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The Effects of Fed Policy on EME Bond Markets

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Abstract

We analyze the effect of the U.S. Federal Reserve's large scale asset purchases (LSAPs) on EME bond markets by focusing on two dimensions—the evolution of the structure (size and currency composition) of EME bond markets and the active reallocations within the bond portfolios of US investors—in a panel setting. On the structure of EME bonds markets, we find that US conditions matter in a statistical sense: when the non-LSAP portion of US yields was lower and when LSAPs had a larger (negative) effect on US yields, EMEs issued more local currency and foreign currency bonds. But local factors matter much more: Countries with more macroeconomic stability (i.e., lower inflation volatility) and stronger regulatory/creditor rights have larger local currency government bond markets, countries with more positive current account balances have more private bonds (both local currency and foreign currency), and countries with stronger regulatory/creditor rights have a higher share of local currency bonds. On US investors' investment in EME local currency bonds, we find increased portfolio weights (relative to benchmark weights) in countries with stronger regulatory/creditor rights and lower inflation volatility, but that US yields (the non-LSAP portion) have a larger effect. In their portfolios of USD-denominated EME bonds, global factors are statistically significant but not materially important, as nearly 100% of the variation is accounted for by local factors (such as strong regulatory/creditor rights).

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1. Introduction

The environment for emerging market economy (EME) bonds has changed dramatically over the past few decades. EME local currency bond markets (LCBMs) have developed, especially in EMEs with low inflation, stronger institutions, and well defined creditor rights (see Burger and Warnock 2003, 2006; Eichengreen and Luengnaruemitchai 2006, Claessens, Klingebiel, and Schmukler 2007). The ability to borrow in the local currency is a positive development that enhances financial stability by ameliorating the currency mismatches that were at the center of past crises (Goldstein and Turner 2004). However, large inflows of foreign investment can be problematic, as 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, the threat of the virtuous cycle turning vicious when unconventional monetary policy (UMP) by many advance economy (AE) central banks may have propelled a global search for yield has many EME policymakers worrying about exactly those problems: the erstwhile excessive upward pressure on the local currency and indiscriminate flows into EMEs creating bond market bubbles that might have enabled increasingly risky borrowing being transformed by an external shock (such as a Federal Reserve tightening cycle) that prompts a stampede for the exits.

At this time of uncertainty about the UMPs of AEs and their effects on EME bond markets, we update the analyses of Burger and Warnock (2006) and Burger et al. (2015) in two steps. First, we assess the development of EME bond markets. Second, we view global bond markets from the perspective of a U.S. investor and attempt to understand what drives foreigners' *active* reallocations

towards and away from certain bond markets. We focus in part on LCBMs, which comprise over 90 percent of the global bond market and have far-reaching implications.[1] For example, the original meaning of the US exorbitant privilege came from the ability of the US to borrow internationally through its local currency bonds; that is, even back in the 1960s foreigners tended to purchase US Treasury bonds (that is, US local currency sovereign bonds). Also, the original sin hypothesis of Eichengreen and Hausmann (1999) focused on EMEs' inability to borrow internationally in their own currency; if EMEs can now attract foreign investors to their LCBMs, the Eichengreen and Hausmann (1999) original sin would be alleviated. But foreign currency debt is also very important—the currency mismatches that generated crises in 1980s Latin American, 1990s Asia, and more recently Iceland are one manifestation of excessive reliance on foreign currency debt—so we also analyze foreign-currency-denominated (and in particular USD-denominated) bonds.

We begin by describing some salient features of global bond markets from 2006 to 2015. The structure of EME bond markets has improved dramatically over the past decade, as many EMEs have lessened their reliance on foreign currency bonds. Yes, that trend has reversed slightly alongside AE UMPs, as private sector issuance of foreign-currency denominated bonds has increased, but the share of EME bonds denominated in the local currency is markedly higher than a decade ago. When we analyze determinants of bond market development, we find that local factors matter: Countries with more macroeconomic stability (i.e., lower inflation volatility) and stronger regulatory/creditor rights have larger local currency government bond markets, countries with more positive current account balances have more private bonds (both local currency and foreign currency), and countries with

[1] For this study, a local currency bond is denominated in the currency of the country that the issuer resides, in keeping with residency-based international accounts. A recent focus on the ultimate nationality of the issuer—for example, when a Chinese firm issues a yuan-denominated bond through an off-shore subsidiary (see, for example, McCauley et al 2013)—is relevant but beyond the scope of our study.

stronger regulatory/creditor rights have a higher share of local currency bonds. US conditions matter in a statistical sense—when the non-LSAP portion of US yields was lower and when LSAPs had a larger (negative) effect on US yields, EMEs issued more local currency and foreign currency bonds—but actually explain very little of the variation of bond market development.

We also examine the portfolio reallocations of US investors from 2006 to 2014, a period that spans bubble years, the global financial crisis, currency wars, and unconventional monetary policy. We employ country-level holdings data built from high-quality security-level data collected by the US Treasury, data that include information about the bonds' currency denomination. This dataset allows us to analyze, among other things, the impact of US monetary policy on US investor positions in local currency bonds, a point central to currency war claims. The only other study of *active* portfolio reallocations within international investors' bond portfolios that we know of is our earlier paper (Burger et al 2015, henceforth BSWW); we update that analysis here. On US investors' investment in EME *local currency* bonds, we find increased portfolio weights (relative to benchmark weights) in countries with stronger regulatory/creditor rights and lower inflation volatility, but that the non-LSAP portion of US yields has an even larger effect. In their portfolios of *USD-denominated* EME bonds, global factors are statistically significant but not materially important, as nearly 100% of the variation is accounted for by local factors (such as strong regulatory/creditor rights).

Our paper is related to a number of literatures. On bond market development, it adds to a literature that spans Burger and Warnock (2006), Claessens et al (2007), and many others; this literature is discussed in Section 4. It also adds to the literature international portfolios and global and local factors. Calvo et al. (1993) noted the importance of global factors such as US interest rates in explaining capital inflows. Chuhan et al. (1998) made the important contribution of separating

different types of flows and found that global factors were important in explaining capital inflows, but that country-specific developments were at least as important. Many subsequent papers confirmed the main points of Calvo et al. (1993) and Chuhan et al. (1998), a recent one being Fratzscher (2012) which, using weekly fund flow data, finds that global factors were the main drivers of capital flows in the midst of the recent crisis, but that country-specific determinants were dominant in the years immediately following the crisis. All of these papers use flow data, which as Ahmed et al. (2016) note include a 'portfolio growth' component that is quite directly related to global conditions (such as investor-country financial wealth). Our paper instead focuses on active portfolio reallocations and finds an almost equal role for global and local factors. Our paper is also directly related to past work on international investment in bonds that includes, among others, Lane (2006) and Fidora et al. (2007) and on US investors' local currency bond portfolios (Burger and Warnock 2007; Burger, Warnock, and Warnock 2012).[2] A closely related but separate literature is on cross-border banking flows; see, for example, Blank and Buch (2007) and Hale and Obstfeld (2016).

Our assessment of EME bond markets--their size, structure and international investment in—begins in the next section with a discussion of data considerations. Section 3 describes how we model the Fed's UMP. In Section 4 we describe and assess the evolution of EME markets. In Section 5 we discuss US investors' global bond portfolios and analyze factors, including the Fed's UMP, behind active reallocations within US investors' bond portfolios during the 2006-14 period. Section 6 concludes.

[2] Data availability limited past studies of US investors' foreign bond portfolios to cross-sectional snapshots at a particular point in time. Available time series now enable a study of portfolio reallocations in local currency bond markets over time.

2. Data Considerations

2.1 Data on the Amount of Bonds Outstanding

We require a dataset on outstanding bonds that can identify the currency denomination of the underlying bonds. In the past we have relied on unpublished Bank for International Settlements (BIS) data on outstanding bonds by country and currency, placed both domestically and internationally. Traditionally, the BIS bond data came in two complementary datasets. One data set was on "domestic debt", which the BIS defined as local currency bonds issued by locals in the local market (i.e., not placed directly abroad). Data were available in BIS Quarterly Review Table 16A (Domestic Debt Securities). To focus on bonds (that is, debt securities with original maturity longer than one year), we obtained from BIS the data underlying Table 16A, which allowed us to exclude short-term notes and commercial paper. Consider for example Brazil. A large proportion of Brazilian debt securities are short-term; see Leal and Carvalhal-da-Silva (2008) for a detailed analysis. In the old BIS database, Brazilian debt securities were broken out by maturity (and currency denomination) and showed that as of end-2011 about $1 trillion of its $1.5 trillion in domestic debt securities were short-term (e.g., money market) instruments. Using the old dataset, one can omit Brazilian short-term instruments and focus on Brazilian domestic long-term debt securities (which totaled $0.5 trillion at end-2011).

The other BIS data set was on "international bonds", bonds issued either in a different currency or in a different market. Certain aggregates of this were presented in BIS Quarterly Review Table 14B (International Bonds and Notes by Country of Residence). Again, we obtained the underlying data from BIS so we could identify issuance by currency by country, a split not presented in the Quarterly Review. Combined, the "international bonds" and "domestic debt" (separating the short-term from the long-term) datasets formed a complete picture of the long-term debt securities issued by a country's

government and private sector. And using the now-discontinued BIS data, BSWW was able to include 21 EMEs (and 23 AEs) in its analysis. However, because BIS methodology changed in 2012 (see Gruić and Wooldridge 2012) and the newer data might not be consistent with the historical data, the analysis in BSWW ended in 2011.

For this paper we use the new BIS dataset. In the new data, data on "international bonds" are largely as in the old dataset described above. What differs in the new dataset is that some countries' central banks, when reporting data to BIS, have opted to combine domestic and international debt into one number. We would argue that even for analysis of aggregates this combining of domestic and international hampers analysis. For analysis like ours that explicitly requires splits on currency and maturity—a split that used to be readily available because the international portion was built up from security-level data and the domestic portion was assumed to be denominated in the local currency—combining the two datasets into one number presents a severe limitation. Thus, in this paper we include only those EMEs that provide BIS with information on domestic debt securities by residence, sector of issuer, and original maturity. This limits our analysis to 14 EMEs (as defined by the IMF's "other emerging market and developing countries" classification as of April 2013).[3] Brazil is one country that has to be omitted from our analysis because in the new dataset does not contain information on the split between short- and long-term debt instruments, we exclude Brazil from our analysis.

[3] Details about reporting practices are at http://www.bis.org/statistics/coverage.pdf. The limitation is even greater for advanced economies, many of which do not provide BIS with separately identified domestic debt data. We do not include AEs in this paper.

2.2 Data on International Bond Portfolios

A dataset of international bond portfolios must be able to identify the currency denomination of the underlying bonds, not just the location of the issuer. A local currency Thai baht bond, for example, is a very different security from a Thai-issued US dollar-denominated bond. Only a dataset built from security-level data can identify the currency denomination of the underlying bonds.

