Strategic Enforcement of Fiscal Rules under Sovereign Risk*

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Abstract

Motivated by an unprecedented deviation from fiscal rules observed during the COVID-19 pandemic, we develop a sovereign debt model with strategic enforcement of fiscal rules. Empirically, we document that the presence of fiscal rules is statistically significantly associated with lower sovereign spreads during the COVID-19 crisis. This correlation persists even when nations deviate from the rule, suggesting that financial markets do not penalize deviations from the rule during global crises due to an expectation of post-crisis compliance. To test our hypothesis, we enhance a sovereign debt model with the possibility of deviating from the fiscal rule by imposing an exogenous cost of deviation. We show that, if there is no deviation cost during a global crisis, the model can rationalize quantitatively the sovereign spread compressing effect of fiscal rules. Overall, the findings suggest that fiscal rules can help emerging markets and developing economies signal fiscal responsibility during episodes of global financial stress, reducing borrowing costs relative to countries without fiscal rules.

JEL classification: F34, F41

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1 Introduction

Sovereign spreads rose rapidly in emerging markets and developing economies (EMDEs) at the onset of the COVID-19 pandemic, shrinking their fiscal space. We empirically investigate whether the existence of a fiscal rule was associated with lower sovereign spreads in EMDEs during the COVID-19 pandemic shock.[1] In theory, the relation between the existence of a fiscal rule and sovereign spreads during economic downturns is ambiguous. On the one hand, fiscal rules could signal fiscal responsibility and serve as a commitment device to reassure confidence in financial markets, lowering spreads. On the other hand, fiscal rules might exacerbate the negative shock by constraining the government's ability to conduct countercyclical fiscal policy, raising spreads further.[2]

We first document trends in fiscal rule adoption prior to and throughout the pandemic using the IMF Fiscal Rule Dataset (IMF, 2022). Then, we empirically investigate whether fiscal rules are associated with lower spreads and whether this relationship is held through the pandemic. We further distinguish between rules that were continually enforced throughout the pandemic, rules that were temporarily abandoned due to escape clause usage, and rules that were suspended due to discretionary fiscal policy. We rely on daily data for sovereign spreads from the J.P. Morgan Emerging Markets Bond Index Global (EMBI Global). Our sample includes 58 EMDEs and spans the period between January 2019 through the first five months of 2022.[3] Our tests include controls such as global, regional, and corporate factors, country-specific proxies of economic activity, and various policy-related variables.

We document three novel findings regarding the relationship between fiscal rules and sovereign spreads. First, we show that countries with a fiscal rule in place faced lower sovereign spreads relative to countries without one before and after the onset of the COVID-19 pandemic.[4] Our estimates suggest that through the pandemic, the presence of fiscal rules is associated with 350 basis points lower sovereign spreads, on average. Second, we illustrate that the difference in sovereign spreads for countries with and without a rule widened in the post-pandemic period (292 basis points prior to the pandemic vs. 398 basis points after the pandemic started), mostly driven by

[1] We consider budget balance rules, debt rules, expenditure rules, and revenue rules in our empirical analysis.

[2] An important strand of the literature has theoretically studied the fiscal rules' tradeoff between commitment and flexibility. See for example, Amador et al. (2006); Halac and Yared (2014); Halac and Yared (2018); and Halac and Yared (2022).

[3] In a robustness test, we investigate the spread-compressing effect of fiscal rules during the global financial crisis (GFC) of 2008-09. The sample covering the GFC timeframe includes 26 countries and uses data covering January 2007 through December 2009.

[4] Additionally, we show that fiscal rules helped compress sovereign spreads during the GFC of 2008-09.

sovereign spreads in countries without rules remaining high even after the global financial stress resided. Third, we find that the estimated effect of fiscal rules on sovereign spreads during the pandemic is virtually identical for rules that were enforced throughout the pandemic, rules for which an escape clause was activated, and for rules that were suspended.

Our results suggest that, during periods of global crises, credit markets interpret the mere existence of a fiscal rule as a signal of the sovereign government's commitment to fiscal responsibility.[5] Even if a country deviates from its rule during a global crisis, the markets expect the sovereign to restore fiscal discipline in the aftermath of the crisis. Our results are robust after controlling for government effectiveness, suggesting that the adoption of fiscal rules creates a degree of market confidence beyond that generated by a government's reputation alone.

We provide suggestive evidence of the mechanism underlying the result that fiscal rules compress spreads even when temporarily abandoned by performing an event study in which we empirically estimate the time it takes to return to compliance following such an abandonment of a budget balance rule. Using a sample including every instance of a sovereign government either suspending, revising upward, or activating an escape clause for a budget balance rule from 2000-2019, we show that following such a rule modification, a government is expected to return to compliance in approximately 3.5 years. This result, in conjunction with the sovereign spread-compressing effect, suggests that during global crises, credit markets internalize that temporary rule abandonments generally do not sacrifice long-term debt sustainability, and therefore do not penalize governments for activating an escape clause or suspending a fiscal rule. Thus, our results provide evidence that sovereigns possessing a reputation of fiscal responsibility faced lower borrowing costs through the pandemic.

Related Literature. This paper mainly contributes to the literature on sovereign spreads, in particular the literature exploring the effect of the COVID-19 shock on sovereign spreads and sovereign debt. Zheng (2023), which is closely related to this paper, uses the global natural experiment created by the COVID-19 shock to identify sovereign borrowing capacity in time of need and its determinants. The study shows that countries with fiscal rules in place were able to borrow more through the pandemic and concludes that following fiscal rules and maintaining fiscal discipline during normal times allows sovereign governments to build the capacity to finance policy responses to fiscal shocks. We view our findings as complementary to Zheng (2023), as we

[5] Our paper complements Halac and Yared (2014), Halac and Yared (2018), and Halac and Yared (2022) by showing empirically that, during the COVID-19 crisis and GFC, fiscal rules help signaling future commitment without sacrificing flexibility in the short run.

highlight the mechanism through which fiscal rules lead to the creation of fiscal space. Specifically, we show that fiscal rules lower borrowing costs for sovereign governments, and that the signal of fiscal responsibility provided to credit markets persists through a crisis period, regardless of the extent to which rules are enforced during the crisis.[6]

Davoodi et al. (2022a) investigate the relationship between fiscal rule compliance and sovereign spreads for a panel of 90 countries during the 1990-2021 period and find that after exceeding a budget balance rule, a country is expected to have higher spreads than countries who adhere to the rule, for around 3-4 years after the initial breach. Our findings, however, suggest that the degree of compliance with fiscal rules through the pandemic did not alter the spread-compressing effect of rules. Whereas Davoodi et al. (2022a) examine the period spanning 1990-2021, our study focuses on the pandemic period. In principle, it is likely that credit markets punish individual countries more during periods of idiosyncratic crisis than during periods of widespread global crisis, and the broader timeframe examined by Davoodi et al. (2022a) largely captures deviations driven by idiosyncratic, country-specific shocks, whereas our timeframe by construction captures a period in which a common, widespread shock affected all countries in our sample.[7]

Arellano et al. (2024) study debt relief programs and make a compelling case for their implementation as a policy option to provide EMDEs with fiscal space during global crises. Havlik et al. (2022) compare the impact of monetary versus fiscal policy announcements on euro area government bond spreads at the onset of the COVID-19 pandemic, finding larger effects for monetary than for fiscal announcements. Other studies that have empirically examined the impact of fiscal rules on spreads include Iara and Wolff (2010) and Kalan et al. (2018). To date, however, the existing literature is mostly limited to studies exploring the effect of fiscal rules across countries within the European Union.[8] Our paper complements this strand of the literature by exploring the signaling effect of fiscal rules on sovereign spreads across a broader group of EMDEs, beyond the European Union, which typically face relatively higher spreads during periods of global financial stress.

[6] Our study also considers a broader set of fiscal rules, as Zheng (2023) only considers national rules that are determined to be credible following a specified set of criteria, and the rules flagged are only up to date as of 2015. Therefore, our study is able to consider rule suspensions or escape clause activations through the pandemic.

[7] Additionally, our sample of countries is limited strictly to EMDEs, whereas Davoodi et al. (2022a) utilizes a broader sample including both advanced economies and EMDEs.

[8] Iara and Wolff (2010) study the impact of national fiscal rules on sovereign spreads within the euro area, finding stronger fiscal rules in member states to have a compressing effect. Kalan et al. (2018) study the impact of non-compliance with fiscal rules on sovereign spreads within the European Union from 1999-2016, finding spreads for countries that have been placed under an Excessive Deficit Procedure (EDP) to be on average 50-150bp higher than spreads for those that have not. Feld et al. (2017) studies the effects of sub-national fiscal rules on the risk premia of sub-national government bonds in Switzerland.

This paper is also related to the literature on rules versus discretion. At the core of these papers is a tradeoff between the benefit of committing the government to not overspend against the benefit of granting it flexibility to react against negative shocks. For example, Amador et al. (2006) study the trade-off between commitment and flexibility in a consumption savings model with taste shocks privately observed by agents. They derive conditions under which minimum-savings policies, reminiscent to fiscal rules, characterize the solution to the principal-agent problem. Halac and Yared (2014), Halac and Yared (2018), and Halac and Yared (2022) study fiscal rules under similar environments. Fiscal rules emerge as an efficient mechanism through which citizens provide incentives to the government to behave according to their best interest. Our paper complements this strand of the literature by showing empirically that, during global crises, fiscal rules can signal future commitment (i.e., fiscal responsibility) without sacrificing flexibility to react against exogeneous shocks.

Our study also ties more broadly into the literature pertaining to the effectiveness of fiscal rules in influencing macro-fiscal outcomes. Azzimonti et al. (2016), for example, theoretically and quantitatively evaluate the impact of a budget balance rule in a political economy model of fiscal policy, showing that the welfare effects depend on the relative benefits of the lower public debt burden compared to the costs of greater tax volatility and less responsive public good provision. Bianchi et al. (2023) study optimal policy response to a recession in the presence of sovereign risk, showing theoretically and quantitatively that in the midst of a recession, a rule that promises lower government spending in the future can help reduce current spreads and make stimulus more desirable. Hatchondo et al. (2022) introduce fiscal rules into a sovereign default model featuring long-term debt, showing that welfare gains can be achieved from the introduction of debt-brake and spread-brake rules, and that a common spread brake generates larger welfare gains for a union of heterogeneous countries. More recently, Esquivel and Samano (2023) show theoretically and quantitatively in a sovereign debt model with capital accumulation that a debt limit rule could increase investment due to lower sovereign risk, generating an economic expansion in the long run and relatively larger welfare gains.

Outline. The remainder of the paper is structured as follows: Section 2 details trends in fiscal rule adoption, and outlines the data employed in our empirical analysis as well as our empirical methodology. Section 3 presents our empirical results and discusses the policy implications that follow. Section 4 presents the model; Section 5 describes the recursive formulation and the

equilibrium concept; Sections 6 and 7 present the quantitative analysis, and Section 8 concludes.[9]

2 Data and Summary Statistics

2.1 Data

Fiscal rules, suspensions, and escape clause usage are flagged using the IMF Fiscal Rule Dataset (IMF 2022), which contains information on the use and design of national and supranational fiscal rules from 1985 to 2021.[10] We employ daily data of emerging market sovereign spreads over Treasuries on U.S. dollar-denominated debt for 58 countries included in the J.P. Morgan Emerging Markets Bond Index Global (EMBI Global) for the period January 2, 2019 through May 27, 2022.[11]

Global, regional, and corporate factors are used as controls in our baseline empirical analysis that analysis the association between fiscal rules and sovereign spreads. The global factor is the EMBI Global index. To construct the regional factor, we adopt an approach similar to that used by Daehler et al. (2021). First, countries are grouped into geographic buckets according to the seven regional classifications defined by the World Bank's World Development Indicators database. The corporate factor is captured by the J.P Morgan CEMBI IG+ index.

Other country-specific economic indicators used as controls in the empirical analysis include the total external debt stock, primary balance (% of GDP), GDP per capita growth, and annual changes in consumer prices, all lagged by one year. Data for the external debt stock and primary balance is sourced from the Spring 2022 vintage of the Cross-country Database of Fiscal Space created by Kose et al. (2022). GDP per capita growth is sourced from the IMF WEO database, and annual inflation data comes from the IMF as well.

Our policy-related variables are included to control for the influence of monetary policy decisions and pandemic-induced lockdowns and restrictions. These controls include dummy variables indicating dates of Federal Reserve (Fed) and European Central Bank (ECB) announcements through the pandemic timeframe, and daily log changes in the country-specific Oxford COVID-19 Government Response Tracker Stringency Index. The Stringency Index, ranging from 0 to

[9] In the Appendix we report additional figures relating to movements in sovereign spreads through the GFC and COVID-19 pandemic, as well as further robustness checks.

[10] The dataset documents the use of four types of rules: budget balance rules, debt rules, expenditure rules, and revenue rules.

[11] In an extension of our baseline analysis of spreads covering the GFC era, our sample is limited to 26 countries for which data on spreads is available during the sample period spanning January 2, 2007, through December 31, 2009. Table A1 presents our sample of countries included in each of these tests.

