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Fiscal rules as institutional tools for public debt management in the European Union Member States

Abstract

This paper aims to assess the impact of the second-generation numerical fiscal rules on the effectiveness of public debt management in the Member States of the European Union. The research was conducted using dynamic panel models on a sample of 27 EU Member States over the period 2008–2021. The effectiveness of public debt management was determined by the level of public debt servicing costs, considering not only the impact of the quality of numerical fiscal rules on interest payments, but also other factors influenced by these rules, such as the quality of fiscal policy, the solvency of public finances and the quality of institutional governance. The motivation for this topic was to evaluate the effectiveness of the second-generation numerical fiscal rules following the changes made to their design in the context of the reconstruction of the EU fiscal surveillance system after the global economic and financial crisis of 2008–2010. The research has found that strong numerical fiscal rules improve the effectiveness of public debt management. In addition, stable fiscal policy and higher solvency of public finances, as well as political stability and the absence of violence, are conducive to lower public debt servicing costs. This paper enriches the literature by extending it with a new approach to fiscal rules, highlighting their multifaceted impact on the quality of public debt management.

Keywords

fiscal rules | public debt management | fiscal policy | public finances solvency | institutional governance

JEL Codes

H30, H62, H63

1. Introduction

This paper aims to assess the impact of the second-generation numerical fiscal rules on the effectiveness of public debt management in the European Union Member States (EU27) over the period from 2008 to 2021. As these rules have been successively implemented into national legislation since the enactment of Council Directive 2011/85/EU on requirements for budgetary frameworks of the Member States in 2011, the research also considers the effectiveness of the first-generation numerical fiscal rules during the global economic and financial crisis of 2008–2010. The effectiveness of public debt management was determined by the level of public debt servicing costs, considering not only the impact of the quality of numerical fiscal rules on interest payments, but also other factors influenced by these rules, such as the quality of fiscal policy, the solvency of

the public finance sector and the quality of institutional governance. To the best of the author's knowledge, the literature has not assessed the effectiveness of public debt management to this extent. This paper therefore enriches the literature by extending it with a new approach to fiscal rules as institutional tools with a multifaceted impact on the quality of public debt management, and provides important conclusions that can inspire further research in this area.

The number of national fiscal rules in EU Member States has increased significantly in recent years. This increase was particularly evident following the entry into force of Council Directive 2011/85/EU on requirements for the Member States' budgetary frameworks. Council Directive 2011/85/EU is part of a set of six pieces of EU legislation constituting the so-called 'six-pack' and the Treaty on Stability, Coordination and Governance in the Economic and

Monetary Union, known as the Fiscal Compact. The changes in European legislation were linked to the need to overhaul the EU's fiscal surveillance system following the global economic and financial crisis of 2008–2010. Both acts modified the provisions of the Stability and Growth Pact, including the construction of national numerical fiscal rules (European Commission, 2022a) and shifting the focus to improving their flexibility and defining rules for their monitoring and enforcement. Thus, the second-generation numerical fiscal rules were designed to reduce the discretionary nature of fiscal policy and increase its transparency, thereby providing an institutional basis for strengthening budgetary frameworks and fiscal coordination among EU countries.

Numerical fiscal rules also support EU Member States' compliance with the deficit and debt reference values under the TFEU. This is especially important given the prevalence of deficit bias resulting from the tendency to relegate fiscal discipline to successive governments and generations (Wyplosz, 2012). The reason is that electoral promises that are not matched by adequate sources of financing lead to the successive accumulation of budget deficits and ultimately to an increase in the burden of public debt (Alesina & Drazen, 1991). While cumulative budget deficits are not the sole cause of debt growth, adjusting fiscal policy to explicit limits on deficits, expenditures or other indicators can prevent a costly restoration of fiscal sustainability and thus enable effective public debt management in the long run (Eyraud et al., 2018).

