The replacement of safe assets in the U.S. financial bond portfolio and implications for the U.S. financial bond home bias

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Abstract

Using a unique dataset of U.S. portfolio investment in foreign bonds from 2003 to 2011, we document the evolution of the sectoral components of home bias in the U.S. bond portfolio: home bias in government, corporate, financial, and non-financial bonds. We show that behind the relatively high and fairly stable U.S. home bias in total bonds is a much lower and steadily declining home bias in bonds issued by the financial sector. One explanatory factor behind the evolution of the financial bond home bias is that it is mostly the foreign financial sector that appears to have met U.S. demand for “safe” investment assets by expanding its supply of high-grade dollar denominated debt. Finally, focusing on just the foreign segment of the U.S. portfolio, we show that the geographical composition of the U.S. foreign financial bond portfolio is also strongly related to the ability of foreign financial institutions to issue high-grade debt that is dollar-denominated.

JEL Classification: F21, F34, G11, G20

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1 Introduction

A large literature has studied the phenomenon of home bias in equities since the seminal work of French and Poterba (1991). Bond holdings and the associated home bias have received much less attention. The studies that do explore the composition of bond portfolios focus on aggregate bond holdings (Burger and Warnock, 2003 and Burger and Warnock, 2004 for the U.S.; DeSantis and Gerard, 2006 and Lane, 2005 for euro-area countries; Fidora et al., 2007). Using a unique dataset derived from security-level data on U.S. portfolio holdings of foreign securities, we go beyond the aggregate U.S. bond portfolio and we document to the best of our knowledge for the first time the evolution of the sectoral composition of the U.S. bond bias for the period 2003-2011. We document the U.S. home bias in government, corporate, financial and non-financial sector bonds. Our main data source is the security-level data underlying the annual Treasury International Capital (TIC) surveys of U.S. portfolio holdings of foreign securities. Because the TIC data are at the underlying security level, we are able to distinguish corporate from government debt and financial sector debt from nonfinancial corporate debt. Our most interesting finding is that behind the fairly stable and relatively high aggregate bond bias is a relatively low and steadily declining (apart from a brief spike in 2008) home bias in bonds issued by the financial sector.

While our annual data allow us to document the evolution of the U.S. home bias in financial bonds (FBHB), we need a longer time series to be able to explore its main determinants. To this end, we construct quarterly series for the FBHB for the period 2003Q1-2011Q4, using the same methodology and data sources as for the annual series, but using some mild assumptions for the quarterly changes in the sectoral composition of the U.S. holdings of foreign bonds. We then show that the steady decline in the U.S. financial bond home bias is associated with an ongoing U.S. investor preference for high-grade U.S. dollar-denominated (USD) financial sector debt. In particular, we find a strong negative relation between the U.S. home bias in financial bonds and the share of high-grade USD bonds in total financial bond issuance by the rest of the world. The result holds if we instrument this issuance share by (i) a measure of the availability of U.S. government safe assets following Krishnamurthy and Vissing-Jorgensen (2012), or (ii) by foreign GDP per capita. We control for the return covariance of bonds issued by the U.S. and the foreign financial sectors as well as for the excess return on foreign financial bonds.

These findings relate to the literature and ongoing policy debate on safe assets. Considerable attention has been paid to the role of structured investment products in providing portfolio alternatives that seemingly offered limited credit risk but with somewhat higher investment returns than investments in Treasury securities in the lead-up to the global financial crisis. Indeed, most asset-backed securities issued in the United States between 2003 and 2007 were rated AAA (Bernanke et al, 2011). Post-crisis, a majority of these investments were revealed to have been both highly illiquid and highly risky, and demand for and issuance of all types of asset-backed securities fell sharply in the years post-crisis (Federal Reserve, 2010). But investor demand for suitable safe portfolio alternatives that offer some degree of investment
return remains. Gorton and Pennachi (1990) and, more recently, Gorton, Lewellen, and Metrick (2012) and Krishnamurthy and Vissing-Jorgensen (2012) describe the mechanism by which the financial sector is able to expand the supply of debt to meet the demand for safe and liquid investment assets. In this paper we show that for U.S. bond investors, it is mostly the foreign financial sector that appears to be filling this role.

By documenting the sectoral composition of the U.S. home bias in bonds and exploring more specifically the factors behind the evolution of the home bias in financial bonds, his paper also relates to the growing literature on open economy macroeconomics that presents various explanations of the home bias phenomenon in the context of open economy general equilibrium models with portfolio choice (Coeurdacier and Rey, 2011 for an overview of the literature; Hnatkovska, 2008 among others).

Finally, using an annual panel of 39 countries for the period 2003-2011, we show that the supply of financial debt with the same ”safe” characteristics (namely high-grade and dollar denomination) also plays a role in the geographical composition of the foreign segment of the U.S. bond portfolio. Controlling for bond returns, returns covariances, and variables that are standard in the gravity literature, we find that the shares the U.S. bond investors allocate to individual countries are positively related to the ability of these countries’ financial institutions to issue dollar debt that is high grade. These results are strongly statistically significant, and are robust to a number of alternative specifications and estimators.

The theoretical motivation for our empirical work comes from portfolio theory, as well as from the literature on the role of transaction and information costs on the decision of investors to hold foreign assets (see for example Martin and Rey (2004) asset trade general equilibrium model with transaction and information costs) as dollar denomination reduces both the transaction costs and the costs associated with hedging currency risk while at the same time highly rated debt might be associated with lower information costs. In the panel estimations we control for factors that are standard in the empirical literature that uses gravity-type models.

The rest of the paper is structured as follows. In Section 3 we document the evolution of the U.S. home bias in government, corporate, financial and non-financial sector bonds. Section 3 explores the factors behind the evolution of the financial bond home bias. In Section 4 we focus on the foreign segment of the U.S. financial portfolio and explore how the factors that drive the aggregate financial bond home bias are also relevant for the geographical composition of the U.S. foreign financial bond portfolio. Section 5 concludes and outlines possible implications.
2 Home bias in the U.S. bond portfolio

The phenomenon of equity home bias has been well documented in the literature starting with the seminal work of French and Poterba (1991). The literature on home bias in bonds, however, is rather limited and the existing studies have focused on the bias in the investors’ total bond portfolio (Burger and Warnock, 2003 and Burger and Warnock, 2004 for the U.S.; DeSantis and Gerard, 2006 and Lane, 2005 for euro-area countries; Fidora et al., 2007). In this paper we use a unique security-level dataset to document the evolution of the sectoral composition of the bond bias in the U.S. bond portfolio for the period 2003-2011. We construct the U.S. home bias in government, corporate, financial and non-financial sector bonds.

