IDB
Inter-American
Development Bank

The Effects of Foreign Investors' Holdings on the Local Currency Sovereign Bond Markets in Latin America

Department of Research and
Chief Economist

Iván Baumann Fonay

TECHNICAL
NOTE Nº
IDB-TN-2451

May 2022

The Effects of Foreign Investors' Holdings on the Local Currency Sovereign Bond Markets in Latin America

Iván Baumann Fonay

Independent Consultant

May 2022

Inter-American Development Bank

Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library

Baumann Fonay, Ivan.
The effects of foreign investors' holdings on the local currency sovereign bond markets in Latin America / Ivan Baumann Fonay.
p. cm. — (IDB Technical Note ; 2451)
Includes bibliographic references.
1. Investments, Foreign-Latin America. 2. Bonds-Latin America. 3. Debts, Public-Latin America. 4. Interest rates-Latin America. I. Inter-American Development Bank. Department of Research and Chief Economist. II. Title. III. Series.
IDB-TN-2451

Abstract[1]

Since the turn of the century, emerging market economies have begun to develop markets for bonds denominated in their local currencies, thus trying to avoid the "original sin" that resulted in many previous crises. This paper tries to determine the impact of foreign investment in these markets for seven Latin American economies. It finds that foreign investment can be either a blessing or a curse, depending on depreciation expectations.

JEL classifications: E44, F34, G12, G15
Keywords: Bond interest rate, International financial markets, Sovereign bonds, International borrowing, Sovereign debt, Financial markets

[1] I am deeply grateful for Eduardo Cavallo and Eduardo Borensztein's very insightful comments and suggestions. All remaining errors are mine.

1. Introduction

Historically, Latin America has suffered a series of sovereign debt crises at both the systemic and regional levels. The opening of the countries' financial accounts, in the context of a wider wave of financial globalization and deregulation, contributed to the entry of international investors. At first, this happened through international commercial bank loans during the 1970s and 1980s, and then through sovereign bonds.

Until very recently, Latin American countries' debt was denominated in foreign currency, mostly (although not exclusively) in United States dollars. This was mainly due to two factors. On the one hand, these countries relied on monetary financing of their fiscal deficits, leading to macroeconomic instability which in turn resulted in high inflation and volatility of their exchange rates. On the other hand, the region in general had very undeveloped capital markets, and virtually non-existent local currency bond markets. In fact, many of the bond markets started to develop with the Brady Bonds during the late 1980s and early nineties, which were in fact the result of a restructuring of the Latin American sovereign debt.

This macroeconomic instability led countries to denominate their debts in a currency they do not issue in order to attract foreign (and even domestic) investors. This phenomenon would later be labeled "original sin" by Barry Eichengreen and Ricardo Hausmann. Bonds issued in dollars would offer foreign investors a (somewhat) guaranteed return in that currency, but the issuing country could suffer severe balance sheet effects in the case of a currency depreciation, which could ultimately lead to a default on those debts.

Although the region has traveled a bumpy road, since the early 1990s most countries have continued a process of pro-market reforms. Central Bank independence, the taming of inflation, and financial stability. This has permitted the incipient development of domestic capital markets. Moreover, the accumulation of international reserves, a byproduct of the commodities price boom of the turn of the century, provided the region with exchange rate "insurance" that reduced foreign investors' worries about eventual currency depreciations.

During the last two decades, the combination of low inflation and macroeconomic stability brought about a tightening of not only foreign currency yields but also *local* currency ones. This allowed governments to issue local currency bonds to finance themselves, in some cases for the first time. After the global financial crisis, the environment of extremely low dollar interest rates led foreign investors to turn their attention to emerging markets' local currency bonds, which

seemed to offer a high(er) and stable (expected) rate of return in dollars. The influx of foreign capital lowered domestic local currency yields, which allowed the government to lower its financing cost. However, as with many things in finance, this blessing could eventually turn to a curse if investors' moods should change.

The rest of the paper is organized as follows. Section 2 revisits the literature review on this topic. Section 3 describes the data used. Section 4 presents the main empirical results of this paper. Section 5 dives into the non-linearities found in the previous section and discusses whether their threshold is reasonable. Section 6 indicates possible further lines of research. The paper concludes in Section 7.

2. Literature Review

As the local currency bond markets in emerging economies started to develop, so did the literature which looked into this phenomenon, and the foreign participation in those markets. Peiris (2010) runs a panel data regression on different determinants of the yields of 10 emerging market economies' sovereign bonds.[2] While he does not use only local currency bonds because of the lack of data at the time, he assumes they are, based on a survey by the BIS. He finds that a 1 percent increase in the share of foreign investors among bondholders reduces yields by about 6 basis points. He then uses a GARCH model to estimate their impact on yields' volatility, but he does not find this effect to be statistically significant.

Arslanalp and Tsuda (2014) compiled a database of emerging markets debt holdings, including 24 major economies from 2004 to mid-2013 (it has recently been expanded, and extended until mid-2021). They also find a change in the behavior of international investors before and after the global financial crisis. This database included harmonized statistics for this group of countries, which allowed further research on this topic to flourish. Most of the subsequent literature is based on this database.