The debt capacity of public finances is determined by several factors. One of these is the level of government bond issuance, which is the main source of capital raised by governments in EU Member States. The value of public debt issued has a decisive impact on the level of bond prices, which are inversely correlated with the level of their current yield (Alińska, 2016). As the need for borrowing increases, sovereigns are forced to issue bonds at prices that are attractive to investors, causing their yields to rise and increasing the public debt servicing costs. The solvency of a country's public finances is also the basis for the pricing of government bond spreads in international financial markets. The higher the solvency of a country, the lower the distance between its long-term government bond yields relative and those of the issuing country, whose debt securities are perceived as highly secure (Waszkiewicz, 2014). The government bond spread is therefore an appropriate benchmark for assessing

the effectiveness of public debt management over the long term, as it reflects the market's perception of the issuer's default risk.

The effectiveness of public debt management is also evident within the context of institutional governance quality. All fiscal policy decisions are made by government institutions, and these can be assessed along several dimensions of governance. The essence of good governance is defined by factors such as open and developmental policies, professional administration, acting for the public good, the rule of law, transparency of processes and a strong civil society (Kaufmann, Kraay & Mastruzzi, 2011). Aligning government institutions with the principles of good governance enhances their effectiveness in the public sphere while encouraging the emergence of responsible fiscal policies aimed at ensuring long-term debt sustainability.

The structure of this paper is as follows: first, a literature review covers the characteristics and measurement of second-generation numerical fiscal rules, a description of the cyclically-adjusted budget balance as a basic measure of the quality of fiscal policy, and the relationship between numerical fiscal rules and the solvency of the public finances, as well as the relationship between these rules and institutional governance; the empirical section establishes research hypotheses, outlines the research methodology employed, defines the variables, and interprets the results. The paper concludes with a final section presenting the conclusions.

2. Literature Review

2.1. Second-generation numerical fiscal rules: characteristics and measurement

Following the implementation of the provisions of Council Directive 2011/85/EU into national legislation, the literature on the effectiveness of EU Member States' budgetary frameworks has mainly focused on analysing the construction of numerical fiscal rules (Mohl et al., 2021). The global economic and financial crisis of 2008–2010 catalysed further reforms, including the existing fiscal rules, which proved to be insufficiently effective. Although the term 'second-generation' suggests a significant change in the approach to fiscal rules, these changes have

merely shifted the focus to their structure, setting new standards that are resilient to economic shocks. Given the lack of a definition of second-generation fiscal rules in the literature (Eyraud et al., 2018), the basis for theoretical considerations in this area is the classical understanding of numerical fiscal rules, supplemented by the guidance provided by Council Directive 2011/85/EU.

The essence of fiscal rules in quantitative terms is best captured by the most frequently cited definition by Kopits and Symansky, namely that they impose a permanent constraint on fiscal policy by setting reference values for selected fiscal aggregates (indicators) such as the budget deficit, public debt, expenditure or revenue, usually in relation to GDP (Kopits & Symansky, 1998). These limits cannot be changed frequently. Fiscal rules are defined as standards in the form of a legal act or political commitment that are binding for at least three years. According to this approach, medium-term budgetary frameworks or expenditure ceilings, which are treated as multi-annual projections that can be revised annually, are not classified as fiscal rules (Budina et al., 2012). The Directive's guidelines further indicate that country-specific numerical fiscal rules should specify the purpose and scope of their application, how they should be monitored and the consequences of non-compliance. Additionally, the exit clauses in the rules should identify a limited number of specific circumstances and strict procedures under which temporary non-compliance with a rule is permitted. Adapted to the specificities of each Member State and consistent with the budgetary objectives at the Union level, numerical fiscal rules should form the basis of a strengthened EU fiscal surveillance framework (Council Directive 2011/85/EU).