Our main data source is the security-level data underlying the annual Treasury International Capital (TIC) surveys of U.S. portfolio holdings of foreign securities.1 Because the TIC data are at the underlying security level, we are able to distinguish corporate from government debt and financial sector debt from nonfinancial corporate debt. In addition, we use data from Flow of Funds to construct the U.S. holdings of domestic bonds that are part of the total U.S. bond portfolio; we use data from the BIS Quarterly Review to construct the foreign and total world sectoral bond market capitalization.2

We use the standard definition of home bias in the literature to compute the aggregate bond home bias (BHB) in the U.S. portfolio:

\[ \text{BHB} = 1 - \frac{\text{U.S. holdings of foreign bonds}}{\text{Total U.S. bond portfolio}} \times \frac{\text{Foreign bond market cap}}{\text{World bond market cap}} \]

Aggregate bonds refer to all government and corporate bonds. The sectoral components of the bond bias are calculated analogously for bonds issued by the particular sector of interest. For example, the financial bond bias is calculated as:

\[ \text{FBHB} = 1 - \frac{\text{U.S. holdings of foreign financial bonds}}{\text{Total U.S. financial bond portfolio}} \times \frac{\text{Foreign financial bond market cap}}{\text{World financial bond market cap}} \]

In the top panel of Figure 1 we confirm the empirical fact, documented in the literature, of a relatively high but pretty stable aggregate bond home bias (BHB) (solid line). Aggregate

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1The Treasury International Capital (TIC) survey collects data at the underlying security (CUSIP or ISIN) level from U.S. resident custodians, broker-dealers, and institutional end-investors who hold foreign debt securities or foreign equity on their own behalf or for U.S.-resident clients. Data are collected annually as of end-December.

2A Data Appendix provides details on the data sources for calculating measures of the U.S. government, corporate, financial, and non-financial bond home bias for the period 2003-2011.
bond bias has been hovering near 0.90 for the last ten years, which means the share of foreign bonds in the U.S. total bond portfolio is only a tenth of their share in the world bond market capitalization. Once we decompose total bonds into government bonds and corporate bonds (GBHB and CBHB respectively) it is clear that behind the relatively high and stable aggregate bias is a much lower and more volatile home bias in corporate bonds. Next, we decompose corporate bonds into bonds issued by the financial and the non-financial sector and plot the associated bias (FBHB and NFBHB, respectively) in the bottom panel of Figure 1. The U.S. bias in financial bonds is relatively low compared to the other sectors and has been steadily declining after its brief spike during the financial crisis. The Figure also shows that the evolution of the corporate bonds bias is driven almost entirely by the bias in financial bonds. Therefore, by looking beyond the aggregate bond bias we are able to show that behind the fairly flat and relatively high aggregate bond bias is a steadily declining and relatively low home bias in bonds issued of the financial sector.

In Figure 2 we present the components of the U.S. FBHB ratio and show that it is the share of foreign financial bonds in the U.S portfolio that determines the observed path of the financial bond bias: this share has grown faster than the foreign share of financial debt outstanding. Interestingly, the U.S. investors increased their holdings of foreign financial bonds even as they held less domestic financial bonds (Figure 3).

The literature has documented and studied more extensively the home bias in equities. While the U.S. foreign portfolio is more heavily weighted towards equity, at 30% bonds are a non-negligible share of the total (see Figure 4). To relate our findings to the literature on equity home bias, we compare the U.S. total bond home bias (BHB) and home bias in bonds issued by financial institutions (FBHB) with the U.S. equity home bias (EHB). Figure 5 shows first, that the aggregate bond bias is much higher and flatter than the equity bias; and second, that the level of home bias in financial bonds comes relatively close to that of the EHB. Finally, the FBHB declined much more steeply and peaked more sharply in 2008 than the EHB; in the post-crisis period, FBHB continued to decline sharply while the EHB has remained pretty stable.

3 Determinants of the U.S. financial bond home bias (FBHB)

The question we ask in this Section is what factors contribute to the observed evolution in the FBHB in the period 2003-2011.
3.1 Changes in the composition of the U.S. financial bond portfolio

A closer look at the composition of the U.S. portfolio of foreign financial bonds in terms of characteristics reveals that the share of U.S. dollar-denominated (USD) high grade financial bonds has been steadily rising (Panel 2 in Figure 6) and in 2011 it reached a level three-times as high as in 2003. We define here high grade bonds as those rated AA- and above. Interestingly, that share has been steadily increasing even as it has become harder to get a high credit rating during and after the financial crisis than before the crisis. While part of this high grade USD share increase is sell-off of lower grade debt, an important part is from new debt issuance and this is precisely what we will see in the remainder of the paper. We will show that when foreign financial institutions are able to issue debt in dollars that is highly rated, the U.S investor is less home biased.

The role of demand for highly-rated, dollar-denominated "safe" assets in the build-up to the financial crisis was a feature of both U.S. and foreign portfolios, and has been considered by both policy makers and by academics. Cabarello (2010) argues that the rise in global demand for safe debt instruments beyond those that could be adequately met by the financial sector through securitization was in fact a root cause of the financial crisis. Bernanke et al (2011) and Bertaut et al (2011, 2012) document how capital inflows to the United States from foreign official investors including those in the "saving glut" countries were largely invested in very safe U.S. Treasury and U.S. government agency securities. Their acquisitions absorbed roughly 80 percent of the increase in Treasuries and agencies outstanding over the four years from end-2003 through 2007. By effectively taking safe U.S. debt off the market and lowering its yields, this encouraged other investors - including European investors - to acquire U.S. asset-backed securities (ABS), the majority of which were rated AAA, as an investment alternative that appeared to offer slightly higher returns with little apparent increase in risk. In large part, this demand was met by the shadow banking system’s creation of assets that were "seemingly safe and seemingly liquid". With the onset of the crisis, demand for ABS dried up, and issuance of ABS in the U.S. and out of offshore centers such as in the Cayman Islands has fallen off to a fraction of its previous rate. But at the same time, some of the factors that led to the decline of available safe assets leading up to the crisis in 2007 are even stronger in the aftermath of the crisis, as foreign official holdings of Treasury securities have continued to grow and increased holdings of Treasuries and agencies by the Federal Reserve have further reduced their availability to private investors.

