Borrowing Costs after Sovereign Debt Relief *

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Abstract

Can debt moratoria help countries weather negative shocks? We exploit the Debt Service Suspension Initiative (DSSI) to study the bond market effects of deferring official debt repayments. Using daily data on sovereign bond spreads and synthetic control methods, we show that countries eligible for official debt relief experience a larger decline in borrowing costs compared to similar, ineligible countries. This decline is stronger for countries that receive a larger relief, suggesting that the effect works through liquidity provision. By contrast, the results do not support the concern that official debt relief could generate stigma on financial markets.

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Keywords: Debt relief; Sovereign debt; Developing countries; Sovereign bond spreads; Debt Service Suspension Initiative

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"*The G20 debt relief initiative does not offer optimal benefit [. . .]. We fear we might unnecessarily create a crisis.*"

Ukur Yatani, Treasury Secretary of Kenya (May 15, 2020)

1 Introduction

Unexpected global and domestic shocks can trigger sovereign debt crises (Easterly, 2001; Kaminsky and Vega-Garcia, 2016; Fernández *et al.*, 2017). In early 2020, the Covid-19 pandemic started putting government finances of developing countries under severe strain, increasing the risk of a new wave of debt crises (Arellano *et al.*, 2020). Revenues declined because economic activity contracted and spending rose in order to tackle the pandemic.[1] As financing needs surged, the international community agreed to help low-income countries respond to the crisis by offering a suspension of debt service due in the second half of 2020. We exploit this policy intervention to test how such a simple debt moratorium can help countries weather negative shocks.

The Debt Service Suspension Initiative (DSSI) is a form of debt relief that eases financing constraints through liquidity provision by deferring debt repayments to official creditors without affecting the net present value (NPV) of public debt. The size of the liquidity provision under the DSSI is non-trivial. For all eligible countries it amounts to USD 11.5 billion in 2020 and accounts for more than one fifth of the fiscal shortfall due to the Covid-19 shock.[2] As such, the DSSI is attractive for both creditors and debtors. Creditors do not incur losses in NPV-terms and may benefit from better economic conditions and improved debt sustainability in debtor countries. Debtors enhance their liquidity and can protect social and health spending. However, many eligible countries have opted not to join the DSSI. This may seem a puzzling response to what at first sight is free money at time of great needs. As indicated by the initial quote by the Treasury Secretary of Kenya, a key motivation behind the reluctance to participate in the debt relief initiative is the reputational concern that sovereign borrowing costs could increase (IMF, 2020a; The World Bank, 2020).[3]

[1] Economic activity in low-income countries is projected to contract by 1 percent in 2020. The overall fiscal deficit will widen to 6.1 percent of GDP from 4.1 percent in 2019. The public debt-to-GDP ratio is projected to increase by more than 5 percentage points (IMF, 2020b).

[2] The size of the fiscal shortfall for DSSI-eligible countries amounts to about USD 49 billion. We compute this shortfall by comparing the fiscal balance, as projected in the June 2020 IMF World Economic Outlook, with the last pre-pandemic projections released in October 2019.

[3] See also numerous articles in the press, e.g., by The Economist and Reuters.

Our goal in this paper is to empirically test how this moratorium on official debt affected sovereign borrowing costs for poor countries in private bond markets. A theoretical perspective does not unambiguously suggest the direction of the effect. In a frictionless setting, an NPV-neutral debt relief should not affect spreads. Moreover, the lack of spillover effects of *official* debt relief on *private* debt markets could also explain a neutral effect.[4] However, joining a debt moratorium could trigger stigma effects as markets may perceive participation as a signal of previously unobserved debt vulnerabilities. Also, sovereign bond spreads can increase in a setting with frictions, since debt service reprofiling can imply future debt sustainability problems, which are priced into higher spreads.[5] But official debt relief could also translate into lower spreads through a liquidity effect. A debt service reduction can make debtors better equipped to deal with negative shocks and promote macroeconomic stability. Especially in a context where countries are under pressure to increase spending, liquidity provision can reduce the risk of debt distress and restore market confidence.[6]

The main empirical challenge to identifying the effect of debt relief on sovereign bond spreads is that the provision of debt relief is usually not random. The case of the DSSI, however, allows us to construct plausible counterfactuals. In contrast to most debt restructurings, the DSSI was implemented simultaneously for all 73 eligible countries and not tailored to the needs of individuals countries.[7] The eligibility criteria were based on preexisting country lists that countries could not select into. This setting allows us to employ a research design based on synthetic control (SC) and difference-in-difference (DiD) methods. Developed by Abadie and Gardeazabal (2003) and Abadie *et al.* (2015), the SC method is now used in the macroeconomic and public finance literature to deal with shocks that affect several countries (Campos *et al.*, 2019; Essers and Ide, 2019; Marchesi and Masi, 2020b). We construct a SC for each DSSI-eligible country with daily data on sovereign bond spreads combining countries from the pool of ineligible countries. In addition to individually analyzing these country-specific SCs, we also apply synthetic DiD (Arkhangelsky *et al.*, 2019) and the generalized SC method (Xu, 2017) to jointly analyze all treated countries.

[4] See Dellas and Niepelt (2016) for a sovereign debt model with private and official creditors.

[5] In the theoretical literature, Yue (2010) shows how debt regenotiations can increase spreads. Fink and Scholl (2016) suggest that bailouts can increase the default probability in the long-run. Hatchondo *et al.* (2020) explicitly model a debt standstill on private creditors and find that it results in higher spreads unless combined with a haircut.

[6] Gourinchas *et al.* (2020) and Roch and Uhlig (2018) show that bailouts can be beneficial for both debtors and creditors. Bianchi *et al.* (2018) show that accumulating reserves can be optimal for indebted governments.

[7] A similar argument is used, for instance, by Arslanalp and Henry (2005) and Reinhart and Trebesch (2016) to identify the impact of coordinated debt relief under the Baker plan and the Brady Initiative.

Comparing sovereign bond spreads of DSSI-eligible countries with their SCs shows that spreads significantly declined after the debt relief was granted, suggesting that official debt relief has a positive spillover effect on private bond markets. The size of this effect differs across countries, but it goes in the same direction for *all* of them. Placebo tests in space and time show that the effect on spreads is due to the DSSI and cannot be explained by contemporaneous IMF programs. Applying synthetic DiD and the generalized SC method—which both unify SC methods with fixed effect models—confirms this result, pointing to an average decline of about 200 basis points (bps).

We then replicate our main findings in a standard DiD setting that traces heterogeneous dynamics of bond spreads after debt relief based on the local projection method (Jordà, 2005). To distinguish between two mechanisms that could drive the main result, we allow for different responses depending on the size of the DSSI relief and the share of private creditors in debt service. The decline in bond spreads is larger for eligible countries that have a larger share of debt service due in the eligibility period. We also find that the effect is stronger in countries with weaker ex-ante fiscal positions. By contrast, the decline in spreads does not depend on the amount of repayments due to private creditors. The absence of spread increases after debt relief—including for countries owing a large share of repayments to private creditors—does not support the presence of a stigma effect. Instead, results are consistent with a positive liquidity effect resulting from the postponement of debt service.

Our analysis contributes to the empirical literature on the consequences of sovereign debt restructurings (Tomz and Wright, 2013; Asonuma and Trebesch, 2016; Reinhart and Trebesch, 2016; Trebesch and Zabel, 2017; Cheng *et al.*, 2019). While most of this literature looks at implications for growth and investment, our work focuses on estimating causal effects on borrowing costs and follows a recent literature that moves beyond treating restructurings as binary treatments (Asonuma and Trebesch, 2016; Trebesch and Zabel, 2017; Meyer *et al.*, 2019). In a seminal paper, Cruces and Trebesch (2013) consider a large sample of sovereign debt restructurings and find haircut sizes to be associated with subsequently higher bonds spreads and longer market exclusion. Our results are consistent with and specify their finding that bond spreads do not increase after debt restructurings with haircuts close to zero. We also add to the sovereign debt literature on heterogeneous creditors (Boz, 2011; Dellas and Niepelt, 2016; Corsetti *et al.*, 2018; Marchesi and Masi, 2020a,b) by looking at the spillover effect of *official* debt restructuring on *private* debt markets.

Furthermore, our paper contributes to the development literature on sovereign debt relief (Krugman, 1988; Sachs, 1989; Aguiar *et al.*, 2009). More specifically, it builds on two articles investigating the reaction of financial markets to debt relief for developing countries. Consistent with the presence of debt overhang, Arslanalp and Henry (2005) document a large appreciation of stock markets in countries that received debt relief under the Brady Plan. Similarly, Raddatz (2011) shows that multinational firms operating in countries that received multilateral debt relief through the Heavily Indebted Poor Countries (HIPC) initiative and the Multilateral Debt Relief Initiative (MDRI) recorded positive abnormal returns in the days after the announcement of debt relief. Compared to these two studies, we look at the direct effect of sovereign borrowing costs and focus on an episode in which only debt service repayments are deferred, suggesting that liquidity support alone can trigger a positive market reaction.

Finally, our results lend support to the view that early and fast debt restructurings can be beneficial and less costly for creditors and debtors (IMF, 2014; Asonuma and Trebesch, 2016). They also suggest that simple state-contingent debt instruments can help countries mitigate their exposure to macroeconomic volatility.[8] More generally, our analysis points to the benefits of a debt relief strategy that is cheaper and politically more feasible to implement for creditors than more traditional approaches. The rapid provision of short-term liquidity through debt service suspension can be an effective form of financial support. As the data do not support borrowers' reputational concerns, such approach could become more common to deal with future temporary shocks.

2 The Debt Service Suspension Initiative

As the spread of the Covid-19 virus evolved into a global pandemic, concerns about its impact on the world's poorest countries grew. These countries not only have less adequate health infrastructure to deal with the pandemic, but also lack financial resources to mitigate the economic fallout caused by lockdowns, trade disruptions, and falling aggregate demand. In response to these concerns,

[8] In particular, bonds with a floating grace period (Cohen *et al.*, 2008), which can be triggered by the debtor in case of adverse shocks, could provide flexibility and simplify contract negotiations in response to short-term financial distress. In this context, see also a proposal by Ross and Ulukan (2020). Moreover, Bolton *et al.* (2020b) recently proposed to deal with sovereign debt distress by providing temporary legal protection to debtor countries while they are diverting financial resources toward dealing with the crisis.

G-20 leaders committed to do "whatever it takes" to "provide help to all countries in need of assistance." On April 15, a month after the World Health Organization (WHO) had declared Covid-19 a pandemic, the G-20 leaders announced their plan for financial support for the world's poorest countries through the DSSI.

The DSSI provides a time-bound suspension of principal and interest payments due by 73 eligible developing countries to bilateral government lenders. It was initially set to last between May 1 and December 31, 2020 and the repayment period for the suspended debt is set to three years, with a one-year grace period.[9] The list of eligible countries was defined to include all countries that are eligible to receive resources from the World Bank's International Development Association (IDA) and all least developed countries under the UN classification, while excluding countries that were in arrears to the World Bank or the IMF (Eritrea, Sudan, Syria, Zimbabwe). In practice, this covers a mix of low and middle-income countries including some that are richer than some excluded countries (e.g, Angola vs. Vietnam).

Eligible countries are also heterogeneous in their access to finance, with many confined to concessional financing, but others issuing bonds in international capital markets. Moreover, eligibility is not conditional on immediate financing needs and debt repayment problems. Many eligible countries were at low or medium risk of debt distress prior to the crisis, while other developing countries that were already in debt renegotiations prior to the crisis were not eligible (e.g., Ecuador). Finally, as the design of the DSSI does not take the severity of the Covid-19 shock into account, the amount of debt service eligible for suspension is orthogonal to key measures of the shock. We show in Figure A2 that this is true for the intensity of the fiscal shocks, the economic shocks, and the health shock (as measured by the number of Covid-19 cases and deaths).

The initiative differs from traditional multilateral financing as it comes with few conditions. Unlike IMF programs, there are no structural benchmarks or prior actions governments need to undertake. Nevertheless, country authorities do have to take some steps. They have to make a formal request, as participation is not automatic. Authorities also have to commit to using the created fiscal space to tackle the crisis and to disclose public debt data. Finally, they have to request

[9] In October 2020, the G-20 agreed to extend the DSSI by 6 months; see Appendix A.1 for a timeline. The description of the DSSI draws on the G20 communiqué.