The literature indicates that effective fiscal rules should have three properties: simplicity, flexibility and enforceability (Kopits & Symansky, 1998). In practice, implementing these ideals in the construction of fiscal rules is challenging (Eyraud et al., 2018). Compared to the first generation, second-generation fiscal rules have become more flexible and enforceable at the expense of simplicity (Schaechter et al., 2010; Schick, 2010). This specificity of the rules was intended to enhance the effectiveness of the fiscal response by providing operational guidelines and a roadmap in times of crisis (Bandaogo, 2020). However, the complexity of the rules and additional constraints may hamper their ability to design and implement fiscal policy effectively. Thus, it is a mistake to adopt an exclusively uncritical

approach to fiscal rules because of their potentially negative consequences for the economy and public finances (Kumar et al., 2009; Calmfors & Wren-Lewis, 2011). The imposition of overly restrictive rules may lead to limited investment opportunities in the public sector and the need to review public functions by transferring part of the financing to the private sector or by spinning off relevant public sector units performing public functions (Marchewka-Bartkowiak, 2012). Overly restrictive fiscal rules can also lead to the use of 'creative accounting' to maintain power and political reputation, which threatens fiscal transparency (Milesi-Ferretti, 2004; Koen et al., 2006; von Hagen & Wolff, 2006; Buti, Nogueira-Martins & Turrini, 2007).

Empirical research confirms the effectiveness of numerical fiscal rules, provided they are properly designed (Potreba, 1996; Alesina & Perotti, 1996; Kumar et al., 2009; Schick, 2010; Bergman, Hutchison & Jensen, 2016; Eyraud et al., 2018; Bandaogo, 2020; Afonso & Coelho, 2022; European Commission, 2022a). Fiscal rules contribute to improving budget balances (Debrun et al., 2008; Luechinger & Schaltegger, 2013; Maltritz & Wüste, 2015; Bergman et al., 2016; Landon & Smith, 2017; Burret & Feld, 2018; Caselli & Reynaud, 2020) and reducing public debt levels (Debrun et al., 2008; Luechinger & Schaltegger, 2013; Azzimonti, Battaglini & Coate, 2016; Bergman et al., 2016; Landon & Smith, 2017; Asatryan, Castellon & Stratmann, 2018). Numerical fiscal rules also reduce the propensity to run excessive deficits due to impulsive budgetary decisions (Gupta, Liu & Mulas-Granados, 2016; Badinger & Reuter, 2017; Bonfatti & Forni, 2019; Gootjes, de Haan, & Jong-A-Pin, 2021) and contribute to the countercyclical effect of fiscal policy (Blanchard, Dell'Ariccia & Mauro, 2010; Delong & Summers, 2012; Bergman & Hutchison, 2015; Nerlich & Heinrich Reuter, 2015; Combes, Minea & Sow, 2017; Guerguil, Mandon, & Tapsoba, 2017; Gootjes & de Haan, 2022). While limiting budget deficits, the rules simultaneously build and preserve the fiscal space needed for discretionary decisions required by circumstance (Eyraud et al., 2018; IMF, 2018).

The increasing use of fiscal rules has led international organisations to create synthetic indicators to assess the quality of these rules based on their institutional characteristics. An example of such an index covering all types of numerical fiscal rules (budget balance rules, debt rules, expenditure rules and revenue rules) in EU Member States is the Fiscal Rules Strength Index (FRSI) developed by the

European Commission's Directorate-General for Economic and Financial Affairs. Initially, five factors were considered when constructing the FRSI: the legal basis of the fiscal rule, the degree of discretion in setting or reviewing the objectives of the rule, the bodies monitoring compliance with the restrictions imposed, and the transparency of the application of the rule, assessed through the role of the media (European Commission, 2016). However, this methodology was revised in 2015 due to the significant reshaping of EU Member States' budgetary frameworks in the aftermath of the global economic and financial crisis. Following the guidelines of Council Directive 2011/85/EU on the structure of second-generation numerical fiscal rules, the FRSI considers eight criteria related to the legal basis of fiscal rules, their design and the institutional setting in which they are implemented (European Commission, 2022b). When calculating the FRSI, numerical fiscal rules are scored according to specific scoring weights assigned to each criterion. The resulting scores are then aggregated to calculate a final assessment of the strength of the impact of a given rule, which is comparable across EU member states (Franek & Postuła, 2019). A similar method of calculating an index to assess the quality of numerical fiscal rules is used by the International Monetary Fund (Kumar et al., 2009; Schaechter et al., 2012).

