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IMF's Precautionary Lending Instruments: Have They Worked?

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ABSTRACT: The paper documents the benefits provided by IMF's precautionary instruments (FCL and PLL) to countries in accessing international financial markets. It builds on multiple methods to show that the announcement of new FCL or PLL generally leads to a significant decline in sovereign spreads. Next, it evaluates the role of the FCL and PLL in mitigating external financial pressures, focusing on the COVID-19 pandemic as a case study. Economies which had a PLL or FCL arrangement in place during the pandemic experienced a lower increase in spreads relative to other emerging markets, even after controlling for country-specific effects and other covariates, suggesting that these arrangements help cushion external shocks. Finally, the study asks whether FCL/PLL drawdowns have an impact on financial perceptions; the analysis finds—albeit on the basis of a very small sample— no evidence of downside effects from countries drawing down on these arrangements .

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WORKING PAPERS

IMF's Precautionary Lending Instruments: Have They Worked?

Prepared by Giulio Lisi[1]

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I. Introduction

Through its general resources, the International Monetary Fund provides temporary financing to address balance of payments support to countries in a manner that is consistent with its Articles of Agreement (IMF 2014). In addition, given the ability to pool resources globally, the IMF can help limit the propagation of global financial shocks. Fund arrangements can therefore play a crucial role in helping countries manage exogenous financial pressures and restore market confidence.

The Flexible Credit Line (FCL) and the Precautionary and Liquidity Line (PLL) have become important components of the Fund's lending toolkit, intended to help countries with strong fundamentals to manage external financing shocks and bolster market sentiment. The FCL and the PLL (as well its precursor, the PCL, the Precautionary Credit Line) were created in the aftermath the 2008 financial crisis with the aim to flexibly respond to balance of payment pressures (IMF 2011). These instruments combine rigorous qualification criteria with no (or limited, for the PLL) ex post conditionality (IMF 2014). The FCL is tailored to countries with very strong economic fundamentals and a sustained track record of very strong policy implementation, while the PLL is tailored for IMF members with sound economic fundamentals but some remaining vulnerabilities. Given these requirements, FCL and PLL allow potentially large access to Fund resources for users, with no (in the case of the FCL) or focused (for the PLL) ex post conditionality. While it has been noted that the uptake of these instruments has been relatively limited in the past (IMF 2014), five countries (Mexico, Colombia, Poland, Peru, and Chile) had an FCL between 2010 and 2020, while three economies (Morocco, Macedonia, and Panama) had a PLL or PCL during the same period. The use of these instruments by a diverse set of countries motivates an analysis of their effects on financial perceptions (IMF 2011).

This study aims to assess the benefits—in terms of market sentiment and outcomes—of the FCL and PLL. The first part of the paper asks whether the announcement of a new FCL or PLL results in improved market confidence, as measured by a decline in sovereign bond spreads. Focusing on precautionary arrangements approved through January 2021, event study difference-in-differences regressions are used to identify movements in sovereign spreads resulting from the announcement of a new FCL or PLL. The analysis uncovers a significant drop in spreads following announcement dates, consistent with improved market confidence. Various robustness tests corroborate these findings. Section V complements these analyses using a synthetic control approach (SCM, Abadie 2021) to gauge the impact of FCL and PLL arrangements at the level of individual countries.[1] These additional tests suggest again a significant decline in spreads resulting from the arrangements (except for Panama), reinforcing the view of a positive impact of FCL and PLL on market confidence.

Next, the paper investigates whether the presence of a PLL or FCL helps countries cushion the impact of financial shocks. It does so by analyzing the evolution of sovereign spreads in the context of the COVID-19 pandemic. Using fixed effects panel regressions, the study compares variations in spreads at the onset of the pandemic between adopters and non-adopters. Results indicate that the increase in spreads following the pandemic was significantly lower among countries with a PLL or an FCL in place relative to other emerging market economies, even after controlling for country-level characteristics, time effects, and other covariates. While the nature of the analysis does not permit completely ruling out the effects of unobserved characteristics on the estimates, these

[1] Recent contributions have used this approach to assess, inter alia, the effects of capital controls (Chen and Nugent 2019); macroprudential tools (Avezum et al. 2021); and debt relief (Lang et al. 2021).

results are generally consistent with earlier observations regarding a positive role of FCL and PLL instruments in helping countries withstand external financing pressures (cf. IMF 2014).

Section VII discusses the effect of drawdowns of FCL or PLL resources on market sentiment, examining the impact of these events on sovereign spreads. It finds that in the two instances where countries did draw on resources available under the arrangements (Morocco and Colombia), movements in spreads were relatively muted, suggesting no significant impact on market confidence. These results suggest there are limited downside effects from countries drawing down on these arrangements.

The findings contribute primarily to the literature on the Fund lending instruments. While there is a substantial amount of research on IMF-supported programs and their effects (inter alia, Eichengreen et al. 2005; Atoyan and Conway 2006; Modi and Saravia 2006; Wei et al. 2010; Newiak and Willems 2017; Scheubel et al. 2018; Gehring and Lang 2020; Bomprezzi et al. 2022; Krahnke 2022), empirical evidence concerning the impact of the FCL or PLL instruments is relatively limited. In this regard, the 2011 Review of the FCL and PCL instruments (IMF 2011: Box 3) adopts an event study approach, showing that sovereign spreads declined after the announcement of a new FCL. The 2014 Review of FCL and PLL arrangements (IMF 2014) builds on cross-sectional regressions to show that announcements of a new instrument had a positive effect on both spreads and capital inflows. It also finds that, following the Fed tapering announcement, countries with a PLL or an FCL in place experienced a more limited increase in spreads compared to other emerging economies. The 2017 Review of the FCL and PLL (IMF 2017) uses an event study methodology to suggest that the reduction of access under an FCL or PLL did not significantly affect spreads. Maurini (2017) analyzes monthly spread levels across 28 emerging market economies between October 1998 and July 2014 in a panel data setting, finding no evidence that the FCL helps limiting sovereign yields in adopting countries. A separate study by Essers and Ide (2019) adopts a synthetic control approach to gauge the impact of FCL announcements on monthly capital inflows and sovereign spreads; this work finds evidence for some, but generally limited, positive effect of the FCL on these variables. In a similar vein, Maurini (2019) builds on propensity score matching to suggest that emerging markets that adopt an FCL tend to experience lower spreads relative to peer economies.

This paper extends the above contributions in several ways, including by (i) using additional methodological approaches to systematically identify the effect of FCL or PLL announcements; (ii) updating the analysis using a larger set of FCL and PLL adopters; (iii) studying the confidence effects of FCL and PLL arrangements in the context of the pandemic; and (iv) examining the effect of drawdowns on market confidence. Differently from Essers and Ide (2019), moreover, (v) the analysis conducted in Section V focuses on daily spreads data and the earliest date of an official communication for a new arrangement (as opposed to the official approval date). As further discussed below, after accounting for these factors, the impact of FCL or PLL on spreads and market confidence appears consistently positive.

II. Data

In line with the existing literature, the study assesses the impact of FCL or PLL announcements on financial outcomes by analyzing changes in sovereign spreads (c.f., IMF 2011; 2014; 2017; Essers and Ide 2019; Gehring and Lang 2020). The main measure of market sentiment is the daily Emerging Markets Bond Global spread index (EMBI), between January 1, 2007, and June 11, 2021.

The EMBI is constructed by JP Morgan as the weighted average of bond yield spreads issued by emerging market economies over US government debt securities, where inclusion in the index is based on the country's

World Bank-defined income level and the issuance of US dollar-denominated bonds (JP Morgan 2018). The data is available for all FCL and PLL users except for Morocco, for which EMBI values remain constant in the period from early 2007 until the end of 2012, and North Macedonia, which is not included in the index. In the case of Morocco, sovereign spreads are substituted with daily spreads on credit-default swaps (CDS) on sovereign bonds, which are shown to be closely correlated with spreads in more recent observation periods.[2] Resulting series are used as the main dependent variable in the analysis. Data for all remaining countries in the EMBIG index, when available, is included in the econometric analysis as controls (see Section 4). For robustness, Section 8 discusses estimates obtained using sovereign CDS spreads and capital inflows as alternative dependent variables (cf. Wei et al. 2010, IMF 2014).

The main explanatory variable is based on the dates of announcements of new FCL or PLL arrangements, approved through the end of January 2021, as reported on the IMF website.[3] As further discussed in sections 4 and 5, the empirical strategy largely relies on variations in spreads around such dates to identify effects. As a result, it is important to consider both the timing of approval of a new arrangement and the date of the first official communication about a new precautionary arrangement. In practice, formal approval by the Board has often been preceded by official communications (e.g., a press release) which might have signaled the high likelihood of a new arrangement to market participants (Table 1).[4,5] In such instances, it is reasonable to expect the information to be already incorporated in market prices at the time of approval, so that focusing on the date of the earliest official communication seems appropriate. In the next sections, both the date of the first official communication and the formal date of approval are used as explanatory variables.

Additional information on the dataset is provided in Table 1, which lists the dates of the first official communication (as available on the IMF website) and approval dates for each arrangement. In the case of the FCL, information about several new arrangements became available in the same month; press releases mentioning FCL arrangements for Mexico, Poland, and Colombia were all published in April 2009, while the FCL for Peru and Chile were both announced in early May 2020. In principle, this feature can complicate the analysis, since news about one arrangement may produce spillovers to other countries (e.g., IMF 2014). This issue is examined in Section 5, which evaluates the impact of individual FCL/PLL arrangements so to exclude countries which received arrangements at a similar time.

[2] Between 2013 and 2019, the correlation coefficient between EMBI and sovereign CDS prices for Morocco was approximately 0.84.

[3] This excludes new FCL arrangements approved by the Board after that date, as well as a the PLL arrangement for North Macedonia, approved by the Board on November 22, 2022.

[4] The approval of a new FCL arrangement is preceded by an informal Board meeting, which includes preliminary discussions of qualification, an evaluation of the proposed access levels, and an assessment of the country's ability to repay the Fund. Following the informal meeting, a press release can be issued indicating authorities' interest and management's intention to recommend Board approval of the FCL arrangement (IMF 2018: 8).

[5] For Mexico, the first FCL was approved on April 17, 2009; however, information concerning the arrangement was already publicly available on April 1, 2009, when the Fund's issued communication stating the Managing Director would '*move ahead rapidly in seeking Board approval*' (IMF 2009a). The FCL for Colombia, approved on May 11, 2009, was preceded by a similar press release (IMF 2009b).

Table 1: Dates of approval and earliest official communication about FCL/PLL instruments.

	Date of first public communication	Date of approval (Board date)
FCL arrangements		
Mexico	April 1, 2009 (press release)	April 17, 2009
Colombia	April 20, 2009 (press release)	May 11, 2009
Poland	April 14, 2009 (press release)	May 6, 2009
Peru	May 8, 2020 (press release)	May 28. 2020
Chile	May 12, 2020 (press release)	May 29, 2020
PLL arrangements		
Morocco	July 27, 2012 (publication of letter of intent)	August 3, 2012
Panama	January 19, 2021 (Board approval)	January 19, 2021

Source: IMF country page websites, https://www.imf.org/en/Countries.

III. Stylized Trends

To introduce the empirical results, this section starts by discussing stylized trends in sovereign spreads for FCL and PLL adopters. Figures 1 and 2 plot the EMBI (or CDS) series in the twelve months before and after the first approval of a new arrangement. The figures also include dates of the earliest official communication (blue line); dates of approval (green line); and average EMBI spreads for all countries over the same period. Several features are worth highlighting.

First, the timing of the announcement of a new FCL or PLL arrangement appears to coincide with periods when sovereign spreads were at relatively high levels. This seems consistent with one of the aims of the instruments—to help members to withstand external shocks amid stressed market conditions (IMF 2011: p. 3 and Box 1). The only exception is the PLL for Panama, which was announced when market pressures resulting from the COVID-19 pandemic had already largely subsided (Figure 2, chart [b]). Therefore, there is generally some time-dependency in the approval of precautionary instruments, which tend to take place when spreads are elevated. This feature of the data suggests that it is appropriate to focus on changes in spreads (as opposed to levels) when estimating effects, as further discussed in Section IV.

Second, the charts show that spreads tend to decline following public communication about an FCL or a PLL, supporting the notion that these instruments have a positive impact on market sentiments. Figure 1 shows a substantial drop in the EMBI following initial press releases for most FCL arrangements, with the steepest declines observed in Mexico, Colombia, Peru, and Chile. In the case of Poland (chart [c]) and Morocco (chart [f]), we observe a large decline in spreads shortly after the Board date. Panama (Figure 2, chart [g]) once again

constitutes an exception, as the announcement of the PLL does not seem to have induced any change in spreads.

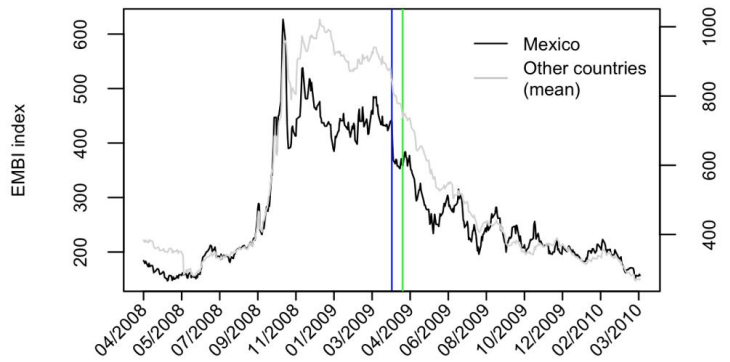
It is also worth highlighting that while in some instances (Mexico, Poland, and Morocco) the announcements seem to have triggered a fall in spreads from relatively high levels, in others (Colombia, Peru, and Chile), spreads were already declining when the arrangements were announced. Moreover, in most cases, declines in the EMBI spreads following the announcements appear to have taken place together with decreases in the index in other emerging markets (grey line). In these cases, it is worth asking whether variations in spreads can be attributed to the FCL itself or to other factors (such as changes in global risk perceptions) that may drive spreads across different economies. This reasoning informs the econometric analyses conducted in sections IV and V, which uses various approaches to disentangle the relevant effects.

Finally, to provide preliminary evidence concerning the impact of the FCL and PLL on market sentiments, Table 2 in Annex A reports results for an event study methodology which evaluates the response in spreads to announcements and approvals of new arrangements. This exercise suggests that, first, financial markets tend to react to early communications about new arrangements: in most case, we observe a larger decline in spreads after the earliest day of public communication relative to the date of Board approvals, except for Poland and Morocco, where the decline is steeper after the Board date. Second, the table shows a substantial drop in yields following the announcement of new FCL arrangements, suggesting a positive effect of the FCL on market perceptions.[6] Among users of the PLL, we observe a significant decline following the Board approval of the PLL for Morocco, while Panama experienced a non-significant increase in spreads after the approval of the arrangement. Except for Panama, therefore, the results are indicative of a positive effect of precautionary instruments on risk sentiments. These findings are investigated systematically in the next two sections.

