The Effects of Fed Policy on EME Bond Markets

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LOYOLA
UNIVERSITY MARYLAND

Outline of presentation

- Research questions
- A preview of results
- Data
- How we capture an LSAP effect
- Findings
  - Bond Markets: Size and Currency Composition
  - International Bond Portfolios
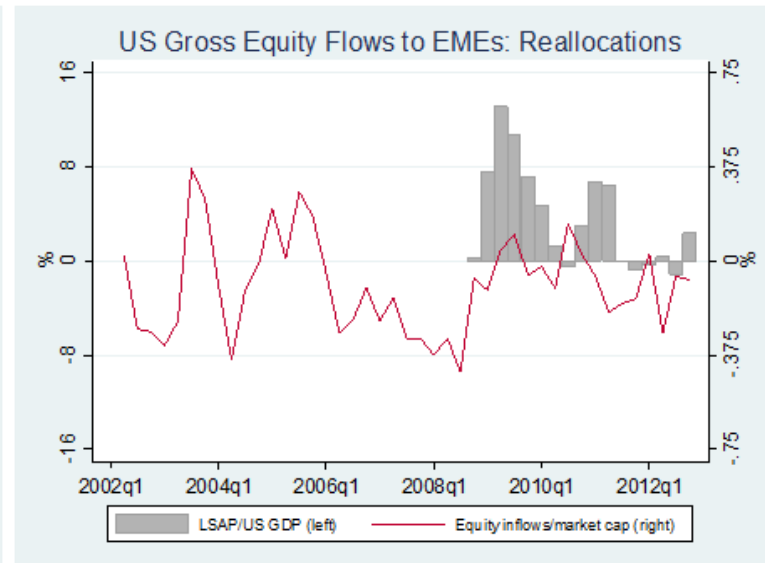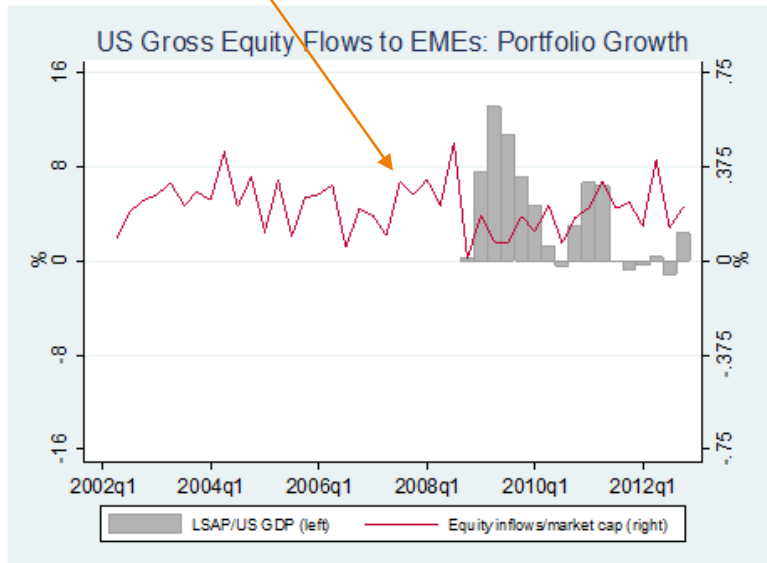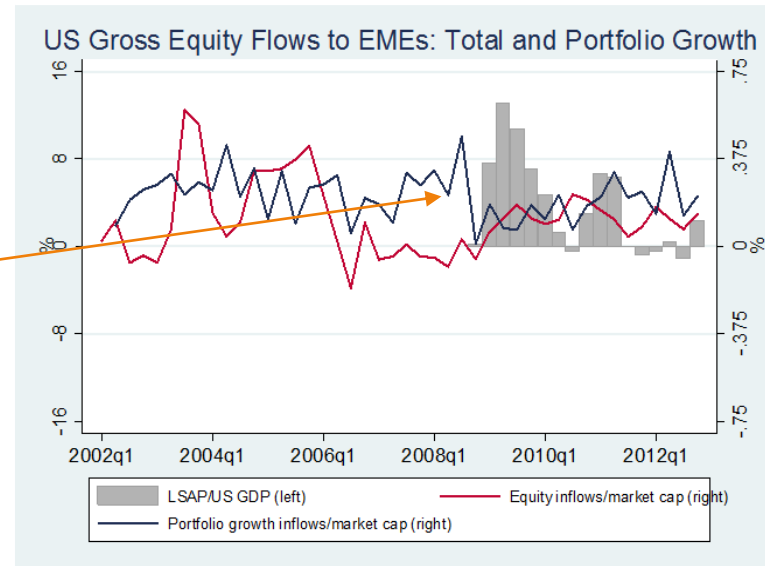- Conclusion

Research questions

- Main Question: What is the effect of the U.S. Federal Reserve's large scale asset purchases (LSAPs) on EME bond markets?

  - We address this in two ways using a 2006-2015 annual panel of 14 EMEs
    - Has the size and currency composition of EME bond markets changed because of Fed LSAPs?
    - Have Fed LSAPs led to <u>active</u> reallocations toward EME bonds within the bond portfolios of US investors?

    - (We don't examine the effect of LSAPs on EME yields…just on size, currency composition, and US investment.)

What we do in this paper

- Bond Market Development
  - Use BIS data on outstanding bonds to
    - Describe some salient features of EME bond markets from 2006 to 2015.
    - Analyze the determinants of local and foreign currency bond market development.
      - Others (including us) have done this type of analysis before, but it's useful to revisit and update.

