



CONSILIUL FISCAL AL ROMÂNIEI
ROMANIAN FISCAL COUNCIL

WORKING PAPER No 4, November 2022

Fiscal Rules, Independent Fiscal Institutions, and Sovereign Risk

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Fiscal Rules, Independent Fiscal Institutions, and Sovereign Risk

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Abstract

This paper explores the implications of fiscal rules and independent fiscal institutions (IFIs) on sovereign risk. We employ a dynamic panel model for a sample composed of 24 countries members of the European Union over the period 2007-2019 and document that fiscal rules contain sovereign default risk measured by the credit default swap (CDS) spreads on sovereign bonds. IFIs, through monitoring compliance with numerical fiscal rules and assuring the transparency of the budgetary process, lead to a reduction in the likelihood of sovereign default, especially those that went through a process of institutional reform. Moreover, having developed financial markets accompanied by both fiscal rules and independent fiscal institutions contribute to a reduction in sovereign CDS premia against the backdrop of increased sovereign risk induced by more developed financial markets.

Keywords: Fiscal rules; independent fiscal institutions; sovereign CDS spreads; sovereign risk

JEL Classification: E62; G15; H63

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1. Introduction

The sovereign risk, usually defined as the probability that a government will default on its debt obligations, has direct and indirect implications on both economy and public finances, both at the national and global levels, and which, in the case of a severe adverse impact, could lead to economic decline, financial distress and even to a sovereign debt crisis (Kilponen et al., 2015; Moretti, 2021; Gilchrist et al., 2022). The transmission of sovereign default risk to the real economy and public finances, with possible feedback loops, occurs through various channels, concerning public debt sustainability, tax regime, government bonds yields and the related borrowing costs, financial market access and lending conditions, also affecting financial and nonfinancial corporations, associated with the related risks and real economic costs, including fiscal spillovers on macroeconomic fundamentals strengths and bearing a cross-countries contagion potential (Afonso et al., 2012; Li and Zinna, 2018; Pappas and Kostakis, 2020; Andrieş et al., 2021).

Considering the weaknesses of the European Union (EU) economic governance against the backdrop of sovereign debt crisis that exacerbated the impact, a deep reform of Treaty on Stability, Coordination and Governance (TSCG) was initiated in 2011, introducing a stricter set of fiscal rules (Fiscal Compact) in the Stability and Growth Pact (SGP) which came into effect in January 2013. Because this fiscal framework proved to be too complex and difficult to implement and achieve the expected results, under the circumstances of new challenges ahead following the COVID-19 health crisis in 2020, mainly due to the sharp increase in public debt ratios, the European Commission (EC) relaunched the review of economic governance (Barnes and Oliinyk, 2021; Strauch, 2021; EUIFIs, 2021; Beetsma, 2022). Key issues discussed with the Member States and communicated by the European Commission on 9th of November 2022 concerning the orientations for a new economic and fiscal governance framework focuses on the need to reduce complexity, increase national ownership, better enforcement and more realistic debt reduction strategies that ensure stability and sustain growth through investment and reforms (country-specific debt anchor, net expenditure benchmark). The revised fiscal framework should have a greater focus on the medium-term approach, ensuring effective multilateral policy coordination and risk-based surveillance and responding to future long-term challenges (Piana, 2022; Rodríguez Muñoz, 2022; European Commission, 2022a).

The large debate on European economic and fiscal governance reform has been guided by the general objective of supporting debt sustainability and the related fiscal rules, thus creating a clear connection between the compliance and enforcement of these new rules and the reduction in sovereign debt default risk, possible in several favorable ways: (i) increasing the credibility of the fiscal policy, (ii) improving the effectiveness of budgeting, (iii) developing the financial system and enhancing the capital market access, (iv) lowering the cost of borrowing, and (v) upgrading the sovereign credit rating and reducing the sovereign spreads.

The role of fiscal rules in the budgetary framework has been assessed in many studies (for an overview, see Căpraru et al., 2022). The literature also focuses on the impact of numerical fiscal rules on a country's credit rating (Fernandez and Parro, 2019; Sawadogo, 2020), sovereign bond spreads (Heinemann et al., 2014; Thornton and Vasilakis, 2017; Sawadogo, 2020; David et al., 2020; Gomez-Gonzalez et al., 2022; Hatchondo et al., 2022), debt prices (Iara and Wolff, 2014; Kelemen and Teo, 2014; Afonso and Guimaraes, 2015), or public debt (Kelemen and Teo, 2014, Alfaro and Kanczuk, 2017). However, no research has specifically evaluated how fiscal rules affect sovereign credit default swap (CDS) spreads.

The influence of numerical fiscal targets on sovereign risk, the cost of public debt and the public debt sustainability derives from the fact that a sound fiscal framework determines market confidence in governments' commitment towards sustainable fiscal policies, i.e., the "commitment effect" (Iara and Wolff, 2014; Thornton and Vasilakis, 2017; David et al., 2020), and anchors fiscal policy expectations (Leeper, 2010; Checherita-Westphal et al., 2022). Through their signaling effect about future fiscal policy actions, they remove information asymmetries between governments and the electorate, without altering the behavior of policymakers, i.e., the "signaling effect" (Debrun and Kumar, 2007; Debrun et al., 2008; Iara and Wolff, 2014). Moreover, financial markets tend to discipline states that violate numerical fiscal targets (Poterba and Rueben, 1997).

