Sovereign bond purchases in emerging market economies: a buffer against the influence of the Global Financial Cycle on sovereign risk ?

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Abstract

During the pandemic, central banks of emerging market economies announced massive programs of sovereign bond purchases. This paper investigates whether such communication has mitigated the influence of the Global Financial Cycle on sovereign risk. Using inverse propensity weighting to account for the endogeneity of the central bank's decision, we found that announcements of sovereign bond purchases significantly reduced the sensitivity of the 10-year sovereign bond yield to the Global Financial Cycle, proxied by the VIX, in our sample of 16 EM economies.

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1 Introduction

The tumultuous global risk-off shock experienced in Q1-2020 prompted heterogeneous outflows from emerging sovereign bond markets, underscoring their susceptibility to the Global Financial Cycle (GFC). In response, twenty-six emerging market central banks took unprecedented measures by announcing sovereign bond purchase programs (SBP). In this paper, we delve into the intriguing question of whether the central bank's announcements of sovereign bond purchases can mitigate the influence of the Global Financial Cycle on sovereign risk in emerging market economies.

We hypothesize that such announcements signal a shift in the monetary policy regime of the central bank, potentially exerting a persistent influence on investors' decisions. Following such an announcement, a deterioration of the GFC becomes less likely to precipitate a drop in the demand and price of domestic sovereign bonds. This resilience stems from the central bank's ability to counter capital outflows by purchasing a significant share of the market, stabilizing it against external shocks. As a result, we anticipate a reduced sensitivity of sovereign bond yields to the GFC, contingent on investors attributing a strictly positive probability to the central bank's potential intervention.[1].

To test this hypothesis, we employ an empirical strategy inspired by Miranda-Agrippino & Rey (2022), utilizing the daily VIX as a high-frequency proxy for the Global Financial Cycle. Our sample comprises 16 emerging economies, divided between those where central banks announced sovereign bond purchases in 2020 and those where they did not[2]. We define the variable *Regime* taking the value 0 before the announcement of sovereign bond purchases and 1 after.

As we show in section 3, announcements of sovereign bond purchases are not randomly distributed within our sample. To deal with the endogeneity of the regime switching and identify its impact on the sensitivity of sovereign bond yields to the GFC, we use inverse propensity score weighting in the lines of Huber (2014) and Jorda & Taylor (2016). First, using a cross-sectional probit model, we compute for each economy the probability of announcing sovereign bond purchases in March-April 2020 conditional to a set of idiosyncratic variables, from which we derive the propensity score. Then, employing a first-difference panel model over the period from January 1, 2019, to June 1, 2021, we regress the daily 10-year sovereign bond yield on the VIX interacted with the Regime variable, weighting observations by the inverse of their propensity scores.

Our findings indicate that the long-term sovereign bond yields of the emerging economies of our sample exhibit a significant sensitivity to the VIX, in line with the Global Financial

[1]Note that, when the CB purchases bonds, it increases its monetary mass, causing a depreciation of the exchange rate. If the bonds are denominated in local currency, this could offset the positive impact of the purchases on their price considered in hard currency. We argue in Appendix 5.1 that this should not be the case.

[2]The former are Colombia, Hungary, India, Indonesia, Mexico, Poland, Romania, South Africa, Thailand, Turkey. The latter are Brazil, Bulgaria, China, Malaysia, Peru, Russia. We restricted our sample to economies for which we had data on the 10-year sovereign bond yield and on the share of the sovereign bond market held by foreigners. The only publicly available database about the second variable is the one developed by Shim et al (2022) at the BIS.

Cycle hypothesis developed by Rey[3]. However, the coefficient of the interaction between the VIX and the Regime variable, is significant and negative. This suggests that announcements of sovereign bond purchases actually dampened the sensitivity of the long-term sovereign bond yield to the GFC.

