GENEVA GRADUATE INSTITUTE
INTERNATIONAL ECONOMICS

Graduate Institute of International and Development Studies
International Economics Department
Working Paper Series

Working Paper No. HEIDWP19-2023

Local Currency Sovereign Debt Markets, Global Financial Conditions and the Role of Foreign Investors

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Local Currency Sovereign Debt Markets, Global Financial Conditions and the Role of Foreign Investors *

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November 2023

Abstract

This paper studies how the presence of foreign investors in local currency sovereign debt markets contributes to the transmission of global financial conditions to emerging market economies. My estimations indicate that the higher the share of local currency government bonds held by foreign investors, the more sensitive the credit risk of these bonds becomes to global financial shocks. When foreign investors' holdings reach 45 percent, the credit risk of local currency government bonds becomes as sensitive to global financial shocks as the credit risk of foreign currency government bonds. I also explore exogenous foreign investor outflows caused by an unanticipated announcement of country weight rebalancing in the J.P. Morgan GBI-EM Global Diversified index in March 2014. Countries that experienced foreign investor outflows also experienced a decrease in the sensitivity of their local currency sovereign debt markets to changes in global financial conditions.

Keywords: Emerging Market Economies, Local Currency Sovereign Debt, Credit Risk, Global Financial Conditions
JEL Codes: F34, G15, H63

*I am thankful to Ugo Panizza for his invaluable and constant feedback while I worked on this paper. I also thank Rui Esteves, Nathan Sussman, Cédric Tille, Tomas Williams, and seminar participants at the Geneva Graduate Institute and the University of Geneva for their insightful comments and suggestions. All errors are my own.
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1 Introduction

The crises that hit several emerging market economies in the 1990s highlighted the risks associated with external debt issued in foreign currency. To reduce vulnerabilities, many of these emerging market economies have put in place policies aimed at developing sovereign debt markets in local currency and promoting foreign participation in them. While successfully reducing the reliance on debt in foreign currency (Arslanalp and Tsuda, 2014; Du and Schreger, 2022; Onen et al., 2023), such efforts might have had the unintended consequence of amplifying global financial shocks to the domestic economy of these countries.

In this paper, I study whether the presence of foreign investors in local currency sovereign debt markets of emerging market economies contributes to the transmission of global financial conditions to these markets. I find that this is the case. Specifically, my estimations indicate that the higher the share of local currency government bonds held by foreign investors, the more sensitive the credit risk of these bonds becomes to global financial shocks. When foreign investors' holdings reach 45 percent, the credit risk of local currency government bonds becomes as sensitive to global financial shocks as the credit risk of foreign currency government bonds. My findings support the "original sin redux" hypothesis (Carstens and Shin, 2019). They are in line with recent research that shows that tighter global financial conditions lead foreign investors to reduce their exposure to local currency sovereign debt (Boermans and Burger, 2020; Bertaut et al., 2023) and cause an increase in the cost of borrowing for emerging market economies (Hofmann et al., 2020; 2022).

I establish these facts using data for 16 emerging market economies over the period 2012-2017 and by comparing how shocks from global financial conditions (proxied by the broad U.S. dollar index) affect sovereign spreads in country-year-weeks with different levels of foreign participation. I compare the response to global financial shocks of local currency credit spreads (Du and Schreger, 2016) with that of traditional foreign currency credit spreads and find that the presence of foreign investors has a statistically and economically significant effect on the transmission of global financial conditions to local currency credit spreads and no effect to their foreign currency counterparts.

On average, foreign currency credit spreads are more sensitive to global financial shocks than local currency credit spreads. However, I show that the difference between the sensitivities of the two types of sovereign spreads decreases as the presence of foreign investors in markets for local currency sovereign bonds increases. The sensitivity of foreign currency credit spreads does not vary. As mentioned, the sensitivity to global

financial shocks of local currency credit spreads becomes indistinguishable from that of foreign currency credit spreads when foreign investors hold 45 percent of local currency government bonds. This finding supports Du and Schreger's (2016) hypothesis that when foreign participation in a local currency sovereign debt market is high, foreign investors become the marginal investors of both types of sovereign debt. Consequently, at high levels of foreign participation in local currency sovereign debt markets, both credit risks should respond similarly to shocks by global financial conditions.[1]

My results are robust to estimation techniques that allow controlling for all possible shocks that may hit a country in a given time period and are not driven by the possible correlation between foreign participation with financial liberalization, the size of the banking sector, or currency mismatches on national balance sheets. I use the broad U.S. dollar index because recent research has established that this variable has become the key measure of global risk appetite after the 2008 global financial crisis (Avdjiev et al., 2019; Erik et al., 2020; Obstfeld and Zhou, 2023).

Further, my results are unlikely to be driven by endogeneity coming from reverse causality (the standard diversification argument suggests that countries with limited exposure to global shocks should attract foreign investors). I also allay concerns about causality by using an unanticipated announcement of country weight rebalancing in a benchmark index as a natural experiment to identify exogenous foreign flows (e.g., Pandolfi and Williams, 2020; Broner et al. , 2021). Specifically, I focus on the J.P. Morgan GBI-EM Global Diversified index as it has been shown that changes in its country weights are associated with sizable foreign investor flows (Arslanalp and Tsuda, 2015; Arslanalp et al., 2020). An event study based on the rebalancing of the index that took place in March 2014 corroborates my main finding, showing that countries that experienced foreign investor outflows also experienced a decrease in the sensitivity of their local currency sovereign debt markets to changes in global financial conditions.

Related Literature

This paper contributes to research on the financial fragility of emerging market economies. The literature on the "original sin" (Eichengreen and Hausmann, 1999; Eichengreen et al., 2005a, 2005b, 2007, 2023) has highlighted that countries that borrow abroad in foreign currency face financial stability risk associated with the presence of currency mismatches. The argument goes that a potential solution to this problem is to try to convince foreign

[1] Du and Schreger (2016) put forward their hypothesis describing the role of foreign investors in the transmission of "global risk aversion". Without any loss of generality, I use the term "global financial conditions" as it better conveys the idea of highly synchronized financial condition cycles across markets (Rey, 2013; Miranda-Agrippino and Rey, 2020).

investors to lend in local currency (another alternative is not to borrow from foreign investors at all). However, when countries borrow in local currency from foreign investors, they might expose the domestic economy to sudden changes in global financial conditions. Carstens and Shin (2019) call this problem the "original sin redux".

Contributions to the recent literature on original sin redux include Hofmann, Shim and Shin (2022) who use a portfolio-choice model to show that when global financial conditions tighten, foreign investors sell off their local currency sovereign holdings to limit losses due to the currency mismatches they had accumulated on their balance sheets.[2] Bertaut, Bruno and Shin (2023) and Boermans and Burger (2020) focus on the behavior of U.S. and Euro area investors and show that increases in the broad U.S. dollar index are associated with decreases in foreign holdings of local currency sovereign debt. Hofmann, Shim and Shin (2022) also show that increases in the broad U.S. dollar index are associated with increases in the credit risks of local currency sovereign debt. My paper contributes to the literature by showing that this response to the broad U.S. dollar index is conditional on foreign participation. Thus, my contribution ties together local currency sovereign debt markets, sensitivities in these markets to global financial conditions, and the role of foreign investors. My work also relates to Ho (2022). The key difference is that he focuses on a smaller group of Asian economies and studies how the presence of foreign investors interacts with exchange rate expectations.

As I compare the responses of the credit risk of local currency sovereign debt to global financial conditions with the response of its foreign currency counterpart, my work also relates to research on the drivers of credit risk of these two types of sovereign debt (e.g., Reinhart and Rogoff, 2011; Jeanneret and Souissi, 2016; Du and Schreger, 2016, 2022; Amstad et al., 2020). My paper contributes to this strand of the literature by showing that the difference in the sensitivity of credit risks of local and foreign currency sovereign debt is conditional on foreign participation in the local currency sovereign debt market.

As for my event study, a few other papers use unanticipated announcements of country weight rebalancing in benchmark indices to identify exogenous foreign investor flows. Using multiple-event study analysis, Williams (2018), Pandolfi and Williams (2020), and Broner, Martin, Padilfi and Williams (2021) demonstrate that announcements of increases in country weights of local currency sovereign debt benchmark indices trigger foreign investor inflows to these markets. My paper contributes to this strand of the literature by using such announcements as a way of identifying foreign investor outflows due to the

[2] Hofmann, Shim and Shin (2022) show that when the dollar appreciates against all currencies, the sell-off of holdings of country i is larger than when the dollar has an equivalent appreciation only against country i's currency. Their exposition is for dollar depreciation, but the same rationale applies to dollar appreciation since the model does not feature asymmetries.

heterogeneous impact that an increase in one country's weight has on others' weights.

The remainder of this paper is organized as follows. Section 2 briefly describes the data. Section 3 presents my main results on the role of foreign investors in the transmission of global financial conditions to local currency sovereign debt markets. Section 4 presents an event study where I explore exogenous foreign investor outflows. Section 5 concludes.

2 Data

I build a balanced weekly panel using data for 16 emerging market economies from January 2012 to December 2017. I focus on Brazil, Chile, China, Colombia, Hungary, Korea, Indonesia, Mexico, Malaysia, Peru, Philippines, Poland, Russia, Thailand, Türkiye, and South Africa. These countries have sizeable sovereign debt markets in local currency that are accessible by foreign investors (Arslanalp and Tsuda, 2015; Arslanalp et al., 2020).

My main dependent variable is the local currency credit spread built by Du and Schreger (2016).[3] I also report results that use the credit risk of foreign currency sovereign debt securities as the dependent variable. In this case, I use the CDS spread as a proxy (sourced from Datastream).[4] Throughout the paper, I use CDS spread and foreign currency credit spread interchangeably.

My key explanatory variable is the interaction between the broad U.S. dollar index (sourced from Datastream) and the share of foreign investor holdings of local currency sovereign debt (Arslanalp and Tsuda, 2014).[5] The first serves as a proxy for global financial conditions (Avdjiev et al., 2019; Erik et al., 2020; Obstfeld and Zhou, 2023), while the second quantifies foreign participation in local currency sovereign debt markets.

I adjust the original frequency of the data on spreads and the broad U.S. dollar index from daily to weekly. The weekly frequency better captures the transmission of global financial conditions to local currency sovereign debt markets than daily, as in some

[3] Du and Schreger (2016) define this spread as the difference between the sovereign yield and the same-tenor U.S. Treasury bond yield adjusted by the currency risk of the sovereign. They compute the currency risk based on cross-currency swap rates. I use data on local currency credit spreads available on Schreger's website. Several papers have used this measure to study the credit risk component of local currency sovereign debt securities (e.g., Hofmann et al., 2020, 2022; Du and Schreger, 2022; Ho, 2022; Devereaux and Wu, 2023).

[4] Both spreads are based on a 5-year tenor.

[5] Data on the share of foreign investor holdings of local currency sovereign debt for Korea is from ADB-supported "Asian Bond Markets Initiative".

Table 1: **Summary Statistics**

	Mean	Median	Std. Dev.	Obs.
Dependent Variables				
Weekly change in local currency credit spread (bps.)	-0.60	-0.52	17.55	4,901
Weekly change in CDS spread (bps.)	-0.40	-0.48	12.05	4,992
Key Explanatory Variables				
Weekly change in broad U.S. dollar index	0.06	0.06	0.72	4,992
Quarterly share of foreign investor holdings of local currency sovereign debt in the previous quarter (percent)	23.00	20.82	13.94	4,940

Note: This table reports summary statistics for dependent and key explanatory variables over the period 2012-2017.

markets, bondholders cannot liquidate their assets on the same day.[6] I use the data on the share of foreign investors of local currency sovereign debt in their original quarterly frequency.