IMF financing, including through the emergency facilities with limited conditionality, or already have an existing IMF program in place. As the latter may in theory endanger our identification strategy, we discuss this issue in Section 4.1.

3 Data and Stylized Facts

Data. We collect daily data on sovereign bond spreads from January 2, 2019 to August 31, 2020 for all the 68 low- and middle-income countries for which data are available from Bloomberg (Table A2). As most of the DSSI-eligible countries have no regular market access, data on sovereign bond spreads are available for 16 countries in the group of *treated* countries.[10] To examine whether this sample is biased, Table A1 compares the 16 eligible countries with sovereign bond spreads data to the other eligible countries and shows that the two samples are not statistically different along many observable dimensions. A notable exception, which reflects the availability of data on bond spreads, is the share of debt owed to private creditors, which is larger for DSSI-eligible countries. The *donor pool* used to construct SCs includes the remaining 52 non-eligible middle-income countries with bond spreads data.

We merge the spread data with macroeconomic indicators (e.g., public debt over GDP, real GDP growth, fiscal and current account balances) from the IMF World Economic Outlook. Data on the size of the DSSI debt service are drawn from a novel World Bank dataset on monthly debt service due.[11] Finally, we code the date of each country's participation in the DSSI based on information from the World Bank, the IMF weekly update, and communications with country authorities.

Stylized facts. The daily data show that average sovereign bond spreads in the 16 DSSI-eligible countries with access to international capital markets sharply increased when the Covid-19 pandemic broke out in March 2020. Spreads jumped from about 550 bps in late-February to almost 1200 bps in early-April, slightly decreased before the DSSI announcement on April 15, and in-

[10] These countries are: Angola, Cameroon, Cote d'Ivoire, Ethiopia, Ghana, Honduras, Kenya, Mongolia, Mozambique, Nigeria, Pakistan, Papua New Guinea, Senegal, Tajikistan, Uzbekistan and Zambia. Of these Ghana, Honduras, Kenya, Mongolia, Nigeria and Uzbekistan have not requested to join the initiative in the sample period.

[11] The data cover 68 of the 73 DSSI-eligible countries (thus excluding Kiribati, Marshall Islands, Micronesia, South Sudan and Tuvalu) and is available at: https://datatopics.worldbank.org/debt/ids/. The list of eligible countries and the size of the DSSI relief is shown in Figure A3.

creased again in the two weeks after that. On May 1, however, when the DSSI officially started with the first countries participating, sovereign bond spreads began a constant, albeit decelerating, downward path over the entire summer (Figure A4).

The decline in sovereign spreads, especially after the first countries joined the DSSI, would suggest that debt relief has not triggered an adverse market reaction, contrary to what the concern regarding reputational costs would predict. However, as shown in Figure A5, sovereign bond spreads were declining in many low and middle-income countries, pushed by the accommodative US monetary policy, among other factors (BIS, 2020). However, a simple comparison between eligible and ineligible countries can be biased if treated and non-treated countries are systematically different and their spreads react differently to global shocks other than the DSSI. To be able to identify the effect of debt relief, in the next section we compare the bond spreads of each DSSI-eligible country with those of its respective SC that closely matches the eligible country in the pre-treatment period.

4 Empirical Analysis

4.1 Synthetic Controls

In a context in which an intervention affects a small number of units (countries in our case), the use of SC methods can provide advantages over more traditional regression analysis (Abadie, 2020). By taking a synthetic combination of untreated countries (the donor pool), SCs often match the characteristics of treated countries in the pre-intervention period better than single unaffected countries and thereby provide more appropriate counterfactuals. Compared to the DiD design, the SC method does not give all untreated units the same weight in the comparison, but generates a weighted average of the untreated countries in the donor pool. Then, the outcomes for the SCs are projected into the post-treatment period using the same weights. In our setting, we consider countries with available data on bond spreads and construct SCs for the 16 DSSI-eligible countries using as donor pool all 52 ineligible countries. The baseline treatment is the official activation of

the DSSI on May 1, 2020, which coincides with the first country (Pakistan) joining the initiative.[12]

Baseline analysis. For the baseline analysis, we construct a SC for each treated country using a set of pre-treatment characteristics that include standard macroeconomic variables and the value of sovereign spreads on specific dates. As macroeconomic variables, we take the 2019 values of real GDP growth, public debt, the fiscal balance and the current account balance (all as a share of GDP), as they are key determinants of sovereign bond yields. To match countries based on initial market responses to the pandemic shock prior to the start of the DSSI, we match them on pre-treatment spreads using four specific dates that correspond to important events of the Covid-19 pandemic: February 4, March 11, March 26 and April 6.[13] Finally, we take differences in the intensity of the Covid-19 crisis into account by adding the number of cases per million people. To allow for sufficiently long and balanced pre- and post-intervention periods, our sample starts on January 2 (the first trading day in 2020) and ends on August 31.

When using the SC method, two main assumptions must hold. First, *no anticipation*. The variables we choose to construct the SCs should be able to approximate the path of sovereign bond spreads of the DSSI-eligible countries but they should not anticipate the event. In our setting, this assumption is likely to be satisfied. The start of the DSSI can be considered a plausibly exogenous shock, as it happened in response to the impacts of the Covid-19 global pandemic rather than in response to the debt build-up of individual countries. Also, debt relief was offered simultaneously to all eligible countries in a centralized way, irrespective of their economic circumstances (Figure A2). Second, *no interference*. The countries in the donor pool used to estimate the synthetic controls should not be affected by the event. This implies that there are no spillover effects from sovereign bond yields of DSSI-eligible countries to those of ineligible countries. While spillover effects of sovereign bond yields exist (Gande and Parsley, 2005), they are mostly limited to economies that are strongly financially integrated (e.g., the euro area, Bruyckere *et al.*, 2013), they are much stronger from richer to poorer countries rather than vice versa (Arezki and Liu, 2020), and they

[12] In a robustness test, we also use the official announcement of the DSSI on April 15, 2020, as the treatment.

[13] On February 4, the WHO asked the UN Secretary-General to activate the UN crisis management policy following the outbreak in China. On March 11, the WHO declared Covid-19 a pandemic. On March 26, the G20 Leaders declared they were "committed to do whatever it takes to overcome the pandemic." April 6 is the first trading day after the WHO reported that over 1 million cases of Covid-19 had been confirmed worldwide. See: https://www.who.int/news-room/detail/29-06-2020-covidtimeline.

stem from global factors (e.g., US monetary policy, global risk aversion Miranda-Agrippino and Rey, 2020). Thus, it is unlikely that bonds spreads in the donor pool, which are mostly dependent on economic conditions in advanced economies, are affected by dynamics of sovereign bond markets in eligible low- and middle-income countries.

Baseline results. Figure 1 visualizes the baseline result. Each line plots the difference between an eligible country's actual spread and the spread of its SC (the *spread gap*). The red line visualizes the average spread gap of the 16 eligible countries. Prior to the treatment, the spread gap is close to zero. Then, on May 1—the day when the DSSI was activated and when the first country officially participated—the gap starts declining and stabilizes at around 300 bps in June. Setting the treatment at the time of the DSSI *announcement* two weeks earlier shows qualitatively similar results and a lag in the fall in spreads consistent with the effect being driven by the DSSI *activation* (Figure A6).[14] In addition to the average negative effect on spreads, the main takeaway from this analysis is that there is no country that experienced an increase in spreads compared to its SC. While for a few countries (e.g., Ethiopia, Kenya, and Uzbekistan) there is almost no effect, for others (e.g., Angola, Nigeria, Senegal, and Tajikistan) the decline in spreads is large, persistent, and economically meaningful.[15]

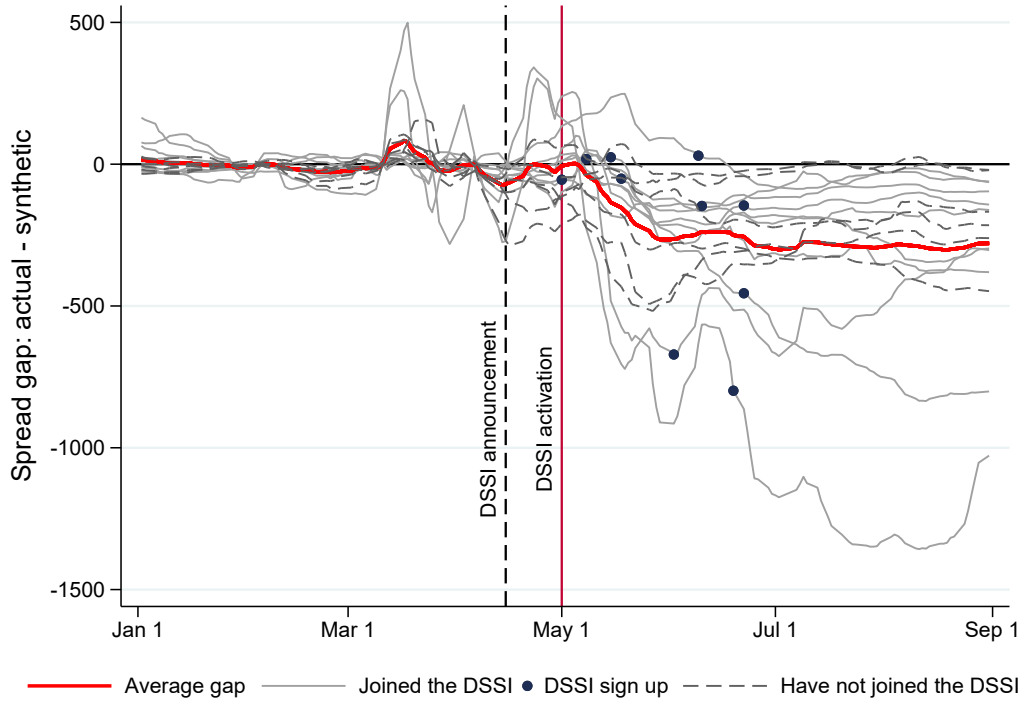
Falsification tests. We run several falsification tests to enhance the validity of this result: a) two in-time placebo tests in which we backdate the timing of the treatment, and b) an in-space placebo test in which we assign the treatment to similar non-DSSI eligible countries.

For the placebo in time, we start by backdating the treatment to March 1, before the UN declared Covid-19 a pandemic. In the period between the placebo and the actual treatment dates, spreads are volatile but do not show any evidence of anticipation effects (Figure 2, panel a). If

[14] One reason explaining why the DSSI's effect is observable after the DSSI activation rather than after its announcement is the uncertainty surrounding the implementation of the DSSI between the two dates. Only on May 1 the policy was officially activated, the first country (Pakistan) officially joined, and it became clear that private creditors would not have to participate in debt relief (IIF, 2020).

[15] Individual plots for each DSSI-eligible country showing actual spreads and those of their SCs are shown in Figure A7. The weights used to construct the SCs are shown in Table A3. Results are robust to excluding from the donor pool countries in default (Argentina, Barbados and Venezuela, based on updated data from Asonuma and Trebesch (2016)); see Figure A8) and to using alternative variables for matching. In particular, results are qualitatively similar when matching on the average pre-treatment bond spreads rather than on their value at specific dates (Figure A9), and when adding pre-treatment sovereign credit ratings to the set of macro variables (Figure A10).