- The Active Portfolio Reallocations of US Investors
  - Use US Treasury country-level holdings data (built from high-quality security-level data) to
    - Examine US investors' active portfolio reallocations of local currency and USD-denominated EME bonds from 2006 to 2014, a period that spans bubble years, the global financial crisis, currency wars, and unconventional monetary policy.
      - 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.

- In both, we'll include a simple measure of the non-LSAP and LSAP portions of US 10-year yield.

In the investments analysis, why the focus on <u>active</u> portfolio reallocations?

US Gross Equity Flows to EMEs: Total and Portfolio Growth

Portfolio Growth Flows

US Gross Equity Flows to EMEs: Portfolio Growth

US Gross Equity Flows to EMEs: Reallocations

Because, as discussed in some detail in Ahmed, Curcuru, Warnock and Zlate (2016), capital flows can have a sizeable "portfolio growth" component that has nothing to do with the recipient country.

In this paper we focus on active reallocations (defined more precisely later).

These figures are of equity flows and are from Ahmed et al (2016).

Preview of findings (1)

- On the size and currency composition 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 these global factors explain very little of the variation in EME bond issuance. 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.

Preview of findings (2)

- On US investors' active portfolio reallocations
    - 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 here US yields (the non-LSAP portion) have a larger effect.
    - In USD-denominated EME bonds, nearly 100% of the variation active reallocations is accounted for by local factors (such as strong regulatory/creditor rights). Global factors are statistically significant but not materially important.

- Summary of bond market development and portfolio results:
    - US conditions matter, but most of the variation in bond market development (i.e., the size and currency composition) is from local factors. The one place where US yields really matter (i.e. in more than just a statistical sense) is in US investors' portfolios: US investors actively reallocated toward EME local currency bonds when US yields (the non-LSAP portion) were lower.

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Data on EME bond markets:
size, currency composition and international investment

It's vital to use appropriate data when analyzing bonds

- The data must include information on the currency denomination of the underlying bonds.
    - From both the issuer's and investor's perspectives, a local currency Thai baht bond is a very different security from a Thai-issued US dollar-denominated bond.
- We also like to separate short-term debt securities (e.g., commercial paper) from long-term (i.e., greater than one year in original maturity) debt securities (which we'll call "bonds").

These two considerations point us toward BIS data on bonds and US Treasury data on int'l holdings.

Unfortunately, BIS bonds data severely limits the sample.

BIS data coverage on domestic bonds by maturity

Countries	All issuers				
	Dec 2011	Dec 2012	Dec 2013	Dec 2014	Mar 2015
Argentina	...	...	...	...	...
Australia	951.1	1,083.8	991.5	1,081.4	1,052.2
Belgium	...	...	...	...	...
Brazil	...	...	...	...	...
Canada	1,221.3	1,351.7	1,381.4	1,328.6	1,239.8
China	...	...	...	...	...
Chinese Taipei	227.8	260.8	271.7	276.2	279.2
Chile	114.4	134.1	131.4	129.5	127.1
Colombia	80.6	90.6	95.0	82.6	76.7
Czech Republic	...	...	...	...	...
France	...	...	...	...	...
Germany	...	...	...	...	...
Hong Kong SAR	...	...	...	...	...
Hungary	41.7	54.6	57.4	58.1	55.4
India	462.3	547.8	564.6	611.0	632.6
Indonesia	...	...	...	...	...
Israel	104.7	121.6	136.8	127.2	128.5
Italy	...	...	...	...	...
Japan	13,204.1	12,182.8	10,426.3	9,549.8	9,572.4
Korea	1,027.4	1,193.5	1,309.6	1,324.7	1,336.3
Malaysia	233.1	279.5	283.2	288.0	275.2
Mexico	364.9	441.6	497.5	492.1	493.5
Netherlands	...	...	...	...	...
Peru	18.1	19.7	18.6	18.5	18.0
Philippines	60.4	75.7	80.2	80.3	80.8
Poland	...	...	...	...	...
Russia	207.3	256.5	284.5	188.5	207.1
Saudi Arabia	36.0	26.3	20.0	11.8	10.5
Singapore	61.0	67.5	68.0	68.2	66.8
Spain	...	...	...	...	...
South Africa	162.1	187.8	172.5	175.3	171.3
Switzerland	185.2	189.1	204.9	194.9	203.2
Thailand	189.7	222.5	210.1	228.9	246.4
Turkey	197.2	220.0	195.1	186.1	168.0
United Kingdom	...	...	...	...	...
United States	...	...	...	...	...

BIS Debt Securities Statistics Table 17B: Domestic bonds and notes: Long-term at original maturity, amounts outstanding by sector and residence of issuer (in billions of US dollars)

If a country has … here, we can't include it in our working sample.

The coverage used to be much better.

EME bond markets:
size, currency composition and international investment

Would like time series data on all foreign holdings, but it doesn't exist so we settle on the holdings of a particular set of investors (US investors). Boilerplate follows.

- From annual comprehensive benchmark surveys conducted by the Treasury Department, Board of Governors of the Federal Reserve System, and the Federal Reserve Bank of New York. 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.
  - 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 the primary source of information, typically reporting about 97 percent of total US holdings of foreign long-term securities. 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. Data at the security-level so 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).

