

## A Virtuous Cycle in Local Currency Bond Markets?

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### Abstract

Whether globalization is a stabilizing or destabilizing force in local bond markets is still debated. We present evidence to suggest the former based on a possible virtuous cycle emerging in local currency bond markets. First we document and discuss the recent surge in local bond market development, particularly evident in emerging economies where reliance on foreign currency debt—and its concomitant currency mismatches—has been substantially reduced. Determining whether these local markets have become more globalized in the sense of attracting cross-border investors turns out to be a difficult question. We demonstrate shortcomings of the most popular source of cross-border asset holdings data (the IMF's CPIS data) and turn our attention to U.S. investors, for which reliable data on local currency holdings are available. Our results point to emerging success in attracting foreigners, as U.S. investors appear to have shifted their portfolio away from developed markets and toward emerging economies' local bond markets. Moreover, we demonstrate that cross-border participation in local currency bonds is highest in countries where investor-friendly institutions and policies have been established. A shift toward emerging economies, if sustained, could assist in further developing local bond markets (by broadening the investor base) and perhaps set off a virtuous cycle in which the newfound ability of emerging economies to borrow internationally in their own currency helps stabilize their domestic macroeconomic performance and reduce the likelihood of future crises.

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## 1. Introduction

There is a growing consensus among policymakers, academics, and market participants regarding the importance of local currency bond markets for financial stability. International organizations, including the IMF, BIS, World Bank, and OECD, have highlighted the importance of local bond market development, and regional organizations such as the Asian Development Bank have championed the strategy.<sup>1</sup> Attention focused on local bond market development following a series of currency crises in emerging economies that revealed the financial fragility associated with a currency mismatch (Goldstein and Turner 2004) and opened the debate regarding the ability of emerging economies to overcome the problem (Eichengreen and Hausmann 2005; Burger and Warnock 2006).

Recent years have seen rapid growth in local currency bond markets worldwide and a substantially reduced reliance on foreign currency issuance in many emerging economies. This paper will review the trends in local bond market development and then investigate the response by cross-border investors to these developments. Previous research using data on holdings as of end-2001 (Burger and Warnock 2007) suggests a strong preference for home-currency bonds by cross-border investors, but in recent years there is anecdotal evidence of increased foreign participation in local currency bond markets (IMF 2006; BIS 2007).

Ideally, we would study all foreign investors' positions in local currency bonds, but we demonstrate why such a study is not possible. Although one broad multilateral database does exist—namely the IMF's Coordinated Portfolio Investment Survey (CPIS) data—it is particularly ill-suited to address participation in local currency bond markets.

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<sup>1</sup> See, for example, BIS (2007), IMF (2006), and Asian Bond Online ([www.asianbondsonline.adb.org](http://www.asianbondsonline.adb.org)).

What we can do is provide a formal analysis of the recently released 2006 benchmark survey of one large set of international investors—U.S. cross-border investors. The survey provides reliable evidence on the change in U.S. positions in local currency bonds since the last benchmark in 2001. Our analysis will investigate whether improvements in local currency bond markets have attracted increased participation by U.S. investors.

Our findings are as follows. We find that many emerging economies have made impressive improvements in their local currency bond markets. Reliance on foreign currency debt—and its concomitant currency mismatches—has been substantially reduced. Returns characteristics have become much more attractive to foreign investors, in part because volatility (the bane of local currency bonds from a foreigners’ perspective) has been greatly reduced. Evidence on emerging economies’ ability to attract foreign investors suggests some success: U.S. investors appear to have shifted their portfolios away from developed markets and toward emerging local bond markets. While the shift into emerging economies’ local currency bond markets has been widespread, we also find that countries with investor-friendly institutions and policies—specifically, fewer capital controls, greater market liquidity and efficiency, stronger regulatory quality and creditor rights, better market infrastructure, lower taxation, and a larger local institutional investor base—attract more U.S. investment.

The paper proceeds as follows. In the next section we describe the development of local currency bond markets around the world and highlight major changes since 2001. In Section 3 we provide a critical review of the IMF’s CPIS data on cross-border holdings and of the existing literature that utilizes it. In Section 4 we describe the returns

characteristics of local currency bonds. In Section 5 we analyze U.S. participation in local bond markets as of end-2006. Section 6 concludes.

## **2. Local Currency Bond Market Development**

A number of studies have documented the importance of institutional factors and macroeconomic policies in fostering the development of debt markets (La Porta, Lopez-de-Silanes, Shleifer, and Vishny 1997; Burger and Warnock 2006; Claessens, Klingebiel, and Schmukler 2007; Jeanne and Guscina 2006; Eichengreen and Luengnaruemitchai 2006; Mehl and Reynaud 2005). Burger and Warnock (2006)—in the “it’s not original, just sin” paper—focus on the local currency bonds of at most 49 countries and find roles for both creditor-friendly policies and creditor-friendly laws. Countries with better historical inflation performance (an outcome of creditor-friendly policies) and stronger rule of law had more developed local bond markets, both private and government. Country size mattered in only some specifications. They also show that the necessary conditions for bond market development are very similar to those that foster development of the banking system. Countries in which people are not willing to become creditors—at one extreme this is an unwillingness to deposit money in banks—tend to have undeveloped banking systems and underdeveloped bond markets. Finally, Burger and Warnock (2006) also separately analyze the size of government and private bonds markets and find that at least as a first pass their determinants are quite similar: Countries with better inflation performance and stronger rule of law have larger sovereign and corporate bond markets. This is not to say that the relationship between sovereign and

corporate bond markets is identical across countries, as some countries with reasonably sized sovereign markets have exceedingly small corporate bond markets.

Blommenstein and Santiso (2007) and BIS (2007) provide details on the recent surge in development of local currency bond markets and document the decreased reliance of emerging economies on foreign currency bonds. Though these studies provide no formal analysis, it seems plausible that improved macroeconomic policies in many emerging economies have contributed to the recent local bond market development.

Table 1 shows the amount of all bonds outstanding (Total) by country for 2006. Not surprisingly, most bonds are issued by developed countries (roughly \$50 trillion outstanding at end-2006, compared to approximately \$4.5 trillion for emerging economies). The table also shows various measures of the size of the local currency bond market. In the United States, Japan, and euro area (except Finland), local currency bond markets exceed annual GDP. Other industrial countries tend to have somewhat smaller local bond markets. Bonds issued by entities from developed countries are also almost exclusively in the local currency (as displayed in the final column of Table 1), although there are some exceptions. In contrast, emerging economies' local currency bond markets tend to be smaller (on average, about one-third of annual GDP) and make up a slightly smaller portion of those countries' overall bond markets.

Table 2 shows the evolution of the size of local currency bond markets and their share of all bonds outstanding. Progress in emerging economies is evident by both indicators: Local currency bond markets have grown in size relative to GDP and emerging economies are now less reliant on foreign currency-denominated bonds.

Particularly impressive is the evolution of Latin America's bond markets, where in 2001 only half of the bonds were issued in local currency but by the end of 2006 over two-thirds were local-currency-denominated.

