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'How Sovereign is Sovereign Credit Risk?' – A Local Rates Approach

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'Cuán Soberano es el Riesgo de Crédito Soberano?' – Un Enfoque de Deuda en Moneda Local

Resumen

Este documento encuentra que el componente global es sumamente fuerte en explicar los rendimientos de la deuda local de un conjunto de 12 Mercados Emergentes (ME) durante un período rico en shocks tanto idiosincrásicos como sistémicos (2005-2021). El primer componente principal (PC) explica el 56 % de la varianza de la rentabilidad para la muestra completa y alrededor del 80% en algunos años. De manera similar, al descomponer los rendimientos individuales de cada país en función de la contribución global e idiosincrática, la fracción de la variación total explicada por la variable global tiene un promedio de 0,86 en los 12 países de la muestra. Una implicación directa es que existe un margen limitado para que los inversores activos (active managers) en mercados emergentes («selectores de países») obtengan un rendimiento superior basándose únicamente en el análisis fundamental del país. Además, el primer PC está fuertemente relacionado con variables financieras globales. Es decir, los beneficios de diversificación para los inversores pasivos (passive cross-over investors) que ofrece la deuda local de ME son limitados. Este trabajo es una extensión de Longstaff, Francis A., et al. "How sovereign is sovereign credit risk?." American Economic Journal: Macroeconomics (2011).

Palabras clave: Mercados Emergentes, deuda local, global, idiosincrático, manejo de portafolio

'How Sovereign is Sovereign Credit Risk?' – A Local Rates Approach

Abstract

This paper finds that a global component is materially strong in explaining local debt returns for a set of 12 Emerging Markets (EM) during a period rich in both idiosyncratic and systemic shocks (2005-2021). The first principal component (PC) explains 56% of return

variance for the full sample and about 80% in some years. Similarly, when breaking down individual country returns based on global and idiosyncratic components, the fraction of the total variation explained by the global variable averages 0.86 across the 12 countries. A direct implication is that there is limited room for EM active investors ('country pickers') to outperform based solely on country fundamental analysis. Furthermore, the first PC is strongly related to global financial variables. That is, diversification benefits for passive cross-over investors to allocate in the EM local debt asset class are rather limited. This paper is an extension of Longstaff, Francis A., et al. "How sovereign is sovereign credit risk?." American Economic Journal: Macroeconomics (2011).

Keywords: Emerging Markets, local debt, global, idiosynratic, country specific, portfolio management

Códigos JEL: F34, G11, G12, G15

'How Sovereign is Sovereign Credit Risk?' – A Local Rates Approach

Longstaff, Pan, Pedersen y Singleton (LPPS) [1] posed the following questions in their 2011 paper: "Is sovereign credit risk primarily a country-specific type of risk? Or is sovereign credit driven mainly by global macroeconomic forces external to the country?". The findings regarding these questions have direct implications on economic policy design and, from an investor perspective, on portfolio management. Investors must be able to differentiate between systemic and idiosyncratic causes of sovereign credit risk when diversifying global debt portfolios.

LPPS analyze a sample of Credit Default Swaps[2] for 26 developed and less developed countries during 2000 – 2010. They find a significant single underlying driver shared among countries. The first principal component accounts for 64 percent of the variation in sovereign credit spreads. During the Global Financial Crisis (2007 – 2010), the first principal component becomes even more significant, accounting for 75 percent of the variation in CDS. LPPS look at the correlation of the first principal component with other assets to understand the source of this high level of commonality. They find that the first principal component has a correlation of −74 percent with U.S. stock market returns, and a correlation of 61 percent with changes in the VIX index.

Can LPPS conclusions be extended to local sovereign bonds (that is, debt issued by a sovereign in its local currency)? Local bonds represent an asset class that has more recently become part of global debt portfolios. A priori, one could expect local bonds to represent primarily a country-specific type of risk, driven by idiosyncratic factors such as inflation expectations, Central Bank's institutional features (reaction function, mandate, credibility), fiscal considerations (which ultimately determine local bond supply), domestic business cycle, domestic saving rates, etc. Furthermore, one could expect a 'clientele effect' that would isolate local rates from global developments. Rather than reacting to global events, the main holders of outstanding local bonds (i.e. domestic pension funds and insurance companies)

[1] Longstaff, F., Pan, J., Pedersen, L., and Singleton K. (2011). How Sovereign is Sovereign Credit Risk? *American Economic Journal*.

[2] Note that Credit Default Swaps are preferred by LPPS over external sovereign bond credit spreads mostly due to liquidity considerations.

