International Investors in Local Bond Markets: Indiscriminate Flows or Discriminating Tastes?

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Abstract

We analyze the local currency bond portfolios of US investors over the period 2006-11. US investors' increased their allocations to local currency bonds, in part due to traditional "push" factors such as US yields and swings in risk aversion/expected volatility. But there was also a reallocation toward EMEs, and those EMEs with strong macroeconomic fundamentals—more positive current account balances and more stable inflation—received the most US investment. Our analysis suggests a seemingly virtuous cycle of local currency bond market development, enhanced financial stability, and increased international investment that has occurred in emerging market economies.

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The extent to which distortions in one country may spread to financial market developments in the other EMEs will depend to a great degree also on whether international investors look at the EMEs as a homogeneous asset class or whether they take an increasingly differentiated view in their evaluations of individual EMEs and their respective progress towards achieving macroeconomic stability. The varying reactions of bond markets in some EMEs following a rise in volatility over the last two years indicate that international investors are beginning to make a greater distinction between those countries' bond markets depending on how the fundamentals are assessed; yet it remains to be seen whether, and to what extent, this development is a lasting one.

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1. Introduction

Investor behavior in bond markets is of great interest to policymakers in both emerging market economies (EMEs) and advanced economies (AEs). But how do investors behave? During the Great Retrenchment of the recent Global Financial Crisis (GFC), the pattern of capital flows were highly heterogeneous across types of flows and destinations (Milesi-Ferretti and Tille 2012). Focusing on mutual fund flows, Raddatz and Schmukler (2012) conclude that international investors do not seem to have a stabilizing role and expose countries to foreign shocks; they generated large reallocations during the global financial crisis with pro-cyclical behavior, reducing exposure to countries during bad times and increasing it when conditions improve. In contrast, Fratzscher (2012) concludes that while common shocks – key crisis events as well as changes to global liquidity and risk – exerted a large effect on capital flows both in the crisis and in the recovery, the effects were highly heterogeneous across countries, with a large part of this heterogeneity being explained by differences in the quality of domestic institutions, country risk and the strength of domestic macroeconomic fundamentals.

In this paper we focus on cross-border investor behavior in local currency bond markets (LCBMs), an asset class that is particularly interesting because it is both newly developed (in

EMEs at least) and purported to have positive implications for financial stability. The GFC provided the first real period of stress for newly developed bond markets.

Of course, in the 1980s and 1990s, policymakers in Latin American and Asian EMEs were not concerned with international flows into their LCBMs because none existed. EMEs could not attract global investors into their local currency bond markets, or if they could the investment was abruptly reversed. Not being able to borrow internationally in their own currencies, EMEs relied on borrowing in foreign currencies. Borrowing in foreign currencies while assets were largely denominated in the local currency resulted in currency mismatches (Goldstein and Turner 2004) that limited policy options. For example, a currency depreciation that might spur growth would immediately cause a sharp increase in debt burdens. Indeed during the ensuing crises, when the currency was finally allowed to depreciate, the financial fragility associated with currency mismatches became obvious, as the depreciation caused a dramatic increase in debt burdens that was quickly followed by defaults and bankruptcies.

The global financial structure has changed since then. The EME crises of the 1980s and 1990s brought about a renewed focus on the development of local currency bond markets (LCBMs). If locals acquired the ability to borrow in the local currency, the currency mismatches at the center of past crises would be ameliorated, enhancing financial stability. And substantial development of LCBMs is evident in emerging market economies (EMEs) with low inflation, stronger institutions, and well defined creditor rights (see Burger and Warnock 2003, 2006; Eichengreen and Luengnaruemitchai 2006, Claessents, Klingebiel, and Schmukler 2007). Getting the fundamentals right in order to develop LCBMs, attracted international investors who broadened the investor base and improved liquidity, encouraging further development of the

local bond market. Far different from past decades' currency mismatches and associated crises, EMEs entered into a virtuous cycle of LCBM development, enhanced financial stability, and international investment.

Compared to the previous era of currency mismatches, depreciations, and defaults/bankruptcies, the cycle was indeed virtuous. But large inflows of foreign investment can be problematic. Most extreme capital flow episodes (surges and stops, for example) are driven by debt flows (Forbes and Warnock 2013); credit booms lead to crises (Mendoza and Terrones 2008, Gourinchas and Obstfeld 2012, Schularick and Taylor 2012); and large foreign investment flows into LCBMs can complicate the tasks of EME policymakers by appreciating real exchange rates, fanning asset price bubbles, and intensifying lending booms. Indeed, this worry of the virtuous cycle turning vicious, at a time when unprecedented monetary easing by central banks in many advanced economies (AEs) might be propelling a global search for yield, has many EME policymakers worrying about exactly those problems: excessive upward pressure on the local currency, indiscriminate flows into EMEs creating bond market bubbles that enable increasingly risky borrowing, and the potential for an external shock (such as Federal Reserve "tapering") prompting a stampede of international investors rushing for the exit.

In this paper, we examine the portfolio reallocations of global investors—specifically, US investors—over the period 2006-11, a period that spans bubble years, the global financial crisis, and currency wars. We employ country-level holdings data built from high-quality security-level data collected by the US Treasury that includes information about the currency denomination of bonds held by US investors. This dataset allows us to, among other things, analyze the impact of US monetary policy on US investor positions in local currency bonds, a point central to

currency war claims. We are aware of no study of cross-border bond portfolio *reallocations* with respect to LCBMs; we aim to fill this gap.[1]

Our assessment of the virtuous and vicious cycles begins in the next section with discussions of the portfolio holdings data. In analyzing portfolio allocations, a decision must be made on how (if at all) to scale holdings. In a technical appendix, we assess various scale factors and argue that a relative weight measure—essentially, the deviation from a global benchmark—is appropriate. Forming such a measure requires measures of the size of each country's local currency bond market, which we also analyze in this paper to describe the evolution of these markets. Global investors plausibly shift portfolios, at least at the margin, based on their expectations of future returns moments. In Section 3 we present historical return characteristics and develop a model of expected return moments. In Section 4 we analyze factors behind reallocations within US investors' local currency bond portfolios during the 2006-11 period. Did global investors discriminate among bond markets based on country-level factors during this volatile period for cross-border flows? We assess this using our panel dataset of cross-border portfolio positions before, during, and after the global financial crisis, while taking account of hyper-aggressive US monetary policy. Section 5 concludes.

2. Foreign Investment in Local Currency Bonds

In this section we present our strategy for analyzing foreign investment in local currency bonds. First, we discuss the requirements for holdings data. Second, we present our preferred

[1] Lack of time series data limited previous studies of US investors' local currency bond portfolios (Burger and Warnock 2007; Burger, Warnock, and Warnock 2012) to snapshots of cross-sectional analysis of portfolios at a particular point in time. Now, with available time series a study of portfolio reallocations in local currency bond markets over time can be done.

measure of scaled holdings, leaving a thorough discussion of the proper way to scale holdings to a technical appendix. Finally, we present the empirical framework we will use to analyze foreign investment.

2.1 Available Data

To study the evolution of foreign investment in local currency bonds, best would be to use time series data on *all foreigners'* holdings of each country's local currency bonds. One would need time series data of foreigners' holdings of Malaysian ringit bonds, Indonesian rupiah bonds, euro-denominated bonds issued by German entities, and so on for perhaps 40 or more countries. Unfortunately, such time series data for a large set of countries does not, to our knowledge, exist. Asian Bonds Online does cover foreigners' holdings of the government bonds of a handful of Asian countries, but we do not know of a source that includes all foreigners' holdings of the local currency bonds of many countries and is available through time.

The IMF Coordinated Portfolio Investment Survey (CPIS) provides data on foreign holdings of many countries' bonds by investor country, but it is limited in that it includes all bonds, not differentiating between local currency- and foreign currency-denominated bonds. One study, Asian Development Bank (2013), works around this limitation by assuming that foreign and local currency debt are held by investors in other countries in proportions equal to the amount outstanding.[2]

[2] ADB makes this assumption only in an attempt to shed a bit more light on foreign holdings, knowing that the assumption is likely imperfect.