Table 1 reports summary statistics for the dependent and key explanatory variables. Weekly changes in local currency credit spreads and CDS spreads have similar mean, median, and standard deviations. However, there are large cross-country differences (Table A.1). To eliminate the possibility of having results driven by country-specific volatility, I standardize these variables by country.[7]

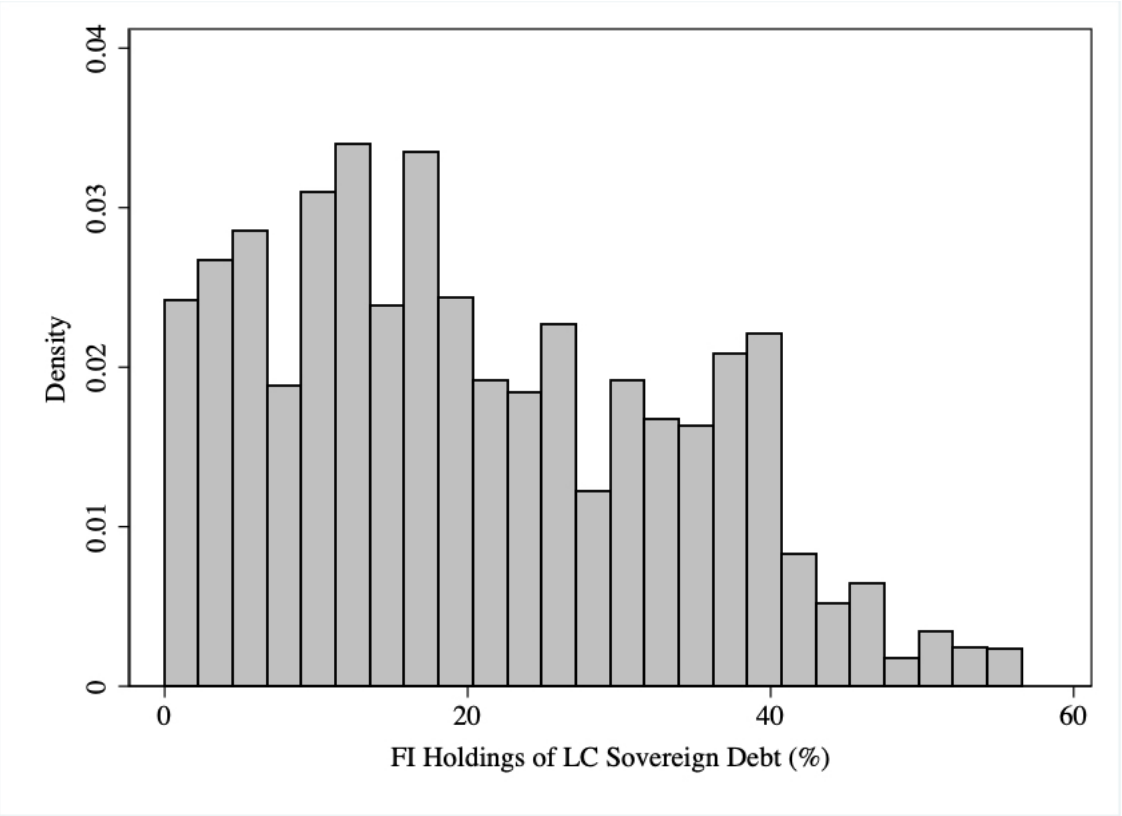
As for foreign participation, the average share of foreign investor holdings of local currency sovereign debt is 23 percent (Table 1). The median share of foreign investor holdings is slightly smaller than the mean, indicating that the distribution could be skewed to the right. Figure 1 confirms the positive skewness but shows that approximately half of the distribution concentrates around 10 to 35 percent foreign participation levels.

I also control for additional global and country-specific factors that influence spreads. Global factors include the VIX index and the 5-year U.S. Treasury yield (both sourced from Datastream). The country-specific factors are: a measure of 5-year exchange rate forward premium based on cross-currency swap rates (Du and Schreger, 2016), a measure

[6]For instance, until September 2021, Brazilian local currency sovereign bonds could only be liquidated one day after placing the sell order (Brazilian Ministry of Finance, 2021). I make the adjustment using the last-traded day of the week. In the case of data on local currency credit spread for Brazil (Du and Schreger, 2016), if the last-traded day of the week falls on the last-traded day of the year, I take the previous day's value. I make this adjustment given the atypical but recurrent, one-day fall in this spread around those last days of the year (Figure A.1).

[7]For each country i's observation value, I subtract country i's sample mean and divide the difference by country i's sample standard deviation.

Figure 1: **Foreign Participation**



Note: This figure plots the distribution of shares of foreign investor holdings of local currency sovereign debt (Arslanalp and Tsuda, 2014) over the period 2012-2017.

of the bid-ask spread for the underlying asset of the dependent variable (Christopoulos, 2021), the domestic short-term monetary policy rate (sourced from BIS), and the total sovereign debt over GDP (Arslanalp and Tsuda, 2014).

In my robustness checks, I also control for the volume of deposit money banks' assets over GDP (Čihák et al., 2012) and net external debt liabilities in foreign currency over GDP (Bénétrix et al., 2019).

3 The Role of Foreign Investors

3.1 Baseline Model

I begin by assessing the responses of spreads to changes in the broad U.S. dollar index conditional on foreign participation in local currency sovereign debt markets. My baseline model builds on previous work by Ebeke and Lu (2015) and Ho (2022). Formally, I estimate the following model:

$$\Delta Spread_{i,t_w} = \beta_1 Spread_{i,t_w-1} + \Delta Dollar_{t_w}(\delta_1 + \delta_2 \widetilde{FI}_{i,t_q-1}) + \gamma_1 \widetilde{FI}_{i,t_q-1} + \sum_k \lambda_k \Delta Z^k + \mu_i + \nu_{t_q} + \varepsilon_{i,t_w}, \quad (1)$$

where $\Delta Spread_{i,t_w}$ is the standardized change from $t_w - 1$ to t_w of either the local currency credit spread ($\Delta LCCS_{i,t_w}$), or the foreign currency credit spread ($\Delta CDS_{i,t_w}$), for country i. $\Delta Spread_{i,t_w-1}$ is its lagged value. $\Delta Dollar_{t_w}$ is the standardized change of the broad U.S. dollar index, with a positive change indicating a dollar appreciation. $\widetilde{FI}_{i,t_q-1}$ is the demeaned share of foreign investor holdings of local currency sovereign debt in the previous quarter.[8] Although the standard diversification argument suggests that countries with limited exposure to global financial shocks should attract foreign investors, I use lagged values to mitigate any concern about endogeneity coming from reverse causality.

The set of controls $\sum_k \Delta Z^k$ includes the VIX index (ΔVIX_{t_w}), the 5-year U.S. Treasury yield ($\Delta US\ yield_{t_w}$), the 5-year exchange rate forward premium ($\Delta Forward_{i,t_w}$), the bid-ask spread of the underlying asset of the depended variable ($\Delta BidAsk_{i,t_w}$), the domestic short-term monetary policy rate ($\Delta Policy_{i,t_w}$), and the total sovereign debt over GDP ($\Delta Debt_{i,t_q}$). All variables are in standardized changes except the domestic short-term monetary policy rate and the total sovereign debt over GDP, which are in percentage points.

Equation 1 also includes country fixed effects μ_i, quarter-year fixed effects ν_{t_q}, and the error term ε_{i,t_w}.

From Equation 1, we can assess how the presence of foreign investors in local currency sovereign debt markets affects the transmission of global financial conditions by looking at the partial derivative of $\Delta Spread_{i,t_w}$ with respect to $\Delta Dollar_{t_w}$:

$$\frac{\partial \Delta Spread_{i,t_w}}{\partial \Delta Dollar_{t_w}} = \delta_1 + \delta_2 \widetilde{FI}_{i,t_q-1}.$$

Thus, δ_1 measures the relationship between spreads and global financial conditions for a country with an average level of foreign participation in its local currency sovereign debt market (when $\widetilde{FI}_{i,t_q-1} = 0$). Meanwhile, δ_2 measures how the level of foreign participation influences this relationship. δ_2 is my key coefficient of interest.

Column 1 of Table 2 reports the estimates of Equation 1 using the local currency credit spread. At the average level of the share of foreign investor holdings of local currency

[8] $\widetilde{FI}_{i,t_q-1} = FI_{i,t_q-1} - \overline{FI}$, where $\overline{FI}$ is the sample mean of the share of foreign investor holdings.

sovereign debt, I find that an increase of one standard deviation in the broad U.S. dollar index is associated with an increase in local currency credit spread of nearly 0.1 standard deviation. The positive and statistically significant estimate of δ_1 shows that a local currency sovereign debt market with an average level of foreign participation is sensitive to changes in global financial conditions

More importantly for my analysis, I also find that δ_2 is positive and statistically significant. A ten percentage point increase in the share of foreign investor holdings adds approximately an extra 0.05 standard deviation to the response of the local currency credit spread associated with a one standard deviation increase in the broad U.S. dollar index. Therefore, local currency sovereign debt markets with higher foreign participation are more sensitive to global financial shocks.

Although country and quarter-year fixed effects control separately for time-invariant country-specific characteristics and unobservable shocks common to all countries at a quarterly frequency, they do not control for slow-moving country-specific institutional changes that may affect spreads. To address this issue, I augment the baseline model with interactive country-quarter-year fixed effects (Column 2 of Table 2). Although using these interactive fixed effects does not allow me to estimate the coefficient of the share of foreign investor holdings by itself (γ_1), I can still estimate δ_1 and δ_2. The results are essentially identical to the estimates of Column 1.

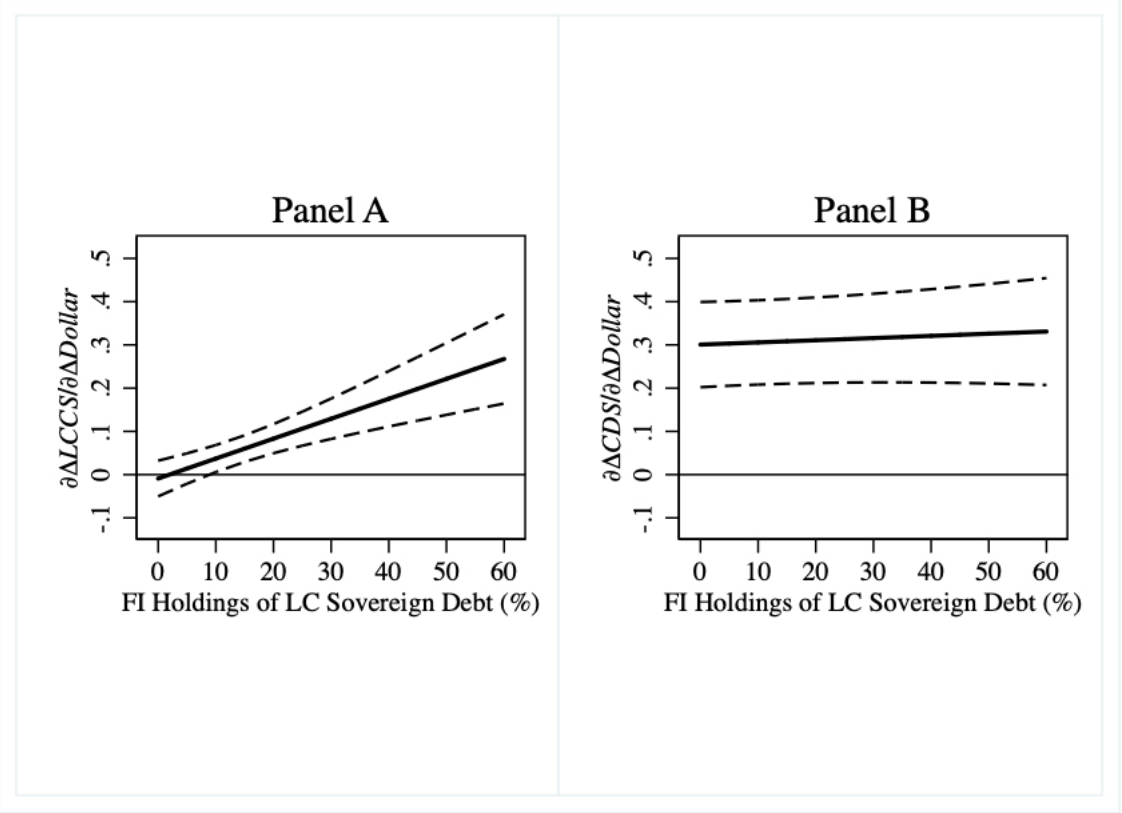
To probe further, I also include country and week-year fixed effects in the baseline model (Column 3 of Table 2). The use of week-year fixed effects allows for controlling for unobservable global shocks taking place at higher frequencies. In this case, I can no longer estimate δ_1, but the estimate of δ_2 remains essentially the same.[9]

The influence of foreign investors in the transmission of global financial conditions to local currency sovereign debt markets is also economically significant. Panel A of Figure 2 plots the responses of the local currency credit spread to changes in the broad U.S. dollar index along the distribution of shares of foreign investor holdings of local currency sovereign debt.[10] The responses are the marginal effects based on estimates reported in Column 1 Table 2. Panel A of Figure 2 shows that the local currency credit spread starts responding to changes in the broad U.S. dollar index from a level of foreign participation in local currency sovereign debt markets of around 10 percent. As the presence of foreign

[9]The large time dimension of my panel should be enough to mitigate concerns about Nickell's (1981) bias from including the lagged dependent variable as a control in Equation 1. However, excluding it produces similar results (Appendix Table A.3).