When it comes to independent fiscal institutions (IFIs), established to monitor compliance with numerical fiscal rules, there is a considerable amount of theoretical and empirical research that emphasizes their role on different types of budget balances (Debrun and Kumar, 2007; Debrun and Kinda, 2017; Căpraru et al., 2022), fiscal forecasting accuracy (Debrun et al., 2017; Beetsma et al., 2019), government borrowing costs (Pappas and Kostakis, 2020), compliance with fiscal rules (Căpraru et al., 2022), or fiscal policy

procyclicality (Chrysanthakopoulos and Tagkalakis, 2022). To the best of our knowledge, there are no studies that assess the IFIs-sovereign risk nexus.

The impact of IFIs on sovereign risk could be explained through different channels. One channel derives from the "signal-enhancement" role of IFIs theorized by Beetsma et al. (2022). Due to their role in assuring transparency and informing the public, rating agencies, supranational financial institutions, etc. about the state of public finances, they provide stronger incentives to policymakers to implement sound policies. Enhancing the policy credibility will reduce the risk premia/sovereign spreads. This credibility could be provided by IFIs through their technical contributions to the budgetary process and the implementation of fiscal policy with a positive impact on fiscal outcomes as well (Debrun et al., 2017; Martins and Correia, 2021).

Another channel deals with the financial flogging hypothesis (Hansen, 2020) derived from the market discipline hypothesis. The financial flogging hypothesis states that financial markets in the context of existence of fiscal rules and fiscal transparency (assured by the IFIs), lead to more government fiscal discipline. Investors impose higher interest rates on debt for countries that have accumulated large debt or/and high deficits levels and practice policies and operations that are perceived as unsustainable (Bergman et al., 2019), higher borrowing costs being associated with increased risk, and charge lower interest rates when fiscal aggregates are deemed sound, reflecting reduced levels of default risk. As a consequence, the existence of fiscal rules and the enhancing role of fiscal transparency ensured by the IFIs influence markets to act in lowering sovereign risk.

The role of IFIs is even more important against the background of the perspectives of changing the European fiscal framework that would assure debt sustainability through "a simple, clear, and credible way, without imposing a fiscal tightening that would imply unnecessary economic costs" (Strauch, 2022) or to pursue unrealistic or undesirable policies (Barnes and Oliinyk, 2021). By the same token, the new monetary policy instrument introduced by the European Central Bank (ECB), the Transmission Protection Instrument (TPI), is based on a cumulative list of four criteria "to assess whether the jurisdictions in which the Eurosystem may conduct purchases under the TPI pursue sound and sustainable fiscal and macroeconomic policies" (ECB, 2022), being directly or indirectly related to public debt sustainability.

In this paper, we examine the impact of fiscal rules and independent fiscal institutions on sovereign default risk by focusing on a sample of 24 countries members of the EU over the period 2007-2019. We document a beneficial impact of fiscal rules in place on sovereign credit risk, results that are consistent across a battery of robustness checks, including endogeneity concerns, different proxy for numerical fiscal rules, alternative estimation technique, and several control variables. When fiscal rules are interacted with independent fiscal institutions that assure the transparency of the budgetary framework and monitor compliance with these numerical targets, we find evidence in favor of IFIs association with lower sovereign spreads, and especially for those that underwent a process of institutional reform that extended their mandates to embrace new tasks and responsibilities. Moreover, having developed financial markets augmented with both fiscal rules and independent fiscal institutions contribute to a reduction in sovereign CDS spreads in the context of increased sovereign risk induced by more developed financial markets.

The remainder of this paper is organized as follows: Section 2 presents the data, Section 3 describes the empirical strategy adopted, Section 4 discusses the findings and performs several robustness tests, and Section 5 concludes.

2. Data

We follow Andrieş et al. (2021) and employ the 5-year sovereign CDS spreads denominated in EUR for a set of 24 countries members of the EU spanning the period from 2007 to 2019⁴, which are the most traded and liquid contracts in the CDS market (Blanco et al., 2005; Augustin et al., 2020). These spreads on sovereign CDS contracts, also known as sovereign insurance premia, together with the bond yield spreads, can gauge market perceptions of default risk of a country (Blommestein et al., 2016), and represent insurance premia for protection against losses stemming from specific credit events, such as debt restructuring or default (Chen and Chen, 2018). However, CDS contracts provide more precise estimates of credit spreads due to the higher liquidity of this market (Longstaff et al., 2011) and lead the bond market in the price discovery process (Blanco et al., 2005). Furthermore, the bond

⁴ In March 2020 the activation of the general escape clause of the SGP led to a suspension of the fiscal rules in the European Union against the backdrop of the COVID-19 health crisis. Recently, the European Commission proposed to maintain the general escape clause even in 2023 amid the heightened economic uncertainties and strong slowdown in growth caused by Russia's invasion of Ukraine. Thus, we do not include 2020 and 2021 years in our analysis.

spreads can incorporate other factors that are not specifically related to default risk, such as inflation expectations and demand/supply for credit conditions (Aizenman et al., 2013). The dataset is retrieved from Thomson Reuters Eikon and we select the spreads available in the last trading day at the end of each year as annual observations. Table 1 exhibits the description of variables.