In what follows we explore how the availability of safe debt issued by foreign financial in-
stitution relates to the steady decline of the FBHB in the buildup to and aftermath of the financial crisis.

3.2 The financial bond home bias and the issuance of "safe" debt by the foreign financial institutions

The sectoral decomposition of the bond bias in the previous Section is calculated on an annual basis for the period 2003-2011 as our main data source, the TIC U.S. claims surveys, is only available on an annual frequency. While these annual data allow us to document the evolution of the bias, we need a longer time series to be able to investigate further what the possible drivers are behind the observed FBHB. To this end, we construct quarterly series for the FBHB using the same methodology and data sources as for the annual series, but using some mild assumptions for the quarterly changes in the sectoral composition of the U.S. holdings of foreign bonds. More specifically, we use our annual observations for the sectoral decomposition of U.S. holdings of foreign bonds and interpolate the shares for the first three quarters of each year. We then apply these shares to quarterly cross-border holdings of foreign bonds by U.S. investors for 2003q1-2011q4 using the approach in Bertaut and Tryon (2007). The quarterly cross-border positions data in Bertaut and Tryon (2007) have been widely used in the literature (references). While not ideal, this approach allows us to at least shed some light on the factors that drive the FBHB.

Using our constructed quarterly FBHB we first test the relation between the FBHB and the share of financial bonds in total foreign bond issuance, \( \frac{\text{Fin. bond iss.}}{\text{Total bond iss.}} \). Superscript \( F \) denotes foreign. We find no statistically significant relation (Table 1, column (1)). Next, instead of the share of financial bonds in total foreign bond issuance, we use the share of high-grade dollar-denominated financial bonds in foreign total financial bond issuance, \( \frac{\text{High grade USD fin. iss.}}{\text{Fin. iss.}} \) (Table 1 column (2)) and show that the FBHB is strongly negatively related to the share of "safe" financial debt and not to financial debt in general.

Next, motivated by portfolio theory and the empirical literature on determinants of capital flows, we control for expected excess returns and returns covariances. As shown in Krishnamurthy and Vissing-Jorgensson (2013) the investors’ demand for safe assets drives a premium on safe assets that the financial sector then exploit. In our case we are interested in shedding some light on the forces behind the observed evolution of the home bias in financial bonds. Since a decline in the FBHB means that U.S. investors put more weight in their bond portfolio on foreign financial bonds relative to domestic financial bonds what we are interested in are the relative returns of these two financial sectors: the returns from investing in debt supplied by the foreign financial sector relative to the returns from debt issued by the domestic financial sector. We use monthly Barclays Live returns data for foreign financial high grade bonds denominated in U.S. dollars (high grade Yankee bonds) to construct the foreign excess return relative to similarly rated U.S. financial bonds. Barclays monthly returns data for
financial Yankee high grade bonds are available for 15 countries, mostly OECD countries (see Appendix for a country list). We use Barclays weighted index of foreign returns comprising these 15 countries. For the estimation, we follow the approach in Coeurdacier and Guibaud (2011) and use as a proxy for expected returns in a given quarter the actual realized return over the subsequent period. The expected returns variable is therefore:

\[ E_t(ER) = R_{t+1}^F - R_{t+1}^{US} \]

where \( F \) denotes the index of returns on foreign financial bonds denominated in dollars; \( US \) denotes the return on similarly rated U.S. financial bonds. The quarterly covariances between these returns are computed over 15- or 30-month rolling windows and the return covariance enters the equation with a lag.

The baseline equation we estimate is:

\[ \text{FBHB}_t = \gamma_0 + \gamma_1 E_t(ER) + \gamma_2 \text{Cov}_{t-1} + \gamma_3 \frac{\text{High grade USD fin. iss.}_t^F}{\text{Fin. iss.}_t^F} + \text{Trend} + \epsilon_t \quad (1) \]

We also control for the U.S. financial bond market capitalization. Since the dependent variable is bounded from above, the estimation is by MLE of the truncated regression.

The results in columns (3)-(4) in Table 1 show that the share of foreign issuance of financial bonds with "safe" characteristics continues to be a significant determinant of the FBHB. The relation is also economically significant. The point estimates show that if, on average, foreign financial institutions increase the share of high grade USD denominated debt in their total bond issuance from 10% to 20%, the U.S. FBHB declines from 0.70 (roughly its level in 2011) to 0.66, which is significant given the relative stability of the bond bias ratios in general. The expected excess return and covariance of returns do enter with the expected signs but are not statistically significant. In the specification in (4) we also interact the high grade USD issuance share variable with a time dummy for the second period of our sample; we do not find evidence that the strength of the relation between FBHB and our high grade issuance variable during and after the global financial crisis differs significantly from the one in the pre-crisis period. The specifications in (2)-(4) explain roughly 80% of the variation in the U.S. FBHB.

Next, to address the potential endogeneity of our issuance share variable, \( \frac{\text{High grade USD fin. iss.}_t^F}{\text{Fin. iss.}_t^F} \), we instrument it, first, by foreign real GDP per capita. The ability and willingness of foreign institutions to issue high-grade debt denominated in currency other than the local currency reflects a level of sophistication and depth of financial markets that is associated with a level of development that we now proxy with per capital income. The results, shown in Table 2 column (2), confirm our findings above. Second, we instrument \( \frac{\text{High grade USD fin. iss.}_t^F}{\text{Fin. iss.}_t^F} \)
by a measure of the availability of U.S. government supplied safe assets. As laid out in Gorton and Pennachi (1990) and, more recently, Gorton, Lewellen, and Metrick (2012) and Krishnamurthy and Vissing-Jorgensen (2012), the financial sector is particularly well able to expand the supply of debt to meet the demand for safe and liquid investment assets. We follow Krishnamurthy and Vissing-Jorgensen (2012) in constructing a measure of the U.S. government supply of safe and liquid assets that is then scaled by U.S. GDP. We add Agency securities and subtract the holdings of foreign official investors so that the measure captures the actual availability of these assets to the U.S. private investor:

\[ \text{Total government sector net supply less Federal Reserve and FOI holdings} \]
\[ = \text{U.S. Treasuries} + \text{GSE securities} + \text{Agency, GSE MBS and ABS} \]
\[ + \text{Reserves at the Federal Reserve} \]
\[ + \text{Currency} \]
\[ + \text{Net security repurchase agreements issued by the Federal Reserve} \]
\[ - \text{U.S. Treasuries, Agency and GSE-backed securities held by the Federal Reserve} \]
\[ - \text{U.S. Treasuries, Agency and GSE-backed securities held by FOI} \]