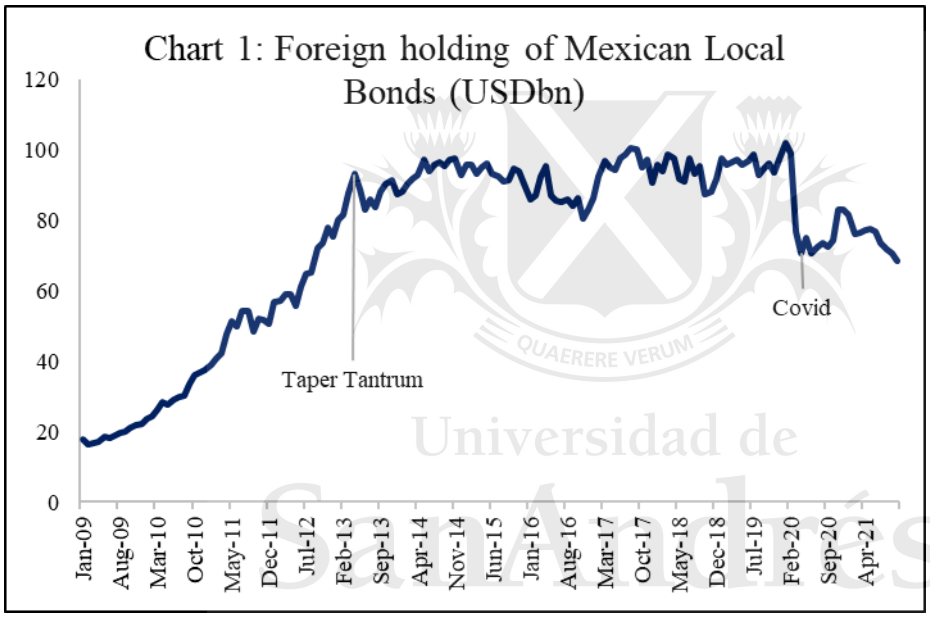
conduct their investment policy based on a specific mandate, such as reducing mismatch between pension liabilities and portfolio assets. However, there is also a narrative that points in the opposite direction. Global events do matter for local bond markets. The monetary stimulus that followed the Global Financial Crisis (GFC) depressed core yields and pushed global investors into riskier credits, among them emerging markets local bonds. Global investors added positions in local bonds, in many cases without hedging the currency exposure, which had performed well prior to the GFC thanks to generalized current account surpluses. The next inflexion point came in May 2013 when then-Chair of the Board of Governors of the Federal Reserve System, Ben Bernanke, hinted the tapering of quantitative easing, causing a sharp sell-off in local bonds across emerging markets (EM). That event, called 'the taper tantrum', effectively changed the dynamics of local debt markets. The share of foreign ownership of local bonds, which had been increasing across countries up to the taper tantrum, stagnated. Almost seven years later, the covid pandemic initial sell-off (March 2020) also negatively affected the EM asset class. Very interestingly, Fed's unprecedented response to the pandemic (historic low real rates & balance sheet expansion) did not generate inflows into EMs. Chart 1 illustrates these events, taking foreign holdings of Mexican bonds as prime example. Chart 2 provides a snapshot for the entire universe at two points in time: 2013Q1 (pre taper tantrum) and 2021Q4 (last observation). In countries below the 45-degree line (the majority) foreign investors have been reducing exposure to local debt since taper tantrum. Notable exception is China that has lately pushed for its inclusion in global fixed income indexes to attract foreign capital.

Chart 1 and 2 depict a dire picture for EM local debt. The asset class has run out of favor for global capital allocators. Returns have disappointed for almost a decade. In this context, the questions posed by LPPS become as relevant as ever. In particular, if there were a strong underlying driver in returns across EM countries (ie. a principal component that explains most variability in returns), then there would be little room for EM active managers ('EM country pickers') to outperform. Furthermore, if this underlying driver were to be correlated to global financial variables (U.S stocks, VIX, US Treasuries, etc), then there would be low diversification benefits for passive cross-over investors to invest in the asset class. These are non-trivial questions that this paper aims to address.

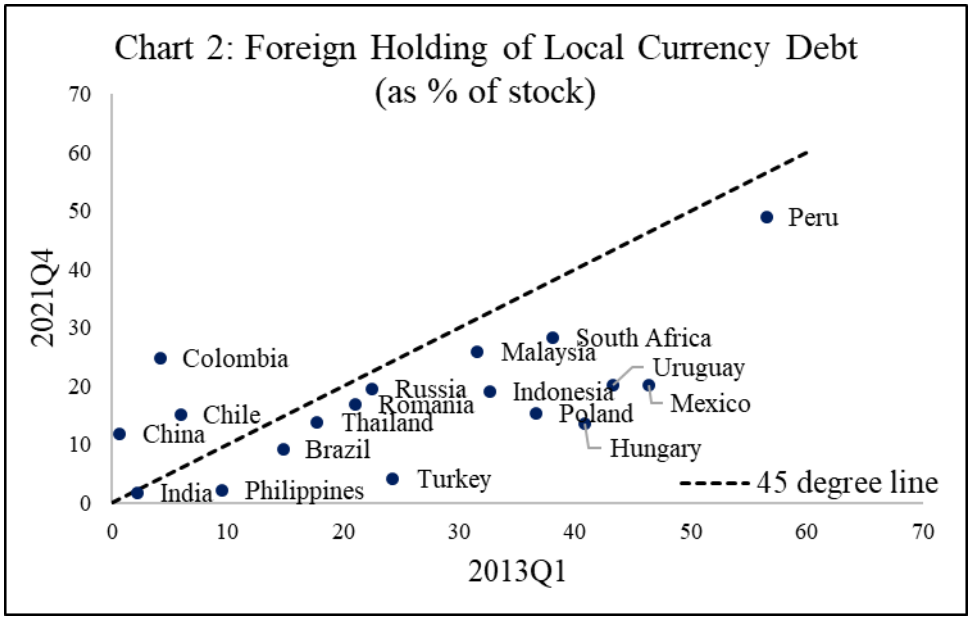
In a later section, individual country returns are decomposed into global and idiosyncratic