Figure 1: Sovereign bond spreads in DSSI-eligible countries vs. their synthetic controls

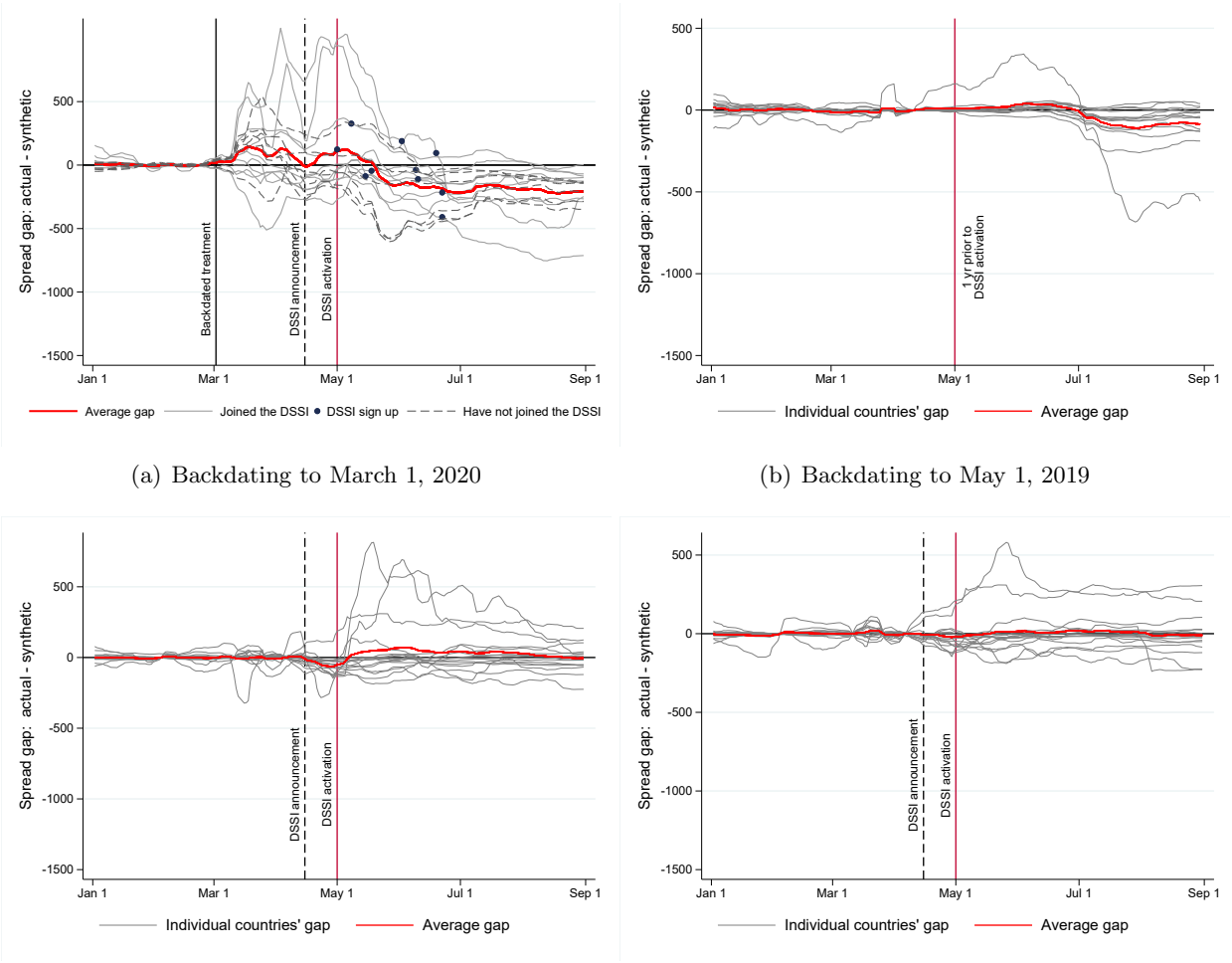


Notes: The figure plots, for all DSSI-eligible countries, the difference between the actual sovereign bond spreads and those of the respective synthetic control (*spread gap*). The red solid line is the average of the country-specific spread gaps. The gray solid lines refer to countries that joined the DSSI in the observation period, while the gray dashed lines refer to eligible countries that did not formally join the initiative (Ghana, Honduras, Kenya, Mongolia, Nigeria, and Uzbekistan). The vertical lines indicate the DSSI announcement on April 15, 2020 (dashed line) and the activation on May 1, 2020 (solid line). The blue dots indicate the date of the country-specific participation in the DSSI. See the description in the main text. Country-level sovereign bond spreads are 7-day moving averages. Data sources: Bloomberg, Our World in Data, and IMF World Economic Outlook.

anything, the average spread gap is positive. After the DSSI activation the spread gap widens and becomes negative for all countries, as shown in Figure 1. In the second in-time placebo, we backdate the treatment by one year (to May 1, 2019) and construct the SC for each of the DSSI-eligible countries (except Mozambique, which was in default in 2019), using 2018 macroeconomic variables. The results show that the gaps between the actual spreads and their SCs are close to zero, demonstrating that the SCs are able to reproduce the dynamics of spreads for DSSI-eligible countries one year before the policy was implemented (Figure 2, panel b).

For the placebo in space, we consider the poorest 16 countries of the donor pool (all with GDP per capita lower than 5,000 USD). If the decline in sovereign spreads is the result of a common trend among poor countries, the placebo should show results similar to our baseline. Instead, we

Figure 2: Falsification tests



(a) Backdating to March 1, 2020

(b) Backdating to May 1, 2019

(c) In-space placebo

(d) IMF programs

Notes: The figures plot the placebo tests of the DSSI's effect on bond spreads. The in-time placebos shift the treatment to March 1, 2020 in panel (a) and one year back in time (to May 1, 2019) in panel (b). They use the group of DSSI-eligible countries as treated units. The in-space placebos consider as treated the 16 poorest countries that are not eligible for the DSSI. Panel (d) plots the *spread gap* for countries that are not eligible for the DSSI but signed an IMF lending arrangement between April 15 (DSSI announcement) and June 22 (the day when the last country joined the initiative in the observation period). The sample includes Armenia, Bahamas, Bolivia, Chile, Colombia, Costa Rica, Dominican Republic, Egypt, Georgia, Guatemala, Jamaica, Jordan, Panama, Peru, Paraguay and Ukraine. See the description in the main text. Country-level sovereign bond spreads are 7-day moving averages. Data sources: Bloomberg, Our World in Data and IMF World Economic Outlook.

see that the average spread gap is close to zero for the entire post-DSSI period and the trajectories of individual countries' spreads are broadly split below and above zero (Figure 2, panel c).[16]

Debt relief or IMF program. A potential concern with our research design is that the effect may not be driven by debt relief *per se*, but could be the result of the conditions attached to DSSI

[16]The list of the 16 countries used for the placebo and country-specific plots are reported in Figure A11.

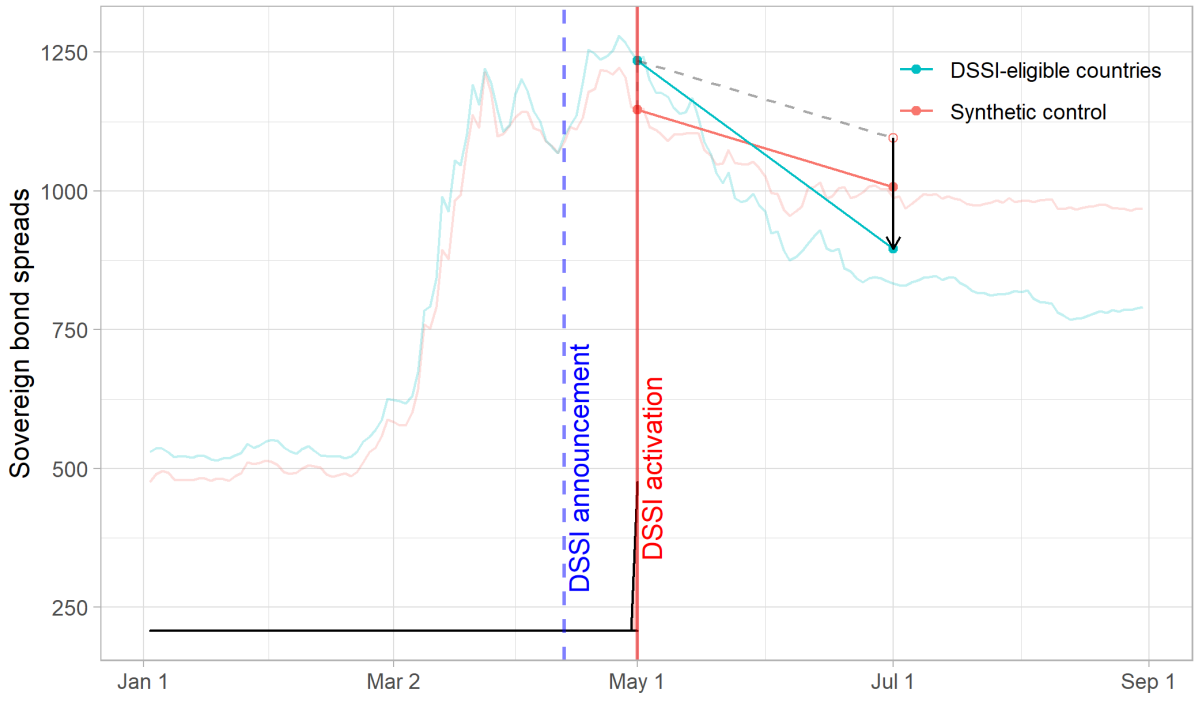
participation (see Section 2). In particular, the presence of an IMF program, coupled with more transparency towards financial markets, may drive down bond spreads (Gehring and Lang, 2020). To disentangle the effect of debt relief from that of requesting an IMF program, we run another placebo test in which the treatment group includes developing countries that are not eligible for the DSSI but signed an IMF emergency financing program soon after the announcement of the DSSI.[17] If the fall in spreads that we observe in the baseline is the effect of IMF programs, then we should observe a similar decline when running this placebo test. The results, however, show a different picture (Figure 2, panel d). While the average gap is mildly negative, especially toward the end of the time window, countries are almost equally split between those with positive and negative spread gaps. Thus, while there is some evidence suggesting that participation in an IMF program for some countries could reduce sovereign bond spreads, this is unlikely to explain the large drop that we observe for almost all eligible countries in response to the DSSI.

Synthetic DiD. DSSI-eligible countries have, on average, a lower per capita GDP than countries in the donor pool. Moreover, the treated and control groups also differ along other unobservable time-invariant characteristics which may drive spreads (e.g., institutional quality, sovereign credit ratings). To deal with such concerns more explicitly, we draw on recent methodological advances that allow for the inclusion of unit fixed effects and time fixed effects under the SC framework. Specifically, we implement the "synthetic DiD" estimator (Arkhangelsky *et al.*, 2019) and, for robustness, the "generalized synthetic control method" (Xu, 2017) to test the effect of the DSSI with this alternative approach.

Figure 3 plots the result of applying the synthetic DiD estimator. The SCs that this method constructs are able to closely match the path of treated countries in the pre-intervention period when the Covid-19 shock increased bond spreads in most countries. When the DSSI is activated on May 1, the bond spreads of treated countries depart from this parallel trend and decline much more and faster than those of their SCs. A gap of about 200 bps remains visible until the end of the observation period. The estimated treatment effect is statistically significant and equal to 199

[17] We consider the time window from April 15 (the date of the DSSI announcement) to June 22 (the date when the last DSSI eligible country joined the initiative). Results are robust to alternative choices. The list of IMF emergency lending programs is available at: https://www.imf.org/en/Topics/imf-and-covid19/COVID-Lending-Tracker. We exclude Ecuador as it restructured its debt post Covid-19.

Figure 3: Synthetic difference in differences



Notes: The figure plots the results of applying the synthetic difference in differences (SDiD) estimator proposed by Arkhangelsky *et al.* (2019). The vertical lines indicate the DSSI announcement on April 15, 2020 (dashed line) and the activation on May 1, 2020 (solid line). The figure shows the parallel trends of bond spreads in eligible countries and their synthetic controls before the DSSI activation and the eligible countries' departure from this parallel trend after the DSSI is activated. The black arrow indicates the treatment effect, i.e., the difference between actual spreads in eligible countries and the projected counterfactual. The treatment effect and its 90% confidence interval are estimated at $\tau = 199.36, [-380.01, -18.7]$. Data sources: Bloomberg, Our World in Data and IMF World Economic Outlook.

bps. Applying the generalized SC method produces very similar results with a slightly larger effect size (Appendix A.2 and Figure A1).