The results, shown in Table 2 column (1), confirm our findings above. In addition, in (3)-(4), we estimate similar regressions but use the foreign share in the U.S. financial bond portfolio as the dependent variable. Our main findings continue to hold. We also estimate similar specifications using full information maximum likelihood to further account for endogeneity problems. Preliminary results (not shown) confirm our main findings outlined above.

4 The U.S. foreign bond portfolio: geographical composition

In this Section we focus specifically on the foreign segment of the U.S. bond portfolio and show that even within the foreign segment of the U.S. bond portfolio, issuance of high grade dollar denominated bonds by financial institutions play a significant role in its geographical composition.

We find that U.S. investors were able to start replacing U.S. dollar-denominated highly rated bonds from the Caribbean (and even increase their holdings of highly rated bonds) with bonds with similar “safe” characteristics from other foreign countries that started issuing high-grade, dollar denominated financial sector debt more aggressively in the aftermath of the financial crisis. The CBC financial sector U.S. dollar-denominated high grade debt issuance share plummeted from 23% in 2007 to less than 2% in 2011. While we are mostly
concerned with the U.S. foreign bond portfolio, it is important to note that along with CBC, the U.S. issuance of financial debt also dropped over the period. The combined share of U.S. and Caribbean Banking Centers’ (CBC) U.S. dollar-denominated high grade financial issuance dropped by 26 percentage points, in large part reflecting the evaporation of the market for ABS and other structured investment products. However, issuance by a small group of mostly OECD countries (Select Group in Table 3) of U.S. dollar-denominated high grade debt increased both in level and share terms (Table 3), offsetting to a certain degree the drop from CBC and the U.S. The rise in issuance by these countries thus served to fill the gap in high grade financial debt supply.

We use an annual panel of 39 countries for the period 2003-2011. Our empirical work is done in a portfolio choice framework taking into account the return on bonds issued by individual countries and their covariance with the aggregate return on the U.S. foreign bond portfolio. Denote country i’s share in the U.S. foreign bond portfolio by $\phi_i$. Portfolio theory (Merton, 1969 and 1971) predicts that $\phi_i$ is related positively to the expected return $E(R_i)$ from country i’s securities and negatively to the covariance of i’s returns with the investor’s overall portfolio return $Cov_i$:

$$\frac{\partial \phi_i}{\partial E(R_i)} > 0 \quad \frac{\partial \phi_i}{\partial Cov_i} < 0$$

Denote by $\text{High grade USD fin. iss.}_{it}/\text{Fin. iss.}_{it}$ the share of high grade dollar denominated financial bond issuance in total foreign financial bond issuance. $\text{High grade USD fin. iss.}_{it}/\text{Fin. iss.}_{it}$ can also be interpreted as a proxy for transaction and information cost associated with U.S. holdings of foreign debt. From the theoretical literature on the role of transaction and information costs on the demand for foreign assets (Martin and Rey, 2004), we can expect:

$$\frac{\partial \phi_i}{\partial \text{High grade USD fin. iss.}_{it}/\text{Fin. iss.}_{it}} > 0$$

We estimate the following model:

$$\log(\phi_{it}) = \gamma_0 + \gamma_1 E_i(R) + \gamma_2 Cov_{it} + \gamma_3 \frac{\text{High grade USD fin. iss.}_{it}}{\text{Fin. iss.}_{it}} + Z_{it} \Gamma + \epsilon_{it} \quad (2)$$

The controls ($Z_{it}$) are mostly from the empirical literature on the determinants of capital flows.
4.1 Data and Variables

In all specifications the dependent variable is the share of country $i$’s financial sector bonds $\phi_{it}$ in the U.S. financial sector bond portfolio (in logs). The data are an annual panel of 39 countries for the period 2003-2011. Our main data source is the security-level data underlying the annual Treasury International Capital (TIC) surveys of U.S. portfolio holdings of foreign securities.\(^6\) With this framework we focus on the U.S investor’s international bond portfolio and while this approach ignores the domestic part of the overall investment portfolio, the analysis is informative about general drivers of portfolio shifts and trends of safe asset replacement.

Expected return $E_t(R_i)$ and covariance $Cov_{it}$ variables: for asset returns the empirical literature uses the countries’ stock and/or bond markets returns due to lack for disaggregated data. The assumption then is that the international investor holds the market in the foreign country. In this paper, however, our unique dataset actually represents the aggregate U.S. foreign bond portfolio; and with data on security prices and coupon rates for most of the bonds in our sample it allows us to construct the actual returns that the U.S. investor incurs in each foreign country and for the portfolio as a whole. All country returns we use in our empirical tests are weighted average returns of that country’s individual securities that the U.S. investor holds (using the market value of the security held). We follow the approach in Coeurdacier and Guibaud (2011) and use as a proxy for expected returns in a given year the actual realized return over the subsequent twelve months.\(^7\)

The covariance of returns variable $Cov_i$ is computed as the covariance of country $i$’s annual returns with the returns on the overall U.S. foreign bond portfolio. The return on the U.S. foreign bond portfolio is the weighted average of all individual bond returns using the TIC survey data. The covariance variable is not time varying since we only have annual data for country-specific bond returns from our TIC survey dataset.