This database also suggests that the answer to the question of whether foreign investors help to develop the local currency bond market or if they only come after it is already mature is complex and probably must be viewed on a case-by-case basis. In particular, Chile's case stands

[2] These determinants include the policy interest rates, inflation, fiscal deficit, foreign participation, the current account deficit, the United States long-term nominal Treasury bond yield, GDP growth, money growth and the debt to GDP ratio.

out, as it has a developed capital market by regional standards, while the share of foreign holdings of domestic bonds had been under 10 percent until late 2017 and remains under 20 percent to this day. There are many possible explanations for this (IMF, 2014), some of them being tax issues and the lack of actual fixed-rate *nominal* peso denominated instruments. In the IMF (2014) view, since international investors do not have liabilities linked to Chilean inflation, the fact that most peso-denominated bonds were inflation-indexed made them unattractive to foreigners. The difference between a "big" market and "liquid" one is also important, as these bonds may be difficult to trade if they are only bought and held *ad aeternum* by pension funds. Indeed, the IMF (2014) points out that daily transactions in the secondary market only averaged 3 percent of the stock back then.

Carvalho and Fidora (2015) use a vector error correction model for the mid-2000s in the euro area. They find that a one percent increase in foreign holdings leads to a reduction in the long-term interest rate of euro area debt securities of about 13 basis points.

Arslanalp and Poghosyan (2016) use panel data to determine the impact of foreign investors based on the government yields of advanced economies, which generally do not issue debt in foreign currency. They confirm that a one percentage point increase in the share of foreign investors in government debt reduces its yield between six and 10 basis points. They also break foreign investors by type and find that official investors have a slightly smaller impact than private ones (7 vs. 8.5 basis points), although the difference is not statistically significant.

Ebeke and Lu (2015) and Ebeke and Kyobe (2015) run an instrumental variables panel regression using the Arslanalp and Tsuda (2014) database for bond yield levels, and then another for their volatility. They instrument the share of foreign holdings in two ways: using the first two quarter lags and using a measure of "financial remoteness" (basically, the geographical distance of the country to financial centers). They find that foreign participation in emerging markets bonds reduces their yields but increases their volatility. In particular, Ebeke and Lu (2015) claim that a 10 percent increase in the share of foreign investors in the government bond market is associated with a reduction in yields between 60 to 80 basis points, very similar to the results in Peiris (2010).

Then there is the question whether foreign participation *always* lowers bond yields, or if this blessing could eventually become a curse. This insight is not new, and it goes back at least to Mexico's 1994 Tequila crisis, the first emerging countries debt event after Latin American countries developed a liquid (foreign currency) sovereign debt market. Calvo (1996, 1998) and Calvo and Mendoza (1996a, 1996b) review the Tequila crisis and point out the role of foreign

investors' positions in domestic (currency) bonds in explaining the unfolding of the event, as opposed to the "conventional" view of real or fiscal determinants. Later, Calvo (2000) argues that large capital inflows, especially when directed to short-term debt, magnify financial vulnerabilities. Moreover, to the extent that these inflows are seen as temporary, this could be in turn a factor coordinating expectations between a "good" and a "bad" equilibrium. Along the same lines, McKinnon (2013) highlights the interest rate differential between emerging markets and the United States as the driver behind "hot money" flows into domestic currency positions, which in turn he considers to be a main factor behind currency crises. Moreover, he argues that a flexible exchange rate regime only *worsens* the situation for emerging markets, as it amplifies the carry trade gains in good times and the currency depreciation afterwards.

Ebeke and Lu (2015) also find that, for countries with high levels of external debt or short-term debt, foreign participation no longer reduces bond yields and can even increase them. The authors also argue that countries with stronger macroeconomic fundamentals will experience (even) lower yields resulting from foreign participation in their bonds. Moreover, Ebeke and Kyobe (2015) distinguish between local and foreign currency-denominated bonds and find that foreign participation in bonds has no effect on either yields or volatility when these are denominated in foreign currency. They suggest that this is due to the absence of currency risk.

Based on the previous authors, Ho (2019) estimates the effect of foreign participation in local currency bonds' yield *spreads* for seven emerging Asian economies. The author uses spreads (instead of yields) because he considers that benchmarking against the US curve is necessary to control for market conditions. He finds that there is a nonlinear effect of their participation on the yield spreads, reducing them in "good" times but amplifying them in times of financial turbulence. He suggests that this is due to the currency risk component of the yield spread, and not so much to the credit risk component. The author similarly finds a nonlinear effect of foreign participation on yield spreads, depending on the expectations of a currency depreciation or appreciation.

Indeed, while debt capital flows in general are more affected by external factors (international liquidity conditions, advanced economies' monetary cycles) than local ones, a study by the IMF (2020) finds that domestic currency bond markets are more sensitive to each country's fundamentals. In particular, it points out that countries that rely too much on foreign investors in their domestic bond markets (controlling for the state of the economy) tend to experience higher yield volatility. This is because when global conditions are good, they say, capital flows enter

emerging markets in a broad way, but when international financial conditions tighten, they tend to pay more attention to the fundamentals of the country. In other words, domestic conditions do not matter much when attracting capital inflows, but strong economic fundamentals help to avoid strong capital *outflows*. They also find that, for countries with a low level of international reserves or shallow financial markets, foreign investors tend to increase yield volatility for domestic bonds.

Matsuoka (2020), using a generalized panel smooth transmission regression, confirms that an increase in foreign private holdings of government debt is associated with a reduction in its interest rate. While the author also uses local currency denominated debt in his estimations, he takes the 5-to-10 *forward* real interest rate as the dependent variable for his model. He uses the forward instead of the spot rate in order to exclude the effects of current economic conditions. Moreover, he also finds this result is reversed if the public debt-to-GDP ratio exceeds approximately 120 percent.