components. When these returns are measured in US dollars (which is the case for foreign asset managers) the global component becomes overwhelmingly strong. These results are somewhat disheartening for EM local debt investors who seek to outperform based solely on country fundamentals. Portfolio decisions cannot be made without a good understanding on global developments.

The remainder of this piece is organized as follows. Section I describes the data and the commonality in local EM bond returns. Section II breaks down local bond returns based on global and idiosyncratic factors. Section III summarizes results and presents concluding remarks.



Source: Banco de Mexico



Source: IMF Sovereign Debt Investor Base for Emerging Markets

I. DATA AND COMMONALITY IN LOCAL SOVEREIGN BONDS

A Principal Component Analysis (PCA) is performed on a sample of monthly local bond returns for 12 Emerging Markets[3] within the JP Morgan GBI-EM Global Diversified Index from February 2005 to December 2021. The GBI-EM Index is widely followed by institutional investors. Therefore, working with index countries assures a degree of liquidity (and reliability on available pricing data) and a degree of development in the local market (in terms of size, access to foreign investors, and lack of restrictive capital controls).

The GBI-EM index represents total realized return (from coupon clipping and from capital gain/loss due to change in market rates) for a basket of EM local currency bonds. The sample covers a longer period than LPPS, which focuses on 2000 – 2010, but for fewer countries (12 compared to 26). CDS markets are more established than local EM debt. The former has wider coverage and longer history as its underlying asset is a hard currency bond generally ruled under international law. That said, there is a wealth of information in the sample used in this paper. Not only as it covers three periods of extreme global risk aversion (such as GFC,

[3] Brazil, Colombia, Czech Republic, Hungary, Indonesia, Malaysia, Mexico, Poland, Russia, South Africa, Thailand and Turkey.

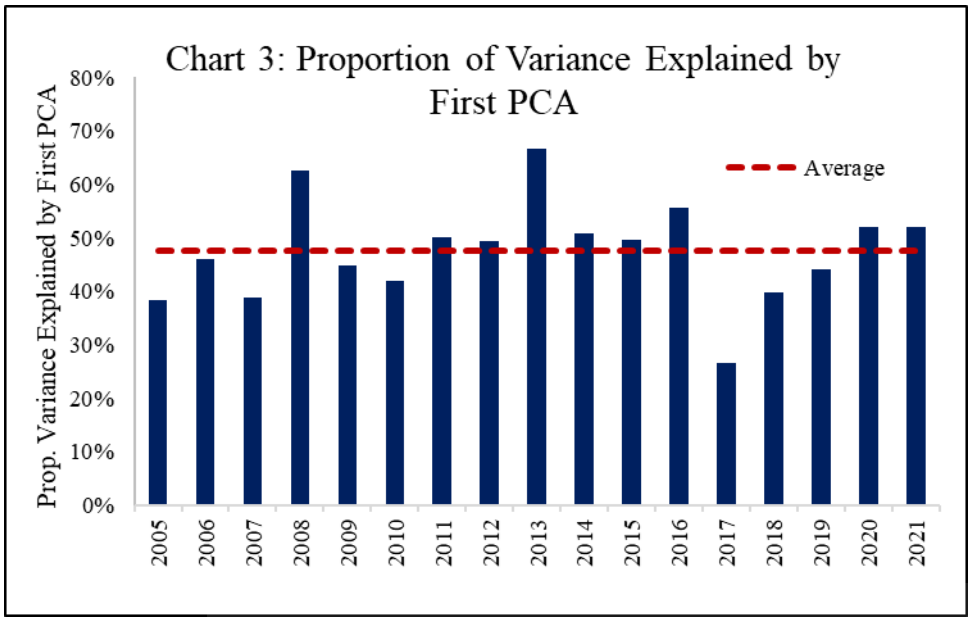
Taper Tantrum and Covid shock) but also of material idiosyncratic developments. For instance, on the latter point, Brazil secured Investment Grade credit rating in 2008 to later lose it in 2015 as consequence of economic mismanagement during Dilma Rousseff's administration. Brazil entered in 2014 its longest recession in history and real GDP per capita (as of time of this paper) remains 7% below 2013 levels. Also, the sample covers several boom-bust cycles in Turkey. In mid-2018 the Turkish Lira (and Turkish local bonds) suffered as consequence of a large credit expansion in 2017 induced by the government sponsored Credit Guarantee Fund. In late 2021 Turkish local assets suffered again steep losses – this time as the Central Bank embarked an aggressive interest rate cutting cycle, despite accelerating global and domestic inflation. By 2021 foreign involvement in local Turkish assets was already low and the sell-off was triggered by residents seeking shelter in hard currency assets. Russian local assets dwindled in value, despite improving macro fundamentals, as sanctions were imposed at different points in times in the period under consideration. South Africa lost its Investment Grade rating after several years of economic mismanagement and corruption during former president Zuma's administration. To sum up, the sample used here covers a large number of idiosyncratic EM developments and at least three global risk aversion episodes.