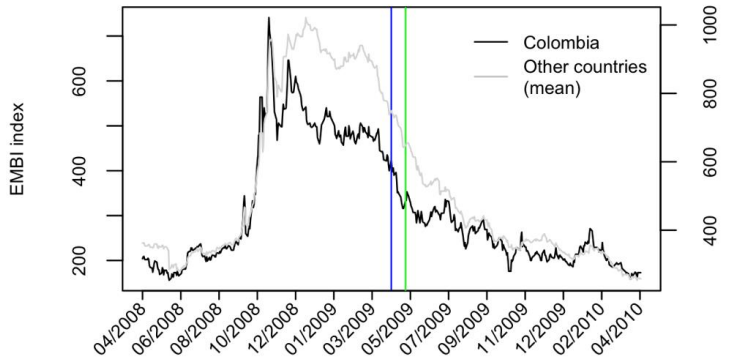
[6] Simulated p-values suggest that the drop in spreads is statistically significant (see Annex A).

Figure 1. Trends in sovereign spreads for FCL adopters. The figure shows levels of EMBI index for adopters (black solid line, right-hand side) and the average EMBI (grey line, left-hand side) in the 24-month period around the first official announcement concerning an FCL arrangement (blue line). The green line corresponds to the approval date.

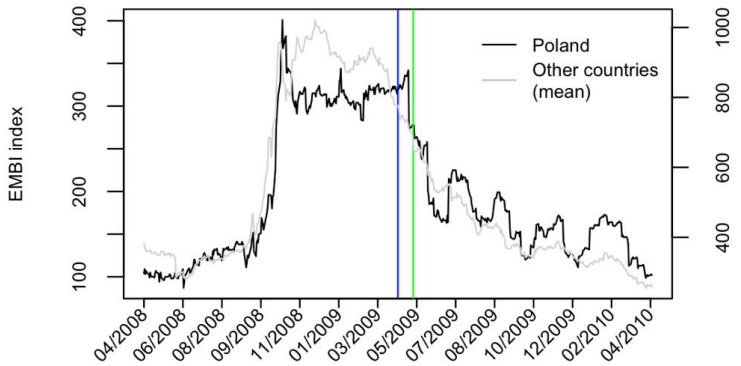
(a) Mexico FCL



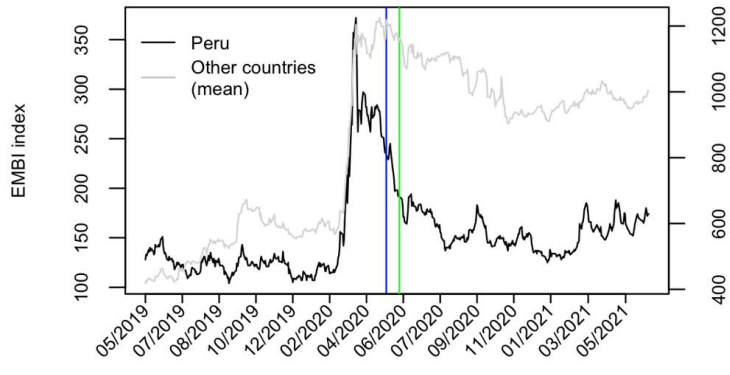
(b) Colombia FCL



(c) Poland FCL



(d) Peru FCL



(e) Chile FCL

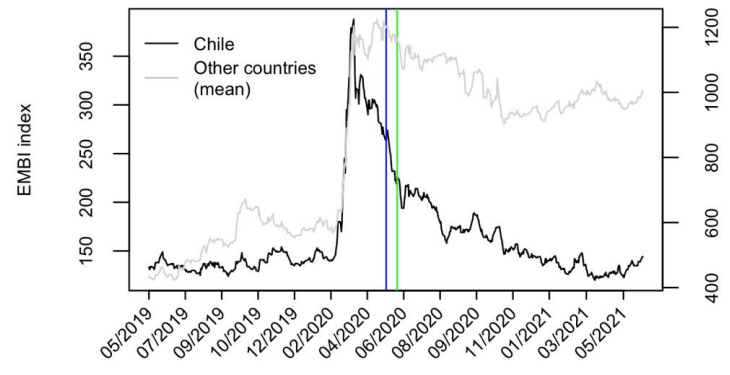
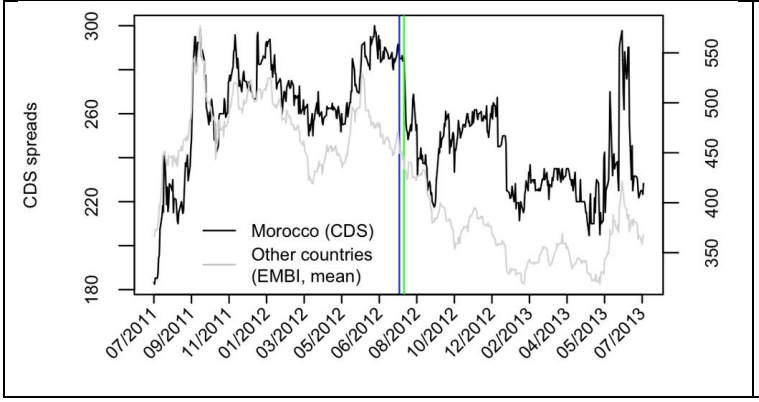
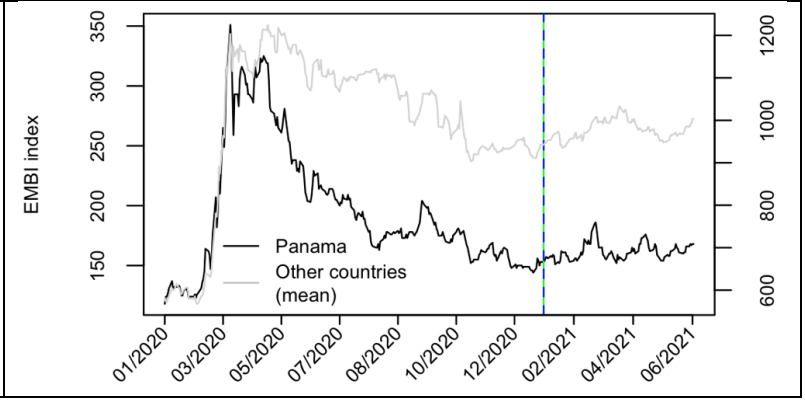


Figure 2. Trends in sovereign spreads and CDS for PLL adopters. The figure shows levels of EMBI index or CDS swaps for adopters (black solid line, right-hand side) and the average EMBI (grey line, left-hand side) for the dates covering the 12-month prior to the first official announcement of a PLL arrangement (blue line), until one year following the event or the most recent observation. The green line corresponds to the approval date.

(f) Morocco PLL



(g) Panama PLL



IV. Cross-country regression analysis

The initial econometric set up follows previous work on monetary policy announcements (Beber and Brandt 2006; Krishnamurty and Vissing-Jorgensen 2011; Hattori et al. 2016), regressing changes in spreads against binary variables for specific time windows around announcement dates.

The following specification is used to gauge the response of EMBI spreads to FCL or PLL announcements:

$$\Delta\, y_{i,t} = \alpha + \beta\, D_{i,t} + X_{i,t} \cdot \gamma' + \varepsilon_{i,t} \qquad (1)$$

Where $\Delta\, y_t$ is the change in spreads for country i on trading day t and $D_{i,t}$ is a binary variable taking the value of 1 for the countries that adopted FCL or PLL instruments, in the time window after the announcement, and zero otherwise. For the analysis, three different time periods are considered, including 7, 10, and 30 trading days after each event. In general, shorter time windows make it easier to attribute estimated effect to the announcement itself, while longer timespans allow the researcher to capture longer-term effects of the event under consideration. The use of different time intervals proposed here seeks to strike a balance between these objectives. Additional methods to estimate longer-term effects of precautionary instruments, by using local projections and synthetic control, are described in detail below and in Section V. For robustness, Annex K reports results obtained using shorter time windows (3 and 5 days) to measure the impact of FCL and PLL announcements.

In equation (1), the coefficient of interest—on the dummy indicator $D_{i,t}$—estimates the change in spreads after the FCL or PLL approval, as compared to changes in spreads for countries that did not adopt the same instruments. By focusing on changes in spreads (rather than the levels), this difference-in-differences estimator helps identify a relative shift in market sentiment in response to the announcements. This is appropriate given that, as noted, in some instances precautionary arrangements have been announced when countries' spreads were at relatively high levels. The assumption is that systematic within-country changes in spreads during the

window interval can be attributed to the event itself (the announcement of a new FCL or PLL). Under this premise, β can be used to measure the short-term impact on market sentiment.

Several controls are used to account for additional drivers of EMBI spreads. Apart from time-invariant country effects (implicit in the use of differences for the dependent variable) equation (1) incorporates global risk factors that can be expected to drive spreads across countries. Building on the existing literature on emerging market spreads (Petrova et al. 2010), the control vector $X_{i,t}$ includes daily values of the VIX index, oil prices, and the spreads between 3-month and 10-year US bonds to capture variations in global risk perceptions. The baseline models include controls in levels, while results for analogous models with differences in the controls are reported in the appendix (Annex K). Finally, all regressions include one- to three-day lags in EMBIG spreads to account for serial correlation in the dependent variable.

OLS estimates of equation (1) are reported in Table 3, which lists results for the three event windows obtained using different types of announcements as explanatory variables. In line with the previous discussion (Table 2, Annex A), results are obtained by first focusing on the earliest date of communication of FCL arrangements only, then considering earliest communications of both FCL and PLL instruments, and finally including Board dates.

Table 3: Changes in EMBI spreads around FCL/PLL announcement dates

	Change in EMBI spreads								
	7-day change			10-day change			30-day change		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Announcement type									
FCL (earliest communication)	−24.116***			−35.981***			−97.326***		
	(3.468)			(3.896)			(4.698)		
FCL / PLL (earliest communication)		−17.631***			−26.195***			−72.537***	
		(2.974)			(3.896)			(4.704)	
FCL / PLL (including Board dates)			−18.019***			−27.056***			−77.666***
			(2.817)			(3.190)			(4.335)
VIX	0.887***	0.887***	0.888***	1.274***	1.274***	1.274***	3.119***	3.117***	3.119***
	(0.054)	(0.054)	(0.054)	(0.069)	(0.069)	(0.069)	(0.114)	(0.114)	(0.114)
Oil prices	0.085***	0.085***	0.085***	0.120***	0.120***	0.120***	0.211***	0.212***	0.221***
	(0.008)	(0.008)	(0.008)	(0.010)	(0.010)	(0.010)	(0.020)	(0.020)	(0.019)
Spread between US 10-year and 3-month rate	−2.870***	−2.872***	−2.869***	−4.019***	−4.022***	−4.017***	−10.074***	−10.095***	−10.075***
	(0.218)	(0.218)	(0.218)	(0.286)	(0.286)	(0.286)	(0.556)	(0.556)	(0.556)
Lagged dep. variable	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	202,147	202,147	202,147	202,032	202,032	202,032	200,994	200,994	200,994
Adjusted R^2	0.303	0.303	0.303	0.262	0.262	0.262	0.162	0.162	0.162

Notes: Dependent variable: EMBI spreads, except for Morocco for which spreads on sovereign bonds CDS are used. Heteroskedasticity-consistent standard errors reported in parentheses. Constant term included but not shown in the table. Lagged daily changes in spreads included in all regressions. Significance levels: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.

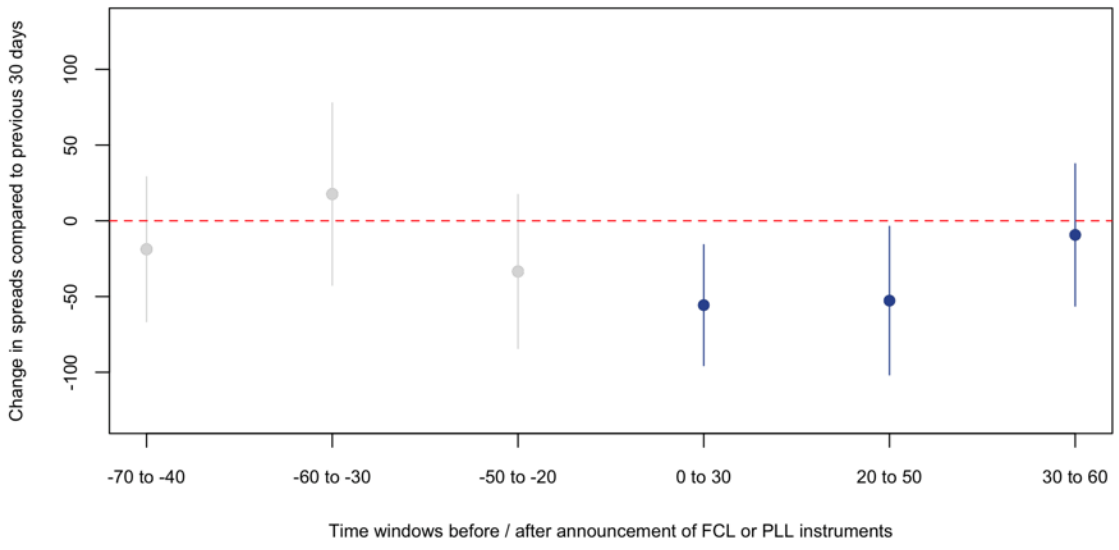
In all cases, we observe a statistically significant decline in spreads following the announcement of FCL or PLL arrangements. These effects also appear to be relatively large, ranging from 17 to 24 basis points drop in spreads in the seven trading days following the announcements, to an over 70 basis points reduction on average in the following 30 trading days. The decline in rates is larger for those regressions that consider only FCL announcement dates (columns [1], [4], and [7]). This effect could be explained by the fact that the impact of the approval of the PLL for Panama is relatively muted, as noted, contributing to lower estimated effects when PLL arrangements are included in the analysis. Moreover, Table 2 suggests that the estimated coefficients are generally greater for longer time windows; for example, the average decline in spreads is larger in the 30-day window after the announcements than for the 7- and 10-day event periods. This supports the proposition, expressed above, that improvements in market sentiments following the approval of new FCL or PLL arrangements tend to persist over time. Among the control variables, an increase in the VIX, higher oil prices, and lower spreads between the 3-month and 10-year US rates are all significantly associated with an increase in EMBI spreads.[7]

In addition, we observe a marked decline in spreads following announcements in all regressions that include only the earliest public communication (the first two rows of Table 3), without therefore accounting for the official Board approval of the arrangement. As noted, this arguably relates to possible anticipation effects in financial markets, whereby news about FCL or PLL arrangements are incorporated into sovereign yields when such information becomes available. Including the dates of early communications together with Board approvals seems therefore important to gauge the full effect of precautionary instruments on market sentiment.