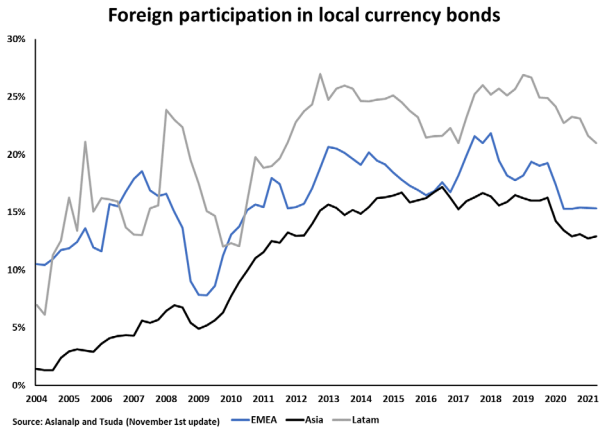
3. Data

I use monthly data throughout this paper. For monetary or financial variables, the data are used as retrieved. For those whose frequency is lower than monthly, the same value was repeated each month. In those cases, the lags used in the instrumentation procedure were constructed in order to avoid repetition.

Like most of the literature reviewed, this paper will rely on Arslanalp and Tsuda's (2014) database of foreign holdings of local currency debt. The original database included quarterly data for six Latin American countries (among others) from 2004 until mid-2013, and it has recently been updated to include seven Latin American countries' quarterly data from 2004 to mid-2021. These countries are Argentina, Brazil, Chile, Colombia, Mexico, Peru and Uruguay.

Figure 1 below displays the Aslanalp and Tsuda (2014) updated database. For all emerging markets regions, the foreign participation in local currency markets rose significantly from 2004 to 2012, with some notorious disinvestment during the global financial crisis. Then the share stabilized during the last decade, with another decrease since 2019. Foreign participation in Latin American domestic currency bonds was the highest among the three regions for most of the sample period. Furthermore, it began falling *before* the two biggest market shocks of the period, the global financial crisis and the covid crisis.

Figure 1.



For the dependent variable, the generic (theoretical) 5-year local currency bond yields from Bloomberg for these countries are used when available. Then the unadjusted spread is constructed subtracting the five-year U.S. Treasury bond taken from the FRED database.

There are two special cases. For most of the period under analysis, Uruguay's medium-term local currency bonds were inflation-adjusted. Only recently (2017) has the country issued longer-term fixed-rate bonds, but most of that issue has been acquired by only a few investors, making the quotes found in Bloomberg unreliable for this analysis. The yields for the indexed bonds were expressed in "real" terms (indexed-unit terms), which could be converted to nominal terms using some measure of expected inflation. This implicitly carries the very strong assumption that investors use the same inflation expectations measure (if any) as the one used here. The alternative is to use the Central Bank's "longer"-term bills (300 days and over), which is the one I chose. This potentially has the problem of choosing an instrument with a different maturity and therefore different implied term-premia, but the gains in liquidity against the alternative should outweigh the costs.

The other special case is Argentina. After the 2001 sovereign default, there were not many issuances of fixed-rate peso-denominated instruments. As with the case of Uruguay, most of the issuances were inflation-indexed for a while. Unlike its neighbor's case, however, inflation figures became unreliable between 2007 and 2015, and so not even the approach suggested in the previous example was feasible. At the same time, an incipient market of floating-rate bonds emerged at the turn of the century, which eventually became the benchmark for local currency debt. However, yields for those floating-rate bonds are not available in Bloomberg. To overcome this, a synthetic

bond was constructed using the market peso reference rate (private banks Badlar rate[3]) and the historical spread over it implicit in the sovereign bonds, which is about 2½ percentage points in nominal terms.

Several control variables were used in the regressions. Inflation measures were constructed using the year-on-year percentage change of the average consumer price index for each month. The indexes were taken from each country's statistics institute.

For the expected depreciation, the spread of the one-year non-deliverable forward of the exchange rate against the U.S. dollar against the spot rate is used, both taken from Bloomberg, and then subtracted the one-year U.S. Treasury bond.

$$Expected\ Depreciation_{i,t} = \frac{NDF_{i,t}}{Spot_{i,t}} - UST1YR_{i,t}$$

Although the term is not the same as those for the bond yields, they are more liquid than the alternatives and, more importantly, those are used more frequently in the market, even for longer underlying periods. To illustrate the point, it is convenient to note that for Peru, for instance, NDFs quotes only reach nine months' time (in Bloomberg at least). The corresponding adjustment was made for that case.

Data for international reserves and external trade were retrieved from the IMF's Data Template on International Reserves and Foreign Currency Liquidity (IRFCL) and the IMF's Direction of Trade Statistics (DOTS), respectively. Data for external debt, public debt and fiscal balance were retrieved from each country's institute of statistics and central bank, depending on the country. With the data of external trade and reserves I constructed an index of international reserves adequacy as the number of months of imports it represents. In other words, this variable is constructed as:[4]

$$Reserves/imports_{i,t} = 12 * \sum_{s=0}^{11} \frac{Reserves_{i,t-s}}{Imports_{i,t-s}}$$

[3] The private banks Badlar rate is the certificates of deposit interest rates for 30-35 days and over one million pesos deposits. It became the de facto reference rate for sovereign and corporate bonds issued in pesos. In particular, some sovereign Badlar bonds were almost as liquid in the secondary market as mutual funds.

[4] It is interesting to note that, on average, during this period these Latin American countries have covered an entire year of imports with their international reserves, as can be seen in Table 1.