100 (with 100 indicating the strictest response), is a composite of nine metrics measuring the stringency of school and workplace closures, stay-at-home requirements, and other government-mandated restrictions. Use of the Stringency Index serves as a control for variation in governments' responses to the pandemic.[12] The Fed and ECB policy dummies follow announcements of interest rate cuts and any other monetary policy-related measures taken to reassure markets through the early stages of the pandemic. A priori, it is ambiguous whether Fed or ECB action would increase or decrease spreads during a crisis period. On one hand, the announcements can ease global risk aversion, lowering spreads and encouraging capital flows into emerging markets. On the other hand, if the Fed or ECB action fails to soothe the global risk aversion, spreads may increase as capital is redirected away from emerging markets (particularly those struggling to contain the pandemic) and into the United States and EU – a flight to safety. Finally, following Bergman and Hutchison (2015), we control for institutional quality using the World Bank Worldwide Governance Indicators (WGI) dataset. Specifically, we employ the percentile rank pertaining to the "government effectiveness" index reported out by the WGI data, ranging from 0 (lowest) to 100 (highest).[13]

2.2 Summary Statistics

2.2.1 Fiscal Rules

In the thirty years preceding the pandemic, fiscal rules, which are numerical limits on budgetary aggregates, had surged in popularity as policies implemented by sovereign governments to achieve fiscal discipline. Fiscal rules commonly take the form of budget balance rules, debt rules, expenditure rules, and revenue rules.[14] Across all income levels, the number of countries with at least one fiscal rule in place has increased from 26 countries in 1997 to 105 countries in 2021.[15] As can be seen in Figure 1a, whereas high-income economies were early adopters of fiscal rules, recent growth in fiscal rule adoption has been dominated by low- and middle-income economies. As recently as 1997, low- and middle-income economies accounted for only 12% of all countries adhering to a fiscal rule, but by 2021 this share had risen to 58%. Among low- and middle-income countries, fiscal rule adoption has been widespread geographically. Regarding the types of rules adopted, budget balance rules and debt rules are by far the most adopted rules (see Figure 1b).

[12] Our methodology using the Oxford COVID-19 Government Response Tracker Stringency Index follows Daehler et al. (2021), who investigated factors influencing credit default swap (CDS) spreads through the COVID-19 pandemic.

[13] This variable captures "perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies".

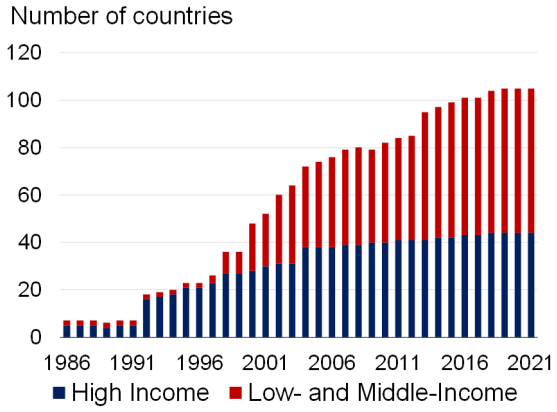
[14] See for example, Davoodi et al. (2022b).

[15] Ibid. While the dataset contains information on fiscal rules for 106 countries, Canada had a fiscal rule from 1998-2005, but did not have any fiscal rule as of 2021.

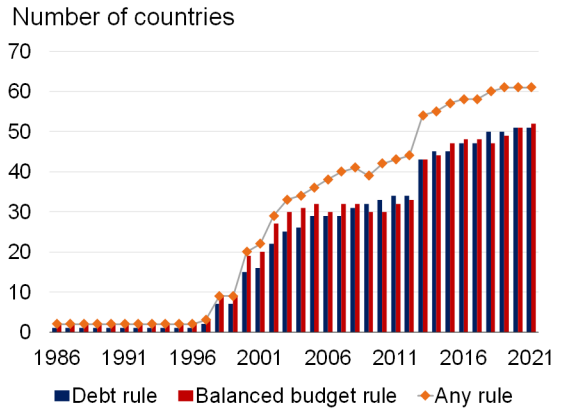
The widespread adoption of fiscal rules by low- and middle-income countries in recent years appears to be associated with better fiscal discipline. Table 1 shows that during the 15 years spanning 2007-2021, the average structural deficit-to-GDP ratio of countries adhering to any type of fiscal rule was 0.63 percentage points lower than the structural deficit of countries without a fiscal rule, and a one-sided t-test for the difference in means shows this difference to be statistically significant at the 5% level. During the years 2020 and 2021 (the COVID-19 pandemic), however, countries with fiscal rules witnessed slightly larger structural deficit-to-GDP ratios (4.59%), on average, than those without (4.35%), suggesting that fiscal rules do not constraint the government's capacity to respond to negative shocks.[16]

Figure 1: Trends in Fiscal Rule Adoption

(a) Adoption of fiscal rules by, income group



(b) Fiscal rules in low- and middle-income countries, by type



Notes: Data is from Davoodi et al. (2022b)

Perhaps the most notable development in fiscal rule usage recently has been the unprecedented spike in escape clause usage and fiscal rule suspension witnessed during the COVID-19 pandemic. In 2020 and 2021, 39% and 36% of low- and middle-income countries with fiscal rules, respectively, either temporarily suspended a rule or used an escape clause.[17] The previous peak occurred in 2010 when suspensions and escape clause usage stood at a 7% rate (Figure 2). With

[16] This finding is consistent with Zheng (2023), which shows that fiscal rules enhance sovereign borrowing capacity.

[17] See Appendix Table A1 for a list of all low- and middle-income countries that either enacted an escape clause or temporarily suspended a fiscal rule during 2020-2021. A potential contributing factor to the increase in escape clause usage and temporary rule suspensions during the pandemic was the development of a "second generation" of fiscal rules in the decade preceding the COVID-19 pandemic. As noted by Eyraud et al. (2018), in the years following GFC 2008-09, a "second-generation" of fiscal rules emerged that sought to construct rules in such a way that allows for an appropriate degree of short-run flexibility when necessary while still promoting long-term fiscal responsibility. In this context, many reforms made post-GFC introduced new escape clauses covering a larger set of contingencies during crisis periods in which unexpectedly large fiscal expansion is necessary while providing guidance on the path back to compliance.

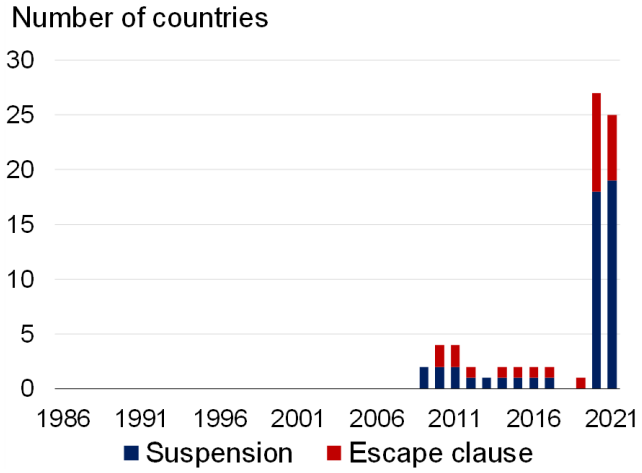
the growing importance and relevance of fiscal rules in the years leading up to the pandemic, such a sudden breakdown in fiscal discipline raises the question of how long it will take for fiscal balances to return to their pre-pandemic trend, thus allowing countries to return to fiscal rule compliance. Our dataset allows us to address this question.

Table 1: Average Structural Deficit 2007-2021 (% GDP)

	Average	Standard deviation
Countries with Fiscal Rule	2.78	1.01
Countries without Fiscal Rule	3.41	0.81

Notes: Data is from Davoodi et al. (2022b) and the April 2022 Vintage World Economic Outlook database. Our sample includes 41 middle and low-income countries. Numbers are reported in percentage points.

Figure 2: Suspensions or Activations of Escape Clause by Year



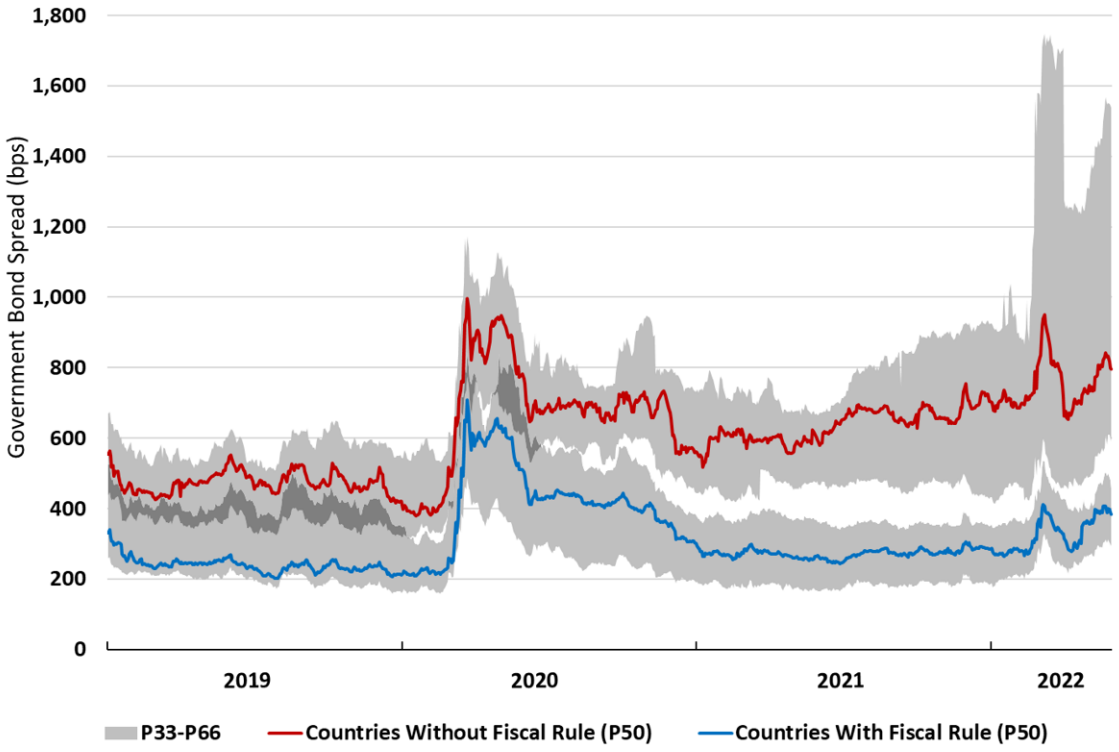
Notes: Data is from Davoodi et al. (2022b). We include all middle and low-income countries with fiscal rules.

2.2.2 Sovereign Spreads

Through the first five months of 2020, the median sovereign spread on US dollar-denominated debt issued by EMDEs increased by over 300 basis points. The trend of rising spreads was geographically widespread, yet some EMDEs managed to navigate through the pandemic with a more subdued increase than others, providing these governments with much-needed fiscal space through a period in which borrowing needs increased drastically. Interestingly, when partitioning our sample of 58 countries included in the J.P. Morgan EMBI Global data into countries with

and without fiscal rules, a clear pattern emerges. As can be seen in Figure 3, countries with fiscal rules tended to have lower spreads compared to countries without fiscal rules both before and after the onset of the pandemic. While the difference in sovereign spreads across countries that adopted fiscal rules versus those that did not is suggestive of a spread-compressing effect of fiscal rules, it is important to acknowledge the issue of endogeneity involved in taking such a stand. Sovereign governments that are inherently more fiscally responsible and hence experience lower borrowing costs could also be more likely to adopt fiscal rules in the first place. Thus, it is not obvious ex-ante whether a sovereign government adopting a fiscal rule should be expected to experience lower spreads relative to a counterfactual in which no rule is adopted.

Figure 3: Sovereign Bond Spreads – By Existence of Fiscal Rule (COVID-19 Timeframe)



Notes: Data is from Davoodi et al. (2022b) and J.P. Morgan Emerging Markets Bond Index Global. Gray areas are intended to show a period around the start of each event and not the duration of each episode. Dashed lines show 25th and 75th percentile country spread. Of our sample of 58 countries, 31 countries have a fiscal rule, and 27 do not.

3 Empirical Analysis

3.1 Framework

Our baseline specification takes the following form:

$$spread_{i,t} = \beta_0 + \beta_1 FiscalRule_{i,t} + \beta_2 EMBI_t + \beta_3 CEMBI_t + \beta_4 Region_{i,t} + \beta_5 Gov_{i,t} + \eta' X_{i,t}^{Econ} + \theta' X_{i,t}^{Policy} + \gamma_t + \nu_i + \epsilon_{i,t} \quad (1)$$

where $spread_{i,t}$ denotes the logged sovereign spread for country i on date t, with January 2, 2019 $\leq t \leq$ March 27, 2022. $FiscalRule_{i,t}$ is a dummy variable indicating whether a fiscal rule exists in country i at time t. The global factor is denoted $EMBI_t$, while $Region_{i,t}$ denotes the regional factor, $CEMBI_t$ is the corporate factor, $Gov_{i,t}$ is the government effectiveness index, $X_{i,t}^{Econ}$ denotes the country-specific vector of covariates relating to macroeconomic activity, and $X_{i,t}^{Policy}$ is the country-specific vector of policy-related covariates. Month and country-fixed effects are included in all tests. $\epsilon_{i,t}$ represents the idiosyncratic error terms.