It is also desirable 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. Unfortunately, such time series data for a large set of countries does not, to our knowledge, exist. Asian Bonds Online covers 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 all bonds (i.e., issued by government and private entities) 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 for bond analysis it is severely limited in that it lumps together all bonds without differentiating between local currency- and foreign currency-denominated bonds. Because it does not identify the currency denomination of the bonds, the CPIS dataset might reflect a propensity of one country to issue bonds in the currency of another. Note that mutual funds are technically equities. Thus, for countries that do not have well developed mutual fund industries and whose residents might naturally tend to invest in foreign-domiciled mutual funds, in the CPIS data such investment (even if in bond funds) will be entered as equity investment; see Felettigh and Monti (2008).

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. Data on US investors' holdings of foreign 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). Custodians are asked but not mandated to enter information on the type of investor, so in practice the type of investor (e.g., institutional or retail) is not typically identified; where it has been identified the bulk of holdings (90+ percent) are by institutions (mutual funds, pension funds, etc.). 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. 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. For foreign currency bonds we limit our analysis to USD-denominated bonds; US investors' holdings of third-currency bonds (i.e., not USD and not in the currency of the issuer) are extremely small, amounting to only 2.3% of their foreign bond portfolio in 2011.

Focusing on US investors' cross-border bond holdings 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 of the bond is known to the data collector. 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 (and some splits) that are built from the security-level data are available for over 100 countries and provide a clean dataset for year-end 2001 and each year-end since 2006. (By-sector by-currency splits are only available starting 2007.)

2.3 The Working Dataset

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". The dataset also allows us to separately analyze bonds by sector of the issuer (government or private) and by currency denomination (local currency, as noted, but also foreign currency).

Given the above discussion, our working dataset for this paper is an annual dataset of 14 EMEs that spans 2006 to 2015. Analysis of by-sector by-currency splits in international bond portfolios starts in 2007. In this draft, because we do not yet have some end-2015 data, our portfolio analysis will end in 2014. Also, in the portfolio analysis we include a measure of yield (to capture yield-chasing behavior), reducing our sample to 12 countries.

3. Measuring Fed Policy

There are many ways to capture the effect of the Fed's large scale asset purchase programs (LSAPs); see Ahmed and Zlate (2014) for a discussion. For example, indicator variables can be used to mark initial announcements and implementation periods of the first three rounds of LSAPs as documented by Gagnon et al. (2010), Krishnamurthy and Vissing-Jorgensen (2011) and Bauer (2012). See also D'Amico and King (2013), Wright (2012), Hamilton and Wu (2012), Bauer and Rudebusch (2014), Rogers et al (2014) and the Fawley and Neely (2013) narrative account of the LSAPs of four major central banks. Another technique is to use a VAR-based approach to assess the effects of QE; see

Wright (2012), Baumeister and Benati (2013), Gambacorta et al (2014), and Bhattarai, Chatterjee and Park (2015).[4]

We follow the simpler approach of Ahmed and Zlate (2014) and split the 10-year Treasury yield into two components: a yield estimated were there no LSAPs and the component of the yield that may be due to LSAPs. Specifically, in a first-stage regression we regress Treasury yields on one-quarter ahead Fed net asset purchases over the period from 2002:Q4 to 2016:Q2 (since the QE programs were announced ahead of implementation) and compute the LSAP component of yields as beta*LSAPs.[5] The remaining yield is the non-LSAP component. For the period prior to the first QE program, we set the LSAP component to zero. The results suggest that, on average, $100b in LSAPs in a quarter would decrease yields by 37.5 basis points (bps), in line with the Ahmed and Zlate (2014) of 31 bps and roughly consistent with other estimates. For example, the D'Amico and King (2013) event study estimated a persistent downward shift in yields averaging 30bps and the VAR estimates of Bhattarai, Chatterjee and Park (2015) suggest $100 billion in LSAPs would have a 25bps effect on impact. Figure 1 shows the actual 10-year Treasury yield (thick line), our estimate of what the 10-year yield would have been without LSAPs (the thin line), and LSAPs scaled by GDP (bars, right hand scale).

Table 1 shows the resulting two series that enter our annual regressions: an estimate of what the US 10-year yield would have been without LSAPs (10yr_nonLSAP) and the effect of LSAPs on the US

[4] Other work on the international effects of US QE policy include Bhattarai, Chatterjee and Park (2015), Glick and Leduc (2012, 2013), Chen et al (2011), and Bauer and Neely (2013); Eichengreen and Gupta (2015), Aizenman et al (2016), and Bowman et al (2015); Tillmann (2014) estimates of the QE effects on the aggregate data of EMEs; and the Ahmed and Zlate (2014), Ahmed et al. (2016), Dahlhaus and Vasishtha (2014) and Lim et al (2014) analyses of the QE effects on capital flows to EMEs.

[5] LSAP/GDP is defined as changes in the size of Federal Reserve securities holdings (from the Federal Reserve Statistical Release H.4.1) scaled by nominal GDP.

10yr yield. The LSAP effect averages 31bps per year from 2009 through 2014, with peak effects in 2010 and 2013.

4. EME Bond Markets

4.1 Structure of EME Bond Markets

We start by presenting salient features of EME bond markets, focusing specifically on size and structure. Table 2 presents information on the evolution of EME bond markets from 2009 to 2014. So that the table is consistent, we include only the 12 countries that have complete data for these two dates: the Latin American EMEs Chile, Colombia, Mexico, and Peru; Asian EMEs Malaysia, Pakistan, Philippines, and Thailand; and other EMEs Croatia, Russia, South Africa, and Turkey.

For the countries included in the table, from 2009 to 2014 local currency bond markets grew from $1342 billion to $1998 billion. As a percent of local GDP, their size remained steady at about 30%--the increase in size was matched by increases in nominal GDP—although their weight in the global bond market increased from 1.6% to 2.1%.[6] Foreign-currency-denominated bonds for this set of EMEs also increased, from $313 billion in 2009 to $651 billion in 2014, increasing from 7.2% to 9.8% of local GDP and nearly doubling its weight in the global bond market (from 0.4% to 0.7%). Of the foreign-currency-denominated bonds, most are USD denominated (e.g., $557 billion out of $651 billion in 2014).

Splitting EME bonds by currency and sector, Figure 2 shows that most EME bonds are denominated in the local currency (the 1st and 3rd bars are the largest) with somewhat more sovereign

[6] According to data from McKinsey Global Institute, at the end of 2014, the size of global bond markets was $94 trillion, more than triple the $30 trillion in 2001 and a sizeable increase from the $64 trillion in 2006.

(the 3rd bar) than private. Most USD-denominated bonds are now private (bar 2 is larger than bar 4 in 2014), a change since 2009 when sovereign USD bonds were larger. While sovereign local currency bond markets represent the largest sectoral category, there has been strong growth in USD-denominated private bonds.

Figure 3 provides more information on the size and currency composition of EME bond markets. Local currency bond market development—that is, local currency bonds as a percent of GDP—increased smartly since 2006 in Asia and Latin America (but not "other EMEs", which is driven primarily by South Africa). And the local currency share (local currency bonds as a share of all bonds) increased in Asian EMEs but peaked around 2010 in Latin America and "other". Even for those, however, the local currency share, at about 67%, is much higher than in 2001 when it was around 50%. The decline the past few years in local currency share in Latin America and "other" EMEs is primarily due to more private sector foreign currency issuance.

4.2 Analysis of the Determinants of the Size and Structure of EME Bond Markets

Why do some EMEs have larger local currency bond markets than others? According to the "original sin" hypothesis, some economies are just naturally larger than others. Nothing other than sheer size distinguishes one economy from another, and the bond markets of smaller economies would forever be inconsequential. But the evidence is not consistent with this hypothesis. Economies can (and have) put in place institutions and policies that foster the development of debt markets (Burger and Warnock 2006). Economies with better inflation performance (an outcome of creditor-friendly policies) have more developed local bond markets, both private and government, and rely less on foreign currency–denominated bonds. Creditor-friendly laws matter. Stronger rule of law is

associated with deeper local bond markets, and countries with stronger creditor rights are able to issue a larger share of bonds in their local currencies. Many studies corroborate these results; they include La Porta et al. (1997); Claessens, Klingebiel, and Schmukler (2007); Jeanne and Guscina (2006); Eichengreen and Luengnaruemitchai (2006); and Mehl and Reynaud (2005). Claessens, Klingebiel, and Schmukler find that government bond markets are larger in large economies with deeper domestic financial systems, lower inflation, larger fiscal deficits, stronger legal origins, and greater capital account openness. Eichengreen and Luengnaruemitchai find that larger size, stronger institutions, less volatile exchange rates, and more competitive banking sectors tend to be positively associated with bond market capitalization. Burger, Warnock, and Warnock (2012) assessed the size of local currency bond markets in 2008 and, as in previous studies, found that EMEs with lower inflation volatility and stronger legal rights have more developed local bond markets.

We update this analysis in an annual panel dataset spanning the period from 2006 to 2015. We follow Burger and Warnock (2006) and Claessens, Klingebiel, and Schmukler (2007) and analyze three measures of bond market development: the ratio of the size of the local currency bond market to GDP (LC bond market development), the ratio of the size of the foreign currency bond market to GDP (FC bond market development) and the share of the country's outstanding bonds denominated in the local currency (local currency share).

Explanatory variables include the rule of law, creditor rights, the fiscal balance, country size, the growth rate, and inflation volatility. *regcr* 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. We follow the GEMLOC Investability Indicator Methodology (Markit 2013) by

constructing a composite measure with twice the weight on regulatory quality.[7] Originally ranging from 0 to 100, we recast to 0 to 1 for the readability of regression coefficients. *caopen* is a Markit (2013) de jure measure of the openness of a country's local currency bond market to foreign investment, with higher scores indicating that a bond market is more open to cross-border investment. From the update of Markit (2013), we use the November observation of "Capital Control, Convertability, and Access" for each country and year and merge with the BSWW estimates of this measure for 2006 and 2007. We assume top scores (i.e., completely open) for South Korea (which enters the Markit dataset in 2011 with score of 100) and Israel and Singapore (which are not in the Markit sample). We also recast *caopen* to range from 0 to 1. Other independent variables include *ca_gdp* and *fbal* (the current account balance and fiscal balance, both scaled by GDP, from IMF's IFS as reported in Haver Analytics); inflation volatility (*infvol*) computed on a rolling basis using three years of quarterly data (source: authors' calculations from IMF's IFS data as reported in Haver Analytics); *growth* calculated as the three-year average growth rate in real GDP per capita (source: authors' calculations from IMF's IFS data as reported in Haver Analytics); *nomgdp* the log of nominal GDP (in USD); and *usi10_nonlsap* and *usi10_lsap*, the non-LSAP portion and LSAP portions of US 10-year Treasury yields as described in Section 3 and presented in Table 1.