4.2 Mechanisms: Local Projections and Heterogeneous Effects

The evidence that bond spreads decline more in DSSI-eligible countries than in their SCs does not support the presence of any stigma coming from debt relief and is consistent with a positive effect due to liquidity provision. To further support this claim, we extend our analysis in a standard DiD setting and trace the dynamic response of sovereign spreads after the DSSI using the standard local projection method (Jordà, 2005). While this approach is less suited to construct a good counterfactual for the treated sample, it allows us to look at heterogeneous responses to the treatment. We

run three additional tests in which we allow for differences in the effect of the treatment depending on: 1) the size of debt relief, 2) the relative importance of private creditors, 3) the initial risk of debt distress, and 4) the initial public debt-to-GDP ratio. We estimate the following baseline equation:

$$\Delta Spread_{c,t+h} = \beta_h DSSI_i \times Post_t + \alpha_1 Spread_{c,t-1} + \alpha_2 Spread_{c,t-2} + \tau_t + \gamma_c + \epsilon_{c,t}, \quad (1)$$

where the dependent variable denotes the change in sovereign bond spreads of country i from day t to $t+h$ and the key explanatory variable is the interaction between the $DSSI$ indicator, which identifies DSSI-eligible countries, and the $Post$ indicator, which is equal to 1 since the DSSI activation day and zero before. The lagged values of sovereign spreads control for potential mean reversion or persistence in the dynamics of spreads. Day fixed effects (τ_t) and country fixed effects (γ_c) absorb global daily shocks and country-specific time-invariant unobservable characteristics which may drive differences in bond spreads. Thus, the coefficients β_h trace the differential effect of the DSSI on bond spreads between eligible and ineligible countries over a 42 trading day window (from May 1 to July 1). In the second step, we allow the coefficient β to vary depending on country characteristics adding a triple interaction with: 1) a binary variable equal to 1 for countries where the amount of debt service relief under the DSSI is larger than 0.5 percent of GDP,[18] 2) a binary variable equal to 1 for countries where the share of debt service due to private creditors between May and December 2020 is at least 60 percent of total debt service relief under the DSSI, 3) a binary variable equal to 1 for countries in debt distress or at high risk of debt distress and equal to 0 for those with moderate or low risk,[19] 4) a binary variable equal to 1 for countries with a debt-to-GDP ratio larger than 75 percent of GDP.

Results confirm—in a standard DiD setting—the statistically significant decline in spreads after the DSSI activation. The effect size reaches approximately 120 bps after about 1 month and persists around that level thereafter (Figure 4, panel a). This result is robust to the use of the DSSI announcement as treatment date (panel b). Splitting the average effect shows that the decline

[18] The thresholds are chosen to split the sample around the median, but results are robust to alternative thresholds.

[19] We use the IMF/World Bank risk rating under the low-income countries Debt Sustainability Framework (LIC DSF). This information is not available for 4 eligible countries which are not part of the LIC DSF (Angola, Mongolia, Nigeria and Pakistan) and which we exclude from this analysis. See https://www.worldbank.org/en/topic/debt/brief/covid-19-debt-service-suspension-initiative.

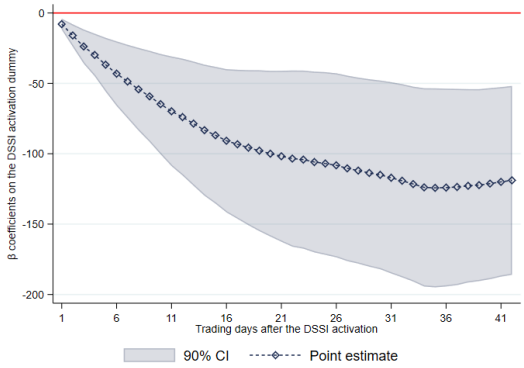
in spreads is twice as large in countries which received a large DSSI relief compared to those where debt relief was 0.5 percent of GDP or less (panel c). This suggests that debt relief has an effect on market prices via liquidity provision.[20]

By contrast, splitting the sample along the share of debt service due to private creditors shows that there is virtually no difference in the decline in spreads between countries with large and small shares (panel d). Moreover, if the DSSI were to affect bond yields through stigma, one should observe a sharper reduction in spreads for countries that stated their intention to not participate in the DSSI. The lack of evidence that spread dynamics for eligible, participating countries are systematically worse than for eligible, non-participating countries (Figure 1 and Figure A7) strengthens our interpretation that debt relief does not generate a stigma effect.

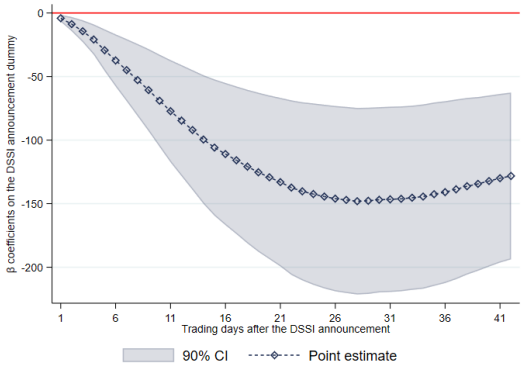
Finally, we test whether the initial fiscal position matters for the market reaction to debt relief. Results show that the decline in spreads is visible and significant only for high-debt and high-risk countries, suggesting that the debt suspension is more likely to bring benefits to countries with weaker fiscal positions (Figure 4, panels e and f). This is consistent with the analysis by Arellano *et al.* (2020) on non-linear effects of debt relief conditional on the initial level of public debt.

[20] A caveat in interpreting this result is that the point estimates across the two sub-samples are not statistically different. However, this is to be expected given the small sample size and the difference in the point estimates is large enough to suggest that the size of liquidity provisions substantively matters for the market reaction after the DSSI.

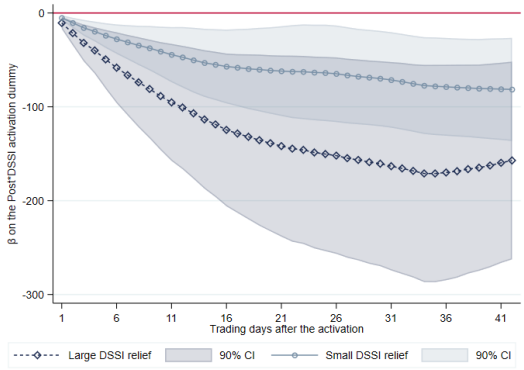
Figure 4: Heterogeneous effects: DiD evidence from impulse response functions



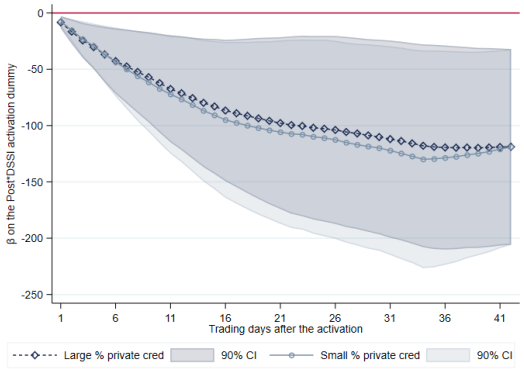
(a) All DSSI-eligible countries



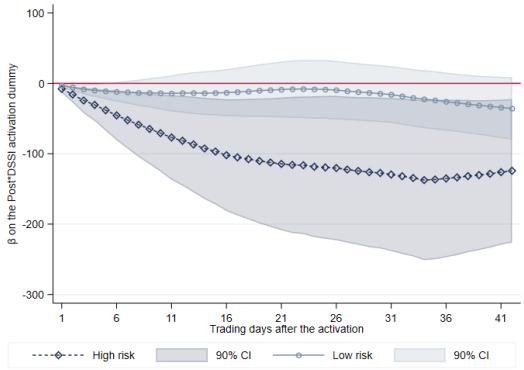
(b) DSSI announcement



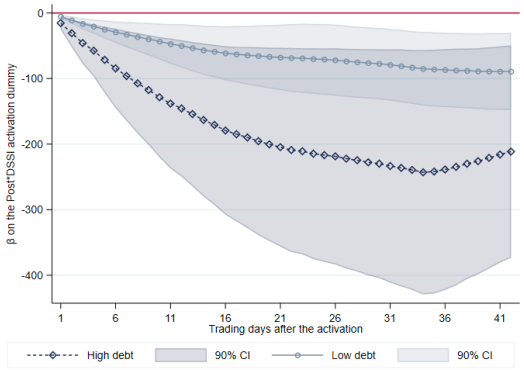
(c) Size of the DSSI relief



(d) Share of private creditors



(e) Risk of debt distress



(f) Public debt

Notes: The charts plot the impulse response functions of the effect of the DSSI activation ($t = 0$) on daily sovereign bond spreads. Panel (a) plots the result of estimating equation (1). Panel (b) considers the DSSI announcement as $t = 0$. Panel (c) plots heterogeneous effects by differentiating between eligible countries that received a debt relief larger and smaller than 0.5 percent of GDP. Panel (d) differentiates between countries with debt service due to private creditors above and below 60 percent of total debt service due under the DSSI. Panel (e) only considers the 12 DSSI-eligible countries with a LIC-DSF "risk of debt distress" rating and differentiates between countries at high risk and those at low or moderate risk. Panel (f) differentiates between eligible countries with public debt above and below 75 percent of GDP. All panels plot the impulse response function and the associated 90% confidence intervals, obtained by estimating equation 1 and clustering standard errors at the country level. See description in the main text. Data source: International Debt Statistics (World Bank), Bloomberg and IMF World Economic Outlook.

5 Discussion

Can a simple debt moratorium—without a haircut for creditors—help countries weather a negative shock? While pressing in the context of the current pandemic, this is an important question for short-term debt crises more generally.

On the one hand, a debt moratorium can provide much needed liquidity. In particular, if the crisis is perceived as temporary, liquidity provision can promote macroeconomic stability, restore market confidence, and reduce the risk of debt distress, leading to a decrease in borrowing costs. On the other hand, signing up for such debt relief could be perceived as a signal that public debt is unsustainable, triggering an increase in borrowing costs.

Our results, based on the short-term market response to a moratorium on official debt service during the Covid-19 pandemic, point to a significant decline in sovereign bond spreads for eligible countries. The evidence suggests that this effect is due to liquidity provision and cannot be explained by the contemporaneous request of IMF financing. These results suggest that rapid and unconditional provision of official debt rescheduling to countries facing short-term liquidity shocks can be an effective form of financial support. In addition, our results would support the design and adoption of simple state-contingent debt instruments with floating grace periods to help poor countries mitigate their exposure to adverse shocks.

Two qualifications are important for the interpretation of our results. First, while these findings can be transferred to other situations in which countries face a short-term crisis, this does not imply that the debt service suspension will be the optimal response to the Covid-19 crisis in the months to come. If the shock persists, the liquidity crisis could evolve into a solvency crisis, as a change in the long-term growth rate of the economy would affect debt sustainability. In such a scenario, a debt stock reduction would be required to reduce debt overhang and restore debt sustainability. Second, our analysis looks at NPV-neutral debt relief provided by the official sector resulting in a positive spillover effect on private bond markets. How markets would react if private creditors also joined the initiative remains an open question.

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Online Appendix—Not for Publication

A.1 DSSI Timeline

Our study period analyzing sovereign bond spreads starts on January 1, 2020, when the world is still largely unaware of Covid-19. On that day, the WHO requested information on a cluster of atypical pneumonia cases in Wuhan from the Chinese authorities based on local media statements.[21] It is not until February 4 that the WHO Director-General asks the UN Secretary-General to activate the UN crisis management policy in response to the virus and urges members to take action now "while 99% of cases are in China." A month later, on March 11, the WHO declares Covid-19 a pandemic, with larger outbreaks developing in Western Europe, the Western Pacific Region, and the Middle East.

While the health impacts of the pandemic are concentrated in high-income and upper-middle-income countries at this stage (mid-March to mid-April), the economic repercussions are already visible elsewhere. Lockdowns are suppressing global demand in goods and services, trade is disrupted, commodity prices drop and sovereign spreads in emerging markets and developing countries are rising rapidly (IMF, 2020b).

On March 26, the leaders of the G20 state they are "committed to do whatever it takes to overcome the pandemic" in order to "protect lives", "restore confidence, preserve financial stability, revive growth and recover stronger" and "provide help to all countries in need of assistance." In the following weeks, a range of proposals are floated by experts and policy makers (Bolton *et al.*, 2020a; Landers *et al.*, 2020). In the run-up of the announcement of the DSSI, on April 13, French President Macron called on "massive cancellation" of Africa's debt, while the next day France's Foreign Minister Bruno Le Maire announced that "we have obtained a debt moratorium at the level of bilateral creditors and private creditors for a total of USD 20 billion."

