International Asset Positions and Currency Hedging: Evidence from U.S. Investor Foreign Holdings*

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Abstract

Foreign investors value U.S. Treasuries for their safety and liquidity, but do U.S. investors see foreign sovereign bonds the same way? We use security-level data on the foreign holdings of all U.S. investors, together with fund-level data on the bond and foreign currency derivative positions of U.S. investment funds, to study what drives U.S. demand for foreign sovereign bonds. Holdings of these bonds track currency-hedged yield differentials far more closely than unhedged ones, and they rise when the convenience yield on foreign sovereign bonds is low relative to that on U.S. Treasuries. U.S. investors hold these bonds mainly for their returns, not their safety. Access to hedging also shapes this demand: funds that hedge respond more strongly to hedged returns, and funds that trade with better-capitalized FX dealers obtain better pricing and larger contracts. Funds that hedge more also hold more foreign sovereign bonds, and we find evidence that easier access to hedging raises these holdings.

JEL Classification: F21, F31, G11, G15, G23
Keywords: cross-border portfolio holdings, currency hedging, safe assets, FX dealers

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1 Introduction

U.S. investors hold far fewer foreign assets than standard portfolio theory predicts, a pattern long studied as the home bias puzzle (French and Poterba, 1991; Lewis, 1999; Coeurdacier and Rey, 2013). Foreign investors, for their part, pay a premium for the safety and liquidity of U.S. Treasuries (Krishnamurthy and Vissing-Jorgensen, 2012; Du, Im and Schreger, 2018b; Jiang, Krishnamurthy and Lustig, 2021). Whether U.S. investors value foreign sovereign bonds for similar safety and liquidity characteristics, or primarily for their returns, is less well understood. The question has become more salient as the convenience yield on U.S. Treasuries relative to other G10 sovereign bonds has turned negative (Du, Keerati and Schreger, 2026), which makes highly rated foreign sovereign debt a plausible alternative safe asset. Because much cross-border bond investment is currency hedged (Du and Huber, 2026; Nenova, Schrimpf and Shin, 2025), the intermediaries that supply this hedging may also shape how much foreign debt investors hold (Kubitza, Sigaux and Vandeweyer, 2025).

The first question we investigate is whether U.S. investors hold foreign-currency sovereign debt for safety and liquidity purposes, as foreign investors do with U.S. Treasuries, or hold these foreign sovereign assets for currency-hedged returns. The two motives lead to different predictions: if U.S. investors value foreign sovereign bonds as safe assets, their portfolio holdings should rise with the convenience yield on those bonds; instead, if U.S. investors are after returns, their holdings should follow the currency-hedged yield differential and fall as a larger part of the bond's return takes the form of a convenience yield.

The second question we investigate is whether currency hedging availability as a friction might limit U.S. investor holdings of foreign currency denominated assets. Specifically, we examine whether the capacity of dealers to supply currency hedging affects how much of this debt U.S. investors are willing to hold. Because hedging requires a dealer on the other side of the foreign exchange (FX) contract, constraints on dealers' balance sheets can make hedging more costly and lead to a tightening of the supply of currency hedges. As a consequence, U.S. investors who rely on currency hedges may hold less foreign-currency debt.

To answer these questions we examine granular data on what U.S. investors hold and on how these positions are hedged. We start with the Treasury International Capital (TIC) Survey of U.S. Ownership of Foreign Securities, an annual, security-level census of the foreign securities held by U.S. residents, broken down by type of investor. The TIC data provide a complete picture of U.S. investor holdings, which we use to document the currency composition of investments and then to test how U.S. holdings of foreign sovereign bonds respond to changes in relative asset returns and sovereign risk. However, the TIC data cannot tell us whether these investor positions are hedged. For this information, we turn to the SEC's Form N-PORT, in which U.S.-registered investment funds report their portfolio holdings. Data reporting includes investor fund use of foreign exchange (FX) forwards and swaps, along with the currency, notional amount, and counterparty of each

contract. Investment funds are the natural unit of observation for our analytics as they are the largest U.S. holders of foreign bonds and account for an even larger share of those denominated in foreign currencies. Observing a fund's foreign-currency bonds and its FX contracts in the same currency allows us to measure currency hedge ratios investment fund by fund for each quarter from 2019:Q3 to 2025:Q4, and to relate the currency hedge ratios to fund portfolio choice.

We first document that U.S. investors allocate a much smaller share of their foreign portfolios to safe assets than of their domestic portfolios. U.S. Treasuries and agency debt account for about a fifth of U.S. investors' domestic holdings, whereas government debt is only a small fraction of their foreign holdings, which consist mostly of equities, corporate bonds, and fund shares.

Turning to currency risk, U.S. investors take it on mainly through their foreign equity holdings, which funds largely leave unhedged. Their bond portfolios carry much less currency risk, because their foreign bonds are predominantly dollar-denominated or currency-hedged. Building on prior work documenting the dominance of the dollar in U.S. foreign bond holdings (Burger, Warnock and Warnock, 2018; Maggiori, Neiman and Schreger, 2020), we show that this pattern holds across all investor types. Where foreign-currency bond exposure does exist, it is concentrated among financial institutions. Mutual funds, depository institutions, and other financial firms hold more than a quarter of their foreign bonds in foreign currencies, compared with a tenth or less for nonfinancial investors. Because funds are also the largest holders of foreign bonds, they account for much of the aggregate foreign-currency bond exposure, and they hedge this exposure far more often than they hedge their equity holdings. Larger investment funds are more likely to hedge, and funds that hedge their G10-currency bonds typically hedge nearly all of the exposure. These foreign-currency positions are a small slice of U.S. bond portfolios, but they can loom large in the markets that issue them.[1]

These high-level results derive from analytics that proceed in three steps. First, using TIC data, we test how U.S. investors' holdings of foreign sovereign bonds respond to currency-hedged and unhedged yield differentials. We also find that these holdings increase when the convenience yield on foreign sovereign bonds is low and the convenience yield on U.S. Treasuries is high. A one percentage point increase in the hedged yield differential is associated with an increase of about 0.12 to 0.15 percentage point in the share of G10 sovereign bonds in U.S. investors' sovereign bond portfolios. Both patterns indicate that U.S. investors hold foreign sovereign bonds, including highly rated G10 sovereign bonds, mainly for their returns rather than for asset safety or liquidity. The same pattern holds, though more weakly, for emerging market sovereign bonds. Across investor types, these patterns are strongest for pension funds and nonfinancial investors, whereas the holdings by depository institutions and insurers are largely unresponsive to returns.

[1]Foreign investors own about 20 percent of outstanding local-currency sovereign debt in the average emerging market economy, and as much as 40 percent in some (So, Valente and Wu, 2019). Using transaction-level data from Colombia, De Leo, Keller, Simoncelli, Villamizar-Villegas and Williams (2026) show that foreign investors' purchases of local-currency sovereign bonds come with matching purchases of the local currency, so that their flows move bond yields and the exchange rate together. Bertaut, Bruno and Shin (2026) show that U.S. investors' flows into these markets respond to duration and exchange rate risk.

Second, using the N-PORT data, which allow us to observe hedging directly, we test fund allocations in relation to currency-hedged returns and convenience yields on foreign bonds, considering various drivers of differential responsiveness. Through this analysis we establish that funds allocate more to G10 sovereign bonds, at both the extensive and intensive margins, when currency-hedged returns are more attractive and when the convenience yield on foreign sovereign bonds is low relative to that on U.S. Treasuries. A one percentage point increase in the currency hedged yield differential raises the probability that a fund holds G10 sovereign bonds by about 3 percentage points. Funds are also more likely to hold G10 sovereign bonds when they already hold more U.S. Treasuries and foreign-currency risky debt, consistent with a diversification motive. At the intensive margin, U.S. investment funds reduce these holdings when the VIX rises, contrary to what a safe-haven motive would imply. Investor holdings of EME sovereign bonds behave differently: funds' allocations do not rise with hedged EME returns and are driven instead by sovereign credit risk. Finally, funds that hedge their FX exposure respond more strongly to hedged returns than funds that do not, indicating that the ability to hedge shapes demand for foreign-currency bonds.

Third, motivated by this last finding, we examine the supply side of FX hedging through empirical strategies that link the pricing and size of funds' FX contracts to the balance-sheet capacity of the dealers with which they transact. Funds transacting with better-capitalized dealers obtain more favorable pricing and enter into larger contracts. A one percentage point increase in a dealer's capital ratio improves pricing by about 0.9 basis points, and this effect survives when we compare the same fund, in the same currency and quarter, across dealers with different capital ratios. Funds whose dealers are better capitalized also take larger forward positions relative to their assets, and funds that hedge more hold more foreign sovereign bonds. Using dealer capital ratios as an instrument for hedging, we find that easier access to hedging raises funds' holdings of foreign sovereign bonds. Hedging frictions thus matter for the demand for foreign sovereign bonds among U.S. investors seeking currency-hedged returns.

Related literature. Our paper relates to three literatures: international portfolio choice and home bias, safe assets and convenience yields, and currency hedging and the intermediaries that supply these contracts. Taken together, they bear on why U.S. investors hold foreign sovereign bonds and on how access to currency hedging shapes that choice.

The first literature to which we contribute is on international portfolio choice and home bias. Hau and Rey (2008) document substantial heterogeneity in home bias across mutual funds, and Curcuru, Thomas, Warnock and Wongswan (2011) find that U.S. investors do not chase past returns in their foreign equity allocations and partly rebalance away from past winners. Closest to our focus on the importance of currency exposures, Burger, Warnock and Warnock (2018) and Maggiori, Neiman and Schreger (2020) show that home bias in bonds is to a large extent a home currency bias: investors disproportionately hold bonds denominated in their own currency, including bonds issued by foreign borrowers. U.S. investors avoid local-currency bonds whose returns have been

volatile and negatively skewed (Burger and Warnock, 2007), and their allocations to emerging market local-currency bonds rose steadily after the global financial crisis, in response both to low U.S. long-term interest rates and to the fundamentals of the recipient countries (Burger, Sengupta, Warnock and Warnock, 2015). Bertaut, Bruno and Shin (2026) show that U.S. investors' flows into these bonds are shaped by exchange rate and duration risks, which interact through valuation changes. We provide fund-level, rather than purely aggregate, evidence on why U.S. investors hold foreign-currency sovereign bonds, the part of their foreign portfolios in which currency risk must be either borne or hedged, and examine these motives at both the extensive and intensive margins.

The second literature is on safe assets and convenience yields. Building on Krishnamurthy and Vissing-Jorgensen (2012), Du, Im and Schreger (2018b) measure the convenience yield of U.S. Treasuries relative to other G10 sovereign bonds using covered interest parity deviations between sovereign bond yields, and Jiang, Krishnamurthy and Lustig (2021) link foreign investors' demand for U.S. safe assets to the value of the dollar. Du, Keerati and Schreger (2026) show that the convenience yield on U.S. Treasuries has turned negative relative to other G10 sovereign bonds, while the dollar's convenience yield has remained positive. Our work applies their decomposition of hedged yield differentials to data on U.S. investors' holdings of foreign sovereign bonds in order to separate return-seeking from safety-seeking demand. U.S. investors' holdings of foreign sovereign bonds rise when the convenience yield on foreign sovereign bonds is low and the convenience yield on U.S. Treasuries is high, which points to returns rather than safety as the main motive for investment.

Third, we contribute to the literature on the currency hedging of international portfolios and on intermediary asset pricing in foreign exchange markets. Du and Huber (2026) document a sharp rise in foreign institutional investors' U.S. dollar holdings and, after the global financial crisis, in their hedge ratios; Nenova, Schrimpf and Shin (2025) show that FX swap volumes track the hedging activity of advanced-economy bond investors and are closely associated with U.S. portfolio debt flows; and Kubitza, Sigaux and Vandeweyer (2025) find that euro area investors reduce their holdings of U.S. dollar bonds when the cross-currency basis widens. Closest to our setting, Sialm and Zhu (2024) study the currency forward positions of U.S. international fixed-income mutual funds and find that most funds use forwards but hedge only a modest share of their currency exposure. On the supply side, the balance-sheet capacity of financial intermediaries is found to matter for asset prices (He, Kelly and Manela, 2017) and, in FX markets, for deviations from covered interest parity (Du, Tepper and Verdelhan, 2018a; Cenedese, Della Corte and Wang, 2021) and for exchange rates (Correa and DeMarco, 2025; Brauer and Hau, forthcoming). These papers focus mainly on foreign investors' hedging of dollar assets or on the pricing of FX derivatives. Our contribution is specifically on U.S. investors' hedging of foreign-currency assets. We use variation within dealer–fund relationships to show that dealer balance-sheet capacity affects the prices and sizes of funds' FX contracts and their hedging. We document a strong association between funds' hedging and U.S. investor holdings of foreign sovereign bonds. The results provide micro-level

evidence that hedging frictions on the supply side of the FX market reach end investors and shape their demand for foreign sovereign bonds.

The remainder of the paper proceeds as follows. Section 2 lays out the conceptual framework organizing our empirical analysis. Section 3 describes the TIC and N-PORT data and presents stylized facts on U.S. investors' foreign holdings and on funds' currency hedging. Section 4 examines the determinants of aggregate foreign sovereign bond holdings using TIC data. Section 5 examines the determinants of fund-level holdings using N-PORT data, including the analysis of FX dealer balance sheets and fund hedging. Section 6 concludes.

2 Conceptual Framework

Our empirical analysis is organized around two motives for holding foreign-currency-denominated assets, returns and diversification, and one friction, arising from the supply side of the FX hedging market, that can limit investors' ability to act on those motives.