Further, to test whether the spread-compressing effect of fiscal rules found during the COVID-19 timeframe, if any, also applies to other periods of global crisis, we test a similar specification using daily data of emerging market sovereign spreads for 26 countries during the GFC era. With this sample, we test a variation of the specification presented in Equation (1) above which does not include the global, corporate, or regional factors, nor the vector of policy-related variables, due to data limitations:

$$spread_{i,t} = \beta_0 + \beta_1 FiscalRule_{i,t} + \beta_2 Gov_{i,t} + \eta' X_{i,t}^{Econ} + \gamma_t + \nu_i + \epsilon_{i,t} \quad (2)$$

where January 2, 2007 $\leq t \leq$ December 31, 2009.

3.2 The Sovereign Spread-Compressing Effect of Fiscal Rules

Table 2 shows the results from the specification outlined in Equation (1).[18] Column (1) displays the estimates when the fiscal rule flag, global factor, regional factor, corporate factor, government effectiveness, country-fixed effects, and month-fixed effects are included as regressors. Column (2) includes all the variables mentioned above, in addition to our regressors relating to fiscal space. Column (3) includes the variables in Column (1), in addition to inflation and GDP per capita growth. Column (4) incorporates all the variables included in the first three tests. Col-

[18] The full set of estimates for all covariates are reported in Table A2, in the appendix.

umn (5) includes all these as well as our policy variables. Notably, the existence of a fiscal rule is negatively associated with spreads across all tests, and the relationship is always statistically significant at the 1 percent level, with coefficient estimates ranging from -.775 to -1.029. In other words, the existence of a fiscal rule is associated with 54%-64% lower sovereign spreads. Given that the median spread throughout the entire sample period for countries without a fiscal rule was 590 basis points, our estimates imply that fiscal rules are associated with a 319-378 basis points reduction in spreads. As expected, March 2020 is the month associated with the highest spreads.

We also estimate a negative and statistically significant relationship between government effectiveness and spreads. Turning to the regressors related to fiscal space, GDP growth, external debt, and inflation, the signs of most coefficient estimates are in line with our expectations. Higher inflation and external debt are found to be associated with higher spreads, GDP per capita growth is found to be associated with lower spreads, and these coefficients are estimated with statistical significance at the 5 percent level across all tests. A stronger primary balance is estimated to compress spreads across all tests, although these coefficients are not always estimated with a high degree of statistical significance. Regarding policy-related regressors, we find statistically insignificant announcement effects for both the Fed and ECB policy variables. Likewise, we find statistically insignificant policy stringency effects.

Table 2: Panel Regression Estimates of Fiscal Rule Impact on Sovereign Spreads

	Log Spread				
	(1)	(2)	(3)	(4)	(5)
Fiscal Rule	-1.029***	-0.867***	-0.835***	-0.775***	-0.775***
	(-38.99)	(-34.36)	(-32.24)	(-29.21)	(-29.21)
Global/Regional/Corporate Factors	Yes	Yes	Yes	Yes	Yes
Policy-Related Controls	No	No	No	No	Yes
Total External Debt Stocks	No	Yes	No	Yes	Yes
Primary Balance	No	Yes	No	Yes	Yes
GDP Per Capita Growth	No	No	Yes	Yes	Yes
Inflation	No	No	Yes	Yes	Yes
Government Effectiveness	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	48956	46675	45887	44320	44320
R^2	0.918	0.926	0.911	0.914	0.914

Notes: t-statistics are reported in parenthesis. Statistical significance at 10%, 5% and 1% is reported with *, ** and ***, respectively

Similarly, the results for the GFC era indicate that a statistically significant spread-compressing effect of fiscal rules existed during 2007-2009, albeit one of a smaller magnitude. The coefficient estimates for β_1 range from -.101 to -.195, implying an average spread-reducing effect of 36 to 67 basis points, given that the median spread for countries without a fiscal rule during the sample period is 378 basis points. We again estimate a negative and statistically significant relationship between government effectiveness and spreads, and the coefficient estimates for the variables related to fiscal space, real GDP growth, and inflation are all statistically significant and are estimated with the expected sign.

3.3 The Sovereign Spread-Compressing Effect during Global Crises

Beyond the effect of fiscal rules on sovereign spreads across the entire timeframe captured in our baseline specification, we are also interested in estimating the differential impact of fiscal rules on spreads prior to and throughout the onset of a crisis period. In a second specification, we employ a difference-in-difference regression to achieve this aim. Specifically, we begin by estimating the following specification, applied to the COVID-19 timeframe:

$$\begin{aligned} spread_{i,t} = \beta_0 + \beta_1 FiscalRule_{i,t} + \beta_2 PostCrisis_t + \beta_3 \left(FiscalRule_{it} \times PostCrisis_t\right) \\ + \beta_4 EMBI_t + \beta_5 CEMBI_t + \beta_6 Region_{i,t} + \beta_7 Gov_{i,t} + \eta' X_{i,t}^{Econ} + \theta' X_{i,t}^{Policy} + \gamma_t + \nu_i + \epsilon_{i,t} \end{aligned} \quad (3)$$

where $PostCrisis_t$ equals 1 from March 1, 2020, onward, and equals 0 in the preceding period. Here, β_1 measures the effect of the existence of a fiscal rule on sovereign spreads in the pre-pandemic period, and $\beta_1 + \beta_3$ captures the effect of fiscal rules through the pandemic.

The full set of estimates obtained from our second specification can be found in Table A4 in the appendix, and a compressed version of the estimates can be seen in Table 3. The coefficient estimates for the COVID-19 period, which is found to be highly statistically significant across all tests, imply a 98 to 147 basis point increase in sovereign spreads during the pandemic relative to the pre-pandemic average. The existence of a fiscal rule is again estimated to compress spreads across all tests, with significance at the 1 percent level. As discussed above, the effect of fiscal rules on sovereign spreads prior to the pandemic is estimated by the standalone fiscal rule coefficient – ranging from -.626 to -.745 – which implies an average spread-reducing effect of 274 to 310 basis points for countries with fiscal rule compared to those without. The effect of fiscal rules on sovereign spreads through the pandemic is estimated by the sum of the standalone fiscal rule coefficient and coefficient on the interaction term. This estimate ranges from -0.8 to -0.973, implying an average spread-reducing effect of 373 to 422 basis points through the pandemic. Thus,

while fiscal rules are associated with lower spreads both prior to and through the pandemic, the ex-post spread compression that we estimate through the pandemic is larger in magnitude than the ex-ante compression.

Table 3: Difference-in-Difference Estimates of Fiscal Rule Impact in Post-COVID Period

	Log Spread				
	(1)	(2)	(3)	(4)	(5)
Fiscal Rule	-0.745***	-0.626***	-0.711***	-0.709***	-0.709***
	(-29.01)	(-25.22)	(-28.31)	(-27.26)	(-27.27)
Post COVID	0.337***	0.238***	0.261***	0.253***	0.254***
	(61.88)	(42.20)	(48.16)	(44.68)	(44.72)
Fiscal Rule × Post COVID	-0.228***	-0.174***	-0.176***	-0.174***	-0.174***
	(-42.38)	(-33.32)	(-35.33)	(-34.31)	(-34.30)
Global/Regional/Corporate Factors	Yes	Yes	Yes	Yes	Yes
Policy-Related Controls	No	No	No	No	Yes
Total External Debt Stocks	No	Yes	No	Yes	Yes
Primary Balance	No	Yes	No	Yes	Yes
GDP Per Capita Growth	No	No	Yes	Yes	Yes
Inflation	No	No	Yes	Yes	Yes
Government Effectiveness	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	48956	46675	45887	44320	44320
R^2	0.920	0.926	0.912	0.914	0.914

Notes: t-statistics are reported in parenthesis. Statistical significance at 10%, 5% and 1% is reported with *, ** and ***, respectively

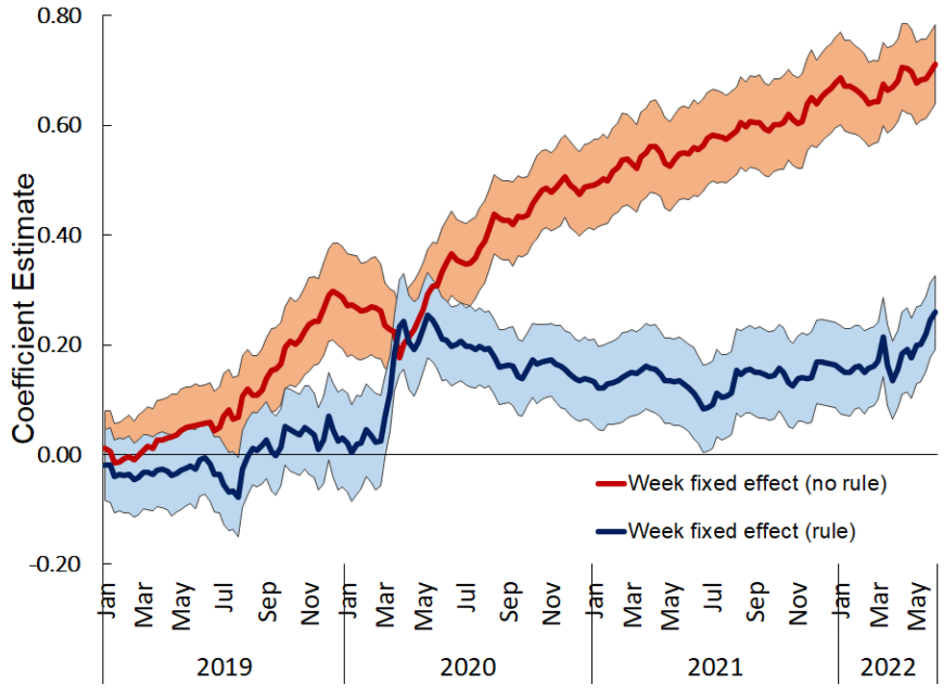
To measure how the impact of fiscal rules on sovereign spreads changed through the pandemic on a more granular level, we employ a third specification in which the time dummies are captured at the weekly level, and the fiscal rule flag is interacted with these weekly dummies:

$$spread_{i,t} = \beta_0 + \beta_1 FiscalRule_{i,t} + \beta_2 \left(FiscalRule_{it} \times \gamma_t\right) + \beta_3 EMBI_t + \beta_4 CEMBI_t + \beta_5 Region_{i,t} + \beta_6 Gov_{i,t} + \eta' X_{i,t}^{Econ} + \theta' X_{i,t}^{Policy} + \gamma_t + \nu_i + \epsilon_{i,t} \quad (4)$$

The results obtained from our estimation of Equation (4) can be visualized in Figure 4. Specifically, the weekly fixed effect estimates are reported alongside the sum of the weekly fixed effect estimate and weekly fixed effect-fiscal rule interaction term. Thus, the difference between the two trends reported in Figure 4 represents the time-varying effect of fiscal rules on sovereign

spreads through the entire sample period. The trends show that a spread-compressing effect is estimated prior to the onset of the pandemic in early 2020, that this effect largely disappears from March-May 2020, and that it reemerges from the end of May 2020 through the remainder of the sampling timeframe. These estimates align with our estimation of Equation (2) shown above, in that the COVID-19 period is associated with rising spreads for countries with and without fiscal rules alike, yet fiscal rules are still found to compress spreads significantly.

Figure 4: Coefficient Estimates for Weekly Fixed Effects and Interaction with Fiscal Rule



Notes: Results are obtained from the estimation of Equation (3), with controls including the global, regional, and corporate factors, measurement of government effectiveness, the existence of a fiscal rule, weekly fixed effects, and country fixed effects. 95% confidence intervals are represented by shaded areas in the graph.

We then test for the differential impact of fiscal rules on sovereign spreads both before and throughout the GFC era, using the same specification as in (3).[19] The results of this test, which can be found in Table A5 in the appendix, imply that the spread-compressing effect of fiscal rules was stronger in the post-GFC period than in the pre-GFC period. In fact, while a negative and statistically significant coefficient estimate is found across all tests for the interaction term between the fiscal rule and post-crisis dummies, the standalone fiscal rule coefficient estimate is only statistically significant in two out of five tests. Therefore, while we do not find strong evidence of a spread-compressing effect of fiscal rules prior to the onset of the GFC, fiscal rules

[19]The post-crisis period for tests applied to the GFC era is defined as starting in March 2008. We exclude the global, regional, and corporate factors, again due to data limitations.

are estimated to compress spreads through the crisis period. Given that the median spread for countries without a fiscal rule was 420 basis points in the post-crisis period, our estimates of the spread-compressing effect of fiscal rules after March 2008 range from 16 to 42 basis points. Our results therefore imply that the spread-compressing effect of fiscal rules during periods of global crises has strengthened since the GFC.[20]

3.4 The Sovereign Spread-Compressing Effect of Fiscal Rule Suspensions and Escape Clause Usage

In our next set of empirical tests, we investigate the effect of fiscal rules on sovereign spreads during the COVID-19 pandemic while distinguishing between rules that are continually enforced throughout a given year, rules that are temporarily abandoned due to escape clause usage, and rules that are temporarily suspended due to discretionary fiscal policy.[21] As mentioned in Section 2, an unprecedented spike in escape clause usage and rule suspensions occurred in 2020 and 2021. Therefore, we investigate whether or not fiscal rules with escape clauses have a larger spread-compressing effect than fiscal rules suspended due to discretionary fiscal policy.