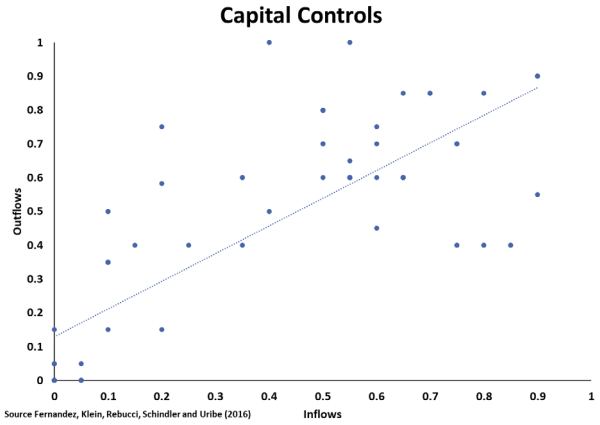
Similarly, I use the trade balance normalized by total trade as a proxy for the current account balance[5]. This variable would enter as both a measure of real appreciation and of currency risk. This variable is defined as:

$$Trade\ Balance_{i,t} = 2 * \sum_{s=0}^{11} \frac{Exports_{i,t-s} - Imports_{i,t-s}}{Exports_{i,t-s} + Imports_{i,t-s}}$$

The Latam Corporate Spread, a measure I will use as a proxy of market risk, is the ICE BofA Latin America Emerging Markets Corporate Plus Index, retrieved from FRED.

Capital controls indexes, both for inflows and for outflows, are taken from the Fernández et al. (2016) updated database. The indexes range from 0 (no controls) to 1, and the idea behind this breakdown instead of an aggregate measure is to determine whether there are different effects of each type. While this will prove to be the case, it is interesting to note that countries that impose capital controls to inflows also tend it to do it to outflows and vice versa, as depicted in Figure 2 (still, the distance to the 45-degree line is fairly large in several cases). These control variables are of particular interest, as several of the countries in the sample have experimented with them during this period for very different reasons, and because they were strangely overlooked in the previous literature.

Figure 2.



[5] I chose not to use the current account balance directly because most countries publish these data on a quarterly basis, whereas trade data are available on a monthly data. Therefore, I prioritized the higher frequency of the latter.

The share of local currency-denominated debt is taken from the Inter-American Development Bank.[6] The capital inflows variable is the sum of the *net portfolio* inflows to emerging markets compiled by the Institute of International Finance, in billions of dollars. Table 1 summarizes the data.

Table 1. Data Summary

Variable	Mean	Median	Std. Dev.	Min	Max
Spread	7.98	5.09	8.84	0.22	77.09
Foreign Participation	21.58	18.60	14.62	0.57	56.61
Expected Depreciation	7.46	3.77	12.53	-4.71	87.12
Inflation	7.72	4.55	9.35	-3.38	57.29
Fiscal Balance / GDP	-1.98	-2.03	2.96	-13.70	7.91
Capital Controls (inflows)	0.35	0.35	0.31	0	0.9
Capital Controls (outflows)	0.42	0.40	0.31	0	1
Public Debt / GDP	46.68	46.40	21.98	3.35	117.88
Latam Corporate Spread	6.47	6.27	1.45	4.15	13.47
Reserves / Imports (Months)	12.40	11.18	5.93	3.07	30.99
2 * Trade Balance / Trade	0.53	-0.15	4.82	-10.83	17.44
Share of Local Currency	65.54	67.79	23.77	15.29	99.78
Capital Inflows	1.56	1.02	3.60	-21.22	10.30
External Debt / GDP	38.44	35.46	17.14	15.42	114.59

There are some control variables that are usually used in this kind of settings that were considered but not used. For example, the level of international reserves in months of imports was favored among other indicators of reserve adequacy (IMF, 2015), such as reserves over GDP or reserves over M2. While all these indicators grow with the level of reserves, the two latter also do with the depreciation of the currency. This means that, everything else constant, the ratio would rise with a currency crisis. Therefore, I chose an indicator that was not sensitive to the exchange rate in that way.

Some measures of market risk other than the Latam Corporate Spread were tried in other specifications of the model. These include the CBOE's VIX volatility index, the Saint Louis Fed Financial Stress Index and the Ted Spread. However, the former seemed to better capture the type of market risk that affects particularly these Latin American domestic currency bonds, with the other two becoming redundant. Some authors used the individual country's monetary policy rate

[6] Unfortunately, the universe of "debt" of this database is not the same as that of Aslanalp and Tsuda (2014), but similar enough for practical purposes here.

as another control variable for other regions. While this seems perfectly reasonable, it would be inconvenient to do so for Latin America as not every country has a target rate as the monetary policy instrument, and some countries have changed their monetary regimes at least once during the period under analysis (Argentina, Uruguay).

3.1 A Brief Note Regarding Argentina

Most of the extreme values in Table 1 correspond to Argentina. This is especially the case for the bonds yield spreads, inflation, expected depreciation, public debt and capital controls. In fact, for the higher frequency variables (inflation, expected depreciation), these extreme values are several standard deviations away from the *extreme* values of the other Latin American countries. However, the specifications without Argentina perform *worse* than those with it, suggesting that the variability that the country adds improves the regression.[7] Moreover, since the specifications would change significantly (inflation and the expected depreciation could enter in levels instead of first differences), the comparison between the models would be somewhat limited.

4. Empirical Work

4.1 Methodology

The econometric model will try to determine the relationship between foreign investors' participation in Latin America's local currency debt markets and their yield spreads. Specifically, I will run a fixed effects panel data regression to determine the effect on yields of foreign investors' participation, adjusting for different market and country-specific states. As in Ho (2019) and Ebeke and Lu (2015), the regressors will be the share of foreign holdings, fundamental control variables and risk factors. Both the risk factors and the control variables were described in the previous section.