The developments highlighted by Table 2 raise an important question: How have cross-border investors responded to the surge in local currency bond issuance by emerging economies? In the following section explain why this is a difficult question to address.

### **3. A Critical Review of CPIS Data**

One potential dataset for a study of cross-border investment in local currency bonds is the IMF's CPIS data, for which data are compiled on international bond (and equity) portfolios of investors from roughly 70 countries.<sup>2</sup> Although this rich matrix of cross-border holdings has attracted significant use in existing studies of foreign investment in bonds, we find significant problems with the CPIS data that preclude their use for a study of investment in local currency bonds. After explaining the data limitations we turn to a review of existing CPIS-based literature.

#### *3.1 Potential Problems with the CPIS Data*

There are at least two potentially severe problems associated with any study that utilizes the CPIS data. First, the CPIS data for most countries is of very poor quality. This owes to the fact that very few of the 70 reporting countries follow best practices and compile the data from comprehensive security-level benchmark surveys. If security-level data that identify the country of the investor and the country of the foreign security (and the security's characteristics such as currency denomination) are not utilized when

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<sup>2</sup> All CPIS data are available at <http://www.imf.org/external/np/sta/pi/cpis.htm>.

compiling the data, then CPIS-based holdings data are no better than capital flows data collected at the aggregate level.<sup>3</sup> Indeed, the financial center bias identified in Warnock and Cleaver (2003) for capital flows data can also be seen in the CPIS data by examining reported investment in Luxembourg equities (Table 3). For example, France reports that it holds 101 percent of the Luxembourg equity market. Germany reports that 38 percent of its foreign equity investment is in Luxembourg, comprising 398 percent of the Luxembourg market. Sweden holds 73 percent of the Luxembourg market. In all, the 25 countries in the table report on average that 27 percent of their foreign equity holdings are in Luxembourg; in total these would be claims on 1545 percent of the market. The euro area itself—excluding Luxembourg—reports that it holds well over 1000 percent of the Luxembourg market. In contrast, the United States, with its security-level survey, indicates that 0.4 percent of its foreign equity portfolio is in Luxembourg, comprising a more modest (and believable) 15 percent of the market.

The United States is not the only country that collects high quality holdings data, and some of the countries in Table 3 may well have good data, but the sheer size of CPIS-reported holdings in Luxembourg calls into question all of the CPIS data. If we think in reality that Italy holds very few Luxembourg equities, how should one go about redistributing the 49 percent of its foreign equity portfolio currently recorded against Luxembourg? The standard practice, to omit all Luxembourg data, is unappealing, as it presumes that anything booked vis-à-vis Luxembourg has the exact same country distribution of the rest of that country's data. And if the CPIS has poor quality data on

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<sup>3</sup> On problems with capital flows data collected at the aggregate-level (rather than security-level), see Warnock and Cleaver (2003) and Grier, Lee, and Warnock (2001).

equities, which trade on organized exchanges and for which information is generally readily available, then we cannot expect much of the CPIS bonds data.

The second potential problem with CPIS data—and a major one for analyzing international investment in local bond markets—is that for bonds there is no detail on their currency denomination. This is related to the first problem: If countries do not collect security-level data, an accurate representation of the currency denomination of bond holdings is not possible. As we will describe below, because CPIS mixes bonds of all currencies together, much of the existing work on international bond holdings is consistent with foreign investors avoiding currency risk.

### *3.2 Studies that Use the CPIS Data*

Lane (2006) exploits the bilateral nature of the CPIS data by examining the investment of at most 22 source countries in at most 114 destination countries, with between 700 and 1200 bilateral observations in each regression. He finds that the level of investment in 2004 and the change in investment from 1997 to 2004 is greater for country pairs that are in the euro area, have more bilateral imports, and have a tax treaty or common legal origin. Distance matters for the level of, but not the change in, investment. Lane also examines EMU countries' external bond portfolios (i.e., in countries outside the EMU) and other countries' positions in EMU bonds. He finds that EMU investment in non-EMU bonds is greater if bilateral imports are greater or there is a tax treaty. In contrast, nothing is significant in regressions of external investment in EMU bonds, suggesting that outside investors view the bonds of EMU countries as very close substitutes.

Fidora, Fratzscher, and Thimann (2007) also use the bilateral CPIS data and focus on the role of real exchange rate volatility. They average the data from 2001 to 2003; for bonds, they have anywhere from 804 to 1388 bilateral observations, with roughly one-quarter being equal to zero. In their baseline model (using a fixed effects Tobit estimator), bilateral bond investment is greater between country pairs that have less real exchange rate volatility, that are geographically closer, and that have a common legal origin. In contrast to Lane (2006), bilateral imports are rarely significant in Fidora et al.

Bae, Yun, and Bailey (2006) also use the CPIS data, but rather than exploiting the bilateral nature of the data they aggregate up to create data on implied liabilities (i.e., the extent each country is able to attract foreign investment) for 45 countries. While Bae et al. “examine what attracts foreign investors to the local bond markets” (page 102) and state that their “dependent variable is local bonds held by foreign investors” (page 122), they use CPIS data and hence theirs is not a study of local bonds. That said, they find that countries that have stronger property rights have more foreign investment in their bonds. Because they use CPIS data, whether those bonds are “local” or not cannot be determined in their data set.

### *3.3 Evidence on the Currency Denomination Problem in the CPIS Data*

A fair reading of the existing CPIS-based literature would seemingly indicate that foreign investment in bonds is greater when trade is greater, exchange rate volatility is lower, property rights are stronger, and when the countries have a tax treaty or common legal origin. However, as noted, the CPIS data does not designate the currency denomination of bonds. In this section we explore potential problems this might cause in CPIS-based analysis. Our read is that it is not clear whether existing results speak to the

propensity to invest in certain countries or, alternatively, countries' propensity to issue bonds in foreign currencies.

We begin by noting that investors from the United States, the one country for which we have high quality data on foreign bond portfolios (including currency denomination), seem to have a strong preference for bonds denominated in their own currency. In their foreign bond portfolios, U.S. investors hold far more dollar-denominated bonds than bonds denominated in any other currency or even all other currencies combined; 75 percent of U.S. investors' foreign bond portfolios is denominated in dollars. This preference is apparent not only in aggregate data but extends down to individual countries; as Figure 1 shows, countries that issue in dollars attract greater U.S. investment. In the figure, *U.S. Holdings* is the portion of the country's outstanding bonds (of any currency denomination) that is held by U.S. investors. *Issuance in Dollars* is the portion of the country's outstanding bonds that is denominated in U.S. dollars. The figure clearly shows that U.S. investment is greater in countries that tend to issue in U.S. dollars; while other factors matter (i.e., all points do not lie directly on the regression line), the  $R^2$  of this simple regression is 0.50.