We estimate the differential effect of fiscal rule suspensions and escape clause usage on spreads with the following modification of Equation (1):

$$spread_{i,t} = \beta_0 + \beta_1 FiscalRule^{e}_{i,t} + \beta_2 EscapeClause_{i,t} + \beta_3 Suspension_{it} + \beta_4 EMBI_t + \beta_5 CEMBI_t + \beta_6 Region_{i,t} + \beta_7 Gov_{i,t} + \eta' X^{Econ}_{i,t} + \theta' X^{Policy}_{i,t} + \gamma_t + \nu_i + \epsilon_{i,t} \quad (5)$$

where $FiscalRule^{e}_{i,t}$ takes on a value of 1 if a fiscal rule is enforced continually throughout a given year. In our sample, ten countries suspend a fiscal rule in 2020 and 2021. The number of countries enacting an escape clause are one in 2019, eight in 2020, and five in 2021. Of the countries suspending fiscal rules and using an escape clause in 2020 and 2021, three nations – India, Paraguay, and the Russian Federation – fall under both categories in both years. We exclude Russia due to the fact that it is an outlier nation in 2022, the reasons for which are largely influenced by sociopolitical developments rather than COVID-19-related factors. Additionally, we include India and Paraguay with the group of nations suspending fiscal rules rather than with nations using an escape clause. By doing so, we implicitly assume that from the perspective of credit

[20] One possible explanation for this development is the development of second-generation rules, which as discussed by Eyraud et al. (2018), have improved previously existing fiscal rules along numerous dimensions, including the balance between flexibility and enforceability.

[21] In our baseline specification, we did not distinguish between these three cases, and our estimates of Equations (1) – (4) therefore only captured the effect of fiscal rules on spreads through the COVID-19 pandemic at the broadest level.

markets, the implications of a suspension on long-term debt solvency outweigh the implications of escape clause usage.

The coefficient estimates of the three fiscal rule dummy variables in Equation (5) are shown in Table 4. The full set of estimates is reported in Table A6 in the appendix. Across all tests, the coefficient estimates are virtually identical for the dummy variables flagging escape clause usage and fiscal rules that are continually enforced. Crucially, the coefficient estimates for the dummy variable indicating a rule suspension do not show any evidence of a mitigation of the spread-reducing effect of fiscal rules. In fact, the coefficient estimates for the fiscal rule suspension dummy variable are slightly larger in magnitude than for the other two fiscal rule indicators.[22]

Table 4: Panel Regression Estimates of Escape Clause vs. Suspension Usage on Sovereign Spreads

	Log Spread				
	(1)	(2)	(3)	(4)	(5)
Fiscal Rule - No Suspension or Escape Clause	-1.022***	-0.867***	-0.845***	-0.802***	-0.802***
	(-39.05)	(-34.57)	(-32.91)	(-30.49)	(-30.48)
Escape Clause	-1.021***	-0.886***	-0.841***	-0.822***	-0.822***
	(-36.68)	(-33.26)	(-31.03)	(-29.43)	(-29.42)
Suspension	-1.232***	-1.041***	-1.043***	-1.004***	-1.004***
	(-45.30)	(-39.94)	(-39.12)	(-36.57)	(-36.57)
Global/Regional/Corporate Factors	Yes	Yes	Yes	Yes	Yes
Policy-Related Controls	No	No	No	No	Yes
Total External Debt Stocks	No	Yes	No	Yes	Yes
Primary Balance	No	Yes	No	Yes	Yes
GDP Per Capita Growth	No	No	Yes	Yes	Yes
Inflation	No	No	Yes	Yes	Yes
Government Effectiveness	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	48956	46675	45887	44320	44320
R^2	0.920	0.927	0.913	0.915	0.915

Notes: t-statistics are reported in parenthesis. Statistical significance at 10%, 5% and 1% is reported with *, ** and ***, respectively

Interestingly, we find no evidence suggesting that usage of an escape clause or a fiscal rule

[22]In the Appendix we report out the results of both specifications in this section reversing this assumption, by categorizing India and Paraguay as countries enacting an escape clause, rather than categorizing the two nations as rule suspenders. The results remain largely unchanged under this alternative assumption (Table A7).

suspension weakened the spread reduction associated with a fiscal rule through the pandemic. We believe this finding to be of particular interest given the trade-offs faced by policymakers seeking to balance the competing goals of simplicity, flexibility, and enforceability. While Debrun and Jonung (2019) show that simplicity, flexibility, and enforceability are very difficult to attain simultaneously, our results suggest that complex rules attempting to achieve flexibility through the inclusion of complicated escape clauses covering many contingencies can be greatly simplified given that credit markets do not appear to perceive any difference between suspensions and escape clause usage during global crises.

3.5 Event Study – Path of Debt Following Suspension or Modification of the Budget Balance Rule

The results presented in Section 3.4 indicate that through the pandemic, the spread-compressing effect of fiscal rules was maintained, even for countries that temporarily abandoned their rules. In this section, we provide suggestive evidence of the mechanism driving this result, namely the fact that countries that suspend their fiscal rules or enact an escape clause generally return to rule compliance in a short amount of time. Hence, credit markets do not perceive a material impact on a sovereign's long-term debt solvency if a rule is temporarily abandoned. We show this empirically through an event study analysis in which the deviation of a country's fiscal balance from its prior average is estimated in the years following the relaxation of a budget balance rule.[23]

The IMF Fiscal Rule Dataset (IMF 2022) identifies every instance in which a budget balance rule was either suspended, revised upward, and/or an escape clause was used over the period 2000-2021. Limiting the sample timeframe to 2000-2019, we identify fourteen instances of such events in the dataset, which we refer to as budget balance rule modification events and are reported in the appendix, in Table A8. Following Davoodi et al. (2022a), we measure a country's fiscal balance using the country's specified budget balance target, which can differ across countries. For example, Chile's budget balance rule pertains to its structural balance, whereas Israel's budget balance rule pertains to its overall balance, and Uruguay's rule pertains to its primary balance. Each of these variables are identifiable in the IMF's Fiscal Rules and World Economic Outlook (WEO) datasets. A country's baseline (pre-suspension/revision) fiscal balance is calculated as the three-year average target balance prior to the suspension or revision of a fiscal rule. Our sum-

[23] We focus the event study on budget balance rules, and not debt, revenue, or expenditure rules, due to sample size limitations. For example, while we identify 14 instances in which a budget balance rule was suspended or modified from 2000-2019, only three countries (Hungary, Malaysia, and Panama) suspended or modified a debt rule over this timeframe.

mary statistics (reported in Table A9) show that following a budget balance rule modification event, the median duration for a country to return to its baseline fiscal balance is 3.5 years. The median deviation of a country's fiscal balance from its baseline following a modification is 4.4% of GDP. In the sample analyzed, two countries, Argentina, and Russia, which both suspended their budget balance rules in 2009 as a result of the global financial crisis, never returned to their pre-suspension baseline in the years following the suspensions, and ultimately abolished their rules.[24]

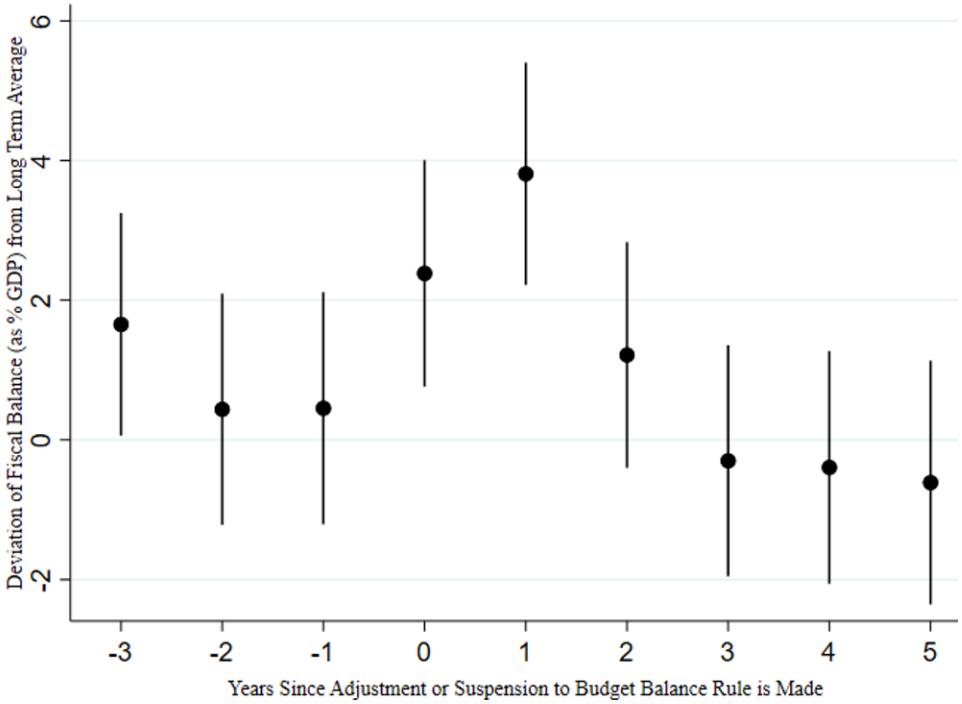
While the sample of countries that have previously suspended, revised, and/or enacted an escape clause for budget balance rules is not large, we employ an event study analysis as an initial step to empirically answer the question of how long a country should be expected to take to return to compliance. After controlling for year and country-fixed effects, our estimates indicate that following a budget balance rule modification, a country is expected to take approximately three years to return to its baseline fiscal balance (Figure 5). This implies that for a country that suspended its budget balance rule in 2020, its target balance would be expected to return to its 2017-2019 average by the year 2023. Further, our estimates find the deterioration of the fiscal balance to reach its peak one year following the initial modification, with the deficit this year estimated to be almost 4% of GDP higher than the three-year average preceding the modification. As mentioned at the beginning of this section, we believe that the short time duration for which it has historically taken for sovereign governments to return to compliance after abandoning fiscal rules is a key driver underlying the results reported in Section 3.4.

3.6 Robustness Tests

To check the robustness of our findings, we conduct a battery of additional exercises. First, we control for the strength of the fiscal rule, rather than our binary measurement which only captures the existence of a rule. To do so, we construct an index of fiscal rule strength following Davoodi et al. (2022a). For any given country with fiscal rules in place, the fiscal rule index is measured by assigning scores within the following four categories: 1) statutory or legal basis of the fiscal rule, 2) monitoring of fiscal rules, 3) enforcement and correction mechanisms, and 4) flexibility and resilience against shocks. Scores are assigned based on rule characteristics as captured in the IMF Fiscal Rule Dataset (IMF 2022). If a country has multiple fiscal rules in place then each rule is scored, weighted according to its score in descending order, then summed to compute the country-level index. Both national and supranational rules are considered, and ultimately the country-level index is standardized such that the lowest possible score is 0, and the

[24] In the case of Argentina, the budget balance rule was suspended between 2009 and 2017, and then abolished thereafter. For Russia, its short-lived budget balance rule (targeting the non-oil balance) became effective in 2008, was suspended in April 2009, and was formally abolished in 2012.

Figure 5: Fiscal Balance following Suspension/Revision of Budget Balance Rule or Escape Clause



Notes: Data is from Davoodi et al. (2022b) and the World Economic Outlook Database (April 2022 Vintage). GLS coefficient estimated (and their 95% confidence intervals) are reported. The dependent variable is equal to the deviation of a country's fiscal balance (as a percentage of GDP) from its three-year average at the time of suspension/adjustment. For example, the coefficient estimate at $t = 0$ implies that in the year in which a rule modification event occurs, a country's deficit is estimated to be approximately 2% of GDP higher than the three-year average preceding the modification. Controls include country and year fixed effects, and the data covers the period 2000-2019.

highest possible score is 1. Conditional on the existence of a fiscal rule, our constructed index has a mean of .362 and standard deviation of .258 during our sample timeframe of 2019-2022. Our fiscal rule strength index allows us to assess the notion that not all rules are created equal, and that the strength of a country's rules may influence the spread-compressing effect afforded by the rules. Indeed, the literature has found rule strength to matter in some contexts, such as their disciplinary effect. For example, Caselli and Reynaud (2020) estimate the causal effect of fiscal rules on fiscal balances using a panel of 142 countries from 1985-2015, finding well-designed rules to have a statistically significant impact on fiscal balances, after correcting for selection bias. Given that rule strength influences the disciplinary effect of fiscal rules, and this disciplinary effect in turn influences a country's degree of fiscal responsibility as perceived by credit markets, it is plausible that the strength of rules may influence their ability to compress spreads as well.

We begin by testing our initial specification outlined in Equation (1), replacing the binary

fiscal rule variable with our constructed index, lagged by one year.[25] The results of this test, which are reported out in Appendix Table A10, indicate that a similar spread-compressing effect is estimated when our index of rule strength is used as a regressor, the difference being that the magnitude of spread reduction associated with the existence of fiscal rules is now increasing in rule strength. For example, for a country whose fiscal rule index takes on the mean value of .362, the magnitude of spread reduction relative to a country with no fiscal rules is estimated to be range from 118 to 156 basis points. Meanwhile, a country whose fiscal rule index takes on the maximum possible value of 1, as Lithuania does throughout the entire sample timeframe, the magnitude of spread reduction is estimated to range from 272 to 338 basis points. It is worth noting that our estimated spread reduction associated with fiscal rules is lower when rule strength is controlled for, compared to our baseline analysis. We therefore interpret the range of estimates reported out in Section 3.2 to be an upper bound for the reduction in spreads associated with the existence of fiscal rules.