EME bond markets:
size, currency composition and international investment

To summarize, the data we use:

- Bond Markets: annual dataset of 14 EMEs (as defined by IMF) from 2006 to 2015.
  - Latin America: Chile (2008-), Colombia, Mexico, and Peru
  - Asia: India (2011-), Malaysia, Pakistan (2009-), Philippines, and Thailand
  - Other: Croatia (2009-), Hungary (2010-), Russia, South Africa, and Turkey
    - We could include Korea and possibly Israel if we use the BIS list of EMEs.

- Portfolio analysis: annual dataset of US investment in 12 EMEs from 2006 to 2014.
  - We lose two countries (PK, PH) due to coverage for some explanatory variables.
  - For now our portfolio analysis ends in 2014, although 2015 holdings data were released last week. We'll add 2015 data once we get a simple but surprisingly tough to find number...the size of the global bond market at end-2015.

- Our panel regressions are unbalanced and for 2006 (or 2007) to 2014 (or 2015). Most descriptive graphs and tables are for 2009-2014 and include a common set of countries that have data for that period.

Measuring the Effect of Fed Policy

- There are many methods to capture the effects of the large scale asset purchase programs (LSAPs). See Ahmed and Zlate (2014) and Bhattarai, Chatterjee and Park (2015) for discussions.

  - Papers that examine the effects of LSAPs include but are not limited to the following: Gagnon et al. (2010), Krishnamurthy and Vissing-Jorgensen (2011) and Bauer (2012); D'Amico and King (2013), Wright (2012), Hamilton and Wu (2012), Bauer and Rudebusch (2014), Rogers et al (2014); Baumeister and Benati (2013), Gambacorta et al (2014), 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); and Ahmed and Zlate (2014), Ahmed et al. (2016), Dahlhaus and Vasishtha (2014) and Lim et al (2014).

Measuring the Effect of Fed Policy

- We follow the simple Ahmed and Zlate (2014) approach of splitting 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, we regress 10-year US Treasury yields on one-quarter ahead (since the QE programs were announced ahead of implementation) Fed purchases of Treasury bonds (scaled by GDP) over the period from 2002:Q4 to 2016:Q2 and compute the LSAP component of yields as beta*LSAPs. 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 of this simple regression 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.

Decomposition of 10-year US Treasury Yield into non-LSAP and LSAP portions

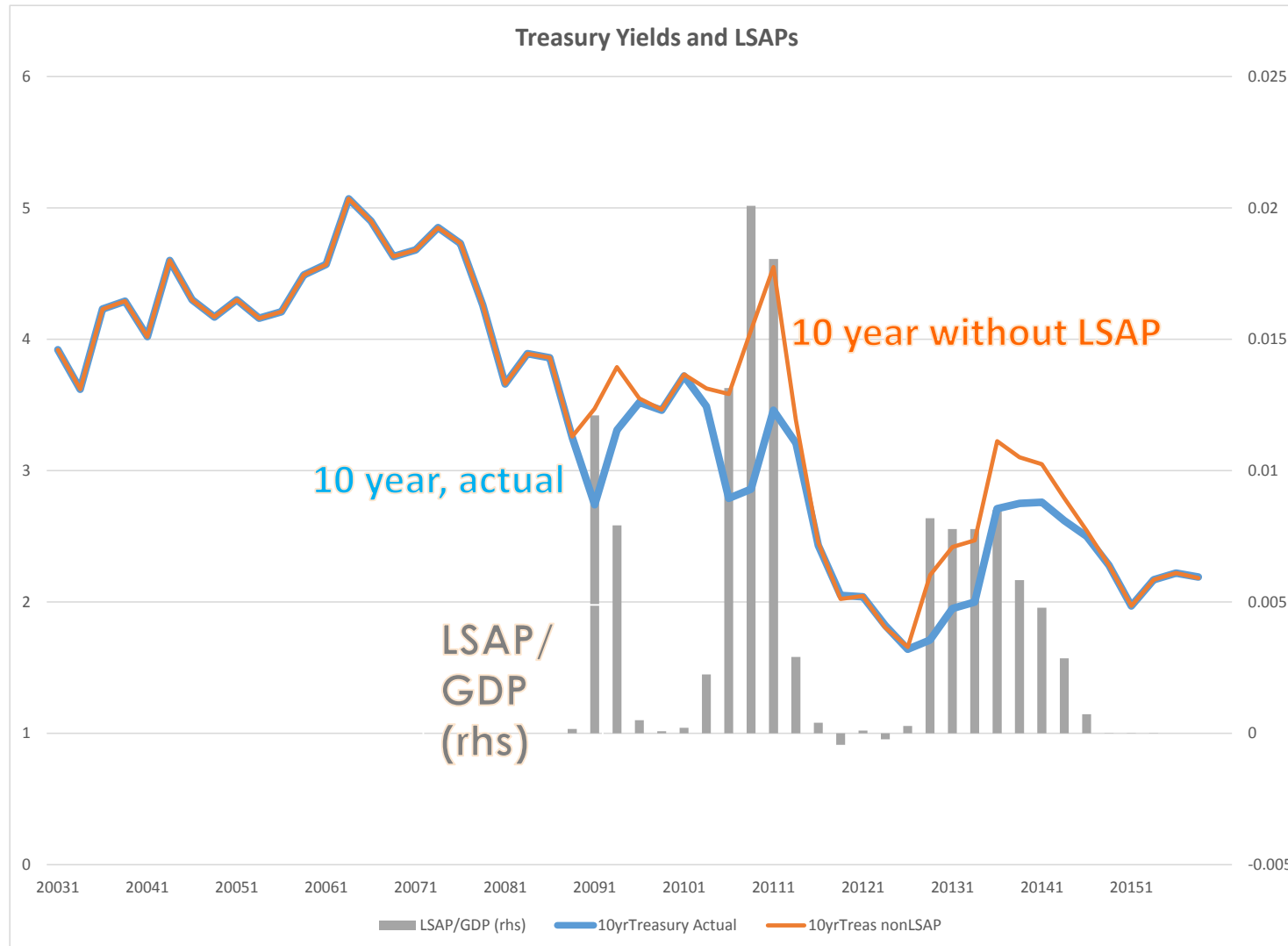Figure 1. 10-year Treasury Yields and LSAPs