In all, the explanatory variables include measures of whether the laws of the country are creditor friendly (the regulatory quality/creditor rights variable); whether policies have been creditor friendly (inflation volatility); current account and fiscal balances; financial openness; the level of US

[7] 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.

long-term interest rates (the portion not due to LSAPs and the LSAP portion); and controls such as growth and size.

Our estimates, shown in Table 3, use an annual panel dataset that spans the period 2006 to 2015 and includes 14 EMEs. In all, we have 120 observations, as due to data limitations some EMEs enter the panel later than 2006.[8] Dependent variables are, in order, local currency bonds (all, government or private) scaled by GDP; foreign currency bonds (all, government or private) scaled by GDP; and the share of local currency to total bonds (all, government or private). Constants are included but not reported. Estimates are calculated using panel-feasible generalized least squared (FGLS) allowing for heteroskedastic error structures and different autocorrelation coefficients for each country. Wald tests (not reported) show that the explanatory variables are always jointly significant. In Table 3a we include time fixed effects (but not global factors) to capture the impact of global forces on EME bond markets during each year in the sample; coefficients for 2007-2015 are reported and should be interpreted relative to 2006.

Table 3a includes time fixed effects and local variables (but not global variables). Some results in Table 3a are that countries with more macroeconomic stability (i.e., lower inflation volatility) and stronger regulatory/creditor rights have larger local currency government bond markets; countries with more positive current account balances have more bonds (both local currency and foreign currency, and especially private bonds); and countries with stronger regulatory/creditor rights have a higher share of local currency bonds. The time effects are often positive for the amounts of local currency and foreign currency bonds (that is, controlling for other variables EME bond markets have

[8] Eight countries have data for all 10 years. In addition, Chile enters in 2008; Mexico, Pakistan and Croatia in 2009; Hungary in 2010; and India in 2011. We lose 3 observations in the final column of Table 3 because Pakistan had no reported private sector bonds.

become larger) and often negative for the local currency share (controlling for other variables there has been an increase in foreign currency issuance relative to local currency issuance). The impact of size varies across the specifications in Table 3a: Larger countries in our sample have *smaller* bond markets (local currency and foreign currency totals; local currency and foreign currency government bonds; and foreign currency private bonds), larger local currency private bond markets, and overall a larger share of local currency bonds.

When we replace time fixed effects with global push variables (Table 3b), we see that US conditions and policies also matter. As in Table 3a, countries with more macroeconomic stability (i.e., lower inflation volatility) and stronger regulatory/creditor rights have larger local currency government bond markets; countries with more positive current account balances have more foreign currency private bonds; and countries with stronger regulatory/creditor rights have a higher share of local currency bonds. And the impact of size varies across the specifications as it did in Table 3a: larger countries have *smaller* bond markets (local currency and foreign currency totals; local currency and foreign currency government bonds; and foreign currency private bonds), larger local currency private bond markets, and overall a larger share of local currency bonds.

US yields and LSAPs also matter. EME local currency and foreign currency bond markets (especially sovereign but also foreign currency private) increased in size when the non-LSAP portion of US yields was lower and when LSAPs had a larger (negative) effect on US yields. We see no evidence, however, that US rates or LSAPs affect the local currency share of sovereign or private sector bonds.

The results for local currency and foreign currency bonds suggest that US rates and LSAPs affect EME bond issuance, but how much? To gauge the relative importance of the global factors we follow

Bekaert and Wang (2009) and conduct a variance decomposition (VARC) analysis. The relative explanatory power of regressor *x* is computed as:

$$VARC_x = \hat{\beta}_x \frac{\text{cov}(\hat{y}, x)}{\text{var}(\hat{y})} \qquad (0)$$

By construction the VARCs of all the regressors sum to one, therefore the VARC for a particular explanatory variable represents its relative contribution. VARC analysis for columns (1), (4) and (7) of Table 3b suggest that US rates and LSAPs explain very little of the variation in EME bond issuance: for local currency bond market development the non-LSAP and LSAP portions of US rates explain only 5% of the variation; for foreign currency bonds only 1% is explained by US rates; and for the local currency share US rates explain 0%. The non-LSAP and LSAP variables are often significant in bond market development regressions, but their importance is minor compared to local factors.

5. US Investors' International Bond Portfolios

5.1 Analyzing Portfolio Reallocations: Measure and Data

Our aim in this portion of the paper is to assess the factors associated with active portfolio reallocations in global bond markets. Forming a suitable measure of active reallocations is not straightforward. Consider the fact that in 2009 US investors held $13 billion in EME local currency bonds, or 0.99% of the outstanding stock (Table 4).[9] EME local currency bond markets expanded greatly between 2009 and 2014 and if US holdings had increased passively along with the increased size of EME local currency bonds—that is, if US investors maintained a portfolio of 0.99% of the EME local currency bond market, US holdings would have increased to $20 billion over that period. But, in

[9] The data in Table 4, as in Table 2, are for a consistent set of 12 EMEs.

addition to the $7 billion in passive increases, US investors actively reallocated toward EMEs, adding another $44 billion in local currency bond holdings, and by 2014 held 3.2% of the outstanding stock.

To isolate active portfolio reallocations we follow Ahmed et al. (2016) in using a measure called *relative weight*. The relative weight measure, which is simply a country's weight in US investors' portfolio relative to its weight in a benchmark portfolio, is consistent with an international CAPM-based model of international portfolio allocation as presented in Cooper and Kaplanis (1986). That model, described in some detail in Holland et al (2016), 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 therefore provides a theoretical underpinning for our focus on relative weight.

Specifically, country i's relative portfolio weight in US portfolios is the ratio of its weight in US investors' portfolio to its weight in the global market. Relative weight can be defined as:

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

where H_i^{US} is defined as US investors' holdings of country *i*'s bonds and $\sum_i H_i^{US}$ represents the global portfolio of bonds held by US investors, while $MCap_i$ is the market capitalization of country *i*'s bond market and $\sum_i MCap_i$ is the market capitalization of the global bond market.

Relative portfolio weight is, as noted above, motivated by a global CAPM. If the portfolio weight assigned to a particular bond market equals its relative weight in the global bond market, the relative weight for that market is one. In reality, US investors' relative portfolio weights are often far less than one—this is one dimension of the well-known home bias in asset holdings—because over 90 percent of US investors' bond holdings are issued by US entities. That said, when we focus on certain asset classes—such as USD-denominated foreign bonds marketed directly to US investors—relative weights can and sometimes do exceed one.

An additional complication is that if portfolio weights differ from benchmark weights, then changes in relative prices will cause passive deviations from the benchmark. Thus, we use a simple normalization by dividing the relative weight from equation (1) by the relative weight for the home market:

$$norm\,\mathrm{Re}\,lWgt = \frac{\omega_{i,US}}{\omega_{i.m}} / \frac{\omega_{US,US}}{\omega_{US.m}} \qquad (2)$$

This *normalized relative weight* is shown in Ahmed et al (2016) to isolate active portfolio reallocations and is consistent with the Bekaert and Wang (2009) adjustment of scaling by the source country's

home bias. In our panel regressions we use normalized relative weights, although we find that this normalization does not materially impact our results.

5.2 Descriptive Analysis

The EME local currency bond portfolio of US investors has grown dramatically from $13 billion in 2009 to $64 billion in 2014. For the set of countries included in Table 4, EME local currency bonds were 1.6% of the global local currency bond market in 2009 and grew to 2.1% in 2014. US holdings increased even faster. US investors held 0.99% of outstanding EME LC bonds in 2009; this increased to 3.2% by 2014. Because the weight of EME local currency bonds in US portfolios has increased relative to their weight in the global bond market, the relative weight measure for EME local currency bonds in US investors' portfolios has increased significantly over this period, from 0.033 in 2009 to 0.105 in 2014.

Holdings of USD-denominated bonds issued by EMEs are substantially larger at $50 billion in 2009 and increasing to $137 billion by 2014, and US investors hold a higher percentage of outstanding EME USD-denominated bonds (19% in 2009, 24.5% in 2014). Indeed, the weights of EME USD-denominated bonds in US bond portfolios (0.20% in 2009, 0.48% in 2014) are not too dissimilar from their weight in the global bond market (0.3% in 2009, 0.6% in 2014), so US investors' relative weight on EME USD-denominated bonds are closer to one (0.65 in 2009, increasing to 0.80 in 2014).

Figure 4 shows a lot of things. The dollar increase in holdings of local currency EME bonds peaked, but some of the decline is likely due to the appreciation of the dollar. There is near zero US holdings of private local currency EME bonds, but US holdings of private USD-denominated bonds has increased substantially (and increases in holdings of government bonds, whether USD-denominated or

in the local currency, have increased too). Through 2012, the weight of local currency bonds in US investors' bond portfolios increased relative to the share of EME local currency bonds in the global bond market, consistent with the evidence in BSWW, but has since declined. That said, local currency relative weights are much higher than in 2006. For USD-denominated bonds, relative weights on LatAm USD bonds are increasing and greater than one—US investors overweight these bonds relative to their weight in global markets—while relative weights on Asian and Other EME USD bonds are low and non-increasing. Finally, we show US relative weight on US bonds, which is used when we normalize relative weights; it is much higher than one (this is the home bias) and peaked in 2009.

5.3. 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. We use a common framework to analyze the evolution in US investors' country-specific relative portfolio weights—that is, their portfolio weights relative to a global benchmark—in various types of foreign bonds. Our annual panel dataset of US investor relative portfolio weights includes 12 destination countries over the 2006-2014 period.[10] For explanatory variables, we include country-specific "pull" factors such as yield[11] (to proxy for expected return), macroeconomic indicators (GDP growth rate, volatility of inflation, and current account balance), institutional variables, and a proxy for the openness of a country's bond market to foreign investment. For global "push" factors we include the volatility index VIX (which measures variation in expected volatility and risk appetite; we divide VIX by 100 for the readability of regression coefficients), the non-

[10] The number of destination countries is limited not by the holdings data, but by data on the size and composition of bond markets and for explanatory variables.

[11] Yield, expressed in basis points, is the annual average of monthly bond yields (yield-to-maturity from the J.P Morgan GBI indexes). JPMorgan provided yield data through 2013; we gathered 2014 and 2015 data from the Bloomberg.

LSAP portion of the 10-year US Treasury rate (to capture a "reach for yield"), and the LSAP effect on US 10-year yields.

The *macroeconomic indicators* included in our regressions represent factors that likely impact the attractiveness of an economy as a destination for cross-border bond investment. Inflation volatility (calculated as a rolling, trailing 12-quarter standard deviation) is included as a proxy for the uncertainty of ex ante real returns; increased inflation volatility will also lead to more volatile nominal bond yields thus increasing reinvestment risk. We include the current account to GDP ratio to proxy for financial imbalances. A country that runs a current account deficit must attract inflows; if those inflows do not materialize, adverse financial market outcomes (such as currency depreciation and/or a spike in bond rates) are likely. We also include the 3-year average growth rate in real GDP per capita as an indicator of the vigor of the destination economy. Our primary *institutional* variable (our measure of regulatory quality and creditor rights) and our *de jure* measure of the openness of a country's local currency bond market to foreign investment are described in Section 3.