The GBI-EM index presents returns in local currency and in US dollar (ie. adding EM FX component). A PCA is performed for each sample.

a. Local Bond Returns Measured in Local Currency

The first principal component accounts for 44 percent of the variation in local currency sovereign debt returns. Even though this is lower than the 64 percent found by LPPS in CDS, it is still material considering the large number of idiosyncratic shocks. For instance, for the subset of investment grade countries[4], where there were fewer domestic shocks, the first principal component of local currency debt accounts for a much larger variation of returns (64 percent). Also, it is clear the force of global shocks on the asset class. As shown in Chart 3, in 2008 (GFC) and 2013 (taper tantrum), the proportion of variance explained by first PCA is well above average.

[4] This subset is comprised of Malaysia, Mexico and Poland. Local debt in these countries belongs to the World Government Bond Index (WGBI), a leading investment grade local currency fixed income benchmark.



As a short side note, the reason to focus only on the first principal component is that there is a small gain (in terms of variance explained) from expanding dimensions. This is captured in Chart 4 (Scree Plot) which depicts how much variance is explained by each principal component. While the first principal component accounts for about 44 percent, the second only adds 8.8% of variance explained.

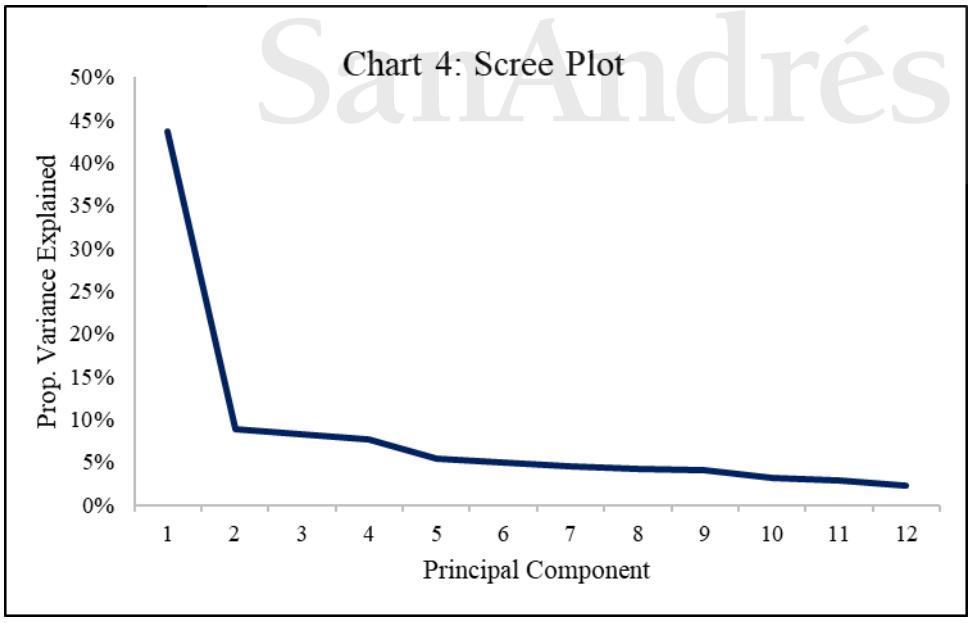
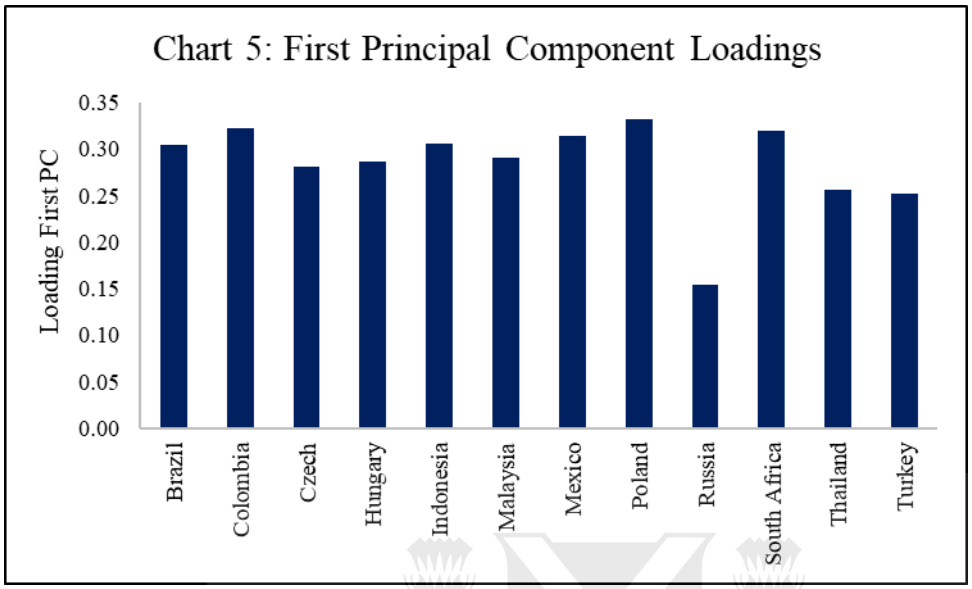
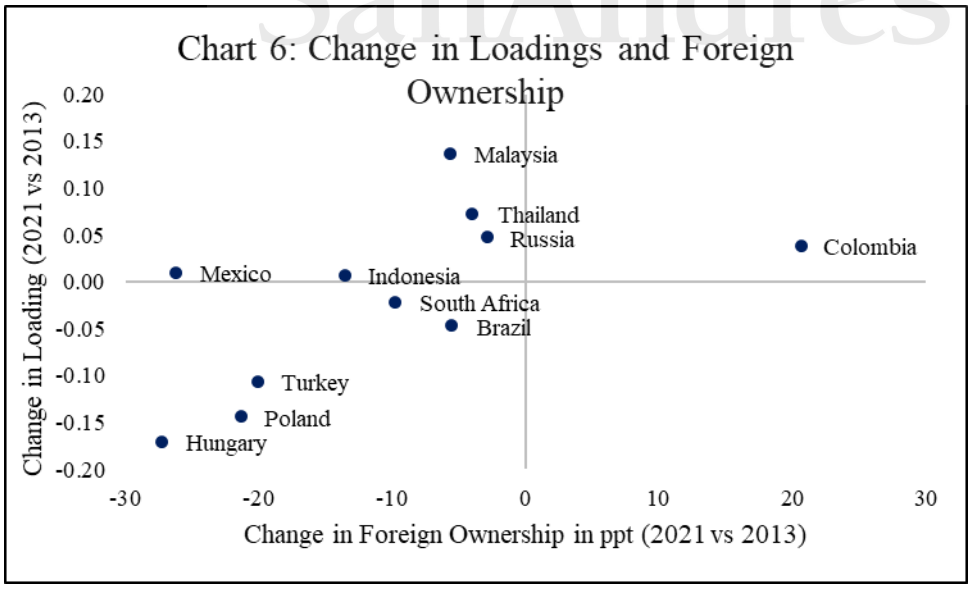