[10]For this exercise, I present estimation results using FI_{i,t_q-1}, rather than $\widetilde{FI}_{i,t_q-1}$. The equations are essentially the same. The only difference is that δ_1 in the equation with $\widetilde{FI}_{i,t_q-1}$ is the elasticity at the sample mean. In contrast, δ_1 is the elasticity at zero in the equation with FI_{i,t_q-1}.

Figure 2: **Baseline Estimated Marginal Effects**



Note: This figure plots marginal effects of local currency credit spreads ($\Delta LCCS_{i,t_w}$) and foreign currency credit spreads ($\Delta CDS_{i,t_w}$), respectively, with respect to the broad U.S. dollar index ($\Delta Dollar_{t_w}$) conditional on the share of foreign investor holdings of local currency sovereign debt (FI_{i,t_q-1}). Marginal effects are based on estimation results reported in Columns 1 and 4 of Table 2. Dashed lines are 95 percent confidence bands.

investors increases in these markets, the response increases substantially.

Next, I look at the response of the foreign currency credit spread in Columns 4, 5, and 6 of Table 2. I find that δ_1 is more than three times larger than when using the local currency credit spread as the dependent variable (compare Columns 1 and 2 with Columns 4 and 5). Specifically, at the average level of the share of foreign investor holdings of local currency sovereign debt, an increase of one standard deviation in the broad U.S. dollar index is associated with an increase in the foreign currency credit spread by more than 0.3 standard deviation.

However, the estimate of δ_2 is virtually zero when using the foreign currency credit spread as the dependent variable. Therefore, the transmission of global financial shocks to foreign currency debt markets does not depend on the presence of foreign investors in local currency sovereign debt markets. This is not surprising as foreign investors hold essentially all sovereign debt in foreign currency. Therefore, what happens in markets

Table 2: **Baseline Estimations**

	$\Delta LCCS_{i,t_w}$			$\Delta CDS_{i,t_w}$		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta LCCS_{i,t_w-1}$	-0.0921***	-0.121***	-0.101***			
	(0.0207)	(0.0231)	(0.0208)			
$\Delta CDS_{i,t_w-1}$				-0.0800	-0.0988*	-0.0788**
				(0.0527)	(0.0531)	(0.0331)
$\Delta Dollar_{t_w}$	0.0969***	0.0962***		0.312***	0.311***	
	(0.0188)	(0.0197)		(0.0509)	(0.0530)	
$\widetilde{FI}_{i,t_q-1}$ (×10)	-0.0281		-0.0285	-0.0270		-0.0278
	(0.0196)		(0.0197)	(0.0194)		(0.0191)
$\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1}$ (×10)	0.0461***	0.0444***	0.0485***	0.00504	0.00591	0.00990
	(0.0108)	(0.0113)	(0.0110)	(0.00760)	(0.00783)	(0.00777)
ΔVIX_{t_w}	0.112***	0.112***		0.335***	0.332***	
	(0.0281)	(0.0290)		(0.0570)	(0.0585)	
$\Delta US\ yield_{t_w}$	-0.284***	-0.282***		0.0392	0.0390	
	(0.0321)	(0.0346)		(0.0888)	(0.0923)	
$\Delta Forward_{i,t_w}$	-0.580***	-0.583***	-0.614***	0.145***	0.147***	0.0964***
	(0.0369)	(0.0388)	(0.0342)	(0.0301)	(0.0332)	(0.0207)
$\Delta BidAsk_{i,t_w}$	0.0383**	0.0377**	0.0341**	0.116***	0.113***	0.0630**
	(0.0172)	(0.0181)	(0.0156)	(0.0352)	(0.0352)	(0.0266)
$\Delta Policy_{i,t_w}$	0.378***	0.292***	0.312***	0.373*	0.356	0.311*
	(0.0868)	(0.0621)	(0.0870)	(0.222)	(0.243)	(0.186)
$\Delta Debt_{i,t_q}$	0.0299***		0.0308***	0.0271***		0.0277***
	(0.0111)		(0.0114)	(0.00920)		(0.00930)
Observations	4722	4720	4722	4722	4720	4722
Countries	16	16	16	16	16	16
Country FE	✓		✓	✓		✓
Quarter-Year FE	✓			✓		
Country×Quarter-Year FE		✓			✓	
Week-Year FE			✓			✓
Adjusted R^2	0.359	0.351	0.418	0.360	0.336	0.629

Note: This table reports the estimates of Equation 1 for a weekly panel over the period 2012-2017. The dependent variables local currency credit spread ($\Delta LCCS_{i,t_w}$) and foreign currency credit spread ($\Delta CDS_{i,t_w}$) are in standardized changes and based on a 5-year tenor. The broad U.S. dollar index ($\Delta Dollar_{t_w}$), the VIX index (ΔVIX_{t_w}), the 5-year US Treasury yield ($\Delta US\ yield_{t_w}$), the 5-year exchange rate forward premium ($\Delta Forward_{i,t_w}$), and the bid-ask spread ($\Delta BidAsk_{i,t_w}$), are also in standardized changes. The domestic monetary policy rate ($\Delta Policy_{i,t_w}$) and the total sovereign debt over GDP ($\Delta Debt_{i,t_q}$) are in percentage point changes. The demeaned share of foreign holdings of local currency sovereign debt ($\widetilde{FI}_{i,t_q-1}$), and its interaction ($\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1}$), are multiplied by 10 for readability. t_w and t_q indicate that variables are in weekly and quarterly frequencies, respectively. Driscoll-Kraay standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

for sovereign debt in local currency does not influence the sensitivity of the credit risk of foreign currency government bonds to global financial shocks.

Note, however, that this finding also provides "placebo" evidence in support of the role of foreign investors in the transmission of global financial shocks to local currency sovereign debt markets. If the relationship between the credit risk of a country's foreign currency government bonds and shocks in global financial conditions were conditional on the foreign presence in its local currency sovereign debt market, that would have raised questions about whether my positive and statistically significant estimates of the role of foreign investors in Columns 1, 2, and 3, were not simply the result of omitted variable bias. For instance, if the share of foreign investors' holdings of local currency government bonds influenced the credit risk of foreign currency government bonds, as it influences the credit risk of local currency government bonds, it could have been possible that factors not captured in my model were affecting foreign participation in local currency sovereign debt markets and also directly influencing the two types of credit risk.

Panel B of Figure 2 plots the response of the foreign currency credit spread to changes in the broad U.S. dollar index along the distribution of shares of foreign investor holdings of local currency sovereign debt. It illustrates the unconditional response of the foreign currency credit spread to changes in the broad U.S. dollar index.

I also extend my baseline model to test for asymmetries across dollar appreciation and depreciation events. I do not find strong evidence supporting the existence of these asymmetries. In this extension, I estimate the following model:

$$\begin{aligned}\Delta Spread_{i,t_w} = \beta_1 \Delta Spread_{i,t_w-1} + \Delta Dollar_{t_w}(\delta_1 + \delta_2 \widetilde{FI}_{i,t_q-1} \\ + \theta_1 D_{t_w} + \theta_2 \widetilde{FI}_{i,t_q-1} \times D_{t_w}) + \gamma_1 \widetilde{FI}_{i,t_q-1} + \theta_3 \widetilde{FI}_{i,t_q-1} \times D_{t_w} + \theta_4 D_{t_w} \\ + \sum_k \lambda_k \Delta Z^k + \mu_i + \nu_{t_q} + \varepsilon_{i,t_w},\end{aligned}$$

where D_{t_w} is a dummy variable that takes value 1 if the dollar depreciates and value 0 otherwise.

Appendix Table A.2 shows that the relationship between local currency credit spread and the broad U.S. dollar is stronger when foreign participation is higher, regardless of the direction of the change in the broad U.S. dollar index. Although the role of foreign investors is larger during dollar appreciation events ($\delta_2 = 0.056$) than depreciation ones ($\delta_2 + \theta_2 = 0.034$), the difference ($\theta_2$) is not statistically significant (Column 1 of Appendix Table A.2).

3.2 Three-Way Panel

In this subsection, I use a three-way panel to formally test for differences in the responses of the two types of spreads at various levels of foreign participation in local currency sovereign debt markets. This approach allows me to fully control for unobserved heterogeneity at the country-week-year level.

I re-arrange my panel by stacking up credit risks associated with both types of sovereign debt. This structure allows me to exploit the country, currency of issuance, and time dimensions of my data. I start with a set of parsimonious fixed effects and estimate the following model:

$$\begin{aligned}\Delta Spread_{i,c,t_w} = \beta_1 \Delta Spread_{i,c,t_w-1} + \Delta Dollar_{t_w}(\delta_1 + \delta_2 \widetilde{FI}_{i,t_q-1} \\ + \phi_1 LC_{i,c} + \phi_2 \widetilde{FI}_{i,t_q-1} \times LC_{i,c}) + \phi_3 \widetilde{FI}_{i,t_q-1} \times LC_{i,c} + \gamma_1 \widetilde{FI}_{i,t_q-1} \\ + \sum_k \Delta Z^k (\lambda_k + \omega_k LC_{i,c}) + \mu_{i\times c} + \nu_{t_q} + \varepsilon_{i,t_w}, \end{aligned} \tag{2}$$

where $LC_{i,c}$ is a dummy variable that takes value 1 if $\Delta Spread_{i,c,t_w}$ corresponds to the standardized change of the local currency credit spread ($\Delta LCCS_{i,t_w}$), and value 0 if it corresponds to the standardized change of the foreign currency credit spread ($\Delta CDS_{i,t_w}$). To model differences in the responses along the distribution of the various levels of foreign participation in local currency sovereign debt markets, $LC_{i,c}$ enters Equation 2 interacting separately with: the standardized change of the broad U.S. dollar index ($Dollar_{t_w}$), the demeaned share of foreign investor holdings of local currency sovereign debt in the previous quarter ($\widetilde{FI}_{i,t_q-1}$), and their interaction term ($Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1}$).

Equation 2 includes interaction terms between the dummy variable $LC_{i,c}$ and the set of controls $\sum_k \Delta Z^k$ to allow for heterogenous coefficients across the currency of issuance dimension. The set of controls $\sum_k \Delta Z^k$ is defined as in Equation 1.

Equation 2 also includes interactive country-currency fixed effects $\mu_{i\times c}$ to control for time-invariant characteristics specific to each local and foreign sovereign debt market. Quarter-year fixed effects ν_{t_q} and the error term ε_{i,c,t_w} complete the model.

In the set-up of Equation 2, I need to evaluate the partial derivative of $\Delta Spread_{i,c,t_w}$ with respect to $\Delta Dollar_{t_w}$ for the local currency credit spread ($LC_{i,c} = 1$) and for the foreign currency credit spread ($LC_{i,c} = 0$). I first examine the case of the foreign currency credit spread because it is set up in my three-way panel as the base level:

$$\left.\frac{\partial \Delta Spread_{i,c,t_w}}{\partial \Delta Dollar_{t_w}}\right|_{LC_{i,c}=0} = \delta_1 + \delta_2 \widetilde{FI}_{i,t_q-1},$$

where δ_1 and $\delta_2 \widetilde{FI}_{i,t_q-1}$ jointly model the relationship between the foreign currency credit spread and global financial conditions. Given the estimates of Column 4 of Table 2, I expect that $\delta_1 > 0$ and $\delta_2 = 0$.