5.3.1 Panel Results for Local Currency Portfolio Reallocations

We present portfolio reallocation results in Tables 5 and 6. We have three versions of the normalized relative portfolio weight dependent variable (equation 2) for local currency bonds and another three for USD-denominated bonds; all relative weights are calculated relative to US investors' global bond portfolios. Dependent variables labeled "all" consider active reallocations of EME bonds (local currency bonds in Table 5, USD-denominated bonds in Table 6), while those labeled "govt" or "pvt" are focused explicitly on EME bonds issued by governments or private entities, respectively. We include either time fixed effects (first 3 columns in Tables 5 and 6), which show the impact of global forces on bond allocations over time without having to specify the precise nature of the global

variables, or specific global "push" factors (last 3 columns in Tables 5 and 6). The time effects capture the impact of global forces on relative bond allocations during each year in the sample; coefficients for 2007-2014 are reported and should be interpreted relative to 2006.

The first 3 columns of Table 5 includes time fixed effects and local variables (but not global variables) and show that US investors actively reallocated toward EME local currency sovereign bonds in countries with stronger regulatory/creditor rights. The time fixed effects show that US allocations toward EME local currency government bonds were significantly higher in the period from 2011 to 2014. When we replace time fixed effects with global push variables (last 3 columns of Table 5), the result that the local currency bond allocations increased in countries with stronger regulatory/creditor rights still holds, and there is evidence of increased allocations towards countries with lower inflation volatility. In addition, US investors' allocations to EME local currency sovereign bonds increased when the non-LSAP portion of 10-year US Treasury yields was lower.

We didn't say anything about reallocations of local currency private bonds in the preceding paragraph. Recall from Figure 4 that US holdings of local currency private bonds are miniscule. And Table 5 columns 3 and 6 show that our factors do not correlate with active reallocations of private sector local currency bonds (other than active reallocations toward private sector local currency bonds that have larger current account deficits), nor are any of the time effects significant.

The results in Table 5 are consistent with the notion that low U.S. Treasury yields (but not LSAPs) pushed US investors into EME local currency sovereign bonds. But some local factors mattered too. To gauge the relative importance of global and local factors we again follow Bekaert and Wang (2009) and conduct a variance decomposition (VARC) analysis. For the model in column 1 of Table 5, we find that 17% of the variation is determined by our local explanatory variables while 83% of the

variation is explained by global factors (as represented by the time fixed effects). Repeating the exercise for column 4 of Table 5 produces a 50/50 split between local and global factors, with inflation volatility and regulatory/credit rights each accounting for 20% of the variation and the US 10-yr Treasury rate (non-LSAP portion) dominating with a VARC of 47%. That is, the classic result of low US rates being associated with a surge in EME investment holds when we focus on EME local currency bonds, providing a plausible channel through which US conditions could have contributed to the appreciation of EME currencies (and also providing support to currency war claims).

5.3.2 Panel Results on USD-denominated Portfolio Reallocations

In Table 6 we analyze portfolio reallocations in USD-denominated bonds. We again include country-level "pull" factors and either time fixed effects (first three columns) or global "push" factors (last three columns). In contrast to the results for local currency bonds, the time fixed effects for USD-denominated bonds are almost always negative or insignificant. Reallocation toward USD-denominated EME bonds occurred in countries with stronger regulatory/creditor rights, slower economic growth, and that are more open. When we include global factors instead of time effects, the results for local factors still hold, and there is evidence that both LSAPs and increases in VIX were associated with reduced allocations of USD sovereign bonds.

To gauge the relative importance of global and local factors we again conduct a variance decomposition analysis, this time for the USD-denominated allocations of columns (1) and (4) of Table 6. For the time effects specification we find that 90% of the variance is explained by local factors, with the most important local variables being regulatory/creditor rights (65%) and openness (20%). Repeating the exercise with specific global factors reveals an even more extreme local-global split: Local factors account for 100% percent of the variation in reallocations of USD-denominated EME

bonds. Again the most important local variables are regulatory/creditor rights (65%) and openness (20%). Global factors, important drivers of the size of EME bond markets and active portfolio reallocations of local currency EME bonds, are statistically significant but not materially important in the active portfolio reallocations of local currency EME bonds.

5.3.3 Portfolio Regressions without differentiating by bonds' currency denomination

In many datasets on portfolio holdings, such as the IMF's CPIS dataset, there is no identification of the currency denomination of the underlying bonds, with USD-denominated and local currency bonds combined in one number. In Table 7 we rerun our normalized relative weight regressions but use as dependent variables data on all bonds (i.e., combining bonds denominated in various currencies). We include an additional independent variable: *usd_share*, the share of the country's bonds denominated in the investor's currency which in this case, as we use data on US investors' portfolios, is the USD.[12] *usd_share* is positive and highly significant, with t-stats of roughly 10, far more significant than any other variable in any of our regressions. While we do not advocate mixing currency denominations in portfolio regressions, if doing so a variable measuring the share of the recipient country's bonds denominated in the investor's currency should be included.

6. Conclusion

The global financial crisis provided a severe test for EME bond markets, but EMEs avoided another round of currency crises and US investors did not blindly flee the newly developed asset class. Advanced economies' unconventional monetary policy is providing another test. Our evidence suggests

[12] *usd_share* is formed specific to the type of bonds. That is, *usd_share* for all bonds is the share of all bonds that is denominated in USD, while for government and private sector bonds it is the share of government and private sector bonds (respectively) that is denominated in USD.

that US investors do not treat EME *local currency bonds* as a homogenous asset class, but rather discriminate among EMEs based on macroeconomic fundamentals such as regulatory quality/creditor rights and inflation volatility. Global factors have had *significant* impacts on EME bond markets and we find evidence of effects on both the development of these markets and on foreign participation. Our empirical results suggest that the post-crisis period of low US interest rates and unconventional monetary policy has been associated with increased issuance of EME bonds and this impact can be seen in the development of local *and* foreign currency denominated bonds. For investor behavior, on US investors' investment in EME local currency bonds we find increased portfolio weights (relative to benchmark weights) in countries with stronger regulatory/creditor rights and lower inflation volatility, but that the non-LSAP portion of US yields has a larger effect. In their portfolios of USD-denominated EME bonds, global factors are statistically significant but not materially important, as nearly 100% of the variation is accounted for by local factors (such as strong regulatory/creditor rights).

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 conditions and risk appetite/expected volatility 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 regulatory/creditor rights and macroeconomic fundamentals. Strong regulatory/creditor rights and macroeconomic conditions should help EMEs attract and retain cross-border investment, which would reinforce a more virtuous cycle in local currency bond markets.

References

Ahmed, S., S. Curcuru, F. Warnock, and A. Zlate, 2016. Decomposing International Portfolio Flows. mimeo.

Aizenman, Joshua, Mahir Binici, and Michael M. Hutchison, 2016. The Transmission of Federal Reserve Tapering News to Emerging Financial Markets. *International Journal of Central Banking* 317-356.

Bauer, Michael D., 2012. Fed asset buying and private borrowing rates. FRBSF Economic Letter 2012-16, May 21.

Bauer, Michael D., and Glenn D. Rudebusch, 2014. The Signaling Channel for Federal Reserve Bond Purchases. *International Journal of Central Banking* 10(3): 233-289.

Bauer, Michael D., and Christopher J. Neely, 2014. International Channels of the Fed's Unconventional Monetary Policy. *Journal of International Money and Finance* 44: 24-46.

Baumeister, Christiane, and Luca Benati, 2013. Unconventional Monetary Policy and the Great Recession: Estimating the Macroeconomic Effects of a Spread Compression at the Zero Lower Bound. *International Journal of Central Banking* 9: 165-212.

Bekaert, G., and X. Wang, 2009, Home bias revisited, unpublished working paper.

Bhattarai, S., A. Chatterjee, and W.Y. Park, 2015. Effects of US Quantitative Easing on Emerging Market Economies. Federal Reserve Bank of Dallas Globalization and Monetary Policy Institute Working Paper No. 255.

Blank, S., and C. Buch, 2007. The Euro and Cross-Border Banking: Evidence from Bilateral Data. *Comparative Economic Studies* 49: 389-410.

Bowman, David, Juan M. Londono, and Horacio Sapriza, 2015. U.S. Unconventional Monetary Policy and Transmission to Emerging Market Economies. *Journal of International Money and Finance* 55: 27-59.

Burger, J., and F. Warnock, 2003. Diversification, Original Sin, and International Bond Portfolios. International Finance Discussion Paper #755, Board of Governors of the Federal Reserve System.

Burger, J., and F. Warnock, 2006. Local Currency Bond Markets. *IMF Staff Papers* 53: 133-146.

Burger, J., and F. Warnock, 2007. Foreign Participation in Local-Currency Bond Markets. *Review of Financial Economics* 16(3): 291-304.

Burger, J., R. Sengupta, F. Warnock, and V. Warnock, 2015. U.S. Investment in Global Bonds: As the Fed Pushes, Some EMEs Pull. *Economic Policy* 30 (84): 729-766.

Calvo, Guillermo, Leonardo Leiderman, and Carmen Reinhart. (1993). "Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors." *IMF Staff Papers* 40(1): 108–151.

Chen, Han, Vasco Curdia, and Andrea Ferrero, 2012. The Macroeconomic Effects of Large-scale Asset Purchase Programmes. *Economic Journal* 122: 289-315.

Chuhan, Punam, Stijn Claessens, and Nlandu Mamingi, 1998. Equity and bond flows to Latin America and Asia: The Role of Global and Country Factors. *Journal of Development Economics* 55(2): 439 - 463.

Claessens, S., D. Klingebiel, and S. Schmukler, 2007. "Government Bonds in Domestic and Foreign Currency: The Role of Institutional and Macroeconomic Factors." *Review of International Economics* 15(2): 370-413.

Cooper, I., and E. Kaplanis, 1986. Costs to crossborder investment and international equity market equilibrium. in J. Edwards, J. Franks, C. Mayer and S. Schaefer (eds.), Recent Developments in Corporate Finance. Cambridge University Press, Cambridge.

Dahlhaus, Tatjana, and Garima Vasishtha, 2014. The Impact of U.S. Monetary Policy Normalization on Capital Flows to Emerging-Market Economies. Bank of Canada Working Paper 2014-53.

D'Amico, Stefania, and Thomas B. King, 2013. Flow and Stock Effects of Large-Scale Treasury Purchases: Evidence on the Importance of Local Supply. *Journal of Financial Economics* 108: 425-448.