Next, we test our second specification for the COVID-19 timeframe outlined in Equation (3) using the fiscal rule index in place of the binary fiscal rule variable and estimate a similar spread-compressing effect as in Section 3.3 now with the magnitude increasing in rule strength. The full set of coefficient estimates for this test can be seen in Appendix Table A11. The standalone fiscal rule index coefficient estimate again represents the spread reduction associated with fiscal rules prior to the onset of the pandemic. This coefficient ranges from -.444 to -.542, implying an 88 to 105 basis point reduction in spreads for a country with rules of mean strength. The spread reduction associated with fiscal rules through the pandemic is then given by the sum of the coefficient estimates for the standalone fiscal rule index and the interaction between the fiscal rule index and the post-pandemic indicator variable. This sum ranges from -.884 to -.958, implying a spread reduction of 186 to 199 basis points through the pandemic.

Similarly, we retest the specification shown in Equation (5) which distinguishes between countries that temporarily suspended their fiscal rules, countries that enacted an escape clause, and those that maintained their rules through the pandemic, using the lagged fiscal rule index in place of binary measurements. As was the case in the initial test outlined in Section 3.4, the results of this test imply a similar spread compression for all countries with fiscal rules, regardless of the degree of enforcement through the pandemic. The results from this test can be seen in Appendix Table A12. Finally, the results of our three main tests outlined in Sections 3.1-3.4

[25] We lag the index due to the fact that it is constructed on an annual basis, and in practice the individual components of fiscal rules from which our index is measured may change at different points during the calendar year for different countries. The lagged index value therefore represents the strength of a country's fiscal rules at the onset of the current year.

remain robust to tests in which outlier countries are excluded. See the Appendix for a description of the methodology used for these tests and see Table A11 for the full set of coefficient estimates for our baseline estimation with outliers removed.

4 Model

In this section we present a sovereign default model with strategic enforcement of fiscal rules. The environment follows the standard long-term debt sovereign default model, as in Hatchondo and Martinez (2009) and Chatterjee and Eyigungor (2012). Time is discrete and indexed by $t \in \{1, 2, \dots\}$. The economy is populated by households and the government. Households receive a stochastic endowment of tradable goods, transfers from the government, and choose consumption. The government issues long-term defaultable bonds, faces a fiscal rule that limits the amount of foreign borrowing and chooses optimally whether to deviate from it or not.

Preferences The representative household has preferences given by:

$$U = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t u(c_t) \tag{6}$$

where $\mathbb{E}_t$ denotes the expectation operator at time t, $\beta \in (0, 1)$ is the discount factor, and c_t denotes consumption of households in period t. The utility function over consumption goods $u : \mathbb{R}_+ \to \mathbb{R}$ satisfies the usual assumptions: $u' > 0$, $u'' < 0$ and $\lim_{c_t \to \infty} u'(c_t) = 0$. Each period, households receive an endowment of a single tradable good $y \in Y \subset \mathbb{R}_{++}$, government transfers T_t, and choose consumption. As we will see, households face endowment losses depending on the government decisions on debt repayment and fiscal rule enforcement. Let $\phi(y_t)$ denote all potential output costs. Then, their budget constraint is given by:

$$c_t \leq y_t - \phi(y_t) + T_t \tag{7}$$

Asset space and fiscal rule The government borrows from a large pool of international investors on behalf of the households. Its objective is to maximize the present expected discounted value of future utility flows of the representative household, and it does so by issuing long-term bonds denominated in foreign currency. The bond specifies a price q_t and a quantity of new borrowing l_t such that the sovereign receives $q_t l_t$ units of foreign currency in period t. As in Hatchondo and Martinez (2009), we assume that a bond issued in period t promises in case of repayment $\kappa(1-\delta)^{j-1}$ units of foreign currency in period $t+j$ for all $j \geq 1$, where $\kappa = (r^\star + \delta) \exp(r^\star)$ and $r^\star$ is the international risk-free interest rate. As such, the stream of coupons decays at an

exogenous constant rate δ, and each unit of debt calls for a payment of κ every period. Hence, debt dynamics are given by:

$$B_{t+1} = (1 - \delta)B_t + l_t \tag{8}$$

where B_t is the stock of bonds at the beginning of period t, and $(1-\delta)B_t$ is the legacy debt that has not matured. This payment structure condenses all future payment obligations derived from past issuances into a one-dimensional state variable: the coupons that mature in the current period.

We consider a fiscal rule that imposes a limit on government borrowing. As such, the rule specifies that the sovereign debt level must be lower than a threshold $\bar{B}$:

$$B_{t+1} < \bar{B} \tag{9}$$

For an initial debt level B_t that is below the limit, the fiscal budget can support any increase in the external debt up to $\bar{B}$. As we explain later, we allow the government to deviate from this rule: it can choose a level of debt higher than $\bar{B}$ by facing a cost in terms of output.

Foreign lenders Sovereign bonds are traded with identical risk-averse foreign lenders with infinite collective wealth. We introduce risk-premium shocks as in Vasicek (1977), Hatchondo et al. (2022), and Bianchi and Sosa-Padilla (2023). These shocks capture global factors that are exogenous to domestic fundamentals and are consistent with the empirical literature that documents global shocks as important drivers of sovereign spreads and international credit flows. Foreign lenders discount future payments with a stochastic discount factor $m_{t,t+1}$, which we model and parameterize as in Bianchi and Sosa-Padilla (2023):

$$m_{t,t+1} = \exp\left[-r^\star - \gamma_t\left(\epsilon_{t+1} + \frac{1}{2}\gamma_t\sigma_\epsilon^2\right)\right]$$

where $\gamma_t \in \mathbb{R}_+$ is a stochastic parameter that governs the risk premium shock, and follows a two-state Markov switching regime with values $\{\gamma_L, \gamma_H\}$ with transition probabilities $\{\pi_{LH}, \pi_{HL}\}$. In the "low risk" regime, we set $\gamma = \gamma_L = 0$ so that we eliminate any risk premia, and the stochastic discount factor collapses to $m_{t,t+1} = \exp(-r^\star)$. In the "high-risk" regime, we assume that $\gamma = \gamma_H > 0$ consistent with a positive risk premium. The value of γ can be seen as capturing times of crisis where lenders require high-risk premia to invest in domestic government bonds.

The bond price satisfies the following asset pricing condition:

$$q_t = \mathbb{E}_t \left[m_{t,t+1}(1 - D_{t+1})(\kappa + (1 - \delta)q_{t+1}) \right] \tag{10}$$

If the sovereign does not default next period, $D_{t+1} = 0$, and each unit of the bond pays the coupon κ, and the fraction that does not mature has market value $(1 - \delta)q_{t+1}$. In states where the sovereign defaults, the associated payoff for the lenders is zero.

Default and fiscal rule deviation. Debt contracts cannot be enforced, and each period the government can default on its debt. When the government defaults, $D_t = 1$, it avoids paying the outstanding debt obligations but incurs two different costs:

i. The government is excluded from financial markets for a stochastic number of periods. With probability ι it reenters the financial markets and exits default with zero debt obligations.

ii. Output is depressed by $\phi^D(y_t)$. This additional cost captures the disruption of trading arrangements, domestic financial markets, etc. that happen during default episodes.

When the government repays the debt, $D_t = 0$, borrows in the international financial markets and decides the level of debt in the following period B_{t+1}. As is implied by (9), this level of debt B_{t+1} indicates whether it violates the fiscal rule.

The fiscal rule enforcement determines whether the government is in good or bad credit standing, which is encoded in the variable $\vartheta_t \in \{0, 1\}$. If the government complies with the rule in the current period, credit standing is good: $\vartheta_t = 0$. If it deviates credit standing is bad, $\vartheta_t = 1$ and the country faces an output loss $\phi^F(y_t)$. We consider this loss as capturing various costs related to reputation and sanctions that follow a fiscal rule deviation, but we abstract from modeling them explicitly. We also assume that there is no deviation cost in periods of crisis, consistent with our empirical analysis. Note that can summarize the credit standing as follows:

$$\vartheta_t = \begin{cases} 0 & \text{if } B_{t+1} \leq \bar{B} \\ 1 & \text{otherwise} \end{cases} \tag{11}$$

Transfers. The government provides lump-sum transfers T_t to households. Its budget constraint is:

$$T_t = (1 - D_t) \left[q_t(B_{t+1} - (1 - \delta)B_t) - \kappa B_t \right] \tag{12}$$

The left-hand side in (12) represents the total government expenditure, while the right-hand side represents its total revenue, which includes the net capital inflow from debt operations when

the government has access to international financial markets.

5 Recursive Formulation and Equilibrium

In this section, we present the optimality conditions in recursive form and define the recursive equilibrium of the model. We focus on a Markov perfect equilibrium, in which policies depend on payoff-relevant states. As such, the government takes into account that its policies for default and borrowing affect the equilibrium allocations for households and prices. In what follows, we denote the next-period value of the variables with a prime symbol.

Define $s \coloneqq \{y, \gamma\}$ as the vector of exogenous states, composed by the tradable endowment and the risk premium shock, respectively. The endogenous states is the current level of debt B. Every period, the government chooses the default decision, borrowing, and transfers subject to the resource constraint, and taking as given its future policies. At any given state, the value of the option to default is given by:

$$V(s, B) = \max_{D \in \{0,1\}} \left\{ (1 - D)V^R(s, B) + D \left[V^D(s) \right] \right\} \tag{13}$$

where $V^R(s, B)$ is the value associated with repaying and staying in the contract, and $V^D(s)$ is the value associated with default. Specifically, the value of repaying is given by:

$$V^R(s, B) = \max_{B'} \left\{ u(c) + \beta \mathbb{E} \left[V\left(s', B'\right) \right] \right\} \tag{14}$$

subject to the resource constraint under repayment:

$$c = y - \vartheta \phi^F(y) + q(s, B')(B' - (1 - \delta)B)) - \kappa B$$

where $q(s, B')$ is the bond price schedule (defined formally later in (16)) and $\vartheta = 1$ if $B' > \bar{B}$, and zero otherwise. The value of default is given by:

$$V^D(s) = u(c) + \beta \mathbb{E} \left[\iota V\left(s', B' = 0\right) + (1 - \iota) V^D(s') \right] \tag{15}$$

subject to the resource constraint under default:

$$c = y - \phi^D(y)$$

Let $\mathcal{D}(s, B)$ and $\mathcal{B}(s, B)$ be the government policy functions for default and borrowing. The

bond price schedule satisfies the bond pricing equation:

$$q(s, B') = \mathbb{E}\left\{m(s, s')(1 - \mathcal{D}(s', B'))\left[\kappa + (1 - \delta)q(s', B'')\right]\right\} \tag{16}$$

where $B'' = \mathcal{B}(s', B')$. Notice that the bond price schedule depends on the endowment, credit standing, and the future level of debt because these state variables affect the probability of default. Similarly, future long-term obligations contain default risk, which is encoded in the continuation price $q(s', B'')$. This future bond price is evaluated at the equilibrium policy function for debt, given a particular choice B'.

We can now define the recursive equilibrium of this economy as follows:

Definition 1 (Markov Perfect Equilibrium). *Given the state $\{s, B\}$, a Markov Perfect Equilibrium consists of policies functions for default $\mathcal{D}(s, B)$ and borrowing $\mathcal{B}(s, B)$, value functions $V(s, B)$, $V^R(s, B)$, and $V^D(s)$, and a bond price schedule $q(s, B')$ such that:*

1. *Given the bond price schedule and future policies $\mathcal{D}(s', B')$ and $\mathcal{B}(s', B')$, and value functions $V(s', B')$, $V^R(s', B')$ and $V^D(s')$, government policies solve its optimization problem.*
2. *Government policies and value functions are consistent with future policies and value functions.*

6 Quantitative Analysis

We now turn to the quantitative analysis of the model, with the goal of evaluating our mechanisms and measuring how fiscal rules shape economic outcomes during global crises. First, we describe the calibration and our moment-matching exercise using emerging markets' data. Then, we present the model fit, comparing the moments in the data and the ones from the simulation of the model. Finally, we lay out the decision rules of the model, and discuss the results for an economy with and without fiscal rules.

6.1 Calibration

A model period is one year and income is normalized to one. We consider two different groups of parameters, which are listed in Table 5. The first group of parameters takes values that can be set directly from the data or using standard values from the literature. The second group of parameter values is estimated in a moment-matching exercise.