As with other difference-in-differences estimators, in equation (1) identification relies on the absence of diverging trends in EMBI spreads between adopters and non-adopters before the announcement itself. To test this assumption, Figure 3 reports coefficients obtained from re-estimating model (1) including lags and lead variables for the binary variable $\mathrm{D}_{i,t}$. This implies shifting the time window used to compute the 30-day change in spreads to different periods before and after the announcements.

[7] Coefficients for the VIX index and the spreads on US 3- and 10-year bonds are both in line with findings discussed by Petrova et al. (2010, Table 4) and consistent with the idea that the variables are proxies for global risk. In addition, previous contributions find that periods of increased risk appetite are associated with higher oil prices in the short-term (Qadan, Idilbi-Bayaa 2020), which is consistent with a positive correlation between this variable and EMBI spreads.

Figure 3. Estimated change in spreads for alternative time windows. The figure shows the estimated 30-day change in spreads for adopters of FCL and PLL instruments, compared to non-adopters, before (grey dots) and after (black dots) the date of adoption. The vertical bars correspond to the 95% confidence intervals obtained for OLS estimates of equation (1), including controls and considering both initial communication and the Board date for new precautionary instruments.



As shown, spreads are not significantly different between non-adopters and adopters in the various time periods before the announcement of an FCL or a PLL. There is a non-significant decline in spreads in the 20 to 50 trading days before the announcement (compared to the previous 30 trading days); this is consistent with the observation that in some countries (Colombia, Peru, and Chile; see Figure 1) spreads started declining before the earliest official communications about a new arrangement. Nevertheless, the decline in spreads is strong—and significant—only immediately after the relevant communication. Therefore, the average drop in spreads was faster among adopters, corroborating the hypothesis that FCL and PLL arrangements contribute to improving market sentiments. In addition, the drop in spreads following the announcement seems to continue for several weeks after the initial announcement. Figure 3 shows that spreads continue to drop, relative to the previous period, for up to 50 trading days after the event. We explore this persistence of the effect on spreads below.

As a further robustness test, the appendix extends the above results using two alternative measures of market perceptions (Annex B). First, the analysis is repeated using CDS on sovereign bonds as dependent variable. Relevant estimates (Table 5, columns 1-3) show a significant decline in sovereign bonds CDS after the announcement of a new FCL or PLL arrangement, which is consistent with the results reported for EMBI spreads.[8] The estimation is also repeated using the change in monthly gross capital flows as an alternative proxy

[8] As noted, CDS spreads are also used to gauge market sentiment for the Morocco PLL in tables 2 and 3.

for market sentiment (cf. Wei at al. 2010, IMF 2014, Essers and Ide 2019).[9] Results reported in the annex (Table 5, columns 4-5) show an increase in capital flows to adopters in the month when a new FCL or PLL arrangement is announced; once again, these findings suggest a positive effect of FCLs and PLLs on market confidence towards adopters, supporting the results.[10]

Overall, results presented in this section indicate that the FCL and the PLL provide tangible benefits to countries in accessing international markets. Differences-in-differences estimates show that sovereign spreads decline in economies which use these instruments, in the period after an announcement, compared to other emerging markets. The choice of a relatively short time span to measure the impact of FCL/PLL announcements limits concerns about confounding factors, helping to identify the key effects. Further sensitivity tests, including regressions based on alternative measures of market confidence and local projections, confirm these results. In all cases, we observe an improvement in measures of market sentiment following the announcement of a new arrangement, which is consistent with a positive effect of the FCL and the PLL in improving market confidence.

Building on these findings, Annex D, discusses the potential mechanisms driving the effects highlighted above, distinguishing between the direct effect of increased access to Fund resources (e.g., Maurini 2017) and a "signaling" channel, whereby the announcement of a new FCL or PLL demonstrates the strength of a country's fundamentals and policies (IMF 2011: 5; IMF 2014: 10-11). As further explained in the annex, this analysis provides tentative evidence in support of both channels. The next section, in turn, investigates the longer-term impact of the FCL and PLL in greater detail.

V. Synthetic control method

Results from the regression analyses discussed in the previous section point to a consistent decline in spreads among adopters, after the announcement of PLL and FCL instruments. This section repeats the analysis using a synthetic control method (SCM, Abadie et al. 2011, Abadie 2020) to estimate the relevant effects.

In the context of this study, the SCM can offer several advantages over cross-country regression analyses (Abadie 2021). By taking as counterfactual weighted combinations of a limited number of countries which did not adopt FCL or PLL instruments, this method can approximate the characteristics of the units of interests (FCL/PLL adopters) better than an unweighted set of countries; it may therefore offer a more accurate basis for comparison than cross-country regressions, given that differences in the economic and institutional structure among the units analyzed may complicate inference. Moreover, the SCM allows the researcher to examine outcomes for

[9] For each country, data on gross capital inflows are aggregated on a monthly basis, summing equity and bond flows in each month. The binary indicator for FCL or PLL announcements $D_{i.t}$ (model [1]) is 1 if a new instrument is announced in month t in country i, and zero otherwise. The dependent variable comprises monthly and bimonthly changes in gross capital flows (see Table 5 in the appendix), using both one-month and two-month windows to gauge the effect of FCL and PLL announcements.

[10] A final robustness check is obtained by estimating equation (1) on alternative samples including (i) a sample that excludes low-income countries (defined as countries eligible for assistance under the Fund's Poverty Reduction and Growth Trust) and (ii) a list of emerging markets, perceived by market participants as qualifying for assistance under the FCL/PLL in summer 2020 (cf. Section VI). Results obtained with these alternative samples (not shown) are consistent with those reported in Table 3.

individual treated units (in this case, FCL/PLL adopters).[11] This is useful to exclude instances where countries received support through FCL or PLL instruments at a similar time, thus excluding possible spillover effects.[12]

The SCM proceeds by creating a synthetic counterfactual as a weighted average of untreated units ('donors'—non FCL/PLL countries), which are chosen to closely approximate the outcome variable (sovereign spreads) for each of the seven FCL or PLL adopters in the period prior to the announcement (Abadie et al. 2010).[13] The counterfactual is then used to project the outcomes of interest in the period after the treatment (in this case, the announcement of a new instrument). For this analysis, synthetic controls are constructed for all FCL/PLL adopters based on several determinants of sovereign spreads (e.g., Essers and Ide 2019; Lang et al. 2021). These include yearly values for fiscal deficit, gross government debt, current account (all expressed as share of GDP), and real GDP growth, in the year prior to adoption of the FCL or PLL, as well as the yearly average of EMBI spreads in the year prior to the adoption. For Morocco, this procedure is carried out using spreads on sovereign CDS instead of EMBI values as the outcome variable. In the case of Poland, including of gross debt among the predictors leads to a considerably worse model fit, so this variable is excluded in the construction of the synthetic control for the country.

The pre-treatment period used to calibrate the synthetic control runs from the beginning of the year until the relevant FCL or PLL announcement, selected using information from the event study in Section 2 (Table 2). For Mexico, Colombia, Peru, and Chile, the treatment is constituted by the earliest official communication, while for Poland, Morocco, and Panama it corresponds to the approval date of the arrangement.[14] In each case, countries that adopted FCL or PLL instruments around the same time as the treated unit are excluded from the potential set of controls; for example, the SC for Mexico excludes both Poland and Colombia, while the one for Peru also excludes Chile (and vice versa) from the pool of potential donor countries.[15] Tables 6-12 (in the appendix) reports the values of each predictor in the treated country and its synthetic control in the pre-treatment period (Abadie et al. 2015), together with the five countries exhibiting the highest weight in each SC. As shown, the pre-treatment values of the covariates for FCL/PLL adopters are very similar to those of their synthetic counterfactuals, suggesting adequate balance between treated and control units.

Detailed results for each country are reported in the appendix (figures A2 and A3), which shows actual spreads observed among countries that adopted an FCL or a PLL against their estimated synthetic control in the 90 trading days before and after each announcement. In general, the results are consistent with a reduction in spreads following the announcement of precautionary instruments. First, in most cases the synthetic control appears to approximate the trend in the unit of interest in the pre-treatment period relatively well; the only

[11] The terminology used in section follows Abadie (2021); the term 'treatment' refers to the announcement of a PLL or FCL instrument, while the expression 'treated unit(s)' refers to countries which adopted a PLL or FCL arrangements. 'Donors' refers to untreated units that are used to create the synthetic counterfactual.

[12] This is a concern given that, as seen in Section 2, FCL instruments have often been adopted by different countries over the same period (e.g., the first FCL in Mexico and Colombia). In these instances, the announcement of a precautionary instrument for one country may have caused movements in yields in other countries, making it more difficult to identify effects.

[13] More formally, given a set of predictors $X_1, X_2, \ldots, X_k$ for the outcome of interest Y, weights W are chosen so as to minimize $\sum^k v_k (X_{T,k} - X_{U,k} W)^2$, where T and U denote respectively the unit of interest (an individual FCL or PLL user) and the set of control units (comparator countries which did not adopt FCL or a PLL). v_k represents the relative importance of predictor k in measuring the discrepancy between these two groups (see Abadie et al. 2015, 497).

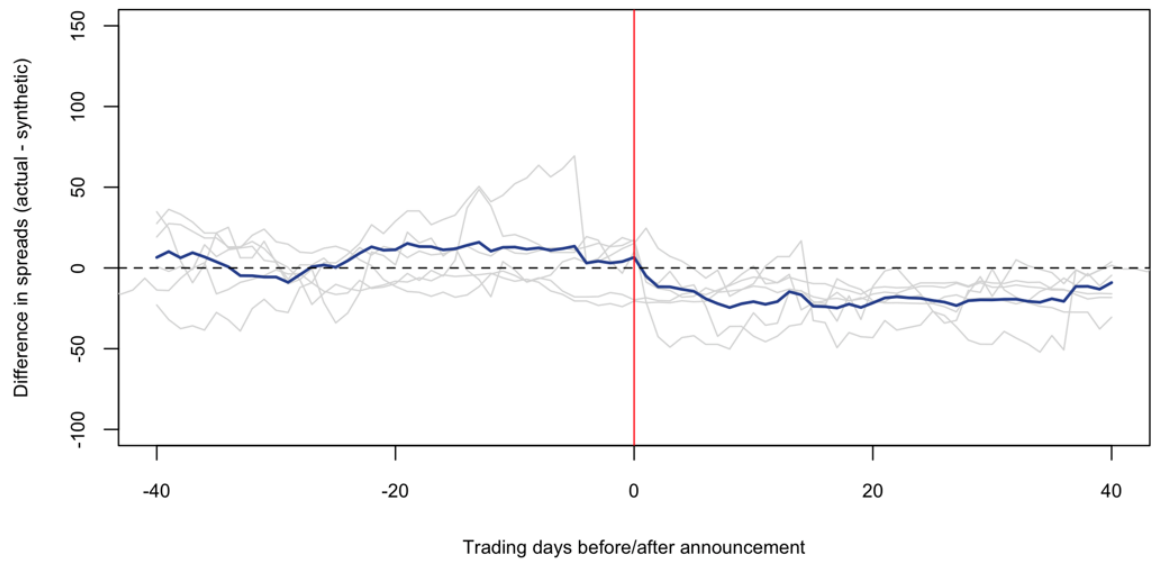
[14] For Panama, there was no official announcement for the PLL before the Board meeting. In the case of Poland and Morocco, markets appear to have reacted specifically to the Bord date rather than the press release (Table 2, annex B), thus motivating the choice of the treatment period.

[15] For both Peru and Chile, the set of potential donors excludes Mexico and Colombia, which had an FCL in place when the arrangements for Chile and Peru were approved.

exceptions are Morocco and Poland, whose actual spreads are higher than in the synthetic counterfactual in the period immediately prior to the announcement and quickly declined after the Board approval. In addition, in all countries except for Panama, observed spreads decline relative to the synthetic counterfactual, suggesting that the announcement of a new PLL or FCL has had a positive effect on market sentiment.

Building on Lang et al. (2021), Figure 8 summarizes these results by plotting the difference between observed spreads and their synthetic controls, for all countries excluding Panama in the 40 trading days before and after the announcement. In the figure, the grey lines correspond to the difference (actual minus synthetic) for each country, while the blue line corresponds to the average for the six economies. As shown, the average difference in spreads (blue line) turns negative shortly after FCL or PLL announcements, confirming the positive effects of the announcement on market sentiment. There is a small positive gap (of about 6 basis points) in the period prior the announcement.[16] After the treatment, spreads are on average 17 basis points lower than their synthetic counterpart, and remain consistently below the synthetic control throughout the 40-day period analyzed. This confirms the relatively long-lasting effect of announcements on spreads already discussed in Section IV.

Figure 8. SCM: Difference in spreads between FCL/PLL adopters and their synthetic controls. The figure shows the gaps between the treated and control units for all FCL and PLL adopters excluding Panama, in the 40-day period before and after the announcement, as well as the average gap (blue line).



Several sensitivity checks are conducted to evaluate the robustness of these results. As a first step, the analysis is repeated by shifting the treatment day to 30 trading days before the actual announcement, and by using the Board dates as an alternative treatment for the FCL in Mexico, Colombia, Chile, and Peru. These tests allow the researcher to verify that spreads do not decline with the respect to the synthetic control before or after the

[16] This is likely due to the large increase in spreads for Poland ahead of the Board date, with respect to the synthetic control for the country; see Figure A1 in the appendix.

treatment. As shown in Figure A4 and A5 in the annex, there are virtually no gaps in spreads between the synthetic and control units for these alternative treatments. Thus, although in some instances spreads may have started declining before the announcements (Figure 1), such movements are in line with what was observed for similar countries. In contrast, results for the SCM presented in Figure 8 indicate a clear decline among adopters in response to the announcement of a new FCL/PLL arrangement; this again confirms the positive effect of these events on market sentiment.

As a further test, 'placebo' SC are estimated for control units that did not have a FCL or PLL in place at the time of the announcement (cf. Abadie and Gardeazabal 2003).[17] If the main results capture the effect of the FCL or PLL, we should not see any change between the treated and synthetic units for the untreated countries. This view is supported by figures A6 and A7 (reported in the annex); the figures show no effect of the announcement on the placebo unit (for Mexico, Chile, and Morocco) or diverging trends between the treated country and its synthetic control (for Colombia, Poland, Panama). The sensitivity tests show limited effects of the FCL and PLL on untreated countries, supporting the validity of the research design. Finally, for Peru and Chile, spreads on the placebo unit (Kazakhstan) increase relative to its synthetic counterpart around the time of the FCL announcement for the country. Although this effect is not present in other placebo tests, it could nonetheless suggest some positive spillovers of FCL announcements on emerging markets which did not adopt this instrument.

In all, the above results largely confirm previous findings concerning the positive impact of FCL and PLL instruments on market sentiment. In most cases, we observe a drop in spreads among adopters (except for Panama) relative to their SCM counterfactual; such a decline is also relatively persistent, with spreads remaining below the SCM benchmark for several weeks after a new instrument is announced. In several instances, moreover, spreads seem to react to early public announcements about new arrangements, with information being already incorporated in spreads at the time of the formal approval.