2.2. Cyclically-adjusted budget balance (CAB) as a measure of the quality of fiscal policy

The main criterion for evaluating the condition of public finances and the quality of fiscal policies in EU Member States is the medium-term budgetary objective (MTO), the benchmark of which is the structural balance, as measured by the cyclically-adjusted budget balance (CAB) indicator (Moździerz, 2015; Mourre et al., 2019b). MTOs are generally set within a defined range between 1% of GDP and balance or surplus, in cyclically-adjusted terms, net of one-off and temporary measures (Regulation 1175/2011 of the European Parliament and of the Council). The exception is the euro area countries, for which a structural deficit floor of 0.5% of GDP has been set in line with the Fiscal Compact. However, if the general government debt ratio remains well below 60% of GDP and the risk of losing the long-term sustainability of public finances is low, the lower bound of the MTO may correspond to a structural

deficit of at most 1% of GDP (Treaty on Stability, Coordination and Governance in EMU). MTOs ensure the sustainability of public finances or rapid progress towards such sustainability, while leaving room for fiscal policy decisions, with a particular attention to public investment needs (Regulation EU 1175/2011 of the European Parliament and of the Council).

The cyclically-adjusted budget balance is a hypothetical value indicating what the value of the budget balance would be if real output were equal to potential output. The CAB determines the impact of discretionary fiscal policy on the budget by adjusting the actual budget balance for non-structural elements that depend on the impact of cyclical factors. This indicator considers changes in interest payments, which is important for assessing the long-term effectiveness of public debt management, regardless of whether interest payments are directly influenced by the decisions of the current government or whether the level of these expenditures is due to the nature of past fiscal policies. The CAB is also used to assess the size of the fiscal impulse and to examine whether a fiscal policy is sustainable (Larch & Turrini, 2009).

According to the methodology adopted by the European Commission, based on OECD guidelines (Girouard & André, 2005), the CAB is calculated as the difference between the headline budget balance (B , in percentage of GDP) and the estimated cyclical component, which is the product of the semi-elasticity of the headline budget balance (ε) and the output gap ($OG = (Y - Y_p)/(Y_p)$, i.e. the distance between actual and potential real GDP) (Mourre & Poissonnier, 2019a), which can be expressed by the following formula:

$$CAB_t = B - \varepsilon OG_t$$

The literature identifies some limitations of the CAB methodology used by the EU due to its aggregated approach. This indicator uses the output gap as a synthetic measure of the business cycle applied to all budget items. Proponents of the disaggregated approach point out that cyclical adjustment based on the output gap may ignore the variation in income and expenditure across phases of the business cycle (Bouthevillain et al., 2001), price effects relevant in periods of high inflation (Morris & Schuknecht, 2007; Escolano, 2010), or the variability of fiscal elasticities over time (Belinga et al., 2014; Köster & Priesmeier, 2017). However, the aggregated method used by the EU

performed relatively well during the global economic and financial crisis compared to disaggregated methods (Mourre et al., 2019a).

Despite many reservations, some dating as early as the 1990s (Blanchard, 1990), the CAB remains one of the key indicators for evaluating the nature of fiscal policy, used in the EU fiscal surveillance framework (Larch & Turrini, 2009; European Commission, 2012, Kuusi, 2018, Mourre et al., 2019b).

2.3. Numerical fiscal rules vs. public finances solvency and institutional governance

The budgetary impact of discretionary fiscal policy plays an important role in maintaining the long-term sustainability of public finances. In this context, the medium- to long-term perspective is linked to the assessment of the solvency of the public finances, which is a key criterion for the effectiveness of public debt management (European Central Bank, 2012). Public debt management is the process of setting and implementing a financing strategy to meet the government's borrowing needs at the lowest possible cost, over the medium to long term, with accepted risk constraints (IMF & World Bank, 2014). The strategy should also pursue other public debt management objectives, such as ensuring the liquidity, efficiency and transparency of the government bond market and the effective management of the government budget liquidity. The main source of raising capital to finance budget deficits and refinance existing liabilities is long-term government bonds issued on both domestic and foreign markets. Nowadays, the government bond market is undoubtedly the most important strategic market for most economies, especially for EU Member States (Postuła, Klepacki & Alińska, 2018).