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

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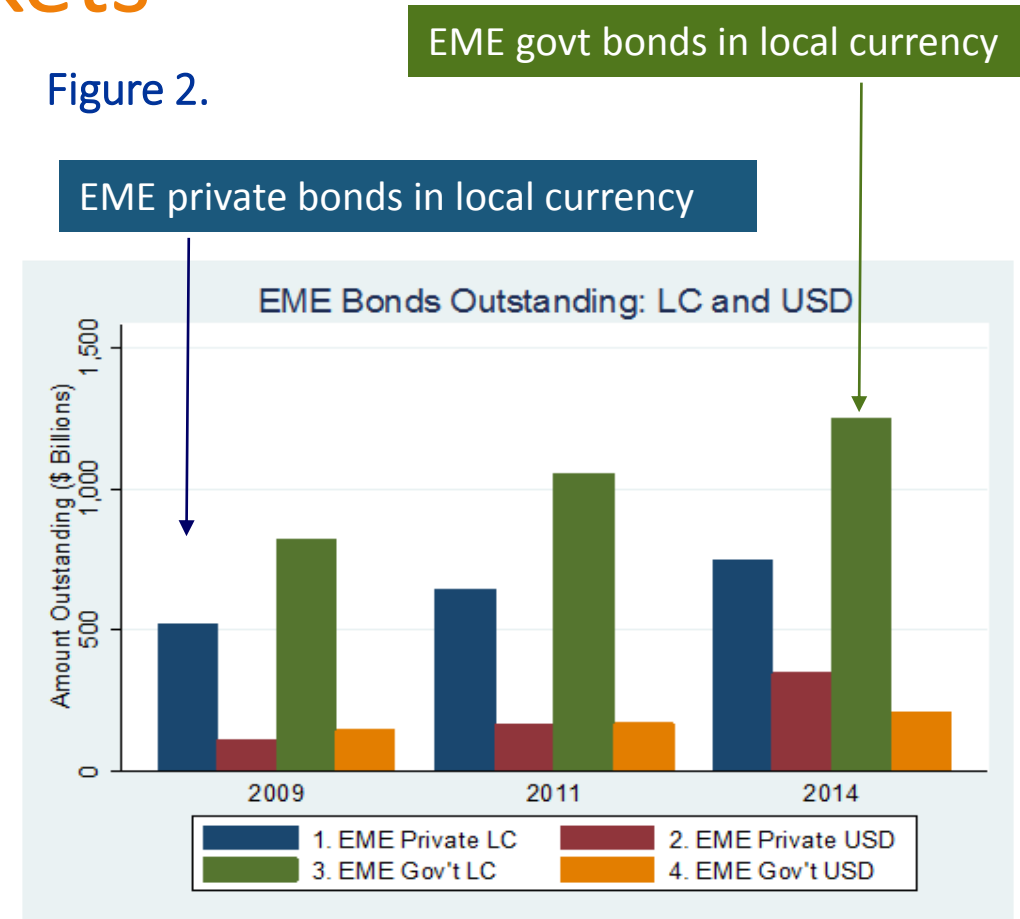 - International Bond Portfolios
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Evolution of EME bond markets

Table 2.

|	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%

EME LC and FC Bond Markets grew as a % of global bond market, most FC bonds are USD-denominated, "LC Share" is quite high but falling.

Figure 2.

EME private bonds in local currency

EME Bonds Outstanding: LC and USD

Legend:
1. EME Private LC
2. EME Private USD
3. EME Gov't LC
4. EME Gov't USD

Most EME bonds are LC-denominated, with somewhat more sovereign than private. Most USD-denominated bonds are now private. Sovereign local currency bond markets largest, strong growth in USD-denominated private bonds.