[Table 1 goes here]

To compute the fiscal rules index, we undertake the same approach as in Căpraru et al. (2022) and employ the Fiscal Rules Dataset from the International Monetary Fund (IMF), comprising information about expenditure, revenue, balanced budget, and debt rules in place, either national or supranational, defined as dummy-type variables. We sum up all these variables to get the fiscal rules index, taking values from 0 (minimum) to 4 (maximum), higher values indicating a greater number of fiscal rules in place.⁵ Countries have adopted multiple fiscal rules with the objective of strengthening their fiscal performance (Vinturis, 2022). As for independent fiscal institutions, we use the Organisation for Economic Co-operation and Development (OECD) database and construct a dummy variable taking the value of one in the year an IFI began operating and onwards, and zero otherwise. This variable captures the presence of independent fiscal institutions as well as the transparency in fiscal governance guaranteed by their tasks and mission in informing the public about the developments in fiscal policy. Debrun and Kinda (2017) show that IFIs complement fiscal rules in improving fiscal outcome, and at the same time foster compliance with numerical rules (Căpraru et al., 2022).

3. Empirical strategy

We assess the implications of fiscal rules on sovereign risk in a dynamic panel framework using the two-step System Generalized Method of Moments (GMM) estimation technique developed by Blundell and Bond (1998) to capture the highly persistent nature of sovereign risk (Li et al., 2022). This estimator allows us to control for potential endogeneity biases derived from simultaneity and omitted variables, by considering the lags of the explanatory

⁵ In Section 4.2 we use as robustness checks the European Commission's fiscal rules index that reflect their existence as well as specific institutional characteristics.

variables as excluded instruments.⁶ As pointed-out by Hansen (1982), the GMM estimator is robust in the presence of serial correlation and heteroskedasticity of unknown form, or non-linearity.

The baseline specification takes the following form:

$$CDS\ Spreads_{i,t} = \beta_1 \times CDS\ Spreads_{i,t-1} + \beta_2 \times Fiscal\ Rules\ Index_{i,t} + \beta_3 \times \mathbf{X}_{i,t} + \beta_4 \times \mathbf{Z}_t + \gamma_i + \varepsilon_{i,t} \quad (1)$$

where $CDS\ Spreads_{i,t}$ is the natural logarithm of CDS quotes of country i in year t , $Fiscal\ Rules\ Index_{i,t}$ is the time-varying fiscal rules index constructed as specified above, $\mathbf{X}_{i,t}$ is a vector of country-specific characteristics that are found in the empirical literature to influence sovereign CDS spreads, i.e., real GDP growth as proxy for domestic business cycle (Aizenman et al., 2013; Cevik and Öztürkkal, 2021; Avdjiev et al., 2022), inflation (Aizenman et al., 2013; Cevik and Öztürkkal, 2021), public gross debt as a share of gross domestic product (GDP) and fiscal balance/GDP to account for fiscal space (Fontana and Scheicher, 2010; Cevik and Öztürkkal, 2021), current account balance in percentage of GDP to quantify external position's sustainability (Cevik and Öztürkkal, 2021; Gomez-Gonzalez et al., 2022), and the quality of a country's governance measured by the Governance Index computed based on Worldwide Governance Indicators (Chen and Chen, 2018). \mathbf{Z}_t is a vector of global variables, i.e., the change in the USD/EUR nominal exchange rate, that is, a variable number of euro units per one unit of US dollar (Fontana and Scheicher, 2010; Blommestein et al., 2016; Chen and Chen, 2018, Augustin et al., 2020), market-wide corporate credit risk proxied by iTraxx Europe index (Fontana and Scheicher, 2010; Galariotis et al., 2016), liquidity in the CDS market gauged by the bid-ask spread of iTraxx Europe index that should reflect common patterns in the CDS market liquidity (Fontana and Scheicher, 2010), and global risk aversion measured by the change in the volatility index (VIX) (Galariotis et al., 2016; Chen and Chen, 2018; Cevik and Öztürkkal, 2021; Avdjiev et al., 2022). γ_i are fixed effects to account for time-invariant country-specific factors and $\varepsilon_{i,t}$ is the idiosyncratic error term. We do not include time fixed effects because we employ several global variables that capture time-varying common factors, in line with other similar approaches (Cevik and Öztürkkal, 2021; Avdjiev et al., 2022). The data is sourced from the IMF, World Bank, and Thomson Reuters Eikon. To mitigate the impact of potential outliers, all country-level variables, except fiscal rules index, are

⁶ Following Roodman (2009) the instruments are collapsed to address instrument proliferation issue and overfitting bias.

winsorized between 1st and 99th percentiles. We apply the finite-sample correction of Windmeijer (2005) to the two-step covariance matrix to address the small-sample downward bias of standard errors.

Iara and Wolff (2014) argue that the simultaneity bias between fiscal rules and sovereign risk, which can be a cause for endogeneity, is not a concern because of the usual adoption lags of political reforms. Moreover, the subsequent fiscal framework reforms were put in place as a consequence of domestic and European Union-level pressure, thus any connection with CDS spreads can be ruled out. However, in an alternative specification we consider fiscal rules index as predetermined as suggested by Iara and Wolff (2014), and instrument it without contemporary values in levels when estimating the model in differences. The validity of instruments is tested using the Arellano-Bond test for absence of autocorrelation in the first-differenced residuals at order 1 and 2, and Hansen J-statistic which is used to determine the validity of the overidentifying restrictions.