In order to analyze foreign holdings *through time* without making assumptions on foreign holdings, we work with data on the holdings of a particular set of investors: US investors. Focusing on US investors' cross-border holdings of local currency bonds is limiting in the sense that we can only analyze the portfolios of one group of investors (US investors), but this is quite a large group for which we have high quality, publicly available data. Importantly, US investors' bond holdings are captured by the US Treasury Department at the security level, so the exact nature (including currency denomination) of the bond is known to the data collector. Moreover, no assumptions are necessary. The bond's security ID, when combined with an issuer's dataset, readily provides the country of the issuer as well as the currency denomination of the bond. The security-level holdings data are not currently available to researchers outside the Federal Reserve Board, but the country-level aggregates that are built from the security-level data are available and provide a clean dataset for year-end 2001 and each year-end since 2006. It is these holdings—in particular, the evolution of these holdings country-by-country—that we will analyze.

We will provide more details later in the paper, but for now we present some charts on aggregate data. Our focus is on the local currency bond portfolio of US investors, a portfolio that has grown from $152 billion in 2001 to almost $500 billion in 2011 (Figure 1). It is a portfolio that is much smaller than US investors' holding of foreign bonds denominated in US dollars, which now totals almost $1500 billion, but a portfolio that is potentially of greater interest. In fact, most of the USD-denominated foreign bonds in US investors' foreign bond portfolio were issued by private sector entities in just a handful of countries such as Caribbean

Financial Centers, Australia, Canada, the Netherlands, and Sweden (Bertaut, Tabova, and Wong 2013).

Overall, local currency bonds have been a relatively stable 25-30 percent of US investors' foreign bond portfolio, but splitting the data by AEs and EMEs reveals one reason we are interested in the local currency bonds: The share of local currency bonds in US investors' EME bond portfolios has grown from about 2% in 2001 to almost 40% in 2011 (Figure 2). Gone are the days when US investors would only hold USD-denominated EME bonds. Analyzing the evolution of US investors' local currency EME bond portfolios alongside their local currency AE bond portfolios can shed light on the characteristics that attract or drive away global investors.

2.2 How Should Holdings Be Scaled?

2.2.1 Suggested by Theory and Available in Practice

As discussed in the technical appendix, there are many ways to scale holdings. For our empirical analysis, we choose as a dependent variable a measure—the relative portfolio weight—that is suggested by theory, available in practice, and does not have the undesirable features of other commonly used measures. For this study, a country's relative portfolio weight is the ratio of its weight in US investors's portfolio to its weight in the global bond market. Specifically, relative portfolio weight is defined as:

$$\frac{\omega_{i,US}}{\omega_{i.m}} = \frac{{}_{lc}H_i^{US} \Big/ \sum_i H_i^{US}}{{}_{lc}MCap_i / \sum_i MCap_i} \qquad [1]$$

where $_{lc}H_i^{US}$ is defined as US investors' holdings of country i's local currency bonds and $\sum_i H_i^{US}$ represents the total US investor bond portfolio (all currencies), while $_{lc}MCap_i$ is the market capitalization of country i's local currency bond market and $\sum_i MCap_i$ is the market capitalization of the global bond market (of all currency denominations). Relative portfolio weight is motivated by a global CAPM; if the portfolio weight assigned to a particular bond market equals its relative size in the global bond market, relative weight for that market is one. In reality, US investors' relative portfolio weights fall far short of one, because over 90% of US investors' bond holdings are issued by US entities.

2.2.2 The "Market Capitalization" of Local Currency Bond Markets

The relative weight measure requires data on the relative size of global bond markets. For data on outstanding bonds by country and currency, placed both domestically and internationally, we rely on unpublished data provided by the Bank of International Settlements (BIS).

In Table 1 we display the bond market data. Global bond markets have almost tripled in size over the past decade, increasing from $30 trillion in 2001 to $83 trillion in 2011. Growth in local currency bond markets is evident in both AEs and EMEs. AE local bond markets have grown from being roughly equal to AE GDP in 2001 to 1.6 times GDP in 2011, while EME local bond markets grew from 18 to 24 percent of EME GDP. EME local currency bonds have also increased as a share of the total global bond market (all currencies), more than doubling from 3.3 percent in 2001 to 6.8 percent in 2011.

While our study focuses on portfolio allocations, we highlight here implications of bond market development on financial stability. With larger local currency bond markets, EMEs have become much less reliant on foreign currency borrowing. In 2001, a substantial one-third of EME bonds were denominated in a foreign currency. By 2011, 84% of EME bonds were denominated in the local currency.

The development of local currency bond markets, impressive across of wide set of EMEs, has been particularly striking in Latin America. In 2001 approximately half of Latin American bonds were denominated in foreign currency, but by 2011 local currency bond markets had grown to the point where only 28 percent of bonds in the region were issued in foreign currency. Brazil and Mexico in particular show evidence of a virtuous cycle. Improved macroeconomic policies and strong creditor rights fostered the development of local currency bond markets, mitigating previously destabilizing currency mismatches. Reduced reliance on foreign currency borrowing alleviated the fear of floating (Calvo and Reinhart 2002) and facilitated new policy regimes with inflation targeting central banks and flexible exchange rates. Improved macro and financial stability attracted foreign investors who improved liquidity and a broadened the investor base, further enhancing local currency bond market development. In fact, this virtuous cycle of improved policies and better developed local bond markets deserves significant credit for allowing EMEs in general, and Latin America in particular, to weather the global financial crisis much better than the Asian financial crisis of the late 1990s (Alvarez and De Gregorio 2013, Vegh and Vuletin 2013). Even when Latin American currencies fluctuated dramatically during the crisis, financial systems were resilient and deep real downturns were avoided.

2.2.3 US Investment in Foreign Bonds: The Relative Weight Measure

For the relative portfolio weight measure, we use the market capitalization data of Table 1 combined with data on US investors' holdings of local currency bonds. Over the past decade, US investors have increased the relative portfolio weight assigned to EME local currency bond markets (Table 2). That is, the weight of EME local currency bonds in US investor bond portfolios has increased relative to the share of EME local currency bonds in the global bond market. EME local currency bonds were 3.3% of the global bond market in 2001 and grew to 6.8% in 2011, so some increase in US holdings might be expected. But US holdings increased even faster, increasing from 1.1% of the cross-border local currency bond portfolio in 2001 to 17.5% by 2011.

Relative portfolio weights that are less than one can be interpreted as a home bias measure of deviations from benchmark weights. The relative weight measure for EME local currency bonds in US investors' portfolios, after a dramatic increase over the past decade, now exceeds the relative weight of AE local currency markets. In other words, in US investors' portfolios of EME local currency bonds are closer to benchmark (ICAPM) weights than are AE local currency bonds.

While the evolution of relative portfolio weights (Table 2) suggests a shift in US foreign bond portfolios away from AEs and toward EMEs, there are also significant variations across regions, countries, and over time that are worthy of careful investigation. Our empirical analysis therefore focuses on an annual panel of US investors' relative portfolio weights from 2006 to 2011.

2.3 An Empirical Framework

US investment in many EME local bond markets is now substantial. But some EMEs receive more US investment than others. We motivate our empirical assessment of fundamental factors behind the amount of US investment a particular EME bond market receives using a simple model of portfolio allocation that encompasses salient features of international bond markets such as barriers to international investment, returns that exhibit higher moments, and other "push" and "pull" factors. We then use the model to inform panel regressions to analyze changes in US investors' relative portfolio weights in LCBMs.