The partial derivative for the local currency credit spread is:

$$\left.\frac{\partial \Delta Spread_{i,c,t_w}}{\partial \Delta Dollar_{t_w}}\right|_{LC_{i,c}=1} = \delta_1 + \phi_1 + (\delta_2 + \phi_2) \widetilde{FI}_{i,t_q-1},$$

where $\delta_1 + \phi_1$ measures the relationship between the local currency credit spread and global financial conditions for a country with an average level of foreign participation in its local currency sovereign debt market, whereas $\delta_2 + \phi_2$ measures how the level of foreign participation influences this relationship.

Columns 1 and 4 of Table 2 suggest that a country with an average level of foreign participation has a smaller response of its local currency credit spread than of its foreign currency credit spread to a change in the broad U.S. dollar index. Thus, I expect that $\phi_1 < 0$. Since I expect $\delta_2 = 0$, the role of foreign investors in the transmission of global financial conditions to local currency sovereign debt markets can only be relevant if $\phi_2 > 0$.

Column 1 of Table 3 reports estimates of Equation 2. They confirm all priors discussed above. I find that δ_1 is positive and statistically significant, whereas the estimate of δ_2 is virtually zero. Taken together, estimates of δ_1 and δ_2 show that the foreign currency credit spread responds positively to an increase in the broad U.S. dollar index, and its response is not affected by foreign participation in local currency sovereign debt markets.

Turning to the local currency credit spread, I find ϕ_1 to be negative and statistically significant. Thus, for a country with an average level of foreign investor participation in its local currency sovereign debt market, the local currency credit spread responds less than the foreign currency credit spread to an increase in the broad U.S. dollar index. Finally, the estimate of ϕ_2 is positive and statistically significant, confirming the relevance of foreign investors for the transmission of global financial conditions to local currency sovereign debt markets.

Estimates of ϕ_1 and ϕ_2 are stable and statically significant across different fixed-effect combinations. While Column 1 of Table 3 reports results from an estimation with

Table 3: **Three-Way Panel Estimations**

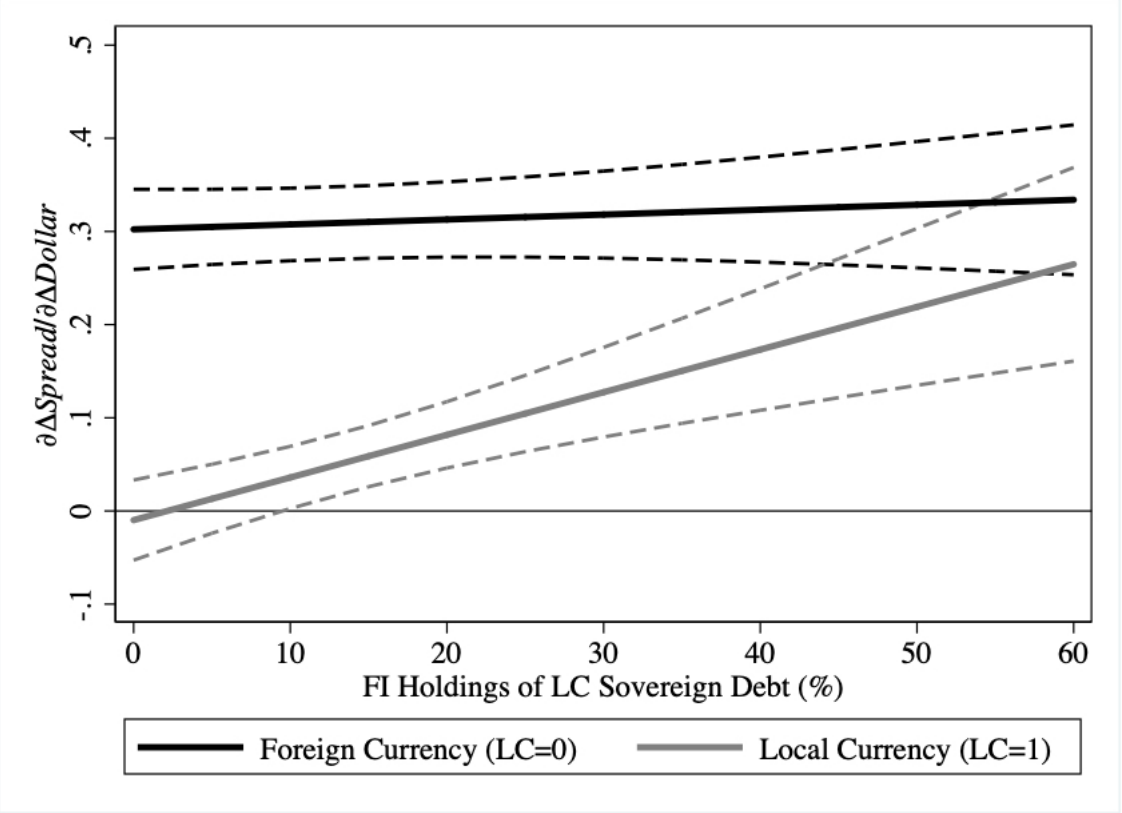
	$\Delta Spread_{i,c,t_w}$			
	(1)	(2)	(3)	(4)
$\Delta Dollar_{t_w}$	0.314***	0.309***		
	(0.0501)	(0.0529)		
$\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1}$ (×10)	0.000529	0.000637	0.000895	
	(0.000756)	(0.000788)	(0.000767)	
$\Delta Dollar_{t_w} \times LC_{i,c}$	-0.219***	-0.210***	-0.221***	-0.222***
	(0.0407)	(0.0431)	(0.0409)	(0.0413)
$\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1} \times LC_{i,c}$ (×10)	0.0405***	0.0367***	0.0401***	0.0406***
	(0.00835)	(0.00836)	(0.00825)	(0.00812)
Observations	9530	9528	9530	9444
Countries	16	16	16	16
Country×Currency FE	✓		✓	
Quarter-Year FE	✓			
Country×Currency×Quarter-Year FE		✓		
Week-Year FE			✓	
Currency FE				✓
Country×Week-Year FE				✓
Adjusted R^2	0.354	0.341	0.473	0.522

Note: This table reports estimates of Equation 2 for a weekly panel over the period 2012-2017. The dependent variable spread ($\Delta Spread_{i,c,t_w}$) is in standardized changes and based on a 5-year tenor. The spread corresponds to the local currency credit spread ($\Delta LCCS_{i,t_w}$) when the dummy variable $LC_{i,c}$ takes value 1, and to the foreign currency credit spread ($\Delta CDS_{i,t_w}$), otherwise. The broad U.S. dollar index ($\Delta Dollar_{t_w}$) is also in standardized changes. The interaction between the broad U.S. dollar index with the demeaned share of foreign holdings of local currency sovereign debt ($\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1}$) and the interaction of the latter with the dummy variable for local currency sovereign spread ($\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1} \times LC_{i,c}$) are multiplied by 10 for readability. Other controls in Equation 2 are not reported for conciseness. t_w and t_q indicate that variables are in weekly and quarterly frequencies, respectively. Driscoll-Kraay standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

only currency-country and quarter-year fixed effect, Columns 2, 3, and 4 of Table 3 report results when also using, respectively: country-currency-quarter-year fixed effects, country-currency with week-year fixed effects, and currency with country-week-year fixed effects.

With my three-way panel, I can replicate the same levels of controlled unobserved heterogeneity obtained with my baseline estimations. For instance, jointly estimating these responses with country-currency and quarter-year fixed effects in the set-up of Equation 2 (Column 1 of Table 3) corresponds to separately estimating them with country and quarter-year fixed effects in the set-up of Equation 1 (Columns 1 and 4 of Table 2). Similarly, estimating Equation 2 with country-currency-quarter-year fixed effects (Column

Figure 3: **Three-Way Panel Estimated Marginal Effects**



Note: This figure plots marginal effects of spread ($\Delta Spread_{i,c,t_w}$) with respect to the broad U.S. dollar index ($\Delta Dollar_{t_w}$) conditional on the share of foreign holdings of local currency sovereign debt (FI_{i,t_q-1}). Marginal effects are based on estimation results reported in Column 1 of Table 3. Dashed lines represent 95 percent confidence bands.

2 of Table 3), or with country-currency and week-year fixed effects (Column 3 of Table 3), also have equivalent estimations of Equation 1 (Columns 2 and 5 of Table 2 in the first case, and Columns 3 and 6 of Table 2 in the second).

However, I can also estimate Equation 2 with country-week-year fixed effects, allowing me to control for all possible shocks that may hit a country in a given time period (Column 4 of Table 3). Specifically, country-week-year fixed effects may control for a larger share of unobserved heterogeneity as they capture country-specific shocks affecting the two types of spreads at a weekly frequency. Not surprisingly, this estimation yields the highest adjusted R^2 in the set-up of Equation 2 (see Table 3).

The three-way panel estimations confirm that foreign investors are relevant for the transmission of global financial conditions. Figure 3 plots the responses of the local currency credit spread ($LC_{i,c} = 1$) and the responses of the foreign currency credit spread ($LC_{i,c} = 0$) to changes in the broad U.S. dollar index along the distribution of shares of foreign investor holdings of local currency sovereign debt. These responses are based on

Column 1 of Table 3. The black line depicts the response of the foreign currency credit spread, while the gray line depicts the response of the local currency sovereign spread.

At low levels of foreign participation in local currency sovereign debt markets, the local currency credit spread is significantly less sensitive to global financial shocks than its foreign currency counterpart. However, the higher the presence of foreign investors in these markets, the smaller this difference becomes. Both markets are equally sensitive to global financial shocks when foreign participation in local currency sovereign debt markets is 45 percent.

3.3 Robustness Checks

So far, I have shown that foreign investors play a relevant role in the transmission of global financial conditions to local currency sovereign debt markets. Now, I subject these results to a battery of robustness checks.

First, I test whether my results are driven by financial liberalization. Suppose financial liberalization affects foreign participation in local currency sovereign debt markets and also directly influences the transmission of global financial conditions to these markets. In that case, I could be wrongly assigning to the role of foreign investors the direct influence that financial liberalization has on the transmission.

While it is plausible that financial liberalization affects the level of foreign participation in local currency sovereign debt markets, empirical evidence is still lacking. Du and Schreger (2016) suggest that slow-moving capital and limits to arbitrage may generate market segmentation along local versus foreign sovereign debt markets. They argue that some domestic investors may face obstacles in investing in foreign or other domestic assets than sovereign debt securities, creating a "distinct local clientele demand" for sovereign debt in local currency. These domestic investors do not sell off their sovereign bonds in response to sudden changes in global financial conditions. Market segmentation may also exist because foreign investors are subject to stricter capital controls in local currency sovereign debt markets than foreign currency counterparts. McCauley, Upper and Villar (2013) suggest that capital controls are less likely to apply to securities issued by the same entity in offshore markets than domestic ones.

To explore this possibility, I re-estimate Equation 1 separately for countries with high and low levels of financial liberalization. I split my sample into these two groups using Fernández et al.'s (2016) overall capital control restrictions index (Appendix Table A.4).