On April 15 the G-20 releases its communique outlining the DSSI as its policy tool to alleviate the economic fallout caused by the pandemic in the world's poorest countries. The debt service suspension is implemented starting on May 1.

[21] This section is based on the WHO timeline of events; see: https://www.who.int/news-room/detail/29-06-2020-covidtimeline.

On October 14, given the scale of the Covid-19 crisis, the members of the G-20 agree on a 6-month extension of the DSSI and endorse the option of another 6 months extension if later deemed necessary.[22] They also announce an agreement in principle on a "Common Framework for Debt Treatments beyond the DSSI," the terms of which are finalized on November 13. This framework sets out principles for debt restructuring which goes beyond approaches used previously under the Paris Club, and where all G20 and Paris-Club member bilateral lenders as well as private lenders are required to agree on debt treatments of comparable terms.[23] While the list of countries eligible to participate in the Common Framework are the same as for the DSSI, the scope of the intervention differs substantially. The treatment under the Common Framework is meant to reduce debt stock (therefor is *not* NPV-neutral) and it mandates private sector participation rather than merely encouraging it. Therefore, the effects of eligibility to the DSSI and to the Common Framework becomes hard to reliably disentangle.

A.2 Generalized synthetic control method

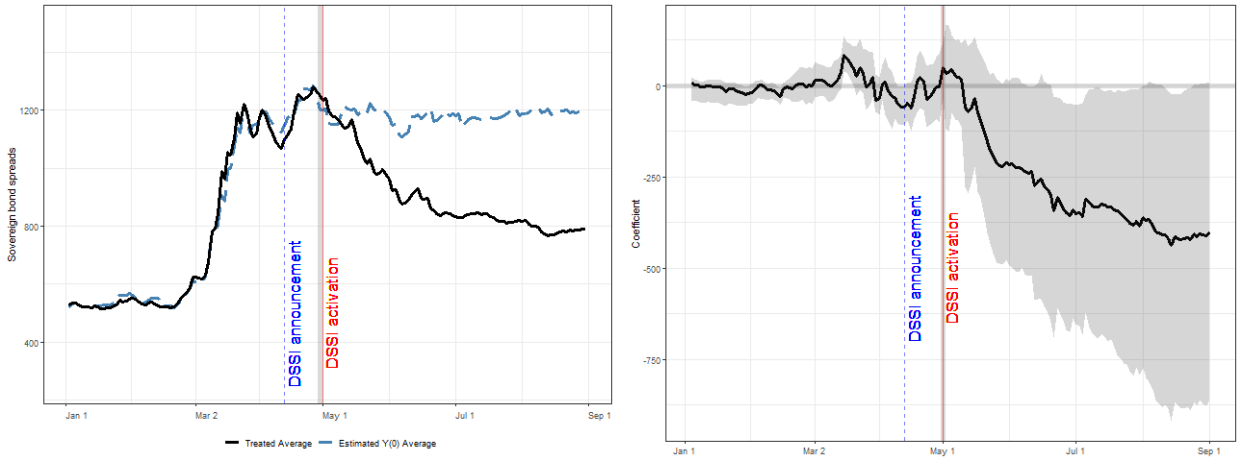
Like the synthetic difference in differences discussed in the main text, the generalized synthetic control method (Xu, 2017) unifies SC methods with fixed effects models. Based on a model that uses unit-specific intercepts interacted with time-varying coefficients, the generalized SC method allows a correlation between treatment and unobserved, time-invariant country heterogeneities. Furthermore, this approach implements a bootstrap procedure to produce confidence intervals around the average treatment effect on the treated (ATT) and thereby allows frequentist inference.[24] Figure A1 plots the results of this analysis and points to a very similar effect of the DSSI. The estimated ATT reaches 300 bps after about one month and is statistically significant at conventional levels during most of the post-intervention period.

[22] See: http://www.g20.utoronto.ca/2020/G20SS_G20_FMCBG_Communiqué_English.pdf.

[23] See: https://www.sciencespo.fr/psia/sovereign-debt/wp-content/uploads/2020/11/English_Extraordinary-G20-FMCBG-Statement_November-13.pdf.

[24] The generalized SC method also includes an automatic, data-driven cross-validation procedure that does not require the researcher to make specification choices.

Figure A1: Generalized synthetic control method



(a) Average bond spreads: treated and synthetic control

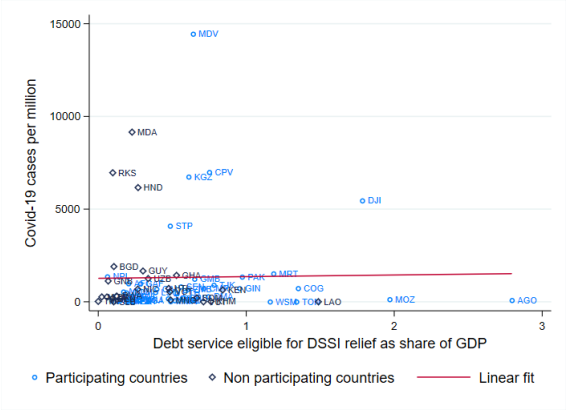
(b) Average treatment effect on the treated (ATT)

Notes: The figures plot the results of applying the generalized synthetic control method proposed by Xu (2017). Panel (a) plots the average bond spreads for the treated countries and their synthetic controls. Panel (b) plots the average treatment effect on the treated (ATT) along with 90% confidence intervals, which are estimated based on a bootstrap procedure. See the description in the main text. Data sources: Bloomberg, Our World in Data, and IMF World Economic Outlook.

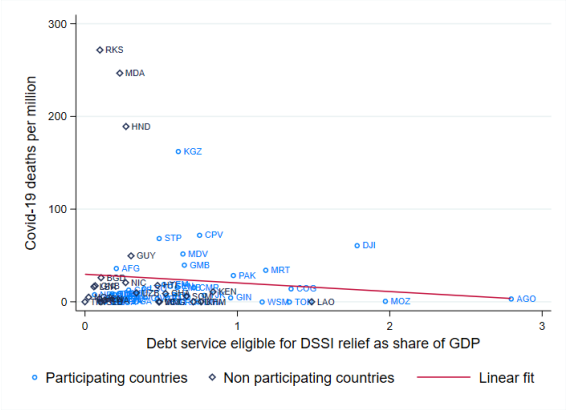
A.3 Appendix Charts

Figure A2: Size of the DSSI relief and the Covid-19 shock

Health shock

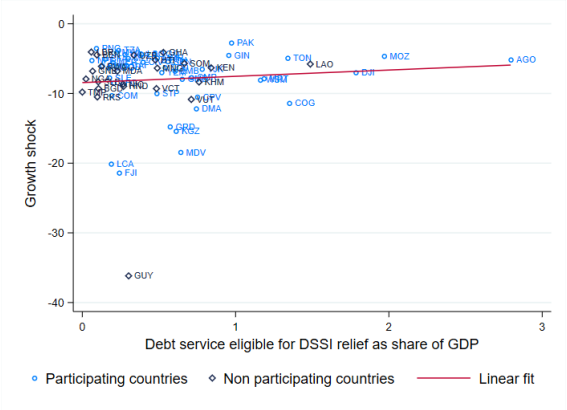


(a) Number of Covid-19 cases

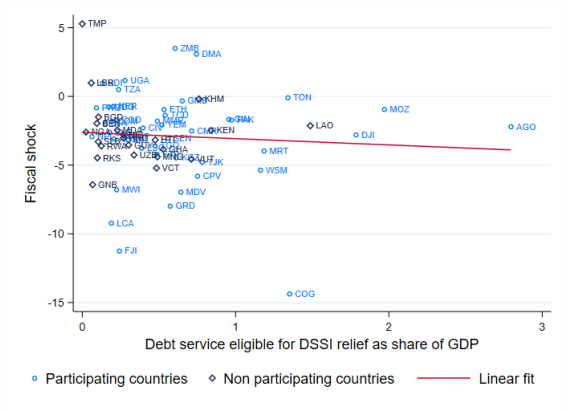


(b) Number of Covid-19 deaths

Economic shock



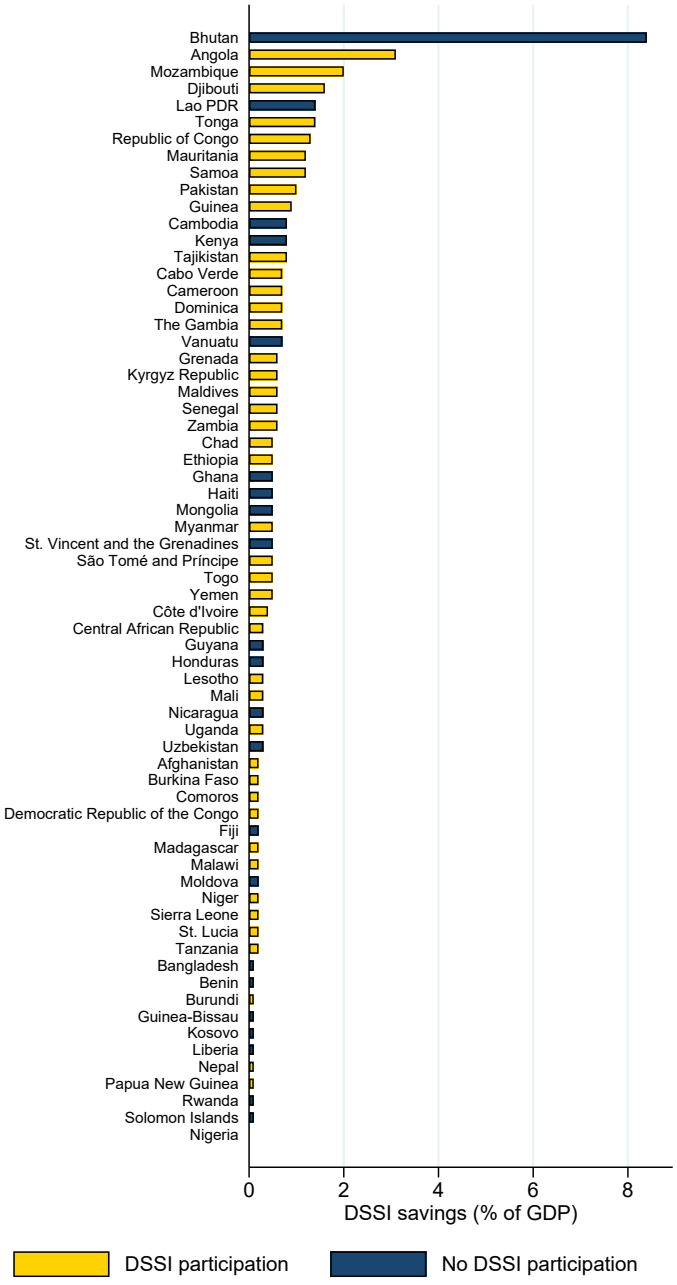
(c) Growth shock



(d) Fiscal shock

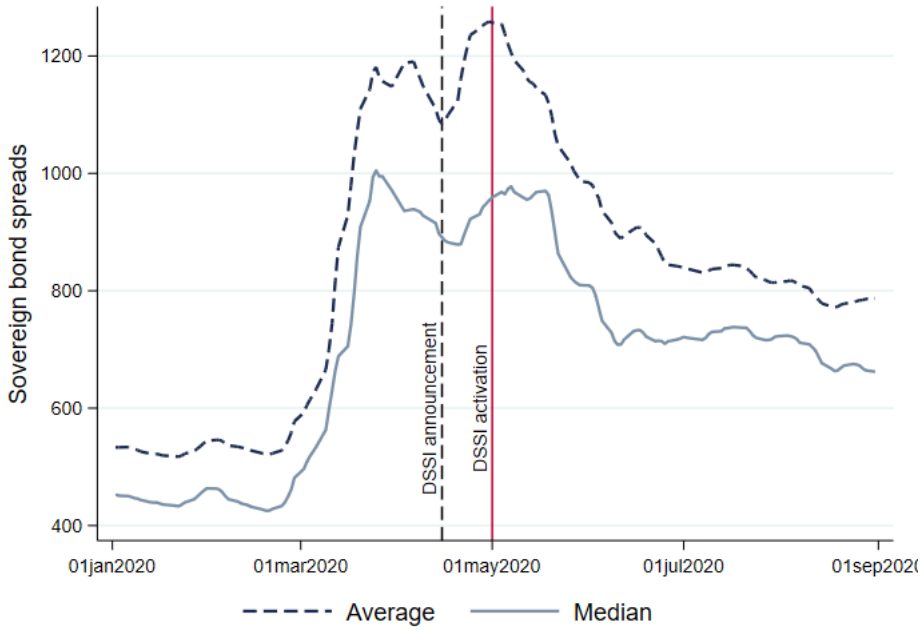
Notes: The figures plot the size of health and economic shocks against the size of the debt service eligible under the DSSI as a share of GDP. Panels (a) and (b) measure the health shock by the number of Covid-19 cases and deaths per million people, respectively. Panels (c) and (d) measure the economic shock by the growth and fiscal shocks, respectively. We calculate these shocks considering real GDP growth and the fiscal balance (as a share of GDP) in 2020 and taking the difference between the projections in the June 2020 release of the IMF World Economic Outlook and the latest pre-pandemic projections released in October 2019. The red solid lines visualize linear fits. Data sources: International Debt Statistics (The World Bank), Our World in Data, and IMF World Economic Outlook.