Returns versus non-pecuniary motives. Consider a U.S. investor deciding whether to hold a foreign sovereign bond denominated in currency c rather than a U.S. Treasury security. If the investor hedges the currency risk of the foreign bond back into dollars using an FX basis swap contract, following Du, Keerati and Schreger (2026) the resulting currency-hedged yield differential can be decomposed as

$$\begin{aligned} \Delta y_{c,t}^{\text{hedged}} &= \underbrace{y_{c,t}^{1\text{y}} - y_{US,t}^{1\text{y}}}_{\text{Unhedged yield differential}} - \underbrace{\rho_{c,t}}_{\text{FX Returns (FX swap basis)}} \\ &= \underbrace{\left(r_{c,t} - \rho_{c,t}\right) - r_{US,t}}_{\text{Dollar Convenience Yield}} + \underbrace{\left(r_{US,t} - y_{US,t}\right)}_{\text{UST Convenience Yield}} - \underbrace{\left(r_{c,t} - y_{c,t}\right)}_{\text{Foreign Convenience Yield}} \end{aligned} \tag{1}$$

where $y_{c,t}^{1y}$ and $y_{US,t}^{1y}$ denote one-year sovereign bond yields in currency c and in U.S. dollars, $\rho_{c,t}$ is the FX swap basis (the cost of swapping currency c into dollars), and $r_{c,t}$ and $r_{US,t}$ are the corresponding short-term risk-free rates. This decomposition first separates the hedged yield differential into a component reflecting FX returns and a component reflecting relative sovereign credit and duration risk (the unhedged yield differential).[2] The decomposition further becomes three convenience yield terms that capture the non-pecuniary, safety-and-liquidity value investors place on holding dollars, U.S. Treasuries, and foreign sovereign bonds, respectively.

This decomposition delivers two testable predictions used to organize our empirical work. If

[2] Although U.S. investors, particularly funds, typically hedge foreign currency partially using FX forwards rather than fully hedging with equivalent-tenor swaps, we express the above decomposition using swaps for simplicity and to facilitate direct translation into convenience yield components. Our subsequent analysis is based on swap hedging, though results using forward hedging are similar.

U.S. investors hold foreign sovereign bonds primarily to earn the compensated hedged return, either because these bonds offer superior risk-adjusted returns or because dollar funding is scarce, then holdings should increase with the hedged yield differential. This differential can widen through three channels: (1) a rise in the dollar convenience yield, which compensates U.S. investors for providing dollars and investing in foreign currency bonds instead; (2) a decline in the foreign bond convenience yield, meaning investors sacrifice less in foregone non-pecuniary benefits (such as safety or liquidity premia); or (3) an increase in the Treasury convenience yield, which raises the implicit cost of holding U.S. Treasuries due to their non-pecuniary benefits, making foreign bonds relatively more attractive. If, instead, U.S. investors hold foreign sovereign bonds for the safety and liquidity services those assets provide directly (a safe-haven motive parallel to their demand for U.S. Treasuries at home), then holdings should rise with the foreign bond's own convenience yield, independent of the hedged return. We use this framework in Sections 4 and 5 to interpret the responsiveness of aggregate (TIC) and fund-level (N-PORT) holdings of foreign sovereign debt to hedged returns and their convenience-yield components.

Separately from this return channel, investors may hold foreign-currency assets for diversification: to move away from concentrated exposure to U.S. safe assets, or as a complement to other foreign-currency risk exposures already in the portfolio. We test for this motive directly in our fund-level analysis by examining whether funds' existing holdings of U.S. Treasuries and foreign-currency risky assets predict their propensity to hold G10 sovereign bonds.

Hedging frictions. The return-versus-safety framework above implicitly assumes that investors who wish to hedge currency risk can do so costlessly. In practice, FX hedging requires transacting with a dealer counterparty. A growing literature on intermediary asset pricing argues that dealers' willingness and ability to supply FX liquidity depends on their balance-sheet capacity (e.g., He, Kelly and Manela, 2017; Correa and DeMarco, 2025; Brauer and Hau, forthcoming). When dealers' capital is constrained, the price and quantity of FX hedging they are willing to supply to their counterparties deteriorates, raising the effective cost of hedging for end investors such as funds. Such hedging frictions, in turn, could affect investor allocation to foreign currency assets.

This friction implies a testable channel linking intermediary balance sheets to fund portfolio choice:

$$\text{Capital Ratio}_{b,t} \downarrow \rightarrow \text{Hedging Cost}_{f,b,c,t} \uparrow \rightarrow \text{FX Hedging Likelihood \& Amount}_{f,c,t} \downarrow \rightarrow \text{FC Investment}_{f,c,t} \downarrow$$

where b indexes FX dealers, f funds, and c currencies. If this friction binds, funds' holdings of foreign-currency safe assets should depend not only on the hedged-return and diversification motives above, but also on the balance-sheet capacity of the dealers with which they transact. We test this channel in Section 5.2 by combining fund-level FX contract data with measures of dealer capital.

3 Data on U.S. Investor Foreign Holdings

This section documents the foreign positions of U.S. investors that motivate our analysis, moving from the aggregate to the fund level. We use TIC data, which cover the foreign securities holdings of all U.S. investors, to describe how U.S. investors allocate their portfolios between domestic and foreign assets, across asset classes and currencies, and across investor types (Section 3.1). We combine this with data from the Financial Accounts of the United States on U.S. domestic asset holdings to construct a complete picture of U.S. investors' portfolio allocations. We then zoom in on U.S. investment funds using N-PORT data. As investment funds are the largest U.S. holders of foreign bonds, and account for an even larger share of foreign-currency-denominated bonds, N-PORT captures the component of the TIC holdings in which currency risk matters most (Section 3.2). Unlike TIC, N-PORT also reports funds' FX derivative positions, which allows us to document how funds hedge the currency risk of their foreign holdings (Section 3.3). Together, these facts set the stage for the two questions posed in the introduction: what drives U.S. investors' demand for foreign-currency assets, and whether access to currency hedging shapes that demand.

3.1 Aggregate Holdings: Evidence from TIC

We measure U.S. investors' holdings of foreign securities using Treasury International Capital (TIC) data. Specifically, the annual Survey of U.S. Ownership of Foreign Securities (SHC) collects comprehensive, security-level data on foreign long-term and short-term securities (equities, long-term debt, and short-term debt) held by U.S. residents. The security-level detail allows holdings to be classified by issuer country, currency of denomination, asset class, and issuer type, providing a benchmark measure of the stock of U.S. cross-border portfolio investment against which we compare the fund-level N-PORT holdings described in Section 3.2.

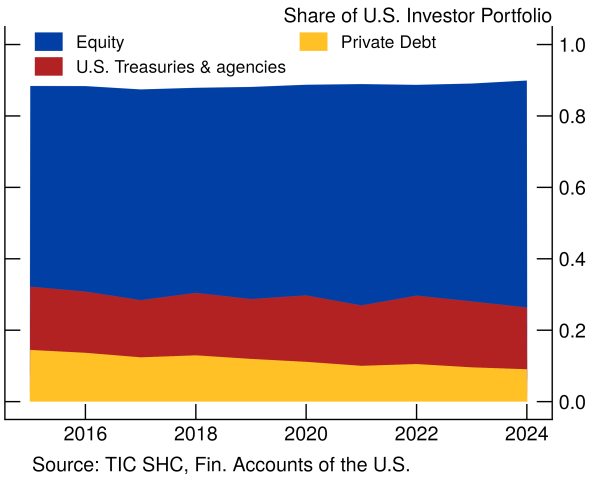
U.S. investors hold a larger share of safe assets at home than abroad. U.S. Treasuries and agency debt (in red in Figure 1, panel (a)) account for about a fifth of their domestic portfolio, while their foreign portfolio consists mostly of equities, corporate debt, and fund shares (in blue and yellow in panel (b)). However, they still shy away from currency risk, holding foreign bonds that are denominated predominantly in U.S. dollars, as shown in Figure 2.[3]

Foreign bonds are held by several types of U.S. investors. Funds, primarily mutual funds, hold the most foreign bonds, followed by insurance companies, other financial organizations (including bank and financial holding companies, and broker-dealers), and nonfinancial organizations (Figure 3). Although every category of investor maintains a majority of foreign bonds denominated in

[3]This preference for dollar-denominated foreign bonds has been documented in earlier work using TIC data. Bertaut et al. (2013) show that about 70 percent of U.S. holdings of European debt securities in 2011 were denominated in dollars, with government debt the only sector in which holdings were not predominantly dollar-denominated. Burger et al. (2018) show that home bias in U.S. investors' bond portfolios can disappear for bonds denominated in dollars, and Maggiori et al. (2020) document a similar currency bias in bond portfolios across countries.

Figure 1: Composition of U.S. Investors' Securities Holdings

(a) Domestic securities



(b) Foreign securities

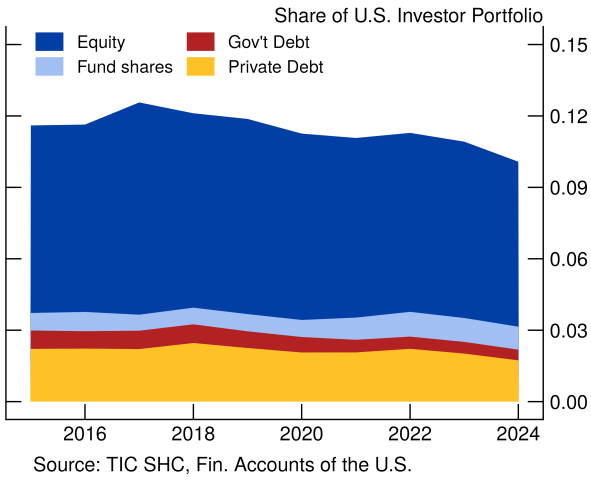
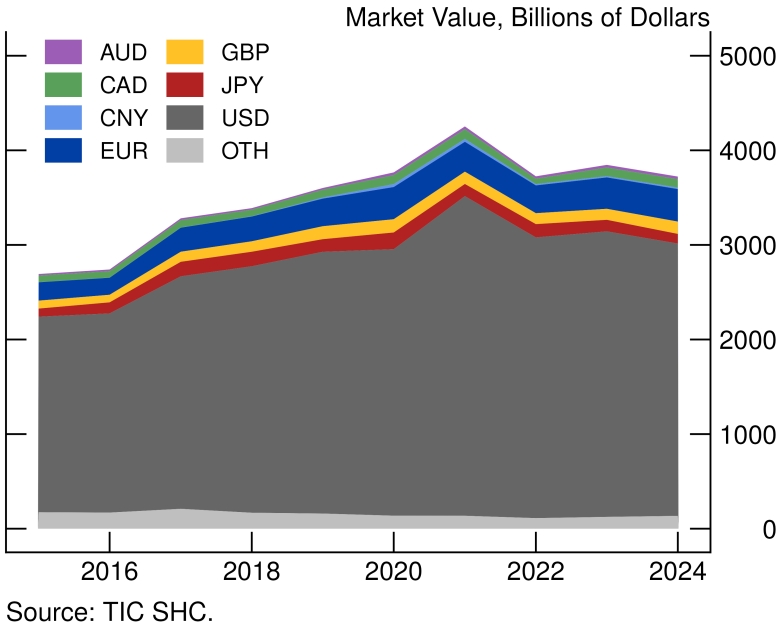


Figure 2: Currency Denomination of Foreign Bonds Held by U.S. Investors



U.S. dollars, mutual funds, depository institutions, and other financial organizations have the most currency diversification, with more than one-quarter of their holdings in foreign currencies (Figure 4). In contrast, nonfinancial organizations (including households) have around ten percent or less foreign currency in their foreign bond portfolio.