VI. FCL/PLL instruments and response to financial shocks: Evidence from COVID-19

So far, the analysis has focused on the effect of the announcement of new FCL or PLL arrangements on market confidence. A complementary question is whether such instruments help cushion external financial shocks. Previous research has shown that countries with an FCL in place witnessed lower increases in spreads in the context of the 2013 'taper tantrum' episode compared to peer economies (IMF 2014: Box 2). This section reexamines this question by looking at the response in spreads in the context of the COVID-19 pandemic.

There are several reasons why the COVID-19 outbreak is useful to evaluate the role of FCL/PLL instruments in alleviating financial pressures. First, the shock affected virtually all countries during the same period, albeit with different severity. Second, the occurrence of the pandemic itself was exogenous to domestic conditions of individual economies. These features allow for an estimate of the difference in the level of spreads before- and after the beginning of the pandemic for countries with precautionary arrangements in place, compared to the

[17] Placebo countries are chosen among donor countries exhibiting a high weight in the various synthetic controls (tables 6-12, in the annex), excluding countries in the same region of the adopters and those with limited variations in EMBI spreads during the period considered.

remaining countries. Building on this reasoning, the following regression is estimated on quarterly spread data (cf. Petrova et al. 2010):

$$\log y_{i,t} = \mu_i + \delta_t + \beta_1 D(FCL/PLL_{i,t}) + \beta_2 COVID_t + \beta_3 \{D(FCL/PLL_{i,t}) \times COVID_t\} + X_{i,t} \cdot \gamma' + \varepsilon_{i,t} \quad (2)$$

The dependent variable $log\ y_{i,t}$ is the logarithm of EMBI spreads for country i in quarter t and (FCL/PLL) is a binary indicator taking the value of 1 if a country has an FCL or PLL instrument in place at time t. The variable $COVID_t$, in turn, is a binary indicator taking the value of 1 after the beginning of the pandemic period which, following Ayar and Patnam (2021), is defined by the second and third quarter of 2020. During this period, four countries (Mexico, Colombia, Peru, and Chile) had an FCL in place—either pre-existent or approved in response to the pandemic—while Morocco had a PLL.

The above specification is estimated in the six quarters from 2019Q2 to 2020Q3 (to include a balanced number of observations before and after the event). The choice of quarterly data is arguably appropriate in this context given (i) difficulties in identifying exactly the beginning of the pandemic, which affected spreads over several weeks, and (ii) the need to avoid bias in the results arising from short-term movements in spreads during the first few weeks of the outbreak. In the model, the estimate of interest is given by β_3, which measures the change in spreads before- and after the beginning of the pandemic in countries with FCL or PLL instruments, relative to control countries.

It is important to emphasize that, while the pandemic constituted an exogenous shock, endogenous factors still determine both the adoption of FCL/PLL instruments and markets' perceptions of sovereign risks, possibly biasing the estimates. Most importantly, eligibility for FCL/PLL instruments requires sound economic fundamentals; therefore, countries with an FCL or PLL in place may have been better equipped to withstand the financial consequences of the pandemic than those countries with weaker economic conditions, independently of having the instrument in place. If this reasoning was correct, β_3 would arguably overestimate the effect of interest.

To partly address this concern, the regression model includes country (μ_i) and year/quarter fixed effects[18] (δ_t). The former variable accounts for all time-invariant characteristics (for example institutional or geographical features) that may determine countries' selection of FCL or PLL instruments, while time fixed effects account for unobserved shocks affecting all units in the same quarter. [19] The vector $X_{i,t}$, in turn, considers several controls capturing time-varying domestic drivers of sovereign spreads (Petrova et al. 2010). Domestic controls include quarterly values for countries' overall fiscal balance, current account, level of non-gold foreign reserves, and gross government debt (all expressed as share of GDP).[20] Quarterly averages of the Economist Intelligence Unit's Political Risk index are added to control for its possible effect on spreads. The vector also includes controls for global economic conditions, including quarterly averages of the VIX index, oil prices, and the spread between US ten-year and three-months rates as done in Section IV. As a further robustness test, estimates are repeated

[18] Since time indicators are strongly correlated with the dummy variable for the COVID-19 period, estimates are repeated both with and without time fixed effects, see Table 4.

[19] This would also include aspects of countries' economic structure which may have determined their vulnerability to the COVID-19 shock, for example individual economies' reliance on the tourism sector or on oil exports.

[20] Given lack of data availability, data for gross government debt and the fiscal deficit are interpolated at the quarterly frequency from yearly values.

using a subset of emerging markets that were seen by market participants as possibly qualifying for FCL or PLL in summer 2020. These additional tests are discussed below and reported in the appendix.

Baseline results are reported in Table 4. As shown, the coefficient on the individual COVID dummy is positive and statistically significant across the different specifications (second row), while it is negative and significant when interacted with the indicator for FCL/PLL. Therefore, although spreads significantly increased in response to the COVID-19 outbreak, such an increase was less pronounced among adopters. It is also interesting to note that, when domestic controls are added to the regression, the individual coefficient on the precautionary instrument dummy becomes not significant. Together, these results suggest that precautionary instruments are particularly effective in supporting market confidence in moments of financial stress. Using the model reported in column (1) and recalling that the dependent variable is expressed in logarithms, estimates suggest that spreads were approximately 7 percent lower in response to the pandemic in countries that had a precautionary instrument in place.[21] As shown in the table, moreover, the effect remains significant after the inclusion of domestic controls (column 2), global economic controls (column 3), all covariates (column 4), and year/quarter effects (column 5).

[21] Taking the average increase in EMBI spreads in the first three quarters of 2020 as reference, this would correspond to an absolute of about 37 basis points, within the range of estimates discussed in Table 3.

Table 4: Panel data analysis for EMBI spreads during the COVID-19 pandemic

	Logarithm of EMBI spreads				
	(1)	(2)	(3)	(4)	(5)
FCL/PLL	−0.053***	0.137	−0.053***	0.055	0.006
	(0.020)	(0.093)	(0.020)	(0.082)	(0.092)
Covid-19 dummy	0.483***	0.514***	0.238***	0.348***	0.326***
	(0.030)	(0.052)	(0.045)	(0.088)	(0.093)
FCL/PLL × Covid-19 dummy	−0.065*	−0.175**	−0.064*	−0.176**	−0.157*
	(0.036)	(0.086)	(0.036)	(0.084)	(0.091)
Current account/GDP		0.006		0.017	0.019
		(0.012)		(0.011)	(0.012)
Fiscal balance/GDP		0.059**		0.045	0.037
		(0.023)		(0.028)	(0.032)
Reserves/GDP		0.024***		0.016**	0.016**
		(0.006)		(0.007)	(0.007)
Government debt/GDP		−0.698**		−0.467*	−0.247
		(0.289)		(0.247)	(0.270)
Political risk index		0.030***		0.032***	0.032***
		(0.010)		(0.011)	(0.011)
Oil prices			−0.007***	−0.001	−0.016*
			(0.003)	(0.005)	(0.009)
VIX			0.011***	0.016***	0.008
			(0.003)	(0.004)	(0.006)
Spread between U.S. 10-year and 3-month rate			−0.067	−0.161**	−0.809***
			(0.051)	(0.074)	(0.301)
Year-quarters FE					✓
Country FE	✓	✓	✓	✓	✓
Observations	437	228	437	228	228
Adjusted R^2	0.455	0.549	0.601	0.679	0.691

Notes: The dependent variable is the logarithm of quarterly average EMBI spreads; the 'COVID-19' variable takes on the value of 1 in 2020Q1-2020Q2, and zero otherwise. The sample covers the period from March 31, 2019, to September 30, 2020. Heteroskedasticity- and serial correlation-robust standard errors are reported in parentheses. Significance levels: *p<0.1; **p<0.05; ***p<0.01.

Turning to control variables, we observe that a decline in oil prices, an increase in the VIX index, and a lower spread between long- and short-term US rates are all associated with higher EMBI spreads, after controlling for the onset of the pandemic itself. These results are broadly in line with those obtained for the event studies regressions in Section IV (Table 3). Among domestic covariates, there is a positive correlation with the political risk index. Less intuitively, an increase in reserves and a reduction in government debt are both associated with higher spreads, a result that can be possibly explained with the economic policy responses in the context of the

pandemic.[22] The fiscal balance is also positively associated with the EMBI index (column 3), although this effect is not significant after including global economic controls to the regression (columns 4 and 5). In addition, when domestic controls are added to the regressions, the coefficient on the interaction term becomes larger.[23]

Table 4 suggests that countries which had precautionary instruments in place at the outset of the pandemic saw a more limited increase in spreads relative to control units. As noted, this conclusion depends on the absence of unobserved variables that may drive both adoption of FCL/PLL instruments and markets' perceptions of the economy in response to the pandemic. While it is not possible to directly test the validity of this premise, one possibility is to repeat the analysis by focusing on countries that can be thought as having similar characteristics (e.g., from a market-risk perspective) as adopters. For this, the appendix report results obtained by estimating equation (3) for a subset of countries which financial markets participants considered as potential FCL/PLL qualifiers as of summer 2020 (Annex I). To the extent that such perceived 'qualifiers' are similar to countries that actually adopted a PLL or FCL (from an economic or institutional perspective), these regressions offer a better basis of comparison than the full sample.

As shown in Annex I, in these alternative regressions the coefficient on the interaction effect remains negative; however, it becomes not significant (the p-value is approximately 0.2 when domestic controls are used in the regression). Nevertheless, lack of data availability on several control variables implies a considerable reduction in the number of observations, with only 75 observations included in these regressions. This lack of statistical power largely accounts for the wider standard errors obtained for these specifications. Even with these limitations, the size and the sign of the key coefficient reported in the annex is consistent with what discussed above.[24]

Relatedly, one can inquire whether results reported in Table 4 can be explained by trends in the pandemic itself. If countries with PLLs or FCLs in place have experienced a less severe shock than other emerging markets in the sample, the negative interaction effect shown in the table could reflect higher economic resilience rather than the presence of a PLL/FCL arrangement, leading to bias in the estimates. In practice, however, there is little evidence that trends in the pandemic were less severe among adopters. Figure 11 illustrates the logged cumulative number of cases of COVID-19 and COVID-related deaths across countries.[25] As shown, countries with an FCL or PLL in place as of the second quarter of 2020 experienced, on average, a higher number of cases than other emerging markets included in the sample. This suggests that, if anything, the pandemic was relatively more severe among adopters.

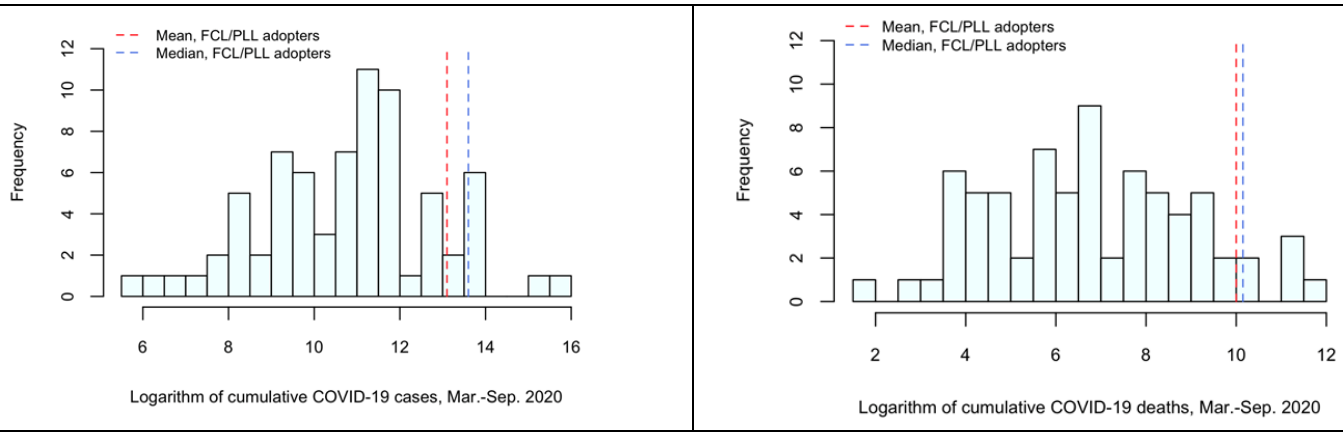
[22] Economies which entered the pandemic with greater fiscal space and stronger fundamentals generally had greater capacity to increase spending to manage the recession (IMF 2021a: 7), possibly explaining the positive correlation between variations in gross debt and spreads during the period; supporting this view, Bergant and Forbes (2022) find that emerging markets with higher pre-existing debt levels were more constrained in using fiscal spending to address pandemic-related needs. The same effect could be partially explained by a lower liquidity premium granted by markets to issuer with larger (and therefore more liquid) sovereign bond markets. At the same time, the foreign reserves position improved in several emerging markets during 2020, partly driven by lower oil imports for net oil importers (IMF 2021b: 2, 16); this trend could explain the positive association between reserves and spreads.

[23] Further tests that replicate the model with individual controls (not shown) suggest that the size of the coefficient becomes larger especially when either (i) foreign reserves or (ii) fiscal deficit series are added as controls. This could indicate that, once a country has a precautionary program in place, markets are less concerned about the level of external buffers or fiscal spending, giving the adopting member more space to pursue counter-cyclical fiscal policy.

[24] As a further robustness check, model (2) is estimated adding interactions between each of the macroeconomic controls and the COVID-19 binary variable; in this alternative specification (not shown) the key effect β_3 remains negative and significant.

[25] Data obtained from the World Health Organization: *https://covid19.who.int/data*.

Figure 11. Trends in cumulative COVID-19 cases and Covid-19-related deaths, March-September 2020 (Source: WHO).



To further investigate this point, Annex J reports two alternative estimates of model (2). These are obtained after adding (i) the cumulative number of cases as a control in the regression and (ii) introducing interactions between the cumulative number of cases and binary indicators for FCL/PLL arrangements and the COVID-19 pandemic. In addition to country fixed effects, these regressions control for the different dynamics in the number of cases and impact of the pandemic across countries. As shown in Annex J, the additional covariates are not significant, while the interaction term between the FCL/PLL indicator and the dummy variable for the pandemic period remains negative and significant. We conclude that the positive effect of FCL/PLL adoption on spreads in the context of the COVID shock cannot be explained by trends in the pandemic within individual economies.

The above analysis indicates that, after controlling for fundamentals, country-specific characteristics, and observed dynamics in the COVID-19 pandemic within countries, FCL/PLL adopters saw a more limited increase in spreads compared to non-adopters in the context of the pandemic. This result is consistent with the idea of a positive role of precautionary instruments in helping countries to cushion external financial shocks. Nonetheless, the findings should be taken with caution, since adopters may still differ from control economies along unobserved characteristics.