The above speaks only to the preferences of one (reasonably large) group of international investors, U.S. investors. In Table 4 we fold in investors from a wide range of countries by utilizing the CPIS data to examine the extent to which currency denomination can explain bilateral investment patterns. We note at the outset that our analysis is subject to all the previously mentioned problems associated with CPIS data. The dependent variable is, for 1271 country pairs, the portion of country  $i$ 's foreign bond portfolio that is invested in country  $j$  as of end-2003. Following the main points of Lane

(2006) and Fidora et al. (2007), we include a measure of bilateral imports and a measure of bilateral exchange rate volatility. We also form a variable *Issuance* that is the portion of country *j*'s bonds that is denominated in the currency of country *i*.

Our results in Table 4 confirm the importance of bilateral trade linkages *in the CPIS data*, as in Lane (2006), but are counter to Fidora et al. (2007), as the impact of bilateral exchange rate volatility on cross-border bond holdings is insignificant.

Importantly, we also find that the impact of currency composition of bond issuance is highly significant. The more bonds Country A issues in the currency of Country B, the more likely are Country B investors to hold Country A's debt.

One would expect exchange rate volatility to be of particular interest to investors considering cross-border positions in local currency bonds. Unfortunately, as we emphasize above, the CPIS data do not allow us to break out the local currency portion of bond holdings. Therefore, it is possible that the significance of exchange rate volatility in previous CPIS-based studies may have been a proxy for the issuance effect reported in Table 4. Countries that issue a significant fraction of their debt in a particular foreign currency have a strong incentive to limit fluctuations in the value of the home currency relative to the currency of bond issuance (see Devereux and Lane, 2003). Thus, bilateral exchange rate stability may be serving in some studies as an imperfect proxy for bilateral issuance, and the previous results in the literature are consistent with our finding of a strong preference for bonds denominated in home currency. Of course, even cross-border investors in home-currency-denominated bonds should be sensitive to exchange rate volatility as it impacts default risk, but our results with the CPIS data do not pick up this potential effect.

### *3.4 An Alternative Dataset*

While we think we have shown quite convincingly that the IMF's CPIS data should not be used in a study of cross-border investment in local currency bonds, a few countries do collect data on their residents' bond investment by country and currency denomination. One is the United States, which has reported U.S. investment in local currency bonds as of end-2001 and end-2006 (Treasury et al, 2002, 2007). The 2001 U.S. data were analyzed in Burger and Warnock (2007). The 2006 U.S. data will be examined below in Section 5. Before turning to that analysis, we first examine the returns characteristics of local currency bonds from the perspective of a U.S.-based investor.

## **4. Returns Characteristics of Local Currency Bond Markets**

In this section we resume our focus on local currency bond markets with analysis of returns characteristics viewed from the perspective of a U.S.-based investor from 2002 to 2006. One would suspect that returns characteristics over this period were very attractive, with inflation generally stable throughout the world and most currencies appreciating against the U.S. dollar. Not surprisingly, as Table 5 shows, over the January 2002–November 2006 period mean monthly U.S.-dollar returns were quite high in both industrial countries (0.81 percent per month) and emerging markets (1.17 percent). This compares favorably both to the returns on U.S. bonds (0.43 percent) and to the near-zero returns on foreign bonds in the earlier, 1998–2001, period.

The higher returns on foreign bonds came with substantially more volatility than U.S. bond returns. The volatility comes from the fact that any unhedged foreign bond is a

combined play on the local bond and the local currency. Currency returns are typically very volatile; this is evident in the table, as industrial country returns are three times as volatile as U.S. returns. Emerging market unhedged returns are also more volatile than U.S. returns, but note the dramatic reduction in volatility relative to the 1998–2001 period. Over the more recent period, the volatility in emerging market bonds has been tempered by improved macroeconomic stability and the ongoing exchange rate management. Hedged returns—for both industrial countries and emerging economies—have much less volatility (and lower returns).

In Figure 2 we generate three efficient frontiers to illustrate the risk-return tradeoffs facing a U.S.-based fixed income investor.<sup>4</sup> Each frontier includes a range of portfolios varying from 100% U.S. bonds to 100% foreign bonds (labeled ‘ROW’). The figure includes three measures of the rest-of-world (ROW) portfolio: (1) an *unhedged* portfolio of 80% industrial and 20% emerging market bonds, (2) a *hedged* portfolio of 80% industrial and 20% emerging market bonds, and (3) a 50-50 combination of (1) and (2). The figure demonstrates that a U.S. investor taking an unhedged position in foreign bonds could have earned higher returns relative to U.S. bonds for this time period. The higher returns are sample-specific; recall from Table 5 that in the preceding period of dollar appreciation U.S. dollar returns on foreign bonds were near zero. The higher variance of unhedged foreign bond returns is not an artifact of this time period, thanks to the well-documented volatility of exchange rates. A portfolio of hedged foreign bonds offered significantly lower volatility with similar returns to an all-U.S. allocation. The final frontier illustrates the diversification benefits from a portfolio of hedged and unhedged foreign bonds. For this period a combination of hedged and unhedged bonds

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<sup>4</sup> We ignore (but should not) the other assets in this investor’s portfolio.

would have allowed U.S. investors to increase returns while also achieving lower variance relative to an all-U.S. allocation.

## **5. Foreign Participation in Local Currency Bonds**

As mentioned earlier, benchmark surveys of U.S. investors reveal an overwhelming preference for bonds denominated in U.S. dollars. Burger and Warnock (2007), who analyze U.S. investors' end-2001 holdings of the local currency bonds of 41 countries, report nearly zero participation in local-currency bond markets in emerging economies and find a particular aversion to the most volatile markets. But, as highlighted in Section 2, there have been dramatic changes to local currency bond markets in the years since 2001. Emerging economies have greatly reduced their reliance on foreign currency debt and focused efforts on developing local currency bond markets. In addition, the returns characteristics reported in the previous section suggest opportunities for diversification along with particularly attractive returns for emerging market bonds (following poor returns in the late 1990s). We turn to evidence from the 2006 benchmark survey of U.S. investment abroad to analyze how U.S. investors have responded to these developments.

Table 6 displays December 2006 survey results for U.S. investment in local currency bonds, as well as results from the December 2001 survey. Participation figures are calculated as a percentage of local currency bonds outstanding. The 2006 survey reveals increased participation in emerging local currency bond markets. Participation is still very limited in Emerging Asia, at 0.21 percent (on average), but is up from near zero in 2001 and is reasonably large in some countries such as Indonesia and Malaysia. U.S.

participation in local-currency Latin American bonds has increased dramatically to a level of 2.03 percent by end-2006, double the share U.S. investors held of developed markets. In fact, for developed markets as a whole U.S. investors *decreased* their holdings as percentage of outstanding bonds. The survey therefore reveals a shift in U.S. investor portfolio weights away from developed countries toward emerging economies.