Eichengreen, B., and R. Hausmann, 1999. Exchange rates and financial fragility. Proceedings, Federal Reserve Bank of Kansas City, pages 329-368.

Eichengreen, B. and P. Luengnaruemitchai, 2006. "Why Doesn't Asia Have Bigger Bond Markets?" In *BIS Papers No 30: Asian Bond Markets: Issues and Prospects*. Basel, Switzerland: Bank for International Settlements.

Eichengreeen, Barry, and Poonam Gupta, 2015. Tapering Talk: The Impact of Expectations of Reduced Federal Reserve Purchases on Emerging Markets. *Emerging Markets Review* 25: 1–15.

Fawley, Brett W., and Christopher J. Neely, 2013. Four Stories of Quantitative Easing. Federal Reserve Bank of St. Louis Review, Jan/Feb, 51-88.

Felettigh, A., and P. Monti, 2008. How to interpret the CPIS data on the distribution of foreign portfolio assets in the presence of sizeable cross-border positions in mutual funds. Evidence for Italy and the main euro-area countries. Banca d'Italia Occasional Paper No. 16.

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.

Fratzscher, M., 2012. "Capital Flows, Push Versus Pull Factors and the Global Financial Crisis," *Journal of International Economics* 88(2): 341-356.

Forbes, K., and F. Warnock, 2013. "Debt- and Equity-Led Capital Flow Episodes," in *Capital Mobility and Monetary Policy* edited by Miguel Fuentes and Carmen M. Reinhart. Santiago: Central Bank of Chile. Also available as NBER Working Paper No. 18329.

Gagnon, Joseph, Matthew Raskin, Julie Remache, and Brian Sack, 2010. Large-scale asset purchases by the Federal Reserve: did they work? Staff Reports 441, Federal Reserve Bank of New York.

Gambacorta, L., B. Hoffman, and G. Peersman, 2014. The Effectiveness of Unconventional Monetary Policy at the Zero Lower Bound: A Cross-Country Analysis. *Journal of Money, Credit and Banking* 46: 615–642.

Glick, Reuven, and Sylvain Leduc, 2012. Central Bank Announcements of Asset Purchases and the Impact on Global Financial and Commodity Markets. *Journal of International Money and Finance* 31: 2078-2101.

Glick, Reuven, and Sylvain Leduc, 2013. The Effects of Unconventional and Conventional U.S. Monetary Policy on the Dollar. San Francisco Fed Working Paper 2013-11.

Goldstein, M., and P. Turner, 2004. *Controlling Currency Mismatches in Emerging Economies*. Washington, DC: Institute for International Economics.

Gourinchas, P.-O., and M. Obstfeld, 2012. "Stories of the Twentieth Century for the Twenty-First," *American Economic Journal: Macroeconomics* 4(1): 226-65.

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.

Gruić, B., and P. Wooldridge, 2012. Enhancements to the BIS debt securities statistics. BIS Quarterly Review (December, pages 63-76).

Hale, G., and M. Obstfeld, 2016. The Euro and the Geography of International Debt Flows. *Journal of European Economic Association* 14(1): 115-144.

Hamilton, James D., and Cynthia Wu, 2012. The Effectiveness of Alternative Monetary Policy Tools in a Zero Lower Bound Environment. *Journal of Money, Credit, and Banking* 44: 3-46.

Holland, S., S. Sarkissian, M. Schill, and F. Warnock, 2016. Global Equity Investment. Mimeo.

Jeanne, O., and A. Guscina. 2006. Government Debt in Emerging Market Countries: A New Data Set. IMF Working Paper 06/98 (April). Washington DC: International Monetary Fund.

Krishnamurthy, Arvind and Annette Vissing-Jorgensen, 2011. The effects of quantitative easing on interest rates: Channels and implications for policy. Brookings Papers on Economic Activity, Fall.

Lane, P., 2006. Global Bond Portfolios and EMU. *International Journal of Central Banking* 2(2): 1-23.

La Porta, R., F. L.-de-Silanes, A. Shleifer, and R. W. Vishny. 1997. Legal Determinants of External Finance. Journal of Finance 52(3): 1131–50.

Leal, Ricardo P. C., Andre L. Carvalhal-da-Silva, 2008. Development of the Brazilian Bond Market. In Eduardo Borensztein, Kevin Cowan, Barry Eichengreen, and Ugo Panizza (eds.) Bond Markets in Latin America: On the Verge of a Big Bang? MIT Press.

Lim, Jamus Jerome, Sanket Mohapatra, and Marc Stoker, 2014. Tinker, Taper, QE, Bye? The Effect of Quantitative Easing on Financial Flows to Developing Countries. Background paper for *Global Economic Prospects 2014*, Washington, DC: World Bank.

Markit Indices Limited, 2013. "GEMLOC Investability Indicator Methodlogy," February 2013, https://www.markit.com/assets/en/docs/products/data/indices/bond-indices/GEMLOC%20Investability%20Indicator%20Methodology.pdf

McCauley, R., C. Upper, and A. Villar, 2013. Emerging market debt securities issuance in offshore centers. BIS Quarterly Review (September, Box 2).

Mehl, A., and J. Reynaud. 2005. The Determinants of Domestic Original Sin in Emerging Market Economies. ECB Working Paper 560 (December). Frankfurt: European Central Bank.

Mendoza, E. and M. Terrones, 2008. "An Anatomy of Credit Booms: Evidence from Macro Aggregates and Micro Data," NBER Working Paper No. 14049.

Rogers, John H., Chiara Scotti, and Jonathan Wright, 2014. Evaluating Asset-Market Effects of Unconventional Monetary Policy: A Cross-Country Comparison. Federal Reserve IFDP 1101.

Schularick, M., and A. M. Taylor, 2012. "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crises, 1870-2008." *American Economic Review* 102: 1029-61.

Tillmann, Peter, 2014. Unconventional Monetary Policy Shocks and the Spillovers to Emerging Markets. working paper.

U.S. Department of the Treasury, Federal Reserve Bank of New York, and Board of Governors of the Federal Reserve System, 2002. Report on Foreign Portfolio Investment in the United States as of December 31, 2001.

_____ 2009. Report on Foreign Portfolio Investment in the United States as of December 31, 2008.

Wright, Jonathan, 2012. What does Monetary Policy do to Long-term Interest Rates at the Zero Lower Bound? *Economic Journal* 122: F447-F466.

Figure 1. 10-year Treasury Yields and LSAPs

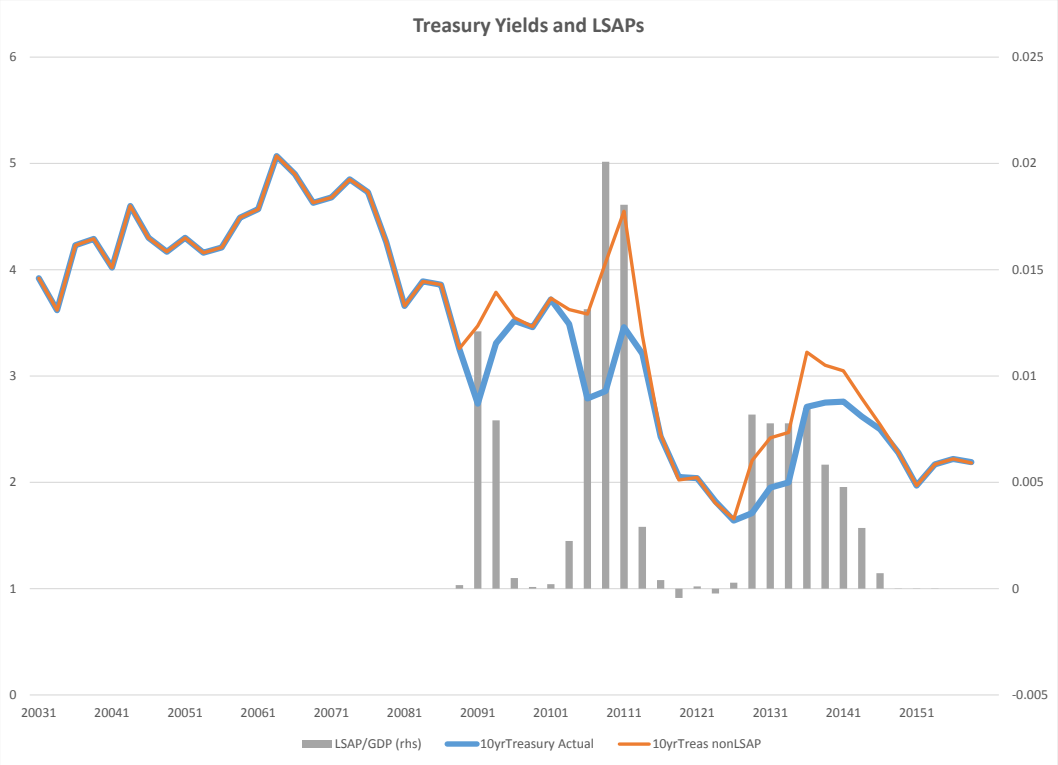


Table 1. 10-year Treasury Yields and LSAPs

	10yr Actual	10yr_nonLSAP	LSAP effect
2006	4.79	4.79	0.00
2007	4.63	4.63	0.00
2008	3.67	3.67	0.00
2009	3.26	3.57	-0.31
2010	3.21	3.75	-0.54
2011	2.79	3.10	-0.32
2012	1.80	1.93	-0.13
2013	2.35	2.80	-0.45
2014	2.54	2.67	-0.13
2015	2.14	2.14	0.00

Table 2. EME Bond Markets

	2009	2014
Size of EME Local Currency Bond Markets		
$ billions	1342	1998
% of GDP	30.7%	30.2%
% of Global Bond Market	1.6%	2.1%
Size of EME Foreign Currency Bond Markets		
$ billions	313	651
% of GDP	7.2%	9.8%
% of Global Bond Market	0.4%	0.7%
Size of EME USD Bond Markets		
$ billions	258	557
% of GDP	5.9%	8.4%
% of Global Bond Market	0.3%	0.6%
Ratio of Local Currency to Total Bonds	81.1%	75.4%

Note: This table and the below figure include data for Chile, Colombia, Mexico, Peru; Malaysia, Pakistan, Philippines, Thailand; and Croatia, Russia, South Africa, and Turkey.