Interaction terms will be added to test the presence of non-linearities in the relationship between foreign holdings and yields spreads in some specifications. Like Ho (2019), within the control and interaction terms, risk measures will be added in first differences. This is because the expected depreciation, one of the interaction terms, proved to have a unitary root, as well as the inflation rate (mainly due to Argentina). This has the additional advantage of having a straightforward comparison with Ho (2019).

[7] The exception seems to be the coefficient of expected depreciation, as we will see in the next section.

The specified model is as follows:

$$y_{it} = \beta_1 Foreign_{it} + \beta_2 Foreign_{it} \times Interaction_{it}^{j} + \sum_{k} \gamma^k Control_{it}^{k} + \alpha_i + \varepsilon_{it}$$

where the interaction term is among the controls, and as we will see, it will change depending on the model particular specification. Therefore, the impact of foreign participation is $(\beta_1 + \beta_2 Interaction_{it}^{j})$. If β_2 proves to be statistically significant (and with the correct sign), then we would have found the non-linearity we are looking for.

In order to avoid eventual endogeneity issues, I will use an instrumental variables panel regression. That is, the share of foreign participation, the level of public debt to GDP, and the first differences of the inflation rate and the expected depreciation will be instrumented with their lags and the rest of the regressors, depending on the equation. Most of these instrumentations are due to possible endogeneity issues with the dependent variable, but there may also be eventual problems between foreign participation and capital controls.

On top of the control variables, some specifications include time controls. These are intended to capture every single common "external factor" that the regression may be missing. Because of this, no other (international) market conditions control will be included in these specifications, as time controls limit the ability to add variables that are not country-specific because of multicollinearity.

4.2 Results

Nine different specifications are presented in this section, more precisely in Table 2 below. The main differences between them are the presence of the most common control variables used in the literature, some other control variables I considered relevant, the addition of time controls, and the presence of interaction terms.

The first model is just the bond yield spreads against the share of foreign participation in local currency bonds, controlled only by time effects. Throughout most of the specifications, this variable has *not* proven to be statistically significant *per se*. However, the sign and magnitude of the effect on the spreads is pretty much in line with the literature in Models 1, 4, 5, 7 and 8 (between minus 4.5 and minus 12 basis points for each additional percentage point in the share of foreign holdings). In the rest of the models, which include those two where the pure effect of the variable results statistically significant, its coefficient lies between minus 22 and minus 29 extra points.

Interestingly, all these latter models account for time effects (most of the literature cited in the first section does not account for them).

Table 2. Regression Results for the Nine Models

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Foreign Participation	-0,0780	-0.2896*	-0.2417	-0.0539	-0.1241	-0.2793*	-0.0451	-0.0465	-0.2271
	(0.1074)	(0.1580)	(0.1514)	(0.0883)	(0.1569)	(0.1539)	(0.0759)	(0.0761)	(0.1764)
Public Debt		0.3692*	0.4184**	0.1866		0.3665*	0.0945	0.0953	0.3872
		(0.2068)	(0.2049)	(0.1574)		(0.2033)	(0.1227)	(0.1227)	(0.2475)
ΔExpected Depreciation		-0.5633**	-0.5203*	-0.8968**	-0.4931**	-1.6091***	-1.4443***	-1.4762***	-0.4981*
		(0.2867)	(0.2707)	(0.4562)	(0.2430)	(0.5493)	(0.2846)	(0.2965)	(0.2699)
Capital Controls (inflows)		23.433***	14.3914***	7.4888	11.6925**	21.4336***	14.0497	14.1979	21.2905***
		(8.3404)	(4.6068)	(5.9315)	(5.4553)	(7.9150)	(9.2570)	(9.1895)	(7.9115)
Capital Controls (outflows)		-46.0997***	-33.2350***	-22.1728***	-29.0718***	-42.6318***	-30.7614***	-30.9129***	-43.2084***
		(8.4403)	(4.9694)	(3.9296)	(5.0639)	(8.1692)	(9.1171)	(9.0567)	(8.8470)
Fiscal Balance		-1.0334***	-0.9172***	-0.8789**	-1.2399***	-1.0705***	-1.1770***	-1.1796***	-1.0897***
		(0.3497)	(0.1653)	(0.3656)	(0.4359)	(0.2452)	(0.4560)	(0.4545)	(0.2619)
Δinflation			0.0713	-0.3777	0.4066	-0.6319	-0.0825	-0.1252	0.1769
			(0.3915)	(0.2936)	(0.3893)	(0.3985)	(0.2079)	(0.2250)	(0.3116)
R / imports (months)			-0.2677**	-0.5362*	-0.5339	-0.2228**	-0.5688**	-0.5626**	-0.2593***
			(0.1254)	(0.3254)	(0.3354)	(0.1004)	(0.2812)	(0.2794)	(0.0832)
2 * Trade Balance / (X+M)			-0.1855	-0.4008	-0.0265				
			(0.3228)	(0.3048)	(0.3296)				
Local Currency			-0.1159	-0.1123	-0.1379**				
			(0.0767)	(0.1099)	(0.0572)				
ΔCorp Latam				2.0720***				0.5133**	
				(0.4995)				(0.2058)	
Capital Inflows				0.1456					
				(0.1008)					
External Debt					0.3085				
					(0.2297)				
Foreign Participation x ΔExpected Depreciation						0.0805***	0.0777***	0.0782***	
						(0.0253)	(0.0209)	(0.0207)	
Foreign Participation x Public Debt									-0.0009
									(0.0035)
Constant	-2.4615	-8.0830	0.5503	19.9014***	12.1471	-4.8981	17.9215***	17.8502***	-6.2634
	(8.9587)	(14.5616)	(13.7891)	(5.1551)	(11.8312)	(14.5083)	(2.5321)	(2.5600)	(16.1207)
Time Controls	Yes	Yes	Yes	No	Yes	Yes	No	No	Yes
R^2 (within)	0.2240	0.5745	0.5719	0.1997	0.5513	0.4858	0.3004	0.2943	0.5951
n	1,167	1,133	1,091	1,070	1,091	1,133	1,133	1,133	1,133