EME Local Currency Bond Markets by Region, LC Share by Region and Sector (Fig. 3)
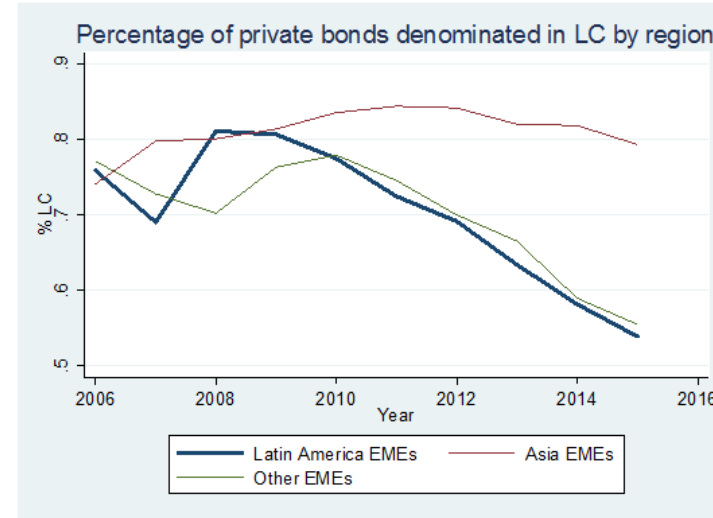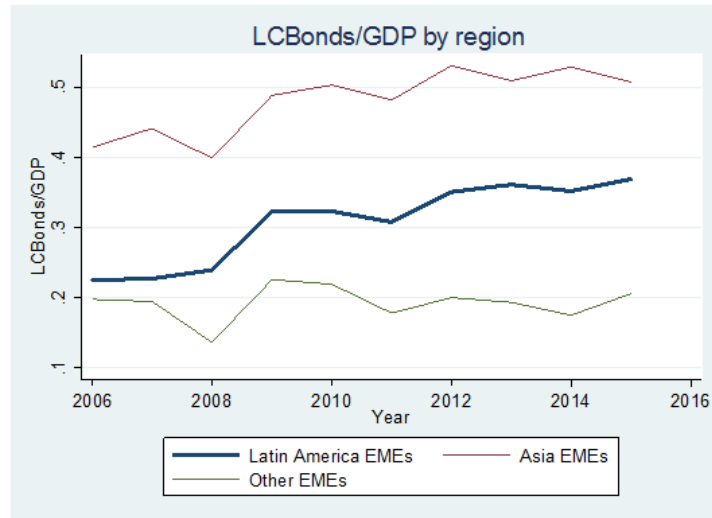
Local currency bonds as a percent of GDP increased smartly since 2006 in Asia and LatAm but not "other EMEs".

LC Share increased in Asia, peaked around 2010 in LatAm and "other". Even for those, however, LC Share is at about 67%, much higher than in 2001 when it was around 50%.
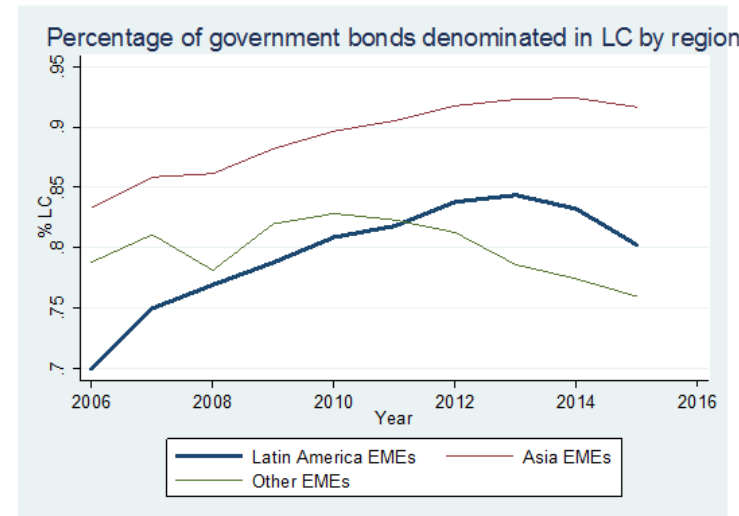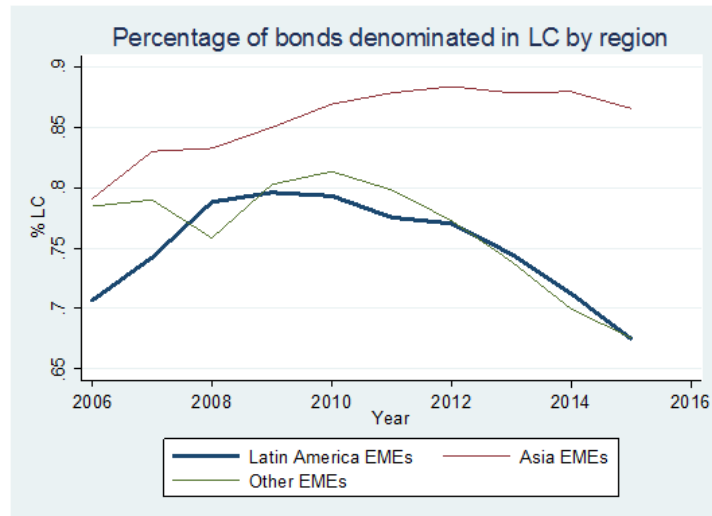
The decline the past few years in LC Share in LatAm and "other" EMEs is primarily due to more private sector foreign currency bond issuance.

Determinants of the Size and Currency Composition of EME Bond Markets

- Analysis from 2006 to 2015 that follows Burger and Warnock (2006) and Claessens, Klingebiel, and Schmukler (2007)

  - Regressions use panel-feasible generalized least squared (FGLS) estimations that allow for heteroskedastic error structures and different autocorrelation coefficients within countries

  - Regressions include local variables and either time fixed effects or global variables (the non-LSAP and LSAP portions of the US 10-year yield)

Local Explanatory Variables: regulatory quality/creditor rights, openness, current account and fiscal balance, inflation volatility, growth rate, and country size.

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. 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 also *caopen* to range from 0 to 1.

ca_gdp is current account balance scaled by GDP*

Fbal is the fiscal balance scaled by GDP*

infvol is inflation volatility computed on a rolling basis using three years of quarterly data (authors' calculations) *

growth is calculated as the three-year average growth rate in real GDP per capita (authors' calculations) *

nomgdp is the log of nominal GDP (in USD)

Also include either time fixed effects or *usi10_nonlsap* and *usi10_lsap*, (the non-LSAP portion and LSAP portions of US 10-year Treasury yields)

　　　　* IMF's IFS data as compiled by Haver Analytics

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

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

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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
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2011.year	0.093**	0.059**	-0.015	0.015	0.025**	0.027**	-0.001	0.020	-0.060
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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

Time fixed effects indicate the following (relative to 2006):

increased size of LC (govt) and FC (govt and private) bond markets

decreased LC Share for private-sector bonds

	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)
	(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

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

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.