Figure 2

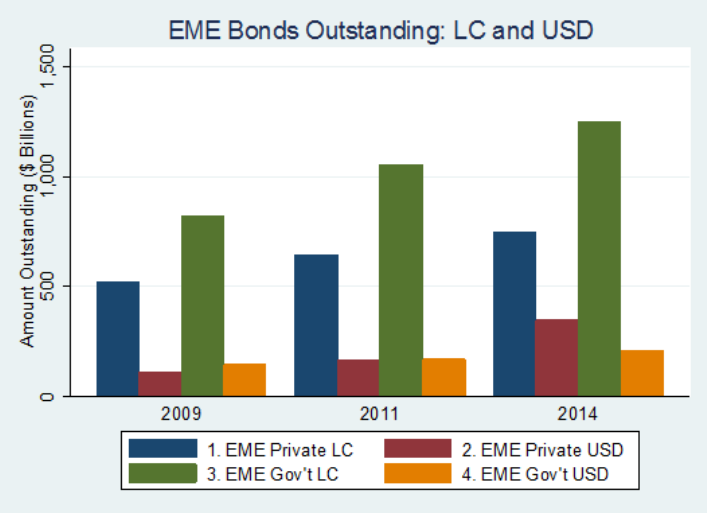
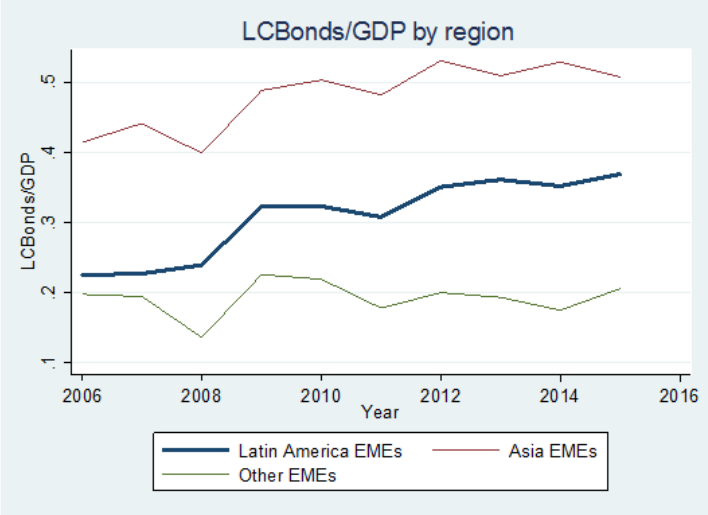
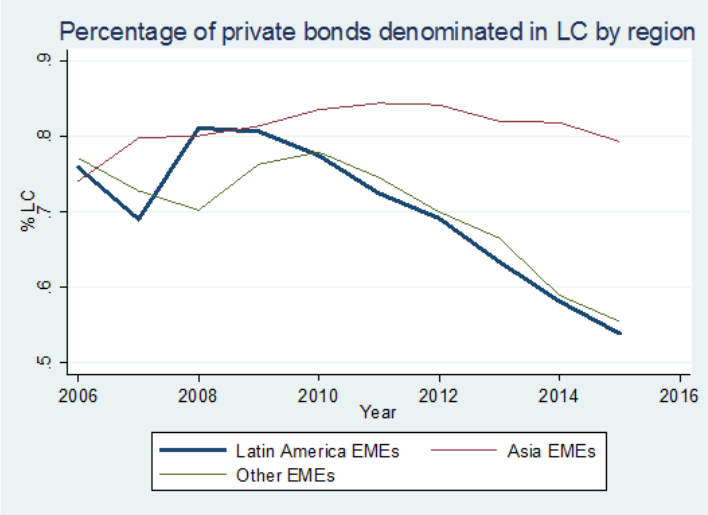
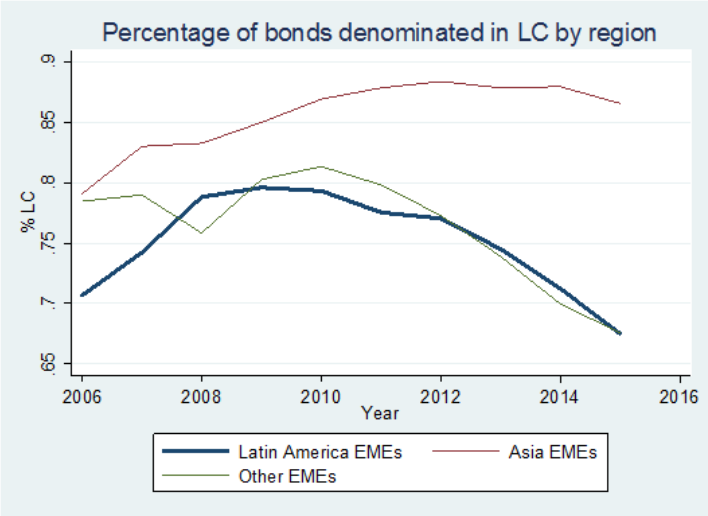


Figure 3. The Structure of Bond Markets







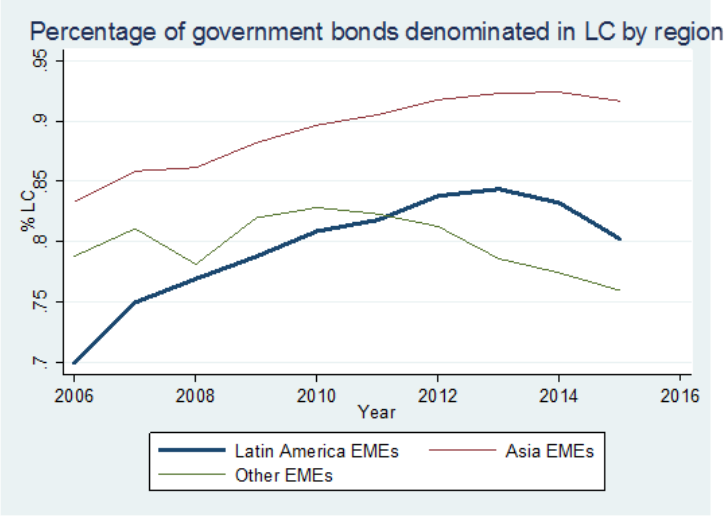


Table 3. Determinants of the Structure of EME Bond Markets

a. With time fixed effects

	LC All	LC Govt	LC Pvt	FC All	FC Govt	FC Pvt	LCShr All	LCShr Govt	LCShr Pvt
fbal	-0.007*	0.000	-0.001	0.001	0.000	-0.000	-0.001	-0.004	0.019**
	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)	(0.005)
cab	0.359*	0.033	0.091**	0.062	0.130*	0.172**	0.106	-0.051	0.387*
	(0.151)	(0.108)	(0.028)	(0.062)	(0.053)	(0.028)	(0.067)	(0.094)	(0.161)
infvol	-1.764*	-1.449**	-0.097	-0.324	-0.352	-0.073	0.400	0.722	-1.934
	(0.687)	(0.495)	(0.225)	(0.250)	(0.208)	(0.131)	(0.431)	(0.510)	(1.069)
growth	0.583	-0.071	-0.286	0.005	-0.006	0.120	0.080	0.118	-1.789**
	(0.425)	(0.335)	(0.159)	(0.155)	(0.130)	(0.078)	(0.267)	(0.343)	(0.654)
nomgdp	-0.102**	-0.068**	0.005*	-0.037**	-0.047**	-0.031**	0.047**	0.063**	0.087**
	(0.009)	(0.008)	(0.002)	(0.007)	(0.005)	(0.003)	(0.011)	(0.011)	(0.009)
regcr	0.237**	0.116**	0.044	0.008	-0.005	0.031*	0.104*	0.204**	0.351**
	(0.057)	(0.043)	(0.030)	(0.026)	(0.020)	(0.015)	(0.048)	(0.069)	(0.109)
caopen	0.014	0.015	0.049*	0.003	0.023	0.023*	-0.001	-0.141**	0.437**
	(0.047)	(0.034)	(0.020)	(0.018)	(0.014)	(0.010)	(0.033)	(0.052)	(0.095)
2007.year	0.021	0.011	-0.000	-0.003	0.003	0.003	0.018*	0.017	-0.020
	(0.014)	(0.010)	(0.007)	(0.005)	(0.004)	(0.003)	(0.008)	(0.014)	(0.024)
2008.year	-0.002	-0.007	-0.007	-0.004	0.011	0.010*	0.009	-0.008	0.011
	(0.020)	(0.014)	(0.009)	(0.008)	(0.006)	(0.005)	(0.013)	(0.020)	(0.035)
2009.year	0.079**	0.051**	0.000	0.009	0.012	0.012	0.011	0.008	0.027
	(0.028)	(0.019)	(0.011)	(0.011)	(0.009)	(0.006)	(0.020)	(0.027)	(0.051)
2010.year	0.114**	0.077**	-0.006	0.014	0.022*	0.020**	0.013	0.014	0.002
	(0.030)	(0.019)	(0.012)	(0.011)	(0.010)	(0.006)	(0.020)	(0.027)	(0.052)
2011.year	0.093**	0.059**	-0.015	0.015	0.025**	0.027**	-0.001	0.020	-0.060
	(0.027)	(0.018)	(0.013)	(0.011)	(0.009)	(0.006)	(0.019)	(0.026)	(0.050)
2012.year	0.127**	0.086**	-0.001	0.029*	0.030**	0.034**	-0.014	0.024	-0.081
	(0.026)	(0.016)	(0.012)	(0.011)	(0.009)	(0.006)	(0.018)	(0.025)	(0.047)
2013.year	0.128**	0.088**	-0.006	0.044**	0.035**	0.046**	-0.038	0.015	-0.129**
	(0.027)	(0.017)	(0.012)	(0.012)	(0.010)	(0.006)	(0.020)	(0.026)	(0.049)
2014.year	0.145**	0.102**	-0.009	0.053**	0.036**	0.053**	-0.059**	0.010	-0.153**
	(0.028)	(0.017)	(0.012)	(0.012)	(0.010)	(0.006)	(0.020)	(0.026)	(0.050)
2015.year	0.129**	0.099**	-0.010	0.072**	0.040**	0.059**	-0.091**	-0.012	-0.179**
	(0.029)	(0.017)	(0.012)	(0.013)	(0.010)	(0.006)	(0.021)	(0.027)	(0.051)
N	120	120	120	120	120	120	120	120	117