I find no evidence that financial liberalization is driving my results about the role

Table 4: **Levels of Financial Liberalization**

	$\Delta LCCS_{i,t_w}$					
	High Level			Low Level		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Dollar_{t_w}$	0.116***	0.115***		0.0756***	0.0753***	
	(0.0214)	(0.0225)		(0.0232)	(0.0243)	
$\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-3}$ (×10)	0.0442***	0.0436***	0.0462***	0.0456***	0.0430***	0.0464***
	(0.0122)	(0.0131)	(0.0122)	(0.0130)	(0.0131)	(0.0133)
Observations	2287	2286	2287	2435	2434	2435
Countries	8	8	8	8	8	8
Country FE	✓		✓	✓		✓
Quarter-Year FE	✓			✓		
Country×Quarter-Year FE		✓			✓	
Week-Year FE			✓			✓
Adjusted R^2	0.399	0.394	0.489	0.324	0.315	0.359

Note: This table reports estimates of Equation 1 for a weekly panel over the period 2012-2017. Sub-samples of levels of financial liberalization are based on Fernández et al.'s (2016) overall capital control restrictions index (Appendix A.4). The countries with a high level of financial liberalization are Chile, Colombia, Hungary, Korea, Mexico, Peru, Poland, and Russia. The dependent variable local currency credit spread ($\Delta LCCS_{i,t_w}$) is in standardized changes and based on a 5-year tenor. The broad U.S. dollar index ($\Delta Dollar_{t_w}$) is also in standardized changes. The interaction between the broad U.S. dollar index with the demeaned level of share of foreign holdings of local currency sovereign debt ($\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1}$) is multiplied by 10 for readability. Other controls in Equation 1 are not reported for conciseness. t_w and t_q indicate that variables are in weekly and quarterly frequencies, respectively. Driscoll-Kraay standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

of foreign investors in the transmission. Table 4 shows that δ_2 remains essentially the same across estimations for countries with high and low levels of financial liberalization, emphasizing the role of foreign investors (compare Columns 1, 2, and 3 with 4, 5, and 6).

As a second robustness check, I test whether the role of foreign investors remains relevant after controlling for the size of the banking sector and currency mismatches on national balance sheets. Both of these factors are correlated with foreign participation in local currency sovereign debt markets.

Regarding the banking sector, the correlation between the share of foreign investor holdings of local currency sovereign debt and the volume of deposit money banks' assets over GDP for my sample is -0.4742. As for currency mismatches on national balance sheets, the correlation between the share of foreign investor holdings of local currency sovereign debt and net external debt liabilities in foreign currency over GDP for my sample is 0.3927. Both correlation coefficients are significant at the 1 percent level.

Given the above correlations, if these factors also influence the transmission of global financial conditions to the local currency sovereign debt markets, my results about the relevance of foreign investors could be biased.

The banking sector may play a role in the transmission of global financial conditions to local currency sovereign debt markets. Tight financial conditions could potentially increase the overall riskiness of the banking sector. Avdjiev et al. (2019) show that a dollar appreciation leads to a contraction in cross-border bank lending in dollars. They suggest that the dollar credit crunch increases the perceived credit risk of borrowing banks. Then, through the linkages of the sovereign-bank nexus, an increase in the overall riskiness of the banking sector could lead to a deterioration of the credit risk of the government (Dell'Ariccia et al., 2018).

Currency mismatches on national balance sheets may also influence the transmission. Countries may suffer output contractions when external shocks trigger local currency depreciation. This happens when the financial channel of exchange rates outweighs the traditional Mundell-Fleming's trade channel. Currency mismatches are at the center of the financial channel. A local currency depreciation reduces the net worth of (net) foreign currency borrowers and their ability to service foreign currency debt. Through this channel, local currency depreciation negatively impacts economic activity (Kearns and Patel, 2016). Episodes of output loss can lead to sovereign default crises (Reinhart and Rogoff, 2011), and governments often default on both local and foreign currency sovereign debt simultaneously (Jeanneret and Souissi, 2016). Thus, it could be the case that market participants factor in currency mismatches when pricing the credit risk of local currency sovereign debt during changes in global financial conditions.

To disentangle the role of foreign investors in the transmission of global financial conditions from the influence of the banking sector and currency mismatch, I estimate the following horse-race model:

$$\begin{aligned}\Delta LCCS_{i,t_w} = \beta_1 LCCS_{i,t_w-1} + \Delta Dollar_{t_w}(\delta_1 + \delta_2 \widetilde{FI}_{i,t_q-1} \\ + \delta_3 \widetilde{BS}_{i,t_q-1} + \delta_4 \widetilde{CM}_{i,t_q-1}) + \gamma_1 \widetilde{FI}_{i,t_q-1} + \gamma_2 \widetilde{BS}_{i,t_q-1} \\ + \gamma_3 \widetilde{CM}_{i,t_q-1} + \sum_k \lambda_k \Delta Z^k + \mu_i + \nu_{t_q} + \varepsilon_{i,t_w},\end{aligned} \tag{3}$$

where $\widetilde{BS}_{i,t_q-1}$ is the size of the banking sector, measured as the demeaned deposit money banks' assets over GDP in the previous quarter, and $\widetilde{CM}_{i,t_q-1}$ is the currency mismatch in the national balance sheet, measured as the demeaned net external debt liabilities in foreign currency over GDP in the previous quarter.

This horse-race model is an augmented version of the baseline model. Thus, the other controls and the fixed effects of Equation 3 are the same as in Equation 1.

In the set-up of Equation 3, the partial derivative of $\Delta LCCS_{i,t}$ with respect to $\Delta Dollar_t$ is:

$$\frac{\partial \Delta LCCS_{i,t_w}}{\partial \Delta Dollar_{t_w}} = \delta_1 + \delta_2 \widetilde{FI}_{i,t_q-1} + \delta_3 \widetilde{BS}_{i,t_q-1} + \delta_4 \widetilde{CM}_{i,t_q-1}.$$

Here, δ_1 measures the relationship between local currency credit spread and global financial conditions for a country with average levels of foreign participation in its local currency sovereign debt, banking sector, and currency mismatch (when $\widetilde{FI}_{i,t_q-1} = \widetilde{BS}_{i,t_q-1} = \widetilde{CM}_{i,t_q-1} = 0$). Again, δ_2 measures how the level of foreign participation influences this relationship. Meanwhile, δ_3 and δ_4 measure the influence of the banking sector and currency mismatch, respectively.

I find the role of foreign investors to be relevant for the transmission even when controlling for the banking sector and currency mismatch. Column 1 of Table 5 reports estimates of Equation 3. The estimate of δ_2 is positively, statistically significant, and only slightly smaller than its corresponding baseline result (Column 1 of Table 2). Estimations of the horse-race model with other fixed-effect combinations give similar results for δ_2 (Columns 2 and 3 of Table 5).

These horse-race estimations also provide perspective on the relevance of foreign investors in the transmission of global financial conditions vis-à-vis other factors. Columns 1, 2, and 3 of Table 5 suggest foreign investors are significantly more important than the banking sector (δ_3) and virtually as important as currency mismatch (δ_4).

I find similar results when estimating horse-race models between foreign participation and either the banking sector or currency mismatch (Columns 4 through 9 of Table 5).[11]

[11] Data on deposit money banks' assets over GDP and on net external debt liabilities in foreign currency over GDP are originally available in annual frequency. To avoid excessive use of notation, I transformed their data into quarterly through interpolation their data. However, using data for these two variables in their original annual frequency produces similar results (Appendix Table A.5).

Table 5: **Horse-Race Estimations**

	$\Delta LCCS_{i,t_w}$								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\Delta Dollar_{t_w}$	0.0960***	0.0952***		0.0974***	0.0967***		0.0971***	0.0963***	
	(0.0188)	(0.0197)		(0.0186)	(0.0196)		(0.0188)	(0.0197)	
$\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1}$ (×10)	0.0341***	0.0324**	0.0375***	0.0413***	0.0397***	0.0450***	0.0278**	0.0260**	0.0295**
	(0.0123)	(0.0129)	(0.0132)	(0.0127)	(0.0134)	(0.0137)	(0.0112)	(0.0116)	(0.0114)
$\Delta Dollar_{t_w} \times \widetilde{BS}_{i,t_q-1}$ (×10)	0.00788*	0.00812*	0.00993**	-0.00368	-0.00356	-0.00269			
	(0.00423)	(0.00450)	(0.00476)	(0.00326)	(0.00338)	(0.00351)			
$\Delta Dollar_{t_w} \times \widetilde{CM}_{i,t_q-1}$ (×10)	0.0373***	0.0376***	0.0403***				0.0304***	0.0304***	0.0316***
	(0.00996)	(0.0104)	(0.0103)				(0.00814)	(0.00838)	(0.00821)
Observations	4722	4720	4722	4722	4720	4722	4722	4720	4722
Countries	16	16	16	16	16	16	16	16	16
Country FE	✓		✓	✓		✓	✓		✓
Quarter-Year FE	✓			✓			✓		
Country×Quarter-Year FE		✓			✓			✓	
Week-Year FE			✓			✓			✓
Adjusted R^2	0.363	0.355	0.423	0.359	0.351	0.418	0.362	0.354	0.422

Note: This table reports estimates of Equation 3 for a weekly panel over the period 2012-2017. The dependent variable local currency credit spread ($\Delta LCCS_{i,t_w}$) is in standardized changes and based on 5-year tenor. The broad U.S. dollar index ($\Delta Dollar_{t_w}$) is also in standardized changes. The interactions between the broad U.S. dollar index with the demeaned share of foreign holdings of local currency sovereign debt ($\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1}$), with the demeaned deposit money banks' assets to GDP ($\Delta Dollar_{t_w} \times \widetilde{BS}_{i,t_q-1}$), and with the demeaned net external debt liabilities in foreign currency to GDP ($\Delta Dollar_{t_w} \times \widetilde{CM}_{i,t_q-1}$) are multiplied by 10 for readability. Other controls in Equation 3 are not reported for conciseness. t_w and t_q indicate that variables are in weekly and quarterly frequencies, respectively. Driscoll-Kraay standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4 Event Study: Exogenous Foreign Investor Outflows

To complement my previous exercises, I exploit exogenous foreign investor outflows caused by an unanticipated announcement of country weight rebalancing in the J.P. Morgan GBI-EM Global Diversified index. I test whether countries that experienced foreign investor outflows also experienced a decrease in the sensitivity of their local currency sovereign debt markets to changes in global financial conditions.

Tracking benchmark indices is an important strategy for foreign investors in local currency sovereign debt markets, and changes in country weights are associated with sizable foreign investor flows (Arslanalp and Tsuda, 2015; Arslanalp et al., 2020). Due to the growing importance of benchmark indices as the preferred habitat for such investors (Pandolfi and Williams, 2019), unanticipated announcements of country weight rebalancing in these indices provide natural experiments to identify exogenous foreign investor flows (e.g., Pandolfi and Williams, 2020; Broner et al., 2021).

In March 2014, J.P. Morgan announced the inclusion of five new Colombian local currency sovereign bonds to its GBI-EM Global Diversified index. J.P. Morgan planned to include the new bonds over four months starting end of May of that same year. As observed by Williams (2018), the sharp and sudden rise in the price of these bonds following the announcement suggests that the inclusion was unanticipated. Arslanalp and Tsuda (2015) show a significant surge in (net) capital flows to Colombia's local currency sovereign debt market immediately after the announcement.

Given the weighting method of the GBI-EM Global Diversified index, the exogenous increase in Colombia's weight should have caused foreign investor outflows from local currency sovereign debt markets of certain countries. Country weights are determined based on a two-criteria rule. The first has to do with the relative importance of each country in the index in terms of market capitalization. The second is an arbitrary cap of 10 percent on country weights to diversify exposure. A byproduct of imposing this rule is that it may create over and under-represented countries in the index and, consequently, distortions for allocation portfolio flows (Arslanalp et al., 2020). An exogenous increase in the weight of a country would come at the expense of decreases in the weights of over-represented countries.

Markets expected a heterogeneous impact on country weights. The announcement specified expected cumulative decreases in the weights of Chile, Hungary, Indonesia, Peru, Philippines, Russia, Thailand, and Türkiye until September 2014, when the phased inclusion of Colombia's bonds should end. Meanwhile, the rebalancing did not affect the weights of Brazil, Malaysia, Mexico, Poland, and South Africa because of their large

market capitalization. This expected heterogeneous impact on country weights produced heterogeneous foreign investor outflows across local currency debt markets.