This article contributes to the limited empirical literature on asset purchase programs in emerging economies. Hartley & Rebucci (2020), Sever et al (2020), and Fratto et al (2021) showed that announcements of sovereign bond purchases caused the yield to decrease in the days following. We contribute to this literature by showing that these announcements also produced a sustained dampening of the sensitivity of the sovereign bond yield to the Global Financial Cycle. Moreover, our study aligns with the broader literature exploring the Global Financial Cycle (Rey 2015, Miranda-Agrippino & Rey 2020, and Miranda-Agrippino & Rey 2022), offering insights into the interplay between unconventional monetary policy, global financial conditions, and domestic economic issues. Eventually, we enrich the growing strand of literature, developed notably in the wake of Jorda & Taylor (2016), using inverse propensity score weighting methods borrowed from microeconometrics to identify the impact of macroeconomic policy choices,

Section 2. depicts the context in which announcements of sovereign bond purchases in emerging market economies took place and the way we classified central banks' communication. Section 3. Section 4. presents our empirical strategy and results.

2 Announcements of sovereign bond purchases in emerging market economies

2.1 Context

In March 2020, global financial markets were struck by a tumultuous risk-off shock, related to the uncertainty surrounding the economic consequences of the Covid-19 pandemic. The VIX rose to levels unreached since the Global Financial Crisis. At the same time, emerging markets were fled by international investors, as depicted in Figure 1, and the spread of long-term rates with the US widened, as illustrated in Figure 2.

On March 12, the ECB communicated on additional LTROs and net asset purchases of €120 billion. On the 15th, the Fed declared that it will increase over the coming months its holdings of Treasury securities by at least $500 billion and and its holdings of agency-backed mortgage securities by at least $200 billion. The VIX started to gradually decrease from March 17, which was interpreted as a sign of the efficiency of the communication of the major central banks. Some of the central banks of emerging market economies followed, by announcing programs of sovereign bond purchases, for the first time in their history.

[3]We assume the VIX to be exogenous from the variations of the sovereign bond yield of the economies of our sample, which allows us to interpret the correlation between the VIX and the spread as the contemporaneous sensitivity of the latter to the former. This type of assumption on the exogeneity of the VIX relative to assets issued out of the US is frequently made in the related literature. See for example the empirical strategies of Rey (2015) or Gilchrist et al (2022).