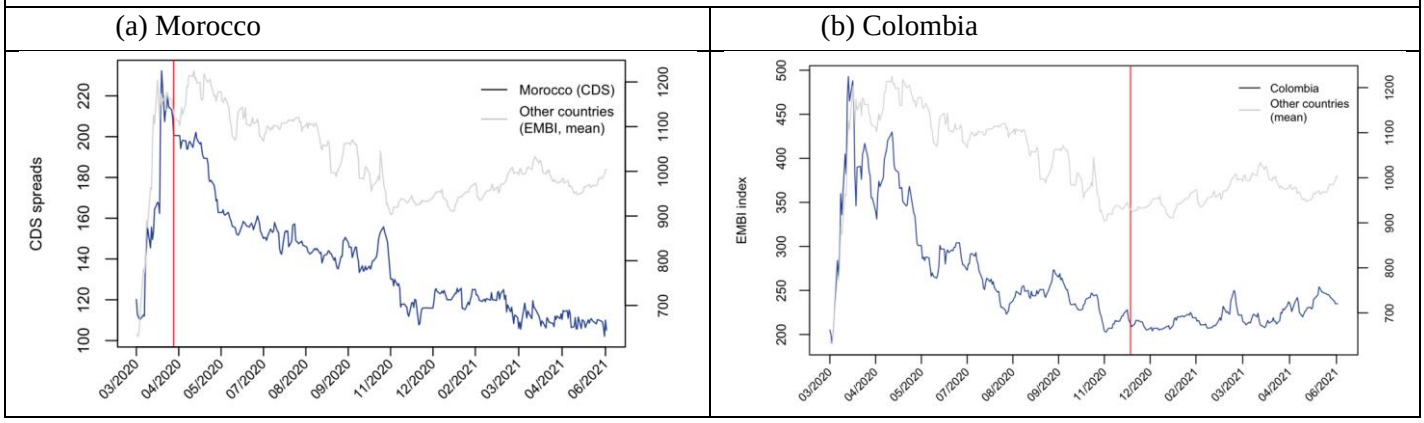
VII. Effects of FCL/PLL drawdowns

The discussion in sections IV-VI has mainly focused on the effect of FCLs or PLLs on market sentiment, both following the announcement of new instruments (sections IV and V) or in the context of heightened global financial pressures (Section VI). This section complements the above analysis by examining the effect of the drawdown of liquidity lines under the two arrangements. The following discussion focuses on the two examples

of drawing on FCL/PLL resources in the context of the pandemic, Morocco and Colombia, asking whether these events have caused any reaction in spreads.[26]

In principle, a drawdown could either improve market confidence, by reducing immediate financial pressures in light of the central bank's increased reserves, or worsen it, by signaling a deterioration in the external balance.[27] To distinguish between these effects, Figure 12 begins by plotting trends in the EMBI or CDS spreads (for Morocco) in the period after March 1, 2020. In the case of Morocco, we observe a decline in CDS spreads after the drawdown, although such a decline seems broadly in line with a drop in spreads observed for other emerging economies. Similarly, Colombia's EMBI index appears to have decreased moderately after the drawdown.

Figure 12. Trends in spreads and drawdown of FCL and resources. The figure shows levels of EMBI index or CDS swaps for Morocco and Colombia, for the period starting March 1, 2020. The red line corresponds to the date of drawdown.



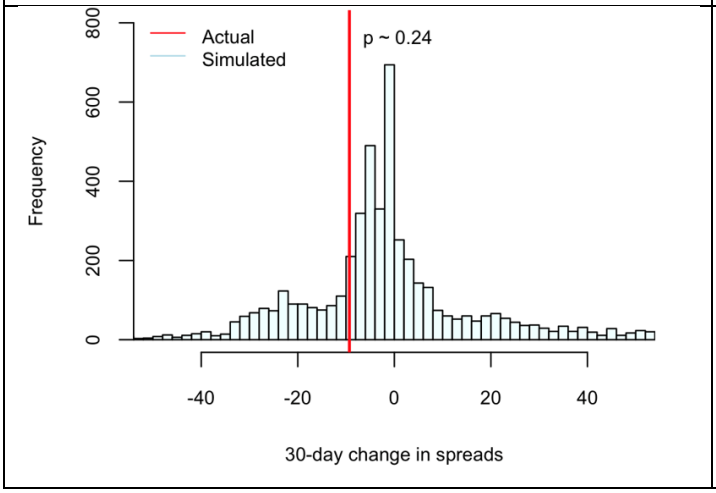
To investigate whether these changes are statistically significant, the analysis simulates confidence intervals for the change in spreads around the dates of the two drawdowns to evaluate the statistical significance of the decline in spreads associated with each event. In this context, the procedure is preferred to asymptotic tests of statistical significance given the limited set of events analyzed in each case (one drawdown in each country). Relevant results are reported in Figure 13: the figure plots a simulated distribution of 30-day changes in average spreads in Morocco and Colombia (light blue bars), obtained by running bootstrap simulations separately on each country (cf. Annex A) and by limiting the sample to trading days after March 1, 2020. In Figure 13, red lines indicate the observed change in the thirty days following the drawdowns.

[26] Moroccan authorities drew all funds available under the PLL (about US$ 3 billion) on April 8, 2020, while the authorities of Colombia made a purchase of US$ 5.4 billion under the FCL on December 3, 2020. Thus far, these constitute the only two cases of drawdowns under the arrangements.

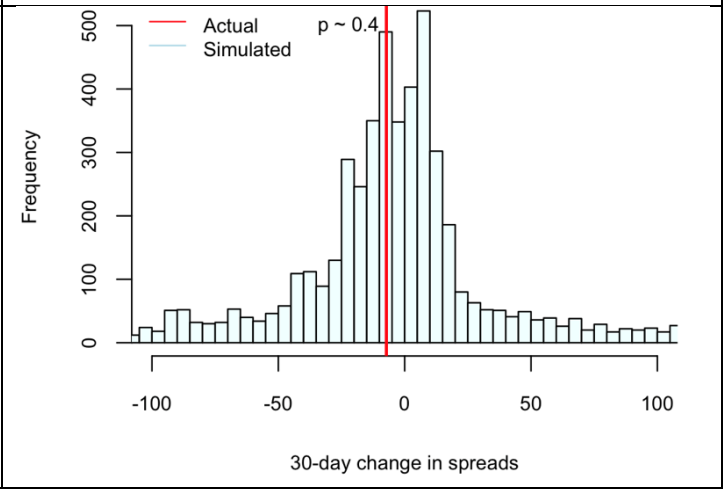
[27] In the case of Colombia, the drawdown was preceded by an augmentation of access under the FCL, which was approved by the IMF Board on September 25, 2020; higher access as a result of the augmentation may therefore have limited the potential impact of the drawdown on market confidence.

Figure 13. Event studies for PLL or FCL drawdowns. The figure reports the frequency of 30 days changes in spreads for Morocco and Colombia, obtained running Politis and Romano (1994) stationary bootstrap with 60 as average block length and drawing 5000 replications. The red line corresponds to the observed change in average EMBI spreads in the 30 trading days following a drawdown, compared to the previous 30 days.

(a) Morocco



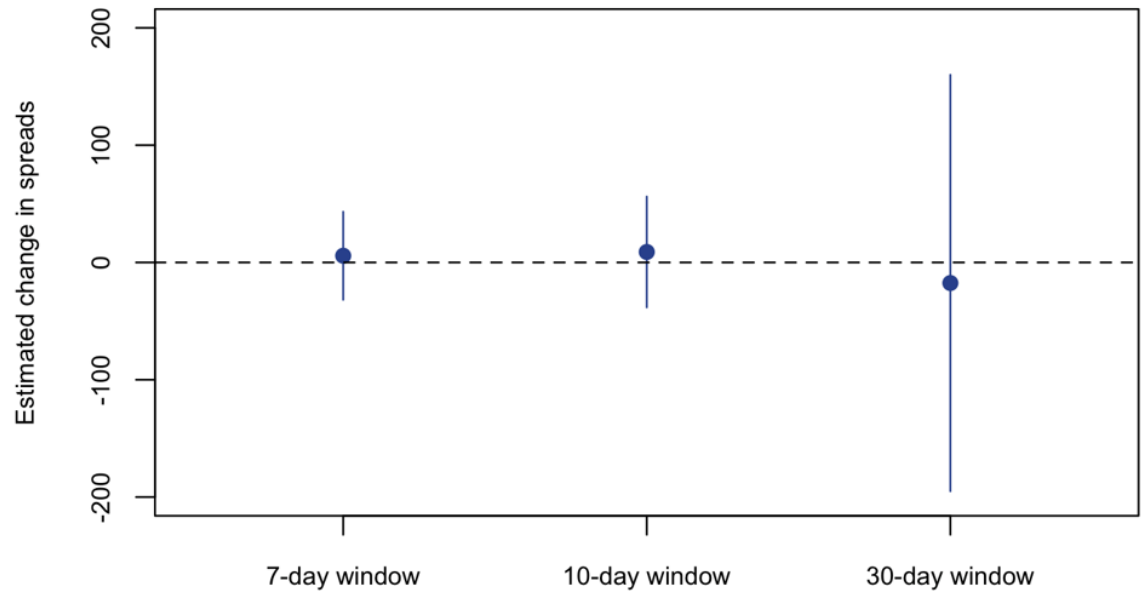
(b) Colombia



As shown, average EMBI spreads declined by 9.3 basis points in Morocco and by 7.2 in Colombia in the 30 trading days after the event; however, this variation does not appear statistically significant, being relatively close to zero as well as the median of the simulated distributions. The observed movement in spreads appear statistically equivalent to the average changes replicated in the bootstrapped sample, suggesting that the drawdowns did not significantly affect market sentiment

As a further step, it is possible to repeat the regression-based analyses of Section 4, looking at variations in spreads following the announcement of the drawdown and controlling for economic covariates. This is equivalent to re-estimating the difference-in-differences model (1) using the date of the drawdown for country i (Morocco and Colombia) as the dummy variable $D_{i,t}$, and estimating the effect for the three relevant time windows (seven, ten, and thirty days). In this case, the coefficient captures the change in spreads for the two countries in the period following the drawdown, compared to control countries in the sample. As in Section V, estimated models include the VIX index, oil prices, and spreads between US long- and short-term bonds as controls, as well as 1- to 3-day lags in EMBI spreads. Relevant results are shown graphically in Figure 13, which plots estimated coefficients of the binary indicator $D_{i,t}$ (corresponding to the occurrence of a drawdown) for the different time windows.

Figure 13. Effects of a drawdown on spreads. The figure shows OLS estimates of the impact of FCL or PLL drawdown on EMBI spreads, obtained estimating specification (1) on the full sample. All regressions include daily values of the VIX index, oil prices, and the difference between 10 year and 3-month rates. Vertical bars correspond to 95% confidence intervals, obtained from the estimates.



These results support the view that drawdowns do not significantly affect spreads. While estimated coefficients obtained using 7 and 10-day windows are positive, the associated statistical significance levels are low in both cases. The coefficient obtained using a the 30-day window is negative; however, confidence bands are substantially wider. In all, these findings are consistent with the simulations illustrated in Figure 13 and indicate that these events do not significantly affect market sentiment. It is nonetheless important to emphasize that the findings are based on just two drawdowns; as such, the above results should be taken with caution.

VIII. Conclusions

This paper evaluates the role of FCLs and PLLs in bolstering market confidence. By using multiple methods, the study shows that the announcement of new FCL and PLL arrangements reduces spreads. Although these results are based on a limited number of cases (particularly for the PLL), the findings appear robust to several sensitivity checks, specifications, and identification assumptions. The decline in spreads triggered by these announcements tends also to persist over time, highlighting a positive impact of these arrangements on financial perceptions towards countries that use these instruments. Finally, in some cases the adoption of the FCL was accompanied by a decline in spreads in other emerging markets; this result suggests some positive spillovers from this instrument, although the evidence is tentative. Systematic analysis of the spillover effects of the FCL is left for future research.

The paper further suggests that these arrangements enhance countries' capacity to withstand external financial shocks, a primary objective of these instruments (IMF 2011, 2014). Using the COVID-19 outbreak as a case study, the analysis shows that countries with an FCL or a PLL in place experienced a lower increase in spreads in the context of the pandemic than other emerging markets. While causality may yet be difficult to definitively ascertain, the estimated impact is robust to the inclusion of fixed effects and various controls. As an extension, the paper discusses the role of FCL and PLL drawdowns on market sentiment, finding no evidence that these events trigger a market reaction (either positive or negative).

Given these results, policy implications can be clearly highlighted. First, IMF's precautionary instruments, and the FCL in particular, provide tangible benefits to countries in accessing international markets. Second, the case remains strong for a continued, and possibly a wider, use of these instruments — provided that the respective qualification criteria are met — to help alleviate the impact of exogenous shocks on emerging markets with very strong or sound macroeconomic fundamentals. Finally, there does not appear to be any evidence to date to support fears about potential adverse effects of drawing down these arrangements.

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Appendix

A. Non-parametric event studies

Table 2 reports results for event study analyses that measure the response in spreads to announcements of new FCL or PLL arrangements. This methodology draws on the literature studying the effects of monetary announcements on financial outcomes (e.g., Neely 2015; Hattori et al. 2016), comparing the average level of spreads in the 30 days before and after each announcement. This exercise is conducted separately for the initial announcement and the Board approval to gauge differences in markets' responses to the two types of events.

To evaluate the statistical significance of these variations, the table also reports p-values for changes in spreads, obtained using a time-series bootstrapping procedure. For each country, the relevant dataset is restricted to a period of 12 months before and after the earliest date of the announcement of the FCL or PLL. Simulated samples are obtained by drawing observations with replacement from the original data, and then used to extract p-values for the observed changes in means. This exercise aims to measure the frequency with which one observes a decline in spreads of a similar (or lower) magnitude as observed in practice, among the simulated samples. In this context, such an approach is arguably preferable to asymptotic tests given the small number of events (at most two) considered for each country. Given the time-series structure of the data, p-values are obtained using the stationary bootstrap approach proposed by Politis and Romano (1994; see also Hattori et al. 2016).

Table 2: Change in spreads following FCL/PLL announcements

	Earliest announcement	Board approval of FCL/PLL
	FCL arrangements	
Mexico	-80.55	-60.99
	(0.06)	(0.10)
Colombia	-100.21	-69.88
	(0.06)	(0.09)
Poland	-20.47	-85.90
	(0.26)	(0.05)
Peru	-66.78	-48.27
	(0.02)	(0.04)
Chile	-63.92	-47.51
	(0.03)	(0.06)
	PLL arrangements	
Morocco	-27.96	-37.35
	(0.14)	(0.09)
Panama	-	0.71
	-	(0.71)

Notes: The table reports the difference in the average value of EMBI spreads in the 30 days after the announcement, compared to the average in the 30 days before the announcement. Figures in parentheses corresponds to p-values obtained using Politis and Romano's (1994) stationary bootstrap, setting 60 days and 5000 respectively as the block length and the number of bootstrap replications. For Morocco, changes are obtained from CDS spreads on sovereign bonds.