Figure 3: Foreign Bond Holdings by U.S. Investor Sector

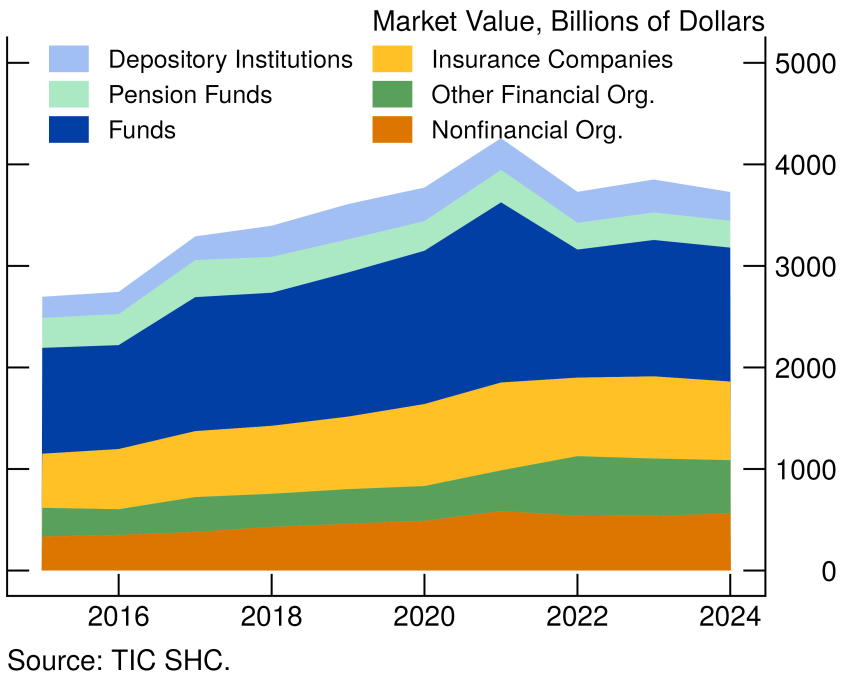
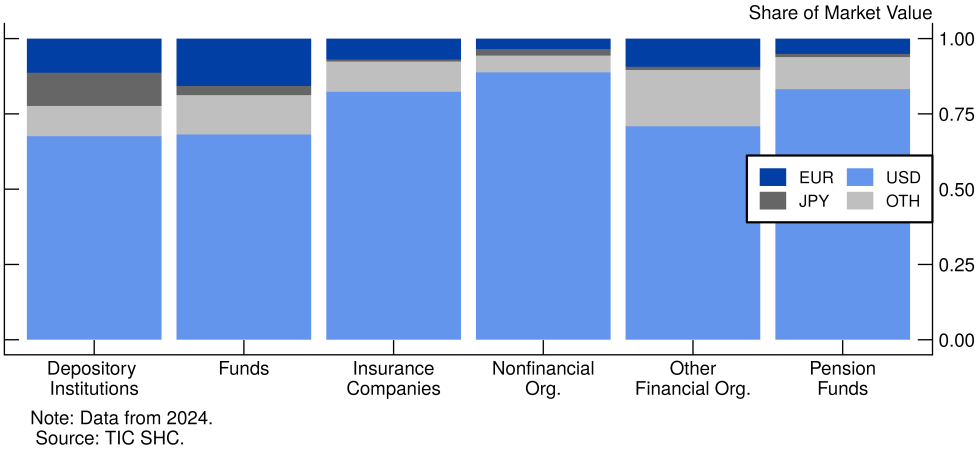


Figure 4: U.S. Holdings of Foreign Bonds by Currency and Investor Sector



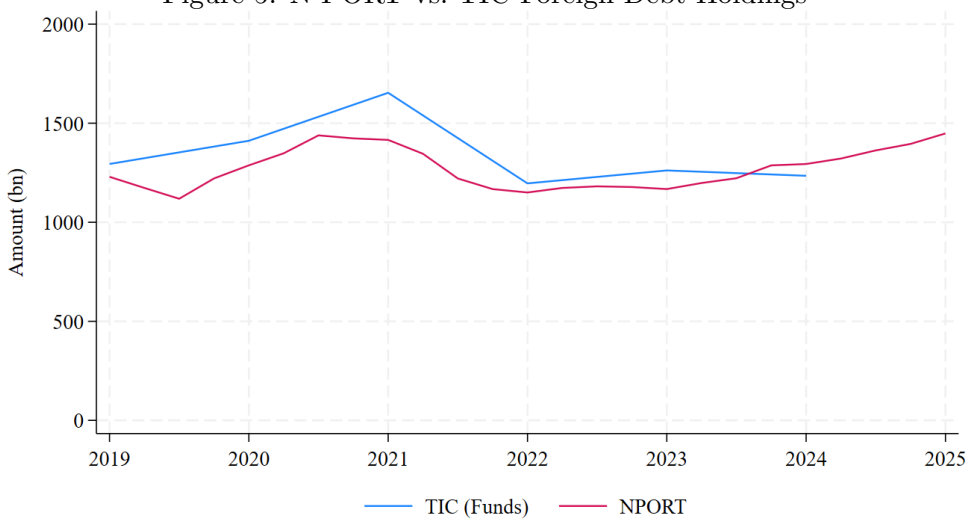
3.2 Fund Holdings: Evidence from N-PORT

To study the role of currency hedging, we zoom in on U.S. investment funds, the largest holders of foreign bonds in the TIC data. N-PORT is an SEC filing submitted by registered investment companies, including mutual funds, ETFs, and closed-end funds, reporting detailed portfolio holdings and fund characteristics. The data are available at monthly or quarterly frequency. We use quarterly data from 2019:Q3 (the earliest available quarter) through 2025:Q4. As Figure 5 shows, N-PORT covers a substantial portion of the foreign debt holdings of funds reported in TIC.

We construct our main dataset at the quarter × fund × investment country × currency × asset category (debt, equity, FX, or other) × issuer type (corporate, government, or other) level, where funds are identified by the Legal Entity Identifier (LEI) of the fund series.[4] After dropping funds with missing series identifiers, holdings currencies, or investment countries, the sample covers 17,128 fund series investing in 195 countries and 89 currencies.

We classify holdings as safe or risky based on their credit ratings, using Moody's ratings where available and Fitch ratings otherwise. For sovereign debt lacking instrument-level ratings, we use sovereign credit ratings. Appendix B reports the coverage of the ratings match. We then collapse the data to the fund × currency × quarter level. At this level, we measure a fund's debt hedge ratio in each currency as its aggregate net short FX derivative position divided by its debt holdings in that currency, $hr^{debt}_{f,c,t} = -\text{FX net amount}_{f,c,t}/\text{Debt}_{f,c,t}$. Table A.1 in the appendix defines all variables used in our analysis, for both the N-PORT and TIC data.

Figure 5: N-PORT vs. TIC Foreign Debt Holdings



Because our analysis focuses on foreign debt, and on sovereign debt in particular, we first examine U.S. funds' holdings of foreign debt by issuer country, asset class, and issuance currency.

[4] In some cases, a fund with the same Series LEI may report different holding amounts for the same period, usually due to amended filings. We address this by using the latest reported amount based on each fund's filing date.

Table 1 breaks down foreign debt holdings along these dimensions. U.S. funds' foreign-currency debt holdings are concentrated in three categories: sovereign bonds issued by G10 countries, sovereign bonds issued by emerging market economies (EMEs), and corporate bonds issued by G10 entities; funds hold very little corporate debt issued by EME firms. Most G10 sovereigns issue primarily in their own currencies, and the majority of these bonds carry safe credit ratings. Many EME sovereigns also issue mainly in local currency, although some issue a meaningful share in foreign currencies, most commonly in U.S. dollars.

The pattern is different for corporate debt, where U.S. funds mainly hold bonds issued by foreign firms in international currencies, especially the U.S. dollar, followed by the euro and the pound sterling. Holdings of corporate bonds issued in firms' home currencies are much smaller and are concentrated in bonds issued by U.K., Canadian, and German firms. This pattern suggests that foreign sovereign debt is the main channel through which U.S. funds take on foreign-currency exposure in their bond portfolios, which motivates our focus on sovereign bonds in the analysis that follows.

Table 1: U.S. Fund Debt Holdings by Issuer Country, Asset Type, and Currency of Issuance

	Govt Safe		Govt Risky		Corp Safe		Corp Risky	
Country	Own Currency	Other Currency	Own Currency	Other Currency	Own Currency	Other Currency	Own Currency	Other Currency
				AFEs				
AU	10.5	0.1	0.0	0.4	2.6	9.9	2.6	17.8
CA	16.3	6.7	1.6	1.8	0.9	11.6	12.7	97.8
CH	2.4	0.0	0.0	0.1	1.9	1.7	0.1	19.0
DE	17.0	0.2	1.4	0.2	5.4	3.7	8.6	13.5
GB	19.9	0.1	1.3	0.9	9.1	2.2	20.3	101.1
JP	16.1	1.3	28.7	0.5	0.3	16.9	0.9	15.6
NO	1.4	0.6	0.0	0.3	0.0	1.7	0.2	5.9
NZ	3.2	0.1	0.0	0.0	0.0	0.7	-0.1	0.4
SE	0.6	0.7	0.9	0.1	1.3	1.6	0.4	6.4
US	1682.5	0.2	2768.9	0.1	487.0	2.8	3130.3	11.4
				EMEs				
BR	0.0	0.0	10.9	2.0	0.0	0.0	-0.2	1.7
CN	0.2	0.1	9.3	0.3	0.0	0.2	0.1	0.4
ID	0.0	0.0	5.3	4.0	0.0	0.0	0.0	1.9
KR	0.6	2.1	8.0	0.6	0.0	0.4	0.0	1.9
MX	0.0	0.0	9.4	10.1	0.0	0.0	0.3	19.8
MY	0.0	0.0	5.7	0.1	0.0	0.0	0.0	1.6
PE	0.0	0.0	5.7	3.2	0.0	0.0	0.2	1.4
PL	0.0	0.0	3.5	3.6	0.0	0.0	-0.1	0.3
TH	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.4
ZA	0.0	0.0	6.1	2.4	0.0	0.0	0.2	0.7
				Financial Centers				
BM	0.0	0.0	0.0	0.4	0.0	1.0	0.0	20.2
HK	0.1	0.2	0.0	0.1	0.0	0.1	0.1	1.4
IE	1.8	0.2	1.3	0.2	9.3	0.6	10.2	20.7
JE	0.0	0.0	0.0	0.0	0.0	4.7	0.7	9.3
KY	0.0	0.3	0.0	1.1	0.0	38.1	0.0	93.8
LU	1.9	0.2	0.0	0.1	0.3	1.3	5.1	21.3
SG	0.6	0.0	2.2	0.0	0.0	2.7	0.1	7.2

Notes: Holdings of foreign debt by U.S. funds in N-PORT, 2025:Q2, in billions of U.S. dollars, for the G10 countries, the EMEs with the largest holdings, and major financial centers. Debt is split into government and corporate debt, and into safe and risky debt based on Moody's and Fitch ratings. "Own currency" refers to debt issued in the currency of the issuer country, and "other currency" to debt issued in any other currency. For the euro area, Germany is treated as the issuer country.

3.3 Fund FX Hedging

A key advantage of the N-PORT data is that funds also report their FX derivative positions, which allows us to measure how funds hedge the currency risk of their foreign holdings. Table 2 reports, for the G10 and selected EME currencies, funds' foreign asset exposure, their FX derivative positions, and the associated hedging behavior. Funds' foreign asset holdings are concentrated in advanced foreign economies (AFEs), with a larger share allocated to equities than to debt. Relative to total foreign portfolio holdings, U.S. funds allocate 85% to AFE assets, of which 83% are equities and 17% debt; 8% to emerging market economy (EME) assets, of which 51% are equities and 49% debt; and 8% to securities issued in financial centers, of which 44% are equities and 56% debt.

U.S. funds maintain substantial FX derivative positions in these currencies, and their net positions are short foreign currency overall, indicating that they use derivatives to hedge the currency exposure of their foreign asset holdings. Most of this hedging is associated with debt positions.[5] For most currencies, more than half of total hedging volume is related to debt hedging, while hedging of equity exposure is much smaller, especially relative to the size of equity holdings. Some funds also use FX derivatives to take directional currency positions, but these account for only a small share of total net FX volume.

Whether a fund hedges at all varies considerably across funds. Among funds with foreign-currency debt positions, the share that hedge this exposure ranges from 16% to 64% by fund count across G10 and major EME currencies, but from 45% to 88% when weighted by AUM, suggesting that larger funds are more likely to hedge. Hedging also varies by currency: among G10 currencies, euro-denominated debt is hedged the most (87% by AUM) and NZD-denominated debt the least (45% by AUM). Equity hedging is much less common, with fewer than 10% of funds by count, and less than 23% by AUM, hedging their foreign equity exposure. Among G10 currencies, equity hedging is highest for EUR and AUD, where more than 20% of equity exposure is hedged by AUM, and lowest for NZD, at only 3%.

Conditional on hedging, however, funds hedge most of their exposure. Among funds that hedge G10-currency debt, hedge ratios are generally close to full hedging, with JPY the main exception at around 70%. Hedge ratios vary more across EME currencies, but remain above 55% for most of them. Finally, the counterparties to funds' FX derivatives are fairly concentrated: Figures C.1 and C.2 in the appendix plot the shares of the top ten buyers and sellers in each G10 currency in 2025:Q2.

[5] We classify FX positions used for debt hedging by identifying funds with FX positions and debt holdings in the corresponding currency. Funds with FX positions and equity holdings, but no debt holdings, are classified as using FX for equity hedging. Funds with FX positions but no asset holdings in that currency are classified as using FX for directional currency positions.

Table 2: Foreign Currency Asset Holdings and FX Hedging

	Foreign Asset Exposure			FX Derivative Exposure		Net Derivative Exposure			% Funds Using FX, AUM		% Funds Using FX, N		% FX Usage			AUM-Weighted Mean Hedge Ratio	
Currency	Debt	Equity	Total	Gross	Net	Debt Hedge	Equity Hedge	Directional	Debt Hedge	Equity Hedge	Debt Hedge	Equity Hedge	Debt Hedge	Equity Hedge	Directional	Debt	Equity
AFEs																	
AUD	18	145	163	50	-18	-16	-1	-1	55	22	36	5	50	9	41	98	0
CAD	32	268	300	66	-35	-32	-2	-2	62	15	38	5	66	7	27	97	11
CHF	5	253	258	28	-11	-4	-3	-4	65	15	16	7	18	18	64	109	8
EUR	260	1144	1398	515	-273	-242	-24	-7	87	16	64	8	83	7	10	93	12
GBP	59	545	604	130	-67	-54	-10	-2	83	16	53	7	73	12	14	98	9
JPY	46	615	660	130	-46	-39	-10	3	65	18	45	7	55	12	33	70	4
NOK	2	20	21	8	-1	-1	0	1	75	12	33	4	37	6	56	102	9
NZD	3	5	8	11	-3	-3	0	0	45	2	32	1	43	2	55	103	41
SEK	3	85	88	13	-6	-3	-1	-2	55	21	28	5	39	9	52	98	1
EMEs																	
BRL	11	61	71	31	-1	-3	0	2	57	22	49	2	75	2	21	32	0
CNY	10	52	62	37	-11	-8	-1	-3	54	1	35	1	39	2	58	81	135
HUF	1	4	5	3	0	0	0	1	66	0	24	0	38	0	62	53	
INR	3	244	247	16	7	-1	4	4	34	16	24	3	23	26	46	45	-8
KRW	9	134	143	28	-10	-8	-1	-1	67	16	22	3	76	4	20	93	-2
MXN	10	30	40	15	-1	-3	0	1	70	0	45	1	68	0	32	59	33
ZAR	6	32	39	10	-1	-2	0	1	74	4	43	1	49	1	38	36	-13

Notes: Statistics for U.S. funds in N-PORT, 2025:Q2, covering 12,940 funds (series LEI) and 80 currencies; the table shows the G10 currencies and selected EME currencies. Foreign asset exposure, FX derivative exposure, and net derivative exposure are in billions of U.S. dollars. The share of funds using FX derivatives is reported weighted by AUM and by number of funds. FX usage is the share of gross FX derivative positions used for debt hedging, equity hedging, or directional positions. Hedge ratios are AUM-weighted averages across funds that hedge. Shares and hedge ratios are in percent. Variable definitions are in Table A.1.