The motivating model follows from the work of Kraus and Litzenberger (1976), de Athayde and Flores (2004) and Harvey, Liechty, Liechty, and Muller (2010) and allows for the fact that asset returns exhibit higher moments. Investors with nonincreasing absolute risk aversion should care about skewness in addition to mean and variance.[3] The analytics are rather complicated—see Harvey et al. (2010) and de Athayde and Flores (2004), who note that feasible solutions can be calculated in most cases—but take the following simple form:

$$\omega = f(\overset{+}{x}, \overset{-}{V}_x, \overset{+}{S}_x) \qquad [2]$$

where the signs above the arguments indicate that portfolio weights (ω) should be higher on countries whose bonds add to the portfolio's expected returns (x) and expected skewness (S_x) and reduce the portfolio's variance (V_x). In an international setting, we also control for barriers

[3] As Kraus and Litzenberger (1976) note, while one could include fourth and higher moments, we lack compelling behavioristic arguments for investor attitudes for those moments.

to international investment, such as restrictions on the repatriation of investment income, and potential diversification benefits. Direct barriers to international investment, *barriers*, can be modeled by assuming that they impose a cost that varies across countries and reduces investors' expected returns.[4] As a proxy for potential diversification benefits, we include the correlation of each country's bond returns with US bond returns, $corr_i$, calculated over a 36-month period. Finally, following a long literature we include some global "push" and local "pull" factors" (in addition to the expected moments).

Thus, our empirical exercise will assess the extent to which the following factors influence US portfolio reallocations: barriers to international investment; potential diversification benefits; expected mean, variance, and skewness of returns; and other "pull" and "push" factors. Specifically, we assess relationships of the following form:

$$\omega = f(\overset{+}{x}, \overset{-}{V}_x, \overset{+}{S}_x, \overset{-}{barriers}, \overset{-}{corr}, push, pull) \qquad [3]$$

While some independent variables in (3) are straightforward, measures of expected mean, variance, and skewness of returns require some discussion.

3. Historical Return Characteristics and a Model of Expected Returns

Our portfolio analysis requires measures of expected returns moments, which we will model in this section. We begin though by presenting some summary statistics for local currency bond returns.

[4] For portfolio allocation models with barriers to international investment, see Black (1974), Stulz (1981), and Cooper and Kaplanis (1986).

3.1 Characteristics of Local Currency Bond Returns

Some basic summary statistics on local currency bond market returns are presented in Table 3. Over the period from January 2006 to December 2011 (coincident with our panel data), unhedged local currency bonds provided attractive average monthly returns in both EMEs (0.6%) and AEs (0.53%). Currency hedged positions in local currency bonds provided lower returns and significantly lower volatility in both EMEs and AEs. The primary advantage of EME local currency bonds during this period was the substantial diversification benefits offered to US investors. The correlation of unhedged EME local currency bonds with US government bonds was essentially zero.

For comparison, we also present return characteristics for other asset classes. For the 2006-11 period, returns on foreign bonds were generally comparable to US government and corporate bonds. From the perspective of a US investor domestic bonds were more stable, but foreign bonds provided significant diversification benefits. The J.P. Morgan Emerging Market Bond Index (EMBI), which consists of USD-denominated EME bonds, provided the highest average monthly returns (0.67%) but the returns were significantly negatively skewed (indicating too many really bad monthly outcomes).

3.2 Estimating Expected Mean, Variance, and Skewness of Returns

Since off-the-shelf time series data on the *expected* mean, variance, and skewness of local currency bond returns do not exist, we calculate these ourselves. We start with data on bond returns from the JP Morgan Government Bond Index (GBI) database, the details of which

are given in the appendix. We assume that the investors are US-based and have a one-year planning horizon; hence, we focus on one-year ahead expectations of returns translated into US dollars. Since lagged realizations of mean, variance, and skewness are likely to inform future expectations, we use the Arellano-Bond dynamic panel GMM estimator (Arellano and Bond, 1991). Specifically, we model expected returns as follows:[5]

$$y_{it} = \sum_{j=1}^{p} \alpha_j y_{i,t-j} + x_{it}\beta_1 + v_i + \varepsilon_{it} \qquad [4]$$

for $i=\{1,\ldots,N\}$ and $t=\{1,\ldots,T_i\}$, where y_{it} is one-year ahead mean, variance, or skewness of country i's USD returns, x_{it} are predetermined explanatory variables, and v_i are country-level panel effects. That is, to estimate expectations of next year's returns, we use annual data for all explanatory variables, including lagged dependent variables and other variables (bond yields, inflation and real GDP growth rates) which are dated in the current year (or earlier) and hence predetermined. For example, as of end-2006 we form expected returns for 2007 using returns information through 2006 and any other information available at end-2006.

Regression results are reported in Table 4. We find that, expected mean and skewness of returns are higher in countries with lower lagged mean and lower lagged skewness of returns, respectively. The negative coefficient on average lagged returns suggests that a year of high returns is often followed by a year of lower returns. On the other hand, higher volatility of returns in the past seems to positively predict future volatility, as measured by rolling standard deviation.

[5] Given that we include lagged values of the dependent variable on the right hand side of our regression, the first differenced errors by construction are first-order serially correlated in the dynamic panel model. However, specification tests run on the error structure revealed no significant evidence of serial correlation at an order higher than 1 in the first-differenced errors. Hence, we use the Arellano-Bond dynamic panel estimation method.

Amongst the other covariates, almost all estimated coefficients have expected signs whenever they are statistically significant. An interesting and intuitive finding is that high current bond yields are found to positively predict future returns volatility. Furthermore, high current inflation presages future returns that are more negatively skewed.[6]

High current as well as past real GDP growth rates are also found to be strong and significant predictors of expected mean and skewness of returns but do not seem to have any impact on future returns volatility. In fact, the only significant predictors of returns volatility seem to be previous year's volatility and the current year's bond yields, which together predict nearly 60% of the variation in returns volatility.[7]

Finally, we note that the correlations between predicted and realized mean, variance, and skewness (shown in the last row of Table 4) are reasonably high and statistically significant, suggesting that our regressions provide suitable estimates of the expected mean, variance, and skewness of international bond returns.

4. Empirical Analysis of US Investors' Foreign Bond Portfolios

Over the past decade, US investors have increased their cross-border holdings of local currency bonds, especially in EMEs. The returns characteristics highlighted in the previous section suggest why these investments were attractive. But there are many other factors that

[6] We also included inflation in the mean and volatility regressions and found it has a negative impact on both as expected, but the coefficients did not come out to be statistically significant and hence have not been reported here for brevity.

[7] In order to find out whether we could better predict expected returns, we tried incorporating a few other covariates such as inflation volatility and current account imbalances. However, their estimated coefficients came out statistically insignificant and hence were dropped from the final models. We also included exchange rate volatility, which was found to have a significant and negative effect on returns volatility alone but did not improve the model fit (correlation between predicted and realized returns) substantially and hence has not been reported here.

may have influenced US investors' portfolio positions. In this section we execute an empirical analysis of US investor portfolio weights that includes the expected returns measures estimated above, along with additional country-level and global factors.

4.1 Panel Results on Portfolio Reallocations

As noted above, the dependent variable for our empirical analysis is the relative portfolio weight as presented in Table 2 and defined as:

$$\frac{\omega_{i,US}}{\omega_{i,m}} = \frac{{}_{lc}H_i^{US} \Big/ \sum_i H_i^{US}}{{}_{lc}MCap_i / \sum_i MCap_i}$$

where ${}_{lc}H_i^{US}$ is defined as US investors' holdings of country i's local currency bonds and $\sum_i H_i^{US}$ represents the total US investor bond portfolio (all currencies), while ${}_{lc}MCap_i$ is the market capitalization of country i's local currency bond market and $\sum_i MCap_i$ is the market capitalization of the global bond market (all currencies).

We have constructed an annual panel of US investor relative portfolio weights in 38 countries over the period 2006-2011. Of particular interest during this time period are push factors such as the impact of the global financial crisis and Federal Reserve policy. To control for the variation in expected volatility and risk appetite during this period, we include the volatility index VIX in our panel regressions. We also include the 10-year US Treasury rate, which provides a rough proxy for the impact of US monetary policy (both conventional and unconventional) and can also capture the "reach for yield." We use end of year observations for both the 10-year Treasury and VIX to match our portfolio weight observations.

While much attention has been given to the global "push" factors in explaining cross-border financial flows, we also analyze country-specific factors to see if investors discriminated among markets during this period. The expected returns series estimated in the previous section represents one set of country-specific factors. We also include institutional variables, a proxy for the openness of a country's bond market to foreign investment, and macroeconomic indicators.