We next analyze the country-level factors that are associated with greater U.S. investment in local currency bond markets. CRISIL (2008) provides a good starting point. Somewhat similar to the country-level investability measures for equities devised in Edison and Warnock (2003), CRISIL has created investability scores for 20 local currency bond markets. In the CRISIL data, there are six components to investability: capital controls, market liquidity and efficiency, regulatory quality and creditor rights, market infrastructure, taxation on bonds, and the size of the local institutional investor base. Capital controls data are from the AREAER (2007) and score countries on three indicators that are particularly relevant from the perspective of investment in local currency bond market: access to securities market, access to domestic money market, and access to the derivatives market. The market liquidity and efficiency measure is formed by combining four variables: secondary market turnover ratio, bid-ask spread, existence of a yield curve, and existence of centralized bond price data. Regulatory quality and creditor rights are taken from the World Bank's Regulatory Quality Index (Worldwide Governance Indicators) and Creditor Rights Index (Doing Business). Market infrastructure indicators cover efficiency of clearing and settlement systems, safety and soundness of safekeeping arrangements, and efficiency of asset servicing. Effective tax rates are from the perspective of a Luxembourg-based institutional investor. Finally,

investor base is the size of institutional investor base (pension and mutual funds) as a share of GDP. For complete details, see CRISIL (2008).

The CRISIL investability data are available for the 20 Gemloc countries.<sup>5</sup> In addition, we added roughly 20 developed countries by creating similar indices. We started with the assumption that developed countries obtain the maximum score for each component and then altered those scores as we gathered information. For readily available data, such as capital controls and the components of regulatory quality and creditor rights, this task is straightforward. For an item such as market infrastructure we were not able to gather data, but here assuming the maximum score for developed markets seems particularly plausible.

Table 7 presents a series of Tobit regression results testing the ability of each of the investability indicators to explain U.S. cross-border participation in local currency bond markets. The dependent variable in each regression is the percentage of local currency bonds held by U.S. investors, as of end-2006.<sup>6</sup> The results indicate that countries with higher scores on the aggregate investability index are able to attract significantly more U.S. investment into local currency bond markets. In addition, all of the individual sub-indices of investability have a statistically significant impact on U.S. participation.

The investability indicators were generated as a way of evaluating the eligibility of developing local currency bond markets for the Gemloc program. It is therefore of particular interest to see whether the indicators are able to explain U.S. investor participation among the twenty markets included in the launch of the GEMX index.

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<sup>5</sup> We thank the Gemloc group for providing us with the underlying investability data.

<sup>6</sup> Colombia is excluded from this analysis (and hereafter) because, as displayed in Table 6, it represents an outlier in terms of the very large percentage of Colombian peso-denominated bonds held by U.S. investors.

Figure 3 displays that the relationship between CRISIL's investability index and U.S. investor positions as of end-2006 is positive and statistically significant.<sup>7</sup>

Having established that U.S. investors' cross-border bond positions were influenced by the institutional factors and policies embodied in the investability index, we next evaluate whether country specific returns characteristics can further explain investor behavior. The favorable returns for emerging economies discussed in Section 4 clearly contributed to the broad increase in participation by U.S. investors displayed in Table 6. The data summarized in Figure 4 indicate, however, that U.S. investors did not discriminate *among* local currency bond markets based on the performance of past returns. Returns in local currency bond markets were generally favorable, prompting more U.S. investment (especially in emerging markets), but past returns characteristics did not appear to influence allocations among local bond markets.<sup>8</sup>

## 6. Conclusion

The recovery of emerging economies from the string of crises in the late 1990s has been remarkable in many ways, not least of which has been the development of local currency bond markets. After suffering the consequences of currency mismatches, many emerging economies have established the necessary institutional framework and pursued creditor-friendly policies in an effort to develop local currency bond markets. These

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<sup>7</sup> While all of the underlying subcomponents are positively related to U.S. investment in the Gemloc subsample, only a few—namely taxation and liquidity and efficiency—are significant. The lack of statistical significance for some indicators could, of course, be due to the limited number of observations in the GEMX subsample.

<sup>8</sup> Long time series of local currency bond returns are not available for a wide range of countries. However, because much of the movement in local currency bond returns owes to currency movements, as a proxy we formed variables measuring the mean, volatility, and skewness of monthly exchange rate changes measured over 5-, 10-, or 15-year periods ending December 2006. In a battery of unreported tests, we found no evidence that U.S. investors' 2006 international bond allocations were influenced by past returns characteristics.

efforts have borne fruit. In the period between 2001 and 2006 we document a substantial increase in local currency bond market development and a reduced reliance on foreign currency bonds. In fact, the most vulnerable area in 2001, Latin America, has made the most dramatic progress.

This study has focused on the response by cross-border investors to these developments in local currency bond markets. Unfortunately, as demonstrated in Section 3, we lack a reliable international source for cross-border investment in local currency bonds. The most frequently cited source, the IMF's CPIS database, lacks information on the currency denomination of bond holdings. We therefore focus our attention on U.S. investors, for which a 2006 benchmark survey is available.

Our empirical results indicate that cross-border participation in local currency bonds is highest in countries where investor-friendly institutions and policies have been established. For emerging economies seeking to broaden their investor base by appealing to international investors, our results are potentially good news. Many of the factors that appeal to cross-border investors are within the control of the host country. It is not surprising that capital controls represent an impediment to cross-border investors, but potential host countries should also take note of the importance of regulatory quality and creditor rights.

The empirical results also point to the possibility of a virtuous cycle developing in local currency bond markets. Over the 2001-2006 period we have witnessed a surge in local currency issuance in emerging economies *and* increased participation from cross-border investors in these bond markets. These two developments should be mutually reinforcing. The same creditor-friendly policies and institutions that enabled the

development of these markets are also factors we have demonstrated to be attractive to cross-border investors. Furthermore, the newfound ability of emerging markets to borrow internationally in their own currency should help stabilize their domestic macroeconomic performance and reduce the likelihood of future crises.

We end, though, on a cautionary note. Inflation is creeping up in many emerging market economies. If this trend continues, one could imagine the gains emerging markets have made in developing local currency bond markets and attracting investors—both domestic and international—might evaporate.

## References

- AREAER, 2007. Annual Report on Exchange Arrangements and Exchange Restrictions (Washington, DC: IMF).
- Bae, K.-H., Y.S. Yun, and W. Bailey, 2006. Determinants of Bond Holdings by Foreign Investors. in *Asian Bond Markets: Issues and Prospects* (BIS Paper No. 30).
- Bank for International Settlements, 2007. Financial stability and local currency bond markets. CGFS Papers No. 28.
- Blommenstein, H. And J. Santiso, 2007. New Strategies for Emerging Domestic Sovereign Bond Markets. OECD Development Centre Working Paper No. 260.
- Burger, J., and F. Warnock, 2006. Local Currency Bond Markets. *IMF Staff Papers* 53: 115-132.
- Burger, J., and F. Warnock, 2007. Foreign Participation in Local Currency Bond Markets. *Review of Financial Economics* 16(3): 291-304.
- Claessens, S., D. Klingebiel, and S. Schmukler, 2007. Government Bonds in Domestic and Foreign Currency: The Role of Macroeconomic and Institutional Factors. *Review of International Economics* 15(2), 370-413.
- CRISIL, 2008. Gemloc Investabilty Indicators. Manuscript.
- Devereux, M. and P. Lane, 2003. Understanding bilateral exchange rate volatility. *Journal of International Economics* 60: 109-132.
- Eichengreen, B., and R. Hausmann, 2005. *Other People's Money: Debt Denomination and Financial Instability in Emerging Market Economies*. Chicago: University of Chicago Press.
- Eichengreen, B., and P. Luengnaruemitchai, 2006. Why Doesn't Asia Have Bigger Bond Markets? in *Asian Bond Markets: Issues and Prospects* (BIS Paper No. 30).
- Edison, H. and F. Warnock, 2003. A simple measure of the intensity of capital controls. *Journal of Empirical Finance*. 10(1): 2003 pp. 81-103.
- Fidora, M., M. Fratzscher, and C. Thimann, 2007. Home Bias in Global Bond and Equity Markets: The Role of Real Exchange Rate Volatility. *Journal of International Money and Finance* 26: 631-655.
- Goldstein and Turner, 2004. *Controlling Currency Mismatches in Emerging Economies*. Institute for International Economics, Washington, D.C.
- Griever, W., G. Lee, and F. Warnock, 2001. The U.S. system for measuring cross-border investment in securities: a primer with a discussion of recent developments. *Federal Reserve Bulletin* 87(10): 633-650.
- International Monetary Fund, 2006. Assessing Global Financial Risks, *Global Financial Report*, p. 1-44.