Figures 6 and 7 plot gross and net FX positions by currency over time. The figures show a general increase in FX derivative activity, both in gross and net terms, particularly for EUR, whose share of total FX volume grew over the sample. Figure 8 further plots the aggregate share of foreign asset exposure offset by FX hedging for the major currencies in which U.S. investors maintain the largest FX hedging positions, showing that hedging ratios for most of these currencies have gradually increased over time.

Figure 6: Gross FX Derivative Positions by Currency for G10 Currencies

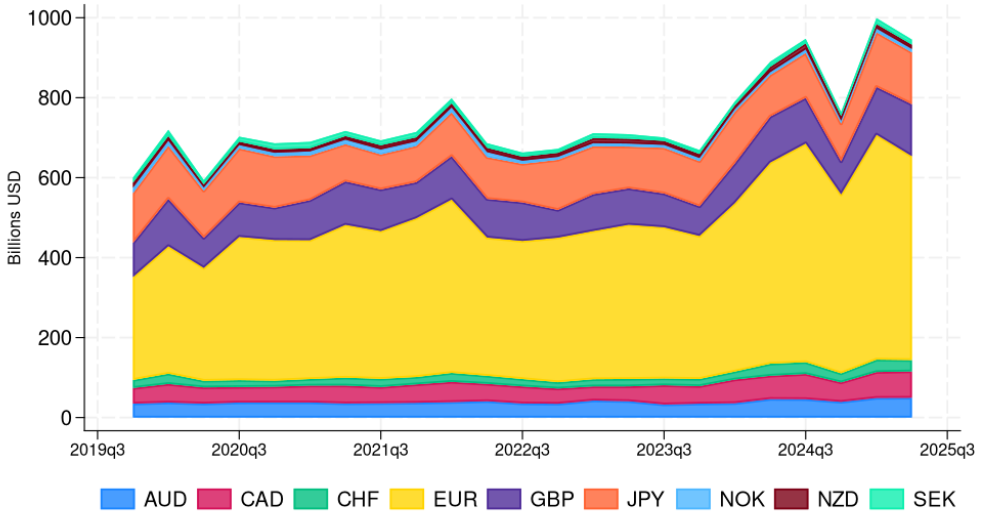


Figure 7: Net FX Derivative Positions by Currency for G10 Currencies

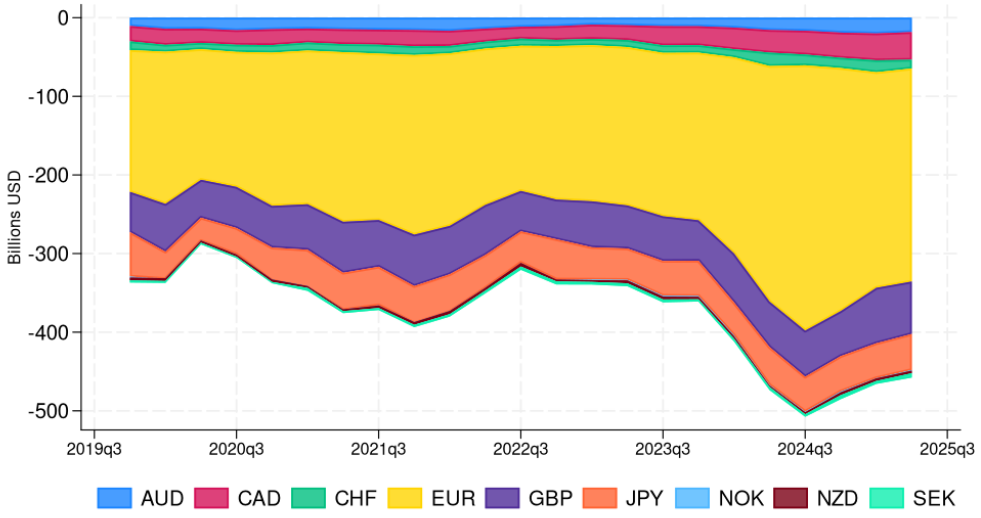
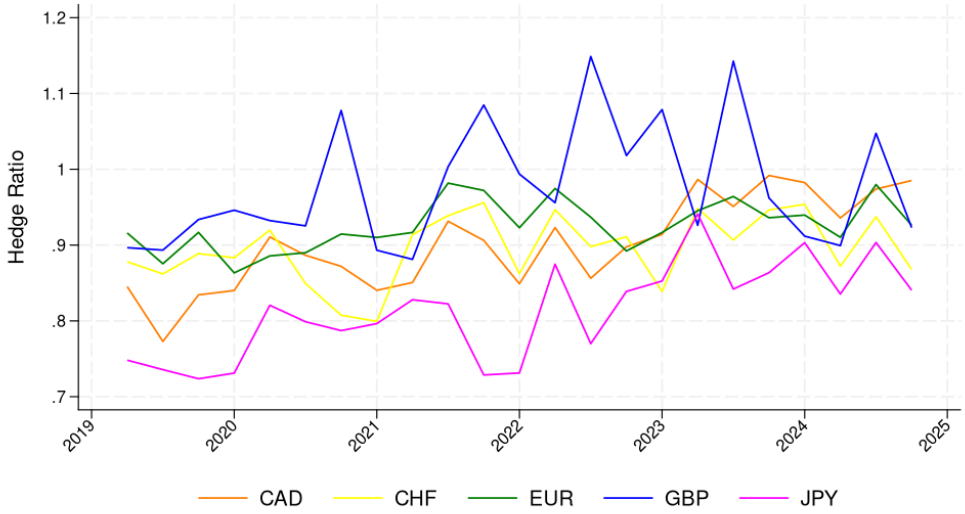


Figure 8: Aggregate Debt Hedging Ratio by Currency for Major G10 Currencies



4 Determinants of Aggregate Foreign Asset Holdings

To analyze what motivates investors' holdings of foreign assets, we regress bond holdings on a range of return and risk drivers. We measure bond holdings as the currency share of sovereign bonds, that is, the proportion held in a particular currency relative to total sovereign bond holdings, to capture investors' intensive margin allocation across foreign currencies. Consistent with their overall foreign holdings profile, we find evidence that U.S. investors hold foreign bonds, even highly rated G10 sovereign bonds, primarily for return, not safety. Throughout the paper, G10 sovereign bonds are local-currency government bonds issued by G10 countries other than the United States, and EME sovereign bonds are local-currency government bonds issued by emerging market economies.

For our first set of tests, we use the following specification:

$$\left(\frac{\text{Foreign Sov Bond Holdings}}{\text{All Sov Bond Holdings}}\right)_{c,t} = \text{Return Drivers}_{c,t} + \text{Sovereign Risks}_{c,t} + \text{VIX}_t + \text{FX}_{c,t} + \text{FE} + \epsilon_{f,c,t} \tag{2}$$

where $\left(\frac{\text{Foreign Sov Bond Holdings}}{\text{All Sov Bond Holdings}}\right)_{c,t}$ denotes U.S. investor's holdings of foreign sovereign bonds denominated in currency c at time t, scaled by U.S. investors' total sovereign bond holdings, including U.S. Treasuries. Return Drivers capture the relative attractiveness of foreign bonds. Table 3 shows results for G10 sovereign bond holdings. In columns (1) and (4), we use unhedged yield differentials, and in columns (2) and (5), we use FX-hedged yield differentials. In columns (3) and (6), we further decompose FX-hedged yield differentials into relative convenience yields on dollar assets, foreign sovereign bonds, and U.S. Treasuries.[6] Sovereign Risk measures country-specific sovereign risk us-

[6]By definition, the hedged yield differential equals the dollar convenience yield (the foregone return from holding

ing CDS spreads, as well as U.S. Treasury CDS. The VIX proxies for global risk sentiment, and FX captures exchange rate levels to control for valuation effects arising from currency movements. Table A.1 in the appendix provides detailed variable definitions.

For fixed effects, the first three columns include only owner type fixed effects to examine how investors allocate across foreign bond currencies. The last three columns additionally include country and currency fixed effects to control for time-invariant country and currency characteristics, allowing us to isolate investors' preferences for foreign sovereign bonds net of these structural differences.

Table 3: G10 Sovereign Bonds: TIC Regressions

	Sovereign Bond Currency Share					
	(1)	(2)	(3)	(4)	(5)	(6)
Unhedged Yield Differentials	-0.009**			0.004		
	(0.004)			(0.006)		
Hedged Yield Differentials		0.149***			0.124***	
		(0.027)			(0.034)	
USD Convenience			0.072***			0.127**
			(0.028)			(0.051)
Foreign Convenience Yield			-0.279***			-0.124***
			(0.041)			(0.046)
US Convenience Yield			0.209***			0.122***
			(0.056)			(0.047)
Foreign CDS	0.941***	0.767***	0.770***	-0.212	-0.322	-0.323
	(0.127)	(0.117)	(0.117)	(0.246)	(0.243)	(0.241)
US CDS	-0.137***	-0.029	0.077	-0.022	0.043	0.042
	(0.047)	(0.046)	(0.055)	(0.049)	(0.054)	(0.067)
VIX	-0.030	-0.005	0.016	-0.004	0.017	0.016
	(0.028)	(0.027)	(0.028)	(0.024)	(0.025)	(0.025)
FX (FC/USD)	0.040***	0.031***	0.036***	-0.155**	-0.185**	-0.187**
	(0.007)	(0.006)	(0.006)	(0.069)	(0.074)	(0.077)
Observations	647	647	647	647	647	647
R-squared	0.246	0.271	0.295	0.543	0.552	0.552
Within R-squared	0.174	0.201	0.228	0.024	0.043	0.043
Owner Type FE	Yes	Yes	Yes	Yes	Yes	Yes
Currency FE	No	No	No	Yes	Yes	Yes

Notes: The dependent variable is U.S. holdings of G10 sovereign bonds, by investor type, as a share of the total bond portfolio. The sample includes only local-currency bonds, defined as bonds denominated in the main currency of the issuer country, and excludes U.S. dollar bonds. Columns (1)–(3) include investor-type fixed effects; Columns (4)–(6) also include currency fixed effects. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Variable definitions are in Table A.1.

dollars), plus the Treasury convenience yield (the foregone return from holding U.S. Treasuries rather than dollar cash), minus the foreign bond convenience yield (the foregone return from holding foreign sovereign bonds rather than local-currency cash); see equation (1) in Section 2 and Du et al. (2026).

As shown in Table 3, the coefficient on unhedged yield differential is small and, if anything, negatively associated with safe bond holdings (Columns 1 and 4), indicating minimal impact on U.S. allocations to foreign sovereign bonds. Instead, U.S. investors' allocations to foreign currency sovereign bonds depend primarily on hedged yield differentials (Columns 2 and 5). When foreign sovereign bonds yield more than Treasuries on a hedged basis, U.S. investors allocate more to those bonds. Columns 3 and 6 further show, conditional on a given foreign currency, that U.S. investors are more willing to hold foreign sovereign bonds when demand is high for dollar liquidity (i.e. the convenience yield on dollar assets measured by the FX swap basis spread is high), when the convenience yield on the foreign bonds (without currency risk) is low, and when the convenience yield on U.S. Treasuries is high. In other words, they hold more when non-pecuniary benefits such as liquidity and safety are evaluated as low for foreign bonds and high for U.S. bonds. U.S. investors forego these non-pecuniary benefits for higher returns abroad. This pattern holds whether or not country and currency fixed effects are included, and it indicates that demand for G10 sovereign bonds, the most highly rated in our sample, tracks compensation for taking on the position, both through the currency return and once currency risk is stripped out, rather than reflecting a pure safe-haven or diversification motive.

Table 4 repeats this exercise for lower-rated sovereign bonds. These are issued mostly by emerging market economies, and for brevity we refer to them as EME sovereign bonds. Although the coefficient is much smaller, the currency-hedged yield differential again enters positively and is still stronger than the coefficient on the unhedged differential (columns 1, 2, 4, and 5). The coefficient on the dollar convenience is again positive and significant across specifications, although also much smaller than in the G10 regressions. For EME sovereign bonds, however, U.S. investors are not as clearly willing to forego any non-pecuniary benefits represented by foreign bond convenience yields. For these bonds, higher holdings are associated with higher foreign bond convenience yields. This is partly due to the fact that for riskier sovereigns, the spread between local-currency yields and local risk-free rates partly captures credit risk rather than pure safety or liquidity premia (Du and Schreger, 2016). Thus, a higher measured convenience yield largely reflects lower sovereign credit risk rather than greater safety or liquidity services. Yet at the same time, foreign sovereign CDS spreads enter positively once the hedged-return channel is controlled for (columns 2, 3, and 6), suggesting that U.S. investors add to EME sovereign positions when compensated for credit risk. Taken together, the G10 and EME results suggest that return-seeking behavior, rather than a demand for safety per se, characterizes U.S. investors' foreign sovereign bond holdings across the credit spectrum.