* $p<0.05$; ** $p<0.01$

b. With global push factors

	LC All	LC Govt	LC Pvt	FC All	FC Govt	FC Pvt	LCShr All	LCShr Govt	LCShr Pvt
fbal	-0.011**	-0.002	-0.002*	0.000	0.001	-0.000	-0.004*	-0.005*	0.022**
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.005)
cab	0.434**	0.231*	0.061	0.100	0.080	0.160**	-0.009	-0.065	0.262
	(0.151)	(0.107)	(0.034)	(0.075)	(0.047)	(0.034)	(0.078)	(0.095)	(0.191)
infvol	-2.443**	-2.010**	-0.155	-0.354	-0.253	-0.156	0.236	0.068	0.962
	(0.582)	(0.400)	(0.214)	(0.242)	(0.147)	(0.140)	(0.355)	(0.352)	(1.053)
growth	0.405	-0.194	-0.097	-0.061	0.006	0.031	0.089	0.103	-1.309*
	(0.347)	(0.293)	(0.142)	(0.143)	(0.079)	(0.089)	(0.213)	(0.274)	(0.626)
nomgdp	-0.094**	-0.085**	0.009**	-0.052**	-0.036**	-0.024**	0.041**	0.047**	0.095**
	(0.009)	(0.008)	(0.002)	(0.007)	(0.004)	(0.003)	(0.013)	(0.014)	(0.011)
regcr	0.222**	0.090*	0.074**	0.009	0.010	0.025	0.109*	0.147*	0.750**
	(0.060)	(0.044)	(0.026)	(0.029)	(0.017)	(0.016)	(0.050)	(0.061)	(0.109)
caopen	0.059	0.026	0.042*	0.030	0.015	0.027*	-0.024	-0.116*	0.386**
	(0.046)	(0.034)	(0.019)	(0.019)	(0.011)	(0.012)	(0.033)	(0.050)	(0.102)
usi10_nonlsap	-0.029**	-0.027**	-0.002	-0.011**	-0.005*	-0.006**	0.002	0.000	0.020
	(0.007)	(0.005)	(0.003)	(0.004)	(0.002)	(0.002)	(0.006)	(0.007)	(0.013)
usi10_lsap	-0.091**	-0.076**	0.000	-0.017	-0.014*	-0.012	-0.004	-0.009	0.006
	(0.023)	(0.017)	(0.009)	(0.012)	(0.007)	(0.006)	(0.016)	(0.019)	(0.047)
N	120	120	120	120	120	120	120	120	117

* $p<0.05$; ** $p<0.01$

The annual panel spans the period 2006 to 2015 and includes 14 EMEs. Because of data limitations, some EMEs enter the panel later than 2006. In Panel A, time fixed effects are included and independent variables are, in order, in order, local currency bonds (all, government or private) scaled by GDP; foreign currency bonds (all, government or private) scaled by GDP; and the share of local currency to total bonds (all, government or private). Independent variables are, in order, fiscal balance (scaled by GDP), current account balance (scaled by GDP), inflation volatility, real GDP growth, the size of the local economy (calculated as the log nominal GDP in USD), our Regulatory/Creditor Rights variable, and openness. In Panel B, the time fixed effects are replaced by global variables (the non-LSAP portion of US 10-year Treasury yields and the LSAP effect on US 10-year Treasury yields). Constants are included but not reported. Estimates are calculated using panel-feasible generalized least squared (FGLS) allowing for heteroskedastic error structures and different autocorrelation coefficients within countries. P-values are reported in parentheses. ** and * denote significance at the 1% and 5% levels, respectively. Wald tests (not reported) show that the explanatory variables are always jointly significant.

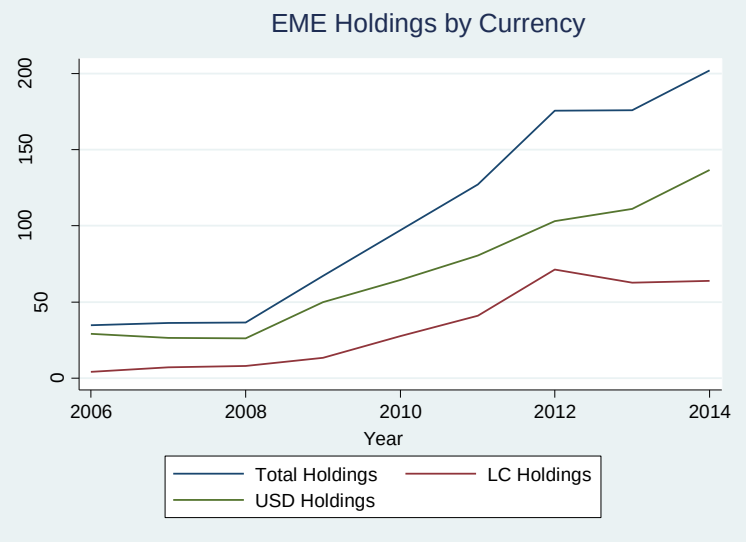
Table 4. US Portfolios of EME Bonds

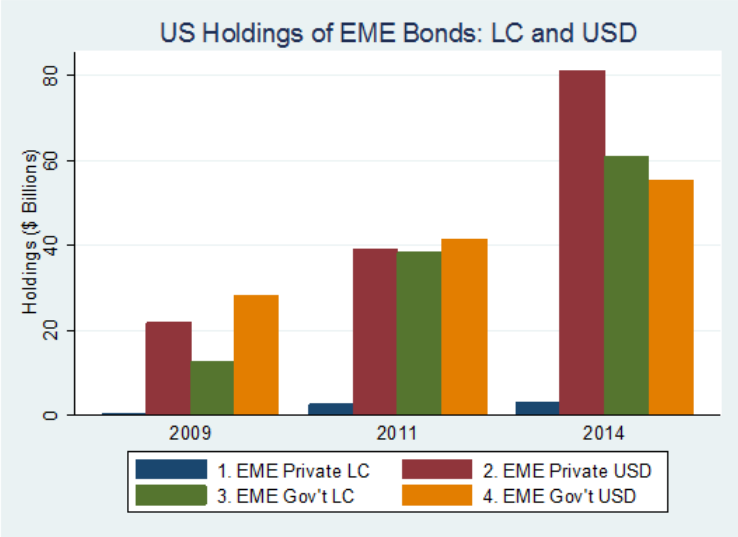
	2009	2014
Size of EME Local Currency Bond Markets		
$ billions	1342	1998
% of GDP	30.7%	30.2%
% of Global Bond Market	1.6%	2.1%
Size of EME Foreign Currency Bond Markets		
$ billions	313	651
% of GDP	7.2%	9.8%
% of Global Bond Market	0.4%	0.7%
Size of EME USD Bond Markets		
$ billions	258	557
% of GDP	5.9%	8.4%
% of Global Bond Market	0.3%	0.6%
Ratio of Local Currency to Total Bonds	81.1%	75.4%

	2009	2014
US Holdings of EME Local Currency Bonds		
$ billions	13	64
% of local bonds	0.99%	3.20%
% of US bond portfolio	0.05%	0.22%
RelWgt	0.033	0.105
US Holdings of EME Foreign Currency Bonds		
$ billions	54	138
% of local bonds	17.2%	21.2%
% of US bond portfolio	0.21%	0.48%
RelWgt	0.575	0.694
US Holdings of EME USD Bonds		
$ billions	50	137
% of local bonds	19.4%	24.5%
% of US bond portfolio	0.20%	0.48%
RelWgt	0.647	0.804

Notes. For ease of comparison, the left half of this table is identical to Table 2. This table, and the below Figure 3, includes data for Chile, Colombia, Mexico, Peru; Malaysia, Pakistan, Philippines, Thailand; and Croatia, Russia, South Africa, and Turkey.

Figure 4. US Investors' Portfolio in EME Bonds





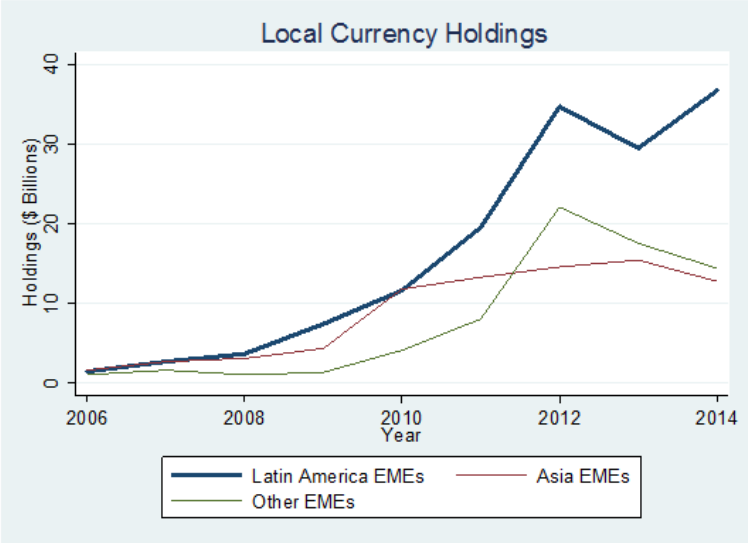
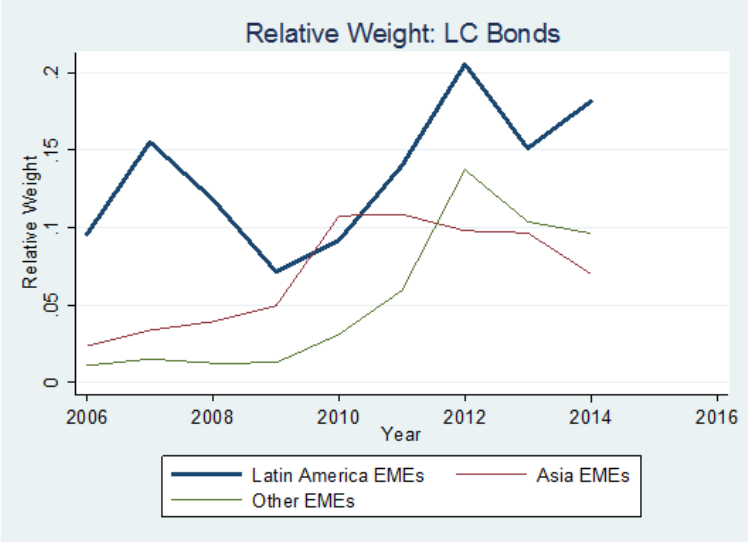
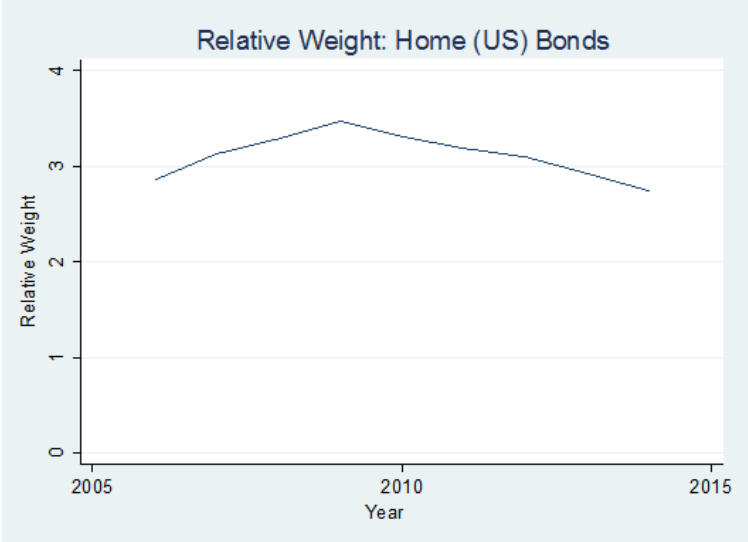


Figure 4 (continued)