When developing a public debt management strategy, it becomes crucial to recognise the relationship between budget deficits and long-term interest rates. The literature indicates a key channel for the impact of budget deficits on interest rates, that is national savings (Baldacci & Kumar, 2010). Budget deficits reduce national savings and increase aggregate demand, leading to an excess supply of public debt and higher real interest rates (Elmendorf & Mankiw, 1998). Although short-term real interest rates reflect cyclical conditions and the stance of monetary policy, and influence real medium- and long-term interest rates, the latter are likely to rise more in response

to the anticipated worsening in budget deficits and debt (Blanchard, 1984). Large deficits and debt can also raise concerns about the government's ability to service the debt, making fiscal stabilisation efforts less of a priority (Baldacci & Kumar, 2010; Combes et al., 2017). Thus, it is important for fiscal authorities to strengthen the national budgetary frameworks by implementing numerical fiscal rules (Kumar et al., 2009; Schaechter et al., 2012).

Empirical research confirms the significant impact of numerical fiscal rules on reducing the costs of sovereign borrowing in both domestic and international financial markets (Thornton & Vasilakis, 2018). It indicates that financial markets react positively to the presence of strong rules on fiscal policy outcomes, supporting the thesis that these rules help to address the problems of growing budget deficits and rising debt (Rommerskirchen, 2015). Well-designed numerical fiscal rules also lead to lower interest rates on government bonds (Afonso & Coelho, 2022) and, consequently, to lower yields and spreads on these assets (Iara & Wolff, 2014; Badinger & Reuter, 2017; Gomez-Gonzalez, Valencia & Sánchez, 2022). The literature also highlights that the most important dimension of the effectiveness of numerical fiscal rules in limiting government bond spreads is their entrenchment in law, followed by enforcement mechanisms (Iara & Wolff, 2014).

Given the institutional dimension of numerical fiscal rules, the literature assesses the relationship between fiscal rules and public governance (Bergman et al., 2016). It is measured by the World Bank's Worldwide Governance Indicators (WGI), which consider a wide range of institutional structures. The six dimensions of the index (voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law and control of corruption) describe the principle of good governance and rank individual economies in terms of the quality of institutional governance (Kaufmann et al., 2011; Muínelo-Gallo, 2022). This is important in the context of fiscal policy decisions made by government institutions charged with managing public debt, including optimising its servicing costs.

3. Empirical research

3.1. Research hypotheses

In accordance with the stated aim of this paper, the main research hypothesis has been formulated:

H1: Increasing in the strength of numerical fiscal rules leads to greater effectiveness of public debt management, which is expressed in lower public debt servicing costs.

As numerical fiscal rules interact with the effectiveness of public debt management through different channels, such as the quality of fiscal policy, the solvency of the public finances and the quality of institutional governance, three specific hypotheses have been formulated:

H1a: The higher the value of the CAB, which measures the budgetary impact of discretionary fiscal policy, the lower the public debt servicing costs.

H1b: The lower the solvency of public finances, as measured by the higher yield of 10-year government bonds and the higher the spread of these assets, the higher the public debt servicing costs.

H1c: The higher the quality of institutional governance, expressed in terms of good governance, the lower the public debt servicing costs.

3.2. Research methodology and definition of variables

The research was conducted by analysing a sample of 27 EU Member States over the period 2008–2021 using the GMM dynamic panel models estimator. For estimating the effectiveness of public debt management, an analysis of the determinants of the level of debt servicing costs (dependent variable) has been carried out. The explanatory variables included indicators such as the Fiscal Rule Strength Index (FRSI), the cyclically-adjusted budget balance (CAB), the actual budget balance, the general government gross debt, the 10-year government bond yield and the bond spread, as well as the Worldwide Governance Indicators.