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.

Table 3. Determinants of the Structure of EME Bond Markets
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

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

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. No evidence that US rates or LSAPs affect the local currency share of sovereign or private sector bonds.

Many of the effects of local factors are as in Table 3a.

Gauging the relative importance of different factors

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:

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

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.

Outline of presentation

- Research questions
- A preview of results
- Data
- How we capture an LSAP effect
- Findings
  - Bond Markets: Size and Currency Composition
  - International Bond Portfolios
- Conclusion

The Ahmed et al (2016) measure of active portfolio reallocations

- Relative Weight: 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.

$$\mathrm{Re}\, lWgt_i^{US} = \frac{\omega_{i,US}}{\omega_{i,m}} = \frac{H_i^{US} / \sum_i H_i^{US}}{MCap_i / \sum_i MCap_i}$$

- H_i^{US} is defined as US investors' holdings of country *i*'s bonds and
- $\sum_i H_i^{US}$ represents US investors' global (including US) bond portfolio
- $MCap_i$ is the market capitalization of country *i*'s bond market
- $\sum_i MCap_i$ is the market capitalization of the global bond market

Normalized Relative Weight

- There can be a small relative price effect in Relative Weight if portfolio weights differ from benchmark weights (as they usually do). A simple normalization fixes this…divide the relative weight from equation (1) by investors' relative weight for their home market:

$$norm\operatorname{Re}lWgt = \frac{\omega_{i,US}}{\omega_{i.m}} \Big/ \frac{\omega_{US,US}}{\omega_{US.m}}$$

- 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 FGLS panel regressions the dependent variable is normalized relative weight, although we find that this normalization does not materially impact our results.

Structure of US investors' EME bond portfolio

- 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.

Table 4. US Portfolios of EME Bonds

	2009	2014		2009	2014
Size of EME Local Currency Bond Markets			US Holdings of EME Local Currency Bonds		
$ billions	1342	1998	$ billions	13	64
% of GDP	30.7%	30.2%	% of local bonds	0.99%	3.20% ←
% of Global Bond Market	1.6%	2.1% ←	% of US bond portfolio	0.05%	0.22% ←
			RelWgt	0.033	0.105
Size of EME Foreign Currency Bond Markets			US Holdings of EME Foreign Currency Bonds		
$ billions	313	651	$ billions	54	138
% of GDP	7.2%	9.8%	% of local bonds	17.2%	21.2%
% of Global Bond Market	0.4%	0.7%	% of US bond portfolio	0.21%	0.48%
			RelWgt	0.575	0.694
Size of EME USD Bond Markets			US Holdings of EME USD Bonds		
$ billions	258	557	$ billions	50	137
% of GDP	5.9%	8.4%	% of local bonds	19.4%	24.5%
% of Global Bond Market	0.3%	0.6%	% of US bond portfolio	0.20%	0.48%
			RelWgt	0.647	0.804
Ratio of Local Currency to Total Bonds	81.1%	75.4%			

EME LC bond portfolio of US investors grew from $13 billion (1.6% of the global bond market) in 2009 to $64 billion (2.1% of global) in 2014.

US holdings increased even faster. US investors held 0.99% of outstanding EME LC bonds in 2009 and 3.2% by 2014.

US investors' relative weight on EME LC bonds increased from 0.033 in 2009 to 0.105 in 2014 (because the weight of EME LC bonds in US portfolios increased relative to their weight in the global bond market).