Table 5 breaks down the same regressions (the version from column 6 on the previous tables, with country and currency fixed effects) by investor type for holdings of G10 sovereign bonds. Although patterns are broadly similar across the majority of types, depository institutions and insurers stand out as different. These investor types do not respond significantly to returns in the same way as the other investor types and as we saw in the aggregate results. The variation

Table 4: EME Sovereign Bonds: TIC Regressions

	Sovereign Bond Currency Share					
	(1)	(2)	(3)	(4)	(5)	(6)
Unhedged Yield Differentials	0.001**			0.000		
	(0.000)			(0.000)		
Hedged Yield Differentials		0.002***			0.002**	
		(0.000)			(0.001)	
USD Convenience			0.006***			0.006***
			(0.002)			(0.002)
Foreign Convenience Yield			0.003*			0.003**
			(0.001)			(0.002)
US Convenience Yield			0.010			0.002
			(0.013)			(0.015)
Foreign CDS	-0.003*	0.009***	0.017***	-0.002	0.002	0.011**
	(0.002)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)
US CDS	-0.024***	-0.017***	-0.019***	-0.008	-0.004	-0.008
	(0.006)	(0.006)	(0.007)	(0.009)	(0.009)	(0.008)
VIX	-0.016***	-0.018***	-0.020***	-0.010***	-0.010***	-0.013***
	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)
FX (FC/USD)	-0.002***	-0.002***	-0.002***	-0.038**	-0.041**	-0.047**
	(0.000)	(0.000)	(0.000)	(0.016)	(0.017)	(0.020)
Observations	571	571	571	570	570	570
R-squared	0.250	0.250	0.263	0.417	0.421	0.433
Within R-squared	0.059	0.059	0.076	0.048	0.055	0.074
Owner Type FE	Yes	Yes	Yes	Yes	Yes	Yes
Currency FE	No	No	No	Yes	Yes	Yes

Notes: The dependent variable is U.S. holdings of EME sovereign bonds, by investor type, as a share of the total bond portfolio. The sample includes only local-currency bonds, defined as bonds denominated in the main currency of the issuer country, and excludes U.S. dollar bonds. Columns (1)–(3) include investor-type fixed effects; Columns (4)–(6) also include currency fixed effects. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Variable definitions are in Table A.1.

explained by the regressors (the within R-squared) is notably smaller for these investors. Pension funds and nonfinancial investors have the strongest results in line with Table 3, while funds and other financial investors show weaker but similar patterns. One possible explanation is that the portfolios of insurers and depository institutions are shaped to a greater extent by regulatory and asset-liability management considerations, which may make their holdings of foreign sovereign debt less sensitive to relative returns. Du et al. (2023) document frictions of this kind in the international portfolios of European insurers and banks. Note that pension funds, which are also liability-driven investors, show the strongest response to returns, so this explanation is at most partial.

Although the TIC data have the advantage of being comprehensive and capture all investor types, they are limited in the ability to do micro-analysis of hedging and foreign currency holdings. From TIC data, however, we know that funds account for the largest share of U.S. holdings of

foreign bonds, and an even larger share of foreign-currency-denominated foreign bonds (given that other major investor sectors, such as insurance companies, hold very little foreign currency bonds). Therefore, for the remainder of the paper, we narrow the scope from all investors to funds, taking advantage of microdata on fund holdings, which includes positions in FX derivatives.

Table 5: G10 Sovereign Bonds: TIC Regressions by Investor Type

	DepInst	Pension	Funds	Insurer	Other Fin	Non Fin
	(1)	(2)	(3)	(4)	(5)	(6)
USD Convenience	-0.044	0.202***	0.196**	0.016	0.256**	0.130***
	(0.117)	(0.053)	(0.091)	(0.014)	(0.107)	(0.044)
Foreign Convenience Yield	-0.069	-0.149**	-0.053	-0.019	-0.348*	-0.104*
	(0.067)	(0.074)	(0.048)	(0.015)	(0.182)	(0.054)
US Convenience Yield	0.073	0.184***	0.088	-0.007	0.210	0.180***
	(0.094)	(0.062)	(0.054)	(0.015)	(0.175)	(0.061)
Foreign CDS	-0.651	-0.290	-0.389	0.032	-0.397	-0.266
	(0.658)	(0.271)	(0.366)	(0.121)	(0.643)	(0.200)
US CDS	-0.008	-0.005	-0.005	0.002	0.282	-0.018
	(0.074)	(0.058)	(0.051)	(0.011)	(0.303)	(0.046)
VIX	0.047	-0.013	-0.001	-0.001	0.088	-0.021
	(0.045)	(0.021)	(0.026)	(0.007)	(0.091)	(0.023)
FX (FC/USD)	0.091	-0.197**	-0.215**	-0.024	-0.733**	-0.043
	(0.125)	(0.089)	(0.094)	(0.019)	(0.339)	(0.078)
Observations	108	108	108	107	108	108
R-squared	0.756	0.770	0.891	0.783	0.730	0.796
Within R-squared	0.070	0.349	0.223	0.050	0.163	0.255
Owner Type FE	No	No	No	No	No	No
Country FE	No	No	No	No	No	No
Currency FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Regressions estimated separately for each investor type: depository institutions, pension funds, funds, insurers, other financial institutions, and nonfinancial investors. The dependent variable is the investor type's holdings of G10 sovereign bonds as a share of its total bond portfolio. The sample includes only local-currency bonds, defined as bonds denominated in the main currency of the issuer country, and excludes U.S. dollar bonds. All specifications include currency fixed effects, which for G10 sovereign bonds are equivalent to country fixed effects. Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Variable definitions are in Table A.1.

5 Determinants of Fund-Level Foreign Asset Holdings

5.1 Regression Results

Parallel to our analysis with TIC data, to analyze what motivates investors' holdings of G10 sovereign bonds, we regress fund holdings from N-PORT on return and risk drivers using the following specification:

$$Y_{f,c,t} = \text{Return Drivers}_{c,t} + \text{Sovereign Risks}_{c,t} + \text{IG Credit}_t + \text{VIX}_t + \text{FX}_{c,t} + \text{FE} + \epsilon_{f,c,t} \quad (3)$$

where $Y_{f,c,t} = \mathbb{1}_{f,t}\left(\sum_{c \in C} \text{Holdings}_{f,c,t} > 0\right)$ is an indicator of whether fund f owns any G10 sovereign bonds at time t, or $Y_{f,c,t} = \sum_{c \in C} \left(\frac{\text{Holdings}}{\text{AUM}}\right)_{f,c,t}$ is the aggregate amount of G10 sovereign bonds scaled by the fund's assets under management (AUM), both used to determine the extensive margin of the fund's propensity to invest in foreign sovereign bonds; and $Y_{f,c,t} = \left(\frac{\text{Holdings}}{\text{AUM}}\right)_{f,c,t}$ denotes fund f's holdings of G10 sovereign bonds denominated in currency c at time t, scaled by the fund's AUM, used to determine the intensive margin of the fund's allocation to foreign sovereign bonds. The remainder of the specification is the same as in Section 4, above, with the exception of the control IG Credit, included here to reflect global investment-grade credit market conditions.

5.1.1 Extensive Margin: G10 Sovereign Bonds

Table 6 examines investors' propensity to invest in G10 sovereign bonds. In the first three columns, the dependent variable is an indicator equal to one if a fund holds any such bonds. In the last three columns, the dependent variable is the fund's total investment in G10 sovereign bonds across all eligible countries, scaled by its AUM. Together, these specifications capture both the participation decision, whether a fund invests in G10 sovereign bonds at all, and the overall scale of its allocation.

For this analysis, our sample includes all funds that invested in any foreign-currency-denominated assets, either bonds or equities, at some point during the sample period. This excludes funds that invest exclusively in U.S. assets, which would have no scope to adjust their allocations in response to changes in the relative attractiveness of G10 sovereign bonds. Because the regressions include fund fixed effects, identification comes from within-fund variation over time. The estimated coefficients therefore capture how changes in the relative attractiveness of G10 sovereign bonds affect a given fund's decision to initiate or expand its allocation, rather than reflecting persistent differences in preferences across funds.

As the first three columns indicate, a fund's propensity to invest in G10 sovereign bonds is primarily driven by three factors: (i) hedged investment returns, (ii) movements in the U.S. dollar, and (iii) diversification motives. When average hedged yield differentials rise, funds become more likely to invest in G10 sovereign bonds (Column 1). Specifically, a one percentage point increase in the hedged yield differential is associated with a *3 percentage point* increase in the probability of holding these foreign assets. Higher hedged returns can result either from more favorable FX hedging returns or from improvements in underlying unhedged yield differentials, both of which increase the relative attractiveness of these foreign assets (Column 2).

As with the TIC regressions, we also decompose the hedged yield differential into components coming from unhedged yield differentials and expected currency return (Column 2), as well as the

Table 6: Extensive Margin: G10 Sovereign Bonds

	Own G10 Debt			Aggregate G10 Debt / AUM		
	(1)	(2)	(3)	(4)	(5)	(6)
Hedged Yield Differentials	0.028***			0.085*		
	(0.004)			(0.044)		
FX Hedging Return		0.016***			0.024	
		(0.003)			(0.036)	
Unhedged Yield Differentials		0.015***			0.001	
		(0.004)			(0.039)	
USD Convenience			-0.017**			-0.029
			(0.007)			(0.078)
UST Convenience			0.026***			0.261***
			(0.005)			(0.047)
Foreign Bond Convenience			-0.015***			0.026
			(0.003)			(0.039)
VIX	-0.004**	0.000	-0.003	0.006	0.049**	0.013
	(0.002)	(0.002)	(0.002)	(0.022)	(0.021)	(0.022)
Broad Dollar	-0.066***	-0.075***	-0.077***	-0.684***	-0.956***	-0.376**
	(0.017)	(0.018)	(0.017)	(0.175)	(0.184)	(0.175)
IG Spread	0.004*	-0.002	0.010***	0.144***	0.114***	0.064
	(0.003)	(0.003)	(0.004)	(0.032)	(0.030)	(0.041)
UST Holdings	0.002***	0.002***	0.002***	0.013***	0.013***	0.013***
	(0.000)	(0.000)	(0.000)	(0.003)	(0.003)	(0.003)
Own FC Risky Debt	0.158***	0.158***	0.158***			
	(0.009)	(0.009)	(0.009)			
Own FC Equity	0.008***	0.009***	0.009***			
	(0.002)	(0.002)	(0.002)			
FC Risky Debt Holdings				0.239***	0.239***	0.239***
				(0.025)	(0.025)	(0.025)
FC Equity Holdings				0.000*	0.000**	0.000
				(0.000)	(0.000)	(0.000)
Observations	149,640	149,640	149,640	149,640	149,640	149,640
R-Squared	0.76	0.76	0.76	0.85	0.85	0.85
Within R-squared	0.09	0.09	0.09	0.13	0.13	0.13
Fund FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Fund-level regressions using N-PORT data. In Columns (1)–(3), the dependent variable is an indicator equal to one if fund f holds any G10 sovereign bonds in quarter t. In Columns (4)–(6), it is the fund's total holdings of G10 sovereign bonds across all G10 countries, as a share of its AUM. The sample includes all funds that held foreign-currency assets at some point during the sample period. All specifications include fund fixed effects. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Variable definitions are in Table A.1.

convenience yields associated with holding U.S. dollars, U.S. Treasuries, and foreign sovereign bonds (Column 3). The results indicate that U.S. investors do not appear to invest in G10 sovereign bonds for their safety and liquidity characteristics; funds are more likely to invest when the convenience yield on foreign sovereign bonds declines and when the convenience yield on U.S. Treasuries rises. In other words, just as with the earlier TIC results, U.S. funds tend to allocate more to G10 sovereign bonds when foreign sovereign bonds become less valued for their non-pecuniary benefits and when U.S. Treasuries become more expensive to hold (i.e., become more valued for their non-pecuniary benefits). Note that although dollar convenience enters with a negative sign at the extensive margin, unlike in the TIC regressions, it remains positive in the intensive margin analysis, as we will see later. As we documented in the TIC results, this pattern for funds is more consistent with a return-seeking motive than with a direct demand for the safety and liquidity services provided by foreign sovereign bonds.

Besides return motives, the negative coefficient on the broad dollar index indicates that funds are more likely to allocate to G10 sovereign bonds during periods of U.S. dollar depreciation. Diversification motives also play an important role, as the coefficient on U.S. Treasury holdings implies that a one percentage point increase in a fund's allocation to U.S. Treasuries (as a share of assets under management) is associated with a 0.2 percentage point increase in the probability of investing in G10 sovereign bonds, consistent with a desire to diversify away from concentrated domestic safe-asset exposures. Likewise, increases in holdings of foreign risky debt are associated with a higher likelihood of holding G10 sovereign bonds, suggesting that broader participation in international bond markets facilitates investment in G10 sovereign bonds. While the coefficient on foreign-currency equity holdings is also positive, its economic magnitude is small, indicating that equity exposures play a more limited role.

In terms of the overall amount that a fund allocates to G10 sovereign bonds, hedged investment returns remain a key driver (Column 4). Although FX hedging returns and unhedged yield differentials lose their statistical significance, as we show later these considerations remain important at the currency level: conditional on investing in G10 sovereign bonds, funds allocate more to currencies offering more attractive relative returns. Meanwhile, Treasury convenience remains the key driver of U.S. investors' decision to own foreign sovereign bonds; when U.S. Treasuries become more expensive to hold for their non-pecuniary benefits, U.S. investors are more willing to diversify by holding foreign sovereign bonds. Furthermore, investment-grade credit spreads also become significant for the overall amount allocated to G10 sovereign bonds. Funds increase their allocations to G10 sovereign bonds when U.S. investment-grade credit spreads widen, potentially suggesting that investors view G10 sovereign bonds as a substitute for U.S. investment-grade credit during periods of rising credit risk.