I begin this event study by comparing the response of local currency credit spread to changes in the broad U.S. dollar index before and after the announcement. I estimate the following model:

$$\begin{aligned}\Delta LCCS_{i,t_w} = \beta_1 LCCS_{i,t_w-1} + \Delta Dollar_{t_w}(\delta_1 + \omega_1 After_{t_w}) \\ + \alpha_1 After_t + \sum_k \lambda_k \Delta Z^k + \mu_i + \nu_{t_q} + \varepsilon_{i,t_w},\end{aligned} \tag{4}$$

where $After_{t_w}$ is a dummy variable that takes value 1 in the 28 weeks following the announcement and value 0 in the 28 weeks before the announcement. 28 weeks correspond to the period from the announcement until the end of the country weight rebalancing. The other controls in Equation 4 are defined as in Equation 1. Country fixed effects μ_i, quarter-year fixed effects ν_{t_q}, and the error term ε_{i,t_w} complete the model.

I estimate Equation 4 separately for affected and unaffected countries. If foreign investors play a role in the transmission of global financial conditions to local currency sovereign debt markets, we should find different values of ω_1 for the two groups of countries. In the case of countries affected by the country weight rebalancing, I expect $\omega_1 < 0$ because foreign participation in these countries decreases with the announcement. Similarly, foreign participation for unaffected countries should remain stable around the announcement. Thus, for unaffected countries, I expect to find $\omega_1 = 0$.

Column 1 of Table 6 reports estimates of Equation 4 for affected countries. As expected, the estimate of ω_1 is negative and statistically significant. This result remains essentially the same after including country-quarter-year fixed effects (Column 2 of Table 6). Therefore, the sensitivity of the local currency credit spread to changes in the broad U.S. dollar index decreased following a decrease in foreign participation in these local currency sovereign debt markets.

Columns 3 Table 6 focuses on unaffected countries. As expected, ω_1 is virtually zero. Again, including country-quarter-year fixed effects does not affect the result (Column 4 of Table 6). Thus, in the case of unaffected countries, the response of local currency credit spread to changes in the broad U.S. dollar index was the same before and after the announcement.

For completeness, Column 5 of Table 6 shows results for Colombia. The estimate of ω_1 is positive. Although not statistically significant, the estimate suggests that the response of local currency credit spread to changes in the broad U.S. dollar index increased after the

Table 6: **Before versus After Estimations**

	$\Delta LCCS_{i,t_w}$				
	Affected		Unaffected		Colombia
	(1)	(2)	(3)	(4)	(5)
$\Delta Dollar_{t_w}$	0.152***	0.161***	0.182**	0.182**	0.219
	(0.0461)	(0.0501)	(0.0795)	(0.0799)	(0.230)
$\Delta Dollar_{t_w} \times After_{t_w}$	-0.261**	-0.274**	0.0145	0.0135	0.141
	(0.116)	(0.119)	(0.130)	(0.132)	(0.279)
Observations	399	399	270	269	56
Countries	8	8	5	5	1
Country FE	✓		✓		
Quarter-Year FE	✓		✓		✓
Country×Quarter-Year FE		✓		✓	
Adjusted R^2	0.329	0.325	0.196	0.206	0.643

Note: This table reports estimates of Equation 4 for a weekly panel spanning 56 weeks, from September 2013 to September 2014. The dependent variable local currency credit spread ($\Delta LCCS_{i,t_w}$) is in standardized changes and based on a 5-year tenor. The broad U.S. dollar index ($\Delta Dollar_{t_w}$) is also in standardized changes. $After_{t_w}$ is a dummy variable that takes value 1 in the 28 weeks after the announcement and value 0 in the 28 weeks before the announcement. Other controls in Equation 4 are not reported for conciseness. t_w and t_q indicate that variables are in weekly and quarterly frequencies, respectively. Driscoll-Kraay standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

announcement. In fact, Colombia experienced foreign investor inflows because its weight increased. Thus, these estimates for Colombia corroborate the estimates for affected (Columns 1 and 2) and unaffected countries (Columns 3 and 4).

Having shown that the response of local currency credit spread to changes in the broad U.S. dollar index decreased after the announcement among affected countries, but not among unaffected countries, next, I assess the impact of heterogeneous foreign investor outflows on this response.

For this purpose, I calculate a measure of expected foreign investor outflows triggered by the announcement. My calculations are based on: (i) the projected changes in country weights from the end of February 2014 to the end of September 2014, announced by J.P. Morgan on 19 March 2014; (ii) the estimated foreign investor base tracking the index at the time of the announcement (Arslanalp and Tsuda, 2015); and (iii) the size of local currency sovereign debt markets by the end of March 2014 (Arslanalp and Tsuda, 2014). Table 7 presents the values of my measure of expected foreign investor outflows as the share of local currency sovereign debt.

With my values of expected foreign investor outflows in hand, I proceed to estimate

Table 7: **Expected Foreign Investor Outflows after Announcement**

	Expected Foreign Investor Outflows as Share (%) of Local Currency Sovereign Debt
Türkiye	2.01
Russia	1.66
Thailand	1.44
Indonesia	0.98
Hungary	0.96
Peru	0.32
Philippines	0.08
Chile	0.02
Brazil	0.00
Malaysia	0.00
Mexico	0.00
Poland	0.00
South Africa	0.00

Note: This table reports foreign investor outflows expected to take place after the announcement of the rebalancing of country weights in the J.P. Morgan GBI-EM Global Diversified index until the end of September 2014. These are my calculations and are based on: (i) the projected changes in country weights from the end of February 2014 to the end of September 2014, announced by J.P. Morgan on 19 March 2014; (ii) the estimated foreign investor base tracking the index at the time of the announcement (Arslanalp and Tsuda, 2015); and (iii) the size of local currency sovereign debt markets by the end of March 2014 (Arslanalp and Tsuda, 2014).

the following model:

$$\begin{aligned}\Delta LCCS_{i,t_w} = \beta_1 LCCS_{i,t_w-1} + \Delta Dollar_{t_w}(\delta_1 + \omega_2 Outflows_{i,t_w}) \\ + \alpha_2 Outflows_{i,t_w} + \sum_k \lambda_k \Delta Z^k + \mu_i + \nu_{t_q} + \varepsilon_{i,t_w},\end{aligned} \tag{5}$$

with $Outflows_{i,t_w}$ taking the country-specific values of expected foreign investor outflows in the 28 weeks after the announcement and value 0 in the 28 weeks just before the announcement. The other controls in Equation 5 are defined as in Equation 1. Country fixed effects μ_i, quarter-year fixed effects ν_{t_q}, and the error term ε_{i,t_w} complete the model.

Column 1 of Table 8 reports estimates of Equation 5 for affected countries. The estimate of ω_2 is negative and statistically significant. The estimate increases significantly in magnitude when using country-quarter-year fixed effects and remains statistically significant (Column 2 of Table 8). In the set-up of Equation 5, the interpretation of ω_2 is that the larger the volume of the foreign investor outflows (as the share of local currency sovereign debt) a country experienced after the announcement, the smaller the

Table 8: **Expected Foreign Investor Outflows Estimations**

	$\Delta LCCS_{i,t_w}$			
	Affected		Affected + Unaffected	
	(1)	(2)	(3)	(4)
$\Delta Dollar_{t_w}$	0.113**	0.142***	0.151***	0.165***
	(0.0525)	(0.0468)	(0.0524)	(0.0537)
$\Delta Dollar_{t_w} \times Outflows_{i,t_w}$	-0.166**	-0.241***	-0.163**	-0.229***
	(0.0761)	(0.0693)	(0.0769)	(0.0761)
Observations	399	399	669	668
Countries	8	8	13	13
Country FE	✓		✓	
Quarter-Year FE	✓		✓	
Country×Quarter-Year FE		✓		✓
Adjusted R^2	0.326	0.325	0.276	0.274

Note: This table reports estimates of Equation 5 for a weekly panel spanning 56 weeks, from September 2013 to September 2014. The dependent variable local currency credit spread ($\Delta LCCS_{i,t_w}$) is in standardized changes and based on 5-year tenor. The broad U.S. dollar index ($\Delta Dollar_{t_w}$) is also in standardized changes. $Outflows_{i,t_w}$ is a continuous variable that takes the country-specific values of expected foreign investor outflows in the 28 weeks after the announcement (see Table 7) and value 0 in the 28 weeks before the announcement. Other controls in Equation 5 are not reported for conciseness. t_w and t_q indicate that variables are in weekly and quarterly frequencies, respectively. Driscoll-Kraay standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

response of the local currency credit spread to changes in the broad U.S. dollar index became.

As a last exercise, I estimate Equation 5 using data for affected and unaffected countries. In this way, the unaffected countries behave as a control group for the affected countries. This approach is appropriate because affected and unaffected countries had similar trends in the responses of local currency credit spread to changes in the broad U.S. dollar index before the announcement (see Appendix Figure A.2). The results are reassuring. The estimate of ω_2 remains negative and statistically significant (Columns 3 and 4 of Table 8).

This event study provides further evidence of the role of foreign investors. It shows that the sensitivity of local currency sovereign debt markets to changes in global financial conditions decreased in countries that experienced foreign investor outflows caused by the country weight rebalancing in the J.P. Morgan GBI-EM Global Diversified index in March 2014.

5 Conclusions

Developing sovereign debt markets in local currency while promoting foreign participation allowed emerging market economies to rely less on debt in foreign currency. However, external borrowing in local currency did not completely insulate these countries from global financial shocks. The findings of this study demonstrate how foreign participation in local currency sovereign debt markets contributes to the transmission of global financial conditions to emerging market economies.

Specifically, I show that the higher the share of local currency government bonds held by foreign investors, the more sensitive the credit risk of these bonds becomes to global financial shocks. I also show when foreign investors' holdings reach 45 percent, the credit risk of local currency government bonds becomes as sensitive to global financial shocks as the credit risk of foreign currency government bonds. Lastly, I complement my main finding with evidence from an event study based on the unanticipated announcement of country weight rebalancing in the J.P. Morgan GBI-EM Global Diversified index in March 2014. I show that countries that experienced foreign investor outflows caused by the announcement also experienced a decrease in the sensitivity of their local currency sovereign debt markets to changes by global financial conditions.

My findings make important contributions to the literature, in particular to research on the financial fragility of emerging market economies. They support the "original sin redux" hypothesis (Carstens and Shin, 2019). From a policy perspective, this recent literature has emphasized that externally borrowing in local currency exposes the domestic economy to sudden changes in global financial conditions. My findings shed new light on the trade-off between borrowing from abroad and exposure to global financial shocks. Borrowing in local currency does not eliminate the trade-off.

In addition, my findings open two interesting avenues for future research, which might be related. First, my estimates show that at low levels of foreign participation in local currency sovereign debt markets, the credit risk of local currency government bonds is significantly less sensitive to global financial shocks than its foreign currency counterpart. This suggests that domestic investors do not price up the credit risk of local currency government bonds as much as foreign investors in response to global financial shocks. Why do domestic and foreign investors price credit risk of local currency government bonds differently? Second, another key question not addressed in this paper is the long-term equilibrium level of foreign participation in local currency sovereign debt markets. What are the determinants of those levels?

References

Amstad, M., Packer, F. and Shek, J., 2020, "Does Sovereign Risk in Local and Foreign Currency Differ?", Journal of International Money and Finance, Vol. 101.

Arslanalp, S. and Tsuda, T., 2014, "Tracking Global Demand for Emerging Market Sovereign Debt", IMF Working Paper, WP/14/39.

Arslanalp, S. and Tsuda, T., 2015, "Emerging Market Portfolio Flows: the Role of Benchmark-Driven Investors", IMF Working Paper, WP/15/263.

Arslanalp, S., Drakopoulos, D., Goel, R. and Koepke, R., 2020, "Benchmark-Driven Investments in Emerging Market Bond Markets: Taking Stock", IMF Working Paper, WP/20/192.

Avdjiev, S., Du, W., Koch, C. and Shin, H. S., 2019, "The Dollar, Bank Leverage, and Deviations from Covered Interest Parity", AER: Insights, Vol. 1(2), 193–208.

Bénétrix, A., Gautam, G., Juvenal, L. and Schmitz, M., 2019, "Cross-Border Currency Exposures", IMF Working Paper, WP/19/299.