Further, we interact the fiscal rules index with the IFI dummy in the following specification:

$$\begin{aligned}
 CDS\ Spreads_{i,t} = & \beta_1 \times CDS\ Spreads_{i,t-1} + \beta_2 \times Fiscal\ Rules\ Index_{i,t} + \beta_3 \times \\
 IFI\ Dummy_{i,t} + & \beta_4 \times Fiscal\ Rules\ Index_{i,t} \times IFI\ Dummy_{i,t} + \beta_5 \times \mathbf{X}_{i,t} + \beta_6 \times \mathbf{Z}_t + \\
 \gamma_i + & \varepsilon_{i,t}
 \end{aligned} \tag{2}$$

4. Empirical findings

4.1 Benchmark results

Table 2 presents the summary statistics of our variables used in the empirical analysis. As we can note, the fiscal rules index has a minimum value of one and a maximum value of four, with a standard deviation of 0.52, meaning that in the period under investigation the countries from our sample had a least one numerical fiscal rule in place.

[Table 2 goes here]

The main results of the paper are displayed in Table 3. We find that a higher number of fiscal rules in place are significantly linked with a reduction in sovereign default risk proxied by the sovereign CDS spreads for both 5-year (Model (1)) and 10-year (Model (2)) maturities,

through commitment and signaling effects, in line with other studies that employ different measures for sovereign risk, such as credit ratings (Fernandez and Parro, 2019; Sawadogo, 2020) or bond spreads (Heinemann et al., 2014; Thornton and Vasilakis, 2017; Sawadogo, 2020; David et al., 2020; Gomez-Gonzalez et al., 2022; Hatchondo et al., 2022). Thus, fiscal rules, which constrain a country's fiscal policy, are perceived as credibility-enhancing devices by the financial markets (Eyraud et al., 2018).

[Table 3 goes here]

The findings are also economically meaningful: a one standard deviation increase in the fiscal rules index is associated with a decrease of 10.32% of a standard deviation in 5-year CDS spreads, and of 12.44% of a standard deviation in 10-year CDS spreads. Both the AR and Hansen J statistic tests confirm the validity of our instruments, whereas the large significance of the coefficients of the lagged dependent variables indicate a persistence in CDS spreads.

Regarding the control variables, an improvement in the fiscal balance, defined as the difference between government revenues and expenditures as a share of GDP, leads to a reduction in the costs associated with sovereign credit risk, whereas a depreciation of the euro against the US dollar, a heightened in the corporate credit risk (iTraxx indices) and in the global risk aversion and global financial conditions (ΔVIX) amplify sovereign default risk.

4.2 Robustness tests

In this section we test the robustness of our findings. In Model (1) from Table 4 we use the composite fiscal rules index developed by the European Commission that contains information about (i) legal base, (ii) binding character, (iii) organizations monitoring compliance and the correction mechanism, (iv) correction mechanisms, and (v) resilience to shocks, higher values of the index being associated with well-designed features.⁷ Model (2) provides an alternative measure of sovereign default risk defined as the difference between 10-year government bond yields and 10-year euro swap rate (risk-free rate) similar to Caporin et al. (2018). In Model (3) we use the bias-corrected least square dummy variable (LSDVC)

⁷ The fiscal rules index developed by the European Commission includes data about independent fiscal institutions as bodies that oversee compliance with these numerical targets. To isolate the effect of IFIs on sovereign risk and to avoid multicollinearity problems in the subsequent analysis (see Section 4.3), the IMF fiscal rules index is employed as our main variable.

estimator that has better small sample properties than GMM in terms of bias and root mean squared error as shown in Monte Carlo simulations conducted by Bruno (2005). In Model (4) we treat fiscal rules index as predetermined as suggested by Iara and Wolff (2014). In all these specifications, our findings remain consistent.

[Table 4 goes here]

Further, we include in Model (5) the public debt/GDP ratio in first difference instead of level to capture the dynamics of public debt. We note a positive and statistically significant impact of this variable on sovereign risk meaning that markets are not concerned by the stock of public debt *per se* (from baseline results exhibited in Table 1 the coefficient of public debt/GDP regressor lacks statistical significance), but rather by its dynamics. In Model (6) we control for country-specific sovereign crisis episodes as defined by the European Systemic Risk Board. While sovereign CDS premia are found to be boosted by these periods of uncertainty, the fiscal rules index preserves its sign and significance. Thus, fiscal rules are able to limit CDS spreads hikes even during country-wide distress.⁸ Finally, an increase in the domestic stock market index return, as reported in Model (7), reduces sovereign credit risk.