To obtain a more detailed understanding of the relationships between variables, subspecifications of

the main panel model have been carried out. Within these subspecifications, additional explanatory variables have been included in subsequent iterations to better identify and assess the impact of individual factors on the effectiveness of public debt management. It has been confirmed that the statistically significant relationships obtained are not sensitive to the model specification, i.e. they do not change when additional determinants of public debt servicing costs are included.

The estimation of the models was preceded by an analysis of the correlations between the explanatory variables to identify the interdependencies involved, focusing on the effect of the strength of the numerical fiscal rules on the other explanatory variables. The analysis of the correlation coefficients has revealed a negative correlation between the strength of fiscal rules and the WGI Governance Indicator for Voice and Accountability, Political Stability, and Absence of Violence/Terrorism, and Rule of Law.

The definitions of the explanatory variables used in the estimation of the model are presented in Table 1.

3.3. Results

The estimation results of the models in Table 3 indicate that the public debt servicing costs are increasing over time, as evidenced by a positive coefficient with the dependent variable lagged by one period, which is several times higher than the negative coefficient with the dependent variable lagged by two periods. In all model estimations, a negative statistically significant parameter estimate was obtained with the variable reflecting the strength of the numerical fiscal rules. Thus, there are no grounds to reject the main hypothesis **H1**, which posits a negative relationship between the strength of numerical fiscal rules and the public debt servicing costs. The negative coefficient estimates with the *cyclically-adjusted budget balance* variable in models (2)–(4) confirm the inverse relationship between the budgetary impact of discretionary fiscal policy and the public debt servicing costs. This confirms hypothesis **H1a** that the higher the value of the CAB, the lower the public debt servicing cost. Positive statistically significant coefficient estimates with the variables *daily 10-year bond yield* and *bond spread* are consistent with hypothesis **H1b**. The results of the model estimations indicate that the higher the yield of 10-year government bonds and the higher

Table 1. Definition of variables

VARIABLE	DEFINITION	DATA SOURCE
debt interest (% of GDP)	a dependent variable representing the government's gross debt servicing costs (interest, payable, according to ESA 2010).	EUROSTAT, European Commission
Fiscal Rules Strenght Index (FRSI)	an indicator providing a synthetic measure of the quality of fiscal rules, covering all types of numerical fiscal rules (budget balance rules, debt rules, expenditure rules and revenue rules) in EU Member States, at all levels of government (central, regional and local, general government and social security).	Fiscal rules database, DG ECFIN, European Commission
cyclically-adjusted budget balance (CAB) (% of potential GDP)	the structural budget balance adjusted for one-off and temporary measures, which represents a hypothetical value indicating what the value of the budget balance would be if actual output were equal to potential output, while accounting for interest payments.	AMECO, DG ECFIN, European Commission
deficit/surplus (% of GDP)	the actual budget balance, that is the difference between total revenue and total expenditure (the government net lending(+)/net borrowing(-), according to ESA 2010).	EUROSTAT, European Commission
public debt (% of GDP)	the government gross debt (the government consolidated gross debt, according to ESA 2010).	EUROSTAT, European Commission
daily 10-year bond yield	a return on capital invested in 10-year government bonds (the value of the 10-year government bond yield for a calendar year was determined on the last working day of the last calendar month).	investing.com
bond spread	a risk premium that signifies the difference between the yield on a 10-year government bond of an EU Member State and the yield on a 10-year government bond of Germany, which is considered highly secure.	investing.com
Worldwide Governance Indicators:	aggregate indicators to assess individual countries, including EU Member States, on the quality of institutional governance in the following six dimensions:	World Bank, WGI
Voice and Accountability	measures perceptions of the extent to which citizens participate in electing their government, as well as freedom of speech, freedom of association and freedom of the media;	
Political Stability and Absence of Violence/ Terrorism	measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorist acts;	
Government Effectiveness	measures perceptions of the quality of public services and their degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government;	
Regulatory Quality	measures perceptions of the government's ability to formulate and implement stable policies and regulations conducive to private sector development;	
Rule of Law	measures perceptions of levels of trust and compliance with the rule of law, in particular contract enforcement, property rights, and the quality of justice;	
Control of Corruption	measures perceptions of the extent of all forms of corruption perpetrated by public authorities, as well as the 'capture' of the state by elites and private interests.	