Our primary institutional variable is a measure of regulatory quality and creditor rights, calculated as a weighted average of the Regulatory Quality Index from the World Bank's World Governance Indicators and the Legal Rights Index from the "Getting Credit" section of the World Bank's Doing Business report.[8] Our measure of the openness of a country's local currency bond market to foreign investment is *de jure* and based on two sources. For 38 EMEs, Markit (2013) has constructed detailed measures for 2010 and 2011 based on the IMF's AREAR documents. We create our 2006-11 measures by combining information from Markit's 2010 and 2011 measures with AREAR information for the entire period. The resulting measure is 0 if a country's local currency bond market is by law completely closed to foreign investors and 100 if there are no impediments to foreign investment.[9] Finally, we include the current account balance to GDP ratio and rolling 12-quarter inflation volatility as macroeconomic indicators that can impact cross-border bond investment.

[8] The regulatory quality index measures a government's ability to formulate and implement sound policies and regulations that promote private sector development, while the creditor rights index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders. We follow the GEMLOC Investability Indicator Methodology (Markit 2013) by constructing a composite measure with twice the weight on regulatory quality. An equal weighted measure yields similar results.

[9] In constructing our financial openness measure we assume there are no impediments to investment in AE bond markets.

Table 5 presents our baseline set of panel (2006-11) regression results. The dependent variable is the relative portfolio weight as defined in equation (2), and in each regression we include fixed destination-country effects and cluster standard errors by country. The specification in column (1) includes institutional variables, expected returns proxies, and global factors as explanatory variables. We find significant explanatory power for the global factors: Falling US Treasury rates spur US investors to increase positions in local currency bond markets abroad, but during periods of increased volatility (and/or risk aversion) US investors decrease their cross-border exposure to local currency bonds. The coefficients for the country-level institutional variables are insignificant, but given the limited time variation in these variables much of their explanatory power is likely absorbed by the country-level fixed effect. Column (2) expands the analysis to include country-level macroeconomic indicators and we find a role for pull factors: US investors reallocate away from the bond markets of economies with volatile inflation.

The full sample results of columns 1 and 2 include both AEs and EMEs. Focusing just on AEs (column 3), the significance of the coefficients on the push factors (US 10-yr Treasury rate and VIX) is reduced. We also find that within the AE panel, US investors reallocated toward bond markets where the expected return was more positive, although the coefficient is only marginally significant.

In EMEs (column 4), macroeconomic fundamentals are much more important. US investors reallocate toward EMEs with more positive current account balances and away from those with volatile inflation. Global factors also strongly influence EME bond allocations. The evidence suggests that EMEs are indeed buffeted by global forces, but local factors such as

current account balance and inflation volatility also affect the portfolio decisions of global investors.

4.2 Discussion of Results

Our empirical results suggest that global factors such as US Treasury rates and expected volatility/risk tolerance exert a significant influence on US investors' cross-border portfolio of local currency bonds and that these forces are particularly powerful for allocations to local currency EME bonds. Interestingly, our data indicate that US investors did not, on average, reduce their allocations to EME local currency bonds during the global financial crisis (Table 2). The results from the EME panel (column 4 of Table 5) suggest that the impact of lower US Treasury rates outweighed the impact of heightened risk aversion during 2008 leading US investors to maintain or even increase their exposure to EME local currency bonds during the crisis.[10]

In the years following the global financial crisis, risk aversion abated but expansionary monetary policy continued. Our results suggest that this combination pushed US investors into foreign bond markets. And our finding that this effect was a particularly strong influence on portfolio allocations to local currency EME bonds provides a plausible channel through which US policy could have contributed to the appreciation of EME currencies. These results are consistent with a long line of literature—starting with the work of Calvo, Leiderman, and Reinhart (1993, 1996), Fernandez-Arias (1996), and Chuhan, Claessens, and Mamingi (1998)—that finds that push factors are particularly important in driving capital flows.

[10] This is based on the marginal impact calculated using coefficients from column (4) of Table 5 and the end of year values for US10-yr Treasury and VIX for 2007 and 2008.

US investors' allocations to EME local currency bonds are not, however, exclusively driven by global monetary and risk conditions. Importantly, we find that country-level macroeconomic factors significantly influence US investors' EME portfolio weights: US investors discriminate among EMEs based on their current account balances and recent inflation histories. For example, using the estimated coefficients from column (4) of Table 5 we find that ceteris paribus the stabilization of Brazil's inflation rate during the past decade can explain a large fraction of the reallocation by US investors' into Brazilian real-denominated bonds. Likewise, the dramatic swing in Hungary's current account balance (which became positive in 2010-11 after averaging -7% of GDP during 2006-08) can explain a significant portion of the reallocation by US investors toward Hungarian forint-denominated bonds. These results are consistent with the importance of macroeconomic fundamentals in explaining equity and bond flows found in Fratzscher (2012). They are also consistent with the IMF's (2013) finding that high inflation and significant external imbalances were associated with the largest EME currency depreciations during the Fed's "taper talk" in the summer of 2013.

5. Conclusion

Back in 2007 when market volatility was on the rise (but nowhere near its peak), the Bundesbank pondered (see opening quote) the role emerging LCBMs would play in promoting (or inhibiting) global financial stability. The ensuing global financial crisis would provide a severe test for these newly developed markets and we can now say that LCBMs provided a stabilizing role. EMEs avoided another round of currency crises, and US investors did not blindly flee the newly developed asset class. Our data indicate that, on average, US investors

maintained their EME local currency bond allocations during the crisis and increased their positions rapidly in the post-crisis period. Moreover, our evidence suggests that US investors do not treat EME local currency bonds as a homogenous asset class, but rather discriminate among EMEs based on macroeconomic fundamentals including current account balances and inflation volatility.

Overall, our results have interesting implications for financial stability and help distinguish between the possibilities of virtuous and vicious cycles in local currency bond markets. The importance of global monetary and risk conditions lend credence to the concerns of EME policy makers who worry that volatile flows will influence exchange rates and real activity. Fears of a vicious cycle with indiscriminate herd-like flows into and out of EMEs are quelled somewhat by our finding that US investors' discriminate among EMEs based on macroeconomic fundamentals. Strong macroeconomic conditions should help EMEs attract and retain cross-border investment which would reinforce a more virtuous cycle in local currency bond markets.

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Technical Appendix: How to Scale Holdings

Theory suggests two main ways to scale holdings in a study of international investment (Holland et al. 2013). One is essentially not to scale (or to scale by the portfolio size, which in a cross-sectional or panel setting is observationally equivalent to not scaling). Not scaling holdings can be justified by a gravity model of international portfolio allocation. For example, Lane and Milesi-Ferretti (2008) present a multi-country extension of the model in Obstfeld and Rogoff (2000) that relates barriers in goods trade to portfolio home bias. A drawback to this approach, as Okawa and van Wincoop (2012) note, is that the real exchange rate hedge channel, through which barriers in goods trade affect asset trade in Obstfeld and Rogoff (2000), does not appear to be operative in practice (van Wincoop and Warnock 2010).[11] Okawa and van Wincoop (2012) highlight another way to derive a theoretical gravity equation for international asset holdings, based on Martin and Rey (2004) and Coeurdacier and Martin (2009), that produces a gravity equation for financial holdings when countries trade claims on Arrow Debreu (AD) securities. In that model, bilateral holdings depending both on bilateral frictions and multilateral resistance indices of source and destination countries. As Okama and van Wincoop note, however, the main limitation of this approach is that key is the combination of AD securities, but such basket would have securities from many countries. In contrast, empirical work on international portfolios is based on a clear separation between the countries of the investor and the security issuer. Overall, Okawa and van Wincoop (2012) decide that "…presently there is no justification for many of the existing empirical gravity specifications (of international asset holdings)…".

A second way to scale holdings in a study of international investment comes from an international CAPM-based model of international portfolio allocation as presented in Cooper and Kaplanis (1986), among others. The Cooper Kaplanis model includes country-specific proportional investment costs, representing both explicit and implicit costs of investing abroad, and is designed to optimize an investor's allocation of wealth among risky securities in n countries in order to maximize expected returns net of costs. If there are no costs to investing, the allocation collapses to the global market capitalization allocation; that is, the investor allocates his wealth across countries according to market capitalizations. If costs are non-zero and non-uniform, allocations deviate from market weights. The higher the costs in a particular foreign market, the more severely underweighted that country will be in the investor's portfolios.