Functional forms. We assume that the consumption utility function takes the following form:

$$u(c_t) = \frac{c_t^{1-\frac{1}{\sigma}} - 1}{1 - \frac{1}{\sigma}}$$

where σ is the elasticity of intertemporal substitution. As is standard in the sovereign default literature, the tradable endowment follows a stationary first-order Markov process given by:

$$\log(y_t) = \rho \log(y_{t-1}) + (1 - \rho) \log(\bar{y}) + \epsilon_t$$

where $\rho \in (0, 1)$ is the persistence of the process, $\bar{y}$ is the mean endowment, and ϵ_t is an idiosyncratic shock. We assume that $\epsilon_t \sim \mathcal{N}(0, \sigma_y^2)$. We consider a convex default cost as in Chatterjee and Eyigungor (2012):

$$\phi^D(y) = \max\{\psi_0 y + \psi_1 y^2, 0\}$$

where $\psi_0 \leq 0$ and $\psi_1 \geq 0$, implying that the cost is zero in the region where $y \in (0, -\psi_0/\psi_1)$ and then increases faster than income when $y > -\psi_0/\psi_1$. Note, however, that this functional form is flexible enough to accommodate different cases: a cost that is proportional to income when $\psi_0 > 0$ and $\psi_1 = 0$, and a cost that increases faster than income when $\psi_0 = 0$ and $\psi_1 > 0$. We consider a similar functional form for the output loss after a deviation of the fiscal rule:

$$\phi^F(y) = \begin{cases} \max\left\{\lambda_0 y + \lambda_1 y^2, 0\right\} & \text{if } \vartheta = 1 \\ 0 & \text{if } \vartheta = 0 \end{cases}$$

where $\lambda_0 < \psi_0$ and $\lambda_1 < \psi_1$ implying that the cost of deviating from the fiscal rule is lower than the cost of defaulting for all possible endowments.

Parameters set externally. We set the intertemporal elasticity of substitution to 1/2, a standard value in the literature. We set the international risk-free rate to 4%, consistent with U.S. Treasury bills' annual yields. We discretize the endowment process into 25 different states following Tauchen (1986). We set the autocorrelation of the endowment process to 0.90 and the standard deviation of the endowment shock to 0.01, consistent with annual estimates for emerging markets. We calibrate the reentry probability ι to 12.5% to generate an average market exclusion spell of 4 years, in line with the estimates of Gelos et al. (2011), and the value of δ, the decay rate of bonds, matches a Macaulay duration of 5 years, in line with the average bond duration reported in Cruces and Trebesch (2013). The parameter governing the coupon payments is normalized to $\kappa = (r^\star + \delta) \exp(r^\star)$ consistent with a risk-free bond price of $\exp(r^\star)$. This normalization has no bearing on the analysis. We follow Bianchi et al. (2018) to parameterize the lenders' risk aversion

Table 5: Parameter Values

Parameters Set Externally	**Value**	**Target statistic/Source**
Preferences		
Intertemporal elasticity of substitution	$\sigma = 1/2$	Standard business cycles literature
Debt and Default		
International risk-free rate	$r^\star = 0.98\%$	Annual rate of 4%
Debt limit	$\bar{B} = 0.5$	Debt rules in emerging markets
Probability of reentry	$\iota = 0.125$	Average autarky spell (4 years)
Debt decay parameter	$\delta = 0.04$	Average Macaulay duration (5 years)
Default taste shock	$\varrho_D = 1e^{-4}$	Numerical convergence
Borrowing taste shock	$\varrho_B = 5e^{-7}$	Numerical convergence
Exogenous Processes		
Persistence of AR(1) endowment	$\rho_y = 0.90$	Estimates for emerging markets
Standard dev. of endowment shock	$\sigma_y = 0.01$	Estimates for emerging markets
Mean of AR(1) endowment	$\bar{y} = 1$	Normalization
Low risk premium pricing kernel parameter	$\gamma_L = 0$	No risk premium in normal times
Prob. of transitioning to high risk premium	$\pi_{LH} = 0.15$	Bianchi et al. (2018)
Prob. of transitioning to low risk premium	$\pi_{HL} = 0.8$	Bianchi et al. (2018)
Parameters Set Internally		
Preferences		
Households discount factor	$\beta = 0.955$	Targeted moments
Debt and Default		
Parameter in deviation cost function	$\lambda_0 = -0.448$	Targeted moments
Parameter in deviation cost function	$\lambda_1 = 0.44$	Targeted moments
Parameter in default cost function	$\psi_0 = -0.4$	Targeted moments
Parameter in default cost function	$\psi_1 = 0.445$	Targeted moments
Exogenous Processes		
High risk premium pricing kernel parameter	$\gamma_H = 50$	Targeted moments

shock. Using data for the EMBI+ spread, they define a period with high-risk premium as one in which the global EMBI+ is one standard deviation above the median, excluding countries in default. They obtain three episodes happening on average every 20 years with a duration of 1.25 years. This yields $\pi_{LH} = 0.15$ and $\pi_{HL} = 0.8$.

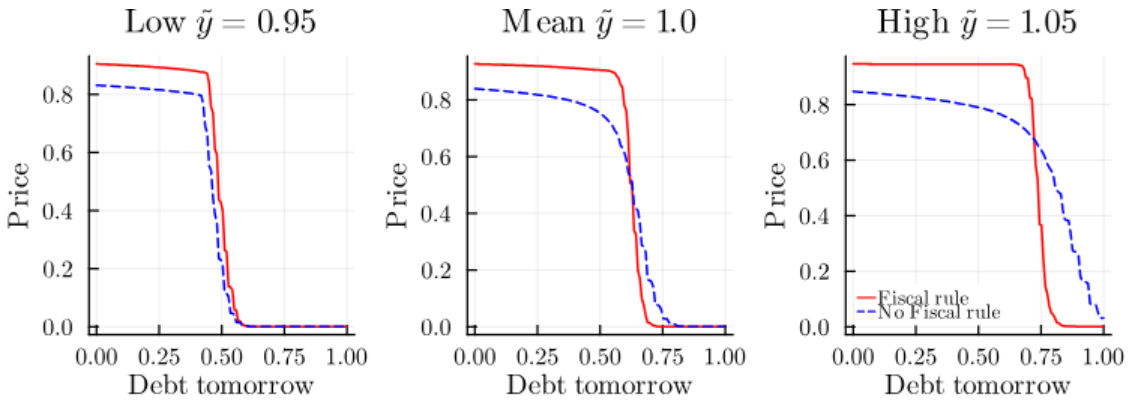
In the solution of the model we also incorporate discrete taste shocks following Dvorkin et al. (2021) to achieve numerical stability and robust convergence in the computational algorithm. The parameter ρ_B governs the relative importance of the taste shocks for the choice of new borrowing and is set to $5e^{-5}$, which is the smallest value that guarantees convergence in the model. For similar reasons, we set $\rho_D = 1e^{-4}$.

Parameters set internally. In a future version of the paper, we will perform a moment-matching exercise and estimate six parameters. These parameters are the discount factor, the deviation and default cost parameters, and the high-risk premium pricing kernel parameter. We collect these parameters in $\Theta = \{\beta, \lambda_0, \lambda_1, \psi_0, \psi_1, \gamma_H\}$. We target six moments on the distribution of debts and defaults. These moments are the mean and standard deviation of the debt-to-output ratio, the mean sovereign spreads, the percentage of time that countries deviate from the fiscal rule, the increase in spreads during crisis periods, and the volatility of consumption relative to output.

7 Results of the Quantitative Analysis

Price schedule. To illustrate the workings of the model, this section presents the price schedule of the model. We consider two alternative economies: one with fiscal rule and one without it. Figure 6 displays the price schedule of the government for selected levels of endowment, conditional on being on the "crisis" regime (i.e, $\gamma = \gamma_H$), for each of the two economies.

Figure 6: Price Schedule for Selected Endowments



Notes: This figure plots the value function for selected endowments, conditional on being on the "global crisis" state. The dashed blue lines correspond to the model without fiscal rule, whereas the solid red lines correspond to the model with fiscal rule.

The borrowing behavior is reflected in the price schedule offered to the government. Since the government can default, the private lenders assess that the probability of repayment on their bonds is higher for a government with a fiscal rule and hence offer a better price. Only when the debt is very high (for example, above 0.6 for the mean endowment) prices are lower with a fiscal rule. Foreign lenders observe that future debt is high, and the government will face the deviation cost until it returns to compliance with the rule, so they understand that the probability of future repayment is low, resulting in a less favorable price. Note, though, that the government faces

higher prices even when it deviates from the rule, as in illustrated by the schedule for $b' > \bar{B}$. For the mean endowment, for example, all levels of debt next period above the debt limit $\bar{B} = 0.5$ and below 0.6 the government faces better terms than without fiscal rule.

Compressing effect of fiscal rules. The results above indicate that having a fiscal rule in place provides higher debt prices for a government that issues defaultable debt. Now, we analyze the behavior of the spreads in the limiting distribution of each of the two economies. To do so, we also simulate the model 200000 periods, discard the first 10000 observations, and compute the mean annualized spread. We calculate such spread we start by computing the yield $\hat{r}$ an investor would earn if it holds the bond to maturity and the government never defaults. This yield $\hat{r}$ satisfies:

$$q_t = \frac{\kappa}{1+\hat{r}} + \frac{\kappa(1-\delta)}{(1+\hat{r})^2} + \frac{\kappa(1-\delta)^2}{(1+\hat{r})^3} + \cdots$$

We then compute the annualized spread as $4(\hat{r} - r^\star)$, where $r^\star$ is the risk-free interest rate. Table 6 presents the results.

Table 6: Mean spread with and without fiscal rules

	Model with fiscal rule		Model without fiscal rule	
	Normal times	Crises times	Normal times	Crises times
Mean spread	1.0	1.1	6.4	6.5

Notes: Moments in the model are computed using simulated time series. All numbers are reported in percentage points.

As we can see, the spread-compressing effect of fiscal rules holds in the model, both in normal times and crisis periods. Under this calibration, the government deviates from the rule 11% of the time, and still the government with fiscal rule faces an annualized spread that is around 5% lower compared to the counterfactual scenario where the rule is not in place.

8 Conclusion

This paper provides empirical evidence that the adoption of fiscal rules can help suppress borrowing costs for emerging markets and developing economies during periods of global financial stress. Using the COVID-19 timeframe as our baseline sample period, we find that the existence of a fiscal rule is associated with lower sovereign spreads, with estimates of the average spread-compressing effect ranging from 319 to 378 basis points. The result is robust after controlling for institutional quality, and to the extent to which enforcement of the rule occurred during the

global crisis. Our robustness tests also indicate that the spread-compressing effect is increasing in rule strength, and we therefore interpret the spread-compressing effect estimated in our baseline test as an upper bound. Further, we show that the spread-compressing effect of fiscal rules is robust to other global crisis periods such as the GFC of 2008-09. The spread-compressing effect is estimated to be stronger during the COVID-19 pandemic than during the GFC, a result which we interpret to reflect the gradual improvement of fiscal rules and generation of "second-generation" rules in the decade preceding the pandemic.

Regarding the finding that fiscal rules compressed spreads through the pandemic regardless of the degree of enforcement, we also provide suggestive evidence for the mechanism driving this result by performing an event study empirically estimating the time it takes to return to compliance following an abandonment of a budget balance rule. Together, our results suggest that during global crises, credit markets internalize the fact that temporary rule abandonments generally do not lead to long-term debt insolvency. Thus, our results provide evidence that credit markets functioned properly through the pandemic in the sense that sovereign governments possessing a reputation of fiscal responsibility faced borrowing costs which facilitated meeting rising short-term needs. Our results have strong implications for policymakers in EMDEs who seek policies that signal fiscal responsibility and compress borrowing costs, especially during global crises such as the COVID-19 pandemic. The results not only suggest that a spread-compressing effect of fiscal rules exists, but that complex rules attempting to achieve flexibility through the inclusion of complicated contingencies can be greatly simplified given that credit markets do not perceive any difference between suspensions and escape clause usage during global crises.

Finally, we consider a sovereign debt model with the possibility of deviating from the fiscal rule by imposing an exogenous cost of deviation. We show that, if there is no deviation cost during a global crisis, the model can rationalize quantitatively the sovereign spread compressing effect of fiscal rules. Overall, the findings suggest that fiscal rules can help emerging markets and developing economies signal fiscal responsibility during episodes of global financial stress, reducing borrowing costs relative to countries without fiscal rules. There are several interesting issues concerning the spread-compressing effect and the fiscal responsibility channel of fiscal rules that future work can focus on. For instance, does the spread-compressing effect of fiscal rules hold during idiosyncratic, country-specific crises? If so, do markets internalize temporary rule abandonments during idiosyncratic negative shocks the same way they do during periods of global crisis? Which type of fiscal rule is most effective in simultaneously signaling fiscal responsibility and enforcing fiscal discipline - simple debt rules, spread break rules as in Hatchondo et al. (2022), or a rule promising low government spending in the future as in Bianchi et al. (2023)?

What would constitute an adequate escape clause for this fiscal rule, if any? Our analysis suggests that the spread-compressing effect of fiscal rules is worth consideration, and, thus, we view the questions posed as promising avenues for future research.

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Appendices

A Additional Tables

Table A1: Sample of Countries Included in Empirical Analysis of Spreads

Angola	Georgia†	Panama*
Argentina*†	Ghana	Papua New Guinea
Armenia†	Guatemala	Paraguay†
Azerbaijan†	Honduras	Peru*†
Belarus	India†	Philippines*
Belize	Indonesia*†	Romania
Bolivia	Iraq*	Russian Federation*†
Brazil*	Jamaica†	Senegal†
Bulgaria*	Jordan	Serbia*
Cameroon	Kazakhstan	South Africa*
China*	Kenya	Sri Lanka
Colombia*†	Lebanon*	Suriname
Costa Rica†	Malaysia*	Tajikistan
Côte d'Ivoire	Mexico*	Tunisia*
Dominican Republic*	Mongolia	Türkiye*
Ecuador*	Morocco	Ukraine*
Egypt, Arab Rep.*	Mozambique	Venezuela, RB*
El Salvador*	Namibia	Vietnam*
Ethiopia	Nigeria	Zambia
Gabon	Pakistan*	

Notes: All countries listed, except for Bulgaria, are included in the baseline COVID-19 sample. * indicates a country included in GFC sample, whereas † indicates a country suspending fiscal rule or enacting escape clause in the analysis presented in Section 3.4.