4.3 Independent fiscal institutions and sovereign risk

Even though the IFIs do not have the same prerogatives in the area of fiscal policy as central banks do in the area of monetary policy, their role in monitoring compliance with fiscal rules, enhancing the budgetary process and promoting sound fiscal policies and sustainable public finances has been found to impact various fiscal aggregates, even after controlling for fiscal rules (see e.g., Căpraru et al., 2022). In Table 5 we interact fiscal rules index with the IFI dummy and show that their interaction leads to a reduction in CDS spreads on sovereign bonds through monitoring compliance with fiscal rules, although with a reduced statistical significance (10%). Our results prove again the importance of the existence of IFIs and their strong role in the fiscal governance framework (EUIFIs, 2021; Barnes, 2022; Checherita-Westphal et al., 2022). At the same time, the reduced significance of the interaction term suggests that fiscal rules *per se* are not sufficient to be effectively implemented under the IFIs’

⁸ Additionally, we re-estimate our model by using Country-Level Index of Financial Stress provided by the ECB Statistical Data Warehouse as measures of country-specific financial crises. The results do not change and are available upon request.

surveillance, but they have to be adequate, well fitted with their institutional features and adapted to specific economic conditions.

[Table 5 goes here]

Some IFIs went through an institutional reform, which allowed them to broaden their mandates to include new roles and responsibilities. When the reform variable is interacted with the IFI dummy in Model (2), the estimated coefficient is negative and highly significant at the 1% level, indicating that the reform has a beneficial effect on CDS premia. Thus, the new roles and responsibilities acquired through reform reduce sovereign risk. The benefits of IFIs' reform are highlighted in Căpraru et al. (2022) as well, with reference to fiscal outcomes and compliance with fiscal rules. These results underline the idea that IFIs have to pursue optimal mandated tasks, enhancing some minimum standards (EUIFIs, 2021; Barnes, 2022).

Finally, in Model (3) and (4) we interact fiscal rules index and IFI dummy, respectively with high financial markets development index, defined as a dummy-type variable that takes the value of one when the financial markets development index provided by the IMF is greater than the median of the sample in a given year, and zero otherwise. We note that more developed financial markets have the potential to enhance sovereign risk, although the results are statistically significant at the conventional levels only in Model (3), in line with Gennaioli et al.'s (2014) results. However, the coefficients of the interaction terms are both negative and highly significant pointing that countries with more developed domestic financial markets can ameliorate their sovereign risk when they are accompanied by both fiscal rules and independent fiscal institutions that ensure transparency in fiscal governance, results that contradicts those of Fernandez and Parro (2019) for a country's credit rating in which fiscal rules and financial development act as substitutes in reducing the default risk. Thus, our findings reveal that fiscal rules, independent fiscal institutions and financial markets act as complements, rather than substitutes, in taming sovereign default risk, and that policymakers should pay special attention to these aspects when elaborating the new economic and fiscal governance framework, and undertake specific actions to facilitate the development of national financial markets within the European Union.

5. Conclusion

This paper investigates the nexus between fiscal rules and sovereign default risk in 24 countries members of the European Union over the period 2007-2019, measured by the credit default swap (CDS) spreads on sovereign bonds. We show that fiscal rules contain sovereign risk through commitment and signaling effects. In the same vein, independent fiscal institutions, that monitor compliance with these numerical targets and assure the transparency of the budgetary process, in interaction with fiscal rules, lead to a reduction in sovereign CDS spreads, especially those that were subjects to institutional reforms. In addition, against the backdrop of increased sovereign CDS premia induced by more developed financial markets (Gennaioli et al., 2014), fiscal rules and independent fiscal institutions in interaction with developed financial markets provide the propitious framework in taming sovereign default risk.

Our study emphasizes the importance of strengthening the role of independent fiscal institutions, all the more in the circumstances of reviewing the European Union economic governance towards more prudent and stability-oriented policies, by prioritizing the new fiscal rules as an anchor of debt sustainability (European Commission, 2022b). Establishing minimum standards for European Union independent fiscal institutions and enhancing their capacity based on an extended mandate in the future fiscal framework, with good and timely access to information, sufficient resources and adequate flexibility to manage them, and ensuring safeguards to their independence should be considered, in the context of their role in monitoring fiscal rules compliance and enforcement, with a beneficial influence on sovereign default risk.

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Table 1. Description of variables.