Chart 5 plots the loadings or weights across countries for the first PC. As shown, the first PC

consists of a roughly uniform weighting of the returns for most of the sovereigns in the sample. In essence, the first PC resembles a “parallel shift” factor in local debt returns.



Interestingly, when looking at how the first PC loadings have evolved in time, there seems to be some relation with foreign ownership of local debt. Chart 6 shows change in two points in time: 2013 (Taper Tantrum) and 2021. For instance, in Turkey, as foreigners have reduced materially its exposure due to country mismanagement, its weight on the first PC has diminished.



What could explain such a high common variability among countries as reflected in the first principal component? Is there any economic meaning? As LPPS found for CDS, global financial markets also do matter to EM local bond returns. The first PC is a summary measure of local debt returns across EM countries. See below a regression of it into a set global financial variables – S&P 500 monthly returns, monthly changes in VIX (implied volatility of S&P 500 options) and monthly changes in US Treasury 10-year rate. An increase in S&P500 returns (SPX) or a decrease in VIX, both indicators of reduced global risk aversion, have a positive effect on the first principal component. An increase in core rates (10-year US Treasury rate, UST 10) widens local bonds yields, having a negative effect on bond returns.

Dependent Variable: PC1
Method: Least Squares
Date: 02/18/22 Time: 18:07
Sample: 2005M02 2021M12
Included observations: 203

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.185144	0.132117	-1.401359	0.1627
SPX	0.170432	0.048766	3.494912	0.0006
VIX	-0.074505	0.037233	-2.001066	0.0467
UST	-5.458216	0.573394	-9.519136	0.0000

R-squared	0.388588	Mean dependent var	1.31E-16
Adjusted R-squared	0.379370	S.D. dependent var	2.293976
S.E. of regression	1.807196	Akaike info criterion	4.040937
Sum squared resid	649.9253	Schwarz criterion	4.106222
Log likelihood	-406.1551	Hannan-Quinn criter.	4.067349
F-statistic	42.15863	Durbin-Watson stat	1.886778
Prob(F-statistic)	0.000000		

b. Local Bond Returns Measured in US Dollars (FX Unhedged)

Global investor performance is usually measured in a hard currency unit, such as the US Dollar, rather than in an EM currency.