Taken together, the results suggest that U.S. investors' allocations to G10 sovereign bonds are shaped by a combination of return and diversification motives, rather than by the non-pecuniary benefits of these assets, especially relative to U.S. Treasuries.

5.1.2 Extensive Margin: EME Sovereign Bonds

Table 7 applies a similar framework to EME sovereign bonds, parallel to Table 4 for TIC data. As in Table 6, the first three columns examine the extensive margin, that is, whether a fund holds any EME sovereign bonds, while the last three columns examine the total amount invested across all EME countries. As before, the regressions include fund fixed effects, so the estimated coefficients capture how changes within a given fund over time affect its decision to initiate or expand EME sovereign bond positions.

Whereas higher hedged yield differentials increase the likelihood that funds invest in G10 sovereign bonds, they have the opposite effect for EME bonds. U.S. funds are less likely to invest in EME sovereign bonds when those bonds become more attractive on a yield basis (Column 1). The decomposition (Column 2) also shows that both FX hedging returns and unhedged yield differentials enter with negative coefficients, although their magnitudes are quantitatively very small. The results for the aggregate amount invested tell a similar story: U.S. investors allocate less to EME sovereign bonds when yield differentials become more favorable (Columns 4 and 5).

To better understand this result, we incorporate sovereign credit risk using credit default swap (CDS) spreads (Column 3). Unlike in the case of G10 sovereign bonds, where credit risk is largely insignificant, credit considerations remain important for EME bonds. The results (Columns 3 and 6) show that U.S. investors are both more likely to invest in, and allocate larger amounts to, EME sovereign bonds when foreign CDS spreads decline. The coefficients on foreign CDS spreads are also substantially larger than those on relative yields. CDS spreads on U.S. Treasuries also enter with a negative and statistically significant coefficient, although their magnitude is small.

These findings suggest that sovereign credit risk is a central consideration for U.S. investors in EME bonds, and that narrower yield differentials largely reflect improvements in credit quality and reductions in country risk, which make these bonds more attractive even as their expected returns decline. Beyond these measures, other determinants largely mirror those for G10 sovereign bonds. Funds are more likely to invest in EME sovereign bonds during periods of U.S. dollar depreciation, when they hold larger allocations to U.S. Treasuries, and when they already own other foreign-currency safe debt.

Taken together, these results indicate that, although EME sovereign bonds, like G10 sovereign bonds, are part of a broader international fixed-income allocation strategy, U.S. investors evaluate the two asset classes differently. Similar to the TIC data results, investment into both types of bonds are influenced by U.S. dollar movements and diversification motives, but investors place greater weight on hedged returns when allocating to G10 sovereign bonds, whereas sovereign credit risk plays a more important role in allocations to EME sovereign bonds.

Table 7: Extensive Margin: EME Sovereign Bonds

	Own EME Debt			Aggregate EME Debt / AUM		
	(1)	(2)	(3)	(4)	(5)	(6)
Hedged Yield Differentials	-0.011***			-0.015		
	(0.003)			(0.014)		
FX Hedging Return		-0.004***	-0.006***		-0.009***	-0.021***
		(0.001)	(0.001)		(0.003)	(0.004)
Unhedged Yield Differentials		-0.003***	-0.003***		-0.011***	-0.014***
		(0.001)	(0.001)		(0.003)	(0.004)
Foreign Bond CDS			-0.031***			-0.158***
			(0.005)			(0.024)
UST CDS			-0.007***			-0.023***
			(0.002)			(0.008)
VIX	-0.003	-0.004*	-0.004	-0.017	-0.021**	-0.019*
	(0.002)	(0.002)	(0.002)	(0.011)	(0.011)	(0.011)
Broad Dollar	-0.080***	-0.104***	-0.033*	-0.160	-0.194*	0.137
	(0.018)	(0.019)	(0.019)	(0.108)	(0.104)	(0.104)
IG Spread	-0.000	-0.001	0.002	-0.020	-0.011	0.010
	(0.003)	(0.003)	(0.003)	(0.014)	(0.016)	(0.016)
UST Holdings	0.001***	0.001***	0.001***	0.004***	0.004***	0.004***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Own FC Safe Asset	0.234***	0.234***	0.234***			
	(0.018)	(0.018)	(0.018)			
Own FC Equity	0.012***	0.012***	0.012***			
	(0.002)	(0.002)	(0.002)			
FC Safe Asset Holdings				0.075***	0.075***	0.075***
				(0.013)	(0.013)	(0.013)
FC Equity Holdings				0.000	0.000*	0.000
				(0.000)	(0.000)	(0.000)
Observations	149,640	149,640	149,640	149,640	149,640	149,640
R-Squared	0.74	0.74	0.74	0.82	0.82	0.82
Within R-squared	0.06	0.06	0.06	0.03	0.03	0.03
Fund FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Fund-level regressions using N-PORT data. In Columns (1)–(3), the dependent variable is an indicator equal to one if fund f holds any EME sovereign bonds in quarter t. In Columns (4)–(6), it is the fund's total holdings of EME sovereign bonds across all EME countries, as a share of its AUM. All specifications include fund fixed effects. Sovereign credit risk is measured by CDS spreads on the issuer country and on U.S. Treasuries. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Variable definitions are in Table A.1.

5.1.3 Intensive Margin: G10 Sovereign Bonds

Table 8 examines how investors allocate across G10 sovereign bonds denominated in different currencies. In all columns, the dependent variable is the amount that each fund allocates to G10 sovereign bonds at the country level. Because the focus is on the intensive margin, the sample includes only funds that invested in G10 sovereign bonds at some point during the sample period.

As in the previous specifications, all regressions include fund fixed effects, and the estimated coefficients therefore capture how changes in the relative attractiveness of G10 sovereign bonds affect a given fund's allocation decisions, rather than reflecting persistent differences in preferences across funds. The first three columns exclude country fixed effects and thus capture how funds allocate across countries (and currencies). The last three columns include country fixed effects, which absorb time-invariant differences across countries and isolate how changes over time within a given country affect a fund's allocation to that country's sovereign bonds.

Across currencies, U.S. investors allocate more to G10 sovereign bonds when hedged yield differentials are more attractive (Column 1), reflecting both higher FX hedging returns and larger unhedged yield differentials (Column 2). The decomposition in Column 3 further shows that allocations increase when the U.S. dollar convenience yield rises. In other words, when foreign demand for dollars strengthens, U.S. investors are more willing to supply dollars in exchange for foreign currency to capture favorable FX hedging returns, and then use the resulting foreign-currency proceeds to invest in foreign sovereign assets. In addition, investors allocate more to G10 sovereign bonds when the convenience yield on foreign sovereign bonds declines and when the convenience yield on U.S. Treasuries increases. Together, these findings suggest that U.S. investors purchase G10 sovereign bonds primarily for their return advantages rather than for the safety and liquidity services they provide.

Beyond relative returns, U.S. investors allocate more to G10 sovereign bonds when the VIX is low and when U.S. investment-grade credit spreads are high. This pattern indicates that investors reduce their holdings of G10 sovereign bonds during periods of elevated market uncertainty, but increase their allocations when the risk premium on U.S. investment-grade bonds rises, viewing G10 sovereign bonds as an attractive alternative.

We obtain similar results when including country fixed effects (Columns 4–6), indicating that investors also increase their allocations to a given country's sovereign bonds when their relative return, particularly FX hedging returns, becomes more attractive over time. The positive effects of lower VIX and wider U.S. investment-grade credit spreads remain robust in these specifications. Taken together, these results indicate that U.S. investors primarily treat G10 sovereign bonds as return-enhancing investments rather than as assets valued mainly for their safety and liquidity.

Table 8: Intensive Margin: G10 Sovereign Bonds

	G10 Debt Holdings / AUM					
	(1)	(2)	(3)	(4)	(5)	(6)
Hedged Yield Differentials	1.059***			0.161**		
	(0.123)			(0.071)		
FX Hedging Return		1.081***			0.141**	
		(0.119)			(0.068)	
Unhedged Yield Differentials		1.099***			0.095	
		(0.119)			(0.065)	
USD Convenience Yield			0.245*			0.755***
			(0.131)			(0.130)
Foreign Convenience Yield			-1.183***			-0.155**
			(0.135)			(0.073)
UST Convenience Yield			1.419***			-0.092
			(0.156)			(0.113)
VIX	-0.261***	-0.297***	-0.398***	-0.206***	-0.170***	-0.168***
	(0.046)	(0.048)	(0.050)	(0.043)	(0.041)	(0.041)
IG Spread	0.186***	0.209***	0.345***	0.330***	0.318***	0.294***
	(0.050)	(0.054)	(0.058)	(0.058)	(0.057)	(0.061)
FX (FC/USD)	0.255***	0.260***	0.299***	-1.473***	-1.899***	-1.889***
	(0.027)	(0.027)	(0.029)	(0.214)	(0.239)	(0.233)
Observations	79,384	79,384	79,384	79,384	79,384	79,384
R-Squared	0.33	0.33	0.34	0.40	0.40	0.40
Within R-squared	0.06	0.06	0.06	0.00	0.00	0.00
Fund FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes

Notes: Fund × currency regressions using N-PORT data. The dependent variable is fund f's holdings of G10 sovereign bonds denominated in currency c, as a share of its AUM. The sample includes only funds that held G10 sovereign bonds at some point during the sample period. All specifications include fund fixed effects; Columns (4)–(6) also include country fixed effects. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Variable definitions are in Table A.1.

5.1.4 Intensive Margin: EME Sovereign Bonds

Table 9 applies the intensive-margin framework to EME sovereign bonds. As before, the sample includes only funds that invested in EME sovereign bonds at some point during the sample period, and all regressions include fund fixed effects, with the last three columns adding country fixed effects.

Conditional on investing in EME sovereign bonds, funds allocate more to currencies with higher hedged yield differentials (Column 1) and the decomposition shows that both FX returns and unhedged yield differentials contribute positively (Columns 2 and 3). Unlike the extensive margin,

where higher yields reduced the likelihood of investing, funds that are already invested in EME bonds tilt their portfolios towards higher-yielding currencies. But these return effects do not survive the inclusion of country fixed effects (Columns 4–6), suggesting the return-chasing pattern reflects differences in allocations across EME countries rather than within a country over time. Within a country, higher foreign CDS spreads are associated with smaller allocations (Column 6), consistent with the importance of sovereign credit risk for EME bonds documented in the extensive-margin results. Similarly, a higher VIX is also associated with smaller allocations, as in the extensive-margin results.

Table 9: Intensive Margin: EME Sovereign Bonds

	EME Debt Holdings / AUM					
	(1)	(2)	(3)	(4)	(5)	(6)
Hedged Yield Differentials	0.137***			0.021		
	(0.046)			(0.044)		
FX Return		0.160***	0.163***		0.003	-0.015
		(0.043)	(0.042)		(0.043)	(0.045)
Unhedged Yield Differentials		0.268***	0.276***		-0.050	-0.067
		(0.048)	(0.047)		(0.047)	(0.048)
Foreign CDS			-0.074			-0.166**
			(0.079)			(0.068)
US CDS			0.139			0.134
			(0.108)			(0.081)
VIX	-0.333***	-0.352***	-0.297***	-0.260***	-0.220***	-0.158**
	(0.063)	(0.091)	(0.096)	(0.064)	(0.063)	(0.061)
IG Spread	0.253**	0.141	0.148	0.187*	0.204*	0.269**
	(0.096)	(0.123)	(0.139)	(0.108)	(0.100)	(0.100)
FX (FC/USD)	0.190***	0.159***	0.159***	0.105	-0.109	0.022
	(0.039)	(0.028)	(0.030)	(0.254)	(0.239)	(0.263)
Observations	34,468	34,468	34,468	34,468	34,468	34,468
R-Squared	0.60	0.61	0.61	0.62	0.62	0.62
Within R-squared	0.02	0.05	0.05	0.00	0.00	0.00
Fund FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes

Notes: Fund × currency regressions using N-PORT data. The dependent variable is fund f's holdings of EME sovereign bonds denominated in currency c, as a share of its AUM. The sample includes only funds that held EME sovereign bonds at some point during the sample period. All specifications include fund fixed effects; Columns (4)–(6) also include country fixed effects. Sovereign credit risk is measured by CDS spreads on the issuer country and on U.S. Treasuries. VIX, IG Spread, and FX (FC/USD) are in logs. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Variable definitions are in Table A.1.

5.1.5 Impact of Hedging on Foreign Debt Holdings

Next, we examine how hedging affects investors' preferences for foreign bonds by interacting hedging returns with a dummy variable indicating whether a fund hedges its FX exposure in a given currency.

For G10 sovereign bonds, U.S. investors who hedge currency risk hold more when hedging returns become more attractive (or when the cost of hedging for U.S. investors declines). In other words, hedging amplifies the response to returns. This is shown by the positive coefficient on the interaction term between hedging returns and the fund hedging dummy, as shown in Table 10.[7] The result remains robust after including country fixed effects, and also when replacing the hedging dummy with the fund's bond hedging ratio in each currency.