The international CAPM seems a promising way to get to a theoretically viable dependent variable—the proportion of the investor's financial wealth allocated to country i's assets—that is actually obtainable to the empiricist. But in practice measures of financial wealth are not as easily found as one might think, country i's assets in a study like ours becomes country i's local currency bonds, and unscaled portfolio allocations are subject to a size bias (Bekaert, Siegel and Wang 2012; Ammer et al 2012) in a way that can bias inference on explanatory variables of interest. That portfolio share is strongly related to country size is obvious: the larger the country, the greater would be US investment in its bonds. What Bekaert et al show is that including size as a control variable to control for this association between size and investment in no way solves the problem, as inference on other variables of interest—typically the whole point of one's study—is muddied in ways that are not easy to predict. A remedy this size bias problem suggested by Bekaert et al (2012) is to analyze deviations from the international CAPM benchmark rather than portfolio shares. Such a measure, which we will call *relative weight*, is both suggested by theory (international CAPM) and free of a country-size bias.

[11] Consistent with van Wincoop and Warnock (2012), Coeurdacier (2009) develops an extension of Obstfeld and Rogoff (2000) to show that for realistic model parameters trade barriers cannot generate a portfolio home bias.

Data Appendix

Throughout, "bonds" refer to debt instruments with greater than one year original maturity. We focus on bonds denominated in the currency of the issuer.

Bond Returns

Our main source of returns data is country-level JPMorgan Government Bond Indexes (GBI) and JPMorgan Government Bond Indexes-Emerging Markets (GBI-EM). See J.P. Morgan (2002, 2006) for complete descriptions.

GBI consists of "regularly traded, fixed-rate, domestic government bonds of countries that offer opportunity to international investors. These countries have liquid government debt markets, which are stable, actively traded markets with sufficient scale, regular issuance and are freely accessible to foreign investors." The indices should be representative (span and weight the appropriate markets, instruments and issues that reflect opportunities available to international investors) and investible and replicable (include only securities in which an investor can deal at short notice and for which firm prices exist). The 13 countries in the original GBI include Australia, Belgium, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Spain, Sweden, UK, and the US.

The GBI-EM is similar to the main GBI in methodology but tracks emerging markets economies. Some of the bonds are speculative; some bond markets are not directly hedgeable. Countries in the GBI-EM include Brazil, Chile, Colombia, Czech Republic, Hungary, Indonesia, Malaysia, Mexico, Poland, Slovakia, South Africa, Thailand, and Turkey. Bonds in the countries in the narrow GBI-EM should be easy to access, with no impediments for foreign investors. A few countries with sizeable local bond markets but that have substantial restrictions on foreigners (China, India, Russia) are added to create the GBI-EM BROAD, which has 16 EMEs.

JPMorgan returns data are available for positions that are unhedged and hedged using exchange rates and forward rates from WM Company as of 4pm London time. Hedging for a few countries in the GBI-EM has not always been possible (e.g., Malaysia, Chile), so hedged returns for some EMs should be viewed as indicative but not actual. Please see Appendix E of JPMorgan (2006) for complete details.

We also include for comparison a US corporate bond index, a dollar-denominated EME bond index (JPMorgan's EMBI), and three equity indices. The Dow Jones Corporate Bond Index is an equally weighted basket of 96 recently issued, readily tradable, investment-grade corporate bonds. We use the index with 5-year maturity. The equity indices are the S&P500 (for the US), MSCI EM, and MSCI EAFE+Canada; see www.msci.com/products/indices/tools/index.html for details on the MSCI data.

Bonds Outstanding

We use two complementary sources of data on the amount of a country's outstanding local currency bonds. Both are from the Bank for International Settlements (BIS), which compiles data from multiple sources.

One data set is on "domestic debt", which the BIS defines as local currency bonds issued by locals in the local market (i.e., not placed directly abroad). Data are available in *BIS Quarterly Review* Table 16A (Domestic Debt Securities). Because our focus is on bonds (with original maturity longer than one year), we obtained the data underlying Table 16A to separate short term from long term.

The other data set is on "international bonds", bonds issued either in a different currency or in a different market. Certain aggregates of this are presented *BIS Quarterly Review* Table 14B (International Bonds and Notes by Country of Residence). For our focus we obtained the underlying data, as issuance by currency by country is not presented in the Quarterly Review.

With these two sources (and our calculations), local-currency-denominated debt is the sum of the long-term debt component of "domestic debt" and the local currency / local issuer portion of "international bonds". Our measure includes all bonds issued by all types of issuers (government and private).

US Bond Holdings

Data on US investors' holdings of local currency bonds is from periodic, comprehensive benchmark surveys conducted by the Treasury Department, Board of Governors of the Federal Reserve System, and the Federal Reserve Bank of New York. See the actual surveys, for example, Treasury Department et al. (2002, 2009) or the Griever, Lee, and Warnock (2001) primer for details. Briefly, from Griever, Lee, and Warnock (2001), the so-called "asset surveys" of US holdings of foreign securities collect data from two types of reporters: US-resident custodians and US institutional investors. Custodians are the primary source of information, typically reporting about 97 percent of total US holdings of foreign long-term securities. Institutional investors, such as mutual funds, pension funds, insurance companies, endowments, and foundations, report in detail on their ownership of foreign securities only if they do not entrust the safekeeping of these securities to US-resident custodians. If they do use US-resident custodians, institutional investors report only the name(s) of the custodian(s) and the amount(s) entrusted (and the data are collected from the custodian, but not double counted).

Reporting on the asset surveys is mandatory, with both fines and imprisonment possible for willful failure to report. The data are collected at the security-level, greatly reducing reporting error; armed with a security identifier, a mapping to the currency of the bond and the residence of its issuer is straightforward. Reporting and the data are comprehensive, and the holdings data form the official US data on international positions (for example, the number for international bonds in the Bureau of Economic Analysis's International Investment Position report is formed by aggregating the survey's security-level information).

For our purposes, we needed a split (US holdings of local currency foreign bonds) not usually published in the Treasury Department reports, and so persuaded Treasury to include an 'own currency' column in the published table on holdings by country by currency (see, for example, Table A.6 of Treasury Department et al. 2009). This is our measure of US holdings of local currency bonds.

Other Variables

As explanatory variables in Tables 4 and 5, we use various data series. In Table 4, *Yield* is the yield-to-maturity in the GBI indexes from J.P Morgan. See J.P Morgan (2006) Appendix B. The other explanatory variables in that table are from the IMF's IFS database (inflation, calculated as each coutnry's year-over-year inflation), WEO (current account balance is as a percent of GDP) or WDI (GDP growth, calculated as year-over-year growth in real GDP per capita).

In Table 5, inflation volatility is computed from three years of quarterly CPI inflation, with the underlying CPI data coming from the IFS database. VIX and USi10 come from the St. Louis Federal Reserve Database (FRED) and are year-end observations of the CBOE volatility index and 10-year US Constant Maturity Treasury rate, respectively. Expected mean, variance and skewness of returns are the predicted values from Table 4 regressions.

Also in Table 5, Reg_CR is calculated as a weighted average of the Regulatory Quality Index from the World Bank's World Governance Indicators and the Legal Rights Index from the "Getting Credit" section of the World Bank's Doing Business report. The regulatory quality index measures a government's ability to formulate and implement sound policies and regulations that promote private sector development, while the creditor rights index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders. We follow the GEMLOC Investability Indicator Methodology (Markit 2013) by constructing a composite measure with twice the weight on regulatory quality. An equal weighted measure yields similar results.

Finally, FA_Open is our measure of the openness of a country's local currency bond market to foreign investment is *de jure* and based on two sources. For 38 EMEs, Markit (2013) has constructed detailed measures for 2010 and 2011 based on the IMF's AREAR documents. We create our 2006-11 measures by combining information from Markit's 2010 and 2011 measures with AREAR information for the entire period. The resulting measure is 0 if a country's local currency bond market is by law completely closed to foreign investors and 100 if there are no impediments to foreign investment. In

constructing our financial openness measure we assume there are no impediments to investment in AE bond markets.