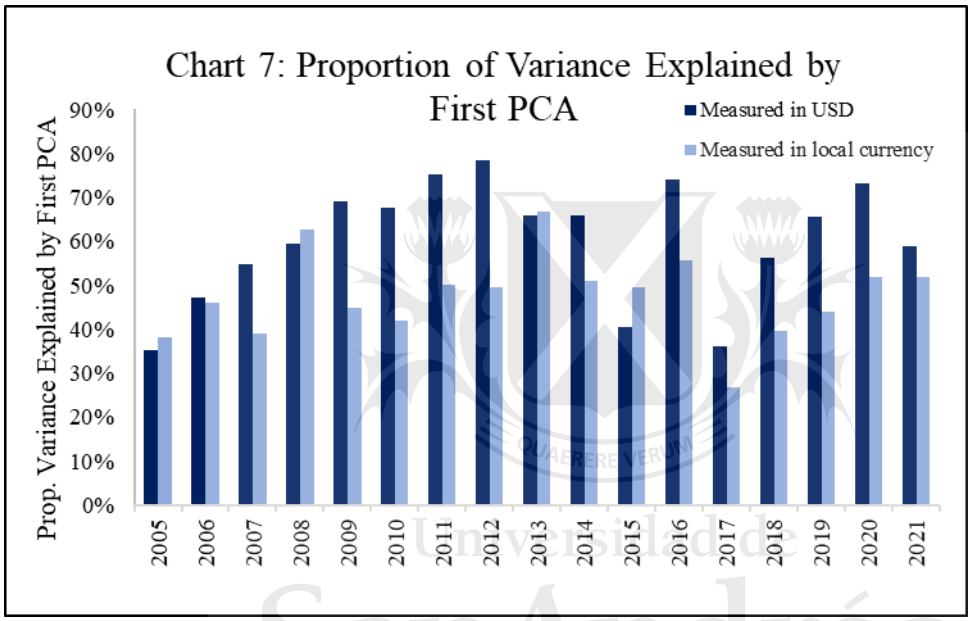
$$\widetilde{USD, FX\ Unhedged\ Return} \cong \widetilde{Local\ Bond\ Return} + \widetilde{FX\ Return}$$

Where "~" denotes random variable and returns are monthly non-annualized.

$$\widetilde{FX\ Return} \cong \frac{\widetilde{S^1_{USD/LC}} - S^0_{USD/LC}}{S^0_{USD/LC}}$$

Where $S^{i}_{USD/LC}$ is spot FX rate at time i, measured as amount of US Dollars per unit of local currency.

Adding the FX component makes local EM bond returns even less idiosyncratic: that is, the latent factor is even more powerful in terms of variance explained. The first principal component explains 56% of return variance. In some years, the first PC explains about 80% of return variability (Chart 7). These are bad news for EM active investors who seek portfolio outperformance by picking EM countries.



The first principal component is not only stronger, but also more related to global variables. A regression of the first component into the above mentioned global financial variables improves R-squared (see output below). A stronger relation to global financial variables implies lower diversification benefits for passive cross-over investors.

Dependent Variable: PC1
Method: Least Squares
Date: 02/18/22 Time: 18:16
Sample: 2005M02 2021M12
Included observations: 203

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.270648	0.143866	-1.881245	0.0614
SPX	0.343334	0.053102	6.465504	0.0000
VIX	-0.072029	0.040544	-1.776576	0.0772
UST	-2.843000	0.624385	-4.553280	0.0000

R-squared	0.433459	Mean dependent var	-1.41E-16
Adjusted R-squared	0.424918	S.D. dependent var	2.595015
S.E. of regression	1.967907	Akaike info criterion	4.211326
Sum squared resid	770.6588	Schwarz criterion	4.276611
Log likelihood	-423.4496	Hannan-Quinn criter.	4.237737
F-statistic	50.75151	Durbin-Watson stat	1.936025
Prob(F-statistic)	0.000000		

II. GLOBAL AND IDIOSYNCRATIC SOURCES FOR LOCAL BOND RETURNS

Next step is to study the extent to which local rates returns for each country can be explained by idiosyncratic and global variables. Here this paper deviates somewhat from LPPS approach.

a. The variables

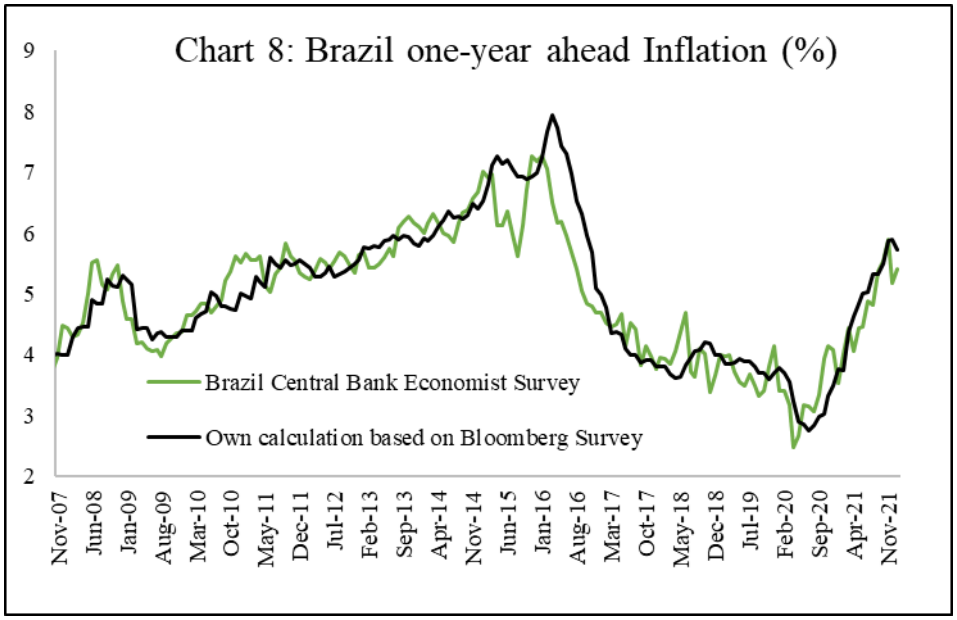
Global Variables: LPPS group variables into four categories ('Global Financial Market Variables', 'Global Risk Premiums', 'Global Investment-Flow Variables', and 'Spread of Other Sovereigns') and make reasonable assumption to select variables for each set. For instance, under the category 'Global Financial Market Variables', LPPS include equity excess return on the CRSP value-weighted portfolio, change in five-year constant maturity Treasury yield, and changes in spread of US investment-grade and high yield corporate bonds. The approach in this paper is more parsimonious – only one global variable is used: the first PC. By construction the first PC best describes the entire set of common factors ('global') that affect local debt returns and, as shown in prior section, is related to global financial variables (i.e. S&P500, US Treasuries and VIX).

