine whether our previous findings are sensitive to the inclusion of such offshore financial centers, we follow the classification of BIS and conduct a robustness check by excluding Hong Kong, China and Singapore from our sample. Also, when determining whether to use a panel–fixed effects or random effects model, a Hausman test indicates that panel–fixed effects are suitable for most model specifications but a few model specifications are more suited for random effects. In the baseline models in Table 27, we report results estimated using a panel–fixed effects model. To test whether the results are sensitive to the choice of the estimation model, we also report estimated results using a random effects model. The results of these tests are listed in **Table 28**.

The first two model specifications in Table 28 list the results estimated for the nonfinancial center subsample, and the last two columns report the estimated results using a random effects model. Largely, the results are consistent with those in Table 27. Foreign investors invest more in bond markets that offer higher returns and lower return volatility. Greater market accessibility and higher

sovereign ratings also attract more foreign investment. In addition, there is evidence that foreign investors underweigh large bond markets in their portfolio and that home bias declines as bond markets expand in size.

Since the value of foreign and domestic bias is observed within certain ranges, we utilize a Tobit model to deal with the censored dependent variables. To justify that these findings are robust to possible endogenous issues, we also use systematic GMM to tackle possible endogeneity. The results of these robustness checks are reported in **Table 29**. As shown, the previous results are robust to alternative estimation methods. Consistently, foreign investors overweigh markets that offer higher returns and lower risk, as well as more open bond markets and those in countries with macroeconomic stability. Meanwhile, a less favorable risk–return profile and small bond market size heighten home bias.

Foreign and domestic biases in developed and emerging bond markets

To further explore whether determinants of foreign and domestic holdings are systematically different in emerging and developed bond markets, this section presents additional tests on global investor bond holdings with a breakdown between emerging and developed markets. Our classification of emerging and developed markets is consistent with BIS classifications. **Table 30** lists the estimated results for foreign and domestic investment biases in emerging and developed markets.

In developed markets, the portfolio decision–making of foreign investors significantly depends on the accessibility of financial markets. In other words, global investors do not seem to invest in developed bond markets for return–seeking purposes. Greater market openness will foster foreign participation. However, in emerging markets, foreign investors exhibit concern over risks. They avoid markets with greater return volatility and overweigh markets with better economic fundamentals. Interestingly, among emerging markets, lower returns, a smaller market size, and a weaker sovereign rating lead to greater home bias.

Overall, the breakdown of bond market development offers insight into how foreign and domestic investors may behave in different market environments. In general, for emerging markets greater market size and a better sovereign rating will broaden the investor base and lower

Table 28: Determinants of Foreign and Domestic Biases—Robustness (I)

Estimation Method	Panel-Fixed Effects (without offshore centers)		Panel-Random Effects	
	Foreign Bias	Domestic Bias	Foreign Bias	Domestic Bias
<i>Risk-Return Profile</i>				
RMEAN	0.0226*** (3.04)	-0.00846 (-0.83)	0.0191*** (2.70)	-0.0209*** (-3.21)
RVOL	-0.0346*** (-3.03)	-0.00158 (-0.15)	-0.0252** (-2.32)	-0.000905 (-0.09)
RSKE	0.00727 (0.45)	0.00147 (0.19)	0.00933 (0.61)	0.00171 (0.19)
FXVOL	1.048 (1.12)	-0.0528 (-0.16)	0.759 (0.74)	-0.00388 (-0.01)
FXSKE	-0.00559 (-0.43)	-0.00355 (-0.38)	-0.00850 (-0.66)	0.002 (0.24)
<i>Market Attributes</i>				
SIZE	-0.185** (-2.10)	-0.625*** (-3.07)	-0.167** (-2.12)	-0.795*** (-8.14)
FinDev	0.646 (1.16)	0.217 (0.85)	0.0873 (0.26)	-0.462 (-1.64)
OPENNESS	0.330*** (2.84)	-0.0475 (-0.62)	0.309*** (2.68)	-0.0873 (-1.59)
Rating	0.0367** (2.55)	-0.00556 (-0.33)	0.0364*** (3.05)	-0.0141 (-1.05)
Observations	229	229	241	241
Number of markets	39	39	41	41
Year-Fixed Effects	YES	YES	YES	YES
Market-Fixed Effects	YES	YES	NO	NO
Adjusted R-squared /Chi ²	0.32	0.31	163.1	1678