Table 2. Correlation matrix

No	EXPLANATORY VARIABLE	1	2	3	4	5	6	7	8	9	10	11
1	Fiscal Rules Strenght Index	1										
2	daily 10-year bond yield	-0.5306*	1									
3	public debt	-0.0005	0.1468*	1								
4	deficit/surplus	0.3031*	-0.4334*	-0.3385*	1							
5	cyclically-adjusted budget balance	0.2975*	-0.3578*	-0.1163*	0.8492*	1						
6	Voice and Accountability	-0.1824*	0.0465	0.0973	0,0429	0.0858	1					
7	Political Stability and Absence of Violence/Terrorism	-0.1825*	0.0341	0.2330*	-0,0730	-0.0011	0.7851*	1				
8	Government Effectiveness	-0.0833	0.0071	0.1231*	-0,0454	-0.0395	0.7126*	0.8334*	1			
9	Regulatory Quality	-0.0905	0.0537	0.1503*	-0,0662	-0.0389	0.6945*	0.7549*	0.9200*	1		
10	Rule of Law	-0.1177*	0.0827	0.1816*	-0.1066*	-0.0823	0.7711*	0.8113*	0.9366*	0.9265*	1	
11	Control of Corruption	-0.0881	0.0512	0.1547*	-0.0953	-0.0706	0.7609*	0.8522*	0.9165*	0.8478*	0.9185*	1

Notes: * Significant at 5%

Source: Author's own calculations

the spread of these assets, the higher the public debt servicing costs.

Higher government gross debt (*public debt*) and higher actual budget balance (*deficit/surplus*) are related to higher public debt servicing costs. The estimation results of model (2) indicate that higher political stability and absence of violence are accompanied by lower public debt servicing costs. Only for one of the Worldwide Governance Indicators – *Political Stability and Absence of Violence/Terrorism* – are there grounds to verify hypothesis **H1c**. The results of the model estimation are not statistically significant for the other WGI.

4. Conclusions

The research has found that strong numerical fiscal rules improve the effectiveness of public debt

management in EU Member States. The changes in the design of the fiscal rules, implemented as part of the overhaul of the EU fiscal surveillance system following the global economic and financial crisis of 2008–2010, have enhanced to their effectiveness in shaping sound public finances. Numerical fiscal rules are the institutional tools that have a multifaceted impact on the effectiveness of public debt management through factors such as the quality of fiscal policy, the solvency of public finances and the quality of institutional governance. The research has also found that stable fiscal policy, higher solvency of public finances and political stability and the absence of violence, as a dimension of institutional governance, are conducive to lower public debt servicing costs.

The effectiveness of the second-generation numerical fiscal rules has also been tested during the COVID-19 pandemic. Although these rules were not able to prevent a significant increase in public debt in EU Member States, this was not due to the unreliability