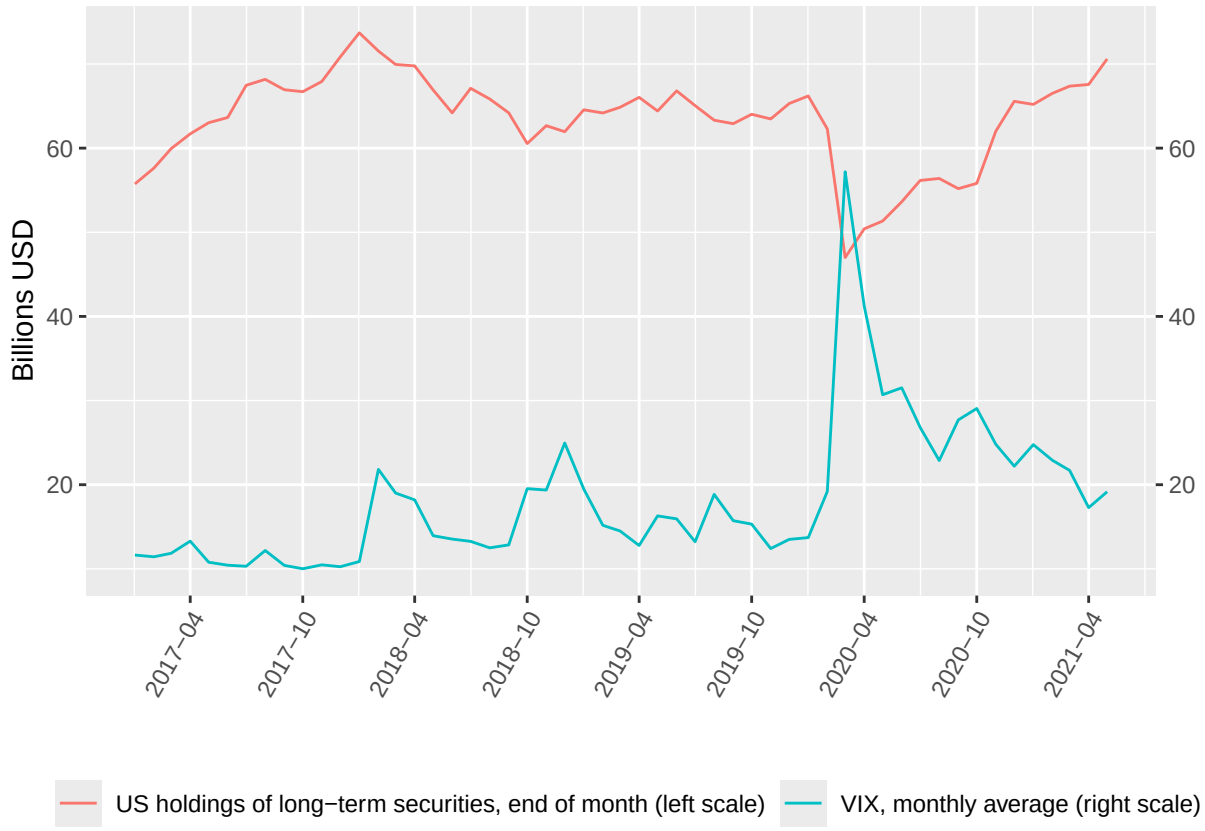


Figure 1: US holdings of long-term securities & VIX. Note: Fig.1 plots the VIX and the mean of the holdings of long-term securities by US residents in the 16 countries of our sample. We use US investors as a proxy for international investors, as public data on international capital flows towards emerging markets does not exist at a higher frequency than the biannual one of the IMF Coordinated Portfolio Survey. Sources: US Treasury data & FRED.