Country Groupings

The groupings of "advanced economies", or AEs, and "other emerging market and developing countries" (shortened here to emerging market economies or EMEs) follow IMF classification as of April 2013. See http://www.imf.org/external/pubs/ft/weo/2013/01/pdf/statappx.pdf.

Figure 1. US Investors' Foreign Bonds by Currency, 2001-2011

The figure shows, for end of year 2001 and 2006-11, the total amount (in billions of USD) of US investors' foreign bond holdings ("Total") as well as the amounts held in USD-denominated ("USD") and local currency ("Local currency") bonds.

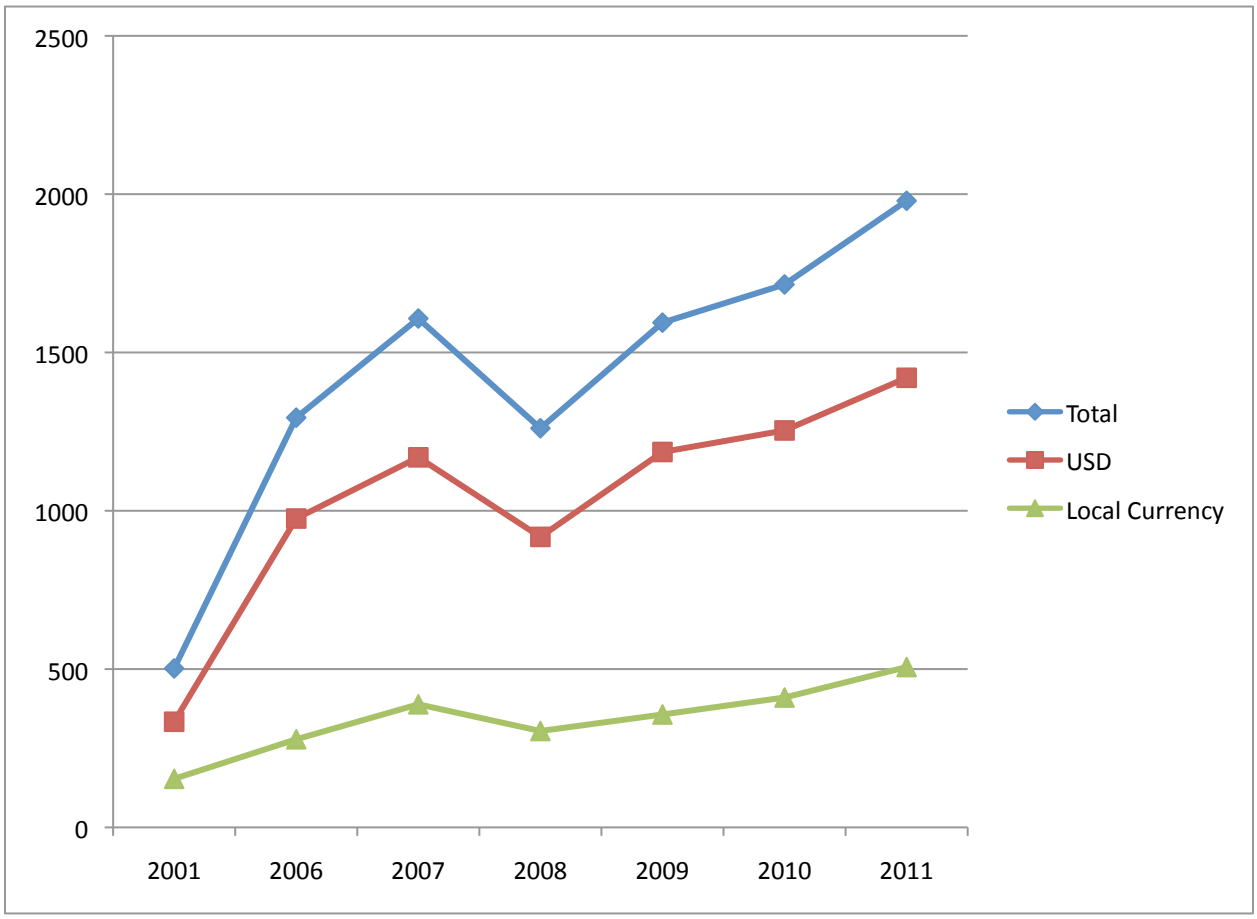

Figure 2. Share of US Holdings of AE and EME Bonds denominated in local currency

The figure shows, for US investors' foreign bond holdings as of year ends 2001 and 2006-11, the shares of AE and EME holdings that are denominated in the local currency.

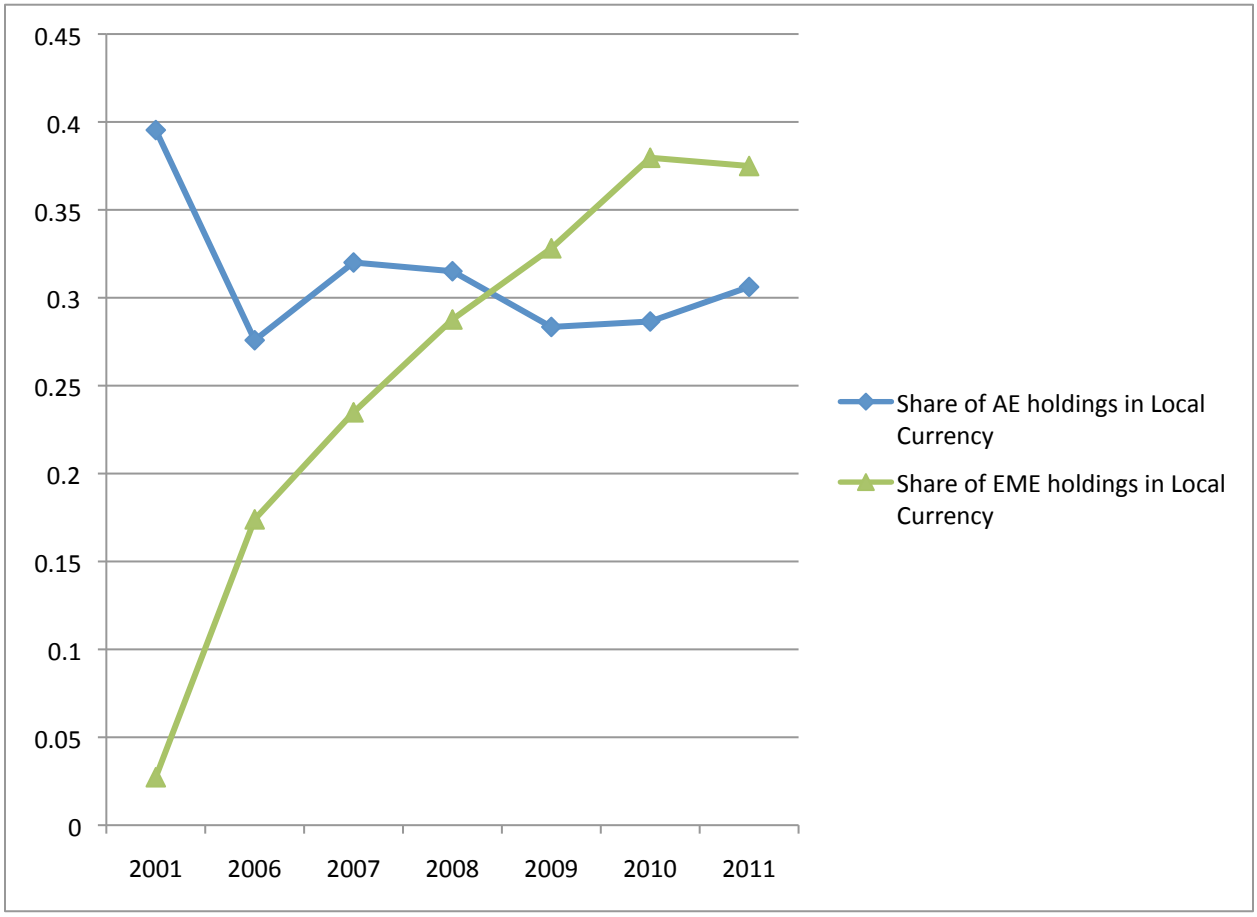

Table 1. Bond Market Development

Data on international bonds are built from data that underlie two BIS Quarterly Review tables, Table 14B (International Bonds and Notes by Country of Residence) and Table 16A (Domestic Debt Securities). Local-currency-denominated debt is the sum of the local currency portion of Table 14B and the long-term debt component from Table 16A. The country groupings follow IMF classifications of "advanced economies" and "other emerging market and developing economies" (shortened to emerging economies) as of April 2013. See http://www.imf.org/external/pubs/ft/weo/2013/01/pdf/statappx.pdf.