Bertaut, C., Bruno, V. and Shin, H. S., 2023, "Original Sin Redux: Role of Duration", BIS Working Paper, No. 1109.

Boermans, M., and Burger, J., 2020, "Fickle Emerging Market Flows, Stable Euros, and the Dollar Risk Factor", Journal of International Economics, Vol. 142.

Brazilian Ministry of Finance, 2021, "Tesouro Direto Passa a Ter Liquidação de Resgate no Mesmo Dia", Accessible here.

Broner, F., Martin, A., Pandolfi, L. and Williams, T., 2021, "Winners and Losers from Sovereign Debt Inflows", Journal of International Economics, Vol. 130.

Carstens, A. and Shin, H. S, 2019, "Emerging Markets Aren't Out of the Woods Yet", Foreign Affairs.

Christopoulos, A. D., 2021, "The Absolute Roll Measure", Manuscript, Accessible here.

Čihák, M., Demirgüç-Kunt, A., Feyen, E. and Levine, R., 2012, "Benchmarking Financial Development around the World", World Bank Policy Research Working Paper No. 6175.

Dell'Ariccia, G., Ferreira, C., Jenkinson, N., Laeven, L., Martin, A., Minoiu, C. and Popov, A., 2018, "Managing the Sovereign-Bank Nexus", IMF Research Department

Working Paper, No. 18/16.

Devereux, M. B. and Wu, S. P. Y., 2022, "Foreign Reserves Management and Original Sin", NBER Working Paper, No. 30418.

Du, W. and Schreger, J., 2016, "Local Currency Sovereign Risk", The Journal of Finance, Vol. 71(3), 1027–69.

_____, 2022, "Sovereign Risk, Currency Risk, and Corporate Balance Sheets", The Review of Financial Studies, Vol. 35, 4587-4629.

Eichengreen, B., and Hausmann, R., 1999, "Exchange Rates and Financial Fragility", NBER Working Paper, No. 7418.

Eichengreen, B., Hausmann, R. and Panizza, U., 2005a, "The Pain of Original Sin", in Other People's Money: Debt Denomination and Financial Instability in Emerging Market Economies, eds. Eichengreem, B. and Hausmann, R., Chicago: University of Chicago Press.

_____, 2005b, "The Mystery of Original Sin", in Other People's Money: Debt Denomination and Financial Instability in Emerging Market Economies, eds. Eichengreem, B. and Hausmann, R., Chicago: University of Chicago Press.

_____, 2007,"Currency Mismatches, Debt Intolerance, and the Original Sin: Why They Are Not the Same and Why It Matters", in Capital Controls and Capital Flows in Emerging Economies: Policies, Practices and Consequences, ed. Edwards, S., Chicago: University of Chicago Press.

_____, 2023, "Yet it Endures: The Persistence of Original Sin", Open Economies Review, Vol. 34, 1–42.

Erik, B., Lombardi, M. K., Mihaljek, D. and Shin, H. S., 2020, "The Dollar, Bank Leverage, and Real Economic Activity: An Evolving Relationship", AEA Papers and Proceedings Vol. 110, 529–534.

Fernández, A., Klein, M. W., Rebucci, A., Schindler, M., and Uribe, M., 2016,"Capital Control Measures: A New Dataset", IMF Economic Review, Vol. 64, 548-574.

Ho, E. H. C., 2022, "Foreign Participation in Local Currency Government Bond Markets in Emerging Asia: Benefits and Pitfalls to Market Stability", Journal of International Money and Finance, Vol. 128.

Hofmann, B., Shim, I. and Shin, H. S., 2020, "Bond Risk Premia and The Exchange

Rate", Journal of Money, Credit and Banking, Vol. 52(S2), 497–520.

_____, 2022, "Risk Capacity, Portfolio Choice and Exchange Rates", BIS Working Paper, No. 775.

Jeanneret, A. and Souissi, S., 2016, "Sovereign Defaults by Currency Denomination", The Journal of International Money and Finance, Vol. 60, 197-222.

Kearns, J., and Patel, N., 2016, "Does the Financial Channel of Exchange Rates Offset the Trade Channel?" BIS Quarterly Review December, 95-113.

McCauley, R. N., Upper, C., Villar, A., 2013, "Emerging Market Debt Securities Issuance in Offshore Centres", BIS Quarterly Review September, 22–23.

Miranda-Agrippino, S., and Rey, H., 2020, "U.S. Monetary Policy and the Global Financial Cycle", Review of Economic Studies, Vol. 87, 2754–2776.

Nickell, S., 1981, "Biases in Dynamic Models with Fixed Effects", Econometrica, Vol. 49(6), 1417-1426.

Obstfeld, M., and Zhou, H., 2023, "The Global Dollar Cycle", NBER Working Paper, No. 31004.

Onen, M., Shin, H. S. and von Peter, G., 2023, "Overcoming Original Sin: Insights from a New Dataset", BIS Working Paper, No. 1075.

Pandolfi, L. and Williams, T., 2019, "Capital Flows and Sovereign Debt Markets: Evidence from Index Rebalancings", Journal of Financial Economics, Vol. 132, 384-403.

_____, 2020, "Real Effects of Sovereign Debt Inflow Shocks", AEA Papers and Proceedings, Vol. 110, 511–515.

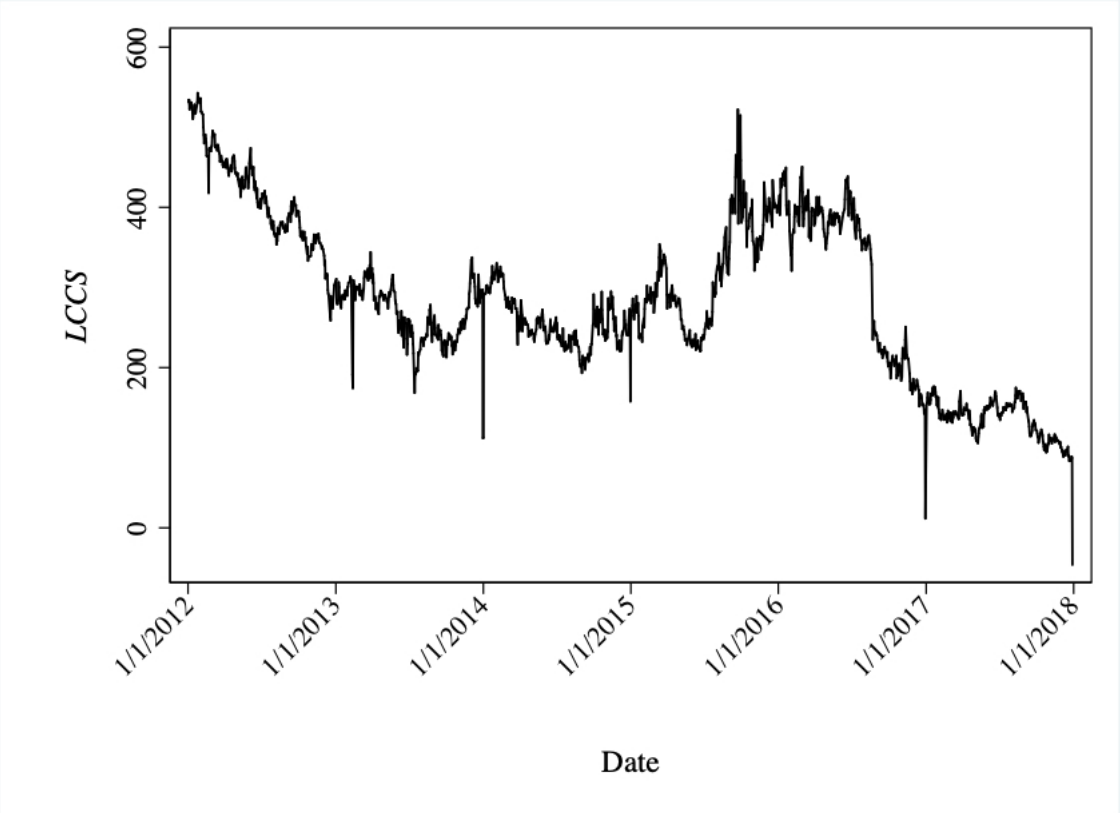
Reinhart, C. M. and Rogoff, K. S., 2011, "The Forgotten History of Domestic Debt", The Economic Journal, Vol. 121(552), 319–350.

Rey, H., 2013, "Dilemma not Trilemma: the Global Cycle and Monetary Policy Independence", Jackson Hole Economic Policy Symposium Proceedings, 285–333.

Williams, T., 2018, "Capital Inflows, Sovereign Debt and Bank Lending: Micro-Evidence from an Emerging Market", The Review of Financial Studies, Vol. 31 (12), 4958–4994.

A Appendix

Figure A.1: **Credit Risk of Brazil's Local Currency Government Bonds**



Note: This figure plots daily 5-year local currency credit spread (Du and Schreger, 2016) for Brazil over the 2012-2018 period.

Table A.1: **Summary Statistics for Dependent Variables by Country**

	Weekly change in local currency credit risk spread (bp.)			Weekly change in CDS spread (bp.)		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
Brazil	-1.64	-0.89	23.46	0.003	-0.89	16.34
Chile	-0.32	0.46	10.60	-0.26	-0.91	6.14
China	-0.14	1.33	16.48	-0.30	-0.45	6.48
Colombia	-0.74	-0.82	13.53	-0.16	-0.67	-0.16
Hungary	-1.73	-1.27	15.41	-1.66	-0.28	15.89
Korea	-0.55	-0.30	11.73	-0.33	-0.27	5.12
Indonesia	0.05	-0.88	21.97	-0.37	-0.91	12.53
Mexico	-0.67	-0.64	8.78	-0.15	-0.29	9.01
Malaysia	-0.56	-0.41	10.06	-0.27	-0.50	8.88
Peru	-0.32	-0.60	15.39	-0.31	-0.84	9.37
Philippines	-0.02	-0.50	29.16	-0.40	-0.49	6.97
Poland	-0.70	-1.15	8.32	-0.71	-0.02	7.06
Russia	-0.40	-0.32	33.12	-0.51	-0.51	24.68
Thailand	-0.42	-1.07	8.39	-0.42	-0.50	6.94
Türkiye	-0.91	-1.49	18.44	-0.39	-0.81	14.80
South Africa	-0.47	-0.34	9.62	-0.13	-0.34	13.82

Note: This table reports summary statistics by country over the period 2012-2017.