Table A2: Panel Regression Estimates of Fiscal Rule Impact on Sovereign Spreads

	Log Spread				
	(1)	(2)	(3)	(4)	(5)
Fiscal Rule	-1.029***	-0.867***	-0.835***	-0.775***	-0.775***
	(-38.99)	(-34.36)	(-32.24)	(-29.21)	(-29.21)
EMBI Global	0.742***	0.715***	0.739***	0.725***	0.717***
	(10.39)	(10.47)	(11.27)	(10.91)	(10.67)
CEMBI	0.195***	0.221***	0.186***	0.196***	0.201***
	(3.32)	(3.89)	(3.44)	(3.55)	(3.61)
Regional Factor	0.174***	0.165***	0.220***	0.210***	0.210***
	(12.56)	(12.13)	(16.86)	(15.42)	(15.42)
Government Effectiveness	-0.0157***	-0.0123***	-0.0127***	-0.0125***	-0.0125***
	(-39.20)	(-32.47)	(-33.38)	(-32.90)	(-32.90)
GDP Per Capita Growth			-0.00842***	-0.00924***	-0.00924***
			(-18.20)	(-17.46)	(-17.46)
Inflation			0.0195***	0.0189***	0.0189***
			(85.01)	(56.73)	(56.73)
Primary Balance		-0.00666***		-0.000757	-0.000760
		(-10.82)		(-0.87)	(-0.87)
Total External Debt Stocks		0.00715***		0.000513**	0.000512**
		(65.89)		(2.38)	(2.38)
Fed Policy Dummy					-0.00765
					(-0.46)
ECB Policy Dummy					0.00925
					(0.58)
Stringency Index					0.0170
					(0.86)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	48956	46675	45887	44320	44320
R^2	0.918	0.926	0.911	0.914	0.914

Notes: t-statistics are reported in parenthesis. Statistical significance at 10%, 5% and 1% is reported with *, ** and ***, respectively

Table A3: Panel Regression Estimates of Fiscal Rule Impact on Sovereign Spreads During GFC

	Log Spread			
	(1)	(2)	(3)	(4)
Fiscal Rule	-0.195***	-0.108***	-0.173***	-0.101***
	(-13.35)	(-5.26)	(-12.69)	(-5.12)
Government Effectiveness	-0.0129***	-0.00849***	-0.00400***	-0.00483***
	(-18.72)	(-11.49)	(-6.09)	(-6.73)
GDP Per Capita Growth			-0.0393***	-0.0405***
			(-33.55)	(-30.75)
Inflation			1.542***	1.700***
			(48.00)	(21.95)
Primary Balance		-0.0581***		-0.0484***
		(-21.12)		(-18.22)
Total External Debt Stocks		-0.00143***		-0.000988***
		(-6.85)		(-4.89)
Country Fixed Effects	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes
Observations	19521	18019	19521	18019
R^2	0.896	0.900	0.911	0.908

Notes: t-statistics are reported in parenthesis. Statistical significance at 10%, 5% and 1% is reported with *, ** and ***, respectively

Table A4: Difference-in-Difference Estimates of Fiscal Rule Impact in Post-COVID Time Period

	Log Spread				
	(1)	(2)	(3)	(4)	(5)
Fiscal Rule	-0.745***	-0.626***	-0.711***	-0.709***	-0.709***
	(-29.01)	(-25.22)	(-28.31)	(-27.26)	(-27.27)
Post COVID	0.337***	0.238***	0.261***	0.253***	0.254***
	(61.88)	(42.20)	(48.16)	(44.68)	(44.72)
Fiscal Rule × Post COVID	-0.228***	-0.174***	-0.176***	-0.174***	-0.174***
	(-42.38)	(-33.32)	(-35.33)	(-34.31)	(-34.30)
EMBI Global	0.261***	0.199***	0.293***	0.289***	0.291***
	(10.63)	(8.35)	(12.99)	(12.45)	(12.53)
CEMBI	0.193***	0.352***	0.260***	0.269***	0.270***
	(11.41)	(20.30)	(16.30)	(15.79)	(15.84)
Regional Factor	0.375***	0.365***	0.365***	0.371***	0.370***
	(31.29)	(30.34)	(32.09)	(31.24)	(31.16)
Government Effectiveness	-0.0151***	-0.0125***	-0.0118***	-0.0117***	-0.0117***
	(-37.91)	(-32.84)	(-31.12)	(-30.85)	(-30.86)
GDP Per Capita Growth			-0.00243***	-0.000236	-0.000255
			(-7.95)	(-0.60)	(-0.65)
Inflation			0.0202***	0.0208***	0.0208***
			(90.42)	(63.85)	(63.83)
Primary Balance		-0.00251***		-0.00618***	-0.00617***
		(-4.63)		(-7.83)	(-7.82)
Total External Debt Stocks		0.00586***		0.0000239	0.0000258
		(59.47)		(0.11)	(0.12)
Fed Policy Dummy					-0.0359**
					(-2.28)
ECB Policy Dummy					-0.0000608
					(-0.00)
Stringency Index					0.0104
					(0.53)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	48956	46675	45887	44320	44320
R^2	0.920	0.925	0.912	0.914	0.914

Notes: t-statistics are reported in parenthesis. Statistical significance at 10%, 5% and 1% is reported with *, ** and ***, respectively

Table A5: Difference-in-Difference Estimates of Fiscal Rule Impact During GFC

	Log Spread			
	(1)	(2)	(3)	(4)
Fiscal Rule	-0.156***	0.00371	-0.148***	0.00943
	(-5.95)	(0.10)	(-5.76)	(0.26)
Post GFC	0.863***	0.862***	0.825***	0.820***
	(103.91)	(96.89)	(100.00)	(86.68)
Fiscal Rule × Post GFC	-0.0561***	-0.106***	-0.0390***	-0.0685***
	(-4.14)	(-7.53)	(-2.95)	(-4.79)
Government Effectiveness	-0.0127***	-0.00889***	-0.00648***	-0.00782***
	(-11.07)	(-7.19)	(-5.68)	(-6.35)
GDP Per Capita Growth			-0.0313***	-0.0275***
			(-16.51)	(-12.73)
Inflation			1.218***	0.927***
			(23.87)	(8.12)
Primary Balance		-0.0810***		-0.0581***
		(-18.65)		(-12.84)
Total External Debt Stocks		-0.00193***		-0.00198***
		(-5.54)		(-5.67)
Country Fixed Effects	Yes	Yes	Yes	Yes
Observations	19521	18019	19521	18019
R^2	0.716	0.715	0.728	0.720

Notes: t-statistics are reported in parenthesis. Statistical significance at 10%, 5% and 1% is reported with *, ** and ***, respectively

Table A6: Panel Regression Estimates of Escape Clause vs. Suspension on Sovereign Spreads

	Log Spread				
	(1)	(2)	(3)	(4)	(5)
Fiscal Rule - No Suspension or Escape Clause	-1.022*** (-39.05)	-0.867*** (-34.57)	-0.845*** (-32.91)	-0.802*** (-30.49)	-0.802*** (-30.48)
Escape Clause	-1.021*** (-36.68)	-0.886*** (-33.26)	-0.841*** (-31.03)	-0.822*** (-29.43)	-0.822*** (-29.42)
Suspension	-1.232*** (-45.30)	-1.041*** (-39.94)	-1.043*** (-39.12)	-1.004*** (-36.57)	-1.004*** (-36.57)
EMBI Global	0.738*** (10.41)	0.714*** (10.52)	0.734*** (11.30)	0.720*** (10.95)	0.713*** (10.71)
CEMBI	0.193*** (3.32)	0.221*** (3.91)	0.184*** (3.44)	0.194*** (3.55)	0.199*** (3.61)
Regional Factor	0.179*** (13.03)	0.167*** (12.30)	0.227*** (17.49)	0.216*** (15.99)	0.216*** (15.99)
Government Effectiveness	-0.0157*** (-39.65)	-0.0125*** (-33.11)	-0.0125*** (-33.36)	-0.0124*** (-32.98)	-0.0124*** (-32.98)
GDP Per Capita Growth			-0.00777*** (-16.91)	-0.00872*** (-16.58)	-0.00872*** (-16.57)
Inflation			0.0199*** (87.16)	0.0200*** (60.18)	0.0200*** (60.18)
Primary Balance		-0.00690*** (-11.26)		-0.00261*** (-3.00)	-0.00261*** (-3.00)
Total External Debt Stocks		0.00701*** (64.88)		-0.0000977 (-0.46)	-0.0000977 (-0.46)
Fed Policy Dummy					-0.00757 (-0.46)
ECB Policy Dummy					0.00922 (0.58)
Stringency Index					0.0161 (0.82)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	48956	46675	45887	44320	44320
R^2	0.920	0.927	0.913	0.916	0.916

Notes: t-statistics are reported in parenthesis. Statistical significance at 10%, 5% and 1% is reported with *, ** and ***, respectively

Table A7: Panel Regression Estimates of Escape Clause vs. Suspension on Sovereign Spreads

	Log Spread				
	(1)	(2)	(3)	(4)	(5)
Fiscal Rule - No Suspension or Escape Clause	-1.032*** (-39.30)	-0.873*** (-34.73)	-0.852*** (-33.07)	-0.806*** (-30.52)	-0.806*** (-30.51)
Escape Clause	-1.111*** (-40.15)	-0.960*** (-36.23)	-0.913*** (-33.85)	-0.892*** (-31.95)	-0.892*** (-31.94)
Suspension	-1.211*** (-43.78)	-1.015*** (-38.37)	-1.031*** (-38.10)	-0.982*** (-35.40)	-0.982*** (-35.40)
EMBI Global	0.741*** (10.41)	0.718*** (10.55)	0.735*** (11.28)	0.723*** (10.96)	0.716*** (10.72)
CEMBI	0.194*** (3.32)	0.222*** (3.93)	0.184*** (3.43)	0.195*** (3.57)	0.200*** (3.62)
Regional Factor	0.176*** (12.77)	0.162*** (11.92)	0.225*** (17.32)	0.212*** (15.63)	0.212*** (15.63)
Government Effectiveness	-0.0156*** (-39.09)	-0.0124*** (-32.76)	-0.0124*** (-32.78)	-0.0123*** (-32.58)	-0.0123*** (-32.58)
GDP Per Capita Growth			-0.00755*** (-16.37)	-0.00836*** (-15.85)	-0.00836*** (-15.85)
Inflation			0.0199*** (87.05)	0.0199*** (59.54)	0.0199*** (59.54)
Primary Balance		-0.00690*** (-11.19)		-0.00228*** (-2.59)	-0.00228*** (-2.59)
Total External Debt Stocks		0.00706*** (65.15)		0.0000707 (0.33)	0.0000707 (0.33)
Fed Policy Dummy					-0.00757 (-0.46)
ECB Policy Dummy					0.00928 (0.58)
Stringency Index					0.0154 (0.78)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	48956	46675	45887	44320	44320
R^2	0.919	0.927	0.912	0.915	0.915

Notes: t-statistics are reported in parenthesis. Statistical significance at 10%, 5% and 1% is reported with *, ** and ***, respectively. In this test, we flag India and Paraguay as countries enacting an escape clause, and not as countries suspending a rule (both are categorized as countries that suspended a rule in Table A6).

Table A8: Sample of Budget Balance Rule Modification Events, 2000-2019

Country	Year	Adjustment	Target Statistic
Argentina	2009	Suspension	Overall balance excluding investment
Armenia	2009	Revision	Overall balance
Chile	2009	Revision	Structural balance
Denmark	2011	Revision	Structural balance
India	2009	Suspension	Primary Balance
Israel	2009	Revision	Overall balance
Mexico	2010	Escape Clause Activation	Overall balance excluding investment
Mongolia	2015	Revision	Structural balance
Panama	2004	Suspension	Nonfinancial public sector deficit
Peru	2009	Suspension	Nonfinancial public sector deficit
Russian Federation	2009	Suspension	Primary Balance
Spain	2008	Escape Clause Activation	Structural balance
United Kingdom	2009	Escape Clause Activation	Overall balance excluding investment
Uruguay	2009	Revision	Primary Balance

Notes: Data is from IMF Fiscal Rule Dataset (IMF 2022)

Table A9: High Deficit Periods Following Budget Balance Rule Modification Events

	Min.	Median	Mean	Max.
Duration (years)	1	3.5	3.7	N/A
Amplitude (deviation from prior average as % GDP)	1.4	4.4	5.6	12.4

Notes: Authors' estimation using data from the IMF Fiscal Rule dataset (IMF 2022). Our sample includes 14 countries, with revisions or suspensions spanning 2001-2019. Two countries (Argentina and Russia) do not return to the prior average deficit in the period analyzed.