Figure 4. US Investors' Portfolios of EME Bonds

EME Holdings by Currency

US Holdings of EME Bonds: LC and USD

Local Currency Holdings
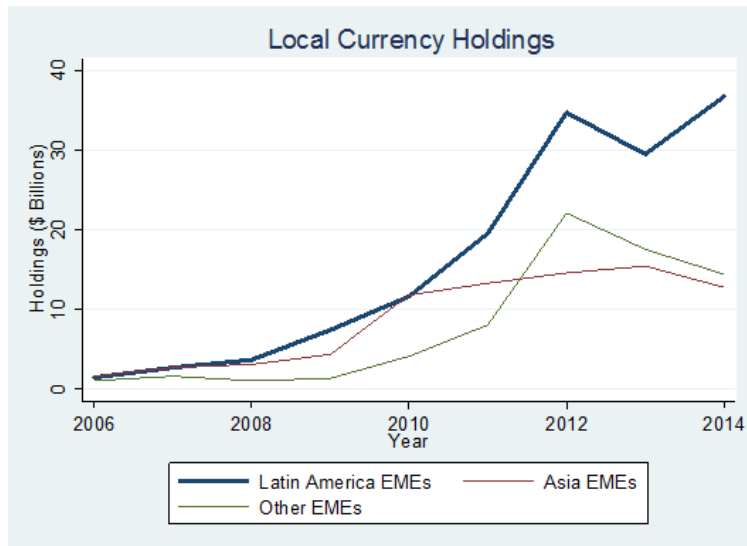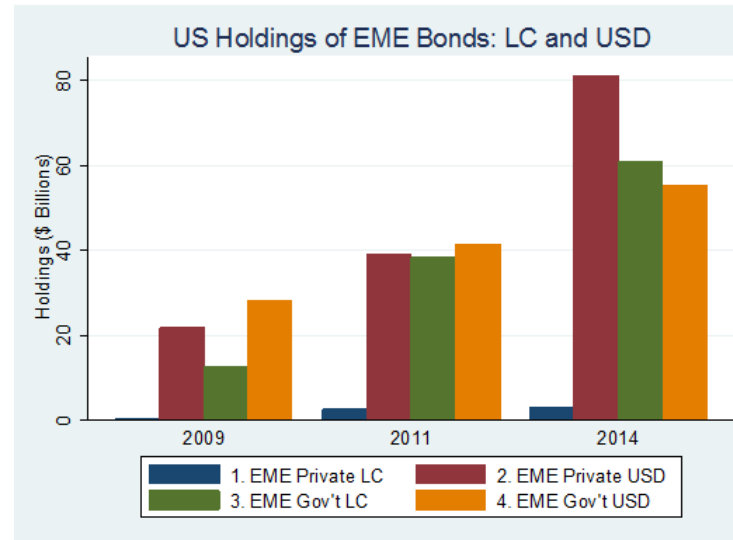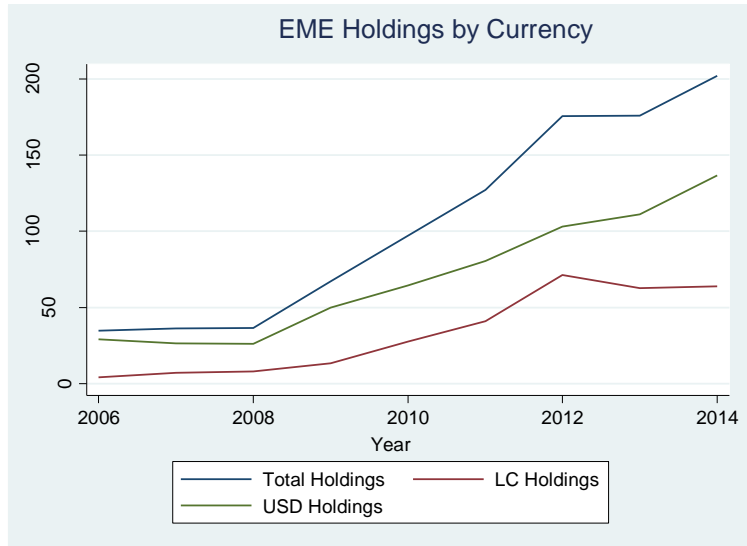
The dollar increase in holdings of local currency EME bonds peaked, but some of that decline is likely due to the appreciation of the dollar.

There is near zero US holdings of private local currency EME bonds, but US holdings of private USD-denominated bonds has increased substantially. And holdings of government bonds, whether USD-denominated or in the local currency, have increased too.

Figure 4. US Investors' Portfolios of EME Bonds, continued
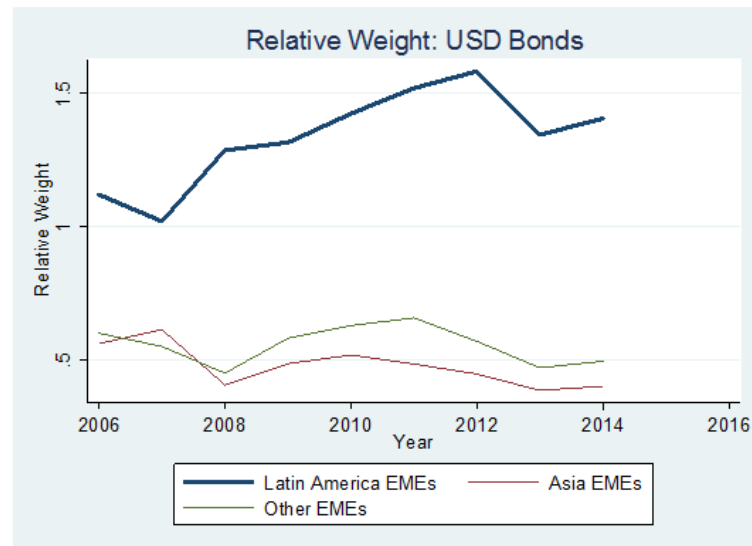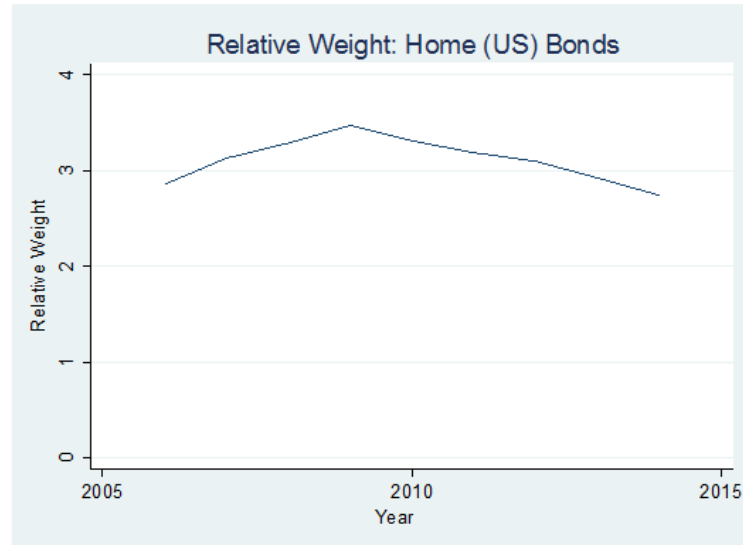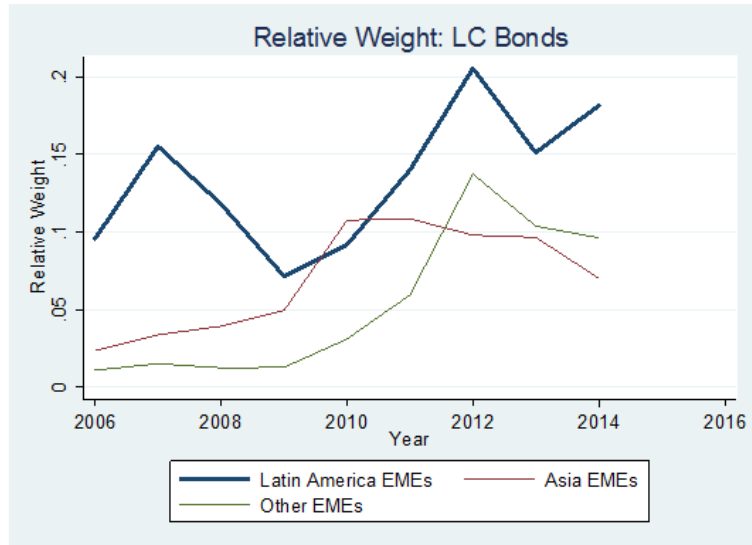
Through 2012, the weight of EME LC bonds in US investors' bond portfolios increased relative to their share in the global bond market, consistent with the evidence in BSWW, but has since declined. That said, LC relative weights are much higher than in 2006.