Notes: This table reports estimated impacts of different variables on foreign and domestic biases using panel-random effects model on a full sample and using panel-fixed effects model on a sample of markets that exclude financial centers (Hong Kong, China; and Singapore), respectively. Dependent variables are foreign and domestic biases. RMEAN is the cumulative monthly return on the local bond market index during the past 12 months. RVOL and RSKE are the standard deviation and skewness of monthly returns on bond indexes over the past 12 months. SIZE is the natural logarithm of the aggregated value of outstanding bonds in a bond market. FXVOL and FXSKE are the standard deviation and skewness of monthly real effective exchange rates changes during the past 12 months, respectively. FinDev is the natural logarithm of the financial development indicator constructed in Svirydzenka (2016). OPENNESS is the natural logarithm of the capital controls index from Table 4dii of the Economic Freedom Network. Rating is the average rating of foreign and local currency sovereign bonds from S&P Global Ratings. The first two models are estimated using panel-fixed effects by including time- and market-fixed effects; the last two models are estimated using panel-random effects by including year-fixed effects. T values are calculated from standard errors clustered at the market level. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' calculations.

home bias. For economies with a smaller bond market, regional integration would help to diversify the investor base. This finding sheds additional light on how emerging bond markets can improve their investor profile.

Conclusion

This study investigates the determinants of foreign and domestic biases in global bond markets. In particular, we try to understand the factors that shape foreign and domestic investor behavior and what drives the discrepancies between foreign and domestic investments.

In general, there is evidence that foreign investors chase better risk-return profiles in global bond markets and that their investments are significantly influenced by

bond market accessibility and macroeconomic outlook as captured by sovereign ratings. Meanwhile, there is evidence that larger bond markets tend to have a lower home bias.

These findings have policy implications for bond market development. If an emerging economy wishes to broaden its bond market investor base, it can make its market more accessible by gradually increasing capital account openness while also maintaining sound public finances and an economic outlook that boosts foreign investor confidence and improves the risk-return profile of bonds. Finally, integrating regional bond markets can help small bond markets to broaden the investor base and lower home bias.

Table 29: Determinants of Foreign and Domestic Biases—Robustness (II)

Estimation Method Variables	Tobit		GMM	
	Foreign Bias	Domestic Bias	Foreign Bias	Domestic Bias
<i>Risk-Return Profile</i>				
RMEAN	0.0195* (1.91)	-0.0209** (-2.03)	0.0243*** (2.72)	-0.00759 (-0.93)
RVOL	-0.0258** (-2.50)	-0.000901 (-0.09)	-0.0218** (-2.05)	0.0239** (2.55)
RSKE	0.00924 (0.68)	0.00171 (0.12)	0.00297 (0.24)	0.00565 (0.51)
FXVOL	0.785 (0.75)	-0.00395 (-0.00)	1.381 (1.43)	0.173 (0.2)
FXSKE	-0.00869 (-0.62)	0.002 (0.14)	-0.00424 (-0.33)	-0.00164 (-0.14)
<i>Market Attributes</i>				
SIZE	-0.162*** (-3.05)	-0.794*** (-17.12)	-0.173** (-2.46)	-0.555*** (-9.15)
FinDev	0.113 (0.45)	-0.462** (-2.09)	0.39 (1.06)	-0.0475 (-0.14)
OPENNESS	0.308*** (4.02)	-0.0873 (-1.19)	0.226*** (2.61)	-0.000846 (-0.01)
Rating	0.0364*** (3.89)	-0.0141 (-1.54)	0.0348*** (3.28)	0.00438 (0.48)
Observations	241	241	200	200
Number of markets	41	41	41	41
Chi ² /F Value	107.8	413.1	5.14	11.26

Notes: This table reports estimated impacts of different variables on foreign and domestic biases using Tobit and systematic generalized method of moments (GMM) models, respectively. Dependent variables are foreign and domestic biases. RMEAN is the cumulative monthly return on local bond market index during the past 12 months. RVOL and RSKE are the standard deviation and skewness of monthly returns on bond indexes over the past 12 months. SIZE is the natural logarithm of aggregated value of outstanding bonds in a bond market. FXVOL and FXSKE are the standard deviation and skewness of monthly real effective exchange rates changes during the past 12 months, respectively. FinDev is the natural logarithm of the financial development indicator constructed in Svirydzienka (2016). OPENNESS is the natural logarithm of the capital control index from Table 4dii of the Economic Freedom Network. Rating is the average rating on foreign and local currency sovereign bonds from S&P Global Ratings. The first two models are estimated using panel-fixed effects by including time- and market-fixed effects; the last two models are estimated using panel-random effects by including year-fixed effects. T values are calculated from standard errors cluster at the market level. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' calculations.