Local variables: A set of ad-hoc idiosyncratic variables is selected. Namely, the monthly change in one-year ahead economist consensus expectations for (1) Current Account balance

as %GDP, (2) Inflation rate, (3) Budget Balance as %GDP, (4) GDP growth rate and (5) Central Bank policy rate[5]. The advantage of working with consensus expectations is that local rates should better reflect forward looking information rather than past economic prints. In contrast, LPPS use market-determined variables as "... in theory, they should aggregate much of the economic information relevant to investors in the sovereign credit market". Therefore, when it comes to select local variables, LPPS choose local market stock return (in local currency), percentage change of the local currency against the US dollar, and percentage change in the dollar value of the sovereign's holdings of foreign reserves. A potential limitation with this approach is that these market-determined variables may not be insulated from global forces – therefore, making the interpretation of such coefficients less clear.

Data availability for economist consensus expectations reduces somewhat the sample (starting October 2007 rather than February 2005). For the 12 countries in the dataset, Bloomberg economist consensus data is adjusted so that it represents a constant one year ahead horizon. Just to make sure that such adjustment is correct, a good benchmark is provided by Brazil. Its Central Bank (BCB) has one of the most timely and comprehensive survey collection systems. See Chart 8 in green one-year ahead inflation according to BCB survey and in black based on own calculations using Bloomberg data. Even though there are some deviations between the two lines, these are rather small considering different source for economist expectation data (BCB survey and Bloomberg).

[5] Due to data availability, one-year ahead Central Bank policy rate is obtained from local swap markets rather than economist's consensus. Even though there may be discrepancies, both tend to converge.



b. Regression Analysis:

Table 1 and Table 2 show regression coefficients for statistically significant variables and R-squared. To reiterate, the dependent variable is monthly local bond return for each country (measured in local currency in Table 1 and in US Dollars in Table 2) and the explanatory variables are the global and idiosyncratic ones mentioned above.

Table 1:
Dependent Variable: Local Bond Returns Measured in Local Currency

	Idiosyncratic Coefficients:					Global Coef.:	R-Squared
	Budget Balance	Current Account	Central Bank Rate	CPI	GDP growth	First PCA	
Brazil			-1.26			0.23	0.76
Colombia			-0.60			0.53	0.61
Czech			-0.69			0.30	0.43
Hungary		0.72	-2.96			0.23	0.73
Indonesia		-2.17	-2.11			0.98	0.64
Malaysia	0.32		-1.81			0.19	0.59
Mexico			-2.27		0.46	0.33	0.72
Poland		0.67	-0.45	-0.80		0.28	0.67
Russia			-0.30		1.19	0.35	0.35
SoA			-1.03			0.59	0.58
Thailand			-3.18			0.26	0.65
Turkey		1.60	-0.91			0.42	0.66

Table 2:
Dependent Variable: Local Bond Returns Measured in US Dollars

	Idiosyncratic Coefficients:					Global Coef.:	R-Squared
	Budget Balance	Current Account	Central Bank Rate	CPI	GDP growth	First PCA	
Brazil			-1.07		1.99	1.41	0.63
Colombia				-3.21		1.53	0.70
Czech					0.89	1.08	0.63
Hungary			-4.12			1.33	0.74
Indonesia			-3.28			1.44	0.61
Malaysia			-2.80			0.74	0.64
Mexico			-2.32		1.20	1.24	0.69
Poland						1.37	0.72
Russia			-0.58		2.96	1.31	0.51
SoA			-2.55		1.83	1.68	0.66
Thailand			-4.13			0.60	0.63
Turkey		2.33	-2.10			1.19	0.73

The model does a fairly good job capturing both global and country specific effects in local bond returns. In LPPS the mean and median values of the adjusted R-Squared in their country sample are 68.7 and 68.6 percent, respectively. This compares to 62 and 65 percent in Table 1 and 66 and 65 percent in Table 2. Furthermore, the signs of coefficients in both Table 1 and Table 2 are in line with economic meaning. That is,