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.

US relative weight on US bonds, used when we normalize relative weights, is much higher than one (this is the home bias) and peaked in 2009.

Empirical Analysis of US Investors' Foreign Bond Portfolios

- Annual panel dataset includes 12 destination countries over the 2006-2014 period.

- DepVar is normalized relative weight

- Explanatory variables: country-specific "pull" factors such as yield in bps (to proxy for expected return), macroeconomic indicators (GDP growth rate, volatility of inflation, and current account balance), the regulatory quality/creditor rights variable, and the proxy for the openness of a country's bond market to foreign investment.

  - 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 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.

    - Current account to GDP ratio as a 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.

    - The 3-year average growth rate in real GDP per capita as an indicator of the vigor of the destination economy.

- For global "push" factors we include the VIX (divided by 100), the non-LSAP portion of the 10-year US Treasury rate, and the LSAP effect on US 10-year yields.

Panel Results for Local Currency Portfolio Reallocations

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

	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

Time fixed effects positive 2011-14 for LC govt bonds.

Panel Results for Local Currency Portfolio Reallocations

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

	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)
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)
	Time FEs	Time FEs	Time FEs			
N	88	82	82	88	82	82

*p<0.1; ** p<0.05; *** p<0.01

US investors actively reallocated toward EME local currency sovereign bonds in countries with stronger regulatory/creditor rights and (in cols 4 and 5) countries with lower inflation volatility.
US investors' allocations to EME local currency sovereign bonds increased when the non-LSAP portion of 10-year US Treasury yields was lower.

Panel Results on USD-denominated Portfolio Reallocations

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

	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

Time fixed effects, when significant, are negative.

Panel Results on USD-denominated Portfolio Reallocations

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

	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)
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)
	Time FEs	Time FEs	Time FEs			
N	88	72	82	88	72	82

* *p*<0.1; ** *p*<0.05; *** *p*<0.01

Reallocation toward USD-denominated EME bonds occurred in countries with stronger regulatory/creditor rights, slower economic growth, and that are more open.

Evidence that both LSAPs and increases in VIX were associated with reduced allocations of USD sovereign bonds.

Gauging the relative importance of different factors

- For local currency bonds
  - Global factors are important. Most of the variation (83%) is from time FEs. When include US factors instead of time FEs, 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%.

- For USD-denominated bonds
  - It's all local factors, with the most important local variables being regulatory/creditor rights (65%) and openness (20%). Near zero VARC for time fixed effects or US variables.

Portfolio Regressions without differentiating by bonds' currency denomination

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

	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	USD-share is by far
	(0.053)	(0.040)	(0.037)	(0.055)	(0.038)	(0.028)	the most significant
infvol	0.133	0.097	-0.290**	-0.131	-0.223	-0.222**	variable in this paper.
	(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)	
			(0.005)			(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)	
	Time FEs	Time FEs	Time FEs				
N	88	82	82	88	82	82	

* *p<0.1; ** p<0.05; *** p<0.01*

We do not advocate mixing currency denominations in portfolio regressions. But if you do so, include a variable measuring the share of the recipient country's bonds denominated in the investor's currency.

Conclusions

- Global factors have had significant but not always materially important impact on EME bond markets, both on the development of these markets and on foreign participation.
  - The post-crisis period of low US interest rates and unconventional monetary policy has been associated with increased issuance of EME bonds, both local- *and* foreign-currency denominated. But local factors are much more important.
  - In US investors' portfolios of EME local currency bonds, increased portfolio weights (relative to benchmark weights) in countries with stronger regulatory/creditor rights and lower inflation volatility. But the non-LSAP portion of US yields has the largest 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).

US conditions matter, but most of the variation in bond market development (i.e., the size and currency composition) is from local factors. The one place where US yields really matter (i.e. in more than just a statistical sense) is in US investors' portfolios: US investors actively reallocated toward EME local currency bonds when US yields (the non-LSAP portion) were lower.
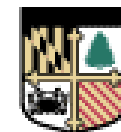
Thank you.

The Effects of Fed Policy on EME Bond Markets

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