For the control variables $Z_{it}$ we follow the empirical literature on the determinants of capital flows. For foreign countries’ financial wealth (size) measure we use their bond market capitalization. We include distance and common language (as a proxy for familiarity with destination country’s culture, laws, market operation, or common customs and practices), and the destination country’s trade share (expressed as the sum of exports and imports) in

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\(^6\)The Treasury International Capital (TIC) survey collects data at the underlying security (CUSIP or ISIN) level from U.S. resident custodians, broker-dealers, and institutional end-investors who hold foreign debt securities or foreign equity on their own behalf or for U.S.-resident clients. Data are collected annually as of end-December.

\(^7\)As a robustness check, we also constructed and used in some of the specifications the excess return for country $i$, which is calculated as the difference between that country’s return $R_i$ and the return on the overall U.S. foreign bond portfolio $R_p$. The return on the U.S. foreign bond portfolio is the weighted average of all individual bond returns using the TIC survey data. Since $R_p$ does not vary in the cross-section, the results are unchanged.
4.2 Results

Columns (1)-(4) of Table 4 show the results using OLS with time and country fixed effects. In specification (1) and (2) we include the three variables we are mostly interested in: expected bond returns, covariance of the bond returns, and the issuance share of high grade dollar-denominated debt, controlling for destination countries’ financial bond market capitalization. We include time fixed effects in both and country fixed effects in (2). Since our covariance variable is not time varying it does not enter in specification (2).

The results show that the geographical composition of the foreign bond portfolio is positively related to incentives that foreign bond issuers provide (high grade and dollar denomination). Our high-grade issuance variable is significant at the 1% level in (1), although this significance weakens somewhat in (2). The relationship is also economically significant, the point estimates show that if country $i$’s issuance share of high grade U.S. dollar-denominated debt increases from 0.0 to 0.1 its share in the U.S. foreign bond portfolio $\phi_i$ increases by 13%–15%.

All other variables also enter with the expected signs. As we would expect, the size of the destination country’s financial bond market is positively related to the share of that country in the U.S. bond portfolio. Even more importantly, our return variable that captures the country-specific returns that U.S. investors actually make on their foreign bond investments is strongly positively related with the country’s shares in the U.S. portfolio in contrast to the time series results in the previous Section. Hence, while in the aggregate an index of foreign financial bond returns does not appear to have an impact on the U.S. financial bond home bias, the differences in country-by-country returns do appear to have a significant relationship with the share of investment these countries receive from the U.S. investor. The result is also economically important. While previous research has captured such a strong positive relationship it has been in terms of a country’s overall equity or bond market returns. In this paper, however, we show that that relationship holds for the U.S. foreign financial bond portfolio with returns measured as the actual country returns that the U.S. investors receive. The covariance of countries’ returns with the return on the U.S. overall foreign bond portfolio also enters with the expected negative sign, indicating that diversification does play a role for the composition of the U.S. foreign bond portfolio.

Importantly, the results in Columns (3)-(4) show that the significance and magnitude of these results hold even when we control for other determinants of portfolio holdings that are common in the empirical literature. We include time fixed effects in both and country fixed effects in (4). Since our covariance variable is not time varying it does not enter in specification (4); distance and common language do not enter the specifications with country fixed effects either. The controls show with the expected signs and except for the trade share

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8See Appendix for more details on the data sources.
and GDP growth are statistically significant: U.S. investors clearly have a preference for debt issued by countries with English as the official language, and are deterred somewhat by debt issued by countries that are more geographically remote. The fact that trade enters with an insignificant coefficient is not surprising given that our dependent variable is the share of financial debt rather than debt more generally. We also include countries’ real GDP growth among the control variables as a possible pull factor for the geographical allocation of U.S. investment abroad. Although GDP growth enters with the expected positive sign, it is not statistically significant and its inclusion does not alter our results. Even more importantly, the inclusion of the controls does not weaken the strength of our main variables. With specifications (1)-(4) we explain between 67% and 85% of the variance in the data.

Similarly to our approach in the time series specification in the previous Section, to address the potential endogeneity of our issuance share variable, $\text{High grade USD fin. iss}_{it}$, we instrument it by countries’ real GDP per capita. The ability and willingness of foreign institutions to issue high grade debt denominated in currency other than the local currency reflects a level of sophistication and depth of financial markets that is associated with a level of development that we now proxy with per capital income. The results are shown in column (5) of Table 4. As an alternative instrument, we use budget (surplus)deficit-to-GDP as a proxy of a country’s financial health. The results are shown in column (6) of Table 4. The results in (5) and (6) show that our main findings still hold. The share of U.S. dollar-denominated high grade in foreign financial issuance is now an even stronger determinant of the geographical composition of the U.S. portfolio; the same is apparent for expected returns. Returns covariances still matter although less strongly than in our previous specifications.

5 Conclusions and Implications

Using a unique dataset derived from security-level data on total U.S. portfolio holdings of foreign securities, we analyze the factors that have driven U.S. investor holdings of foreign financial bonds since 2003 and the implications for home bias in the U.S. bond portfolio.

First, we document an ongoing U.S. investor preference for high-grade U.S. dollar-denominated financial sector debt. Prior to the global financial crisis of 2008, U.S. investors could readily acquire mortgage-backed and other asset-backed securities to fill this portfolio niche, as the overwhelming majority of these products were given high investment grade ratings because of their securitized structure. In the build-up to the crisis more and more of these products were issued through the Caribbean banking centers and were therefore recorded as foreign financial holdings in the U.S. portfolio. Post crisis, we show that for U.S. bond investors, it is mostly the financial sectors of other foreign countries that appear to be meeting the demand for seemingly safe investment assets by issuing more conventional bonds.

Second, we show that as a result of these developments, the home bias in the U.S. financial bond portfolio has been steadily declining in the past decade, apart from a brief spike in
2008. More specifically, we document the evolution of the sectoral components of the home bias in the U.S. bond portfolio: government, corporate, financial and non-financial bond home bias. By looking beyond the aggregate bond bias we are able to show that behind the fairly flat and relatively high aggregate bond bias is a steadily declining and relatively low home bias in bonds issued by the financial sector.