B. Event-study regression for alternative dependent variables.

Table 5: Change in CDS spreads and capital inflows around FCL/PLL announcement dates

	Change in sovereign CDS spreads			Change in gross capital inflows	
	7-day change	10-day change	30-day change	30-day change	60-day change
	(1)	(2)	(3)	(4)	(5)
FCL / PLL (including Board dates)	−16.703***	−22.694	−73.850***	143.341*	110.817**
	(3.36)	(3.67)	(5.56)	(83.77)	(51.38)
VIX	0.799***	1.138***	3.046***	−4.778***	−4.787***
	(0.054)	(0.054)	(0.054)	(0.069)	(0.069)
Oil prices	0.104***	0.171***	0.325***	−0.677***	−0.675***
	(0.008)	(0.008)	(0.008)	(0.010)	(0.010)
Spread between US 10-year and 3-month rate	−2.281***	−3.533***	−7.678***	7.534***	7.537***
	(0.218)	(0.218)	(0.218)	(0.286)	(0.286)
Lagged dep. variable	✓	✓	✓	✓	✓
Observations	159,324	159,288	158,728	9,107	9,107
Adjusted R^2	0.303	0.212	0.085	0.222	0.222

Notes: Heteroskedasticity- and serial correlation-robust standard errors are reported in parentheses. Constant term included but not shown. Significance levels: *p<0.1; **p<0.05; ***p<0.01.

C. Local projections

The following model is estimated on the full sample:

$$\Delta\, y_{t,t+h} = \alpha_i + \delta_t + \beta\, D_{i,t} + y_{t,t-h} \cdot z' + \varepsilon_{i,t}$$

Here the dependent variable indicates the change in the average monthly spreads from month t to month $t+h$. $D_{i,t}$ is the binary indicator equivalent to 1 in a month when a new precautionary arrangement was announced, while Z is a vector of lagged dependent variables including 1- to 3-month lags of average monthly spreads. Month/year (δ_t) and country-specific (α_i) fixed effects are added to the regression to control for global shocks and unobserved country characteristics.

Differently from equation (1), which estimates differences in the days immediately following the event, the above model estimates the cumulative change in spreads at increasingly distant horizons; this is helpful to gauge longer-term variations in spreads following the launch of precautionary instruments. Figures 4 and 5 show the response functions (estimates and 95% confidence intervals) for the set of regressions estimated computed using up to three months after the event to compute the dependent variable. In line with evidence presented in section IV, regressions are estimated by first considering new FCL arrangements (Figure 4) and then by grouping both FCL and PLL arrangements (Figure 5).

Figure 4. FCL announcements and average monthly spreads: Impulse response function. The blue line indicates estimate coefficients for the change in spreads in the months following announcements of new FCL instruments. The grey area indicates 95 % confidence intervals for the regressions.

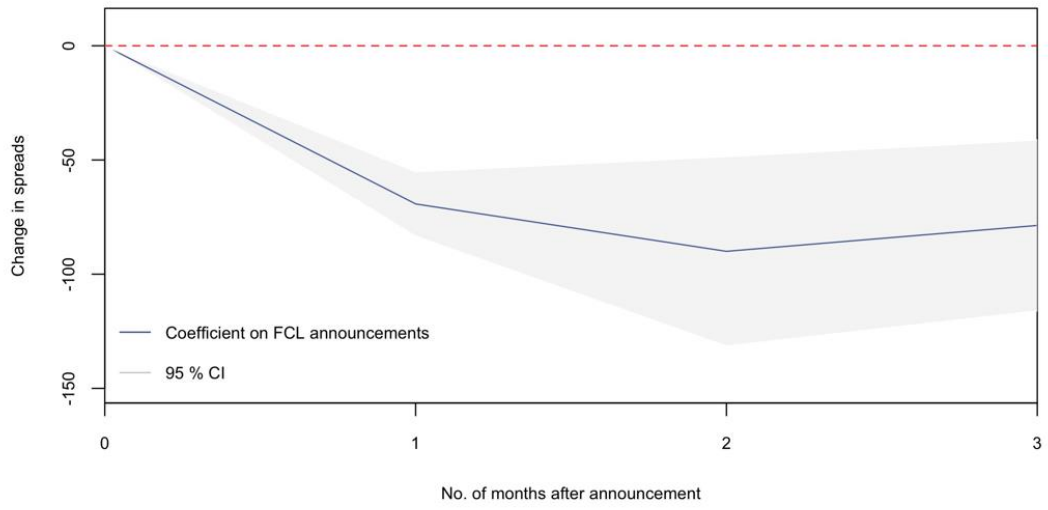
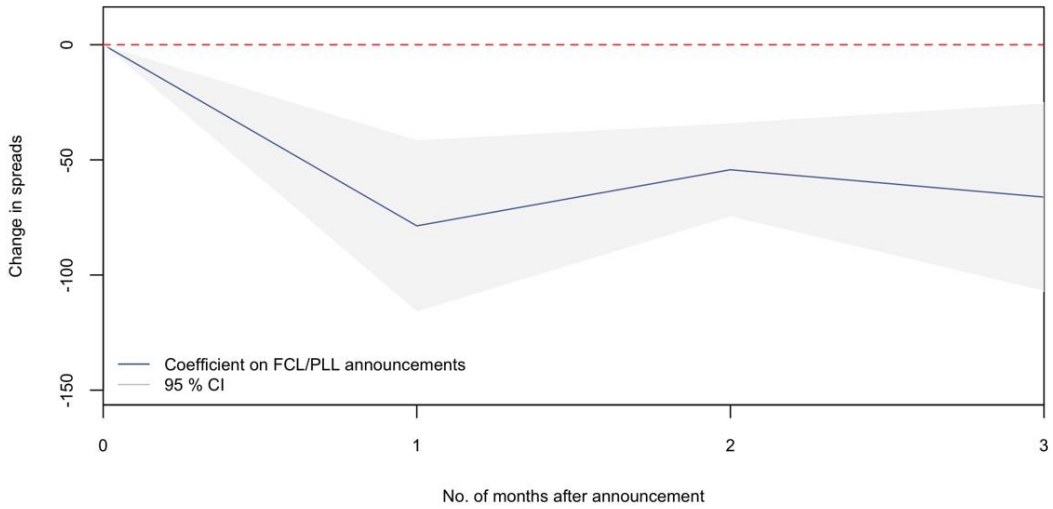


Figure 5. FCL / PLL announcements and average monthly spreads: Impulse response function. The blue line indicates estimate coefficients for the change in spreads in the months following announcements of new FCL of PLL instruments. The grey area indicates 95 % confidence intervals for the regressions.



D. Mechanisms

This annex presents some indicative tests for the mechanisms driving the decline in sovereign spreads following the announcement of a new FCL or PLL instrument, as highlighted in Section IV.

The literature suggests two possible ways in which precautionary instruments could help to improve market sentiment. A direct way is through potential access to Fund resources following the adoption of an FCL or PLL, which should help reducing financial pressures by supporting the external reserves position (e.g., Maurini 2017). A separate mechanism works instead through a "signaling" channel, whereby the announcement of a new precautionary arrangement demonstrates the strength of a country's economic fundamentals and policies (IMF 2011: 5; IMF 2014: 10-11; Maurini 2019).

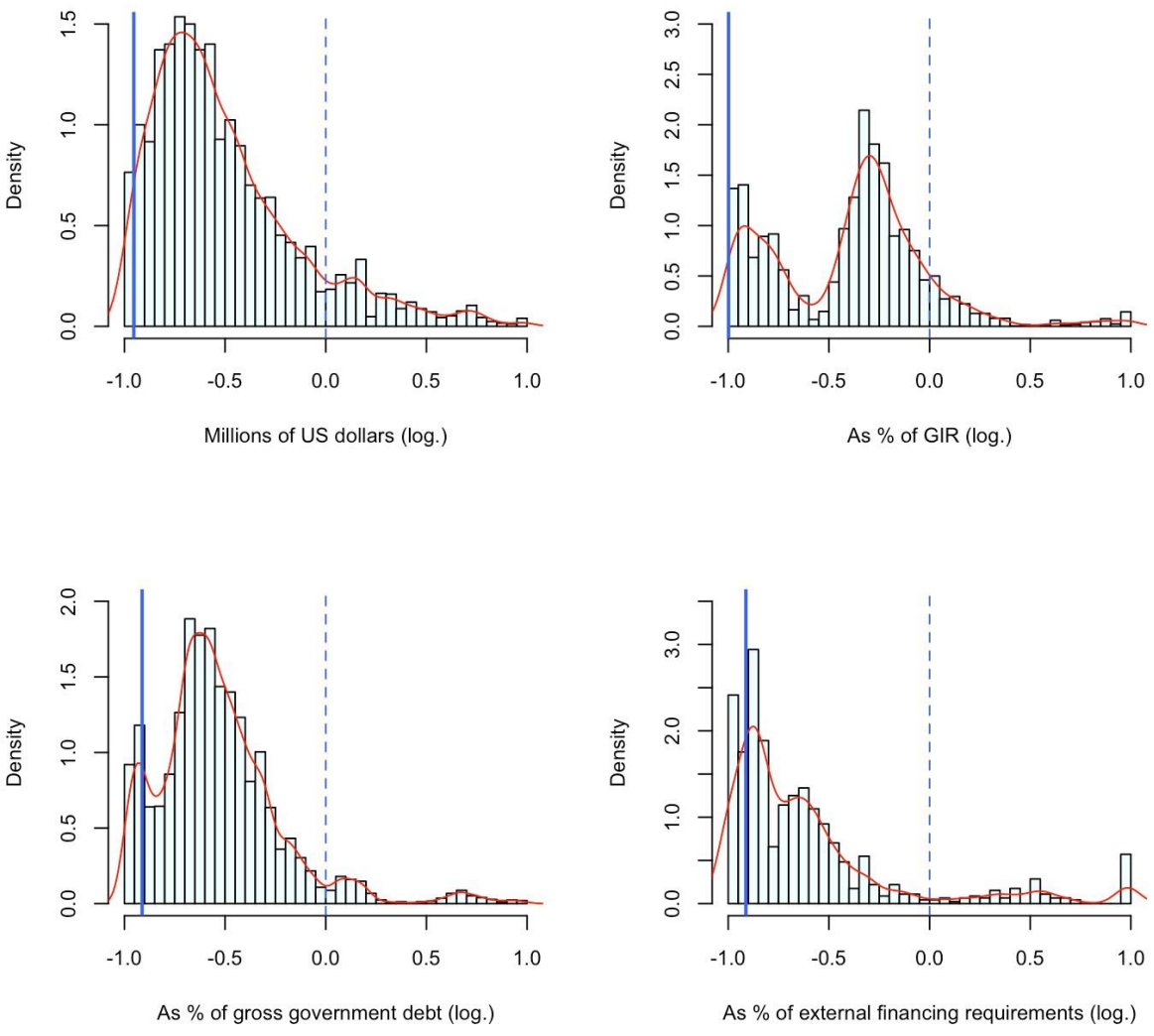
While it is not straightforward to distinguish between these two mechanisms empirically, the first effect (access to Fund resources) can be indirectly tested by comparing the magnitude in the decline in spreads following an announcement, with the size of the potential access to Fund resources. Intuitively, if the impact of FCL and PLL instruments is solely driven by access, we should see a strong and significant negative correlation between these two variables. A weak correlation, in turn, would suggest that most of the effect is driven by different mechanisms, including the signaling effect suggested in the literature.

To address this question, Figure A1 reports results for correlation tests between the potential access under the FCL or PLL and spreads for six cases (Mexico, Colombia, Poland, Peru, Chile, and Morocco) for which a decline in spreads is observed in the thirty days following the announcement of a new FCL or PLL arrangement (cf. Section III and Annex A). Given the limited sample size considered here, the figure reports also 95 percent confidence intervals obtained through a bootstrap procedure with 5,000 replications for each correlation test. This exercise is repeated by comparing the change in spreads with four measures of potential access under the FCL or PLL, namely (i) the (logged) access in millions of US dollars; the tests equally consider the logarithm of access expressed as percent of (ii) gross international reserves (GIR); (iii) gross government debt; and (iv) external financing requirements, calculated as the sum of the current account and short-term external debt.

As shown, a higher potential access under precautionary arrangements tends to be associated to a sharper decline in spreads. When estimated on the observed sample, the estimated correlation coefficient (blue solid line) is strongly negative. Bootstrap replications also suggest a generally negative correlation coefficients, suggesting that higher access levels are associated with a more sustained decline in spreads. Together, these results lend support to the idea that higher levels of potential access under precautionary instruments help to limit sovereign spreads. Nevertheless, given the limited number of observations, the estimates should be taken with caution. Specifically, as shown in the chart, the correlation is generally weaker in the simulated samples (light blue columns) and, in all cases, the effect is not statistically different from zero (the 95 percent confidence interval include a null effect, blue dotted line). Low levels of statistical significance suggest that the decline in sovereign yields is not entirely explained by access levels. This suggests that different mechanisms –potentially a signaling channel-, also play a role in driving the response in spreads to the announcement of a new precautionary arrangement. In line with this view, the results discussed in Section V and Annex C indicate a stronger effect on spreads for the FCL compared to the PLL. This implies that more stringent qualification requirements for the FCL relative to the PLL are associated with a more robust decline in spreads, which would also be consistent with a signaling effect in driving EMBI spreads' responses to the announcements.

Overall, the tests discussed in this section suggest that both a direct channel (through potential access) and a signaling mechanisms drive the effect of precautionary instruments on market sentiment. Nevertheless, it is important to emphasize that the limited number of observations used in this section and various possible confounders make it difficult to causally interpret these additional results. As such, the analysis discussed in this section should be taken with caution. A more rigorous assessment of the mechanisms driving responses in spreads to FCL and PLL announcement is left to future research.

Figure A1. Correlation tests between the size of reserves and the change in spreads around the announcement date of a new FCL or PLL instruments. The chart shows values for the sample Pearson's correlation coefficients (blue vertical line) and the frequency of simulated correlation (light blue columns) between size of potential access under precautionary instruments and the 30-day change in spreads after the date of announcement of a new FCL or PLL. Simulated coefficients are obtained by using 5000 bootstrap replications. The minimum and maximum values shown in the charts correspond to the 2.5th and 97.5th percentile of the simulated distributions; the red line is the kernel density function of the simulated samples, while the blue dotted line corresponds to an estimated zero correlation.