*Significant at the 90% level; **significant at the 95% level; ***significant at the 99% level

Maybe one of the biggest contributions of this paper is the assessment of the impact of capital controls. These control variables have been added since the second specification, and they have proven to be very significant, especially that of capital controls to *outflows*. It was to be expected that, with capital controls to outflows (inflows), the level of the interest rate should be lower (higher) in equilibrium, and this is what the outcomes are implying. Roughly speaking, the

effect of capital controls to outflows double that of those to inflows. Moreover, their magnitude is impressive (although, as we have seen these two come hand in hand, so they would basically net each other leaving broadly half of the magnitude of the capital controls to outflows).

The ratios of public debt to GDP, fiscal balance to GDP, and reserves to imports all enter the specifications with the expected sign and are statistically significant in general. This would suggest, predictably, that prudent fiscal policy and debt management lower a country's (domestic) yield spreads. Having a buffer of international reserves, as a proxy to an "insurance policy," also helps in that regard. Cavallo (2019) sums up the policy options countries have to prevent capital flow reversals, with these three determinants being of particular importance. Strong fiscal fundamentals seem to be paramount to financial stability.

Interestingly, the same seems not to be the case for some *external* fundamentals (excluding the measure of international reserves presented above). Our proxy of the monthly current account balance, as well as the ratio of external debt to GDP (included in Model 5) are not statistically significant when used in the specifications. This confirms IMF (2020), in that the sensitivity of domestic currency bond yields are becoming less sensitive to the level of external debt, and more sensitive to the level of international reserves.

This also leads us to the anomaly of these models. The (pure) effect of the change of the expected depreciation does not have predicted sign. This may be explained by the fact that most of the changes in this variable happen around the mean of it, which is very close to zero. Importantly, the median of the variable is *negative*. Meanwhile, we will be interested in the extreme outcomes of (the change in) this variable, where the result is unambiguous. On the other hand, the change in inflation, a control variable which was used in other studies, is not statistically significant in any of the specifications used. This suggests a possible case of omitted variable bias in previous works (possibly capital controls), or that the endogeneity problem is still present here. A more mundane explanation for this is that the term mismatch between the expected depreciation variable and the yield spread is more relevant than expected. Sadly, the measures used in the literature for the first term are not available for Latin American markets, as the FX markets are not as developed as those of their Asian (or advanced economies) peers.

Models 4 and 8, which do not use time controls, have (the change in) the Corporate Latam Index Spread entering the specifications both with the expected sign and statistically significant at the 99 percent level. This suggests that external factors affect the Latin American bond markets,

as in Calvo (1998, 2000), even for domestic currency-denominated instruments. However, the measure of portfolio net flows to emerging markets is not statistically significant once the other variable is taken into consideration.

Models 6 to 9 try different interaction terms. Model 9 includes an interaction between the share of foreign holdings and the ratio of public debt to GDP, as in Ebeke and Lu (2015) and Matsuoka (2020). However, this interaction did not prove to be statistically significant. Models 6 to 8, however, use the change in expected depreciation as the interaction term as in Ho (2019), and it is statistically significant and with the expected sign. This implies that foreign holdings raise (lower) yield spreads when there is a sudden change in expectations that predict a *big* currency depreciation (appreciation). I emphasize the word *big* here because, given the pure effect of foreign holdings in Model 6, a notorious expected depreciation is needed for the sign to change (though this is not the case for Models 7 and 8). How big and relevant this change has to be will be discussed in the next subsection.

Table 3 below summarizes the (demeaned) country-specific effects of each model. In general, these are only statistically significant when no time controls are added (Models 4, 7 and 8). This is unsurprising, as adding them basically floods each specification with (other) dummies. However, it is interesting to note that some countries play in the same ballpark throughout them, and that some other retain their order. This suggests that there could be some other variables explaining each country's idiosyncrasies.

Table 3. Demeaned Country-Specific Effects

	Argentina	**Brazil**	**Chile**	**Colombia**	**Mexico**	**Peru**	**Uruguay**
Model 1	13.63	-0.33	-9.48	-5.50	-2.43	-4.32	1.51
Model 2	14.46	-5.64	1.78	-4.21	0.70	-1.17	-11.20
Model 3	9.85	-0.89	4.45	-5.33	-0.76	1.06	-10.68
Model 4	12.43***	7.37**	-0.49**	-4.71**	-5.91*	-4.48*	-7.06*
Model 5	11.01	13.78**	-13.28	-1.83	-1.35	-6.78	-10.20
Model 6	13.33	-4.28	1.19	-4.79	-1.35	0.38	-9.20
Model 7	15.61***	4.89***	-4.44***	-3.09***	-7.21**	-6.31*	-3.89***
Model 8	15.62***	4.82***	-4.41***	-3.08***	-7.16**	-6.30*	-3.93***
Model 9	13.56	-4.02	1.55	-4.59	-1.52	-0.23	-9.26

* Significant at the 90% level; **significant at the 95% level; ***significant at the 99% level.