Variable name	Definition	Source
Dependent variables		
In(5y CDS)	Natural logarithm of the 5-year sovereign CDS spreads denominated in EUR	Own calculations based on Thomson Reuters Eikon data
In(10y CDS)	Natural logarithm of the 10-year sovereign CDS spreads denominated in EUR	Own calculations based on Thomson Reuters Eikon data
10y Bond Yield Spread	The difference between the 10-year government bond yield and the 10-year euro swap rate	Own calculations based on Thomson Reuters Eikon data
Independent variables		
IMF Fiscal Rules Index	Sum of the expenditure, revenue, balanced budget, and debt rules in place, either national or supranational, defined as dummy-type variables. The index takes values from 0 (mimum) to 4 (maximum), higher values being associated with a higher number of rules in place	Own calculations based on International Monetary Fund data
Real GDP Growth	Annual percentage growth rate of GDP at market prices based on constant local currency	World Bank
Inflation	Annual percentage change of the Consumer Price Index (CPI)	World Bank
Gross Debt/GDP	Government gross debt as a share of GDP	International Monetary Fund
Fiscal Balance/GDP	Difference between government revenues and expenses as a share of GDP	International Monetary Fund
Current Account/GDP	Sum of net exports of goods and services, net primary income, and net secondary income as a share of GDP	World Bank
Governance Index	Principal Component Analysis (PCA) of the six Worldwide Governance Indicators: (i) voice and accountability, (ii) political stability and absence of violence/terrorism, (iii) government effectiveness, (iv) regulatory quality, (v) rule of law, and (vi) control of corruption. Higher values denote better governance	Own calculations based on Worldwide Governance Indicators
Δ USD/EUR	First difference of the USD/EUR nominal exchange rate, i.e., a variable number of euro units per one unit of US dollar	Own calculations based on Thomson Reuters Eikon data
In(5y iTraxx Europe Index)	Natural logarithm of the 5-year iTraxx Europe Index	Own calculations based on Thomson Reuters Eikon data
In(10y iTraxx Europe Index)	Natural logarithm of the 10-year iTraxx Europe Index	Own calculations based on Thomson Reuters Eikon data
Bid-Ask Spread (5y)	The difference between bid and ask quotes of the 5-year iTraxx Europe Index	Own calculations based on Thomson Reuters Eikon data
Bid-Ask Spread (10y)	The difference between bid and ask quotes of the 10-year iTraxx Europe Index	Own calculations based on Thomson Reuters Eikon data
Δ VIX	First difference of the VIX index	Own calculations based on Thomson Reuters Eikon data
Additional control variables		
EC Fiscal Rules Index	Fiscal Rules Index computed by the European Commission based on the following criteria: (i) legal base, (ii) binding character, (iii) bodies monitoring compliance and the correction mechanism, (iv) correction mechanisms, and (v) resilience to shocks	European Commission

Δ Gross Debt/GDP	First difference of the government gross debt as a share of GDP	Own calculations based on International Monetary Fund data
Sovereign Crisis	Dummy variable that takes the value of one when a country experienced a sovereign crisis, and zero otherwise	European Systemic Risk Board
Equity Index Return	Percentage change of the main equity index	Own calculations based on Thomson Reuters Eikon data
Interaction variables		
IFI Dummy	Dummy variable that takes the value of one when an independent fiscal institution began operating and onwards, and zero otherwise	Organisation for Economic Co-operation and Development
Reform	Dummy variable that takes the value of one when an independent fiscal institution was subject to institutional reforms and onwards, and zero otherwise	Own calculations based on International Monetary Fund and Organization for Economic Co-operation and Development databases
High Financial Markets Development Index	Dummy variable that takes the value of one when the financial markets development index is higher than the median of the sample in a given year, and zero otherwise. Financial markets development comprises information related to depth (stock market capitalization to GDP, stocks traded to GDP, international debt securities government (% of GDP), total debt securities of nonfinancial corporations (% of GDP), total debt securities of financial corporations (% of GDP)), access (percent of market capitalization outside of top 10 largest companies, total number of issuers of debt (domestic and external, nonfinancial corporations, and financial corporations), and efficiency (stock market turnover ratio (stocks traded/capitalization)).	Own calculations based on Sahay et al. (2015) data

Table 2. Summary statistics.

Variables	Unit	Mean	St. dev.	p25	Median	p75	Min	Max	Obs.
ln(5y CDS)		4.3669	1.3877	3.5807	4.2924	5.1193	1.8132	9.6094	270
ln(10y CDS)		4.6929	1.1450	4.0898	4.6233	5.2661	2.4445	9.2835	270
IMF Fiscal Rules Index		2.8407	0.5179	3.0000	3.0000	3.0000	1.0000	4.0000	270
Real GDP Growth	%	1.4288	3.2128	0.4757	1.9406	3.1953	-10.1493	9.9430	270
Inflation	%	1.5765	1.5915	0.3405	1.4619	2.5732	-1.5448	6.0914	270
Gross Debt/GDP	%	69.101	36.723	39.773	66.733	92.930	6.6610	183.142	270
		6	9	7	4	7	8	8	
Fiscal Balance/GDP	%	-3.0151	3.2612	-4.5542	-2.5798	-0.5556	-13.8728	3.2282	270
Current Account/GDP	%	0.0183	4.0993	-2.1868	0.2347	2.2510	-14.4440	8.5041	270
Governance Index		-0.4100	2.0704	-1.7929	-0.5609	1.4102	-4.4021	3.6085	270
ΔEUR/USD		0.0163	0.0576	-0.0224	0.0249	0.0484	-0.1153	0.1007	270
ln(5y Itraxx Index)		4.3890	0.4023	4.1423	4.2976	4.6501	3.7892	5.1655	270
ln(10y Itraxx Index)		4.7494	0.2267	4.5286	4.7351	4.8770	4.4341	5.1888	270
Bid-Ask Spread (5y)	basis points	0.5577	0.7042	0.0000	0.5000	1.0000	0.0000	2.5000	270
Bid-Ask Spread (10y)	basis points	1.4119	2.6935	0.0000	0.8800	1.0000	0.0000	10.0000	270
ΔVIX		-1.6896	8.8838	-5.3800	-3.9300	5.4800	-18.3200	17.5000	270

Note: This table presents the descriptive statistics for the winsorized variables used in the benchmark model.

Table 3. Baseline model results.