E. Comparison between treated and control units

Table 6: SCM, Pre-treatment comparison and main comparator countries for Mexico

Pre-treatment predictor values			Weight for top 5 control units	
Predictor	*Treated*	*Synthetic*	*Country*	*Weights*
Real GDP growth	1.1	1.5	Croatia	0.43
Current account deficit	-1.5	-3.6	Hungary	0.21
Fiscal deficit	-0.7	-0.8	Turkey	0.19
Gross government debt	42.5	42.6	Gabon	0.16
Average spreads in previous year	254.8	255.1	Trinidad and Tobago	0.00

Table 7: SCM, Pre-treatment comparison and main comparator countries for Colombia

Pre-treatment predictor values			Weight for top 5 control units	
Predictor	*Treated*	*Synthetic*	*Country*	*Weights*
Real GDP growth	3.3	3.3	Croatia	0.19
Current account deficit	-2.6	-2.6	Chile	0.19
Fiscal deficit	-0.00	-0.00	Turkey	0.19
Gross government debt	32.4	32.4	Nigeria	0.05
Average spreads in previous year	305.3	305.3	Gabon	0.03

Table 8: SCM, Pre-treatment comparison and main comparator countries for Poland

Pre-treatment predictor values			Weight for top 5 control units	
Predictor	*Treated*	*Synthetic*	*Country*	*Weights*
Real GDP growth	4.2	4.2	Croatia	0.45
Current account deficit	-3.6	-3.6	Egypt	0.26
Fiscal deficit	-7.0	-6.9	Jamaica	0.05
Average spreads in previous year	158.7	244.2	Panama	0.02

Table 9: SCM, Pre-treatment comparison and main comparator countries for Peru

Pre-treatment predictor values			Weight for top 5 control units	
Predictor	*Treated*	*Synthetic*	*Country*	*Weights*
Real GDP growth	2.2	2.2	Kazakhstan	0.35
Current account deficit	-0.9	-0.9	Latvia	0.33
Fiscal deficit	-1.4	-1.4	Paraguay	0.17
Gross government debt	27.1	27.3	Saudi Arabia	0.11
Average spreads in previous year	128.7	145.9	Kuwait	0.02

Table 10: SCM, Pre-treatment comparison and main comparator countries for Chile

Pre-treatment predictor values			Weight for top 5 control units	
Predictor	*Treated*	*Synthetic*	*Country*	*Weights*
Real GDP growth	1.0	1.0	Paraguay	0.48
Current account deficit	-3.7	-0.9	Latvia	0.26
Fiscal deficit	-2.7	-2.7	Kazakhstan	0.11
Gross government debt	28.2	28.3	Saudi Arabia	0.10
Average spreads in previous year	136.3	166.3	Romania	0.05

Table 11: SCM, Pre-treatment comparison and main comparator countries for Morocco

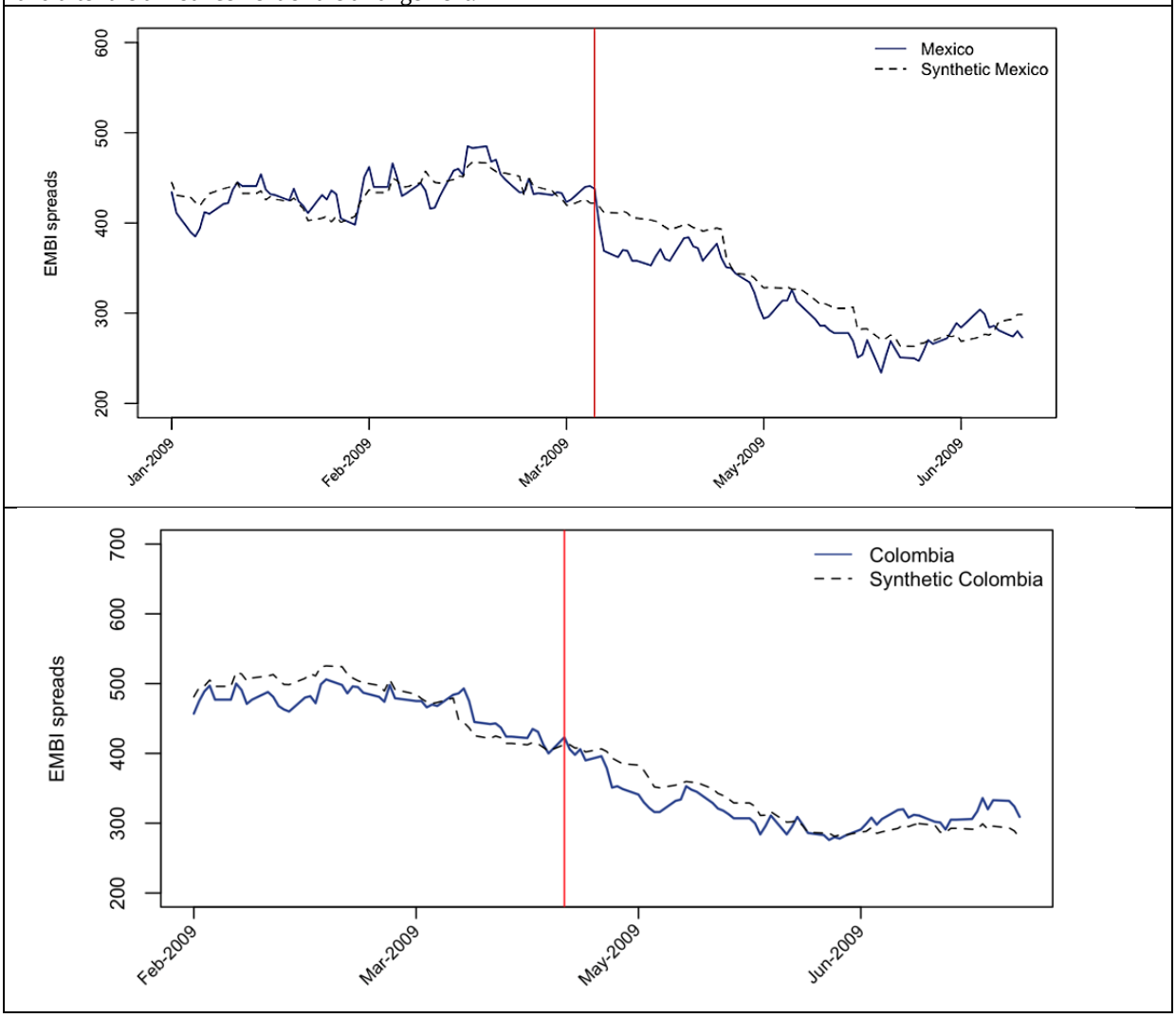
Pre-treatment predictor values			Weight for top 5 control units	
Predictor	*Treated*	*Synthetic*	*Country*	*Weights*
Real GDP growth	5.2	5.2	El Salvador	0.35
Current account deficit	-7.9	-7.9	Panama	0.33
Fiscal deficit	-6.6	-4.0	Tunisia	0.15
Gross government debt	-52.5	-51.5	Egypt	0.12
Average spreads in previous year	273.5	273.6	Serbia	0.00

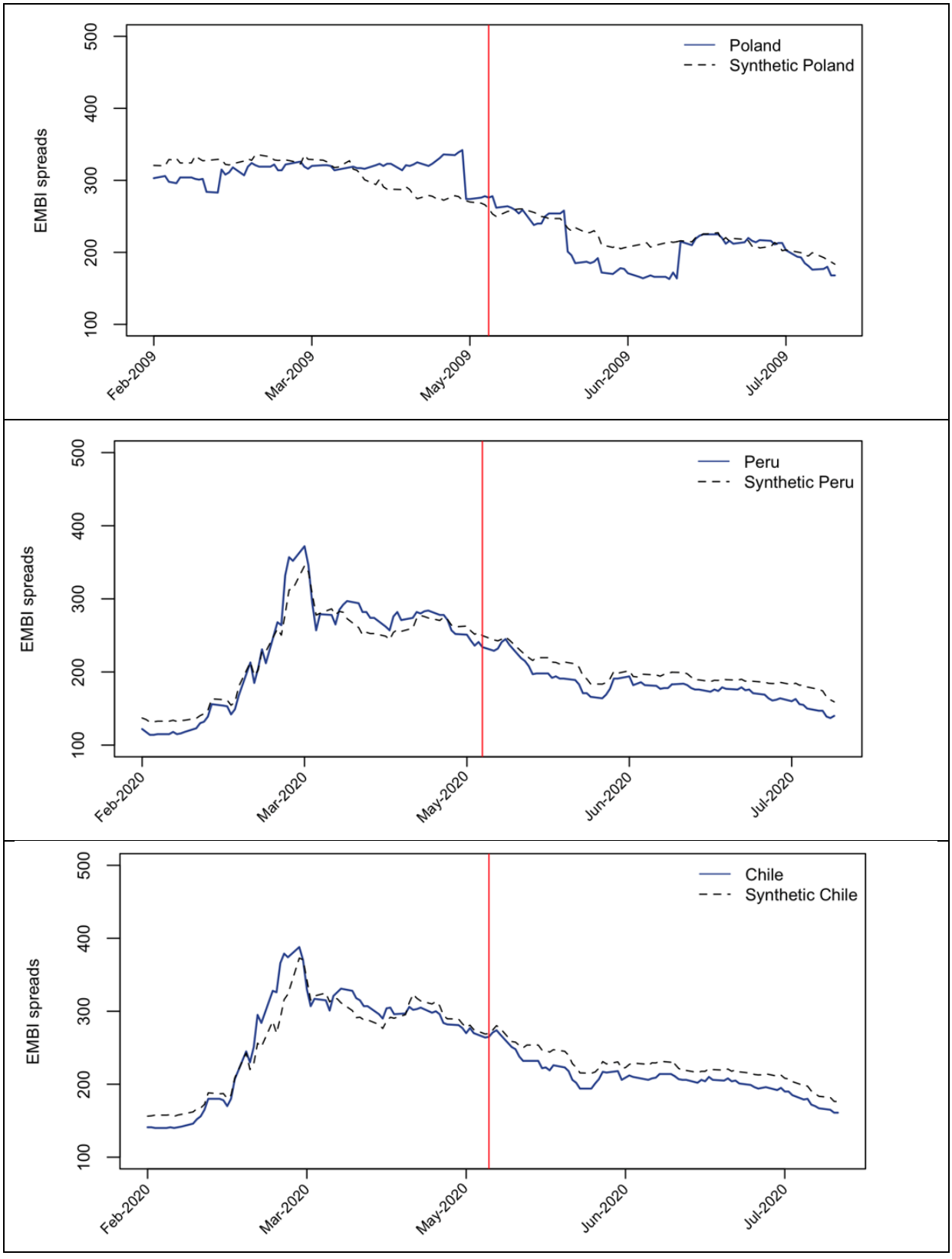
Table 12: SCM, Pre-treatment comparison and main comparator countries for Panama

Pre-treatment predictor values			Weight for top 5 control units	
Predictor	*Treated*	*Synthetic*	*Country*	*Weights*
Real GDP growth	-17.9	-9.9	Peru	0.60
Current account deficit	2.3	2.2	India	0.25
Fiscal deficit	-10.1	-9.6	Kuwait	0.11
Gross government debt	-66.3	-47.9	Iraq	0.03
Average spreads in previous year	193.9	197.6	Turkey	0.00

F. Synthetic control: Country results, FCL adopters

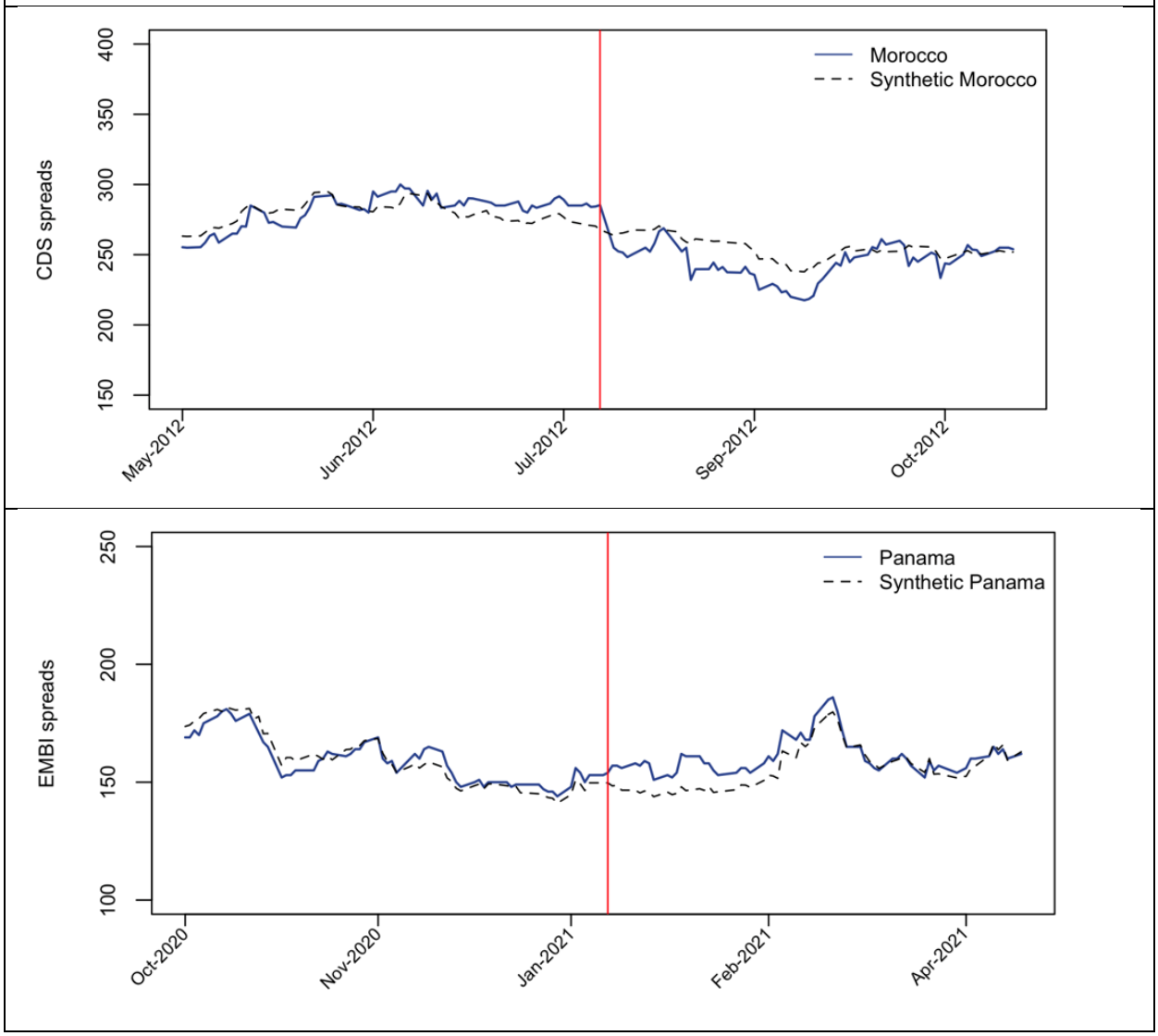
Figure A2. Synthetic controls for individual FCL adopters. The charts show trends in EMBI spreads among countries which adopted FCL instruments (blue solid line) and their synthetic control (dashed line) in the 90-day period before and after the announcement of the arrangement.