Table 3. GMM model estimation results

EXPLANATORY VARIABLE	one step GMM		two step GMM		one step GMM		one step GMM	
	debt interest		debt interest		debt interest		debt interest	
	Coefficient		Coefficient		Coefficient		Coefficient	
	(Std. err.)		(Std. err.)		(Std. err.)		(Std. err.)	
L1.debt interest	0.9308 (0.0386)	***	0.7037 (0.0617)	***	0.7673 (0.0542)	***	0.6979 (0.0614)	***
L2.debt interest	-0.1566 (0.0309)	***	-0.1315 (0.0443)	***	-0.1401 (0.0409)	***	-0.1491 (0.0446)	***
Fiscal Rules Strenght Index	-0.1560 (0.0214)	***	-0.1387 (0.0429)	***	-0.1177 (0.0381)	***	-0.1328 (0.0427)	***
cyclically-adjusted budget balance			-0.0060 (0.0077)		-0.0378 (0.0146)	**	-0.0410 (0.0160)	**
daily 10-year bond yield			0.0656 (0.0085)	***	0.0688 (0.0081)	***	0.0679 (0.0085)	***
public debt			0.0159 (0.0026)	***	0.0154 (0.0024)	***	0.0182 (0.0027)	***
deficit/surplus					0.0350 (0.0132)	***	0.0371 (0.0147)	***
bond spread	0.0553 (0.0066)	***						
time effects	YES		YES		YES		YES	
country effects	YES		YES		YES		YES	
WORLDWIDE GOVERNANCE INDICATORS:								
Voice and Accountability			0.0018 (0.0053)				0.0016 (0.0053)	
Political Stability and Absence of Violence/ Terrorism			-0.0063 (0.0032)	**			-0.0050 (0.0032)	
Government Effectiveness			-0.0053 (0.0050)				-0.0049 (0.0050)	
Regulatory Quality			0.0034 (0.0044)				0.0039 (0.0043)	
Rule of Law			0.0050 (0.0055)				0.0072 (0.0055)	
Control of Corruption			0.0037 (0.0040)				0.0026 (0.0040)	
_cons	0.4305497 0.0559336	***	46.40693 22.35035	**	7.103621 19.88599		29.67862 24.50822	
number of observations	314		286		314		286	
number of groups	27		27		27		27	
number of instruments	92		111		106		112	
Wald test	3339.07	***	4205.08	***	4632.3	***	4258.97	***
Sargan test	144.8554	0.0001	99.02662	0.0331	105.1826	0.0123	94.16071	0.0666
Arellano-Bond test AR(1)			-1.7885	0.0737				
Arellano-Bond test AR(2)			-0.9867	0.3238				

Notes: *** p < 0.01, ** p < 0.05, * p < 0.1. In parentheses: Standard error.

Source: Author's own calculations

Table 4. Description of the descriptive statistics

VARIABLE	Observations	Mean	Standard deviation	Minimum	Maximum
Fiscal Rules Strenght Index	378	0.7084127	0.9798401	-1.02	2.82
public debt	378	66.22778	37.75777	4.5	206.3
debt interest	378	1.956614	1.238837	0	7.7
deficit/surplus	378	-3.066138	3.707325	-32.1	4.2
cyclically-adjusted budget balance	378	-2.365608	3.167287	-30.8	6.2
daily 10-year bond yield	366	2.855295	3.129125	-0.575	35.488
bond spread	366	1.758749	2.613217	-0.5189998	33.672
Voice and Accountability	350	51.98492	29.71663	4.830918	95.77465
Political Stability and Absence of Violence/ Terrorism	370	54.64296	29.54909	0.4716981	99.52607
Government Effectiveness	370	55.5651	28.28134	3.349282	98.55769
Regulatory Quality	370	56.19351	27.2911	3.349282	99.04306
Rule of Law	370	53.47647	28.92073	0.4694836	98.55769
Control of Corruption	370	55.74705	30.06113	0.4739336	96.20853

Source: Author's own calculations

of their design, but to the sharp downturn in the global economy. Nevertheless, the COVID-19 pandemic and the ongoing energy crisis may prompt further changes to strengthen the effectiveness of fiscal rules through the improvement of the enforcement mechanism and the monitoring of compliance by independent financial institutions.

Against the background of the above considerations, it can be concluded that strong numerical fiscal rules play an important role in shaping financial stability. By promoting responsible fiscal practices and strengthening the sustainability of public finances, fiscal rules set out a framework that not only allows for the effective management of public debt, but also supports the broader objectives of sustainable economic growth and stability in EU Member States.

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