Table A10: Panel Regression Estimates of Fiscal Rule Index and Spreads (COVID-19 Timeframe)

	Log Spread				
	(1)	(2)	(3)	(4)	(5)
Fiscal Rule Index (Lagged)	-0.850***	-0.618***	-0.692***	-0.621***	-0.621***
	(-26.71)	(-18.99)	(-24.44)	(-20.08)	(-20.08)
EMBI Global	0.744***	0.714***	0.740***	0.725***	0.718***
	(10.48)	(10.50)	(11.35)	(10.97)	(10.72)
CEMBI	0.196***	0.221***	0.187***	0.196***	0.201***
	(3.35)	(3.90)	(3.47)	(3.58)	(3.63)
Regional Factor	0.172***	0.167***	0.220***	0.209***	0.210***
	(12.54)	(12.26)	(16.91)	(15.42)	(15.42)
Government Effectiveness	-0.0149***	-0.0117***	-0.0119***	-0.0117***	-0.0117***
	(-37.26)	(-30.81)	(-31.34)	(-30.89)	(-30.89)
GDP Per Capita Growth			-0.00788***	-0.00929***	-0.00929***
			(-17.13)	(-17.65)	(-17.64)
Inflation			0.0194***	0.0189***	0.0189***
			(84.93)	(56.84)	(56.85)
Primary Balance		-0.00574***		0.000744	0.000742
		(-9.32)		(0.85)	(0.85)
Fed Policy Dummy					-0.00767
					(-0.46)
ECB Policy Dummy					0.00926
					(0.58)
Stringency Index					0.0173
					(0.88)
Total External Debt Stocks		0.00697***		0.000357*	0.000357*
		(64.18)		(1.66)	(1.66)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	48956	46675	45887	44320	44320
R^2	0.920	0.927	0.912	0.914	0.914

Notes: t-statistics are reported in parenthesis. Statistical significance at 10%, 5% and 1% is reported with *, ** and ***, respectively.

Table A11: Difference-in-Difference Estimates of Fiscal Rule Index and Spreads in Post-COVID Time Period

	Log Spread				
	(1)	(2)	(3)	(4)	(5)
Fiscal Rule Index (Lagged)	-0.542***	-0.466***	-0.490***	-0.444***	-0.444***
	(-16.86)	(-14.15)	(-17.16)	(-14.30)	(-14.30)
Post COVID	0.294***	0.211***	0.227***	0.217***	0.218***
	(59.56)	(41.02)	(46.67)	(42.44)	(42.48)
Fiscal Rule Index × Post COVID	-0.416***	-0.357***	-0.329***	-0.330***	-0.330***
	(-39.96)	(-35.68)	(-34.99)	(-34.48)	(-34.48)
EMBI Global	0.275***	0.205***	0.306***	0.296***	0.299***
	(11.23)	(8.65)	(13.60)	(12.83)	(12.91)
CEMBI	0.157***	0.329***	0.225***	0.241***	0.242***
	(9.30)	(19.02)	(14.17)	(14.20)	(14.26)
Regional Factor	0.392***	0.378***	0.385***	0.389***	0.388***
	(32.81)	(31.60)	(33.98)	(32.92)	(32.83)
Government Effectiveness	-0.0149***	-0.0122***	-0.0117***	-0.0116***	-0.0116***
	(-37.55)	(-32.08)	(-31.14)	(-30.74)	(-30.75)
GDP Per Capita Growth			-0.00249***	-0.000410	-0.000430
			(-8.20)	(-1.04)	(-1.09)
Inflation			0.0200***	0.0203***	0.0203***
			(89.77)	(62.54)	(62.51)
Primary Balance		-0.00281***		-0.00594***	-0.00592***
		(-5.20)		(-7.54)	(-7.52)
Total External Debt Stocks		0.00598***		0.000289	0.000291
		(61.22)		(1.35)	(1.36)
Fed Policy Dummy					-0.0350**
					(-2.23)
ECB Policy Dummy					-0.00183
					(-0.12)
Stringency Index					0.00642
					(0.33)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	48956	46675	45887	44320	44320
R^2	0.920	0.926	0.913	0.914	0.914

Notes: t-statistics are reported in parenthesis. Statistical significance at 10%, 5% and 1% is reported with *, ** and ***, respectively.

Table A12: Panel Regression Estimates of Escape Clause vs. Suspension on Spreads, controlling for the intensity of the rule

	Log Spread				
	(1)	(2)	(3)	(4)	(5)
Fiscal Rule - No Suspension or Escape Clause	-0.844*** (-26.35)	-0.619*** (-18.90)	-0.678*** (-23.77)	-0.604*** (-19.43)	-0.604*** (-19.43)
Escape Clause	-0.995*** (-25.67)	-0.779*** (-20.09)	-0.771*** (-22.33)	-0.713*** (-19.39)	-0.713*** (-19.39)
Suspension	-1.222*** (-34.33)	-0.932*** (-26.07)	-1.024*** (-32.21)	-0.950*** (-28.00)	-0.950*** (-28.00)
EMBI Global	0.740*** (10.48)	0.713*** (10.52)	0.734*** (11.33)	0.720*** (10.95)	0.712*** (10.71)
CEMBI	0.194*** (3.34)	0.220*** (3.90)	0.184*** (3.44)	0.194*** (3.55)	0.199*** (3.60)
Regional Factor	0.177*** (12.92)	0.169*** (12.47)	0.226*** (17.50)	0.217*** (16.02)	0.217*** (16.02)
Government Effectiveness	-0.0149*** (-37.63)	-0.0118*** (-31.26)	-0.0119*** (-31.52)	-0.0117*** (-31.11)	-0.0117*** (-31.11)
GDP Per Capita Growth			-0.00759*** (-16.57)	-0.00905*** (-17.24)	-0.00905*** (-17.24)
Inflation			0.0195*** (85.99)	0.0192*** (58.28)	0.0193*** (58.28)
Primary Balance		-0.00612*** (-9.96)		-0.0000936 (-0.11)	-0.0000953 (-0.11)
Total External Debt Stocks		0.00691*** (63.79)		0.000165 (0.77)	0.000165 (0.77)
Fed Policy Dummy					-0.00756 (-0.46)
ECB Policy Dummy					0.00922 (0.58)
Stringency Index					0.0158 (0.81)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	48956	46675	45887	44320	44320
R^2	0.9204	0.9277	0.9129	0.9153	0.9153

Notes: t-statistics are reported in parenthesis. Statistical significance at 10%, 5% and 1% is reported with *, ** and ***, respectively.

Table A13: Panel Regression Estimates of Fiscal Rule Impact on Spreads (COVID-19 Timeframe), Outliers Removed

	Log Spread				
	(1)	(2)	(3)	(4)	(5)
Fiscal Rule	-1.392***	-1.371***	-1.118***	-1.096***	-1.096***
	(-61.93)	(-56.50)	(-42.72)	(-40.67)	(-40.67)
EMBI Global	0.707***	0.689***	0.707***	0.679***	0.672***
	(11.53)	(11.09)	(11.35)	(10.83)	(10.59)
CEMBI	0.181***	0.206***	0.182***	0.186***	0.191***
	(3.59)	(3.99)	(3.54)	(3.57)	(3.63)
Regional Factor	0.233***	0.216***	0.256***	0.262***	0.262***
	(19.85)	(17.58)	(20.72)	(20.40)	(20.39)
Government Effectiveness	-0.00707***	-0.00643***	-0.00825***	-0.00794***	-0.00794***
	(-20.51)	(-18.62)	(-22.74)	(-22.00)	(-22.00)
GDP Per Capita Growth			-0.00437***	-0.00377***	-0.00377***
			(-9.87)	(-7.49)	(-7.49)
Inflation			0.0155***	0.0157***	0.0157***
			(27.76)	(27.40)	(27.40)
Primary Balance		-0.00838***		-0.00697***	-0.00697***
		(-13.08)		(-8.48)	(-8.48)
Total External Debt Stocks		0.00194***		0.000329	0.000328
		(11.18)		(1.60)	(1.60)
Fed Policy Dummy					-0.00689
					(-0.44)
ECB Policy Dummy					0.00917
					(0.61)
Stringency Index					0.0146
					(0.77)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	47250	45173	45136	43569	43569
R^2	0.904	0.908	0.910	0.908	0.908

Notes: t-statistics are reported in parenthesis. Statistical significance at 10%, 5% and 1% is reported with *, ** and ***, respectively. We exclude a country when its mean spread over the entire sample timeframe is more than three standard deviations above the mean across all countries. This results in Venezuela and Lebanon being excluded from the sample.

B Equations

1. Value for the sovereign:

$$V(s, B, \vartheta) = \max_{D \in \{0,1\}} \left\{(1 - D)V^R(s, B, \vartheta) + D\left[V^D(s)\right]\right\}$$

2. Repayment value with strategic enforcement of fiscal rule:

$$V^R(s, B, \vartheta) = \max_{B'} \left\{u(c) + \beta \mathbb{E}\left[V\left(s', B', \vartheta'\right)\right]\right\}$$

where:

$$c = y - \vartheta\phi^F(y) + q(s, B', \vartheta')(B' - (1 - \delta)B)) - \kappa B$$

$$\phi^F(y) = \begin{cases} \max\left\{\lambda_0 y + \lambda_1 y^2, 0\right\} & \text{if } \vartheta = 1 \\ 0 & \text{if } \vartheta = 0 \end{cases}$$

3. Default value:

$$V^D(s) = \frac{\left(y - \phi^D(y)\right)^{1-1/\sigma} - 1}{1 - 1/\sigma} + \beta \mathbb{E}_{s'|s}\left[\iota V(s', 0, 0) + (1 - \iota)V^D(s')\right]$$

where:

$$\phi^D(y) = \max\{\psi_0 y + \psi_1 y^2, 0\}$$

4. Bond price schedule:

$$q(s, B', \vartheta') = \mathbb{E}\left\{m(s, s')(1 - \mathcal{D}(s', B', \vartheta'))\left[\kappa + (1 - \delta)q(s', B'', \vartheta'')\right]\right\}$$

where:

$$m(s, s') = \exp\left[-r^\star - \gamma\left(\log(y') - \rho\log(y) - (1 - \rho)\log(\bar{y}) + \frac{1}{2}\gamma\sigma_y^2\right)\right]$$

C Equations with Taste Shocks

We assume that sovereign debt only takes values within a finite and bounded support with J points. The grid of long-term positions can be summarized by a vector Λ given by:

$$\Lambda = \left[B_1, B_2, ..., B_J\right]^T$$

where the operator T represents the transpose. We perturb the borrowing choice B' as follows: each period the sovereign draws a random vector $\boldsymbol{\epsilon}$ of additive taste shocks of size J, and each element of the vector is associated to a particular debt choice on Λ in case of repayment. From an ex-ante perspective, taste shocks make the debt choice decision stochastic.

1. Value for the sovereign:

$$\boldsymbol{V}(s, B, \vartheta) = \rho_D \log\left[\exp\left(\frac{\boldsymbol{V}^R(s, B, \vartheta)}{\rho_D}\right) + \exp\left(\frac{V^D(s)}{\rho_D}\right)\right]$$

2. Repayment value with strategic enforcement of fiscal rule:

$$V^R(s, B, \vartheta) = \rho_B \log\left(\sum_{j=1}^{J} \exp\left(\frac{W_j(s, B, \vartheta)}{\rho_B}\right)\right)$$

where:

$$W_j(s, B, \vartheta) = \frac{c_j(s, B, \vartheta)^{1-1/\sigma} - 1}{1 - 1/\sigma} + \beta \mathbb{E}_{s'|s} \boldsymbol{V}\left(s', B'_j, \vartheta'\right)$$

$$c_j(s, B, \vartheta) = y - \vartheta \phi^F(y) + q\left(s, B'_j, \vartheta'\right)\left(B'_j - (1-\delta)B\right) - \kappa B$$

$$\phi^F(y) = \begin{cases} \max\left\{\lambda_0 y + \lambda_1 y^2, 0\right\} & \text{if } \vartheta = 1 \\ 0 & \text{if } \vartheta = 0 \end{cases}$$

3. Default value:

$$V^D(s) = \frac{\left(y - \phi^D(y)\right)^{1-1/\sigma} - 1}{1 - 1/\sigma} + \beta \mathbb{E}_{s'|s}\left[\iota V(s', 0, 0) + (1-\iota) V^D(s')\right]$$

where:

$$\phi^D(y) = \max\{\psi_0 y + \psi_1 y^2, 0\}$$

4. Default probability:

$$\Pr(D = 1 | s, B, \vartheta) = \frac{\exp\left(\frac{V^D(s)}{\rho_D}\right)}{\exp\left(\frac{V^D(s)}{\rho_D}\right) + \exp\left(\frac{\boldsymbol{V}^R(s,B,\vartheta)}{\rho_D}\right)}$$

5. Choice probabilities for debt:

$$\Pr(B' = B'_j | s, B, \vartheta) = \frac{\exp\left(\frac{W_j(s,B,\vartheta)}{\rho_B}\right)}{\sum_{k=1}^{J} \exp\left(\frac{W_k(s,B,\vartheta)}{\rho_B}\right)}$$

6. Bond price schedule:

$$q\left(s, B', \vartheta'\right) = \mathbb{E}_{s'|s}\left[m(s', s) \Pr\left(D' = 0 | s', B', \vartheta'\right)\left(\kappa + (1-\delta)\sum_{B''} \Pr\left(B'' | s', B', \vartheta'\right) q\left(s', B'', \vartheta''\right)\right)\right]$$

where:

$$m(s, s') = \exp\left[-r^{\star} - \gamma\left(\log(y') - \rho\log(y) - (1-\rho)\log(\bar{y}) + \frac{1}{2}\gamma\sigma_y^2\right)\right]$$