	Total	Local Currency Denominated						
		2011			2006		2001	
	US $ Billions	US $ Billions	% of GDP	% of Total	% of GDP	% of Total	% of GDP	% of Total
AE	**75,954**	**69,177**	**159**	**91**	**131**	**91**	**105**	**93**
Euro area AEs	**22,106**	**20,147**	**157**	**91**	**133**	**91**	**94**	**89**
Austria	672	588	141	88	132	82	90	74
Belgium	765	747	145	98	104	97	118	96
Finland	193	149	57	77	53	85	41	72
France	4,397	4,012	145	91	112	92	82	91
Germany	4,269	3,792	105	89	119	91	96	92
Greece	556	550	190	99	107	97	74	89
Ireland	1,259	1,020	470	81	285	78	46	65
Italy	4,021	3,953	180	98	147	97	114	96
Netherlands	2,817	2,265	271	80	241	81	165	74
Portugal	400	396	167	99	88	98	57	89
Spain	2,756	2,676	181	97	135	97	53	92
Other AEs	**24,389**	**20,387**	**132**	**84**	**100**	**82**	**81**	**87**
Australia	1,216	777	56	64	41	51	30	55
Canada	1,957	1,527	88	78	65	77	69	72
Denmark	840	704	211	84	194	86	160	90
Hong Kong SAR	116	45	18	39	19	53	15	54
Iceland	41	19	132	45	358	58	78	63
Japan	12,331	12,253	209	99	158	99	108	99
New Zealand	64	46	29	72	17	57	22	64
Norway	430	220	45	51	33	52	27	54
Singapore	130	90	37	69	40	60	35	69
South Korea	1,265	1,117	100	88	94	91	85	91
Sweden	745	449	83	60	72	65	57	63
Switzerland	327	312	47	95	55	95	58	97
United Kingdom	4,907	2,827	115	58	65	52	46	62
US	**29,409**	**28,630**	**191**	**97**	**158**	**96**	**131**	**98**

Table 1, continued. Bond Market Development

	Total	Local Currency Denominated						
			2011		2006		2001	
	US $ Billions	US $ Billions	% of GDP	% of Total	% of GDP	% of Total	% of GDP	% of Total
EM	**6,942**	**5,845**	**24**	**84**	**19**	**77**	**18**	**67**
Euro area EMs	**854**	**591**	**16**	**69**	**18**	**71**	**17**	**64**
Croatia	18	10	15	52	13	49	9	33
Czech Republic	97	74	34	76	29	88	14	85
Hungary	75	39	28	52	46	66	28	60
Poland	223	161	31	72	34	77	20	86
Russia	156	91	5	59	3	41	2	13
Slovakia	36	22	23	61	23	81	18	68
Turkey	249	195	25	78	27	80	36	78
Latin America EMs	**1,466**	**1,053**	**20**	**72**	**19**	**68**	**17**	**52**
Argentina	93	38	8	40	30	50	14	29
Brazil	582	456	18	78	15	69	20	59
Chile	105	79	32	75	24	72	42	77
Colombia	107	86	26	80	28	76	19	61
Mexico	477	370	32	78	24	78	17	59
Peru	41	24	14	59	12	54	12	60
Asia EMs	**4,155**	**4,009**	**36**	**96**	**28**	**92**	**22**	**90**
China	2,956	2,938	40	99	27	98	18	95
India	515	489	26	95	30	95	25	97
Indonesia	113	84	10	74	15	87	27	96
Malaysia	260	233	81	90	59	79	57	77
Pakistan	34	32	15	94	15	90	22	96
Philippines	101	63	28	62	26	50	21	48
Thailand	175	170	49	97	37	89	28	80
Other EMs					**24**	**88**	**12**	**80**
South Africa	191	164	40	86	39	90	32	87

Table 2. US Participation in Local Currency Bond Markets

The table shows US investors' local currency bond portfolio as of the end of 2001, 2006, 2008, and 2011. Data are author's calculations using data on US investment from the US Department of the Treasury et al. (2002-2012) and the size of local currency bond markets (mostly from the BIS; see Table 1 for details). ω_{US} and ω_{mkt} are the weight of the country in US and world market portfolios. The ω_{US} to ω_{mkt} ratio is a relative weight measure. It equals one if the weight of the countries' bonds in US and world market portfolios are identical and less than one if US investors' underweight the country (relative to its market size).

	2011				2008		2006		2001	
	US Holdings ($ B)	ω_{us}	ω_{m}	ω_{us}/ω_{m}	US Holdings ($ B)	ω_{us}/ω_{m}	US Holdings ($ B)	ω_{us}/ω_{m}	US Holdings ($ B)	ω_{us}/ω_{m}
EM	**86.89**	**0.37**	**6.80**	**0.05**	**28.39**	**0.03**	**20.11**	**0.03**	**1.72**	**0.00**
Euro area	**17.61**	**0.08**	**0.69**	**0.11**	**4.65**	**0.03**	**4.74**	**0.04**	**0.74**	**0.01**
Croatia	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Czech Republic	0.19	0.00	0.09	0.01	0.04	0.00	0.01	0.00	0.01	0.00
Hungary	3.26	0.01	0.04	0.31	1.52	0.09	0.62	0.04	0.17	0.03
Poland	13.24	0.06	0.19	0.30	2.89	0.08	3.83	0.11	0.55	0.04
Russia	0.66	0.00	0.11	0.03	0.10	0.01	0.02	0.00	0.00	0.00
Slovakia	0.19	0.00	0.03	0.03	0.00	0.00	0.24	0.05	0.00	0.00
Turkey	0.08	0.00	0.23	0.00	0.10	0.00	0.02	0.00	0.00	0.00
Latin America	**40.05**	**0.17**	**1.23**	**0.14**	**16.74**	**0.09**	**10.73**	**0.06**	**0.46**	**0.00**
Argentina	0.36	0.00	0.04	0.03	0.34	0.02	2.39	0.12	0.07	0.01
Brazil	20.11	0.09	0.53	0.16	8.48	0.11	4.72	0.09	0.08	0.00
Chile	0.97	0.00	0.09	0.04	0.01	0.00	0.00	0.00	0.01	0.00
Colombia	4.01	0.02	0.10	0.17	3.37	0.21	1.43	0.10	0.00	0.00
Mexico	13.31	0.06	0.43	0.13	3.99	0.06	2.08	0.03	0.28	0.01
Peru	1.30	0.01	0.03	0.20	0.33	0.07	0.06	0.02	0.00	0.00
Asia	**19.76**	**0.08**	**4.67**	**0.02**	**5.17**	**0.01**	**2.77**	**0.01**	**0.06**	**0.00**
China	0.31	0.00	3.42	0.00	0.20	0.00	0.01	0.00	0.00	0.00
India	0.34	0.00	0.57	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Indonesia	5.83	0.02	0.10	0.25	1.85	0.12	1.08	0.06	0.00	0.00
Malaysia	7.73	0.03	0.27	0.12	2.59	0.06	1.06	0.04	0.02	0.00
Pakistan	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Philippines	3.97	0.02	0.07	0.23	0.05	0.00	0.04	0.00	0.01	0.00
Thailand	1.58	0.01	0.20	0.03	0.48	0.02	0.57	0.02	0.03	0.00
Other EMs										
South Africa	7.34	0.03	0.19	0.16	0.91	0.04	1.04	0.03	0.44	0.03