- Jeanne, O., and A. Guscina, 2006. Government Debt in Emerging Market Countries: A New Data Set. IMF Working Paper 06/98.
- La Porta, R., F. Lopez-de-Silanes, A. Shleifer, R. Vishny, 1997. Legal Determinants of External Finance. *Journal of Finance* 52(3): 1131-1150.
- Lane, P., 2006. Global Bond Portfolios and EMU. *International Journal of Central Banking* 2(2): 1-23.
- Mehl, A. and J. Reynaud, 2005. Domestic original sin in emerging market economies. ECB Working Paper No. 560.
- Treasury Department, FRBNY, and Federal Reserve Board, 2002. Report on Foreign Portfolio Investment in the United States as of December 31, 2001.
- Treasury Department, FRBNY, and Federal Reserve Board, 2007. Report on Foreign Portfolio Investment in the United States as of December 31, 2006.
- Warnock, F., and C. Cleaver, 2003. Financial centers and the geography of capital flows. *International Finance* 6(1): 27-59.

**Table 1. Bond Market Development.**

The table depicts data for 2006. Data on international bonds are from security-level data underlying BIS Quarterly Review Table 14B (International Bonds and Notes by Country of Residence). Local-currency-denominated debt is the sum of the long-term debt component of BIS Quarterly Review Table 16A (Domestic Debt Securities) and the local currency portion of Table 14B. Domestic debt for Egypt, Morocco, and Nigeria are from the World Bank. Israel's domestic debt is from Bank of Israel's 2006 Annual Report.

	<b>Total (USD billions)</b>	<b>Local Currency Denominated</b>		
		<b>(USD billions)</b>	<b>(% of GDP)</b>	<b>(% of total)</b>
<b>USA</b>	<b>22,000</b>	<b>21,200</b>	<b>161</b>	<b>96</b>
<b>Other industrial</b>	<b>13,318</b>	<b>10,847</b>	<b>105</b>	<b>81</b>
Australia	610	321	42	53
Canada	1,079	835	65	77
Denmark	575	488	176	85
Iceland	110	66	403	60
Japan	6,964	6,898	158	99
New Zealand	33	19	18	57
Norway	216	112	33	52
Sweden	440	285	74	65
Switzerland	235	223	59	95
United Kingdom	3,057	1,601	67	52
<b>Euro Area</b>	<b>16,339</b>	<b>14,892</b>	<b>141</b>	<b>91</b>
Austria	520	428	133	82
Belgium	536	523	133	98
Finland	175	157	75	89
France	2,806	2,584	115	92
Germany	3,815	3,453	118	91
Greece	402	393	127	98
Ireland	705	522	237	74
Italy	3,142	3,050	164	97
Netherlands	2,027	1,635	244	81
Portugal	221	217	111	98
Spain	1,990	1,931	157	97

Table 1 (continued)

	Total (USD billions)	Local Currency Denominated		
		(USD billions)	(% of GDP)	(% of total)
<b>Emerging Markets</b>	<b>4,498</b>	<b>3,734</b>	<b>33</b>	<b>83</b>
Egypt	15	13	12	85
Israel	106	92	75	87
Morocco	26	25	44	98
Nigeria	8	8	7	100
South Africa	112	102	40	90
<b>EM Europe</b>	<b>604</b>	<b>435</b>	<b>21</b>	<b>72</b>
Croatia	13	6	15	49
Czech Republic	48	42	29	87
Hungary	77	50	44	65
Poland	150	114	34	76
Russia	83	34	3	41
Slovakia	17	14	24	79
Turkey	215	174	45	81
<b>Latin America</b>	<b>791</b>	<b>529</b>	<b>20</b>	<b>67</b>
Argentina	128	64	30	50
Brazil	234	161	15	69
Chile	50	36	25	71
Colombia	23	8	6	36
Mexico	309	244	29	79
Peru	20	11	11	54
Venezuela	28	5	3	19
<b>Asia</b>	<b>2,647</b>	<b>2,436</b>	<b>43</b>	<b>92</b>
China	751	737	28	98
India	299	283	35	95
Indonesia	61	53	15	87
Malaysia	142	117	75	82
Pakistan	19	17	11	89
Philippines	63	31	27	50
South Korea	1,010	925	104	92
Taiwan, China	187	168	46	90
Thailand	115	105	51	92
<b>Financial Centers</b>				
Hong Kong SAR	71	38	20	53
Singapore	93	56	43	61

**Table 2. The Evolution of Bond Market Development.**

The table depicts data on local currency bond market development for 2001 and 2006. See Table 1 for details.

<b>Local Currency Denominated Bonds</b>				
	<b>% of GDP, 2001</b>	<b>% of GDP, 2006</b>	<b>% of total, 2001</b>	<b>% of total, 2006</b>
<b>United States</b>	<b>136</b>	<b>161</b>	<b>98</b>	<b>97</b>
<b>Other industrial</b>	<b>85</b>	<b>105</b>	<b>87</b>	<b>81</b>
Australia	32	42	56	53
Canada	70	65	72	77
Denmark	152	176	89	85
Iceland	94	403	66	60
Japan	108	158	99	99
New Zealand	23	18	64	57
Norway	28	33	54	52
Sweden	60	74	62	65
Switzerland	62	59	97	95
United Kingdom	47	67	62	52
<b>Euro Area</b>	<b>99</b>	<b>141</b>	<b>90</b>	<b>91</b>
Austria	92	133	74	82
Belgium	132	133	97	98
Finland	51	75	76	89
France	87	115	91	92
Germany	97	118	92	91
Greece	88	127	90	98
Ireland	47	237	65	74
Italy	122	164	96	97
Netherlands	171	244	74	81
Portugal	69	111	90	98
Spain	63	157	93	97