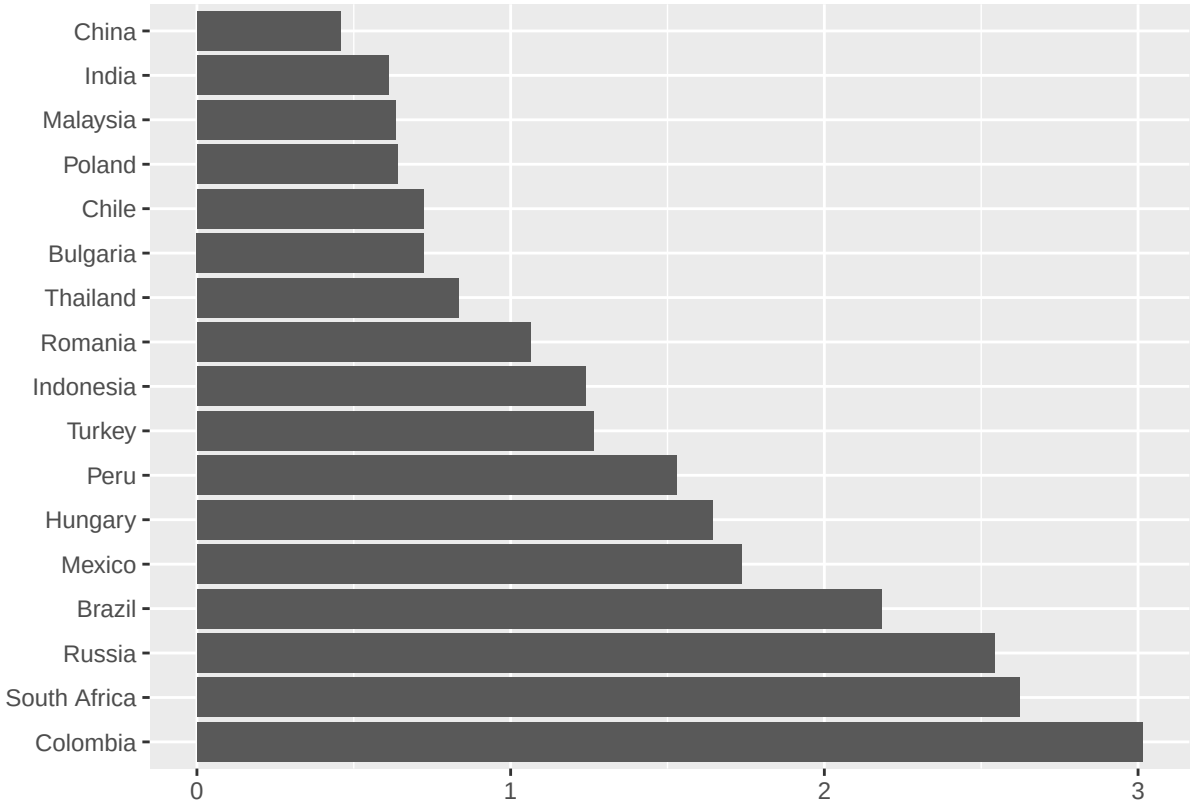


Figure 2: Evolution of the spread with the US between January and March 2020. Note: Fig.2 plots for each of the economies of our sample the absolute variation of the spread of the 10-year LC sovereign bond with the US treasuries of the same maturity, during the two months preceding the ECB announcement of March 13. Sources: Refinitiv.

2.2 Sample

We first look in the IMF Policy Response to Covid-19 Tracker for any mention of sovereign bond purchases in the 193 countries considered as emerging market or developing by the institution. We then find the corresponding press releases on the central banks' website[4].

Note that changes in the legal framework are not considered announcements unless they are accompanied by a statement of the central bank regarding the concrete use of its new powers. On May 7, the Brazilian parliament authorized the Banco Central do Brasil (BCB) to purchase public and private assets on the secondary market. However, the BCB did not announce any sovereign bond purchases following this decision. Its president even declared that he would not use his new powers until the exhaustion of all other solutions. Hence, we do not consider this event as equivalent to an announcement of sovereign bond purchases.

According to data availability, we constitute two samples, one on which we analyse the determinants of the central bank's decision[5] in section 3, and one on which we study the impact of announcements on the sensitivity of the sovereign bond yield to the GFC[6], using high-frequency market data, in section 4.

Table 1 presents the dates of the announcements for our main sample gathered thanks to the described method, and Appendix 5.3 provides the links to the corresponding press releases. We consider that the monetary policy regime switches on the date of the first announcement. We store this information in a Regime variable taking the value 1 from this date and 0 before.

We compared the result of this search to what is reported by Fratto et al (2021) in their database on announcements of asset purchases in emerging market economies. The information we collected about the economies of our sample matched theirs at the exception of what we consider as the first announcement of sovereign bond purchases in Indonesia and Mexico.

Table 1: First announcement of sovereign bond purchases on the secondary market

Country	Date
Thailand	2020-03-17
Poland	2020-03-17
India	2020-03-18
Mexico	2020-03-20
Romania	2020-03-20
Colombia	2020-03-23
South Africa	2020-03-25
Turkey	2020-03-31
Indonesia	2020-03-31
Hungary	2020-04-07

[a] Sources: CB press releases

[4]Chile constituted a limit case, as the central bank announced on June 16 that it will repurchase its own bonds, sending a mixed signal to the market. Hence, we exclude Chile from our analysis.

[5]We refer to this sample as the auxiliary sample in the rest of the article.

[6]We refer to this sample as the main sample in the rest of the article.

2.3 Content of the announcements

Among the targets mentioned in the first announcement, the stabilization of the sovereign bond market and the increase of its liquidity dominate the support to the government spending and to the economic activity, as reported in Table 2.