Third, we show that foreign financial firms appear to issue financial debt targeted at U.S. investors. The same is not true for bonds issued by other sectors or for bonds as a whole. It appears that financial firms in a select group of OECD and emerging market countries - most notably, Australia, Canada, the Netherlands, and Sweden - have expanded their U.S. dollar, high-investment grade issuance to fill the void that was previously met by in large part by structured investment products issued primarily in the United States and in offshore financial centers. More specifically, we show that the share of high grade dollar-denominated debt in foreign financial bond issuance is strongly negatively related to the U.S. home bias in financial bonds. The result holds if we instrument that issuance share by foreign GDP per capita or by a measure of the availability of U.S. government safe assets. We also control for the covariance of returns for bonds issued by the U.S. and the foreign financial sectors as well as for excess returns on foreign financial bonds.

Finally, using an annual panel of 39 countries for the period 2003-2011, we show that even within the foreign segment of the U.S. bond portfolio, issuance of high grade dollar denominated bonds by financial institutions play a significant role in its geographical composition. Controlling for bond returns, returns covariances and bond market capitalization, we find that the shares the U.S. bond investors allocate to individual countries are positively related to the ability of these countries’ financial institutions to issue dollar debt that is high grade. These results are strongly statistically significant, and are robust to a number of alternative specifications and estimators. Results are also robust to the inclusion of controls standard in the empirical literature such as distance, common language, trade shares, and GDP growth; as well as to instrumenting the share of high grade USD issuance with countries’ GDP per capita or government deficit-to-GDP. Given that our data covers the period before and after the financial crisis, our results explain how U.S. investors have replaced their holdings of foreign-issued structured debt products with high-grade dollar-denominated financial sector debt primarily issued by a select group of foreign countries.

Our analysis relates to recent research (Gorton, Lewellen, and Metrick (2012); Krishnamurthy and Vissing-Jorgensen (2012)) that explores the role of financial institutions in expanding debt issuance to meet demands for safe and liquid assets, a market supply response that was clearly at play in the expansion of the shadow banking sector pre-crisis and remains important in an environment of central bank large scale asset purchases and concerns over the credit-worthiness of sovereign debt.

In the post-crisis low interest rate environment, highly rated foreign financial institutions are finding it increasingly easy to tap the bond markets. However, a lesson of the financial crisis is that assets given a high investment rating by credit rating agencies did not necessarily turn
out to be low-risk ex post. Although high investment grade ratings appear harder to come by post crisis, a potential concern is that increased U.S. dollar-denominated debt issuance abroad could turn out to be a risky strategy for financial firms in those countries if their assets are largely in the form of domestic currency loans in their domestic market. While a full exploration of this potential concern is beyond the scope of this paper, this is not the case at least for Australian banks. As noted by the Reserve Bank of Australia (2010), Australian banks are fully hedged for the currency exposure generated by the increase in U.S. dollar debt issuance. This development suggests that while U.S. portfolio investors apparently are less willing to take on foreign currency risk or the hedging costs when investing in cross-border financial debt, another class of investors is apparently willing to take on specifically the risks associated with the currency hedge. Exploration of investor motivations and appetites across different foreign assets including equity and willingness to take on currency hedges as well as fixed-income investments should provide fertile ground for future research into cross-border investment.
References


Figure 1: Sectoral components of the U.S. home bias in bonds, 2003-2011
Figure 2: Financial bond home bias ratio and its components

Financial Bond Home Bias (BHB and FBHB) for the U.S.

Share of Foreign Financial Bonds in U.S. Financial Bond Holdings

Share of Foreign Financial Bonds in the World Financial Bond Market Portfolio
Figure 3: U.S. Holdings of Domestic and Foreign Long-term Bonds
Figure 4: Bonds vs Equity in the U.S. foreign portfolio
Figure 5: Financial bond and equity home bias
Figure 6: The U.S. foreign financial bond portfolio, 2003-2011
Table 1: Financial bond home bias and foreign issuance of financial high grade USD bonds

<table>
<thead>
<tr>
<th></th>
<th>Financial bond home bias (FBHB)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>Fgn. fin share (log)</td>
<td>-0.071</td>
</tr>
<tr>
<td></td>
<td>(0.271)</td>
</tr>
<tr>
<td>High grade USD in foreign fin. bond iss (log)</td>
<td>-0.038</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
</tr>
<tr>
<td>U.S. bond market cap. (log)</td>
<td>0.069</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
</tr>
<tr>
<td>Exp. excess return over US, Yankee fin.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Cov. of returns: US and Yankee fin., lag</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(0.408)</td>
</tr>
<tr>
<td>2007q4-2011q4*High grade USD sh. of foreign fin. bond iss</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Time trend</td>
<td>-0.003</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
</tr>
<tr>
<td>Observations</td>
<td>36</td>
</tr>
<tr>
<td>$\hat{R}^2$</td>
<td>0.51</td>
</tr>
</tbody>
</table>

*p-values in parentheses
High grade refers to ratings AA and above.
Truncated regression, MLE. Regressions include a constant.
The dependent variable is the home bias in the U.S. financial bond portfolio (FBHB) as defined in the main text.
Table 2: Financial bond home bias and foreign issuance of financial high grade USD bonds: Instrumental variables

<table>
<thead>
<tr>
<th></th>
<th>Financial bond home bias (FBHB)</th>
<th>Foreign fin. share in U.S. bond portf. (log)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>U.S. safe debt</td>
<td>( GDP^F ) per cap</td>
</tr>
<tr>
<td>High grade USD in foreign fin. bond iss (log)</td>
<td>-0.058</td>
<td>-0.059</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>U.S. fin. bond market cap (log)</td>
<td>0.095</td>
<td>0.098</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>Exp. excess return over US, Yankee fin.</td>
<td>-0.003</td>
<td>-0.004</td>
</tr>
<tr>
<td></td>
<td>(0.236)</td>
<td>(0.359)</td>
</tr>
<tr>
<td>Cov. of returns: US and Yankee fin., lag</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(0.323)</td>
<td>(0.331)</td>
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<tr>
<td>Time trend</td>
<td>-0.005</td>
<td>-0.005</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.809</td>
<td>-0.848</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.085)</td>
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<tr>
<td>Observations</td>
<td>36</td>
<td>36</td>
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<tr>
<td>( \hat{R}^2 )</td>
<td>0.81</td>
<td>0.80</td>
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</table>

* p-values in parentheses based on HAC standard errors.

High grade refers to ratings AA and above.