**Table 2** (continued)

<b>Local Currency Denominated Bonds</b>				
	<b>% of GDP, 2001</b>	<b>% of GDP, 2006</b>	<b>% of total, 2001</b>	<b>% of total, 2006</b>
<b>Emerging Markets</b>	<b>28</b>	<b>33</b>	<b>75</b>	<b>83</b>
South Africa	34	40	87	90
<b>EM Europe</b>	<b>20</b>	<b>21</b>	<b>64</b>	<b>72</b>
Croatia		15	33	49
Czech Republic	15	29	85	87
Hungary	31	44	61	65
Poland	21	34	86	76
Russia	2	3	13	41
Slovakia		24	67	79
Turkey	48	45	78	81
<b>Latin America</b>	<b>18</b>	<b>20</b>	<b>51</b>	<b>67</b>
Argentina	14	30	29	50
Brazil	22	15	59	69
Chile	46	25	77	71
Colombia	6	6	30	36
Mexico	17	29	59	79
Peru	13	11	60	54
Venezuela	4	3	25	19
<b>Asia</b>	<b>37</b>	<b>43</b>	<b>90</b>	<b>92</b>
China	21	28	95	98
India	26	35	97	95
Indonesia	30	15	96	87
Malaysia	82	75	82	82
Pakistan	26	11	96	89
Philippines	22	27	48	50
South Korea	102	104	91	92
Taiwan, China	29	46	92	90
Thailand	30	51	81	92
<b>Financial Centers</b>				
Hong Kong SAR	15	20	55	53
Singapore	37	43	69	61

**Table 3. CPIS Data on Foreign Holdings of Luxembourg Equities**

The table shows, for selected countries, 2004 CPIS data expressed as a percent of each country's foreign equity holdings and as a percent of Luxembourg stock market capitalization.

Reporting Country	% of foreign holdings in Luxembourg	% of Luxembourg market capitalization
Austria	19%	20%
Belgium	42%	134%
Bulgaria	80%	0%
Chile	54%	17%
Colombia	26%	0%
Czech Republic	22%	1%
Estonia	12%	0%
Finland	13%	14%
France	11%	101%
Germany	38%	398%
Greece	26%	3%
Hungary	23%	0%
Iceland	29%	3%
Ireland	6%	35%
Italy	49%	371%
Korea	46%	8%
Mexico	16%	5%
Netherlands	1%	41%
Poland	22%	0%
Portugal	29%	8%
Romania	33%	0%
Spain	30%	63%
Sweden	21%	73%
Switzerland	31%	208%
UK	2%	39%
Average	27%	
Sum		1545%
memo: U.S.	0%	15%

**Table 4. Bilateral Bond Holdings**

The table shows regression results for end-2003 data. The dependent variable is the portion of country *i*'s foreign bond portfolio that is invested in country *j*. Issuance is the portion of country *j*'s bonds that is denominated in the currency of country *j*. Imports is the portion of country *i*'s imports that originate from country *j*. ER Volatility is the nominal exchange rate volatility between the currencies of countries *i* and *j*. Following Lane (2006), a full set of source and destination dummies are included in this 'double fixed effects' model. P-values are in parentheses.

Issuance	0.057
	(0.010)
Imports	0.672
	(0.000)
ER Volatility	-15.5
	(0.575)
N	1271
Adj. R <sup>2</sup>	0.725
Source Dummies	Included
Destination Dummies	Included

**Table 5. Monthly US\$ Returns of Local Currency Bonds, 2002 -- 2006**

The table shows returns characteristics of local currency bonds. Returns are monthly, reported in U.S. dollars, and for the period January 2002 – November 2006. Industrial Countries refers to the JP Morgan GBI Global excluding U.S. Bond Index, which consists of the following 12 countries: Japan, Germany, France, Italy, UK, Spain, Belgium, Canada, Netherlands, Denmark, Sweden, Australia. Emerging Markets refers to the JP Morgan GBI-EM Broad Index, which consists of the following 16 countries: Brazil, Chile, Colombia, Czech Republic, Hungary, Indonesia, Malaysia, Mexico, Poland, Slovakia, South Africa, Thailand, Turkey, Russia, India, China. For the 1998-2001 period, local currency emerging market bond returns indices did not exist, so we calculated returns based on EMBI/JACI plus currency returns and averaged across 20 EMEs.

	Mean Return (%)	Variance	Skewness	Correlation with U.S. returns
U.S. Bonds	0.43	2.26	-0.59	1.00
Unhedged Foreign Bonds				
Industrial Countries	0.81	6.97	0.15	0.56
Emerging Markets	1.17	3.96	-0.25	0.27
Hedged Foreign Bonds				
Industrial Countries	0.39	0.61	-0.38	0.82
Emerging Markets	0.54	0.66	-0.23	0.47
Memo: Unhedged Foreign Bonds, 1998-2001				
U.S.	0.52	1.89	-0.21	1.00
Industrial Countries	0.11	6.10	0.08	0.49
Emerging Markets	-0.03	58.7	-0.94	0.12

**Table 6. U.S. Participation in Local Currency Bond Markets**

The table shows the percent of each country's local currency bonds held by U.S. investors as of end-2001 and end-2006. Data are from author's calculations using data on U.S. investment from Treasury Department et al. (2002, 2007) and the size of local currency bond markets (mostly from BIS; see Table 1 for details).