Figure A3: Participation in the DSSI and potential savings



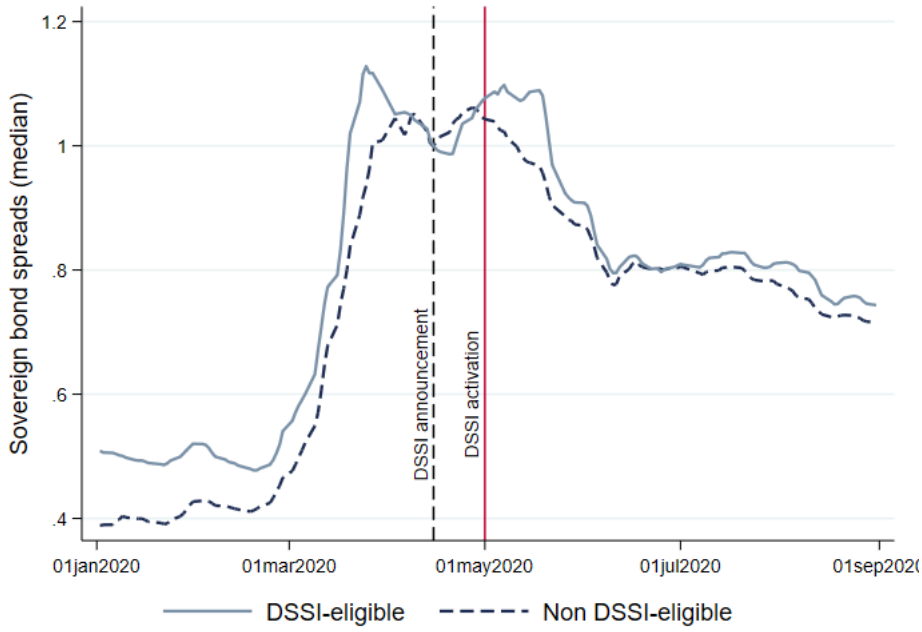
Source: The World Bank. DSSI participation is as of September 17, 2020.

Figure A4: Sovereign bond spreads in DSSI-eligible countries



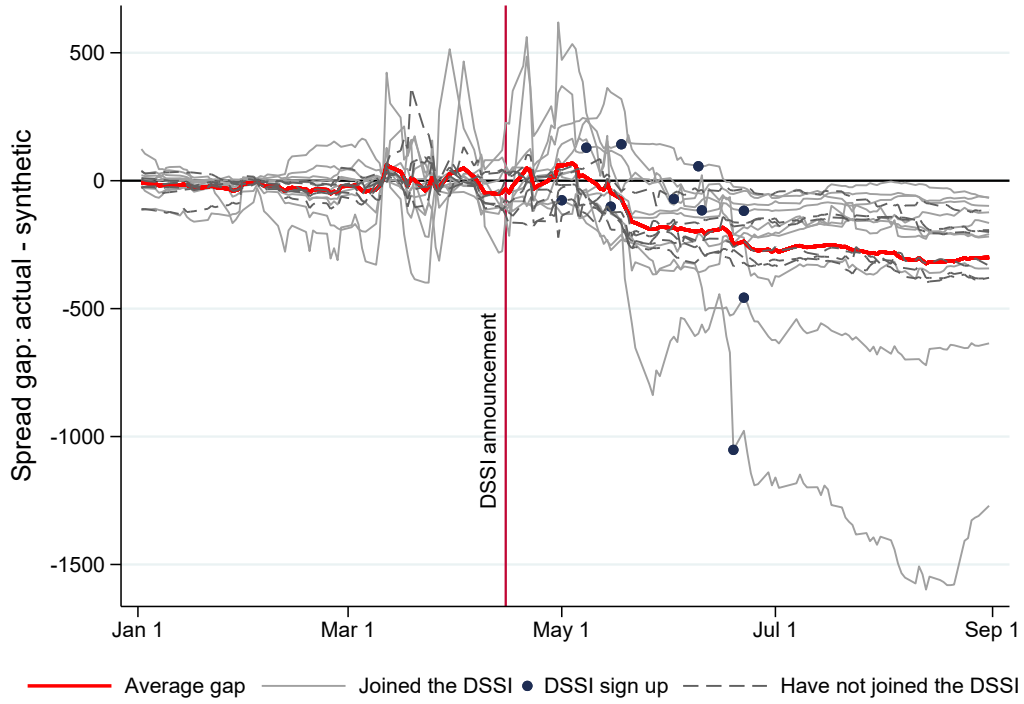
Notes: The figure plots the average and median sovereign bond spreads for countries eligible for the DSSI. Country-level sovereign bond spreads are 7-day moving averages. Data source: Bloomberg.

Figure A5: Sovereign bond spreads around the DSSI activation: eligible vs non-eligible countries



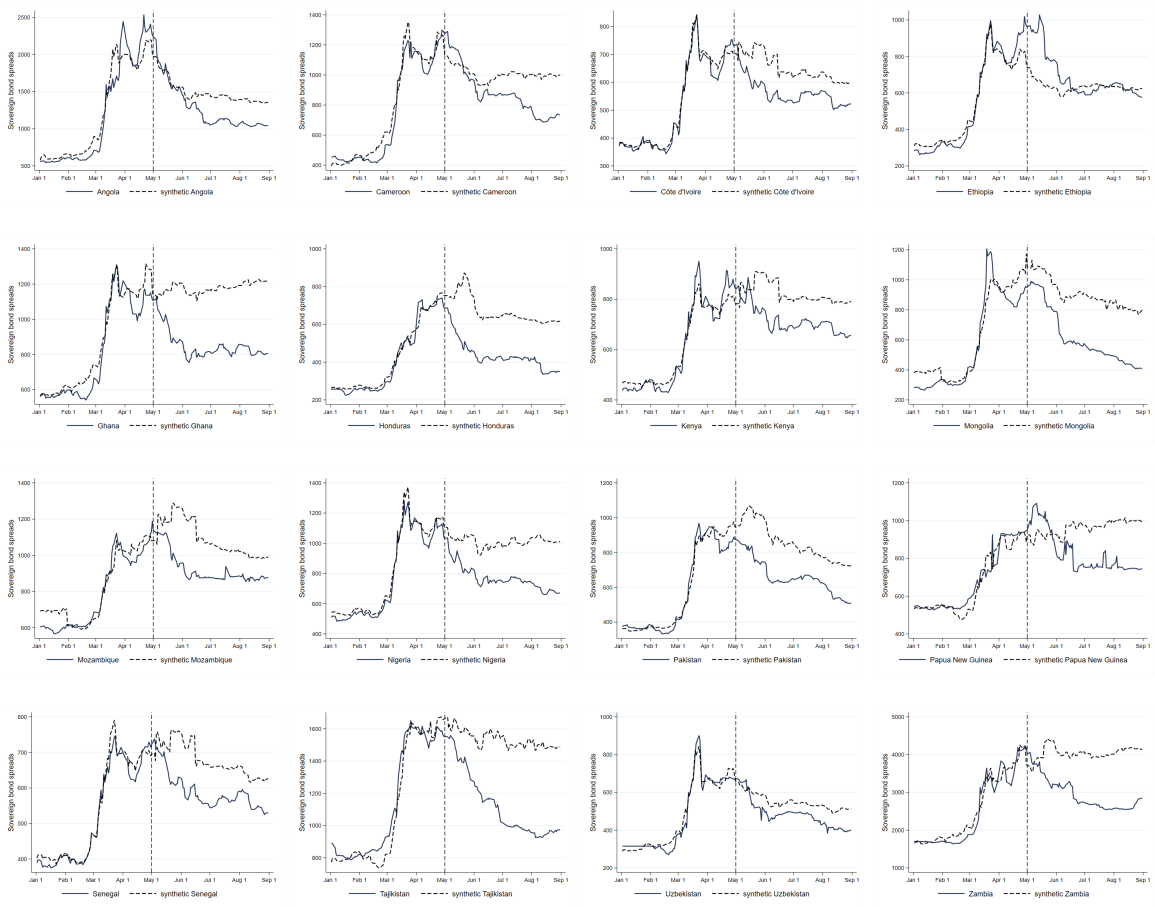
Notes: The figure plots the median sovereign bond spreads for DSSI-eligible and ineligible countries. Country-level sovereign bond spreads are 7-day moving averages. Data source: Bloomberg.

Figure A6: DSSI announcement as treatment



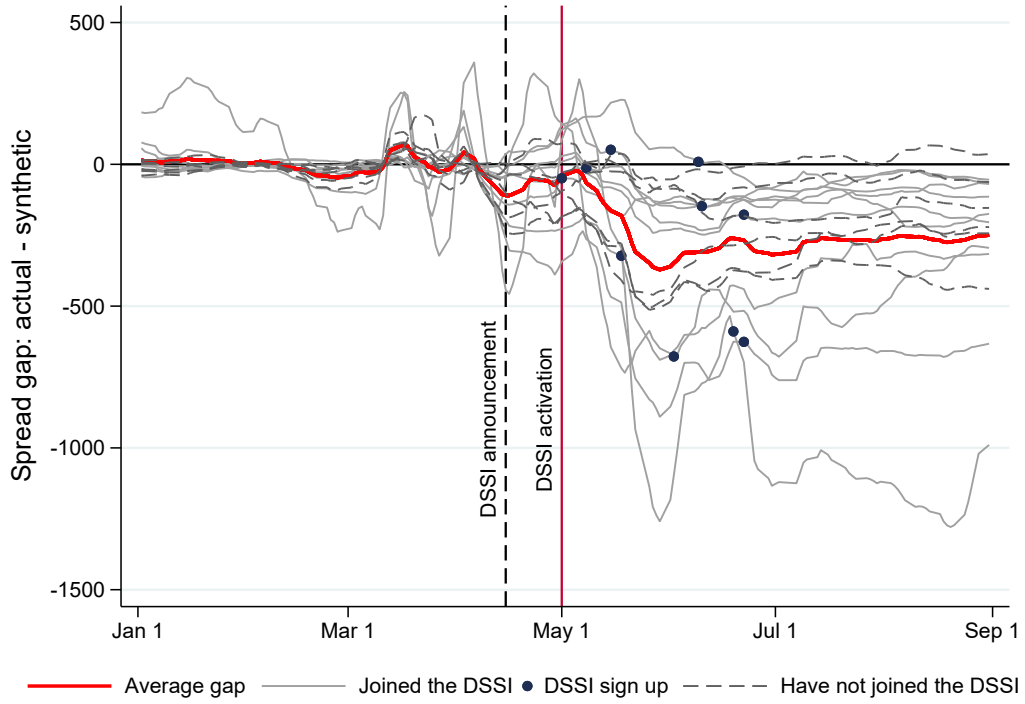
Notes: The chart plots, for all DSSI-eligible countries, the difference between the actual sovereign bond spreads and those of the respective synthetic control (*spread gap*). The treatment in this specification is the DSSI announcement on April 15, 2020 and is indicated by the vertical line. As above, the red solid line is the average of the country-specific spread gaps. The gray solid lines refer to countries that joined the DSSI in the observation period, while the gray dashed lines refer to eligible countries that did not formally join the initiative (Ghana, Honduras, Kenya, Mongolia, Nigeria, and Uzbekistan). The blue dots indicate the date of the country-specific participation in the DSSI. See the description in the main text. Country-level sovereign bond spreads are 7-day moving averages. Data sources: Bloomberg, Our World in Data, and IMF World Economic Outlook.