Table A.2: **Depreciation versus Appreciation Estimations**

	$\Delta LCCS_{i,t_w}$			$\Delta CDS_{i,t_w}$		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Dollar_{t_w}$	0.197***	0.196***		0.462***	0.460***	
	(0.046)	(0.049)		(0.120)	(0.126)	
$\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1}$ (×10)	0.056**	0.059**	0.059***	0.014	0.019	0.016
	(0.022)	(0.026)	(0.022)	(0.014)	(0.016)	(0.014)
$\Delta Dollar_{t_w} \times D_{t_w}$	-0.117**	-0.116*		-0.144	-0.142	
	(0.056)	(0.061)		(0.129)	(0.135)	
$\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1} \times D_{t_w}$ (×10)	-0.022	-0.023	-0.026	-0.016	-0.016	-0.016
	(0.031)	(0.038)	(0.031)	(0.024)	(0.028)	(0.023)
Observations	4722	4720	4722	4722	4720	4722
Countries	16	16	16	16	16	16
Country FE	✓		✓	✓		✓
Quarter-Year FE	✓			✓		
Country×Quarter-Year FE		✓			✓	
Week-Year FE			✓			✓
R^2	0.367	0.406	0.459	0.372	0.395	0.655

Note: This table reports estimates of the following equation: $\Delta Spread_{i,t_w} = \beta_1 \Delta Spread_{i,t_w-1} + \Delta Dollar_{t_w}(\delta_1 + \delta_2 \widetilde{FI}_{i,t_q-1} + \theta_1 D_{t_w} + \theta_2 \widetilde{FI}_{i,t_q-1} \times D_{t_w}) + \gamma_1 \widetilde{FI}_{i,t_q-1} + \theta_3 \widetilde{FI}_{i,t_q-1} \times D_{t_w} + \theta_4 D_{t_w} + \sum_k \lambda_k \Delta Z^k + \mu_i + \nu_{t_q} + \varepsilon_{i,t_w}$. The dependent variables local currency credit spread ($\Delta LCCS_{i,t_w}$) and foreign currency credit spread ($\Delta CDS_{i,t_w}$) are in standardized changes and based on a 5-year tenor. The broad U.S. dollar index ($\Delta Dollar_{t_w}$) is also in standardized changes. The interaction between the broad U.S. dollar index with the demeaned share of foreign holdings of local currency sovereign debt ($\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1}$), and their interaction with the dummy variable for dollar depreciation ($\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1} \times D_t$) are multiplied by 10 for readability. Other controls in the estimated equation are not reported for conciseness. t_w and t_q indicate that variables are in weekly and quarterly frequencies, respectively. Driscoll-Kraay standard errors in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.3: **Baseline Estimations without Lagged Dependent Variable**

	$\Delta LCCS_{i,t_w}$			$\Delta CDS_{i,t_w}$		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Dollar_{t_w}$	0.101***	0.101***		0.320***	0.319***	
	(0.0177)	(0.0183)		(0.0516)	(0.0534)	
$\widetilde{FI}_{i,t_q-1}$ (×10)	-0.0232		-0.0239	-0.0187		-0.0191
	(0.0181)		(0.0179)	(0.0176)		(0.0173)
$\Delta Dollar_{w} \times \widetilde{FI}_{i,t_q-1}$ (×10)	0.0471***	0.0462***	0.0493***	0.00552	0.00639	0.0100
	(0.0110)	(0.0117)	(0.0112)	(0.00765)	(0.00821)	(0.00783)
ΔVIX_{t_w}	0.114***	0.116***		0.341***	0.341***	
	(0.0285)	(0.0297)		(0.0635)	(0.0655)	
$\Delta US\ yield_{t_w}$	-0.292***	-0.293***		0.0416	0.0425	
	(0.0298)	(0.0315)		(0.0932)	(0.0974)	
$\Delta Forward_{i,t_w}$	-0.589***	-0.595***	-0.624***	0.150***	0.153***	0.0991***
	(0.0365)	(0.0379)	(0.0347)	(0.0322)	(0.0362)	(0.0208)
$\Delta BidAsk_{i,t_w}$	0.0315*	0.0296	0.0272	0.118***	0.115***	0.0652**
	(0.0183)	(0.0196)	(0.0171)	(0.0363)	(0.0369)	(0.0282)
$\Delta Policy_{i,t_w}$	0.402***	0.327***	0.336***	0.360	0.343	0.306*
	(0.0921)	(0.0696)	(0.0896)	(0.219)	(0.242)	(0.183)
$\Delta Debt_{i,t_q}$	0.0276***		0.0284***	0.0244***		0.0246***
	(0.0105)		(0.0109)	(0.00858)		(0.00871)
Observations	4765	4765	4765	4765	4765	4765
Countries	16	16	16	16	16	16
Country FE	✓		✓	✓		✓
Quarter-Year FE	✓			✓		
Country×Quarter-Year FE		✓			✓	
Week-Year FE			✓			✓
Adjusted R^2	0.350	0.336	0.408	0.349	0.320	0.624

Note: This table reports alternative results to those in Table 2. These are estimates of Equation 1 without controlling for the lagged dependent variable. The dependent variables local currency credit spread ($\Delta LCCS_{i,t_w}$) and foreign currency credit spread ($\Delta CDS_{i,t_w}$) are in standardized changes and based on a 5-year tenor. The broad U.S. dollar index ($\Delta Dollar_{t_w}$), the VIX index (ΔVIX_{t_w}), the 5-year US Treasury yield ($\Delta US\ yield_{t_w}$), the 5-year exchange rate forward premium ($\Delta Forward_{i,t_w}$), and the bid-ask spread ($\Delta BidAsk_{i,t_w}$), are also in standardized changes. The domestic monetary policy rate ($\Delta Policy_{i,t_w}$) and the total sovereign debt over GDP ($\Delta Debt_{i,t_q}$) are in percentage point changes. The demeaned share of foreign holdings of local currency sovereign debt ($\widetilde{FI}_{i,t_q-1}$), and its interaction ($\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1}$), are multiplied by 10 for readability. t_w and t_q indicate that variables are in weekly and quarterly frequencies, respectively. Driscoll-Kraay standard errors in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.4: **Levels of Financial Liberalization**

	Financial Liberalization	
	Median	Level
Brazil	0.65	Low
Chile	0.225	High
China	0.9	Low
Colombia	0.575	High
Hungary	0.075	High
Korea	0.1625	High
Indonesia	0.675	Low
Mexico	0.625	High
Malaysia	0.875	Low
Peru	0	High
Philippines	0.875	Low
Poland	0.6	High
Russia	0.4	High
Thailand	0.725	Low
Türkiye	0.7	Low
South Africa	0.7	Low
All Countries	0.625	–

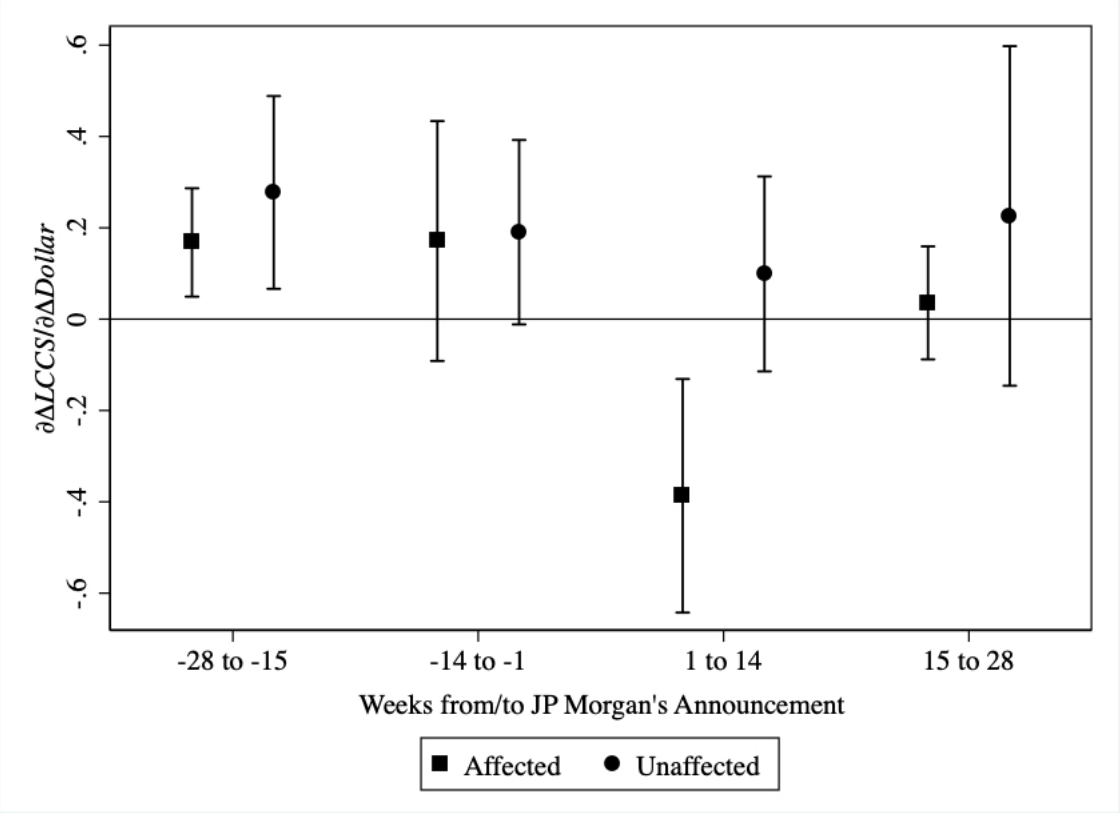
Note: This table reports median values and classification of financial liberalization for sample countries over the period 2012-2017. Median values of financial liberalization are based on Fernández et al.'s (2016) overall capital control restrictions index. Countries considered to have a high level of financial liberalization are those that have median values lower than the sample median.

Table A.5: **Alternative Horse Race Estimation**

	$\Delta LCCS_{i,t_w}$								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\Delta Dollar_{t_w}$	0.0950***	0.0941***		0.0976***	0.0968***		0.0964***	0.0956***	
	(0.0187)	(0.0196)		(0.0186)	(0.0196)		(0.0187)	(0.0196)	
$\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1}$ (×10)	0.0333***	0.0318**	0.0369***	0.0410***	0.0395***	0.0449***	0.0275**	0.0258**	0.0293**
	(0.0124)	(0.0130)	(0.0133)	(0.0128)	(0.0134)	(0.0137)	(0.0113)	(0.0117)	(0.0116)
$\Delta Dollar_{t_w} \times \widetilde{BS}_{i,t_a-1}$ (×10)	0.00760*	0.00795*	0.00990**	-0.00400	-0.00377	-0.00284			
	(0.00429)	(0.00456)	(0.00487)	(0.00334)	(0.00345)	(0.00360)			
$\Delta Dollar_{t_w} \times \widetilde{CM}_{i,t_a-1}$ (×10)	0.0372***	0.0374***	0.0403***				0.0305***	0.0304***	0.0316***
	(0.00979)	(0.0102)	(0.0104)				(0.00809)	(0.00829)	(0.00829)
Observations	4722	4720	4722	4722	4720	4722	4722	4720	4722
Countries	16	16	16	16	16	16	16	16	16
Country FE	✓		✓	✓		✓	✓		✓
Quarter-Year FE	✓			✓			✓		
Country×Quarter-Year FE		✓			✓			✓	
Week-Year FE			✓			✓			✓
Adjusted R^2	0.362	0.355	0.423	0.359	0.351	0.418	0.362	0.354	0.422

Note: This table reports alternative results to those in Table 5. These are estimates of Equation 3 with the demeaned deposit money banks' assets over GDP ($\widetilde{BS}_{i,t_a-1}$) and the demeaned net external debt liabilities in foreign currency over GDP ($\widetilde{CM}_{i,t_a-1}$) in annual frequency. The dependent variable local currency credit spread ($\Delta LCCS_{i,t_w}$) is in standardized changes and based on 5-year tenor. The broad U.S. dollar index ($\Delta Dollar_{t_w}$) is also in standardized changes. The interactions between the broad U.S. dollar index with the demeaned share of foreign holdings of local currency sovereign debt ($\Delta Dollar_{t_w} \times \widetilde{FI}_{i,t_q-1}$), with the demeaned deposit money banks' assets over GDP ($\Delta Dollar_{t_w} \times \widetilde{BS}_{i,t_a-1}$), and with the demeaned net external debt liabilities in foreign currency over GDP ($\Delta Dollar_{t_w} \times \widetilde{CM}_{i,t_a-1}$) are multiplied by 10 for readability. Other controls in Equation 3 are not reported for conciseness. t_w, t_q, and t_a indicate that variables are in weekly, quarterly and annual frequencies, respectively. Driscoll-Kraay standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure A.2: **Transmission around Announcement**



Note: This figure plots marginal effects of local currency credit spread ($\Delta LCCS_{i,t_w}$) with respect to the broad U.S. dollar index ($\Delta Dollar_{t_w}$) conditional on the distance from the J.P. Morgan's announcement of index rebalancing. Affected countries were expected to see their weights decrease after the announcement. These are Chile, Hungary, Indonesia, Peru, Philippines, Russia, Thailand and Türkiye. Unaffected countries are Brazil, Malaysia, Mexico, Poland, and South Africa. Marginal effects are based on estimations of $\Delta LCCS_{i,t_w} = \beta_1 \Delta LCCS_{i,t_w-1} + \sum_j \delta_1^j C_j \Delta Dollar_{t_w} + \sum_j \omega_1^j C_j + \sum_k \lambda_k \Delta Z^k + \mu_i + \nu_{t_q} + \varepsilon_{i,t_w}$, where C_j is a dummy variable that takes value 1 at every j-block of 14 weeks, and value 0 otherwise. Estimations are conducted separately for the two groups.