Table 2, continued. US Participation in Local Currency Bond Markets

	2011				2008		2006		2001	
	US Holdings ($ B)	φ_{us}	φ_{m}	φ_{us}/φ_{m}	**US Holdings ($ B)**	φ_{us}/φ_{m}	**US Holdings ($ B)**	φ_{us}/φ_{m}	**US Holdings ($ B)**	φ_{us}/φ_{m}
AE	**408.69**	**1.75**	**47.45**	**0.04**	**268.92**	**0.03**	**247.12**	**0.03**	**150.33**	**0.03**
Euro area	**135.80**	**0.58**	**23.45**	**0.02**	**120.64**	**0.02**	**105.49**	**0.02**	**82.02**	**0.04**
Austria	1.48	0.01	0.68	0.01	0.80	0.00	1.20	0.01	0.75	0.01
Belgium	3.25	0.01	0.87	0.02	4.58	0.03	3.37	0.03	2.77	0.03
Finland	1.09	0.00	0.17	0.03	0.54	0.02	0.92	0.03	0.57	0.03
France	27.32	0.12	4.67	0.02	27.86	0.03	29.93	0.04	14.70	0.03
Germany	52.30	0.22	4.41	0.05	55.12	0.05	38.63	0.04	38.15	0.05
Greece	0.78	0.00	0.64	0.01	0.81	0.01	1.14	0.01	1.38	0.04
Ireland	10.91	0.05	1.19	0.04	5.25	0.02	5.90	0.03	0.49	0.03
Italy	16.52	0.07	4.60	0.02	8.86	0.01	6.18	0.01	9.55	0.02
Netherlands	15.23	0.07	2.64	0.02	12.77	0.02	14.29	0.03	7.82	0.03
Portugal	0.44	0.00	0.46	0.00	0.24	0.00	0.30	0.01	0.16	0.01
Spain	6.50	0.03	3.11	0.01	3.80	0.01	3.63	0.01	5.68	0.05
Other AEs	**272.86**	**1.17**	**23.99**	**0.05**	**148.25**	**0.03**	**141.63**	**0.04**	**68.31**	**0.03**
Australia	26.87	0.11	0.90	0.13	7.75	0.08	6.20	0.07	3.26	0.07
Canada	102.85	0.44	1.78	0.25	44.24	0.17	39.99	0.15	21.48	0.11
Denmark	1.50	0.01	0.82	0.01	7.98	0.04	8.36	0.05	2.27	0.02
Hong Kong	1.35	0.01	0.05	0.11	0.26	0.02	0.25	0.02	0.07	0.01
Iceland	0.54	0.00	0.02	0.11	1.28	0.28	0.34	0.02	0.00	0.00
Japan	50.19	0.21	14.26	0.02	49.67	0.02	39.41	0.02	21.35	0.01
New Zealand	4.34	0.02	0.05	0.35	1.28	0.26	1.75	0.30	1.29	0.29
Norway	7.04	0.03	0.26	0.12	1.48	0.04	2.06	0.06	0.41	0.02
Singapore	5.54	0.02	0.10	0.23	1.59	0.07	2.48	0.14	0.04	0.00
South Korea	12.95	0.06	1.30	0.04	3.43	0.02	2.32	0.01	0.25	0.00
Sweden	7.36	0.03	0.52	0.06	3.61	0.04	6.42	0.07	3.66	0.07
Switzerland	1.65	0.01	0.36	0.02	1.02	0.01	0.25	0.00	0.11	0.00
Taiwan	0.31	0.00	0.26	0.01	0.13	0.00	0.00	0.00	0.11	0.00
UK	48.40	0.21	3.29	0.06	23.50	0.04	30.39	0.06	13.51	0.05

Table 3. Monthly US Dollar Returns (January 2006 to December 2011)

The table shows returns characteristics—mean, variance, skewness, and correlation with US government bonds—of various bonds and equities. Returns are monthly, in US dollars, and reported for the period January 2006 to December 2011. In this table, AEs and EMEs consist of countries included in JPMorgan GBI (excluding the US) and JPMorgan GBI- EM Broad, respectively.

	MEAN (%)	VARIANCE	SKEWNESS	Corr w/ US
EME Local Currency				
Unhedged	0.600	10.606	-0.973	-0.002
Hedged	0.373	1.180	1.249	0.247
AE Local Currency Bonds				
Unhedged	0.526	7.562	-0.370	0.431
Hedged	0.357	0.741	0.197	0.768
EMBI	0.670	8.767	-3.510	0.151
US Govt Bonds	0.510	1.993	0.316	1
US Corp Bonds	0.593	2.392	-0.820	0.342
US Equities	0.186	26.146	-0.853	-0.268

Table 4. Regressions for Expected Mean, Variance, and Skewness

The table shows dynamic panel regressions of one-year ahead mean, standard deviation, or skewness of unhedged local currency bond returns (in US dollars). Regressions use annual end-of-year data for the period 2006-11. Yield is the yield on a country's JPMorgan GBI. Inflation is year-over-year inflation in each country. GDP growth is year-over-year real GDP growth. Robust Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1, Constant is not reported.

Dep. Variable	Mean	Standard Deviation	Skewness
DepVar			
Lag 1	-0.1518** (0.0750)	0.1783*** (0.0704)	-0.1181** (0.0550)
Lag 2	-0.2389*** (0.0435)		0.0890 (0.0628)
Yield	-0.0001 (0.0015)	0.0029** (0.0013)	0.0236 (0.0359)
Lag 1	0.0028*** (0.0010)	-0.0016 (0.0010)	-0.0509 (0.0434)
Inflation			-0.0712*** (0.0268)
GDP Growth Rate	0.0006** (0.0003)	-0.0005 (0.0005)	0.0420*** (0.0104)
Lag 1	0.0009*** (0.0004)		0.0238** (0.0114)
Lag 2			0.0566*** (0.0128)
No. of Observations	321	347	320
Correlation: predicted and actual values	0.2586***	0.5956***	0.3049***

Table 5. Fixed Effects Panel Regression of US Investor Portfolio Weights 2006-2011
The table presents panel regressions using annual data from 2006 through 2011. The dependent variable is U.S investors' relative portfolio weight for each country's local currency bonds. Each panel regression includes fixed destination-country effects. Standard errors (reported in parentheses) are clustered at the country level. Output for constants is not shown. Higher scores on Reg_CR indicate stronger regulatory quality and creditor rights and higher scores for FA_Open indicate that a bond market is more open to cross-border investment. The expected mean, standard deviation, and skewness of unhedged returns are the predicted values from Table 4. Correlations with US bond returns are computed on a rolling basis using three years of monthly data. Inflation volatility (Inf_vol) is computed on a rolling basis using three years of quarterly data. * p<0.1; ** p<0.05; *** p<0.01

	Full Sample		AEs	EMEs
	(1)	(2)	(3)	(4)
Reg_CR	0.002	0.001	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)
FA_Open	-0.001	-0.000		-0.001
	(0.001)	(0.001)		(0.001)
E(mean)	0.484	-0.408	1.212	-0.013
	(0.684)	(0.621)	(0.626)*	(0.880)
E(stdev)	-0.181	0.214	-0.269	0.048
	(0.364)	(0.306)	(0.578)	(0.505)
E(skew)	0.023	0.012	0.018	-0.001
	(0.017)	(0.013)	(0.016)	(0.013)
Corr w/US	0.010	0.020	0.009	0.030
	(0.020)	(0.019)	(0.022)	(0.029)
USi10	-0.027	-0.027	-0.013	-0.041
	(0.006)***	(0.005)***	(0.006)*	(0.007)***
VIX	-0.002	-0.002	-0.001	-0.003
	(0.001)***	(0.000)***	(0.001)**	(0.001)***
CA/GDP		0.002	-0.000	0.004
		(0.002)	(0.002)	(0.002)**
Inf_vol		-0.017	-0.001	-0.016
		(0.007)**	(0.005)	(0.008)*
R^2 (within)	0.28	0.35	0.18	0.52
Observations	222	218	121	97
Countries	38	38	21	17