Table 30: Determinants of Foreign and Domestic Biases in Developed and Emerging Markets

Subsamples Variables	Developed Markets		Emerging Markets	
	Foreign Bias	Domestic Bias	Foreign Bias	Domestic Bias
<i>Risk-Return Profile</i>				
RMEAN	-0.00897 (-0.58)	0.0268* (1.78)	0.0269 (1.47)	-0.0146*** (-3.26)
RVOL	-0.0270 (-1.45)	-0.0519 (-1.57)	-0.0344*** (-3.47)	0.00525 (0.93)
RSKE	0.00417 (0.34)	0.0096 (0.60)	-0.00106 (-0.03)	0.000804 (0.11)
FXVOL	4.764* (1.73)	1.239 (0.31)	0.574 (0.58)	-0.181 (-0.99)
FXSKE	-0.0108 (-0.62)	-0.0135 (-0.55)	-0.0219 (-1.09)	0.000051 (0.01)
<i>Market Attributes</i>				
SIZE	-0.0615 (-0.29)	-0.375 (-0.98)	-0.0813 (-0.52)	-0.742*** (-7.76)
FinDev	-0.436 (-0.51)	0.503 (0.45)	0.504 (0.77)	0.167 (1.17)
OPENNESS	0.273** (2.76)	0.0506 (0.34)	0.346 (1.60)	-0.0904 (-1.68)
Rating	0.00316 (0.18)	0.0119 (0.31)	0.0508* (1.92)	-0.0116*** (-4.45)
Observations	138	138	103	103
Number of markets	23	23	18	18
Number of markets	0.277	0.14	0.355	0.931
Number of markets	YES	YES	YES	YES
Number of markets	YES	YES	YES	YES
Chi ² /F Value	12.49	17.23	37.54	597

Notes: This table reports estimated determinants of foreign and domestic biases in emerging and developed bond markets. The market classification is from BIS. Dependent variables are foreign and domestic biases defined as the deviations of a market's weight in the aggregate foreign and domestic bond investment portfolios from the market's weight in the world bond portfolio. RMEAN is the cumulative monthly return on local bond market index during the past 12 months. RVOL and RSKE are the standard deviation and skewness of monthly returns on bond indexes over the past 12 months. SIZE is the natural logarithm of aggregated value of outstanding bonds in a bond market. FXVOL and FXSKE are the standard deviation and skewness of monthly real effective exchange rates changes during the past 12 months, respectively. FinDev is the natural logarithm of the financial development indicator constructed in Svirydenka (2016). OPENNESS is the natural logarithm of the capital control index from Table 4dii of the Economic Freedom Network. Rating is the average rating on foreign and local currency sovereign bonds from S&P Global Ratings. Models are estimated using panel-fixed effects by including time- and market-fixed effects. T values are calculated from standard errors clustered at the market level. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' calculations.

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Appendix

Table A1: Variable Definitions and Data Sources

Variables	Definitions	Data Sources
Foreign bias and domestic bias (FB and DB)	Deviation of a market's weight in the aggregate foreign (domestic) investment portfolio from the market's weight in the world bond portfolio: $FB_{i,t} = \log\left(\frac{W_{i,t}^{FI}}{W_{i,t}^M}\right) \text{ and } DB_{i,t} = \log\left(\frac{W_{i,t}^{DI}}{W_{i,t}^M}\right)$	International Monetary Fund's Coordinated Portfolio Investment Survey
Bond market size (SIZE)	Natural logarithm of aggregated value of outstanding bonds in a bond market	BIS debt securities statistics (DEBT_SEC2) Table C1
Return momentum (RMEAN)	Average monthly return on bond market index during the past 12 months	JP Morgan GBI Aggregate Diversified Index; Emerging Market Bond Index Global Diversified
Return volatility (RVOL)	Standard deviation of monthly return on bond market index during the past 12 months	
Return skewness (RSKE)	Skewness of monthly return on bond market index during the past 12 months	
Exchange rate volatility (FXVOL)	Standard deviation of monthly percentage changes of real effective exchange rates during the past 12 months	BIS monthly effective exchange rates
Exchange rate skewness (FXSKE)	Skewness of monthly percentage changes of real effective exchange rates during the past 12 months	
Financial development (FINDEV)	Natural logarithm of financial development indicator constructed in Svirydzienka (2016): 0 (less developed) to 1 (well developed)	Svirydzienka (2016)
Financial market openness (OPENNESS)	Natural logarithm of capital control index from Table 4dii of the Economic Freedom Network: 0 (fully controlled) to 10 (fully open)	Economic Freedom Network
Sovereign rating (RATING)	Average rating on foreign and local currency sovereign bonds from S&P Global Ratings	Bloomberg

BIS = Bank for International Settlements.

Source: Authors' calculations.