	(1)	(2)
	ln(5y CDS)	ln(10y CDS)
IMF Fiscal Rules Index	-0.2918*** (0.0987)	-0.2936*** (0.1050)
Real GDP Growth	-0.0044 (0.0126)	0.0073 (0.0133)
Inflation	0.0013 (0.0170)	0.0092 (0.0203)
Gross Debt/GDP	-0.0015 (0.0038)	-0.0046 (0.0036)
Fiscal Balance/GDP	-0.0410** (0.0185)	-0.0399*** (0.0145)
Current Account/GDP	0.0153 (0.0176)	0.0039 (0.0169)
Governance Index	0.0035 (0.0955)	0.1200 (0.0751)
ΔUSD/EUR	0.8412* (0.4851)	0.5808* (0.3483)
ln(5y iTraxx Europe Index)	0.6052*** (0.1193)	
ln(10y iTraxx Europe Index)		0.4763*** (0.1265)
Bid-Ask Spread (5y)	0.0566 (0.0564)	
Bid-Ask Spread (10y)		-0.0181 (0.0142)
ΔVIX	0.0154** (0.0067)	0.0165*** (0.0030)
Dependent (t-1)	0.5559*** (0.1466)	0.7311*** (0.1127)
Observations	270	270
Countries	24	24
AR(1) test	-3.0277***	-3.5665***
AR(2) test	-0.3813	0.2634
Hansen J statistic	1.3600	1.5886
Instruments	15	13

Note: This table presents the results for the baseline model from Equation (1) using the System GMM estimator with the finite-sample correction of Windmeijer (2005). The dependent variables are ln(5y CDS) and ln(10y CDS), respectively. AR(1) and AR(2) tests are the first and second order tests for autocorrelation of the first-differenced residuals, respectively, with the null hypothesis of no autocorrelation. Hansen J statistic tests the overidentifying restrictions with the null hypothesis that the overidentifying restrictions are valid. Corrected standard errors in parentheses.

Table 4. Robustness tests.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Sys-GMM	Sys-GMM	LSDVC	Sys-GMM	Sys-GMM	Sys-GMM	Sys-GMM
	In(5y CDS)	10y Bond Yield Spread	In(5y CDS)	In(5y CDS)	In(5y CDS)	In(5y CDS)	In(5y CDS)
EC Fiscal Rules Index	-0.1178** (0.0488)						
IMF Fiscal Rules Index		-0.4418*** (0.1279)	-0.2013** (0.1009)	-0.4390*** (0.1327)	-0.2796*** (0.0753)	-0.4350*** (0.1122)	-0.2026** (0.0849)
ΔGross Debt/GDP					0.0182** (0.0079)		
Sovereign Crisis						0.6183** (0.2947)	
Equity Index Return							-0.0114*** (0.0029)
Real GDP Growth	-0.0064 (0.0127)	0.0302 (0.0390)	-0.0154 (0.0145)	-0.0093 (0.0139)		-0.0048 (0.0164)	0.0029 (0.0158)
Inflation	0.0020 (0.0190)	0.2412** (0.1080)	-0.0014 (0.0241)	-0.0081 (0.0176)	0.0094 (0.0217)	-0.0015 (0.0215)	-0.0274 (0.0194)
Gross Debt/GDP	-0.0022 (0.0045)	-0.0006 (0.0082)	0.0004 (0.0035)	0.0044 (0.0044)		-0.0015 (0.0046)	-0.0014 (0.0047)
Fiscal Balance/GDP	-0.0545*** (0.0182)	-0.1108** (0.0472)	-0.0381*** (0.0144)	-0.0252 (0.0171)	-0.0082 (0.0126)	-0.0058 (0.0186)	-0.0319** (0.0157)
Current Account/GDP	0.0247 (0.0153)	0.0353 (0.0661)	0.0251 (0.0156)	0.0163 (0.0148)	0.0032 (0.0241)	0.0141 (0.0263)	0.0225 (0.0154)
Governance Index	-0.0296 (0.1173)	-0.0294 (0.2589)	-0.0021 (0.1068)	-0.0153 (0.0806)	0.0681 (0.0991)	0.0144 (0.1220)	0.0014 (0.0966)
ΔUSD/EUR	0.7730 (0.5058)	-0.6595 (0.7457)	0.9303 (0.6806)	0.7745 (0.5391)	1.2710* (0.7079)	0.8496 (0.6326)	0.6224 (0.4501)
In(5y iTraxx Europe Index)	0.5438*** (0.0970)		0.7048*** (0.1407)	0.6656*** (0.1322)	0.5023** (0.2000)	0.7260*** (0.1925)	0.4574*** (0.1327)
Bid-Ask Spread (5y)	0.1153* (0.0612)		0.0953 (0.0651)	0.0905* (0.0485)	0.0442 (0.0785)	-0.0141 (0.0723)	0.0410 (0.0634)
In(10y iTraxx Europe Index)		0.3156* (0.1821)					
Bid-Ask Spread (10y)		0.0835 (0.0602)					
ΔVIX	0.0123* (0.0070)	0.0018 (0.0072)	0.0120* (0.0068)	0.0115 (0.0074)	0.0193* (0.0110)	0.0138 (0.0107)	
Dependent (t-1)	0.4298*** (0.1505)	0.4910*** (0.1446)	0.5039*** (0.0529)	0.5159*** (0.1540)	0.6481*** (0.2228)	0.5475** (0.2133)	0.6608*** (0.1407)
Observations	270	298	270	270	270	270	270
Countries	24	26	24	24	24	24	24
AR(1) test	-2.6751***	-2.1190**		-2.7640***	-2.5040**	-2.4633**	-3.2194***
AR(2) test	-0.4533	-0.0495		-0.7563	-0.1722	0.2992	-0.4260
Hansen J statistic	1.0097	8.0844		1.9106	0.3586	5.5616	4.0681
Instruments	13	18		16	14	16	15