Figure A7: Synthetic control method for DSSI-eligible countries



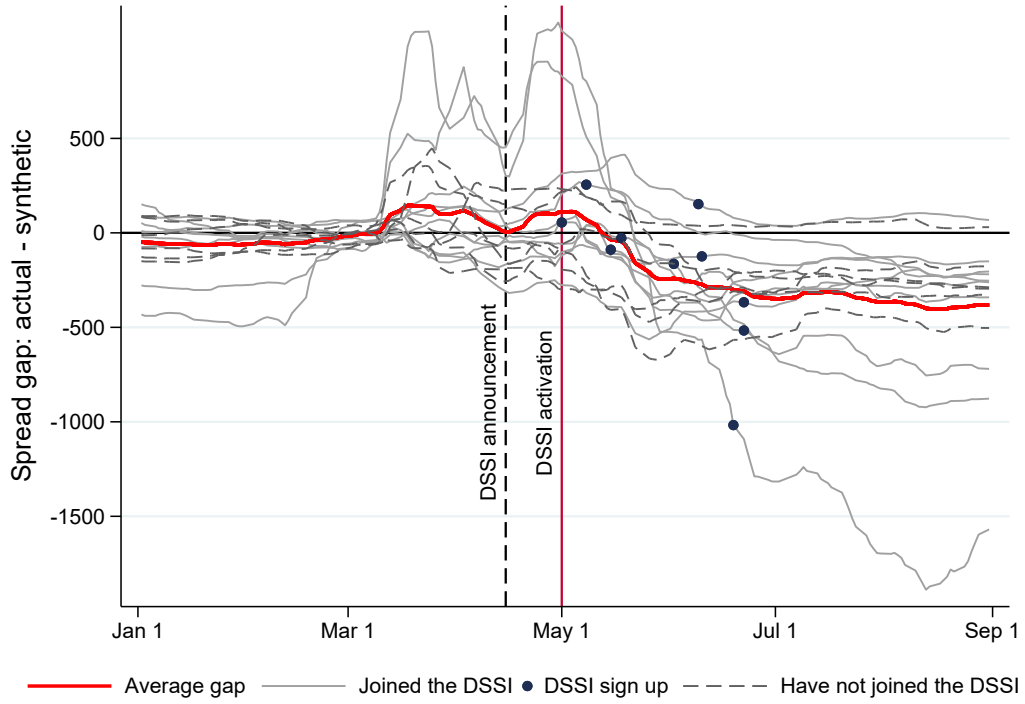
Notes: The charts plots—for each DSSI-eligible country individually—the difference between the actual sovereign bond spreads and those of the respective synthetic control (*spread gap*). The treatment is the DSSI activation on May 1, 2020 and is indicated by the vertical line. See description in the main text. Ghana, Honduras, Kenya, Mongolia, Nigeria and Uzbekistan did not formally request to join the initiative in the observation period. Data source: Bloomberg, Our World in Data and IMF World Economic Outlook.

Figure A8: Sovereign bond spreads in DSSI-eligible countries vs. their synthetic controls, dropping Argentina, Barbados and Venezuela



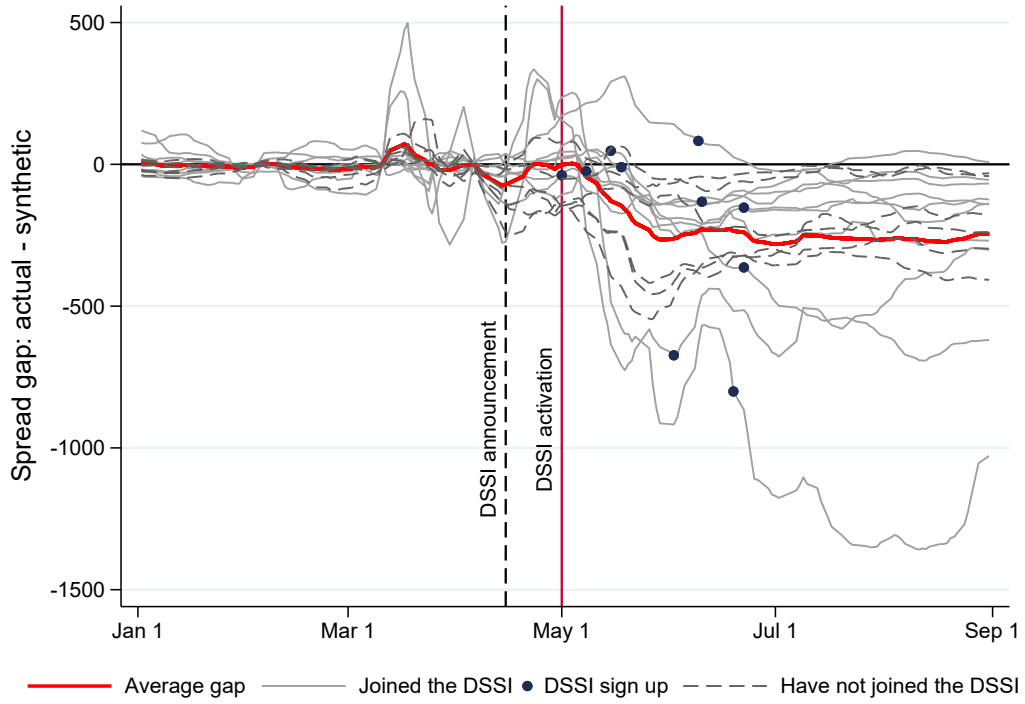
Notes: The chart plots, for all DSSI-eligible countries, the difference between the actual sovereign bond spreads and those of the respective synthetic control (*spread gap*). In this specification, the donor pool excludes Argentina, Barbados and Venezuela. As above, the red solid line is the average of the country-specific spread gaps. The gray solid lines refer to countries that joined the DSSI in the observation period, while the gray dashed lines refer to eligible countries that did not formally join the initiative (Ghana, Honduras, Kenya, Mongolia, Nigeria, and Uzbekistan). The vertical lines indicate the DSSI announcement on April 15, 2020 (dashed line) and the activation on May 1, 2020 (solid line). The blue dots indicate the date of the country-specific participation in the DSSI. See the description in the main text. Country-level sovereign bond spreads are 7-day moving averages. Source: Bloomberg, Our World in Data and IMF World Economic Outlook.

Figure A9: Sovereign bond spreads in DSSI-eligible countries vs. their synthetic controls, matching on average pre-DSSI spreads



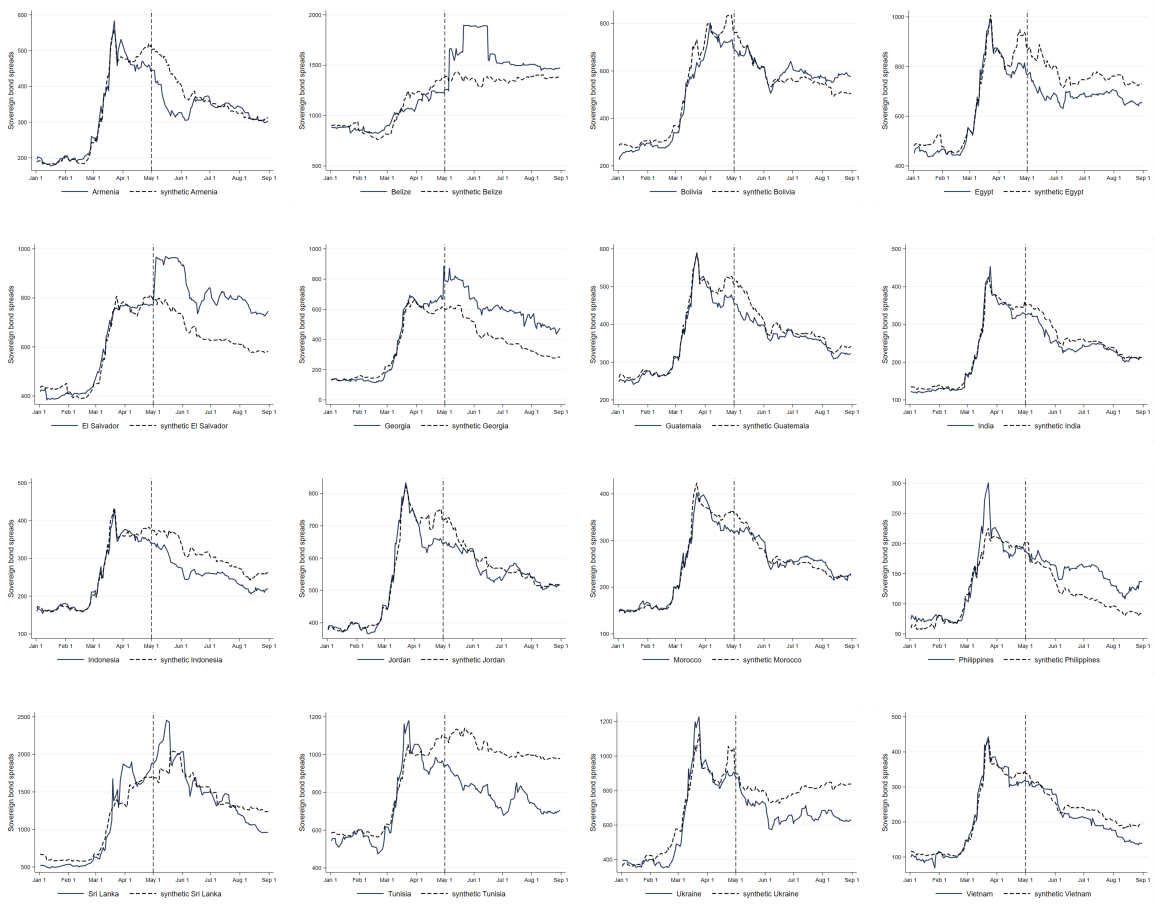
Notes: The chart plots, for all DSSI-eligible countries, the difference between the actual sovereign bond spreads and those of the respective synthetic control (*spread gap*). This specification matches on average pre-DSSI spreads. As above, the red solid line is the average of the country-specific spread gaps. The gray solid lines refer to countries that joined the DSSI in the observation period, while the gray dashed lines refer to eligible countries that did not formally join the initiative (Ghana, Honduras, Kenya, Mongolia, Nigeria, and Uzbekistan). The vertical lines indicate the DSSI announcement on April 15, 2020 (dashed line) and the activation on May 1, 2020 (solid line). The blue dots indicate the date of the country-specific participation in the DSSI. See the description in the main text. Country-level sovereign bond spreads are 7-day moving averages. Source: Bloomberg, Our World in Data and IMF World Economic Outlook.

Figure A10: Sovereign bond spreads in DSSI-eligible countries vs their synthetic controls, controlling for sovereign credit rating



Notes: The chart plots, for all DSSI-eligible countries, the difference between the actual sovereign bond spreads and those of the respective synthetic control (*spread gap*). This specification controls for sovereign credit ratings. As above, the red solid line is the average of the country-specific spread gaps. The gray solid lines refer to countries that joined the DSSI in the observation period, while the gray dashed lines refer to eligible countries that did not formally join the initiative (Ghana, Honduras, Kenya, Mongolia, Nigeria, and Uzbekistan). The vertical lines indicate the DSSI announcement on April 15, 2020 (dashed line) and the activation on May 1, 2020 (solid line). The blue dots indicate the date of the country-specific participation in the DSSI. See the description in the main text. Country-level sovereign bond spreads are 7-day moving averages. Source: Bloomberg, Our World in Data and IMF World Economic Outlook.