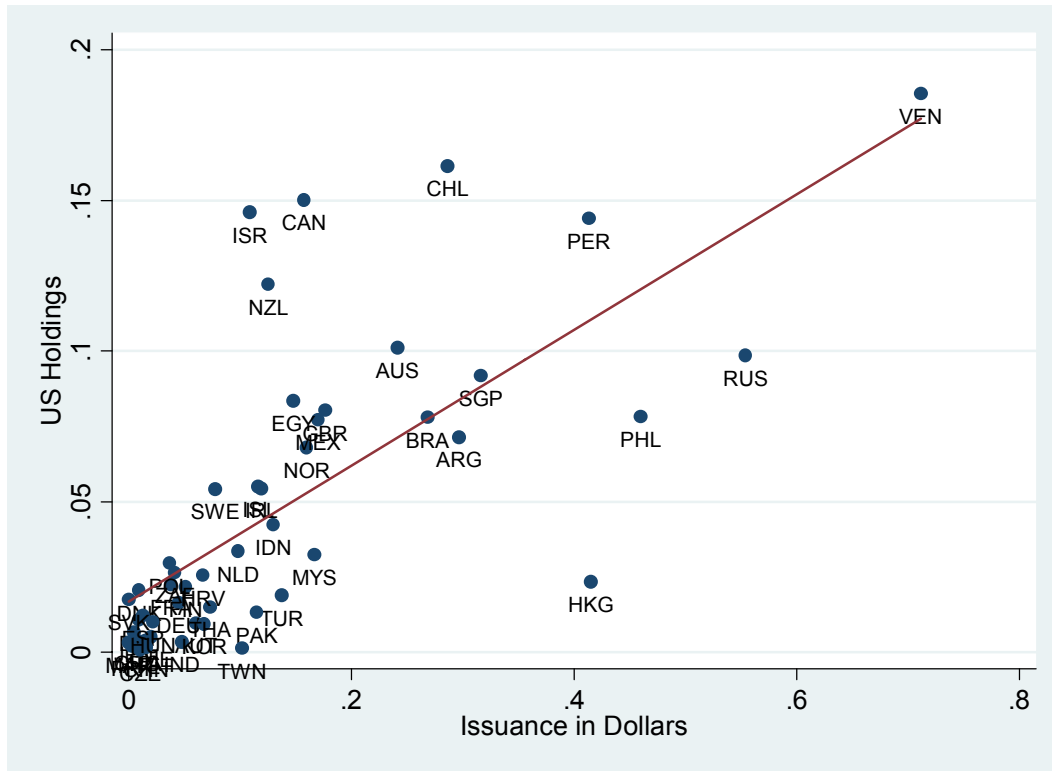
	<b>2001</b>	<b>2006</b>		<b>2001</b>	<b>2006</b>
<b>Emerging Markets</b>	<b>0.14</b>	<b>0.69</b>	<b>Industrial Countries</b>	<b>1.20</b>	<b>0.94</b>
South Africa	1.17	1.03	<b>Other industrial</b>	<b>1.06</b>	<b>1.25</b>
<b>EM Europe</b>	<b>0.51</b>	<b>1.09</b>	Australia	2.84	1.93
Croatia	0.00	0.00	Canada	4.38	4.79
Czech Republic	0.11	0.02	Denmark	0.93	1.71
Hungary	1.07	1.24	Iceland	0.00	0.51
Poland	1.46	3.35	Japan	0.48	0.57
Russia	0.08	0.05	New Zealand	11.20	9.37
Slovakia	0.00	1.78	Norway	0.89	1.84
Turkey	0.00	0.01	Sweden	2.93	2.25
			Switzerland	0.07	0.11
<b>Latin America</b>	<b>0.15</b>	<b>2.03</b>	United Kingdom	2.01	1.90
Argentina	0.20	3.73			
Brazil	0.07	2.93	<b>Euro Area</b>	<b>1.35</b>	<b>0.71</b>
Chile	0.04	0.00	Austria	0.43	0.28
Colombia	0.00	17.63	Belgium	0.91	0.64
Mexico	0.26	0.85	Finland	0.92	0.59
Peru	0.00	0.54	France	1.29	1.16
Venezuela	0.26	0.90	Germany	2.12	1.12
			Greece	1.33	0.29
<b>Asia</b>	<b>0.04</b>	<b>0.21</b>	Ireland	1.01	1.13
China	0.00	0.00	Italy	0.72	0.20
India	0.00	0.00	Netherlands	1.19	0.87
Indonesia	0.01	2.04	Portugal	0.22	0.14
Malaysia	0.02	0.90	Spain	1.56	0.19
Pakistan	0.00	0.00			
Philippines	0.05	0.14			
South Korea	0.06	0.25			
Taiwan, China	0.14	0.00			
Thailand	0.08	0.55			
<b>Financial Centers</b>	<b>0.20</b>	<b>2.90</b>			
Hong Kong SAR	0.29	0.65			
Singapore	0.13	4.42			

### Table 7. Regressions of U.S. Holdings of Local Currency Bonds

The table shows Tobit regressions of the share (from 0 to 1) of local currency bonds held by U.S. investors on various investability indicators. Investability ranges from 0 to 1, with a value of 1 indicating the market is completely open to foreign investment. Regressions include all countries listed in Table 6 except those for which we do not have investability data (Argentina, Croatia, Czech Republic, Iceland, Israel, Korea, Pakistan, Taiwan, and Venezuela) and Colombia (an extreme outlier). Dropping another outlier (New Zealand) would increase the statistical significance of each variable. Robust standard errors are in parentheses. \*\*\*, \*\*, and \* denote significance at the 1, 5, and 10 percent levels, respectively.

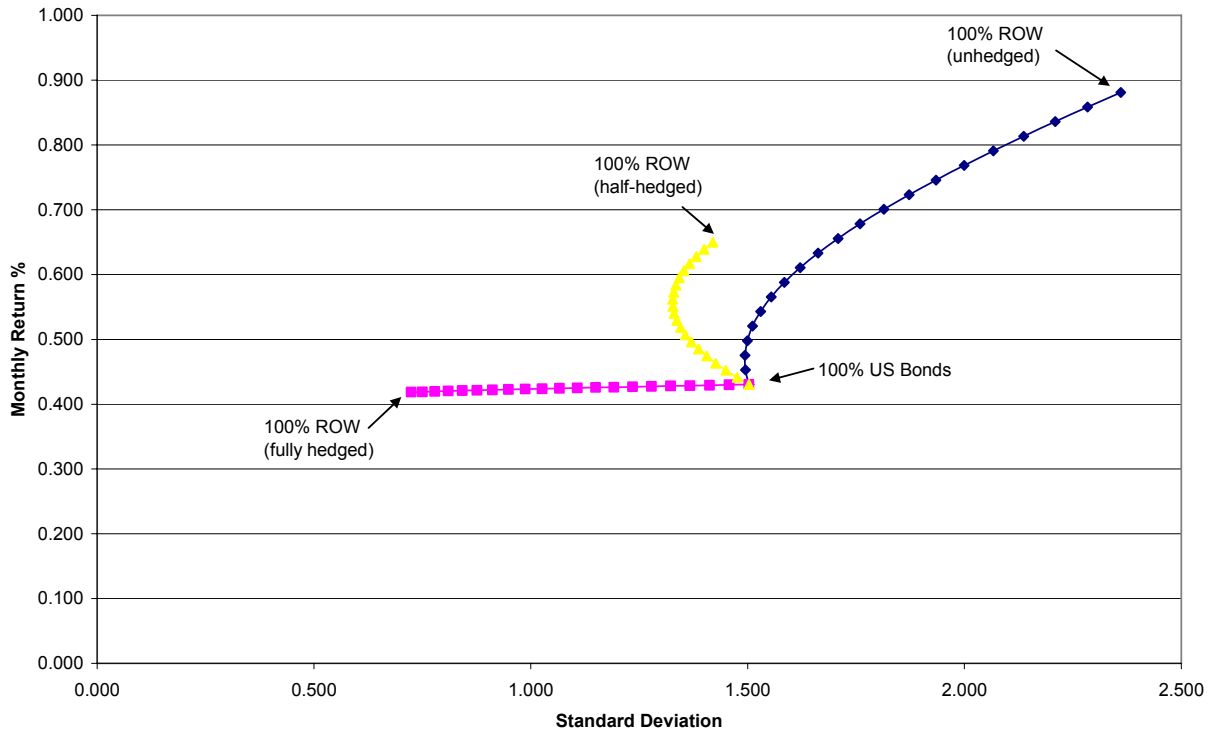
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Investability	0.046** (2.55)						
Capital Account Openness		0.126** (2.34)					
Liquidity_Efficiency			0.158** (2.40)				
RegQuality_CRights				0.315** (2.49)			
Market Structure					0.189** (2.05)		
Taxation						0.241** (2.43)	
Domestic Investor Base							0.242** (2.15)
Observations	39	39	39	41	39	39	39