Table 2: Main targets of the sovereign bond purchases as stated in the central banks' first announcement

Disclaimed goal	% of occurence
Stabilize the SB market	100
Increase liquidity on the SB market	90
Reduce volatility on the SB market	50
Support the government spending & economic activity	20

[a] Sources: CB press releases

3 Adressing endogeneity: estimation of a probit

Announcements of sovereign bond purchases in EM economies occurred in a very specific international context: during or shortly after the global financial shock of March 2020, and after the change in the Fed stance. We can hence suspect the decisions of the EM central banks to be endogeneously determined by the Global Financial Cycle. However, such interpretation would miss a crucial part of the story: the majority of the EM central banks did not announce SBP in 2020. Hence, what is at play in the decision to communicate on unconventional monetary policy is the interaction between a specific international context and some unknown idiosyncratic parameters.

To determine what are these unknown idiosyncratic parameters, we use a cross-sectional probit. We first define a variable SBP taking the value 1 if the central bank announced SBP in 2020, 0 otherwise. We then estimate the following model on our auxiliary sample composed of 64 EM countries:[7]

$$P(SBP = 1|C, S) = \Phi(\beta + \gamma_j C_j + \theta_j S_j + \epsilon)$$

C is a vector of "conjunctural" variables capturing the developments on domestic financial markets during the first months of 2020, and S a vector of "structural" variables (GDP per capita, financial crises occurrence, exchange rate regime...).[8].

We use the area under a receiver operating characteristic (AUROC) as our decision criterion to select the best model rather than the accuracy of the model because of the imbalanced nature of our samples, as often recommended in the literature (see for eg. Richardson et al. 2024). Indeed, we first select and estimate the model on the largest sample at our disposal,

[7] Including the 16 countries of our main sample.

[8] The full list of the 51 variables tested is available in Annex 5.4

in which only 23.4% of the central banks announced SBP. Hence, using accuracy as our decision metric could lead to choose a model which predicts well the decision not to announce SBP in March-April 2020 (high true negative rate) but misclassifies the minority group (high false negative rate, low true positive rate). Then, we would use this model for classification on our main sample, in which the imbalance goes the other way: 62.5% of the central banks of this sample announced SBP. A model which fails to predict properly $SBP = 1$ could hence not perform well on our main sample. So we rather use the AUROC as our decision criterion, which values models with both a high true positive rate and a high true negative rate. We hence select the model with the highest AUROC of 0.86, which yields the results described in Table 3.

Table 3 provides some interesting insights on the decision to announce SBP. Not surprisingly, operating under a de facto fixed exchange rate regime[9] reduces the probability for the central bank to announce SBP in March-April 2020. Sovereign bond purchases come at the cost of an increase of the monetary mass, dragging down the domestic currency, threatening the stability of the exchange rate and hindering the completion of the central bank's goals. The simple fact of communicating on such impending purchases can impact the spot exchange rate through investors' expectations, as discussed in Appendix 5.1. The number of financial crises endured by the economy since 2000 also impacts negatively the probability for the CB to announce SBP. We interpret this as the sign that credibility matters. As developed in section 1, the ability of the announcements to stabilize markets is highly correlated to investors' expectations and beliefs about the central bank. Lacking credibility due to the recent financial history of their economy may have discouraged some EM central banks to openly switch to unconventional monetary policy. This is in line with the positive (but insignificant) coefficient of the variable capturing the central bank independence. More independent central banks are probably more credible on the markets and aware of it. However, as we keep this variable in the model for prediction motives, we do not want to make further hypotheses from this.

Table 3: Probit model, exploring the determinants of the CB decision to announce SBP in 2020

	(1)
Fixed exchange rate regime	−1.26**
Financial crises since 2000	−0.78*
CB independence (2019 estimate)	2.00
Inflation (end 2019)	0.07
Num.Obs.	64

* p <.05,** p<.01,***<.001

[9]According to the IMF AREAR.