5.2 FX Dealer Balance Sheets and Fund Hedging

The results in Table 10 show that funds that hedge their FX exposure respond more strongly to hedged yield differentials, FX returns, and dollar convenience yields than funds that do not hedge. In other words, a fund's demand for foreign sovereign bonds depends not only on returns but on its ability to hedge the associated currency risk. This raises a natural question: if U.S. investors' willingness to hold foreign-currency assets depends on their capacity to hedge FX risk, do frictions in the *supply* of FX hedging affect their portfolio decisions? We hypothesize the following channel:

$$\text{Capital Ratio}_{b,t} \downarrow \rightarrow \text{Hedging Cost}_{f,b,c,t} \uparrow \rightarrow \text{FX Hedging Likelihood \& Amount}_{f,c,t} \downarrow \rightarrow \text{FC Investment}_{f,c,t} \downarrow$$

where b indexes FX dealers, f funds, and c currencies. Under this hypothesis, deterioration in FX dealers' balance-sheet capacity raises the cost of hedging for the funds that transact with them, which in turn reduces those funds' hedging activity and, ultimately, their demand for foreign-currency assets. If this channel is operative, FX market frictions shape the marginal demand for foreign currency assets over and above the return and diversification motives documented above. This hypothesis builds on a broader literature on intermediary asset pricing in FX markets, which argues that financial intermediaries, rather than end investors, are often the marginal participants setting prices and quantities in currency markets, and that intermediaries' balance-sheet constraints therefore propagate to exchange rates and to the liquidity they supply to their counterparties (He et al., 2017).

We examine the supply side of FX hedging by studying how dealer balance-sheet conditions affect the FX contracts that funds are able to transact. To test this hypothesis, we combine N-PORT FX derivative contract data with dealer balance-sheet data, covering 417 funds, 42 dealers, 10 G10 currencies, and 24 quarters. For each FX forward contract, we measure FX pricing as the deviation of the executed contract rate from the contemporaneous Bloomberg forward rate: for funds taking long foreign-currency positions, a positive deviation in the FC/USD rate denotes more favorable pricing, while for funds taking short foreign-currency positions, a negative deviation denotes more favorable pricing. For consistency in this paper, however, we reverse the sign for short positions

[7] For investors in EME bonds, hedging also amplifies the hedged yield differentials, but not the FX return component, where the interaction coefficient is significantly negative.

Table 10: Impact of Hedging: G10 Sovereign Bonds

	G10 Debt Holdings / AUM					
	(1)	(2)	(3)	(4)	(5)	(6)
Hedged Yield Differentials	0.117			-0.802***		
	(0.158)			(0.125)		
Hedged Yield Diff x Is hedged	1.914***			2.123***		
	(0.269)			(0.275)		
FX Hedging Return		0.671***			-0.047	
		(0.110)			(0.063)	
FX Hedging Return x Is hedged		0.648***			0.564***	
		(0.039)			(0.040)	
Unhedged Yield Differentials		0.976***			0.135**	
		(0.114)			(0.063)	
USD Convenience Yield			-2.055***			-1.027***
			(0.179)			(0.152)
USD Convenience x Is hedged			5.644***			4.748***
			(0.328)			(0.336)
Foreign Convenience Yield			-1.058***			-0.343***
			(0.128)			(0.075)
UST Convenience Yield			1.065***			-0.145
			(0.147)			(0.109)
VIX	-0.250***	-0.298***	-0.289***	-0.210***	-0.165***	-0.148***
	(0.045)	(0.047)	(0.048)	(0.043)	(0.041)	(0.039)
IG Spread	0.187***	0.190***	0.168***	0.329***	0.267***	0.189***
	(0.050)	(0.052)	(0.056)	(0.057)	(0.054)	(0.058)
FX (FC/USD)	0.260***	0.303***	0.330***	-1.411***	-1.739***	-1.746***
	(0.026)	(0.027)	(0.029)	(0.209)	(0.219)	(0.216)
Observations	79,384	79,384	79,384	79,384	79,384	79,384
R-Squared	0.34	0.37	0.38	0.41	0.43	0.43
Within R-squared	0.06	0.11	0.13	0.02	0.05	0.06
Fund FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	No	No	No	Yes	Yes	Yes

Notes: Fund × currency regressions using N-PORT data. The dependent variable is fund f's holdings of G10 sovereign bonds denominated in currency c, as a share of its AUM. Return and convenience yield variables are interacted with an indicator equal to one if the fund hedges its FX exposure in currency c (Is hedged). All specifications include fund fixed effects; Columns (4)–(6) also include country fixed effects. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Variable definitions are in Table A.1.

such that a positive price deviation also denotes favorable pricing. We measure a dealer's capital ratio as its equity divided by total capital (equity plus debt), sourced from Refinitiv, following the market-based capital ratio methodology of He et al. (2017). At the fund × bank × currency × quarter level, we estimate

$$Y_{f,c,b,t} = \text{Dealer Capital Ratio}_{b,t} + \text{FE}_{fb} + \text{FE}_c + \text{FE}_t + \epsilon_{f,c,[b],t} \tag{4}$$

where $Y_{f,c,b,t}$ denotes either: (1) FC Pricing$_{f,c,b,t}$, the FX pricing deviation from the contemporaneous Bloomberg forward rate, with positive values indicating favorable pricing for both long and short positions; or (2) $\left(\frac{\text{FX Forward Amount}}{\text{AUM}}\right)_{f,c,b,t}$, the net forward contract size, scaled by fund AUM. We include bank × fund fixed effects to absorb persistent characteristics of a given dealer-fund relationship, so the coefficient of interest captures how FX pricing and contract size change within that relationship as the dealer's capital ratio varies over time.

Tables 11–13 relate FX dealer balance-sheet capacity to fund FX contracting at the fund × bank and fund levels, and to the downstream effect on fund FX hedging and G10 sovereign debt holdings.

Table 11: Impact of FX Dealer Balance Sheets on Fund FX Contracts: Fund × Bank Level

	FX Price Dev		Fwd Amount	
	(1) Long	(2) Short	(3) Long	(4) Short
Bank Capital Ratio	0.953***	0.886***	0.238**	0.322**
	(0.200)	(0.131)	(0.101)	(0.126)
Observations	29,762	43,158	29,762	43,158
R-Squared	0.18	0.19	0.46	0.50
Bank x Fund FE	Yes	Yes	Yes	Yes
Currency FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Notes: Regressions using N-PORT data at the fund × bank × currency × quarter level, covering 417 funds, 42 FX dealers, 10 G10 currencies, and 24 quarters. The dependent variables are the deviation of the executed FX forward rate from the contemporaneous Bloomberg forward rate (FX Price Dev, in basis points, signed so that positive values denote more favorable pricing for the fund) and the forward contract amount as a share of fund AUM, each computed separately for long and short foreign-currency positions. The key regressor is the dealer's market-based capital ratio, equity divided by equity plus debt. All specifications include fund × bank, currency, and quarter fixed effects. Standard errors clustered at the fund level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Variable definitions are in Table A.1.

Table 11 shows that funds transacting with better-capitalized dealers obtain more favorable FX pricing and enter into larger contracts, both when taking long and short foreign-currency positions. A one percentage point increase in a dealer's capital ratio corresponds to 0.89–0.95 basis points of more favorable FX pricing. This positive link between dealer balance-sheet capacity and the size of FX contracts echoes Correa and DeMarco (2025), who find that dealer leverage is positively and significantly associated with the volume of dealers' own FX derivative positions, particularly for

foreign-headquartered dealers; our fund-level results suggest that this leverage-driven expansion in dealer FX activity also translates into larger and more favorably priced contracts for the funds on the other side of these trades.

A concern with this fund × bank specification is that dealer capital could be correlated with unobserved factors that jointly determine which funds match with which dealers. To help address this, we also restrict the sample to funds that transact in a given currency with multiple dealers in the same quarter, following a Khwaja and Mian (2008)-style identification strategy. Using fund × currency × quarter fixed effects, this identification strategy compares pricing received by the same fund, in the same currency and quarter, across dealers with different capital ratios. As Table 12 shows, within this more demanding specification, higher dealer capital still leads to better FX pricing for funds. The positive effect of dealer capital on contract size survives for long foreign-currency positions but is not statistically significant for short positions.

Table 12: Impact of FX Dealer Balance Sheets on Fund FX Contracts: Fund × Currency × Quarter Fixed Effects

	FX Price Dev		Fwd Amount	
	(1) Long	(2) Short	(3) Long	(4) Short
Bank Capital Ratio	0.262*	0.344***	0.315**	0.089
	(0.134)	(0.104)	(0.125)	(0.178)
Observations	23,615	33,449	23,615	33,449
R-Squared	0.75	0.74	0.50	0.55
Fund x Currency x Time FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes

Notes: Regressions using N-PORT data at the fund × bank × currency × quarter level, with the same dependent variables and key regressor as in Table 11. The sample is restricted to funds that trade a given currency with more than one dealer in the same quarter. All specifications include fund × currency × quarter and bank fixed effects, so that coefficients are identified from differences in capital ratios across the dealers of the same fund, in the same currency and quarter. Standard errors clustered at the fund level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Variable definitions are in Table A.1.

Table 13 aggregates the fund × bank relationship to the fund level, capturing each fund's exposure-weighted access to dealer balance-sheet capacity, netting short and long positions. For each fund, we compute weighted average bank capital ratios and pricing deviations, with weights based on FX contract size. This analysis also restricts the sample to funds that hedge more than 10 percent of their FX exposure in a given currency, to reduce noise from funds with minimal hedging. Consistent with the fund × bank results, funds whose dealer relationships are, on average, better capitalized obtain more favorable overall FX pricing (Column 1) and transact larger net contracts relative to funds' AUMs (Column 2), indicating that the fund × bank-level frictions documented above are not offset by funds substituting toward other dealers.

Columns 3 and 4 trace these pricing and contract-size effects through to funds' hedging activity and their holdings of foreign sovereign debt. Hedging is strongly and positively associated with

Table 13: Impact of FX Dealer Balance Sheets on Fund FX Hedging and G10 Sovereign Bond Holdings

	(1) FX Price Dev	(2) Forward Amount	(3) G10 Sov Hldgs %AUM	(4) G10 Sov Hldgs %AUM
Bank Capital Ratio	0.124**	0.694***		
	(0.063)	(0.201)		
Fwd Amount			0.158***	
			(0.021)	
Fwd Amount (Est.)				0.176*
				(0.102)
Observations	30,691	30,691	30,691	30,691
R-Squared	0.21	0.73	0.49	0.44
Fund FE	Yes	Yes	Yes	Yes
Currency FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Notes: Regressions using N-PORT data in which the fund × bank relationships are aggregated to the fund level: for each fund, bank capital ratios and FX pricing deviations are averaged across its dealers, weighted by FX contract size, and long and short positions are netted. The sample is restricted to funds that hedge more than 10 percent of their FX exposure in a given currency. Columns (1) and (2) relate the weighted-average dealer capital ratio to the fund's FX pricing and to its net forward contract amount as a share of AUM. Column (3) relates the forward amount to the fund's G10 sovereign bond holdings as a share of AUM, and Column (4) instruments the forward amount with the weighted-average dealer capital ratio. All specifications include fund, currency, and quarter fixed effects. Standard errors clustered at the fund level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Variable definitions are in Table A.1.

sovereign debt holdings (Column 3). When we instrument hedging with dealer capital ratios, the estimated effect of hedging on sovereign debt holdings remains positive and is statistically significant at the 10 percent level (Column 4), with a larger standard error, as is usual with instrumental-variable estimates. This provides evidence that better-capitalized dealers raise funds' sovereign debt holdings through greater hedging.

Taken together, these results show that frictions in the supply of FX hedging reach funds: when FX dealers' capital constraints tighten, funds face worse pricing and smaller contracts, and they hedge less. The instrumented estimates indicate that these frictions also reduce funds' willingness to hold foreign-currency sovereign debt, which provides a mechanism, complementary to the return and diversification motives documented in the preceding sections, through which FX hedging frictions shape the marginal demand for G10 sovereign bonds.

6 Conclusion

This paper studies the foreign positions of U.S. investors, focusing on their holdings of foreign sovereign debt and on the currency hedging that accompanies them. Combining aggregate TIC data on the holdings of all U.S. investors with fund-level N-PORT data on holdings and FX deriva-

tives, we find that U.S. investors' demand for foreign sovereign bonds, including highly rated G10 sovereign bonds, is driven primarily by returns rather than by the safety and liquidity services these bonds provide. Holdings respond to currency-hedged rather than unhedged yield differentials, and rise when foreign sovereign bonds offer low convenience yields relative to U.S. Treasuries. At the fund level, diversification motives also play a role, and funds that hedge their currency exposure respond more strongly to hedged returns than funds that do not. The supply of hedging matters as well: funds that transact with better-capitalized dealers obtain more favorable FX pricing and enter into larger contracts. Funds that hedge more also hold more foreign sovereign bonds, and instrumental-variable estimates indicate that easier access to hedging raises these holdings.

Our results leave several questions for future research, the first of which is how investors other than funds hedge: because comparable data on derivatives positions are not available for other types of investors, we cannot observe how insurers, pension funds, or banks hedge their foreign holdings, even though the TIC data suggest that their demand for foreign sovereign debt responds differently to returns. Second, hedging frictions are likely to bind more strongly in some periods and markets than in others, for example when global risk or exchange rate volatility is elevated or when the supply of hedging is concentrated among a few dealers. Exploring this variation would help identify when intermediary constraints matter most for cross-border portfolios. Third, while we focus on quantities, the interaction between end investors' hedging demand and dealers' balance-sheet capacity may also shape prices, including exchange rates and deviations from covered interest parity, which a growing literature has begun to examine (e.g., Du et al., 2018a; Cenedese et al., 2021; Correa and DeMarco, 2025). Finally, understanding how credit risk and currency risk jointly shape U.S. investors' demand for EME sovereign bonds remains an important open question.