EMBI spreads
100
200
300
400
500
Feb-2009
Mar-2009
May-2009
Jun-2009
Jul-2009
Poland
Synthetic Poland
EMBI spreads
100
200
300
400
500
Feb-2020
Mar-2020
May-2020
Jun-2020
Jul-2020
Peru
Synthetic Peru
EMBI spreads
100
200
300
400
500
Feb-2020
Mar-2020
May-2020
Jun-2020
Jul-2020
Chile
Synthetic Chile

G. Synthetic control: Country results, PLL adopters

Figure A3. Synthetic controls for PLL adopters. The charts show trends in EMBI spreads among countries which adopted PLL instruments (blue solid line) and their synthetic control (dashed line) in the 90-day period before and after the announcement of the arrangement.



H. Synthetic control: Placebo tests

Figure A4. SCM: Difference in spreads between FCL/PLL adopters and their synthetic controls for placebo treatment. The figure shows the gaps between the treated and control units for FCL and PLL adopters excluding Panama, in the 40-day period before and after a placebo treatment, set at 30 trading days before the actual treatment. The blue line corresponds to the average gap.

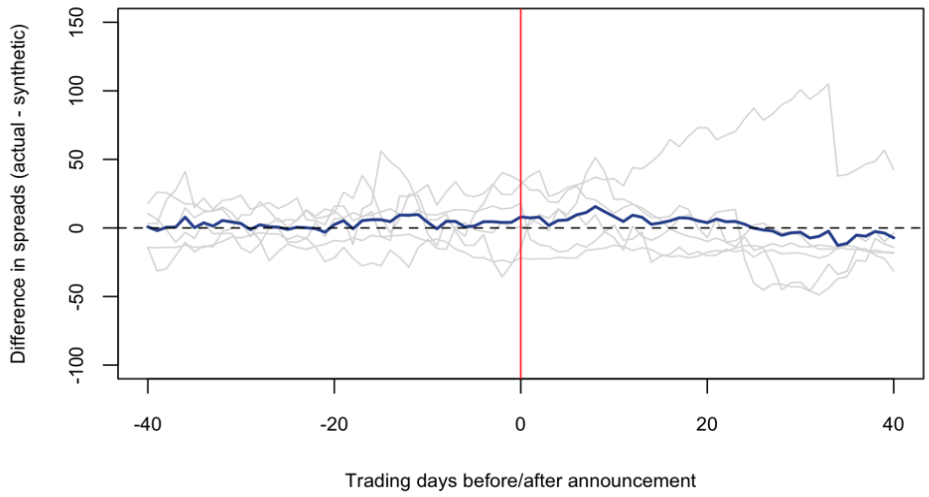


Figure A5. SCM: Difference in spreads between FCL/PLL adopters and their synthetic controls for Board approval. The figure shows the gaps between the treated and control units for Mexico, Colombia, Poland, Chile, and Peru, in the 40-day period before and after the Board approval of the arrangement. The blue line corresponds to the average gap.

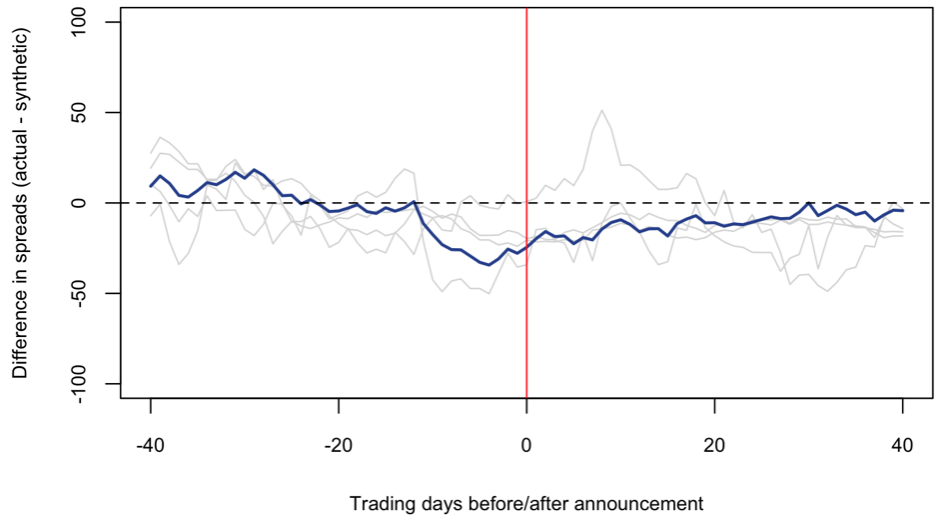


Figure A6. Synthetic controls for placebo countries, FCL. The charts show trends in EMBI spreads for selected countries which did not adopt an FCL instrument (blue solid line) and their synthetic control (dashed line) in the 90-day period before and after the announcement of the arrangement for the adopter.

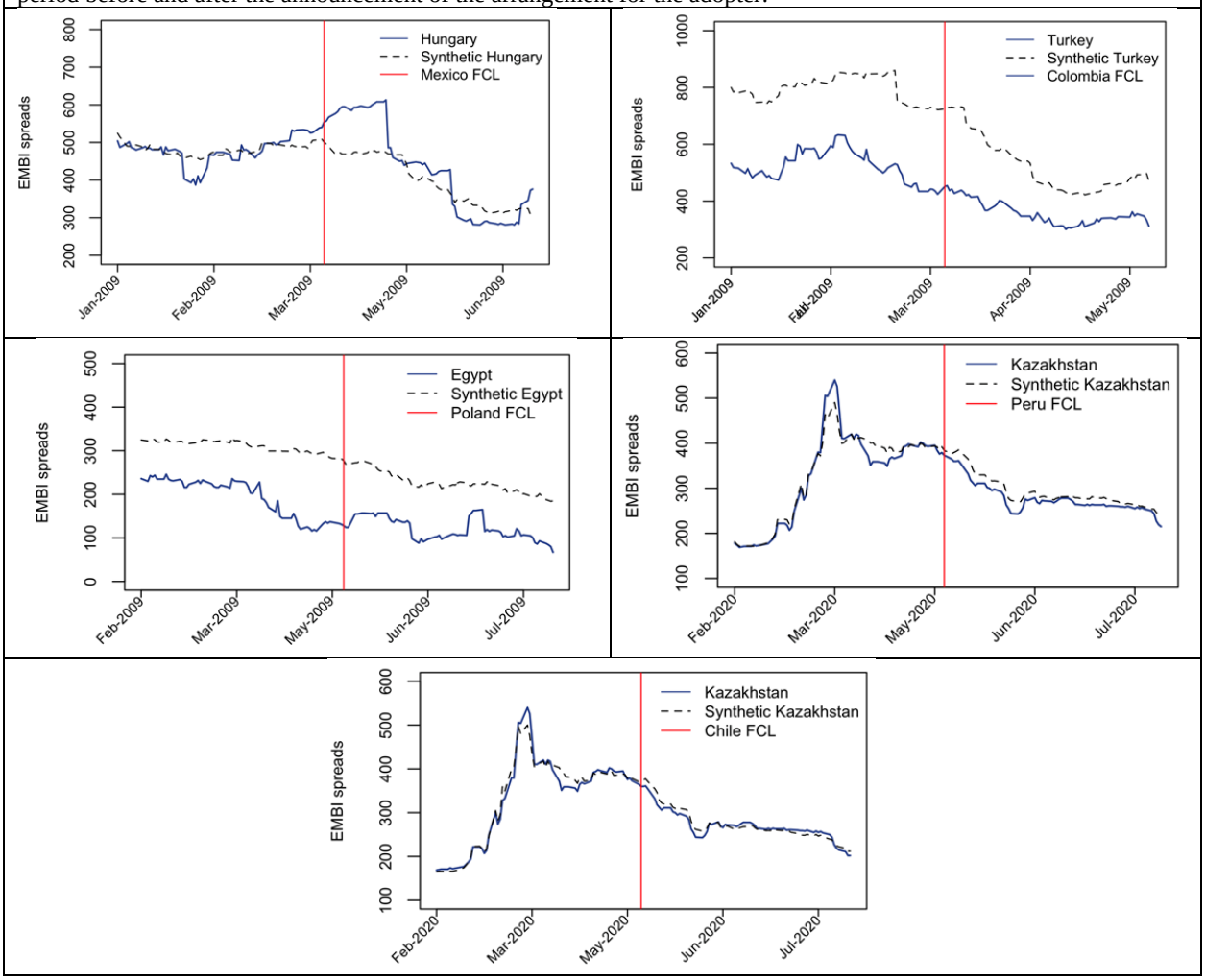
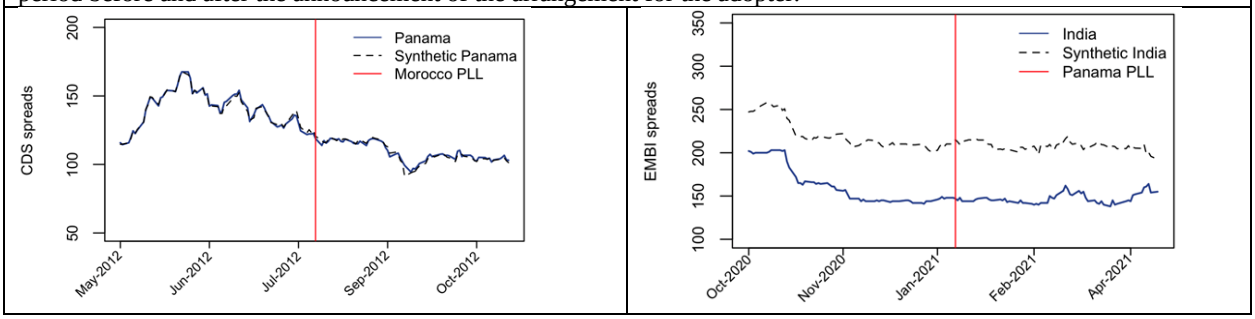


Figure A7. Synthetic controls for placebo countries, PLL. The charts show trends in EMBI spreads for selected countries which did not adopt a PLL instrument (blue solid line) and their synthetic control (dashed line) in the 90-day period before and after the announcement of the arrangement for the adopter.



I. Evidence from the COVID-19 pandemic: Perceived qualifiers only

	Logarithm of EMBI spreads	
	(1)	(2)
FCL/PLL	0.129***	0.024
	(0.049)	(0.038)
Covid-19 dummy	0.483***	0.301***
	(0.085)	(0.087)
FCL/PLL × Covid-19 dummy	−0.110	−0.076
	(0.093)	(0.082)
Current account/GDP	0.060**	0.021
	(0.025)	(0.013)
Fiscal balance/GDP	0.045	0.040*
	(0.032)	(0.024)
Reserves/GDP	0.005	−0.007
	(0.010)	(0.009)
Government debt/GDP	−0.714	0.175
	(0.701)	(0.485)
Political risk index	0.015	0.019*
	(0.014)	(0.011)
Oil prices		−0.001
		(0.004)
VIX		0.021***
		(0.005)
Spread between U.S. 10-year and 3-month rate		−0.232*
		(0.119)
Country FE	✓	✓
Observations	75	75
Adjusted R^2	0.640	0.864

Notes: The dependent variable is the logarithm of quarterly average EMBI spreads; the 'COVID-19' variable takes on the value of 1 in 2020Q1-2020Q2, and zero otherwise. The sample covers all countries that were perceived as qualifying for FCL or PLL instruments by market participants as of summer 2020. Regressions cover the period from March 31, 2019, to September 30, 2020. Heteroskedasticity- and serial correlation-robust standard errors are reported in parentheses. Significance levels: *p<0.1; **p<0.05; ***p<0.01.

J. Evidence from the COVID-19 pandemic: Controlling for trends in infections

	Logarithm of EMBI spreads	
	(1)	(2)
FCL/PLL	0.053	0.067
	(0.083)	(0.084)
Covid-19 dummy	0.352***	0.349***
	(0.088)	(0.088)
Cumulative_cases	−0.00000	−0.00000
	(0.00000)	(0.00000)
FCL/PLL × Covid-19 dummy	−0.174**	−0.193**
	(0.085)	(0.090)
FCL/PLL × Cumulative No. of cases		−0.001
		(0.001)
Covid-19 dummy × Cumulative No. of cases		0.00000
		(0.00000)
FCL/PLL × Covid-19 dummy × Cumulative No. of cases		0.001
		(0.001)
Current account/GDP	0.017	0.017
	(0.011)	(0.011)
Fiscal balance/GDP	0.044	0.044
	(0.028)	(0.028)
Reserves/GDP	0.016**	0.016**
	(0.007)	(0.007)
Government debt/GDP	−0.463*	−0.468*
	(0.245)	(0.247)
Political risk index	0.032***	0.032***
	(0.011)	(0.011)
Spread between U.S. 10-year and 3-month rate	−0.158**	−0.157**
	(0.074)	(0.075)
Oil prices	−0.001	−0.001
	(0.005)	(0.005)
VIX	0.016***	0.017***
	(0.004)	(0.004)
Country FE	✓	✓
Observations	228	228
R^2	0.765	0.766
Adjusted R^2	0.677	0.672

Notes: The dependent variable is the logarithm of quarterly average EMBI spreads; the 'COVID-19' variable takes on the value of 1 in 2020Q1-2020Q2, and zero otherwise. Regressions cover the period from March 31, 2019, to September 30, 2020. Heteroskedasticity- and serial correlation-robust standard errors are reported in parentheses. Significance levels: *p<0.1; **p<0.05; ***p<0.01.

K. Event study regressions with alternative time windows and differences in control variables

	Change in EMBI spreads				
	Alternative time windows		Controls in first differences		
	3-day change	5-day change	7-day change	10-day change	30-day change
	(1)	(2)	(3)	(4)	(5)
FCL / PLL (earliest communication)	−7.435***	−11.561***	−10.726***	−17.850***	−64.415***
	(2.667)	(2.541)	(2.651)	(3.037)	(4.270)
VIX	0.217***	0.574***			
	(0.011)	(0.018)			
Oil prices	0.023***	0.059***			
	(0.004)	(0.007)			
Spread between US 10-year and 3-month rate	−0.813***	−1.947***			
	(0.109)	(0.184)			
Δ VIX			1.164***	0.937***	−0.217
			(0.109)	(0.141)	(0.289)
Δ Oil prices			−0.598***	−0.660***	−1.342***
			(0.087)	(0.112)	(0.230)
Δ Spread between US 10-year and 3-month rate			−28.420***	−35.860***	−68.399***
			(3.582)	(4.621)	(9.484)
Observations	202,307	202,228	193,643	193,537	192,569
Adjusted R^2	0.649	0.410	0.296	0.255	0.150

Notes: Dependent variable: EMBI spreads, except for Morocco for which spreads on sovereign bonds CDS are used. Heteroskedasticity-consistent standard errors reported in parentheses. Constant term included in columns (1) and (2), but not shown in the table. Lagged daily changes in spreads included in all regressions. Controls in columns 3-5 correspond to the daily change in VIX, oil prices, and US bond term spreads. Significance levels: *p<0.1; **p<0.05; ***p<0.01.

PUBLICATIONS

IMF's Precautionary Lending Instruments: Have they worked?

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