4 Empirical strategy

Over the period from January 1, 2019, to June 1, 2021, we estimate first-difference regressions of the form:

$$\begin{aligned}\Delta S_{i,t} = \beta \Delta VIX_t + \gamma \Delta VIX_t * Regime_{i,t} + \eta \Delta Regime_{i,t} \\ + \theta_1 \Delta PolicyRate_{i,t} + \theta_2 \Delta ExchangeRate_{i,t} \\ + \theta_3 \Delta CovidCases_{i,t} + \epsilon_{i,t} \quad (1)\end{aligned}$$

We use a first-difference estimator to remove time-invariant unobserved heterogeneity and to fit with the high degree of autocorrelation of the sovereign bond yield. $S_{i,t}$ is the yield of the 10-year sovereign bond denominated in local currency of country i on day t. We include the first-difference of the VIX, of the Regime variable and of their interaction as dependent variables to study whether the announcements of SBP reduced the sensitivity of the sovereign bond yield to the Global Financial Cycle. We use the first differences of the policy rate, of the exchange rate with the US dollar and of the number of Covid cases per inhabitant[10] as control variables. We deal for the heteroscedasticity and autocorrelation of the residuals by estimating Driscoll and Kraay standard errors, which account for both cross-sectional and serial autocorrelation.

If estimated with OLS, the coefficient γ can be interpreted as the impact of the announcements of SBP on the sensitivity of the sovereign bond yield to the Global Financial Cycle only if the regime switching is a random experiment, uncorrelated to any other variables influencing this sensitivity. However, as we show in section 3, the probability to announce SBP in March-April 2020 is influenced by some structural characteristics of the studied economies, which may themselves determine the evolution of the sensitivity of the sovereign bond yield to the GFC.

To identify the causal effect of the announcements on this sensitivity, we introduce inverse-propensity weighting (IPW) in the spirit of Huber (2014) and Jorda & Taylor (2016) in our estimation procedure. Using the model described in section 3, we compute the probability to announce SBP in 2020 for each of the 16 countries of our main sample and define their weights in the following way:

- If $SBP_i = 1$, $w_i = 1 - \mathbb{P}(SBP_i = 1)$
- If $SBP_i = 0$, $w_i = 1 - \mathbb{P}(SBP_i = 0) = \mathbb{P}(SBP_i = 1)$

We then estimate equation (1) using least weighted squares with these inverse-propensity scores as weights. The more (less) endogenous the central bank decision was, the less (more) weight we attribute to the observations associated to it to ensure the proper identification of the causal effect of the regime-switching.

The second column of table 4 presents the results of the IPW estimation. The coefficient of the VIX is positive and significant. This shows the exposure of the countries of our sample to the Global Financial Cycle, and is in line with Rey (2015) conclusions, who found that

[10]The number of Covid cases has been shown to influence the sovereign bond yields of European economies by Ortman & Tripier 2021.

a deterioration of the GFC causes the price of risky assets to decrease. The coefficient of the interaction of the VIX with the Regime variable is negative and significant. In line with our initial hypothesis, the announcements of sovereign bond purchases reduced the sensitivity of the sovereign bond yield to the GFC. The difference in magnitude between the estimates of this coefficient by OLS and IPW is striking: the estimated average impact of an announcement is more than two times lower when controlling for its endogeneity.

About control variables, a depreciation of the domestic currency or an increase in the number of Covid-19 cases per inhabitant are associated with a significant increase of the sovereign bond yield. The coefficients of the Regime variable and of the policy rate are insignificant.