In (1)-(2) the dependent variable is the home bias in the U.S. financial bond portfolio (FBHB) as defined in the main text.
In (3)-(4) the dependent variable is the share of foreign financial bonds in the U.S. bond portfolio (log).
In (1) and (3) the high grade USD share of foreign fin. bond issuance is instrumented by the ratio of U.S. gov. safe assets to GDP as defined in the text.
In (2) and (4) the high grade USD share of foreign fin. bond issuance is instrumented by foreign real GDP per capita.
Table 3: High grade USD financial bond issuance shares, by region

Shares of Total Financial USD High grade Bond Issuance (in%)

<table>
<thead>
<tr>
<th></th>
<th>Caribbean BC</th>
<th>Select Group</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>4.32</td>
<td>3.94</td>
<td>84.07</td>
</tr>
<tr>
<td>2007</td>
<td>22.74</td>
<td>3.95</td>
<td>58.85</td>
</tr>
<tr>
<td>2011</td>
<td>1.80</td>
<td>23.92</td>
<td>53.35</td>
</tr>
<tr>
<td>Change 2007 to 2011</td>
<td>-20.93</td>
<td>19.96</td>
<td>-5.51</td>
</tr>
</tbody>
</table>

High grade refers to ratings AA and above
Select Group: Australia, Brazil, Canada, Hong Kong, Japan, Netherlands, Norway, South Korea, Sweden.
Table 4: U.S. foreign bond portfolio: panel estimation results

<table>
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<tr>
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<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fin. Bond Mkt Cap (log)</td>
<td>0.557</td>
<td>0.241</td>
<td>0.564</td>
<td>0.231</td>
<td>0.893</td>
<td>0.872</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.038)</td>
<td>(0.000)</td>
<td>(0.058)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>USD high grade fin iss share</td>
<td>1.574</td>
<td>1.339</td>
<td>1.372</td>
<td>1.039</td>
<td>13.36</td>
<td>10.49</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.065)</td>
<td>(0.016)</td>
<td>(0.039)</td>
<td>(0.002)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>Expected return, fin. (log)</td>
<td>0.166</td>
<td>0.158</td>
<td>0.178</td>
<td>0.186</td>
<td>0.254</td>
<td>0.325</td>
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<tr>
<td></td>
<td>(0.023)</td>
<td>(0.039)</td>
<td>(0.018)</td>
<td>(0.004)</td>
<td>(0.018)</td>
<td>(0.001)</td>
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<td>Covariance of returns, fin.</td>
<td>-1.345</td>
<td>-1.135</td>
<td>-0.155</td>
<td>-0.879</td>
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</tr>
<tr>
<td></td>
<td>(0.012)</td>
<td>(0.035)</td>
<td>(0.722)</td>
<td>(0.026)</td>
<td></td>
<td></td>
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<tr>
<td>Distance(log)</td>
<td>-0.820</td>
<td>-0.691</td>
<td>-0.639</td>
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<td>(0.008)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td></td>
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<td>Common language</td>
<td>1.127</td>
<td>0.828</td>
<td>0.789</td>
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<td>(0.013)</td>
<td>(0.002)</td>
<td>(0.004)</td>
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<tr>
<td>Trade (log)</td>
<td>-0.011</td>
<td>0.315</td>
<td>-0.224</td>
<td>-0.167</td>
<td></td>
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<tr>
<td></td>
<td>(0.939)</td>
<td>(0.459)</td>
<td>(-0.012)</td>
<td>(0.059)</td>
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<tr>
<td>GDP growth rate</td>
<td>1.708</td>
<td>3.117</td>
<td>4.157</td>
<td>6.779</td>
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<tr>
<td></td>
<td>(0.578)</td>
<td>(0.328)</td>
<td>(0.431)</td>
<td>(0.258)</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>IV</th>
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</thead>
<tbody>
<tr>
<td>Time fixed effects</td>
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<td>yes</td>
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<tr>
<td>Country fixed effects</td>
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<td>yes</td>
</tr>
<tr>
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<td>186</td>
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<td>Groups</td>
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<td>39</td>
</tr>
<tr>
<td>$\hat{R}^2$</td>
<td>0.67</td>
<td>0.69</td>
</tr>
</tbody>
</table>

$p$-values in parentheses. High grade refers to ratings AA and above.

All estimations include time dummies. Coefficients for the time dummy variables and the constant not shown.

(1)-(4): OLS estimation; (5): USD high grade fin iss share instrumented by the log of real GDP per capita.

(6): USD high grade fin iss share instrumented by the gov. deficit-to-GDP.
6 Appendix: Data description

6.1 Bond bias: methodology and data sources

Data sources:
- The U.S. holdings data source is the underlying security level data for the Treasury International Capital (TIC) survey of U.S. holdings of foreign securities. The TIC survey measures total U.S. portfolio holdings of foreign securities. Data are collected from major U.S. custodian banks, broker-dealers, and large institutional end-investors who invest in foreign securities or hold them on behalf of U.S.-resident end-investors. Data are collected annually as of end-December. The individual security level data provide information on current market value and current face value of holdings, currency of issue, coupon rates, current price, industry of issuer, and issue and maturity dates for each security as of end-December. The survey is available on annual basis 2003-2011.
- U.S. liabilities data: security level data from the TIC survey of foreign holdings of U.S. securities. The survey is available on annual basis 2003-2011.
- Flow of Funds (FOF) data from the Federal Reserve Board.
- BIS Quarterly Review data from the Bank for International Settlements.