5. Change in Depreciation Expectations and Foreign Holdings as a Double-Edged Sword: How High Is (Not) Too High?

The impact of the interaction term described in Table 2 is shown in Figures 3 and 4, which represent Models 6 and 8, respectively (Model 7 is virtually the same as Model 8 for this purpose). They were constructed in order to show these effects during *severe* changes in the expected depreciation. The blue line in each graph represents the impact of each level of foreign holdings in local currency on the yield spreads, when the change in expected depreciation is of about minus 2 percentage points (percentile 5 of the distribution of that variable). Ten extra points in foreign holdings reduce the yield spread by 4 basis points according to Model 6 and by 2 basis points according to Model 8. Similarly, the black line in each graph represents the impact of each level of foreign holdings in local currency on the yield spreads, when the change in expected depreciation is of about 10 percentage points (percentile 99 of the distribution). In those cases, 10 extra percentage points in foreign holdings raise the yield spreads by about 5 and 7 basis points in Models 6 and 8, respectively.

Figure 3.

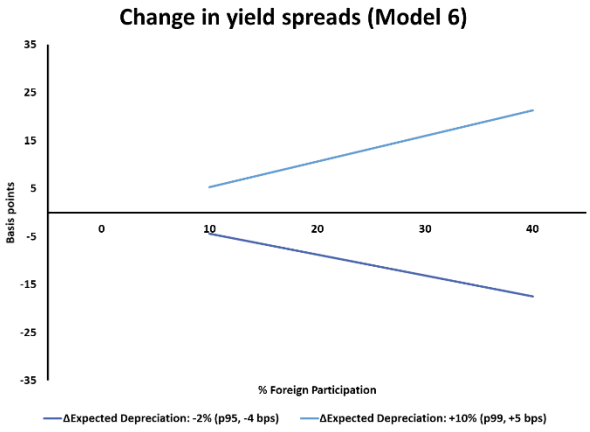
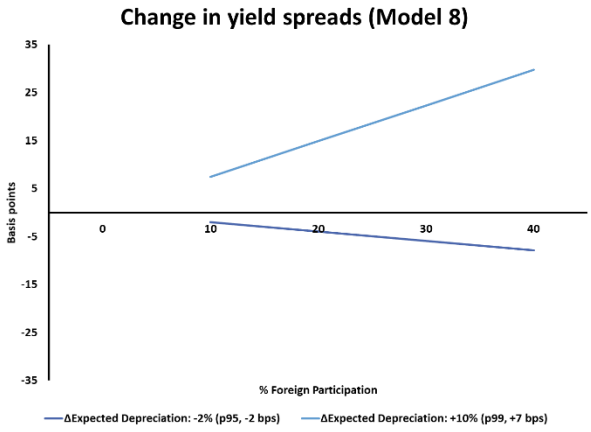


Figure 4.



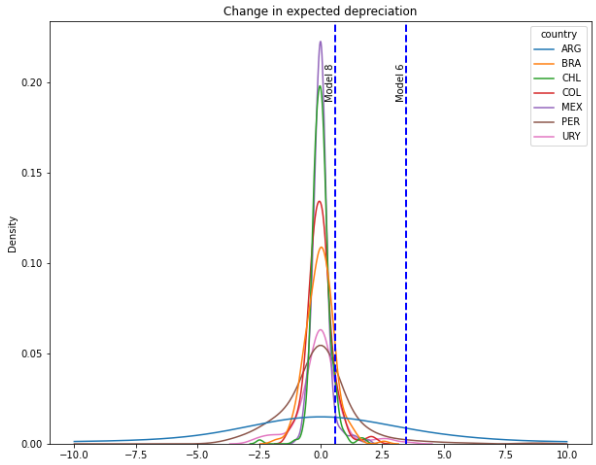
The reason behind the selection of percentiles, is that this phenomenon of the asymmetric impact of foreign holdings only presents in Model 8 with a change in the expected depreciation of about 3.47 percentage points in a month, which is around the 97th percentile of the variable. It is important to note that in Model 6, this happens at 0.57 percentage points (85th percentile).

These values may seem high at first, this is not necessarily the case. The results in Table 2 suggest that, effectively, foreign participation in domestic currency bond holdings *generally*

reduce bond yield spreads. Foreign investors choose to buy these bonds as long as their expected return, measured in dollars (or some other hard currency) is higher than buying a similar instrument denominated in that currency. To the extent that these positions are unhedged, foreign investors are subject to movements in the exchange rate, but during normal times they are not significant enough to undo a trading position, especially if this is costly. However, if there is a big change in depreciation expectations, then it might be justified to undo a position, raising the yields (even more). Also note that the magnitude of this percentiles seems quite small for the change in the 12-month expected depreciation.

Figure 5 shows the distribution of the change in expected depreciation for each country. The two blue lines represent the tipping points for this non-linearity for Model 6 and Model 8. Note that most of the countries are very centered around zero, except for Argentina, which has a great deal of variability (recall Subsection 3.1). Note that the breakeven for Model 8 does not seem to be anything extreme for several of the countries in the sample, and the same could be said for the one for Model 6 and Argentina. In fact, the breakeven for Model 8 almost seems like business as usual for that country, which would also describe both the high participation the country has in international portfolios and its violent swings.

Figure 5.



6. Further Research

There are many possible ways in which this line of research could be followed. The country-specific effects summarized in Table 3 and their relative stability suggest there could be some extra variables that could further explain not only the differences in yield spreads between countries, but also the yield spreads themselves. Moreover, it would be interesting to extend this analysis to other regions, also including advanced economies, to check whether there are region-specific idiosyncrasies, or between advanced economies and emerging ones.