Table 4: Sensitivity of the 10Y sovereign bond yield to the GFC and announcements of sovereign bond purchases

	OLS	IPW
VIX	0.50***	0.69***
VIX:Regime	−0.39*	−0.14**
Regime	10.67	10.28
Policy rate	0.29	0.26
Covid-19 cases per inhabitant	2066.17*	1715.45*
Exchange rate (USD to domestic currency)	0.06***	0.07***
Num.Obs.	10 064	10 064
R2	0.026	0.028
R2 Adj.	0.025	0.028

* p <.05,** p<.01,***<.001

Dynamic effects

In this section, we conduct a simple experiment to test whether the effect of an announcement on the sensitivity of the sovereign bond yield to the GFC fades with time. Our initial hypothesis claims that, after the first announcement of sovereign bond purchases by the central bank, investors change their behavior on the market as they feel insured against a degradation of the Global Financial Cycle. However, as time goes, investors may consider that the insurance provided by the central bank is no longer relevant or experience that it does not really work as they thought it would. To test this hypothesis, we reduce the number of days in our sample. Hence, the number of days after the announcement goes down for the countries where they occurred. We expect that, the closer to the date of the announcement we get, the stronger its effects should be, as investors consider the information to be more relevant and/or have not yet been deceived by the central bank. And, as described in table 5, we find that, the closer to March-April 2020 the last date of our sample is, the larger the coefficient of the interaction of the VIX with the Regime variable is, which suggests that the impact of the announcement is indeed fading with time.

Table 5: Sensitivity of the 10Y sovereign bond yield to the GFC and announcements of sovereign bond purchases, dynamic impact, IPW estimation

	Jan2019-Sep2020	Jan2019-Dec2020	Jan2019-Jun2021
VIX	0.71***	0.72***	0.69***
VIX:Regime	−0.18*	−0.16*	−0.14*
Regime	17.90	13.10	10.28
Policy rate	4.96	0.78	0.26
Covid-19 cases per inhabitant	−1077.49	562.59	1715.45
Exchange rate	0.07***	0.07***	0.07***
Num.Obs.	6944	8352	10 064
R2	0.037	0.034	0.028
R2 Adj.	0.037	0.034	0.028

* p <.05,** p<.01,***<.001

Conclusion

In this paper, we study whether the central bank's announcements of sovereign bond purchases can mitigate the influence of the GFC on sovereign risk in emerging market economies. We provide preliminary evidence that it can in a significant manner. The insurance provided by the central bank's potential purchases during risk-off episodes seems to have partially insulated the most exposed markets from the international financial conjuncture, signifying an efficient transmission of the information to the agents, as well as their trust on the willingness and the ability of the central bank to conduct such policy. Further research will explore the heterogeneity of the impact of announcements across investors' classes and residencies.

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5 Appendix

5.1 Impact of the purchases on the exchange rate and local-currency bond price

The purchases increase the bond price by rising demand. At the same time, the purchases increase the supply of local money and depreciate the exchange rate, which cause the bond price considered in hard currency to decrease. If investors make their arbitrage in hard currency, this could make them consider that announcements of sovereign bond purchases do not constitute a real insurance against the impact of the GFC on the bond price considered in hard currency. However, we argue that this should not be the case, because the total value of the domestic monetary mass is much larger than the total value of the domestic sovereign bonds. Hence, the impact of the purchases on the bond price considered in hard currency through the "exchange rate channel" should be much lower than its impact through the "supply channel". Consequently, even when considered in hard currency, the bond price should increase when the CB conducts purchases. The mechanism described in the introduction should then be valid even when considering local-currency bonds and investors making their arbitrage in terms of hard currency values.

5.2 Data sources

The benchmark yield of 10-year sovereign bonds issued in local currency and the CB policy rate and the come from Refinitiv. The VIX time series was downloaded on the FRED website. The share of the sovereign bonds denominated in local currency held by foreigners was taken from from Shin et al (2023). Information about the macroprudential stance comes from the integrated macroprudential policy database (iMapp) of the IMF. The Fed shadow rate is the one estimated by Leo Krippner and available on his website. Data on US capital flows comes from the databases of the Treasury International Capital (TIC) system.