**Figure 1. U.S. Investment and Dollar-Denominated Bonds**



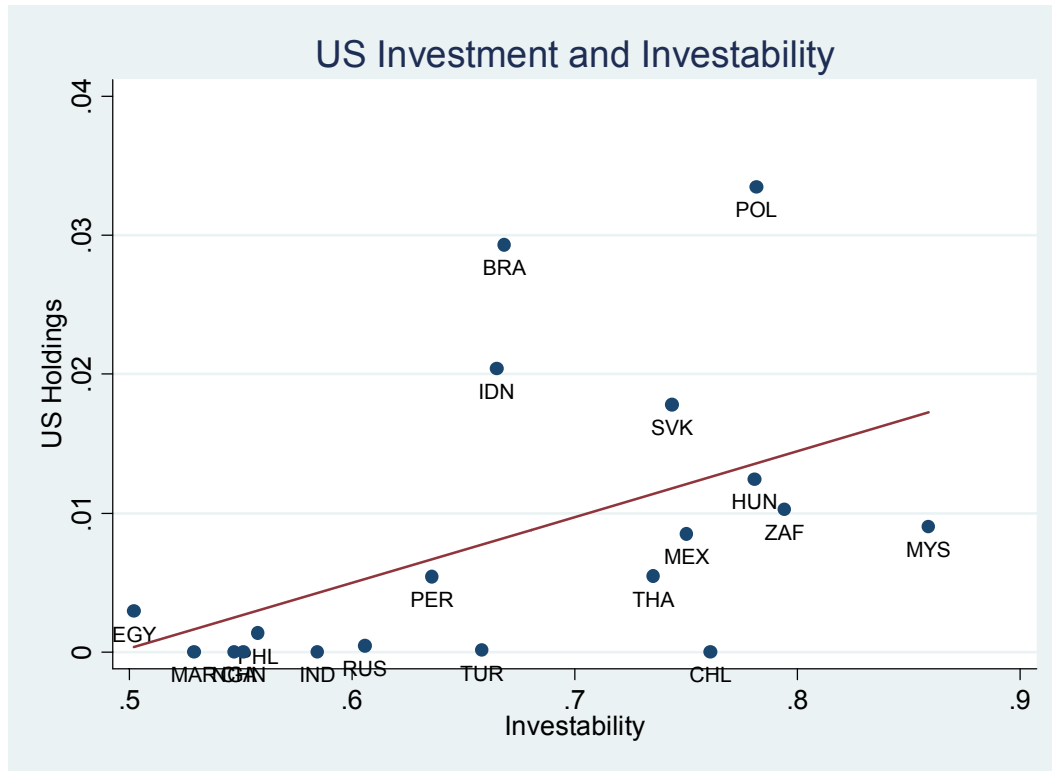
Note. U.S. Holdings is the portion of the country's outstanding bonds that is held by U.S. investors. Issuance in Dollars is the portion of the country's outstanding bonds that is denominated in U.S. dollars. Bond Holdings data are from Treasury Department et al. (2007). All data are as of end-2006. The  $R^2$  of the regression line is 0.50.

**Figure 2: US - ROW Bond Portfolios  
2002 - 2006**



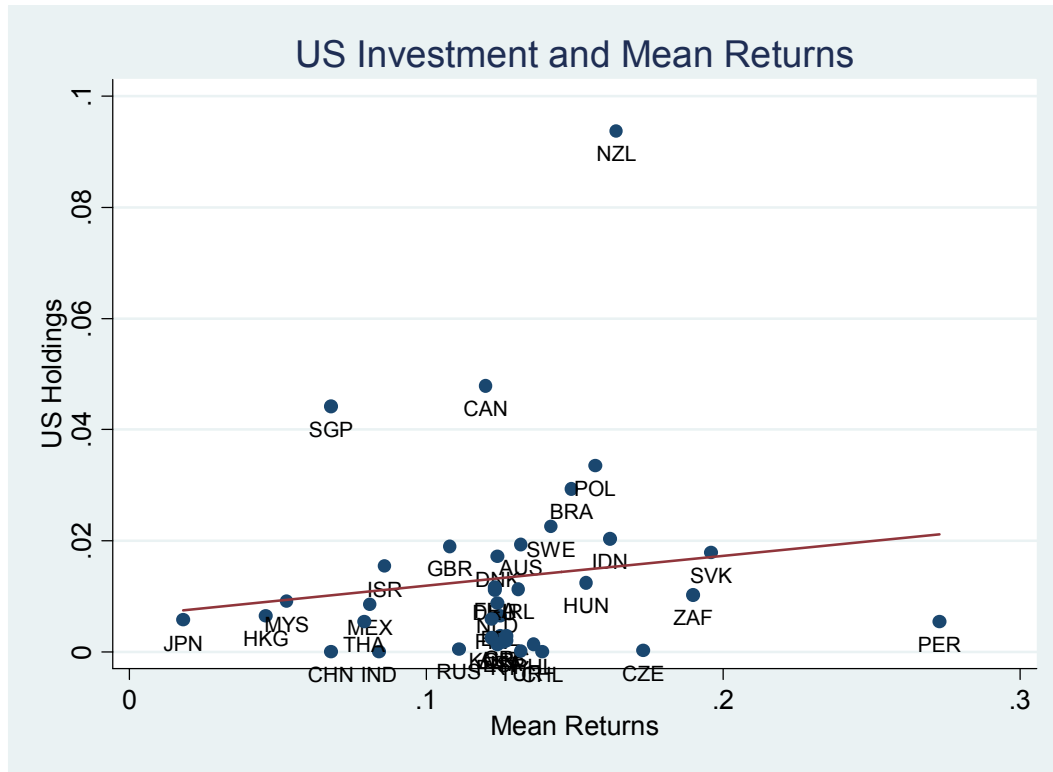
Note. Each frontier includes a range of portfolios varying from 100% U.S. bonds to 100% foreign bonds (labeled 'ROW'). The figure includes three definitions for the rest-of-world (ROW) portfolio: (1) an *unhedged* portfolio of 80% industrial and 20% emerging market bonds, (2) a *hedged* portfolio of 80% industrial and 20% emerging market bonds, and (3) a 50-50 combination of (1) and (2). Returns data are from January 2002 to November 2006.

**Figure 3. U.S. Investment and Investability Index, GEMX Countries**



Note. U.S. Holdings is the portion of the country's outstanding bonds that is held by U.S. investors; bond holdings data are as of end-2006 from Treasury Department et al. (2007). Investability for GEMX countries is from CRISIL (2008) and is comprised of the following six components: capital controls, market liquidity and efficiency, regulatory quality and creditor rights, market infrastructure, taxation on bonds, and the size of the local institutional investor base. The  $R^2$  of the regression line is 0.24.

**Figure 4. U.S. Investment and Past Returns**



Note. U.S. Holdings is the portion of the country’s outstanding bonds that is held by U.S. investors; bond holdings data are as of end-2006 from Treasury Department et al. (2007). Mean annual USD returns (in decimal form) are on unhedged local currency bonds (mostly from JPMorgan’s GBI indices) from January 2002 to December 2006. The  $R^2$  of the regression line is 0.02.