Note: This table presents the results for robustness tests. The dependent variable is ln(5y CDS) for Model (1) and Models (3)-(7), whereas in Model (2) the dependent variable is 10-year government bond yield spread defined as the difference between 10-year government bond yield and 10-year euro swap rate. In Model (1) we employ the fiscal rules index developed by the European Commission. In Model (2) we use the 10-year bond yield spread as proxy for sovereign default. Model (3) exhibits the findings using the bias-corrected least squares dummy variable (LSDVC) estimator. In Model (4) we treat fiscal rules index as predetermined. In Model (5) we use change in public debt/GDP instead of the level – note that the real GDP growth variable is omitted due to strong correlation with change in public debt/GDP. In Model (6) we present the results by controlling for country-specific sovereign crises as defined by the European Systemic Risk Board, and in Model (7) we control for equity index return – note that the ΔVIX is omitted due to high correlation with equity index return. AR(1) and AR(2) tests are the first and second order tests for autocorrelation of the first-differenced residuals, respectively, with

the null hypothesis of no autocorrelation. Hansen J statistic tests the overidentifying restrictions with the null hypothesis that the overidentifying restrictions are valid. Corrected standard errors in parentheses for Models (1), (2) and (4)-(7), and bootstrap standard errors in parentheses based on 50 repetitions for Model (3)

Table 5. Further analysis: the role of IFIs.

Dependent: ln(5y CDS)	(1)	(2)	(3)	(4)
IMF Fiscal Rules Index	-0.1906** (0.0884)	-0.2242** (0.0955)	-0.1344* (0.0781)	-0.2435*** (0.0700)
IFI Dummy	0.6052 (0.4110)	-0.1208 (0.1015)	-0.1061 (0.0982)	0.0961 (0.0999)
IMF Fiscal Rules Index × IFI Dummy	-0.2326* (0.1305)			
IFI Dummy × Reform		-0.2200*** (0.0851)		
High Financial Markets Development Index			0.6289* (0.3592)	0.0873 (0.1970)
IMF Fiscal Rules Index × High Financial Markets Development Index			-0.3465*** (0.1021)	
IFI Dummy × High Financial Markets Development Index				-0.4107*** (0.0868)
Real GDP Growth	-0.0077 (0.0115)	-0.0084 (0.0108)	-0.0105 (0.0114)	-0.0093 (0.0103)
Inflation	0.0030 (0.0186)	0.0009 (0.0180)	0.0240 (0.0199)	0.0183 (0.0193)
Gross Debt/GDP	-0.0009 (0.0039)	0.0017 (0.0040)	0.0017 (0.0038)	-0.0002 (0.0040)
Fiscal Balance/GDP	-0.0364** (0.0161)	-0.0364** (0.0177)	-0.0266* (0.0149)	-0.0257* (0.0132)
Current Account/GDP	0.0113 (0.0164)	0.0231 (0.0157)	0.0149 (0.0185)	0.0159 (0.0149)
Governance Index	0.0490 (0.0806)	-0.0034 (0.0828)	0.1326 (0.0958)	0.1015 (0.0880)
ΔUSD/EUR	0.9710** (0.4706)	0.9026* (0.4715)	1.1089** (0.4724)	1.1179*** (0.4210)
ln(5y iTraxx Index)	0.5480*** (0.1161)	0.6255*** (0.1122)	0.5174*** (0.1244)	0.5381*** (0.1124)
Bid-Ask Spread (5y)	0.0623 (0.0557)	0.0813 (0.0549)	0.0677 (0.0545)	0.0724 (0.0494)
ΔVIX	0.0164** (0.0068)	0.0122* (0.0070)	0.0159** (0.0067)	0.0164*** (0.0062)
Dependent (t-1)	0.5587*** (0.1461)	0.4675*** (0.1582)	0.5665*** (0.1479)	0.5941*** (0.1299)
Observations	259	259	259	259
Countries	23	23	23	23
AR(1) test	-2.9453***	-2.7485***	-2.9857***	-3.2102***
AR(2) test	-0.5634	-0.6052	-0.4555	-0.7117
Hansen J statistic	0.6502	0.5859	1.0599	0.5143
Instruments	17	17	18	18

Note: This table presents the results for further analysis using the System GMM estimator with the finite-sample correction of Windmeijer (2005). The dependent variable is ln(5y CDS). In Model (2) the reform variable is dropped from the regression output due to multicollinearity. AR(1) and AR(2) tests are the first and second order tests for autocorrelation of the first-differenced residuals, respectively, with the null hypothesis of no autocorrelation. Hansen J statistic tests the overidentifying restrictions with the null hypothesis that the overidentifying restrictions are valid. Corrected standard errors in parentheses.