Ebeke and Kyobe (2015) and Ebeke and Lu (2015) have looked into potential differences in the determinants of the yields between the periods before and after the global financial crisis. We have recently experienced yet another real and financial shock during the Covid-19 pandemic, with monetary and fiscal stimuli quite similar in order of magnitude to that previous crisis. A few years from now, when the data become available, it would be interesting to see if there is some kind of structural breakdown after this crisis as well.

This paper has analyzed foreign investors' impact on entering Latin American bond markets, but it is not clear *why and when* they do it, at least not from this exercise. Liquidity seems to be one important factor, but at the same time foreign investors are the ones expected to bring that liquidity. Whether it is liquidity that attracts foreign investors or it is foreign investors who come first is still unclear.

The effects of the change in the mood of international investors on emerging markets debt yields tends to be higher in those countries that have a lower credit rating. This could be because of a segmentation of the countries, but also of the investors, as some "real money" funds can only allocate their portfolio in "investment grade" assets. It would be interesting to see which of these segmentations apply, if not both.

7. Conclusion

This paper has attempted to estimate the impact of foreign participation in local currency bond yield spreads for Latin American countries. It is found that, in general, foreign investors tend to lower the yield spreads of domestic currency-denominated bonds. This was what to be expected, according to most of the literature. It is also found, however, that during extreme and volatile times, having a share of this debt in the hands of international holders could actually raise yield spreads.

Nonetheless, countries are not doomed to suffer these non-linearities. A sound fiscal policy, prudent debt management, and the accumulation of international reserves as an external buffer can minimize their effects. While this is textbook policy advice for governments, it also never hurts to emphasize it again.

Additional research is needed to generalize and confirm these results. Due to the increasing links and externalities between countries, and particularly between advanced and emerging economies, further study and understanding of the phenomenon of foreign investment in emerging economies is crucial.

References

Arslanalp, S., and T. Poghosyan. 2016. "Foreign Investor Flows and Sovereign Bond Yields in Advanced Economies." *Journal of Banking and Financial Economics* 2(6): 45-67.

Arslanalp, S., and T. Tsuda. 2014. "Tracking Global Demand for Advanced Economy Sovereign Debt." *IMF Economic Review* 62(3): 430-464.

Calvo, G.A. 1996. "Capital Flows and Macroeconomic Management: Tequila Lessons." *International Journal of Finance & Economics* 1(3): 207-223.

Calvo, G.A. 1998. "Varieties of Capital-Market Crises." In: G.A. Calvo and M. King, editors. *The Debt Burden and its Consequences for Monetary Policy*. International Economic Association Series. New York: United States: Palgrave Macmillan.

Calvo, G.A. 2000. "Balance-of-Payments Crises in Emerging Markets: Large Capital Inflows and Sovereign Governments." In: P. Krugman, editor. *Currency Crises*. Chicago, United States: National Bureau of Economic Research/University of Chicago Press.

Calvo, G.A., and E.G. Mendoza. 1996a. "Petty Crime and Cruel Punishment: Lessons from the Mexican Debacle." *American Economic Review* 86(2): 170-175.

Calvo, G.A., and E.G. Mendoza. 1996b. "Mexico's Balance-of-Payments Crisis: A Chronicle of a Death Foretold." *Journal of International Economics* 41(3-4): 235-264.

Carvalho, D., and M. Fidora. 2015. "Capital Inflows and Euro Area Long-Term Interest Rates." *Journal of International Money and Finance* 54: 186-204.

Cavallo, E.A. "International Capital Flow Reversals." Working Paper IDB-WP-1040. Washington, DC, United States: Inter-American Development Bank.

Ebeke, C., and Y. Lu. 2015. "Emerging Market Local Currency Bond Yields and Foreign Holdings—A Fortune or Misfortune?" *Journal of International Money and Finance* 59(C): 203-219.

Ebeke, C., and A.J. Kyobe. 2015. "Global Financial Spillovers to Emerging Market Sovereign Bond Markets." IMF Working Paper 2015/141. Washington, DC, United States: International Monetary Fund.

Fernández, A. et al. 2016. "Capital Control Measures: A New Dataset." *IMF Economic Review* 64: 548-574.

Ho, E. 2019. "The Double-Edged Sword of Foreign Participation in Local Currency Government Bond Markets," Hong Kong Monetary Authority Research Memorandum 14/2019.

IMF. 2014. “Chile: Selected Issues Paper.” IMF Staff Country Reports 2014.219 (2014), A001. Washington, DC, United States: International Monetary Fund.

IMF. 2015. “Assessing Reserve Adequacy—Specific Proposals.” IMF Policy Paper, March 2015. Washington, DC, United States: International Monetary Fund.

IMF. 2020. “Managing Volatile Portfolio Flows.” Global Financial Stability Report, April 2020. Chapter 3. Washington, DC, United States: International Monetary Fund.

Matsuoka, H. 2020. “Debt Intolerance: Threshold Level and Composition.” Policy Research Working Paper 9276. Washington, DC, United States: World Bank.

McKinnon, R. I. 2013. *The Unloved Dollar Standard: From Bretton Woods to the Rise of China.* OUP Catalogue, Oxford University Press.

Peiris, S.J. 2010. “Foreign Participation in Emerging Markets’ Local Currency Bond Markets.” IMF Working Papers 2010/088. Washington, DC, United States: International Monetary Fund.