- *Central Bank Rate: Negative*. Expectations of Central Bank rate hikes shift yield curve upwards (at least front end), causing losses in local bonds.
- *GDP growth: Positive*. Upward revisions in expected economic growth should compress risk premia in local yields, generating positive returns. One could argue that a negative sign would also be reasonable for an overheated economy which could prompt a Central Bank hawkish response. However, model controls for both inflation and Central Bank rate forecasts.
- *Budget Balance: Positive*. A downward revision of expected fiscal balance (larger deficit) imply losses for local bondholders due to greater primary bond supply.
- *Inflation: Negative*. An increase in inflation expectations increase bond yields, generating losses.
- *Current Account: Undetermined*. A priori there is no strong belief on a determined sign.

- *First PCA: Positive* as it captures constructive global conditions per regression in Section 1.

The most prominent difference between Table 1 and Table 2 (that is, when considering local bond returns in local currency or US Dollar) is the size of coefficients for the global component, which is much higher when returns are measured in US Dollar. That is, adding FX return layer make local bond returns more systemic and less idiosyncratic. Poland, a highly rated country (A- by S&P and A2 by Moody's), is the extreme case where no country specific variable is statistically significant.

The first column in Table 3 (local currency) reports a measure of what fraction of the total variation explained by the regression is due solely to the global variable. The methodology follows LPPS: first regress the returns on just the global variable, and then divide the R-Squared from this regression by the R-Squared from the full regression. Looking at these estimates, having countries like Russia, Turkey and Brazil (which are rich in idiosyncratic shocks) in the low end of spectrum seems reasonable. On the other hand, a priori one would have expected a lower value for South Africa (0.96) as, during Zuma years, there were plenty of idiosyncratic shocks – most prominently, ousting Minister of Finance Nene (*'Nenegate'*) on December 9, 2015. South Africa local bonds lost 7% of their value in that month (14% when measured in US Dollars)[6]. Regardless of how strong the global component is, a Wald test with null hypothesis that all idiosyncratic coefficients are zero in the full regression is rejected for every country (second column in Table 3). Country fundamentals cannot be fully discarded in asset allocation decisions!

Table 4 reproduces estimates from Table 3 considering local bond returns measured in US Dollars. It should be no surprise that the fraction of total variation explained solely by the global variable (first column) is much higher than in Table 3. Furthermore, in the case of Colombia, Czech Republic and Poland the Wald test on idiosyncratic coefficients cannot be rejected (second column).

[6] A potential explanation for South Africa is that, despite idiosyncratic shocks, its local bonds are held by a large domestic asset management industry. Its assets under management (AUM) are at +100%GDP. As its asset allocation is regulated (eg. non-South African exposure is capped), the industry effectively acts as 'steady hands' holding local debt, reducing return volatility.

These results are somewhat disheartening for an EM investor who makes asset allocation decisions based solely on country fundamentals and whose performance is measured in US Dollars. It is a hard job. And portfolio decisions cannot be made without a good understanding on global developments.

Table 3:
Dependent Variable: Local Bond Returns Measured in Local Currency

	Fraction explained by global component	Wald test p-value
Brazil	0.64	0.00
Colombia	0.87	0.01
Czech	0.89	0.06
Hungary	0.61	0.00
Indonesia	0.87	0.00
Malaysia	0.74	0.00
Mexico	0.73	0.00
Poland	0.85	0.00
Russia	0.36	0.00
SoA	0.94	0.04
Thailand	0.58	0.00
Turkey	0.49	0.00
Average	**0.71**	

Table 4:
Dependent Variable: Local Bond Returns Measured in US Dollars

	Fraction explained by global component	Wald test p-value
Brazil	0.95	0.00
Colombia	0.96	0.18
Czech	0.94	0.10
Hungary	0.89	0.00
Indonesia	0.88	0.00
Malaysia	0.92	0.00
Mexico	0.91	0.00
Poland	0.99	0.32
Russia	0.76	0.00
SoA	0.94	0.00
Thailand	0.69	0.00
Turkey	0.52	0.00
Average	**0.86**	

III. CONCLUSION

There is a material common underlying driver of returns for EM local debt. When measured in US dollars, this latent factor explains as much as 56% of return variance across countries (with peaks of about 80% in some years – Chart 7).

When studying individual country returns (measured in USD), the fraction of the total variation explained by a regression solely based on global variable averages 0.86 (first column in Table 4). Assuming the return specification is correct, then global forces are overwhelmingly strong.

These results are somewhat disheartening for an EM local debt investor whose decisions are driven mainly by country fundamental analysis. Portfolio decisions should not be made without a good understanding on global developments.

The implications for policymaking are more nuanced as policymaking should be assessed in dimensions beyond asset prices and, therefore, beyond the scope of this paper. However, results here should still add some value. That is, while policy making does matter for asset prices (just compare Turkey and Poland in Table 4), ideally policy planning should not be made in isolation, with no regard to global circumstances.

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