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A Variable Definitions

Table A.1: Variable Definitions

Variable	Definition	Source
Panel A. Dependent variables		
Foreign sovereign bond holdings share	U.S. investors' holdings of foreign sovereign bonds denominated in currency c, by investor (owner) type, as a share of their total sovereign bond holdings, including U.S. Treasuries.	TIC SHC
Own G10 (EME) Debt	Indicator equal to one if fund f holds any G10 (EME) sovereign debt in quarter t.	SEC N-PORT
G10 (EME) Debt Hldg	Fund f's holdings of G10 (EME) sovereign debt, as a percentage of its assets under management (AUM); in the intensive-margin regressions, holdings in currency c.	SEC N-PORT
FX Price Dev (Long/Short)	Deviation of the executed FX forward rate from the contemporaneous Bloomberg forward rate, in basis points, signed so that a positive value denotes more favorable pricing for the fund; computed separately for long and short foreign-currency positions.	SEC N-PORT; Bloomberg
Fwd Amount (Long/Short)	Notional amount of the fund's FX forward contracts in currency c, for long and short foreign-currency positions.	SEC N-PORT
G10 Sov Hldgs %AUM	Fund f's holdings of G10 sovereign bonds, as a percentage of AUM.	SEC N-PORT
Panel B. Return drivers		
Unhedged yield differential	One-year sovereign bond yield in currency c minus the one-year U.S. Treasury yield, $y^{1y}_{c,t} - y^{1y}_{US,t}$.	Bloomberg
FX hedging return	Return from hedging currency c into U.S. dollars with an FX forward, $-\rho_{c,t}$, where $\rho_{c,t}$ is the FX swap basis.	Bloomberg
Hedged yield differential	Currency-hedged yield differential, equal to the unhedged yield differential plus the FX hedging return, $\Delta y^{hedged}_{c,t}$ in equation (1).	Bloomberg
USD convenience yield (FX Swap Basis (neg))	Convenience yield on the U.S. dollar, $(r_{c,t} - \rho_{c,t}) - r_{US,t}$, where r denotes short-term risk-free rates; reported as FX Swap Basis (neg) in the TIC tables.	Bloomberg
UST convenience yield	Convenience yield on U.S. Treasuries relative to dollar cash, $r_{US,t} - y_{US,t}$.	Bloomberg
Foreign convenience yield	Convenience yield on foreign sovereign bonds relative to local-currency cash, $r_{c,t} - y_{c,t}$.	Bloomberg
Panel C. Risk and macroeconomic controls		
Foreign CDS	Sovereign credit default swap spread of the issuer country of currency c.	Markit
U.S. CDS	Credit default swap spread on U.S. Treasury debt.	Markit
VIX	CBOE Volatility Index, a proxy for global risk sentiment. Measured in logs.	CBOE via Haver
FX (FC/USD)	Exchange rate level, in units of foreign currency c per U.S. dollar. Measured in logs.	Bloomberg; Refinitiv

Continued on next page

Table A.1 continued

Variable	Definition	Source
Broad Dollar	Broad U.S. dollar index. Measured in logs.	FRED
IG Spread	U.S. investment-grade corporate bond spread. Measured in logs.	FRED
Panel D. Fund portfolio controls		
UST Holdings	Fund f's holdings of U.S. Treasuries, as a percentage of AUM.	SEC N-PORT
Own FC Risky Debt (Safe Asset)	Indicator equal to one if fund f holds any foreign-currency risky debt (safe debt).	SEC N-PORT
FC Risky Debt (Safe Asset) Holdings	Fund f's holdings of foreign-currency risky debt (safe debt), as a percentage of AUM.	SEC N-PORT
Own FC Equity	Indicator equal to one if fund f holds any foreign-currency equity.	SEC N-PORT
FC Equity Holdings	Fund f's holdings of foreign-currency equity, as a percentage of AUM.	SEC N-PORT
Panel E. Hedging and FX dealers		
Is hedged	Indicator equal to one if fund f hedges its FX exposure in currency c.	SEC N-PORT
Hedge ratio	Fund f's net short FX derivative position in currency c divided by its debt holdings in currency c, $-\text{FX net amount}_{f,c,t}/\text{Debt}_{f,c,t}$.	SEC N-PORT
Bank Capital Ratio	Market-based capital ratio of FX dealer b: market value of equity divided by market value of equity plus debt, from Refinitiv, following He et al. (2017).	Refinitiv
Panel F. N-PORT summary statistics (Table 2)		
Foreign Asset Exposure	Total amount held in currency c as debt, equity, or total, in billions of U.S. dollars.	SEC N-PORT
FX Derivative Exposure	Gross (sum) or net (difference) of buy and sell FX derivative amounts in currency c, in billions of U.S. dollars.	SEC N-PORT
Net Derivative Exposure	Net FX derivative amount in currency c of funds taking debt hedge, equity hedge, or directional positions, in billions of U.S. dollars.	SEC N-PORT
% Funds Using FX, AUM	AUM-weighted percentage of funds with holdings in currency c that take debt or equity hedging positions.	SEC N-PORT
% Funds Using FX, N	Percentage of funds, by count, with holdings in currency c that take debt or equity hedging positions.	SEC N-PORT
% FX Usage	Gross FX derivative amount associated with debt hedging, equity hedging, or directional positions, as a percentage of the total gross FX derivative amount in currency c.	SEC N-PORT
AUM-Weighted Mean Hedge Ratio	Hedge ratio of debt or equity exposure, averaged across funds that hedge, weighted by fund net assets.	SEC N-PORT

Notes: TIC SHC refers to the Treasury International Capital Survey of U.S. Ownership of Foreign Securities; SEC N-PORT refers to the portfolio holdings reports filed by U.S.-registered investment funds with the Securities and Exchange Commission. c indexes currencies (and the corresponding issuer countries), f funds, b FX dealers, and t time. Safe and risky debt are classified using Moody's ratings where available and Fitch ratings otherwise. G10 sovereign debt refers to local-currency government bonds issued by G10 countries other than the United States; EME sovereign debt refers to local-currency government bonds issued by emerging market economies.

B Credit Rating Coverage

We classify debt securities as safe or risky using Moody's ratings where available and Fitch ratings otherwise. Tables B.1 and B.2 report, for 2024 and 2020, the number and value of debt securities in our sample that are matched to ratings from each provider, by currency.

Table B.1: Match of Debt Securities to Credit Ratings, by Provider: 2024

	By Count							By Amount (Billions USD)						
		Matched			% Matched				Matched			% Matched		
	Total	Moodys	Fitch	Total	Moodys	Fitch	Total	Total	Moodys	Fitch	Total	Moodys	Fitch	Total
AEs:														
AUD	1,760	831	640	961	47	36	55	64	49	48	61	77	76	96
CAD	4,249	2,491	1,723	2,741	59	41	65	91	68	54	70	74	59	77
CHF	382	128	109	172	34	29	45	14	9	7	14	65	49	95
DKK	275	40	84	103	15	31	37	10	2	5	5	18	45	46
EUR	24,767	13,144	11,076	15,688	53	45	63	873	519	496	641	59	57	73
GBP	8,882	2,977	2,919	3,752	34	33	42	194	110	135	160	56	69	82
JPY	1,592	404	259	409	25	16	26	161	69	48	69	43	30	43
NZD	640	152	154	176	24	24	28	10	10	10	11	97	99	103
SGD	183	47	65	66	26	36	36	10	4	6	6	38	56	56
USD	2,343,674	242,471	172,766	278,233	10	7	12	32,732	17,342	14,764	18,639	53	45	57
EMs:														
BRL	1,212	72	182	194	6	15	16	34	7	33	33	22	97	97
CNY	844	60	39	76	7	5	9	39	1	1	1	2	2	3
COP	644	168	177	186	26	27	29	12	12	12	12	97	98	99
IDR	344	76	104	122	22	30	35	24	4	6	7	17	27	28
KRW	451	9	13	13	2	3	3	36	3	4	4	9	11	11
MXN	1,116	218	237	263	20	21	24	44	33	36	39	75	83	88
MYR	393	74	121	121	19	31	31	18	5	8	8	28	43	43
THB	363	50	45	52	14	12	14	12	3	3	3	25	24	28
ZAR	600	152	149	159	25	25	26	19	19	19	19	99	99	99

Notes: Number and value, in billions of U.S. dollars, of debt securities in the sample that are matched to Moody's and Fitch ratings, by currency. For securities rated by both agencies, we use the Moody's rating.

Table B.2: Match of Debt Securities to Credit Ratings, by Provider: 2020

	By Count							By Amount (Billions USD)						
		Matched			% Matched				Matched			% Matched		
	Total	Moodys	Fitch	Total	Moodys	Fitch	Total	Total	Moodys	Fitch	Total	Moodys	Fitch	Total
AEs:														
AUD	3,991	1,053	744	1,113	26	19	28	48	38	35	42	80	73	88
CAD	3,596	2,125	1,390	2,305	59	39	64	77	62	46	65	81	59	84
CHF	530	280	182	328	53	34	62	9	6	4	8	74	46	91
DKK	225	70	72	109	31	32	48	14	6	6	7	45	40	50
EUR	20,172	12,292	10,306	14,016	61	51	69	638	488	419	552	77	66	87
GBP	47,259	3,129	2,994	3,739	7	6	8	168	123	111	149	73	67	89
JPY	2,007	1,015	595	1,026	51	30	51	204	149	91	149	73	44	73
NZD	3,857	114	116	131	3	3	3	8	8	8	8	97	95	98
SGD	264	81	110	115	31	42	44	7	4	6	6	61	83	83
USD	1,284,182	212,526	159,584	245,202	17	12	19	29,469	15,054	12,954	16,358	51	44	56
EMs:														
BRL	684	102	153	161	15	22	24	43	13	23	23	30	54	54
CNY	725	32	32	52	4	4	7	33	1	1	2	3	3	5
COP	340	123	154	154	36	45	45	11	7	7	7	62	65	65
IDR	370	145	172	199	39	46	54	41	12	16	16	30	38	40
KRW	411	32	47	48	8	11	12	34	4	7	7	12	20	20
MXN	1,160	251	246	272	22	21	23	69	39	39	39	57	56	57
MYR	425	151	192	193	36	45	45	14	8	9	9	56	65	65
THB	322	79	75	86	25	23	27	11	7	6	7	63	61	69
ZAR	378	133	130	142	35	34	38	13	11	11	11	81	81	82

Notes: Number and value, in billions of U.S. dollars, of debt securities in the sample that are matched to Moody's and Fitch ratings, by currency. For securities rated by both agencies, we use the Moody's rating.

C FX Derivative Counterparty Concentration

Figures C.1 and C.2 plot, for each G10 currency, the shares of the top ten buyers and sellers in funds' FX derivative contracts in 2025:Q2.

Figure C.1: Top 10 Buyers by Share per Currency for G10 Currencies: 2025Q2

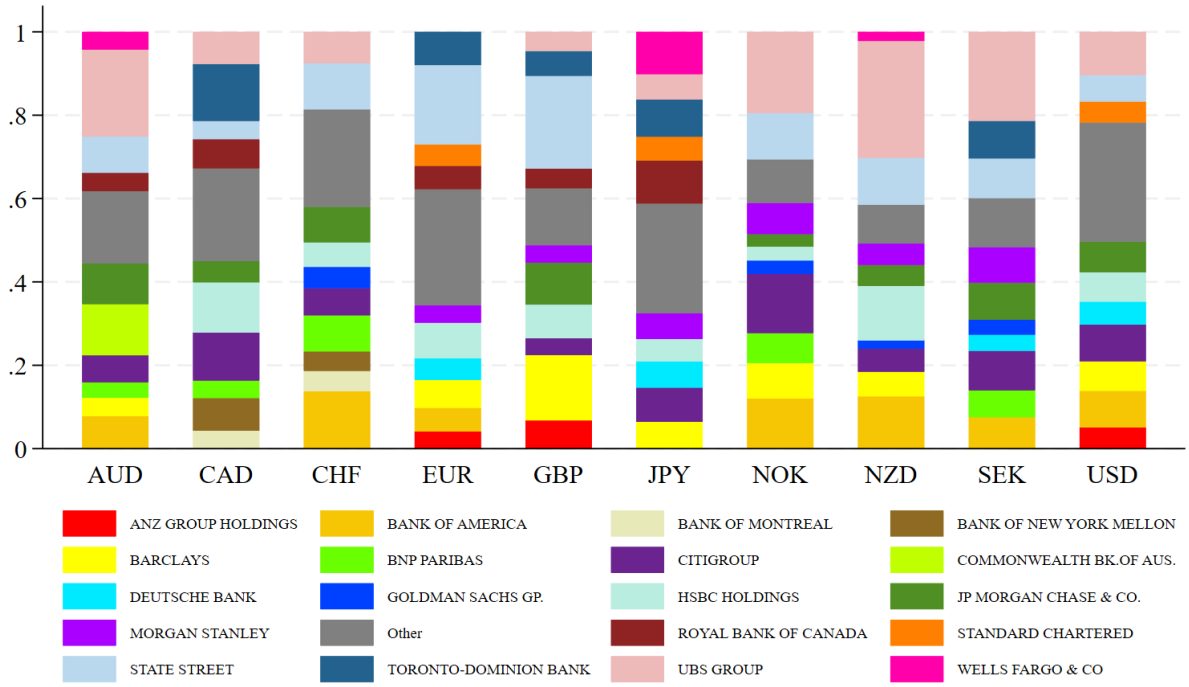


Figure C.2: Top 10 Sellers by Share per Currency for G10 Currencies: 2025Q2