Figure A11: Synthetic control method for non DSSI-eligible countries



Notes: The charts plot, for the 16 poorest ineligible countries, the actual sovereign bond spreads (solid line) and those of the respective synthetic control (dashed line). The vertical line indicates the DSSI activation on May 1, 2020. See description in the main text. Data source: Bloomberg, Our World in Data and IMF World Economic Outlook.

A.4 Appendix Tables

Table A1: Sample and sovereign bond data

	With spreads		Without spreads		Difference	t-test
	Mean	St.Dev.	Mean	St.Dev.		
Debt service eligible for suspension (% GDP), 2020 (WB)	0.8	0.8	0.6	1.2	-0.1	(-0.51)
Participation in DSSI (% eligible) as of Sep 1, 2020 (WB)	62.5	50.0	57.9	49.8	-4.6	(-0.33)
Covid-19 cases per million people as of Sep 1, 2020 (OWD)	978.7	1452.2	1375.3	2772.5	396.6	(0.73)
Covid-19 deaths per million people as of Sep 1, 2020 (OWD)	20.2	45.7	22.2	43.7	2.0	(0.15)
GDP per capita in current USD, 2019 (IMF WEO)	1938.4	938.6	2692.5	3134.5	754.1	(1.54)
Real GDP growth, 2020 (IMF WEO)	-1.2	2.7	-2.4	8.6	-1.3	(-0.94)
Budget balance (% GDP), 2020 (IMF WEO)	-5.9	2.9	-6.3	2.9	-0.4	(-0.25)
2020 Real GDP growth revision, Summer 2020 vs Fall 2019 forecast (IMF WEO)	-4.5	1.1	-6.2	4.4	-1.7*	(-2.61)
2020 Budget balance revision (% GDP), Summer 2020 vs Fall 2019 forecast (IMF WEO)	-2.4	1.7	-2.7	3.4	-0.4	(-0.61)
Domestic credit to the private sector (% GDP), 2019 (WB)	23.8	15.0	30.4	25.4	6.6	(1.24)
Total public external debt (% GDP), 2019 (WB)	34.3	16.5	35.4	33.3	1.0	(0.17)
External public debt owed to bilateral creditors (% GDP), 2019 (WB)	11.6	7.6	15.7	23.1	4.1	(1.10)
External public debt owed to private creditors (% GDP), 2019 (WB)	11.0	8.2	2.9	5.2	-8.1**	(-3.73)

Notes: The table shows the means and standard deviations of a set of economic and macroeconomic variables for the samples of DSSI-eligible countries with and without available data on sovereign bond spreads. DSSI-eligible countries are listed in Table A2. Column 5 shows the difference in means between the two samples and the last column reports the results of a t-test that examines the difference in means between the two samples. *** p<0.01, ** p<0.05, * p<0.1

Table A2: Sample and sovereign bond data

Country	Spread index	DSSI
Angola	JP Morgan EMBIG Angola Sovereign Spread	1
Argentina	JPMorgan EMBI Plus Argentina Sovereign Spread	0
Armenia	J.P. Morgan - EMBIG Armenia Sovereign Spread	0
Aruba	J.P. Morgan CACI - Aruba Sovereign Spread	0
Bahamas, The	J.P. Morgan CACI - Bahamas Sovereign Spread	0
Bahrain	J.P. Morgan MECI Bahrain Sover	0
Barbados	J.P. Morgan CACI - Barbados Sovereign Spread	0
Belarus	J.P. Morgan EMBIG Belarus Sovereign Spread	0
Belize	JPMorgan EMBIG Belize Sovereign Spread	0
Bolivia	J.P. Morgan - EMBIG Diversified Bolivia Sovereign Spread	0
Brazil	JPMorgan EMBIG Brazil Sovereign Spread	0
Cameroon	J.P. Morgan EMBI Global Cameroon Sovereign Spread	1
Chile	JPMorgan EMBIG Chile Sovereign Spread	0
China	JPMorgan EMBIG China Sovereign Spread	0
Colombia	JPMorgan EMBIG Colombia Sovereign Spread	0
Costa Rica	J.P. Morgan CACI - Costa Rica Sovereign Spread	0
Côte d'Ivoire	J.P. Morgan - EMBIG Ivory Coast Spread to Worst	1
Croatia	J.P. Morgan EMBIG Croatia Sovereign Spread	0
Dominican Republic	J.P. Morgan EMBIG Dominican Republic Sovereign Spread	0
Ecuador	JPMorgan EMBIG Ecuador Sovereign Spread	0
Egypt	JPMorgan EMBIG Egypt Sovereign Spread	0
El Salvador	JPMorgan EMBIG El Salvador Sovereign Spread	0
Ethiopia	J.P. Morgan EMBI Global Ethiopia Sovereign Spread	1
Gabon	JPMorgan EMBIG Gabon Sovereign Spread	0
Georgia	JPMorgan EMBI Global Georgia Sovereign Spread	0
Ghana	J.P. Morgan EMBIG Ghana Sovereign Spread	1
Guatemala	J.P. Morgan CACI - Guatemala Sovereign Spread	0
Honduras	J.P. Morgan - EMBIG Honduras Sovereign Spread	1
Hungary	J.P. Morgan EMBIG Hungary Sovereign Spread	0
India	J.P. Morgan - EMBIG India Sovereign Spread	0
Indonesia	J.P. Morgan EMBIG Sovereign Spread Indonesia	0
Iraq	JPMorgan EMBIG Iraq Sovereign Spread	0
Jamaica	J.P. Morgan CACI - Jamaica Sovereign Spread	0
Jordan	J.P. Morgan MECI Jordan Sovereign Spread	0
Kazakhstan	J.P. Morgan EMBIG Kazakhstan Sovereign Spread	0
Kenya	J.P. Morgan EMBI Global Kenya Sovereign Spread	1
Lebanon	J.P. Morgan EMBIG Lebanon Sovereign Spread	0
Malaysia	J.P. Morgan EMBIG Malaysia Sovereign Spread	0
Mexico	JPMorgan EMBIG Mexico Sovereign Spread	0
Mongolia	J.P. Morgan - EMBIG Mongolia Sovereign Spread	1
Morocco	J.P. Morgan EMBIG Morocco Sovereign Spread	0
Mozambique	J.P. Morgan - EMBIG Mozambique Sovereign Spread	1
Namibia	J.P. Morgan EMBIG Namibia Sovereign Spread	0
Nigeria	J.P. Morgan EMBIG Nigeria Sovereign Spread	1
Pakistan	JPMorgan EMBIG Pakistan Sovereign Spread	1
Panama	JPMorgan EMBIG Panama Sovereign Spread	0
Papua New Guinea	JP Morgan EMBIG PapuaNewGuinea Sovereign Spread	1
Paraguay	J.P. Morgan - EMBIG Paraguay Sovereign Spread	0
Peru	J.P. Morgan EMBIG Peru Sovereign Spread	0
Philippines	JPMorgan EMBIG Philippines Sovereign Spread	0
Poland	JPMorgan EMBIG Poland Sovereign Spread	0
Romania	J.P. Morgan - EMBIG Romania Sovereign Spread	0
Russia	J.P. Morgan EMBIG Russia Sovereign Spread	0
Senegal	J.P. Morgan EMBIG Senegal Sovereign Spread	1
Serbia	J.P. Morgan EMBIG Sovereign Spread Serbia	0
South Africa	J.P. Morgan EMBIG South Africa Sovereign Spread	0
Sri Lanka	J.P. Morgan EMBIG Sri Lanka Sovereign Spread	0
Suriname	J.P. Morgan EMBIG Suriname Sovereign Spread	0
Tajikistan	JPMorgan EMBIG Tajikistan Sovereign Spread	1
Trinidad and Tobago	JPMorgan EMBIG Trinidad and Tobago Sovereign Spread	0
Tunisia	J.P. Morgan EMBIG Tunisia Sovereign Spread	0
Turkey	J.P. Morgan EMBIG Turkey Sovereign Spread	0
Ukraine	J.P. Morgan EMBIG Ukraine Sovereign Spread	0
Uruguay	JPMorgan EMBIG Uruguay Sovereign Spread	0
Uzbekistan	CEMBI Broad Div. Uzbekistan Sovereign Spread	1
Venezuela	J.P. Morgan EMBIG Venezuela Sovereign Spread	0
Vietnam	J.P. Morgan EMBIG Vietnam Sovereign Spread	0
Zambia	J.P. Morgan - EMBIG Zambia Sovereign Spread	1

Notes: The table lists all countries in the sample. It specifices the spread index used in the analysis in column 2 and indicates countries that are eligible for the DSSI in the last column.

Table A3: Synthetic controls

Country	Composition of the Synthetic control	RMSPE	Fit Index
Angola	Sri Lanka (79.10%), Bahamas (12.40%), Lebanon (4.50%), Ecuador (4.00%)	123.26	0.0271
Cameroon	Georgia (50.40%), Indonesia (11.40%), Iraq (10.50%), Paraguay (9.90%), Guatemala (8.40%), Lebanon (4.10%), Kazakhstan (3.00%), Ecuador (1.70%), Venezuela (0.70%)	40.68	0.0386
Cote d'Ivoire	Kazakhstan (33.10%), Guatemala (29.90%), Belize (18.40%), Ukraine (12.40%), China (3.70%), Russia (1.60%), Lebanon (1.00%)	20.46	0.0836
Ethiopia	Armenia (23.50%), Egypt (22.30%), Georgia (18.20%), Indonesia (14.90%), Philippines (10.90%), Gabon (7.10%), Lebanon (3.00%)	32.06	0.0474
Ghana	China (52.10%), Suriname (16.80%), Egypt (15.70%), Argentina (7.30%), Ecuador (4.00%), Georgia (2.20%), Lebanon (1.90%)	107.75	0.1526
Honduras	Bahamas (59.80%), Poland (22.90%), Sri Lanka (16.60%), Gabon (0.60%)	36.72	0.1044
Kenya	Egypt (40.60%), China (26.50%), Belize (15.10%), Kazakhstan (13.70%), Argentina (3.90%), Lebanon (0.20%)	30.19	0.1008
Mongolia	Georgia (57.90%), Jamaica (20.60%), Kazakhstan (16.10%), Ecuador (4.90%), Argentina (0.40%)	72.68	0.0814
Mozambique	Belize (31.60%), Armenia (26.20%), Kazakhstan (20.70%), Barbados (17.50%), Lebanon (4.00%)	31.13	0.0830
Nigeria	Indonesia (37.80%), Paraguay (32.30%), Turkey (9.80%), Lebanon (6.90%), Guatemala (5.50%), Belize (3.80%), Suriname (2.90%), Venezuela (0.50%), Bolivia (0.50%)	57.08	0.0738
Pakistan	India (46.10%), Sri Lanka (23.50%), Tunisia (20.00%), Bahrain (7.10%), Argentina (1.60%), Suriname (1.60%), Lebanon (0.10%)	26.77	0.0486
Papua New Guinea	Russia (34.50%), Bahamas (31.80%), China (13.40%), Belize (9.60%), Turkey (7.70%), Lebanon (1.50%), Venezuela (1.40%)	28.01	0.1093
Senegal	Belize (28.10%), Kazakhstan (25.70%), Poland (23.00%), Egypt (17.80%), Armenia (4.60%), Lebanon (0.80%)	17.36	0.0973
Tajikistan	Kazakhstan (40.30%), Vietnam (33.60%), Lebanon (8.40%), Indonesia (7.40%), Iraq (5.50%), Venezuela (2.50%), Armenia (2.40%)	54.84	0.0482
Uzbekistan	Kazakhstan (70.10%), Georgia (20.90%), Argentina (7.10%), Barbados (1.90%)	21.65	0.0639
Zambia	Sri Lanka (78.20%), Lebanon (15.60%), Venezuela (5.10%), Turkey (1.10%)	161.01	0.0195

Notes: The table lists, for each DSSI-eligible country, the composition of its synthetic control. The last two columns report the *root mean squared prediction error (RMSPE)* of the outcome variable in the pre-DSSI period and the *Fit Index*, i.e., the ratio between the *RMSPE* and the variance of the outcome variable in the pre-DSSI period. The synthetic control estimates refer to those plotted in Figures 1 and A7.