5.3 Central banks' announcements

The URL links to the press releases of the central banks are listed below:

- Colombia
- Hungary
- India
- Indonesia
- Mexico
- Poland
- Romania
- South Africa

- Thailand

5.4 List of variables used to build the probit model

Table 6

N	Description of the variable	Source
1	R-squared of the regression of the exchange rate on the VIX (estimated from 2015 to 2019)	Refinitiv
2	Standard deviation of the exchange rate between January 10 to March 13 2020	Refinitiv
3	Standard deviation of the exchange rate in 2019	Refinitiv
4	Ratio of variable 2 on variable 3	Refinitiv
5	Exchange rate with the US dollar on 10 January 2020	Refinitiv
6	Exchange rate with the US dollar on 13 March 2021	Refinitiv
7	Rate of variation of the exchange rate between Jan 10 and March 13	Refinitiv
8	Variable taking the value 1 if the exchange rate is de facto pegged	IMF
10	GDP per capita (end 2019)	IMF
11	GDP (end 2019)	IMF
12	Annual GDP growth in 2019	IMF
13	GDP growth forecast for 2020 (end 2019)	IMF
14	Ratio of general government debt on GDP (end 2019)	IMF
15	General government debt (end 2019)	IMF
16	General government deficit (end 2019)	IMF
17	Current account ratio (end 2019)	IMF
18	Population (end 2019)	IMF
19	Annual inflation (end 2019, YoY)	IMF
20	Inflation forecast for 2020 (by end 2019, YoY)	IMF
21	Average inflation between 2014 and 2019 (end of period inflation, YoY)	IMF
22	Average inflation between 2009 and 2019 (end of period inflation, YoY)	IMF
23	Average inflation between 2000 and 2019 (end of period inflation, YoY)	IMF
24	Annual inflation (2019, average of QoQ inflation)	IMF
25	Inflation forecast for 2020 (by end 2019, average of QoQ inflation)	IMF
26	Average inflation between 2014 and 2019 (average of QoQ inflation)	IMF
27	Average inflation between 2009 and 2019 (average of QoQ inflation)	IMF
28	Average inflation between 2000 and 2019 (average of QoQ inflation)	IMF
29	Number of banking crises since 1970	Laeven & Valencia 2020
30	Number of currency crises since 1970	Laeven & Valencia 2020
31	Number of sovereign debt crises since 1970	Laeven & Valencia 2020

Table 7

N	Description of the variable	Source
32	Number of debt restructurings since 1970	Laeven & Valencia 2020
33	Number of banking crises since 2000	Laeven & Valencia 2020
34	Number of currency crises since 2000	Laeven & Valencia 2020
35	Number of sovereign debt crises since 2000	Laeven & Valencia 2020
36	Number of debt restructurings since 2000	Laeven & Valencia 2020
37	Total number of crises since 1970	Laeven & Valencia 2020
38	Total number of crises and debt restructurings since 1970	Laeven & Valencia 2020
39	Total number of crises since 2000	Laeven & Valencia 2020
40	Total number of crises and debt restructurings since 2000	Laeven & Valencia 2020
41	Index of de jure independence of the central bank	Romelli 2024
42	Index of de jure independence of the governor and CB board	Romelli 2024
43	Index of de jure independence of the monetary policy	Romelli 2024
44	Index of independence of the statutory objectives of the CB	Romelli 2024
45	Index of de jure independence of the CB regarding lending to the government	Romelli 2024
46	Index of de jure financial independence of the CB	Romelli 2024
47	Index of de jure independence of the reports produced by the CB	Romelli 2024
48	Grilli, Masciandaro and Tabellini (1991) Index of Central Bank Independence [0;1].	NA
49	Cukierman et al. (1992) Unweighted Index of Central Bank Independence [0;1].	NA
50	Cukierman et al. (1992) Weighted Index of Central Bank Independence [0;1].	NA
51	Jacome and Vazquez (2008) Index of Central Bank Independence [0;1].	NA