Bond home bias \( (BHB) \) for the U.S. can be defined as follows:

\[
BHB = 1 - \left( \frac{r1_{BHB}}{r2_{BHB}} \right)
\]

\( r1_{BHB} \) (share of foreign bonds in U.S. bond holdings) can be expressed as:

\[
\frac{\text{U.S. holdings of foreign bonds}}{\text{U.S. holdings of foreign bonds + Total U.S. bonds outstanding - Foreign holdings of U.S. bonds}}
\]

Data for the respective components are from FOF:
- U.S. holdings of foreign bonds: FL263163003, ”Rest of the world; bonds; liability”
- Total U.S bonds outstanding
  \[
  = \text{FL253162005 (municipal row 1, Table L.211)}
  + [\text{FL893163005 (row 1, Table L.212)} - \text{FL263163003 (row 3, Table L.212)}] \text{ (corporate)}
  + \text{FL893161705 (agency and GSE row 1, Table L.210)}
  + \text{FL313161505 (treasury sec. row 1, Table L.209)}
  \]
- Foreign holdings of U.S. bonds
  \[
  = \text{FL263062003 (municipal row 12, Table L.211)}
  + \text{FL263063005 (corporate row 17, Table L.212)}
  + \text{FL263061705 (agency and GSE row 10, Table L.210)}
  + \text{FL263061105 (treasury sec. row 12, Table L.209)}
  \]
r2_BHB (share of foreign bonds in the world bond market portfolio) can be expressed as:

\[
\frac{\text{World holdings of foreign bonds}}{\text{World bond portfolio}}
\]

Data source is BIS Quarterly Review:
- World bond portfolio: the sum of all domestic debt securities outstanding (Table 16A, "All issuers") and all international bonds and notes securities outstanding (Table 14B, "All countries")
- World holdings of foreign bonds
  - Domestic bonds issued by the U.S. (Table 16A, "United States")
  - International bonds issued by the U.S. (Table 14B, "United States")

Financial bond home bias (FBHB) for the U.S. is defined as follows:

\[
\text{FBHB} = 1 - \left( \frac{r1_{FBHB}}{r2_{FBHB}} \right)
\]

r1_FBHB (share of foreign financial bonds in U.S. financial bond portfolio):

\[
\frac{\text{U.S. financial long-term (LT) claims on the world}}{\text{U.S. fin. LT claims on world + U.S. total fin. bonds outstanding - foreign hold. of U.S. fin. bonds}}
\]


U.S. total financial bonds outstanding: FL793163005 ("Financial business; corporate and foreign bonds; liability") from FOF.


r2_FBHB (share of foreign financial bonds in the world financial bond market portfolio):

\[
\frac{\text{World holdings of foreign financial bonds}}{\text{World financial bond portfolio}}
\]

Data source is BIS Quarterly Review:
- World financial bond portfolio: the sum of all domestic financial debt securities outstanding (Table 16B, "Financial institutions” total) and all international financial bonds and notes securities outstanding (Table 13B, sum of "Financial institutions" rows for Floating rate, Straight fixed rate, and Equity-related categories).
• World holdings of foreign financial bonds:
  World financial bond portfolio—
  – Domestic financial bonds issued by the U.S.(Table 16B, ”United States”)—
  – International financial bonds issued by the U.S.

The only difference in the construction of the quarterly series for FBHB compared to the annual series comes from the following series:

1. Quarterly U.S. financial long-term claims on the world are constructed using:
   • Interpolated annual share of financial in total corporate bond holdings from the TIC U.S. claims surveys that is then applied to:
   • Quarterly claims positions constructed following Bertaut and Tryon (2007).

2. Foreign holdings of U.S. financial bonds
   • Interpolated annual share of financial in total corporate foreign holdings of U.S. bonds from the TIC U.S. liabilities surveys that is then applied to:
   • Quarterly data on foreign holdings of U.S. corporate bonds from FOF (FL263063005 ”Rest of the world; U.S. corporate bonds; asset”).

6.2 Data sources for time series and panel regressions

The issuance data are from Thomson One.

U.S. government sector net supply of safe & liquid instruments: constructed using Flow of Funds data as follows:

\[
\begin{align*}
\text{(Total government sector net supply less Federal Reserve holdings =} & \\
= FL313161505 + FL403161705 + FL413065005 + FL713113003 + FL763025005+ \\
+ FL713125005 + FL713122605 + FL713124003 + FL712150003 – FL712050000 \\
- FL713061100 – FL713061705)
\end{align*}
\]

\[
\begin{align*}
\text{(Total government sector net supply less Federal Reserve and FOI holdings =} & \\
= FL313161505 + FL403161705 + FL413065005 + FL713113003 + FL763025005+ \\
+ FL713125005 + FL713122605 + FL713124003 + FL712150003 – FL712050000– \\
- FL713061100 – FL713061705 – FL263061130 – FL263061713)
\end{align*}
\]

FOF series mnemonics description

30
1. Total government sector net supply less Federal Reserve holdings
   FL313161505: Federal government; Treasury securities, including U.S. savings bonds; liability
   FL403161705: Government-sponsored enterprises; GSE issues; liability
   FL413065005: Agency-and GSE-backed mortgage pools; total mortgages; asset
   FL713113003: Monetary authority; depository institution reserves; liability
   FL763025005: U.S.-chartered depository institutions; vault cash; asset
   FL713125005: Monetary authority; currency outside banks; liability
   FL713122605: Monetary authority; checkable deposits due to rest of the world; liability
   FL713124003: Monetary authority; checkable deposits due to government-sponsored enterprises; liability
   FL712150003: Monetary authority; federal funds and security repurchase agreements; liability
   FL712050000: Monetary authority; federal funds and security repurchase agreements; asset
   FL713061100: Monetary authority; Treasury securities; asset
   FL713061705: Monetary authority; agency- and GSE-backed securities; asset

2. FOI holdings
   FL263061130: Rest of the world; Treasury securities held by foreign official institutions; asset
   FL263061713: Rest of the world; agency- and GSE-backed securities held by foreign official institutions; asset

**Countries in main panel estimation:** Argentina, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Cyprus, Denmark, Finland, France, Germany, Hong Kong, Hungary, Iceland, Indonesia, Ireland, Italy, Japan, South Korea, Luxembourg, Malaysia, Mexico, Netherlands, New Zealand, Peru, Philippines, Portugal, Russia, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom.

**Countries in 15-country sample panel** (specification (5)-(6) in Table 4): Australia, Brazil, Canada, Chile, Finland, France, Germany, Hong Kong, Japan, Malaysia, Netherlands, Spain, Sweden, Switzerland, United Kingdom.

**Bond market capitalization** (per country issuer of debt securities) data are from Bank for International Settlements (BIS) Quarterly Review June 2012.

**Trade shares** are calculated using U.S. exports to and imports from country $i$ (source: Direction of Trade Statistics (DOTS)) and total U.S. imports and exports (source: International Financial Statistics (IFS)).
Real GDP growth is calculated using GDP per capita (constant 2000 U.S.$) data from World Development Indicators (WDI).