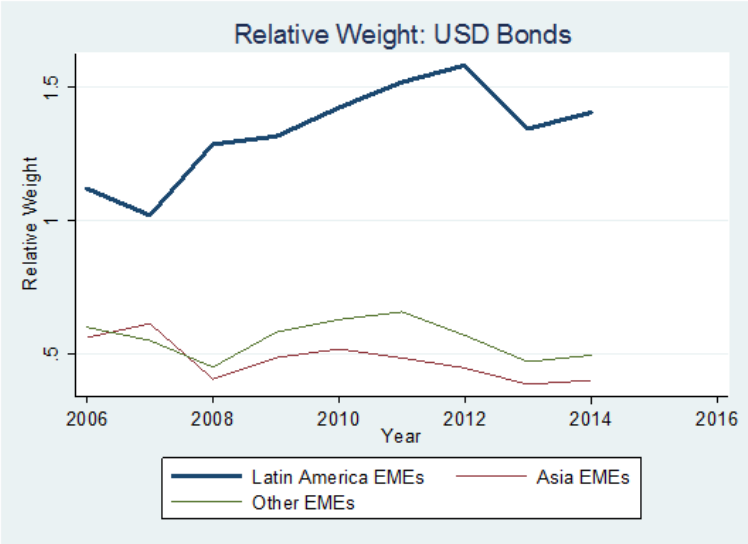


Table 5. Determinants of Active Reallocations in US Investors' EME Local Currency Bond Portfolios

The annual panel spans the period 2006 to 2014 (from 2007 for sectoral splits) and includes 12 EMEs. Because of data limitations, some EMEs enter the panel later than 2006. Dependent variables are normalized relative weights for local currency bonds (all bonds, government bonds, private bonds). Independent variables are, in order, current account balance (scaled by GDP), inflation volatility, yield, real GDP growth, our Regulatory/Creditor Rights variable, openness and either time fixed effects (first three columns) or global variables (the non-LSAP portion of US 10-year Treasury yields, the LSAP effect on US 10-year Treasury yields, and VIX). Constants are included but not reported. Estimates are calculated using panel-feasible generalized least squared (FGLS) allowing for heteroskedastic error structures and different autocorrelation coefficients within countries. P-values are reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. Wald tests (not reported) show that the explanatory variables are always jointly significant.

	Norm LC all	Norm lc_govt	Norm lc_pvt	Norm LC all	Norm lc_govt	Norm lc_pvt
cab	0.020	0.157**	0.469	-0.028	0.091	0.030
	(0.045)	(0.064)	(0.977)	(0.044)	(0.067)	(0.632)
infvol	-0.132	-0.410	-0.266	-0.632***	-0.997***	-1.030
	(0.259)	(0.457)	(8.318)	(0.236)	(0.376)	(4.273)
yield	0.066	0.209	3.695	-0.030	0.091	0.852
	(0.107)	(0.144)	(2.950)	(0.109)	(0.137)	(2.169)
growth	-0.235*	-0.303	5.102	-0.103	-0.112	1.712
	(0.136)	(0.212)	(3.395)	(0.102)	(0.164)	(2.021)
regcr	0.033*	0.094***	-0.022	0.041***	0.110***	-0.302
	(0.018)	(0.025)	(0.494)	(0.016)	(0.023)	(0.433)
caopen	-0.003	0.040*	-1.247***	-0.003	0.037*	-0.926**
	(0.013)	(0.021)	(0.401)	(0.014)	(0.021)	(0.384)
2007.year	0.006					
	(0.004)					
2008.year	0.007	0.005	0.068			
	(0.006)	(0.008)	(0.204)			
2009.year	-0.000	0.001	0.150			
	(0.008)	(0.013)	(0.250)			
2010.year	0.011	0.024*	0.155			
	(0.009)	(0.014)	(0.246)			
2011.year	0.030***	0.041***	0.153			
	(0.008)	(0.011)	(0.219)			
2012.year	0.042***	0.060***	0.091			
	(0.007)	(0.010)	(0.198)			
2013.year	0.035***	0.050***	0.174			
	(0.007)	(0.011)	(0.216)			
2014.year	0.033***	0.045***	0.191			
	(0.008)	(0.011)	(0.229)			
usi10_nonlsap				-0.010***	-0.016***	-0.000
				(0.002)	(0.004)	(0.042)
usi10_lsap				-0.014	-0.024	-0.073
				(0.010)	(0.017)	(0.191)
vix_eoy				0.016	-0.010	0.072
				(0.020)	(0.039)	(0.530)
N	88	82	82	88	82	82

Table 6. Determinants of Active Reallocations in US Investors' EME USD-denominated Bond Portfolios

The annual panel spans the period 2006 to 2014 (from 2007 for sectoral splits) and includes 12 EMEs. Because of data limitations, some EMEs enter the panel later than 2006. Dependent variables are normalized relative weights for USD-denominated bonds (all bonds, government bonds, private bonds). Independent variables are, in order, current account balance (scaled by GDP), inflation volatility, yield, real GDP growth, our Regulatory/Creditor Rights variable, openness and either time fixed effects (first three columns) or global variables (the non-LSAP portion of US 10-year Treasury yields, the LSAP effect on US 10-year Treasury yields, and VIX). Constants are included but not reported. Estimates are calculated using panel-feasible generalized least squared (FGLS) allowing for heteroskedastic error structures and different autocorrelation coefficients within countries. P-values are reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. Wald tests (not reported) show that the explanatory variables are always jointly significant.

	Norm USD all	Norm usd_govt	Norm usd_pvt	Norm USD all	Norm usd_govt	Norm usd_pvt
cab	-0.199	0.482	-1.427**	-0.412**	0.329	-1.653**
	(0.196)	(0.335)	(0.709)	(0.191)	(0.333)	(0.680)
infvol	-2.556**	0.700	-3.054	-0.801	-0.161	-1.882
	(1.023)	(1.322)	(3.935)	(0.781)	(1.197)	(2.643)
yield	-0.723**	-0.384	0.154	-0.896***	-0.662	0.266
	(0.330)	(0.473)	(1.514)	(0.331)	(0.488)	(1.441)
growth	0.278	-1.466**	-3.683**	-0.550*	-1.416***	-3.898***
	(0.396)	(0.668)	(1.698)	(0.304)	(0.426)	(1.291)
regcr	0.471***	0.397***	0.436*	0.429***	0.345***	0.533**
	(0.058)	(0.092)	(0.240)	(0.061)	(0.093)	(0.221)
caopen	0.206***	-0.031	-0.022	0.171***	-0.021	-0.068
	(0.051)	(0.087)	(0.165)	(0.050)	(0.087)	(0.151)
2007.year	-0.028					
	(0.018)					
2008.year	-0.045*	-0.129***	0.029			
	(0.023)	(0.030)	(0.086)			
2009.year	-0.017	-0.110**	-0.055			
	(0.030)	(0.049)	(0.107)			
2010.year	-0.013	-0.129**	-0.089			
	(0.032)	(0.055)	(0.115)			
2011.year	-0.016	-0.047	-0.113			
	(0.029)	(0.047)	(0.096)			
2012.year	-0.046*	-0.008	-0.082			
	(0.026)	(0.035)	(0.088)			
2013.year	-0.075***	-0.080**	-0.138			
	(0.029)	(0.038)	(0.092)			
2014.year	-0.041	-0.030	-0.094			
	(0.031)	(0.040)	(0.093)			
usi10_nonlsap				0.012*	0.001	0.026
				(0.007)	(0.012)	(0.029)
usi10_lsap				0.115***	0.218***	0.202
				(0.029)	(0.054)	(0.126)
vix_eoy				-0.120*	-0.480***	0.141
				(0.068)	(0.126)	(0.329)
N	88	72	82	88	72	82

Table 7. Determinants of Active Reallocations in US Investors' EME Bond Portfolios

The annual panel spans the period 2006 to 2014 (from 2007 for sectoral splits) and includes 12 EMEs. Because of data limitations, some EMEs enter the panel later than 2006. Dependent variables are normalized relative weights for EME bonds (all bonds, government bonds, private bonds). Independent variables are, in order, the share of the EME's bonds denominated in USD (specific to the dependent variable), current account balance (scaled by GDP), inflation volatility, yield, real GDP growth, our Regulatory/Creditor Rights variable, openness and either time fixed effects (first three columns) or global variables (the non-LSAP portion of US 10-year Treasury yields, the LSAP effect on US 10-year Treasury yields, and VIX). Constants are included but not reported. Estimates are calculated using panel-feasible generalized least squared (FGLS) allowing for heteroskedastic error structures and different autocorrelation coefficients within countries. P-values are reported in parentheses. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. Wald tests (not reported) show that the explanatory variables are always jointly significant.

	Norm all all	Norm all govt	Norm all pvt	Norm all all	Norm all govt	Norm all pvt
usd_share	0.340***	0.255***	0.039***	0.333***	0.251***	0.035***
	(0.024)	(0.021)	(0.005)	(0.024)	(0.022)	(0.005)
cab	-0.082	0.033	0.018	-0.118**	-0.026	-0.032
	(0.053)	(0.040)	(0.037)	(0.055)	(0.038)	(0.028)
infvol	0.133	0.097	-0.290**	-0.131	-0.223	-0.222**
	(0.282)	(0.252)	(0.145)	(0.233)	(0.216)	(0.089)
yield	-0.042	-0.053	-0.207***	-0.127	-0.139	-0.194***
	(0.099)	(0.089)	(0.063)	(0.091)	(0.092)	(0.048)
growth	-0.225	-0.211*	-0.038	-0.274***	-0.233**	-0.096**
	(0.140)	(0.118)	(0.091)	(0.105)	(0.095)	(0.044)
regcr	0.062***	0.043***	0.043***	0.058***	0.051***	0.024***
	(0.020)	(0.016)	(0.011)	(0.019)	(0.016)	(0.008)
caopen	0.018	0.010	0.009	0.018	0.003	0.006
	(0.015)	(0.013)	(0.009)	(0.015)	(0.014)	(0.007)
2007.year	0.005					
	(0.005)					
2008.year	-0.001	-0.006	0.004			
	(0.006)	(0.005)	(0.003)			
2009.year	-0.006	-0.005	-0.001			
	(0.009)	(0.007)	(0.005)			
2010.year	0.000	0.004	0.000			
	(0.009)	(0.008)	(0.006)			
2011.year	0.016**	0.017***	0.003			
	(0.008)	(0.006)	(0.005)			
2012.year	0.023***	0.028***	0.002			
	(0.007)	(0.006)	(0.004)			
2013.year	0.009	0.021***	0.001			
	(0.008)	(0.006)	(0.005)			
2014.year	0.017**	0.024***	0.010**			
	(0.008)	(0.006)	(0.005)			
usi10_nonlsap				-0.005**	-0.008***	0.001
				(0.002)	(0.002)	(0.001)
usi10_lsap				0.020**	0.006	0.008**
				(0.010)	(0.010)	(0.004)
vix_eoy				-0.012	-0.046**	0.014
				(0.020)	(0.022)	(0.011)
N	88	82	82	88	82	82